RESOLUCION 737 - SUBTEL

Fecha de publicación: 9/3/2026

Información Comercial

Nombre comercial del equipo

Código	Descripción
929003151101	Philips Hue LG G95 E27 EU
929003151202	Philips Hue LG G125 E27 EU
929003151402	Philips Hue LG Triangle E27 EU
929003151501	Philips Hue LG ST72 E27 EU

Fabricante: Signify (China) Investment Co., Ltd.

Importador o representante en Chile: SIGNIFY CHILENA S.A.

Domicilio: *El Bosque Norte 0211, Las Condes - Santiago*

Correo electrónico de contacto: tomas.aragona@signify.com

Sitio Web: philips-hue.com/es-cl

Características técnicas

Tipo de equipo	Lámparas inteligentes
Marca	Hue
Modelo	*FAMILIA POR SIMILITUD – Modelos en información comercial.*
Módulo	Integrado en la placa.
Tecnología o modulación	GFSK (BT); DSSS, O-QPSK (Zigbee)
Frecuencias	2400-2483.5MHz
Ganancia de antena (dBi)	0.32 dBi
P.I.R.E. (EIRP)	9.16 dBm

*Por la presente, **Signify Chile**, en su carácter de importador de equipos de telecomunicaciones, declara bajo juramento que los modelos de productos que se detallan son técnicamente idénticos en lo que respecta a sus componentes de radiofrecuencia (RF), potencia de salida, tipo de antena y protocolos de comunicación.*

Se certifica que las diferencias entre los modelos son exclusivamente de carácter cosmético o funcionales no relacionadas con la interfaz inalámbrica. No se han realizado cambios en el hardware, software de radio o disposición de componentes que alteren los resultados presentados en el informe de ensayo de referencia.

Declaración de conformidad

"El equipo previamente individualizado cumple con las disposiciones establecidas en la Norma Técnica de Equipos de alcance reducido, aprobada por la resolución exenta N° 1.985, de 2017, de la Subsecretaría de Telecomunicaciones."

Firma del Importador/Responsable:

Nombre de quien firma: Tomás Aragona

Cargo: Representante Legal

DEKRA Testing and Certification (Shanghai) Ltd.
No.250, Jiangchangsan Road, Jing'an District, Shanghai, China
TEL: +86-21-6056 7666 / FAX: +86-21-6056 7555

Test report No:
6174543.52

TEST REPORT
Radio Spectrum Matters (RF)

Identification of item tested	LED lamp
Trademark	PHILIPS
Model and /or type reference	9290031511A, 9290031512A, 9290031514A, 9290031515A
Ratings	220-240 Vac, 50/60 Hz, 6.8W
Test Laboratory	DEKRA Testing and Certification (Shanghai) Ltd. No.250, Jiangchangsan Road, Jing'an District, Shanghai, China
Applicant´s name / address	Signify (China) Investment Co., Ltd. Building No.9, Lane 888, Tianlin Road, Minhang district, 200233 Shanghai, China
Test method requested, standard	ETSI EN 300 328 V2.2.2 (2019-07)
Verdict Summary	IN COMPLIANCE
Tested by (name / position & signature)	Kaiyuan Dai Test Engineer
Approved by (name / position & signature)	Zuyao Fan Project Manager
Date of issue	2024-01-09
Report template No	TRF_EN300328_RF V1.0

INDEX

page

COMPETENCES AND GUARANTEES

DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

GENERAL CONDITIONS

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA.
5. The information provided by the customer in this report may affect the validity of the results, the test lab is not responsible for it.
6. The test results presented in this report relate only to the object tested.
7. Samples undergoing test have been provided by: The client.

UNCERTAINTY

For all measurements where guidance for the calculation of the instrumentation uncertainty of a measurement is specified in a product standard, the measurement instrumentation uncertainty has been calculated and applied in accordance with these standards.

Uncertainties have been calculated according to the DEKRA internal document. The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%. Refer to the Annex 1 for furter information.

The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to calculate the uncertainty associated with the measurement result, unless the specification, standard or customer have special requirements.

ENVIRONMENTAL CONDITIONS

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Ambient temperature	15 °C – 35 °C
Relative Humidity air	30% - 60%
Atmospheric pressure	86 kPa – 106 kPa

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

POSSIBLE TEST CASE VERDICTS

Test case does not apply to test object	N/A
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not measured	N/M

DEFINITION OF SYMBOLS USED IN THIS TEST REPORT

☒ Indicates that the listed condition, standard or equipment is applicable for this report/test/EUT.				
☐ Indicates that the listed condition, standard or equipment is not applicable for this report/test/EUT.				
Decimal separator used in this report	☐	Comma (,)	☒	Point (.)

ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

EUT	:	Equipment Under Test
QP	:	Quasi-Peak
CAV	:	CISPR Average
AV	:	Average
SAC	:	Semi-Anechoic Chamber
OATS	:	Open Area Test Site
BW	:	Bandwidth
Cat	:	Receiver Category
DC		Duty Cycle
MU		Medium Utilization Factor
U_N	:	Nominal voltage
N/A	:	Not Applicable
N/M	:	Not Measured

DOCUMENT HISTORY

Report nr.	Date	Description
6174543.52	2024-01-09	First release.

DATA PROVIDED BY THE APPLICANT

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested", "Applicant´s name / address", “Ratings” and "Derived model(s)", "Antenna Gain").
2. Derived model not tested. These models have been declared by the applicant as being the same as the model under test.

DEKRA declines any responsibility with respect to the information provided by the applicant and that may affect the validity of results.

CONCLUSION, REMARKS AND COMMENTS

The equipment under test (EUT) does meet the requirements of the stated standard(s)/test(s).
This report shall not be reproduced, except in full, without the written approval.

The tests described in this report do not result in the right to use any approval mark as conferred by DEKRA. As far as the tests were based on certain specifications, these are mentioned in the report.

According to the declaration from manufacturer, all models are identical except for appearance and model name.

After review, all tests were carried out on the following model 9290031515A. The test results stated in this report are also representative for models which can be derived using model list given in Annex 4.

Amendment 1 report:

The report is issued to base on original test report Ref. No. 2231095R-RF-CE-P17V01 issued by DEKRA Testing and Certification (Suzhou) Co., Ltd. dated on 2022-05-24 including the following changes and additions, which were considered technical modifications:

- New model 9290031511A, 9290031512A, 9290031514A and 9290031515A were added to replace the original model 9290031511, 9290031512, 9290031514 and 9290031515

These new models are the same as original ones except only plastic reflector in original models while both plastic and glass reflectors exist in these new models.

After review, no additional tests were considered necessary. The test results stated in this report are also representative for models which can be derived using model list given in Annex 4.

1 GENERAL INFORMATION

1.1 General Description of the Item(s)

Description of the item.....:	LED lamp
Test model / type number.....:	9290031515A
Serial number .....:	N/A
Trademark.....:	PHILIPS
Manufacturer.....:	Signify (China) Investment Co., Ltd. Building No.9, Lane 888, Tianlin Road, Minhang district, 200233 Shanghai, China

Test model.....:	9290031515A						
Mode of Operation.....:	Bluetooth 5.0						
Physical Layer .....:	LE 1M, LE 2M, LE Coded (S=2), LE Coded (S=8)						
Data Rate.....:	1 Mbit/s, 2 Mbit/s, 500 Kbit/s, 125 Kbit/s						
Operating frequency range(s) – Tx.:	2400 – 2483.5 MHz						
Operating frequency range(s) – Rx :	2400 – 2483.5 MHz						
Type of Modulation .....:	GFSK						
Antenna Type .....:	PCB						
Antenna Gain.....:	0.32 dBi						
Number of channel .....:	40						
Operating Temperature Range.....:	-20 to 45 ℃						
Geo-location capability	Not Supported						
Rated power supply.....:	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☒	AC: 220 – 240 V, 50/60 Hz	☒	☐	☐	☒	☐
	☐	AC: 100 – 277 V, 50/60 Hz	☐	☐	☐	☐	☐
	☐	DC: 12 V, 24 V, 12 / 24 V					
	☐	Battery:					
Software version.....:	Not provided						
Hardware version.....:	Not provided						

Intended use of the Equipment Under Test (EUT)
The product is LED lamp and it uses Zigbee and Bluetooth technology.

No	Module/parts of test item	Type	Manufacturer
	N/A		

1.2 **Test data**

Location	DEKRA Testing and Certification (Suzhou) Co., Ltd.
Address	No.99 Hongye Rd., Suzhou Industrial Park, Suzhou, 215006, Jiangsu, China
Date of receipt of test item	2022-03-31
Date(s) of performance of tests	2022-04-01 to 2022-04-30

1.3 Channel List

Bluetooth 5.0 LE

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2404 MHz	02	2406 MHz	03	2408 MHz
04	2410 MHz	05	2412 MHz	06	2414 MHz	07	2416 MHz
08	2418 MHz	09	2420 MHz	10	2422 MHz	11	2424 MHz
12	2426 MHz	13	2428 MHz	14	2430 MHz	15	2432 MHz
16	2434 MHz	17	2436 MHz	18	2438 MHz	19	2440 MHz
20	2442 MHz	21	2444 MHz	22	2446 MHz	23	2448 MHz
24	2450 MHz	25	2452 MHz	26	2454 MHz	27	2456 MHz
28	2458 MHz	29	2460 MHz	30	2462 MHz	31	2464 MHz
32	2466 MHz	33	2468 MHz	34	2470 MHz	35	2472 MHz
36	2474 MHz	37	2476 MHz	38	2478 MHz	39	2480 MHz

2 DESCRIPTION OF TEST SETUP

2.1 Operating mode(s) used for tests

During the tests the following operating mode(s) has(have) been used.

Operating mode	Operating mode description
1	Transmit by LE_1Mbps
2	Transmit by LE_2Mbps
3	Transmit by LE_Coded S=2
4	Transmit by LE_Coded S=8
5	Receive by LE_1Mbps
6	Receive by LE_2Mbps
7	Receive by LE_Coded S=2
8	Receive by LE_Coded S=8
9	Normal operation
Supplemental information: ---	

2.2 Support / Auxiliary equipment / unit / software for the EUT

The EUT has been tested with the following auxiliary equipment / unit / software:

Auxiliary equipment / unit / software	Type / Version	Manufacturer	Supplied by
Notebook	Think pad L440	Lenovo	Adapter
Software	Type / Version	Manufacturer	Supplied by
Hueapprobtiontool	N/A	N/A	N/A
Supplemental information: ---			

3 VERDICT SUMMARY SECTION

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

3.1 Standards

Standard	Year	Description
ETSI EN 300 328 V2.2.2	2019-07	Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum

3.2 Deviation(s) from the Standard(s) / Test Specification(s)

The following deviation(s) was / were made from the published requirements of the listed standards:

No Deviation.

3.3 Overview of results

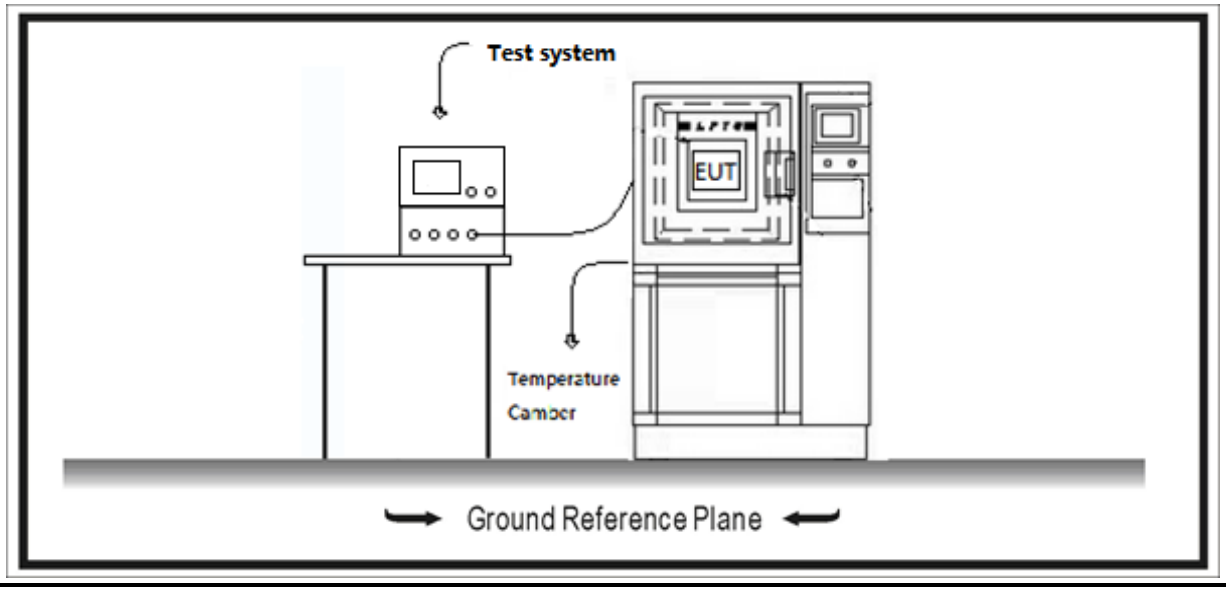
Test Item – ETSI EN 300 328 V2.2.2						
Performed Test Item	**Test Procedure**	**Adaptive**		**Non-Adaptive**		**Verdict**
		(≥10dBm)	**(<10dBm)**	**(≥10dBm)**	**(<10dBm)**	
RF Output Power	Claus 5.4.2	Yes	**Yes**	Yes	Yes	**PASS**
Power Spectral Density	Claus 5.4.3	Yes	**Yes**	Yes	Yes	**PASS**
Duty cycle, Tx-Sequence, Tx-gap	Claus 5.4.2	N/A	**N/A**	Yes	N/A	**N/A**
Medium Utilisation (MU) factor	Claus 5.4.2	N/A	**N/A**	Yes	N/A	**N/A**
Adaptivity	Claus 5.4.6	Yes	**N/A**	N/A	N/A	**N/A**
Occupied Channel Bandwidth	Claus 5.4.7	Yes	**Yes**	Yes	Yes	**PASS**
Transmitter unwanted emissions in the out-of-band domain	Claus 5.4.8	Yes	**Yes**	Yes	Yes	**PASS**
Transmitter unwanted emissions in the spurious domain	Claus 5.4.9	Yes	**Yes**	Yes	Yes	**PASS**
Receiver Spurious Emissions	Claus 5.4.10	Yes	**Yes**	Yes	Yes	**PASS**
Receiver Blocking	Claus 5.4.11	Yes	**Yes**	N/A	N/A	**PASS**
Geo-location capability	N/A	N/A	**N/A**	N/A	N/A	**N/A**
Supplementary information: 1) Geo-location capability should be implemented by manufacturer.						

4 TEST RESULT

4.1 **RF Output Power**	**VERDICT: PASS**

4.1.1 **Limit**	
Standard	ETSI EN 300 328 V2.2.2
☒	For adaptive equipment using wide band modulations other than FHSS
The maximum RF output power shall be 20 dBm.	
☐	For non-adaptive equipment using wide band modulations other than FHSS
The maximum RF output power for non-adaptive equipment shall be declared by the supplier and shall not exceed 20 dBm. See clause 5.4.1 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.	

4.1.2 **Test Setup**



4.1.3 **Test Procedure**			
References Rule		Chapter	Description
☒	ETSI EN 300 328 V2.2.2	5.4.2.2.1.2	RF Output Power
Step 1			
1, Use a fast power sensor with a minimum sensitivity of -40 dBm and capable of minimum 1 MS/s 2,Use the following settings: (1)Sample speed 1 MS/s or faster (2)The samples shall represent the RMS power of the signal. (3)Measurement duration: For non-adaptive equipment: equal to the observation period defined in clause 4.3.1.3.2 or clause 4.3.2.4.2. For adaptive equipment, the measurement duration shall be long enough to ensure a minimum number of bursts (at least 10) are captured. Note 1: For adaptive equipment, to increase the measurement accuracy, a higher number of bursts may be used.			

Step 2
1, For conducted measurements on devices with one transmit chain: (1), Connect the power sensor to the transmit port, sample the transmit signal and store the raw data. Use these stored samples in all following steps. 2,For conducted measurements on devices with multiple transmit chains: (1)Connect one power sensor to each transmit port for a synchronous measurement on all transmit ports. (2)Trigger the power sensors so that they start sampling at the same time. Make sure the time difference between the samples of all sensors is less than 500 ns. (3) For each individual sampling point (time domain), sum the coincident power samples of all ports and store them. Use these summed samples as the new stored data set.
Step 3
Find the start and stop times of each burst in the stored measurement samples. The start and stop times are defined as the points where the power is at least 30 dB below the highest value of the stored samples in step 2. NOTE 2: In case of insufficient dynamic range, the value of 30 dB may need to be reduced appropriately.
Step 4
Between the start and stop times of each individual burst calculate the RMS power over the burst using the formula below. The start and stop points shall be included. Save these Pburst values, as well as the start and stop times for each burst. $P_{burst} = \frac{1}{k}\sum_{n=1}^{k} P_{sample}(n)$ with 'k' being the total number of samples and 'n' the actual sample number
Step 5
The highest of all Pburst values (value "A" in dBm) will be used for maximum e.i.r.p. calculation
Step 6
1,Add the (stated) antenna assembly gain "G" in dBi of the individual antenna 2, In case of smart antenna systems operating in mode with beamforming (see clause 5.3.2.2.4), add the additional beamforming gain Y in dB.
If more than one antenna assembly is intended for this power setting, the maximum overall antenna gain (G or G + Y) shall be used. The RF Output Power (P) shall be calculated using the formula: P = A + G + Y This value, which shall comply with the limit given in clause 4.3.1.2.3 or clause 4.3.2.2.3, shall be recorded in the test report.

4.1.4 **Test Data**

Test Mode	Test Conditions	Frequency (MHz)	Measured Power (dBm)	EIRP (dBm)	Limit (dBm)
Mode1	Tnom (25℃)	2402	8.24	8.56	≦20
		2440	8.56	8.88	≦20
		2480	8.11	8.43	≦20
	Tmax (45℃)	2402	8.04	8.36	≦20
		2440	8.31	8.63	≦20
		2480	7.84	8.16	≦20
	Tmin (-20℃)	2402	8.49	8.81	≦20
		2440	8.84	9.16	≦20
		2480	8.37	8.69	≦20
Mode2	Tnom (25℃)	2402	8.31	8.63	≦20
		2440	8.56	8.88	≦20
		2480	8.19	8.51	≦20
	Tmax (45℃)	2402	8.07	8.39	≦20
		2440	8.28	8.6	≦20
		2480	7.91	8.23	≦20
	Tmin (-20℃)	2402	8.56	8.88	≦20
		2440	8.81	9.13	≦20
		2480	8.41	8.73	≦20
Mode3	Tnom (25℃)	2402	8.21	8.53	≦20
		2440	8.53	8.85	≦20
		2480	8.12	8.44	≦20
	Tmax (45℃)	2402	7.96	8.28	≦20
		2440	8.33	8.65	≦20
		2480	7.96	8.28	≦20
	Tmin (-20℃)	2402	8.47	8.79	≦20
		2440	8.82	9.14	≦20
		2480	8.37	8.69	≦20
Mode4	Tnom (25℃)	2402	8.25	8.57	≦20
		2440	8.56	8.88	≦20
		2480	8.14	8.46	≦20
	Tmax (45℃)	2402	7.98	8.3	≦20
		2440	8.34	8.66	≦20
		2480	7.97	8.29	≦20
	Tmin (-20℃)	2402	8.51	8.83	≦20
		2440	8.84	9.16	≦20
		2480	8.36	8.68	≦20

Note 1: EIRP=Measured power+Antenna gain.

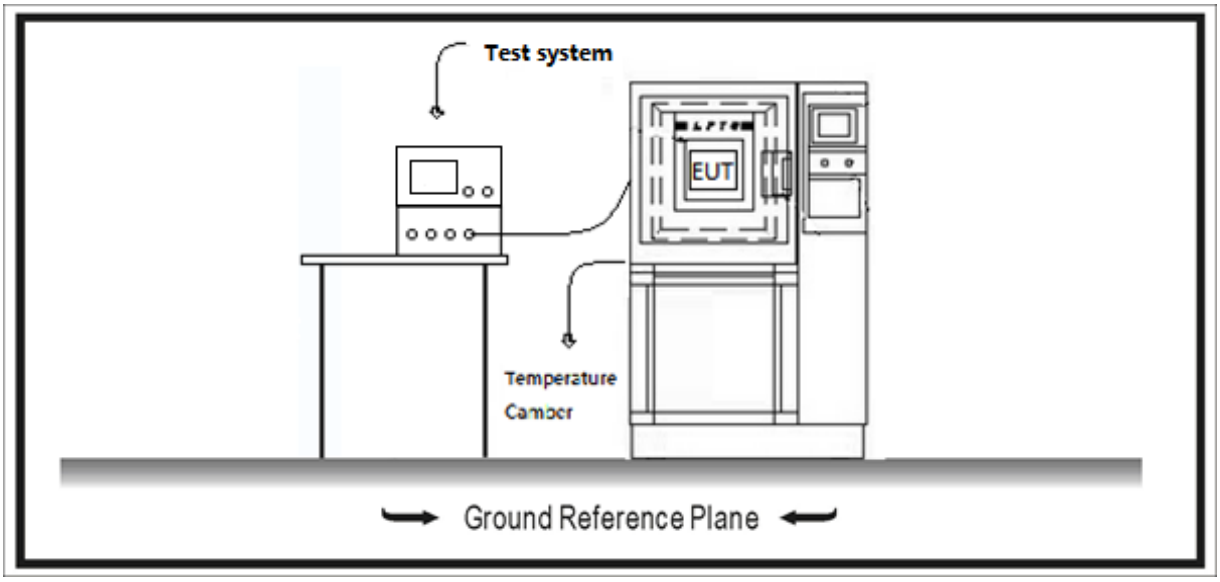
Note 2: The antenna gain please refer to clause 1.2.

Note 3: Only the EIRP of higher gain antenna is showed in the report.

4.2 **Power Spectral Density**	**VERDICT: PASS**

4.2.1 **Limit**	
Standard	ETSI EN 300 328 V2.2.2
The maximum Power Spectral Density is limited to 10dBm per MHz.	

4.2.2 **Test Setup**



4.2.3 **Test Procedure**

	References Rule		Chapter	Description
☒	ETSI EN 300 328 V2.2.2		5.4.3.2.1	Power Spectral Density
	☒	Option 1:	For equipment with continuous and non-continuous transmissions	
	☐	Option 2:	For equipment with continuous transmission capability or for equipment operating with a constant duty cycle	

Step 1

1, Connect the UUT to the spectrum analyzer and use the following settings:

Start Frequency: 2 400 MHz Stop Frequency: 2 483,5 MHz

Resolution BW: 10 kHz Video BW: 30 kHz

Sweep Points: > 8 350

NOTE: For spectrum analyzers not supporting this number of sweep points, the frequency band may be segmented.

Detector: RMS Trace Mode: Max Hold

Sweep time: 10 s; the sweep time may be increased further until a value where the sweep time

has no impact on the RMS value of the signal

For non-continuous signals, wait for the trace to stabilize.

Save the data (trace data) set to a file.

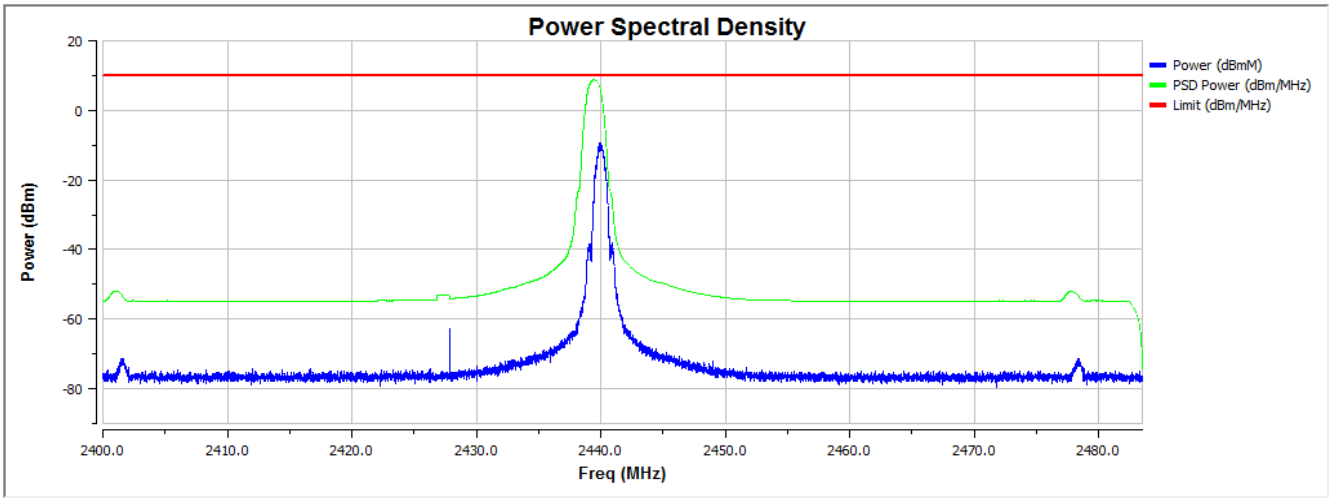
Step 2
For conducted measurements on smart antenna systems using either operating mode 2 or operating mode 3 (see clause 5.3.2.2), repeat the measurement for each of the transmit ports. For each sampling point, add up the coincident power values (in mW) for the different transmit chains and use this as the new data set.
Step 3
Add up the values for power for all the samples in the file using the formula below. $P_{Sum} = \sum_{n=1}^{k} P_{sample}(n)$ with 'k' being the total number of samples and 'n' the actual sample number
Step 4
Normalize the individual values for power (in dBm) so that the sum is equal to the RF Output Power (e.i.r.p.) measured in clause 5.4.2 and save the corrected data. The following formulas can be used: $C_{corr}=P_{sum}-P_{e.r.i.p.}$ $P_{samplecorr}(n)=P_{sample}(n)-C_{corr}$ with 'n' being the actual sample number
Step 5
Starting from the first sample $P_{Samplecorr}(n)$ (lowest frequency), add up the power (in mW) of the following samples representing a 1 MHz segment and record the results for power and position (i.e. sample #1 to sample #100). This is the Power Spectral Density (e.i.r.p.) for the first 1 MHz segment which shall be recorded.
Step 6
Shift the start point of the samples added up in step 5 by one sample and repeat the procedure in step 5 (i.e. sample #2 to sample #101).
Step 7
Repeat step 6 until the end of the data set and record the Power Spectral Density values for each of the 1 MHz segments. From all the recorded results, the highest value is the maximum Power Spectral Density for the UUT. This value, which shall comply with the limit given in clause 4.3.2.3.3, shall be recorded in the test report.

4.2.4 **Test Data**

Test Mode	Test Conditions	Frequency (MHz)	Power Spectral Density (dBm/MHz)	Limit (dBm)
Mode1	Tnom (25℃)	2402	8.49	≦10
		2440	8.82	≦10
		2480	8.36	≦10
Mode2	Tnom (25℃)	2402	7.29	≦10
		2440	7.56	≦10
		2480	7.11	≦10
Mode3	Tnom (25℃)	2402	8.41	≦10
		2440	8.74	≦10
		2480	8.33	≦10
Mode4	Tnom (25℃)	2402	8.45	≦10
		2440	8.76	≦10
		2480	8.35	≦10

Note 1: The worst data plot as below:

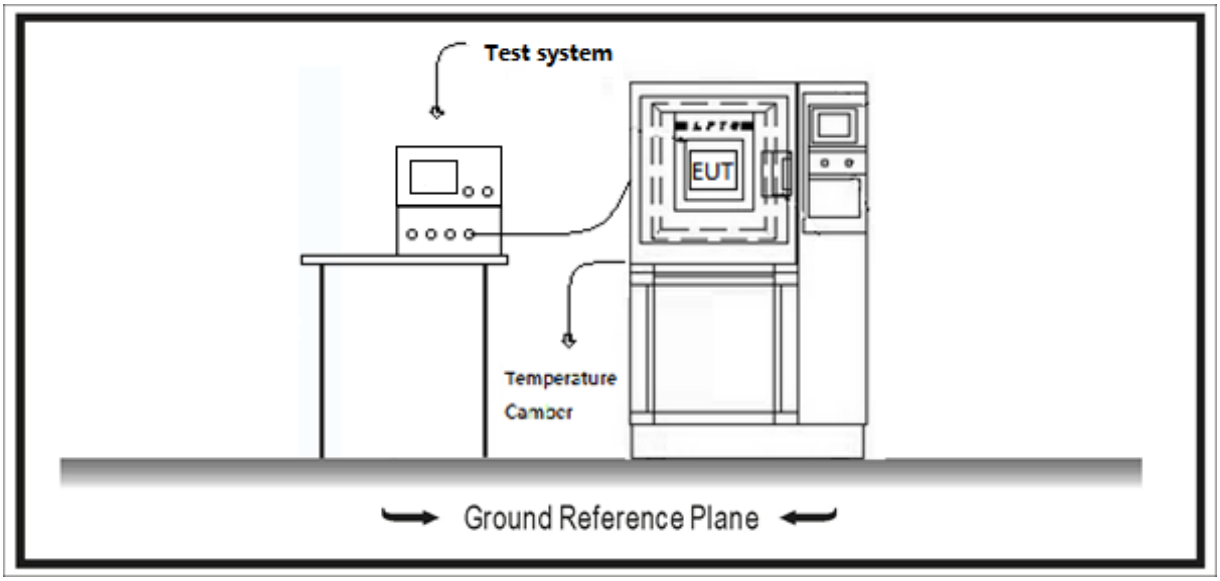
Mode1/CH19/2440MHz



4.3 **Duty Cycle, Tx-sequence, Tx-gap**	**VERDICT: N/A**

4.3.1 **Limit**	
Standard	ETSI EN 300 328 V2.2.2
☒	For adaptive equipment using wide band modulations other than FHSS / For non-adaptive equipment using wide band modulations other than FHSS and EIRP lower than 10dBm.
N/A	
☐	For non-adaptive equipment using wide band modulations other than FHSS and EIRP higher than 10dBm.
1,The Duty Cycle shall be equal to or less than the maximum value declared by the supplier. 2,The maximum Tx-sequence Time and the minimum Tx-gap Time shall be according to the formula below: 3,Maximum Tx-Sequence Time = Minimum Tx-gap Time = M where M is in the range of 3,5 ms to 10 ms.	

4.3.2 **Test Setup**



4.3.3 **Test Procedure**			
References Rule		Chapter	Description
☒	ETSI EN 300 328 V2.2.2	5.4.2.2.1.3	Duty Cycle, Tx-sequence, Tx-gap
Step 1			
1, Use the same stored measurement samples from the procedure described in clause 5.4.2.2.1.2. 2, The start and stop times are defined as the points where the power is at least 30 dB below the highest value of the stored samples. In case of insufficient dynamic range, the value of 30 dB may need to be reduced appropriately.			
Step 2			
Between the saved start and stop times of each individual burst, calculate the TxOn time. Save these TxOn values.			

Step 3
Duty Cycle is the sum of all TxOn times between the end of the first gap (which is the start of the first burst within the observation period) and the start of the last burst (within this observation period) divided by the observation period. The observation period is defined in clause 4.3.1.3.2 or clause 4.3.2.4.2.
Step 4
1, For FHSS equipment using blacklisting, the TxOn time measured for a single (and active) hopping frequency shall be multiplied by the number of blacklisted frequencies. This value shall be added to the sum calculated in step 3 above. If the number of blacklisted frequencies cannot be determined, the minimum number of hopping frequencies (N) as defined in clause 4.3.1.4.3 shall be assumed 2, The calculated value for Duty Cycle (DC) shall be recorded in the test report. This value shall be equal to or less than the maximum value declared by the manufacturer
Step 5
1, Use the same stored measurement samples from the procedure described in clause 5.4.2.2.1.2. 2, Identify any TxOff time that is equal to or greater than the minimum Tx-gap time as defined in clause 4.3.1.3.3 or clause 4.3.2.4.3. These are the potential valid gap times to be further considered in this procedure. 3, Starting from the second identified gap, calculate the time from the start of this gap to the end of the preceding gap. This time is the Tx-sequence time for this transmission. Repeat this procedure until the last identified gap within the observation period is reached. 4, A combination of consecutive Tx-sequence times and Tx-gap times followed by a Tx-gap time, which is at least as long as the duration of this combination, may be considered as a single Tx-sequence time and in which case it shall comply with the limits defined in clause 4.3.1.3.3 or clause 4.3.2.4.3. 5, It shall be noted in the test report whether the UUT complies with the limits for the maximum Tx-sequence time and minimum Tx-gap time as defined in clause 4.3.1.3.3 or clause 4.3.2.4.3.

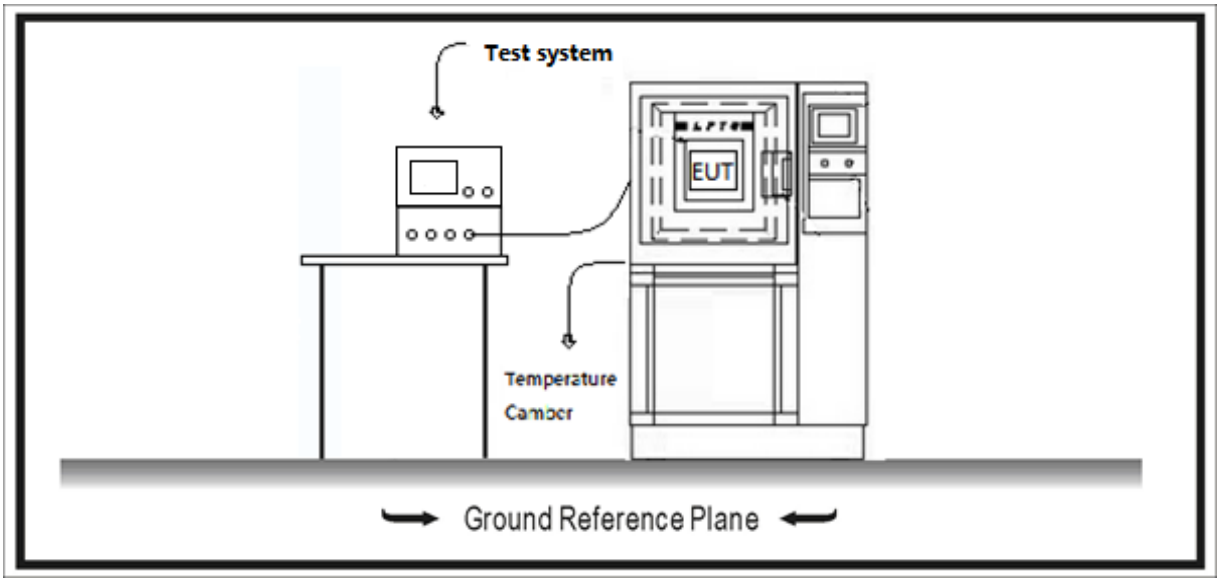
4.3.4 **Test Data**

Applicability requirement:
These requirements apply to non-adaptive equipment or to adaptive equipment when operating in a non-adaptive mode.The equipment is using wide band modulations other than FHSS.
These requirements do not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.
Applicability judgment: Not Application

4.4 **Medium Utilisation (MU) factor**	**VERDICT: N/A**

4.4.1 **Limit**	
Standard	ETSI EN 300 328 V2.2.2
☒	For adaptive equipment using wide band modulations other than FHSS / For non-adaptive equipment using wide band modulations other than FHSS and EIRP lower than 10dBm.
N/A	
☐	For non-adaptive equipment using wide band modulations other than FHSS and EIRP higher than 10dBm.
the maximum Medium Utilisation factor shall be 10 %.	

4.4.2 **Test Setup**



4.4.3 **Test Procedure**			
References Rule		Chapter	Description
☒	ETSI EN 300 328 V2.2.2	5.4.2.2.1.4	Medium Utilisation (MU) factor
Step 1			
Use the same stored measurement samples from the procedure described in clause 5.3.2.2.1.2.			
Step 2			
For each burst calculate the product of (P_{burst} / 100 mW) and the Tx_{On} time. P_{burst} is expressed in mW. TxOn time is expressed in ms.			
Step 3			
Medium Utilization is the sum of all these products divided by the observation period (expressed in ms) which is defined in clause 4.3.1.3.2 or clause 4.3.2.4.2. This value, which shall comply with the limit given in clause 4.3.1.6.3 or clause 4.3.2.5.3, shall be recorded in the test report. If, in case of FHSS equipment, operation without blacklisted frequencies is not possible, the power of the bursts on blacklisted hopping frequencies (for the calculation of the Medium Utilization) is assumed to be equal to the average value of the RMS power of the bursts on all active hopping frequencies.			

4.4.4 **Test Data**

Applicability requirement:

These requirements apply to non-adaptive equipment or to adaptive equipment when operating in a non-adaptive mode.The equipment is using wide band modulations other than FHSS.

These requirements do not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

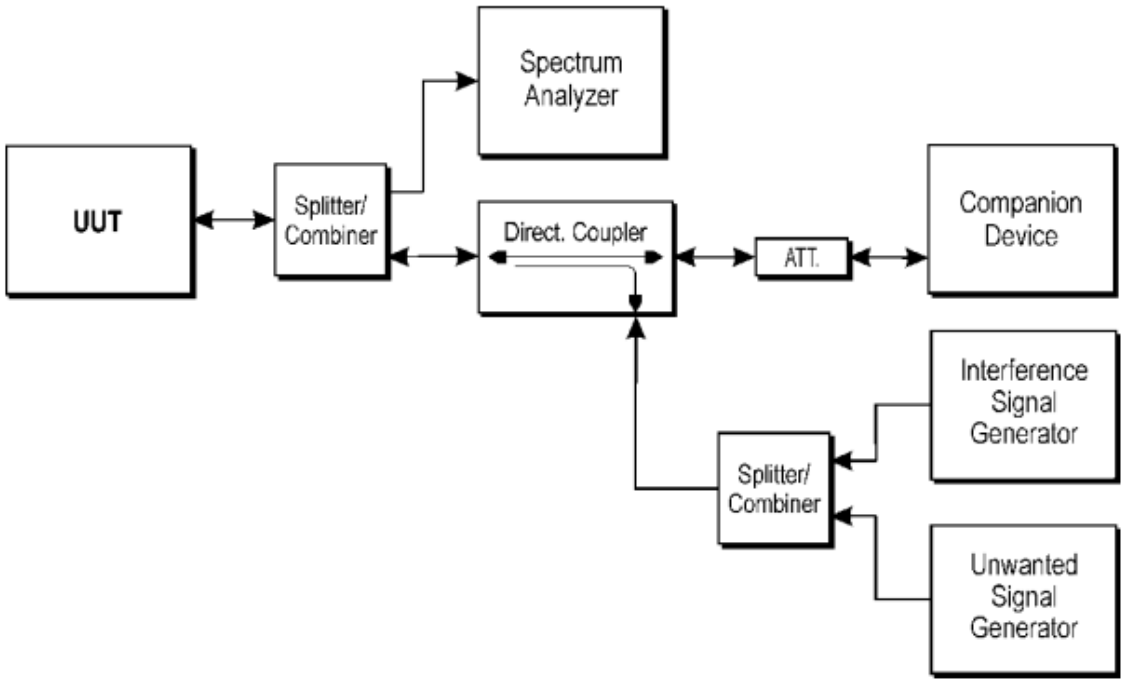
Applicability judgment: Not Application

4.5 **Adaptivity**	**VERDICT: N/A**

4.5.1 **Limit**	
Standard	ETSI EN 300 328 V2.2.2

☐	For adaptive equipment using wide band modulations other than FHSS	
	☐	Non-LBT based Detect and Avoid
		(1) 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; (2) COT ≤ 40 ms; (3) Idle Period shall be minimum 5% of COT with a minimum of 100μs; (4) Detection threshold level =-70 dBm/MHz + 10 × $\log_{10}$ (100 mW / P_{out}) (Pout in mW e.i.r.p.); (5) To verify that the UUT is not resuming normal transmissions as long as the interference and blocking signals are present, the monitoring time may need to be 60 s or more.
	☐	LBT based Detect and Avoid(Frame Based Equipment)
		(1) The CCA observation time shall be not less than 18μs; (2) The CCA time used by the equipment shall be declared by the supplier; (3) COT = 1-10 ms; (4) Idle Period = 5% of COT; (5) Detection threshold level =-70 dBm/MHz + 10 × $\log_{10}$ (100 mW / P_{out}) (Pout in mW e.i.r.p.); (6) To verify that the UUT is not resuming normal transmissions as long as the interference and blocking signals are present, the monitoring time may need to be 60 s or more.
	☐	LBT based Detect and Avoid(Load Based Equipment)
		(1) The CCA observation time shall be not less than 18μs; (2) Extended CCA time shall be between 18μs and 160μs; (3) COT ≤ 13ms; (4) Detection threshold level =-70 dBm/MHz + 10 × $\log_{10}$ (100 mW / P_{out}) (Pout in mW e.i.r.p.); (5) To verify that the UUT is not resuming normal transmissions as long as the interference and blocking signals are present, the monitoring time may need to be 60 s or more.
	☐	Short Control Signalling Transmissions:
		Short Control Signalling Transmissions of adaptive non-FHSS equipment shall have a maximum Tx_{On} / (Tx_{On} + Tx_{Off}) ratio of 10 % within any observation period of 50 ms.
	☐	Unwanted Signal
		Single power≥-35dBm

4.5.2 **Test Setup**



4.5.3 **Test Procedure**			
References Rule		Chapter	Description
☒	ETSI EN 300 328 V2.2.2	5.4.6.2.1.3	Adaptivity

The different steps below define the procedure to verify the efficiency of the LBT based adaptive mechanism of equipment using wide band modulations other than FHSS. This method can be applied on Load Based Equipment and Frame Based Equipment.

For systems using multiple receive chains only one chain (antenna port) need to be tested. All other receiver inputs shall be terminated.

Step 1

1, The UUT shall connect to a companion device during the test. The interference signal generator, the unwanted signal generator, the spectrum analyser, the UUT and the companion device are connected using a set-up equivalent to the example given by figure 5 although the interference and unwanted signal generator do not generate any signals at this point in time. The spectrum analyser is used to monitor the transmissions of both the UUT and the companion device and it should be possible to distinguish between either transmission. In addition, the spectrum analyser is used to monitor the transmissions of the UUT in response to the interfering and the unwanted signals.

2, Adjust the received signal level (wanted signal from the companion device) at the UUT to the value defined in table 10 (clause 4.3.2.6.3.2.2) for Frame Based Equipment or in table 11 (clause 4.3.2.6.3.2.3) for Load Based Equipment.

NOTE 1: Testing of Unidirectional equipment does not require a link to be established with a companion device.

3, The analyzer shall be set as follows:

(1)RBW: ≥ Occupied Channel Bandwidth (if the analyzer does not support this setting, the highest available setting shall be used)

(2)VBW: 3 × RBW (if the analyzer does not support this setting, the highest available setting shall be used)

(3)Detector Mode: RMS

(4)Centre Frequency: Equal to the centre frequency of the operating channel

(5)Span: 0 Hz

(6)Sweep time: > maximum Channel Occupancy Time

(7)Trace Mode: Clear Write

(8)Trigger Mode: Video

Step 2

1, Configure the UUT for normal transmissions with a sufficiently high payload resulting in a minimum transmitter activity ratio (TxOn / (TxOn + TxOff)) of 0,3. Where this is not possible, the UUT shall be configured to the maximum payload possible.

2, For Frame Based Equipment, using the procedure defined in clause 5.4.7.2.1.4, it shall be verified that the UUT complies with the maximum Channel Occupancy Time and minimum Idle Period defined in clause 4.3.2.6.3.2.2 step 3). When measuring the Idle Period of the UUT, only transmissions from the UUT shall be considered.

3, For Load Based equipment, using the procedure defined in clause 5.4.6.2.1.5, it shall be verified that the UUT complies with the maximum Channel Occupancy Time and minimum Idle Period defined in clause 4.3.2.6.3.2.3, step 2 and step 3. When measuring the Idle Period of the UUT, only transmissions from the UUT shall be considered.

NOTE 2: For the purpose of testing Load Based Equipment referred to in the first paragraph of clause 4.3.2.6.3.2.3 (IEEE 802.11™ [i.3] or IEEE 802.15.4™ [i.4] equipment), the limits to be applied for the minimum Idle Period and the maximum Channel Occupancy Time are the same as defined for other types of Load Based Equipment (see clause 4.3.2.6.3.2.3 step 2) and step 3). The Idle Period is considered to be equal to the CCA or Extended CCA

time defined in clause 4.3.2.6.3.2.3 step 1) and step 2).
Step 3: Adding the interference signal
An interference signal as defined in clause B.6 is injected on the current operating channel of the UUT. The power spectral density level (at the input of the UUT) of this interference signal shall be equal to the detection threshold defined in clause 4.3.2.6.3.2.2 step 5) (frame based equipment) or clause 4.3.2.6.3.2.3 step 5) (load based equipment).
Step 4: Verification of reaction to the interference signal
1, The spectrum analyzer shall be used to monitor the transmissions of the UUT on the selected operating channel with the interfering signal injected. This may require the spectrum analyzer sweep to be triggered by the start of the interfering signal. 2,Using the procedure defined in clause 5.4.7.2.1.4, it shall be verified that: i) The UUT shall stop transmissions on the current operating channel. NOTE 3: The UUT is assumed to stop transmissions within a period equal to the maximum Channel Occupancy Time defined in clause 4.3.2.6.3.2.2 (frame based equipment) or clause 4.3.2.6.3.2.3 (load based equipment). ii) Apart from Short Control Signalling Transmissions, there shall be no subsequent transmissions while the interfering signal is present. NOTE 4: To verify that the UUT is not resuming normal transmissions as long as the interference signal is present, the monitoring time may need to be 60 s or more. iii) The UUT may continue to have Short Control Signalling Transmissions on the operating channel while the interfering signal is present. These transmissions shall comply with the limits defined in clause 4.3.2.6.4.2. NOTE 5: The verification of the Short Control Signalling transmissions may require the analyzer settings to be changed (e.g. sweep time). iv) Alternatively, the equipment may switch to a non-adaptive mode.
Step 5: Adding the unwanted CW signal
1, With the interfering signal present, a 100 % duty cycle CW signal is inserted as the unwanted signal. The frequency and the level are provided in table 10 (clause 4.3.2.6.3.2.2) for Frame Based Equipment or in table 11 (clause 4.3.2.6.3.2.3) for Load Based Equipment. 2, The spectrum analyzer shall be used to monitor the transmissions of the UUT on the selected operating 3,Using the procedure defined in clause 5.4.7.2.1.4, it shall be verified that: i) The UUT shall not resume normal transmissions on the current operating channel as long as both the interference and blocking signals remain present. NOTE 6: To verify that the UUT is not resuming normal transmissions as long as the interference and blocking signals are present, the monitoring time may need to be 60 s or more. ii) The UUT may continue to have Short Control Signalling Transmissions on the operating channel while the interfering and blocking signals are present. These transmissions shall comply with the limits defined in clause 4.3.2.6.4.2. NOTE 7: The verification of the Short Control Signalling transmissions may require the analyzer settings to be changed (e.g. sweep time).
Step 6: Removing the interference and unwanted signal
On removal of the interference and unwanted signal the UUT is allowed to start transmissions again on this channel however this is not a requirement and therefore does not require testing.
Step 7: Removing the interference and unwanted signal
Step 2 to step 6 shall be repeated for each of the frequencies to be tested.

4.5.4 **Test Data**

Applicability requirement:

This requirement does not apply to non-adaptive non-FHSS equipment or adaptive non-FHSS equipment operating in a non-adaptive mode.

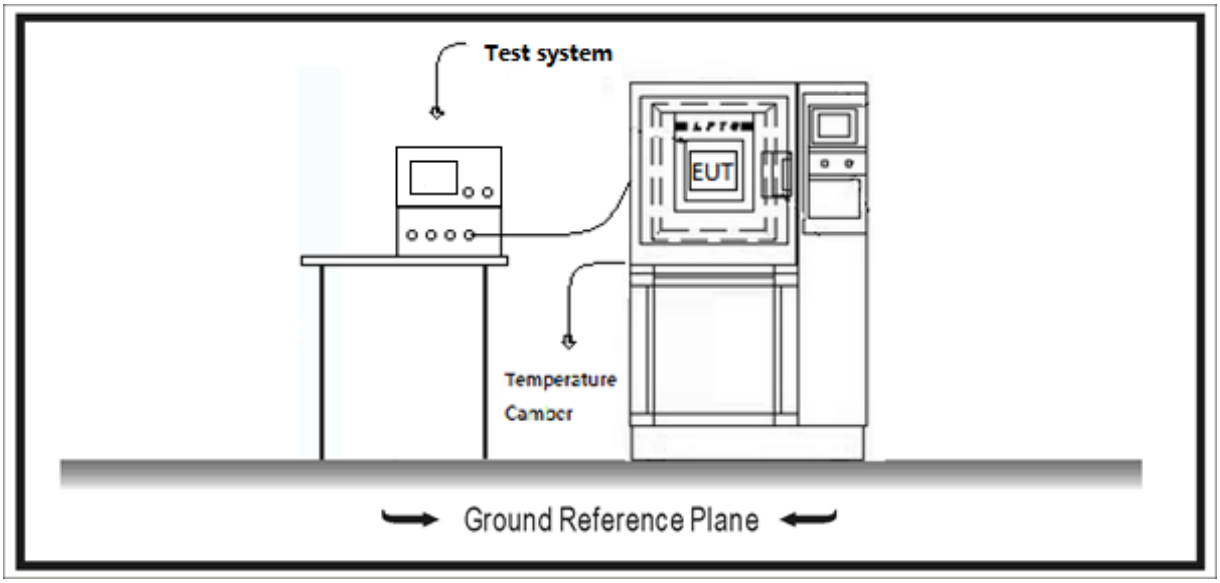
In addition, this requirement does not apply for non-FHSS equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for non-FHSS equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

Applicability judgment: Not Application

4.6 **Occupied Channel Bandwidth**	**VERDICT: PASS**

4.6.1 **Limit**	
Standard	ETSI EN 300 328 V2.2.2
☒	For adaptive equipment using wide band modulations other than FHSS
The Occupied Channel Bandwidth shall fall completely within the band given in 2.4GHz to 2.4835GHz.	
☐	For non-adaptive equipment using wide band modulations other than FHSS
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.	

4.6.2 **Test Setup**



4.6.3 **Test Procedure**

References Rule		Chapter	Description
☒	ETSI EN 300 328 V2.2.2	5.4.7.2.1	Occupied Channel Bandwidth

Step 1

1, Connect the UUT to the spectrum analyzer and use the following settings
(1),Centre Frequency: The centre frequency of the channel under test
(2),Resolution BW: ~ 1 % of the span without going below 1 %
(3),Video BW: 3 × RBW
(4),Frequency Span : 2 × Nominal Channel Bandwidth
(5), Detector Mode: RMS
(6), Trace Mode: Max Hold
(7), Sweep time: 1 s

Step 2

Wait for the trace to stabilize.
Find the peak value of the trace and place the analyzer marker on this peak.

Step 3

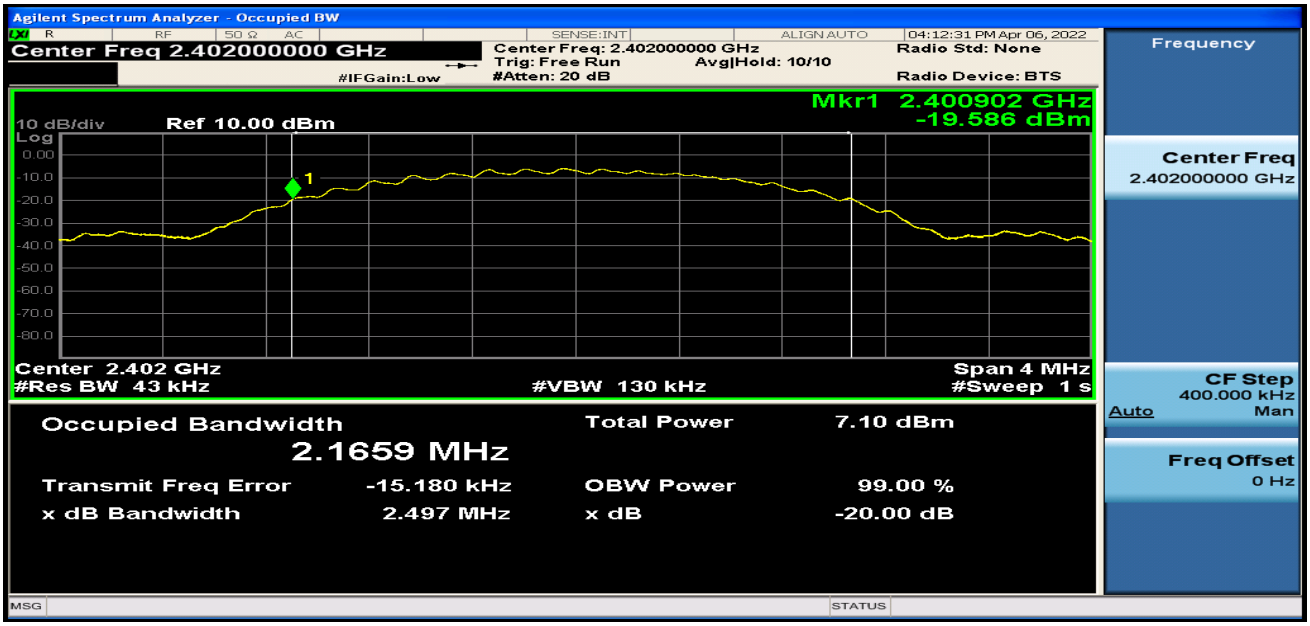
Use the 99 % bandwidth function of the spectrum analyzer to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.
NOTE: Make sure that the power envelope is sufficiently above the noise floor of the analyzer to avoid the noise signals left and right from the power envelope being taken into account by this measurement.

4.6.4 **Test Data**

Test Mode	Frequency (MHz)	99% Bandwidth (MHz)	Frequency near the operating band (MHz)	Limit (MHz)
Mode1	2402	1.068	2401.454	Within 2400-2483.5MHz
	2480	1.065	2480.517	Within 2400-2483.5MHz
Mode2	2402	2.166	2400.902	Within 2400-2483.5MHz
	2480	2.171	2481.067	Within 2400-2483.5MHz
Mode3	2402	1.131	2401.414	Within 2400-2483.5MHz
	2480	1.125	2480.540	Within 2400-2483.5MHz
Mode4	2402	1.126	2401.414	Within 2400-2483.5MHz
	2480	1.120	2480.536	Within 2400-2483.5MHz

Note 1: The worst data plot as below:

Mode2/CH00/2402MHz



4.7 **Transmitter unwanted emissions in the out-of-band domain**	**VERDICT: PASS**

4.7.1 Limit

Standard	ETSI EN 300 328 V2.2.2

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.

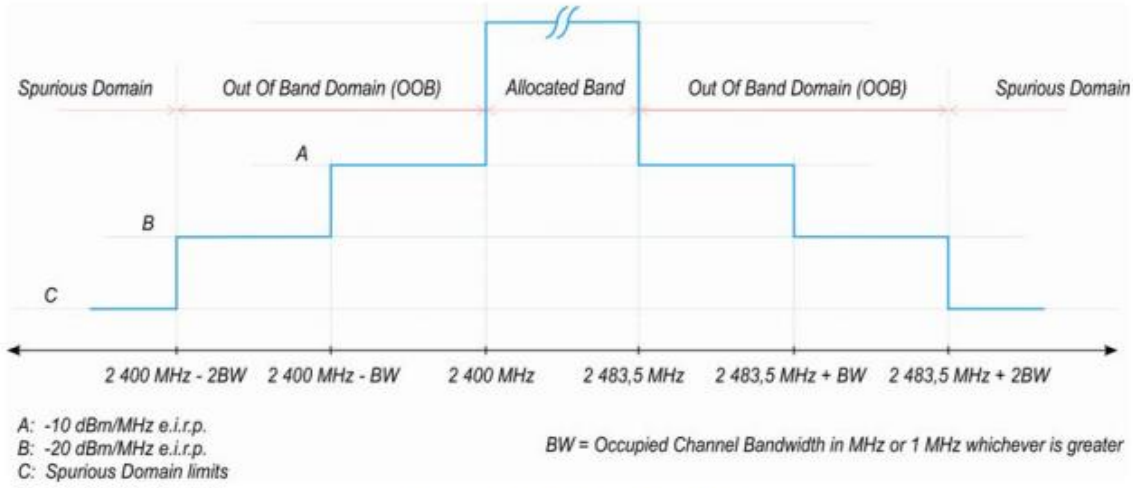
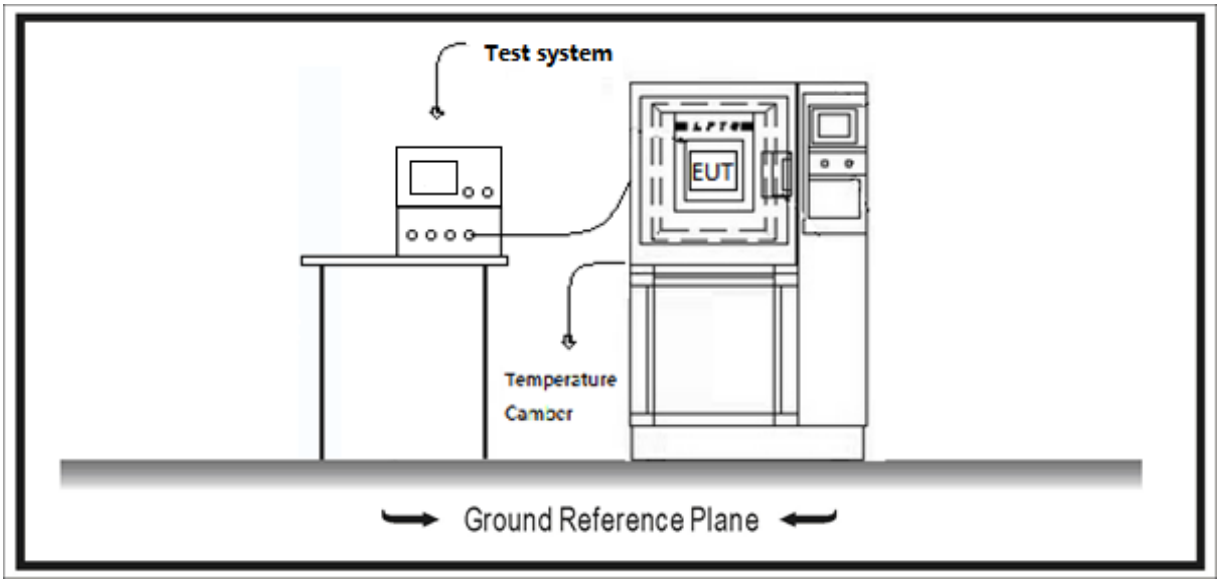


Figure 3: Transmit mask

4.7.2 Test Setup



4.7.3 **Test Setup**

	References Rule	Chapter	Description
☒	ETSI EN 300 328 V2.2.2	5.4.8.2.1	Transmitter unwanted emissions in the out-of-band domain

The applicable mask is defined by the measurement results from the tests performed under clause 5.4.7 (Occupied Channel Bandwidth).

The Out-of-band emissions within the different horizontal segments of the mask provided in figure 1 and figure 3 shall be measured using the procedure in step 1 to step 6 below. This method assumes the spectrum analyser is equipped with the Time Domain Power option

Step 1

1, Connect the UUT to the spectrum analyzer and use the following settings
(1), Centre Frequency: 2 484 MHz
(2), Span: 0 Hz
(3), Resolution BW: 1 MHz
(4), Video BW: 3 MHz
(5), Detector Mode: RMS
(6), Trace Mode: Max Hold
(7), Sweep Mode: Single Sweep
(8), Sweep Points: Sweep time [µs] / (1 µs) with a maximum of 30 000
(9), Trigger Mode: Video trigger
(10), Sweep Time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power

Step 2(segment 2 483,5 MHz to 2 483,5 MHz + BW):

1, Adjust the trigger level to select the transmissions with the highest power level.
2,For frequency hopping equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.
3,Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.
4,Select RMS power to be measured within the selected window and note the result which is the RMS power within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.
5,Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 3(segment 2 483,5 MHz + BW to 2 483,5 MHz + 2BW):

Change the centre frequency of the analyzer to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483,5 MHz + BW to 2 483,5 MHz + 2BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW - 0,5 MHz (which means this may partly overlap with theprevious 1 MHz segment).

Step 4 (segment 2 400 MHz - BW to 2 400 MHz):

Change the centre frequency of the analyzer to 2 399,5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 5 (segment 2 400 MHz - 2BW to 2 400 MHz - BW):
Change the centre frequency of the analyzer to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).
Step 6 (segment 2 400 MHz - 2BW to 2 400 MHz - BW):
1,In case of conducted measurements on equipment with a single transmit chain, the declared antenna assembly gain "G" in dBi shall be added to the results for each of the 1 MHz segments and compared with the limits provided by the mask given in figure 1 or figure 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered. 2,In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain "G" in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered. Comparison with the applicable limits shall be done using any of the options given below: (1),Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain "Y" in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figure 1 or figure 3. (2)Option 2: the limits provided by the mask given in figure 1 or figure 3 shall be reduced by 10 × log10(Ach) and the additional beamforming gain "Y" in dB. The results for each of the transmit chains shall be individually compared with these reduced limits. NOTE 2: Ach refers to the number of active transmit chains. It shall be recorded whether the equipment complies with the mask provided in figure 1 or figure 3.

4.7.4 **Test Data**

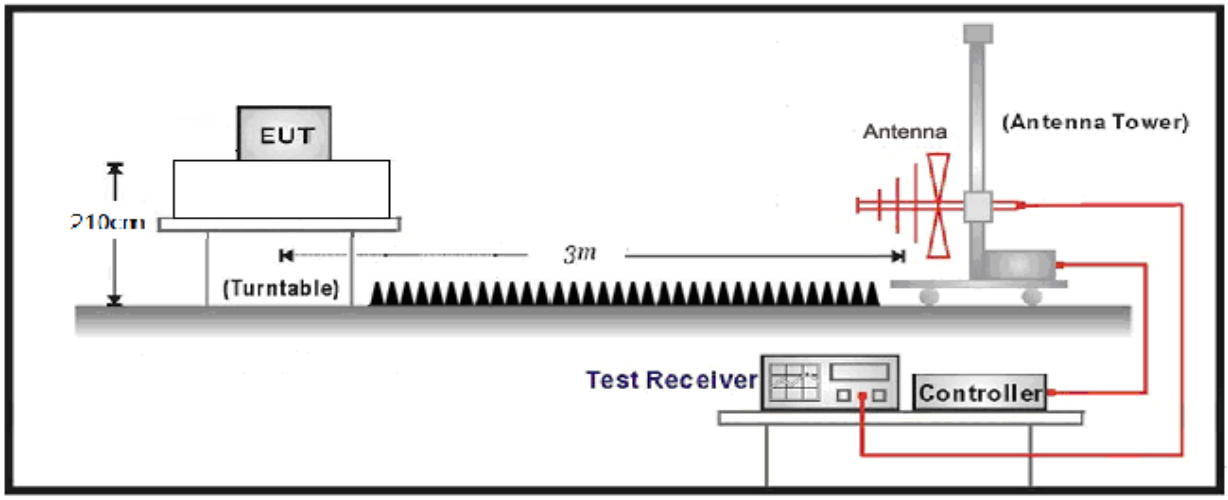
Test Mode	Frequency Range (MHz)	Measured Values (dBm/MHz)	Limit (dBm/MHz)
Mode1	2400–2BW~2400-BW	-42.49	≤ -20
	2400–BW~2400	-37.94	≤ -10
	2483.5~2483.5+BW	-42.64	≤ -10
	2483.5+BW~2483.5+2BW	-44.9	≤ -20
Mode2	2400–2BW~2400-BW	-42.08	≤ -20
	2400–BW~2400	-24.62	≤ -10
	2483.5~2483.5+BW	-39.25	≤ -10
	2483.5+BW~2483.5+2BW	-43.84	≤ -20
Mode3	2400–2BW~2400-BW	-42.38	≤ -20
	2400–BW~2400	-37.91	≤ -10
	2483.5~2483.5+BW	-42.66	≤ -10
	2483.5+BW~2483.5+2BW	-44.84	≤ -20
Mode4	2400–2BW~2400-BW	-37.92	≤ -20
	2400–BW~2400	-42.43	≤ -10
	2483.5~2483.5+BW	-42.61	≤ -10
	2483.5+BW~2483.5+2BW	-44.82	≤ -20

4.8 **Transmitter unwanted emissions in the spurious domain**	**VERDICT: PASS**

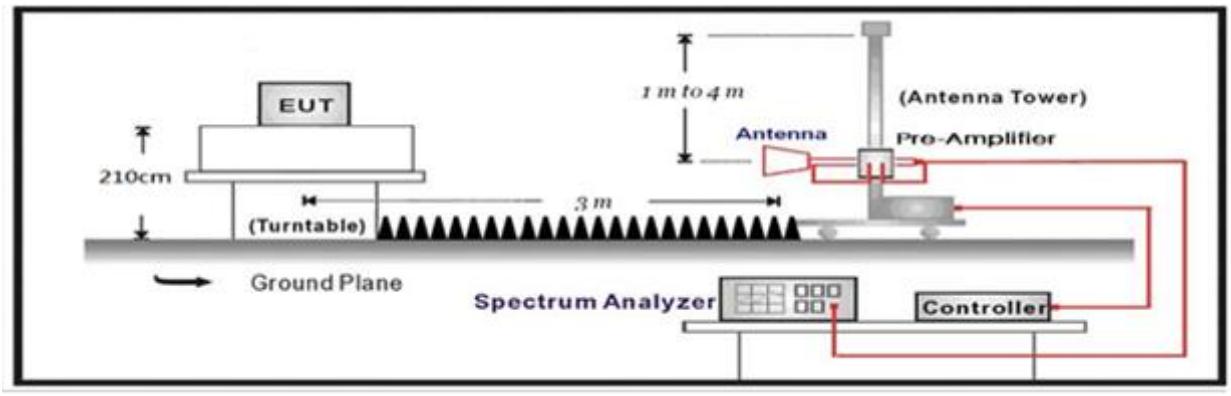
4.8.1 **Limit**		
Standard	ETSI EN 300 328 V2.2.2	
Frequency range	**Maximum power**	**Bandwidth**
30 MHz to 47 MHz	**-36 dBm**	100kHz
47 MHz to 74 MHz	**-54 dBm**	100kHz
74 MHz to 87,5 MHz	**-36 dBm**	100kHz
87,5 MHz to 118 MHz	**-54 dBm**	100kHz
118 MHz to 174 MHz	**-36 dBm**	100kHz
174 MHz to 230 MHz	**-54 dBm**	100kHz
230 MHz to 470 MHz	**-36 dBm**	100kHz
470 MHz to 694 MHz	**-54 dBm**	100kHz
694 MHz to 1 GHz	**-36 dBm**	100kHz
1 GHz to 12,75 GHz	**-30 dBm**	1MHz

4.8.2 **Test Setup**

Transmitter unwanted emissions in the spurious domain / AC6 (Below 1G)



Transmitter unwanted emissions in the spurious domain / AC6 (Above 1G)



4.8.3 Test Procedure

4.8.4	References Rule	Chapter	Description
	ETSI EN 300 328 V2.2.2	5.4.9.2.2	Radiated measurement

4.8.5

Step 1

The sensitivity of the measurement set-up should be such that the noise floor is at least 12 dB below the limits given in table 4 or table 12.

Step 2

The emissions over the range 30 MHz to 1 000 MHz shall be identified.
Spectrum analyzer settings:
(1),Resolution bandwidth: 100 kHz
(2),Video bandwidth: 300 kHz
(3),Filter type: 3 dB (Gaussian)
(4),Detector mode: Peak
(5),Trace Mode: Max Hold
(6),Sweep Points: ≥ 19 400
NOTE 1: For spectrum analyzers not supporting this high number of sweep points, the frequency band may need to be segmented.
(7)Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 100 kHz frequency step, the measurement time is greater than two transmissions of the UUT, on any channel.
For Frequency Hopping equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on any of the hopping frequencies.
NOTE 2: The above sweep time setting may result in long measuring times in case of frequency hopping equipment. To avoid such long measuring times, an FFT analyzer could be used.
Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.9.2.1.3 and compared to the limits given in table 4 or table 12.

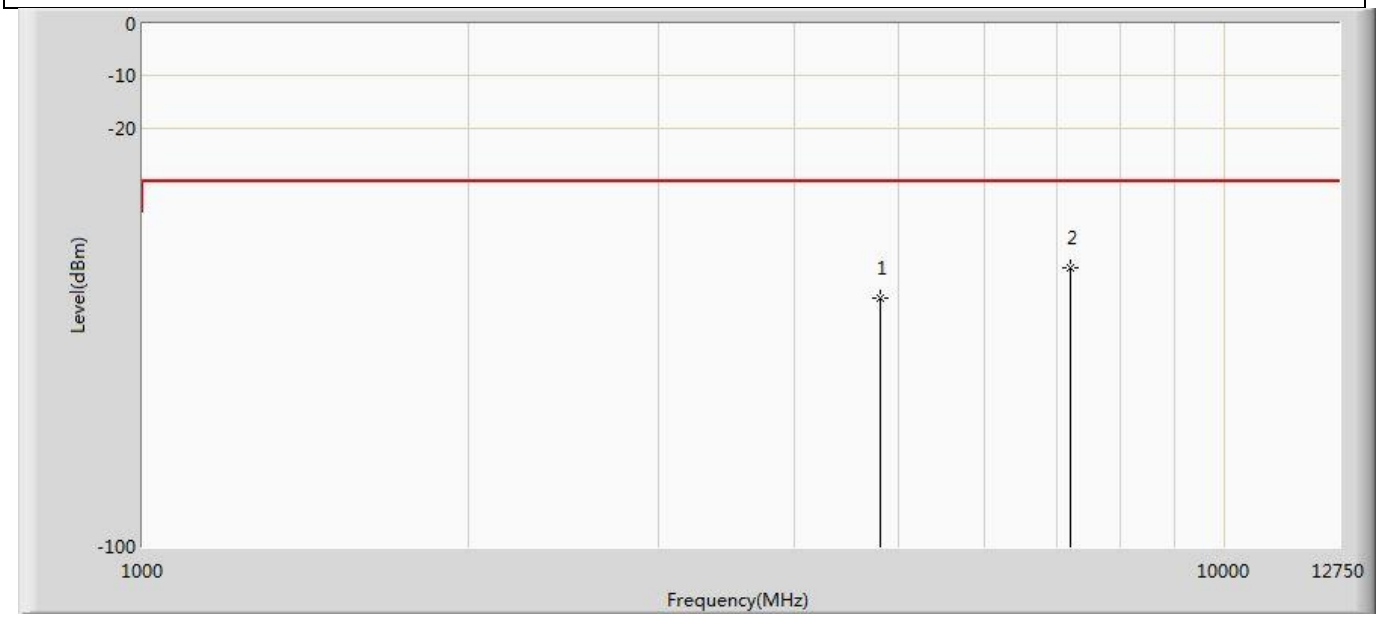
Step 3

The emissions over the range 1 GHz to 12,75 GHz shall be identified.
Spectrum analyzer settings:
(1),Resolution bandwidth: 1 MHz
(2),Video bandwidth: 3 MHz
(3),Filter type: 3 dB (Gaussian)
(4),Detector mode: Peak
(5),Trace Mode: Max Hold
(6),Sweep Points: ≥ 23 500
NOTE 3: For spectrum analyzers not supporting this high number of sweep points, the frequency band may need to be segmented.
(7)Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 1 MHz frequency step, the measurement time is greater than two transmissions of the UUT, on any channel.
For Frequency Hopping equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on any of the hopping frequencies.

		NOTE 4: The above sweep time setting may result in long measuring times in case of frequency hopping equipment. To avoid such long measuring times, an FFT analyzer could be used. Allow the trace to stabilize. Any emissions identified during the sweeps above that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.9.2.1.3 and compared to the limits given in table 4 or table 12. FHSS equipment may generate a block (or several blocks) of spurious emissions anywhere within the spurious domain. If this is the case, only the highest peak of each block of emissions shall be measured using the procedure in clause 5.4.9.2.1.3.
		Step 4
		In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), step 2 and step 3 need to be repeated for each of the active transmit chains (Ach).The limits used to identify emissions during this pre-scan need to be reduced with 10 × $\log_{10}$ (Ach) (number of active transmit chains).
		Measurement of the emissions identified during the pre-scan
		The procedure in step 1 to step 4 below shall be used to accurately measure the individual unwanted emissions identified during the pre-scan measurements above. This method assumes the spectrum analyser has a Time Domain Power function.
		Step 1
		The level of the emissions shall be measured using the following spectrum analyzer settings: (1),Measurement Mode: Time Domain Power (2),Centre Frequency: Frequency of the emission identified during the pre-scan (3),Resolution Bandwidth: 100 kHz (< 1 GHz) / 1 MHz (> 1 GHz) (4),Video Bandwidth: 300 kHz (< 1 GHz) / 3 MHz (> 1 GHz) (5),Frequency Span: Zero Span (6),Sweep mode: Single Sweep (7),Sweep time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power (8),Sweep points: Sweep time [µs] / (1 µs) with a maximum of 30 000 (9),Trigger: Video (burst signals) or Manual (continuous signals) (10),Detector: RMS
		Step 2
		Set a window where the start and stop indicators match the start and end of the burst with the highest level and record the value of the power measured within this window. If the spurious emission to be measured is a continuous transmission, the measurement window shall be set to match the start and stop times of the sweep.
		Step 3
		In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), step 2 needs to be repeated for each of the active transmit chains (Ach). Sum the measured power (within the observed window) for each of the active transmit chains.
		Step 4
		The value defined in step 3 shall be compared to the limits defined in tables 4 and 12.

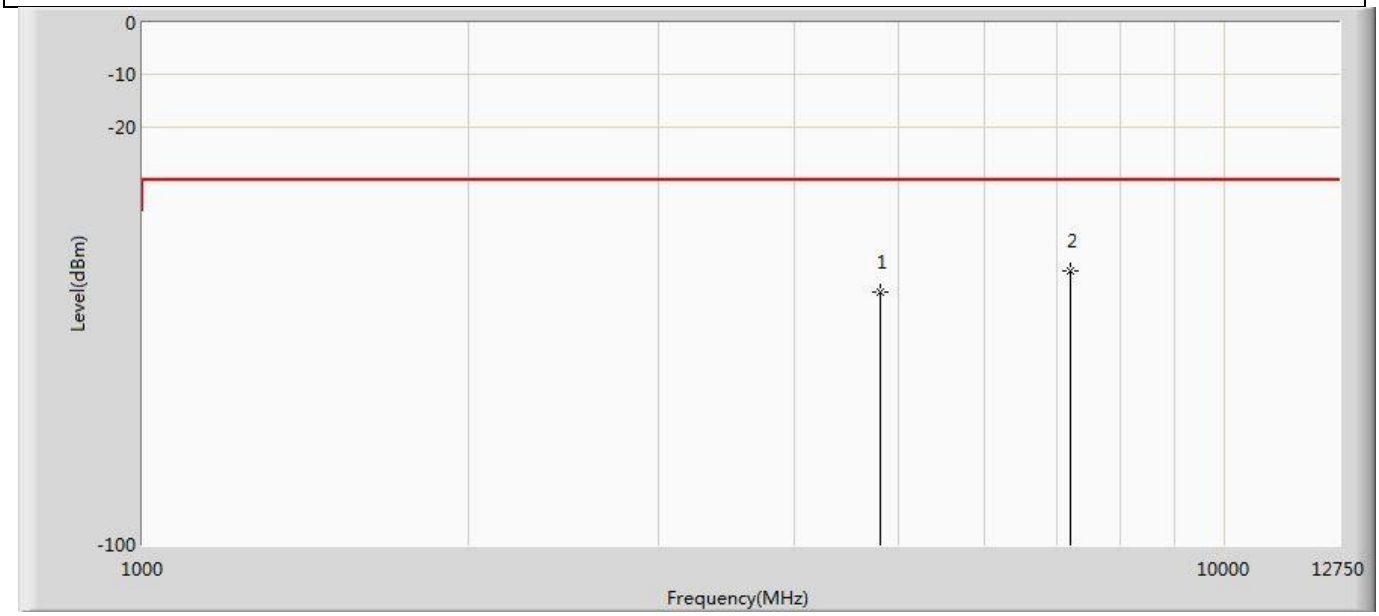
4.8.6 **Test Data**

Site: AC6	Time: 2022/04/20 - 17:04
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-V	Polarity: Vertical
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 1:Transmit at 2402MHz by LE_1Mbps	



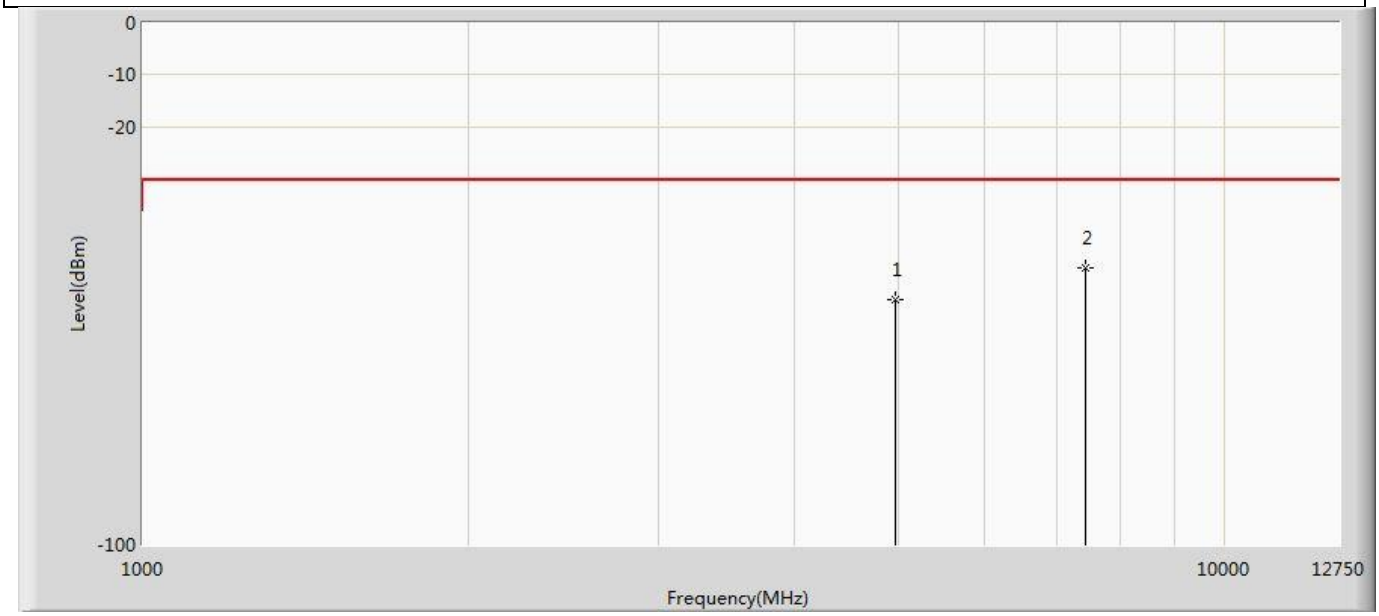
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4804.000	-52.371	-66.969	-22.371	-30.000	14.598	PK
2	*	7206.000	-46.804	-67.360	-16.804	-30.000	20.556	PK

Site: AC6	Time: 2022/04/20 - 17:04
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-H	Polarity: Horizontal
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 1:Transmit at 2402MHz by LE_1Mbps	



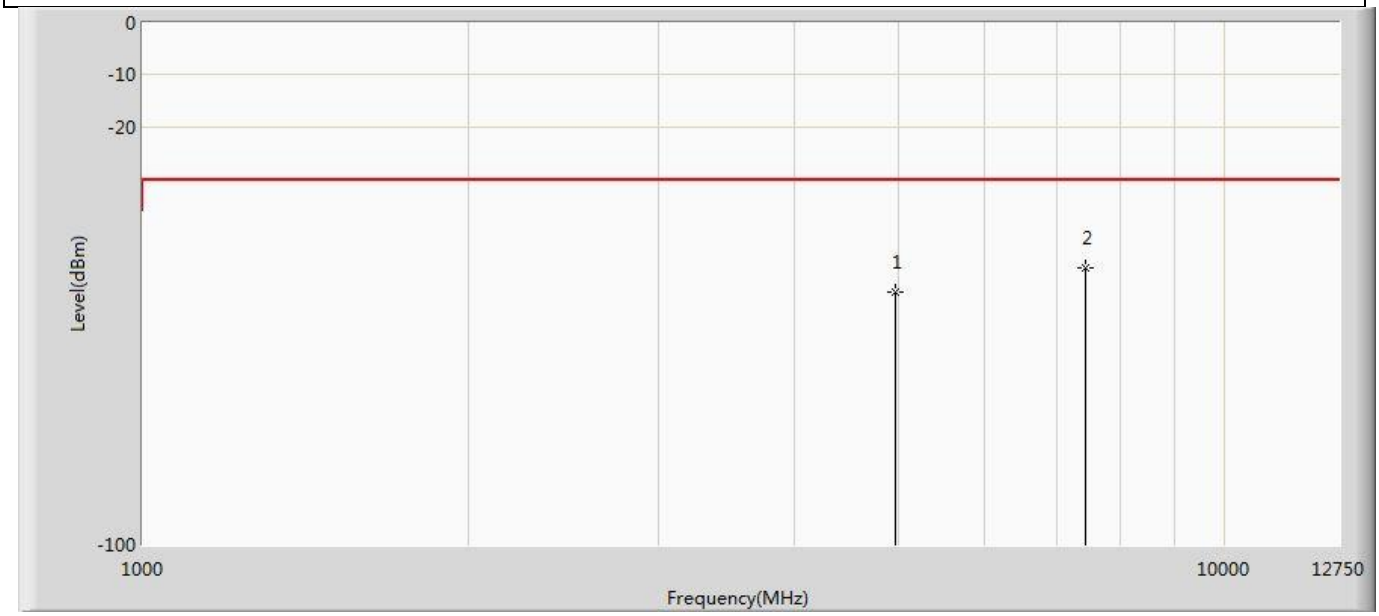
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4804.000	-51.616	-67.286	-21.616	-30.000	15.670	PK
2	*	7206.000	-47.530	-68.254	-17.530	-30.000	20.724	PK

Site: AC6	Time: 2022/04/20 - 17:04
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-V	Polarity: Vertical
EUT: LED LAMPc	Power: AC 230V/50Hz
Note: Mode 1:Transmit at 2480MHz by LE_1Mbps	



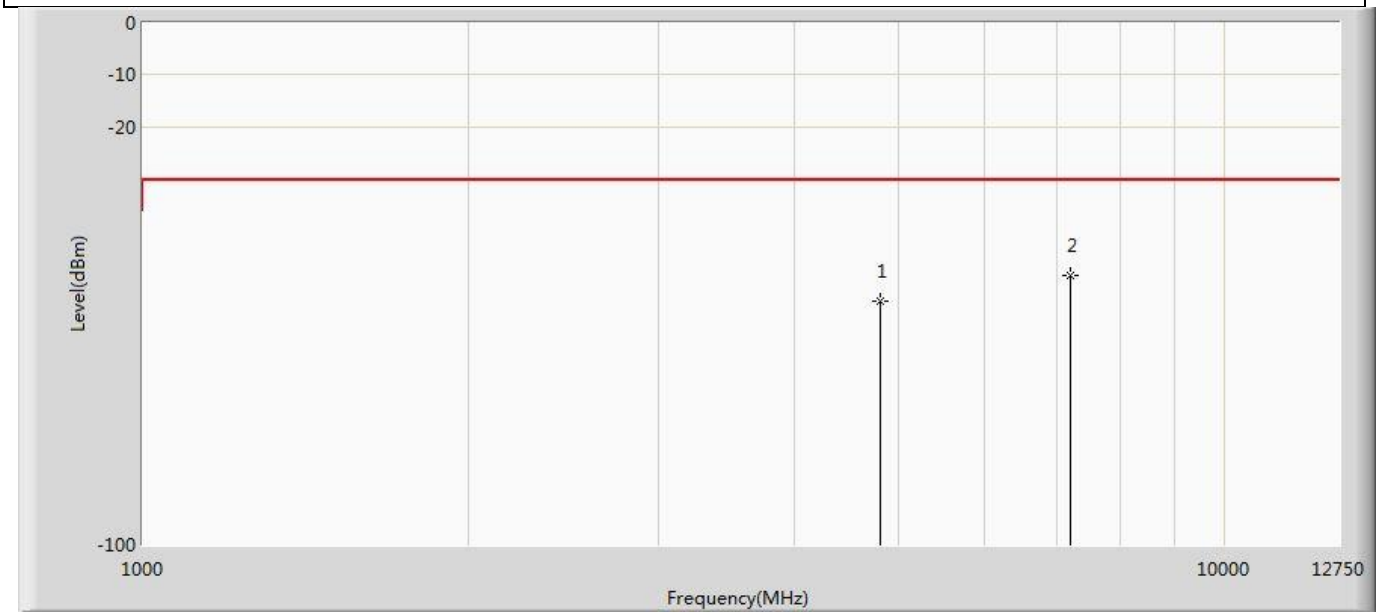
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4960.000	-53.039	-67.468	-23.039	-30.000	14.429	PK
2	*	7440.000	-46.950	-68.636	-16.950	-30.000	21.686	PK

Site: AC6	Time: 2022/04/20 - 17:04
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-H	Polarity: Horizontal
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 1:Transmit at 2480MHz by LE_1Mbps	



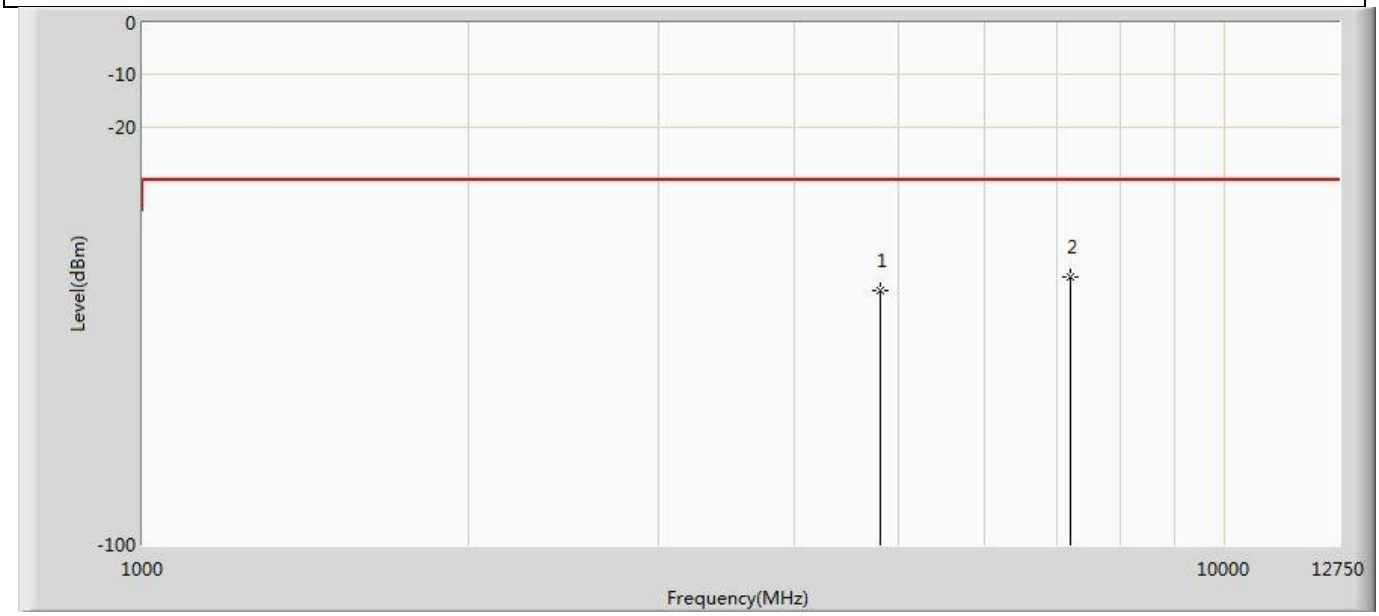
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4960.000	-51.491	-67.006	-21.491	-30.000	15.515	PK
2	*	7440.000	-46.812	-68.960	-16.812	-30.000	22.148	PK

Site: AC6	Time: 2022/04/20 - 17:04
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-V	Polarity: Vertical
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 2:Transmit at 2402MHz by LE_2Mbps	



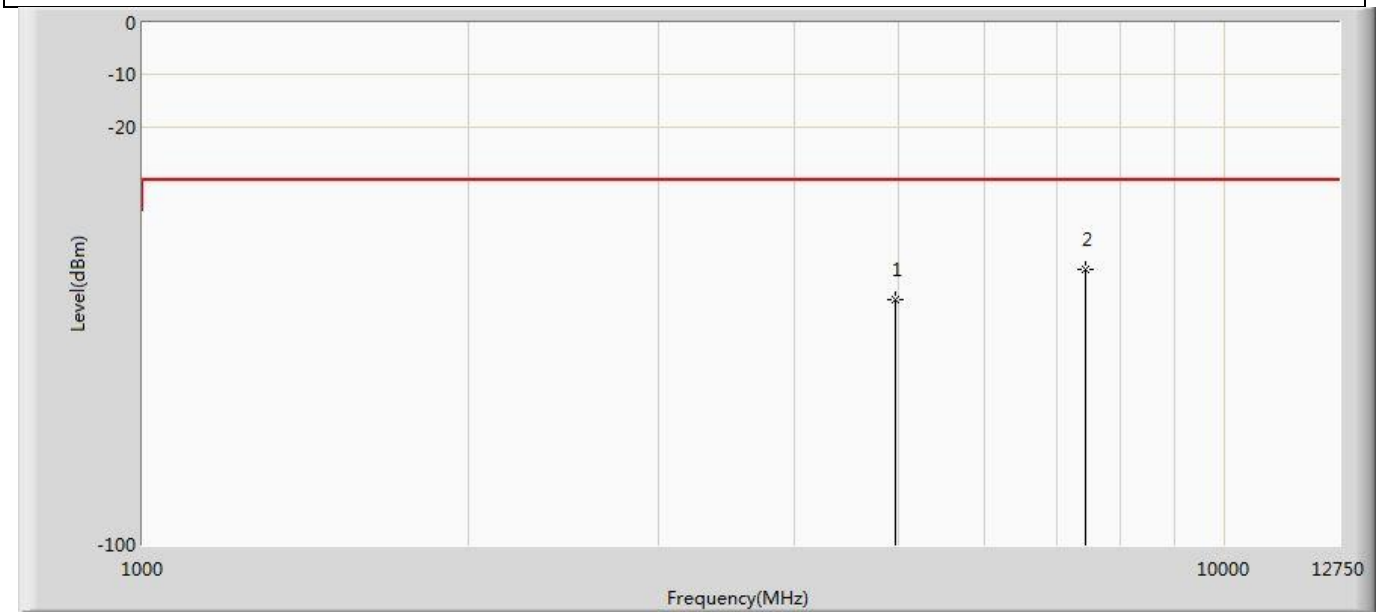
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4804.000	-53.284	-67.882	-23.284	-30.000	14.598	PK
2	*	7206.000	-48.416	-68.972	-18.416	-30.000	20.556	PK

Site: AC6	Time: 2022/04/20 - 17:04
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-H	Polarity: Horizontal
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 2:Transmit at 2402MHz by LE_2Mbps	



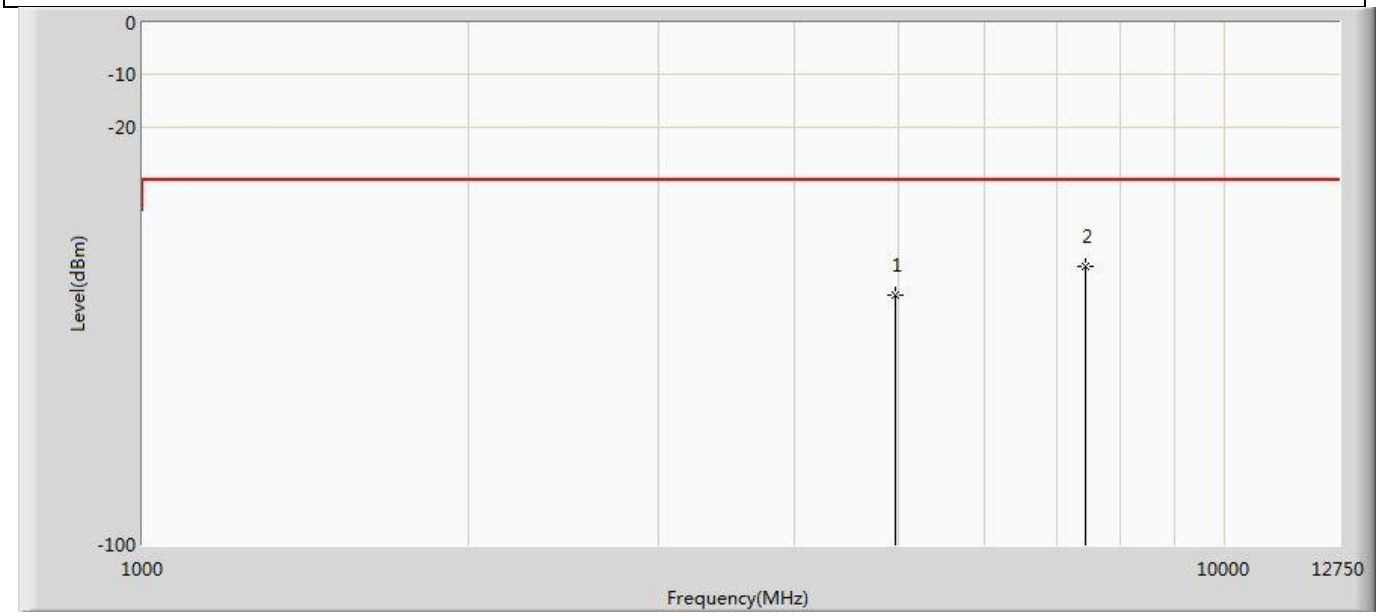
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4804.000	-51.323	-66.993	-21.323	-30.000	15.670	PK
2	*	7206.000	-48.593	-69.317	-18.593	-30.000	20.724	PK

Site: AC6	Time: 2022/04/20 - 17:05
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-V	Polarity: Vertical
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 2:Transmit at 2480MHz by LE_2Mbps	



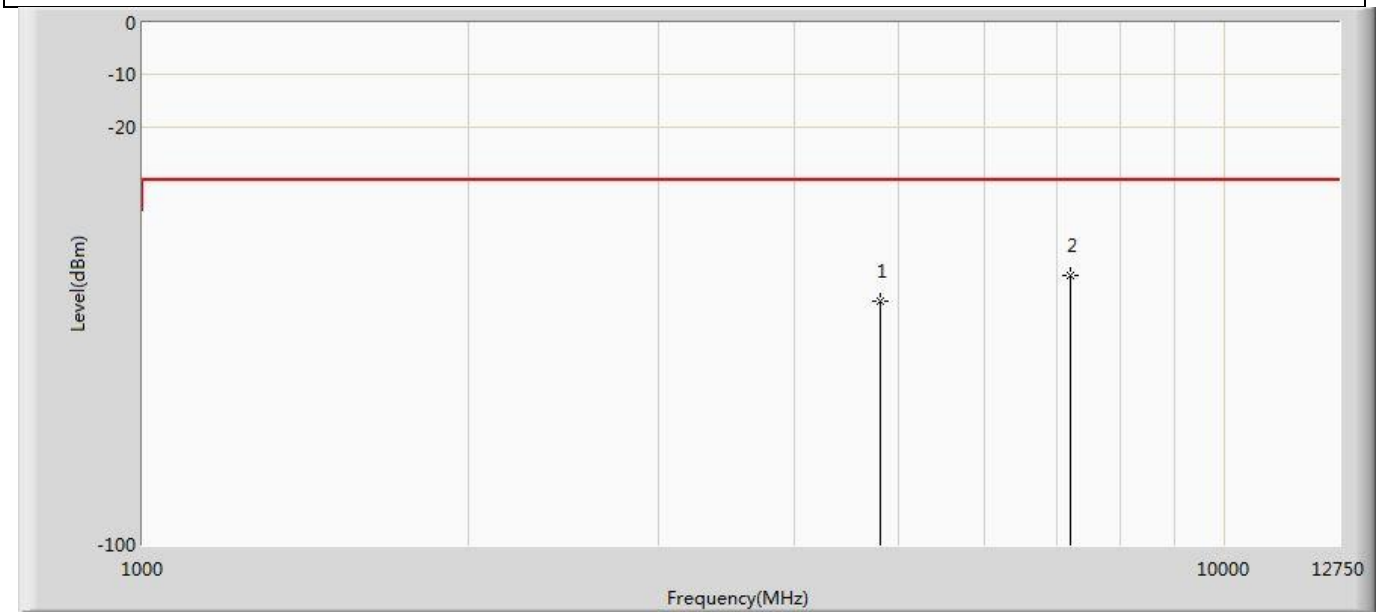
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4960.000	-53.134	-67.563	-23.134	-30.000	14.429	PK
2	*	7440.000	-47.326	-69.012	-17.326	-30.000	21.686	PK

Site: AC6	Time: 2022/04/20 - 17:05
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-H	Polarity: Horizontal
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 2:Transmit at 2480MHz by LE_2Mbps	



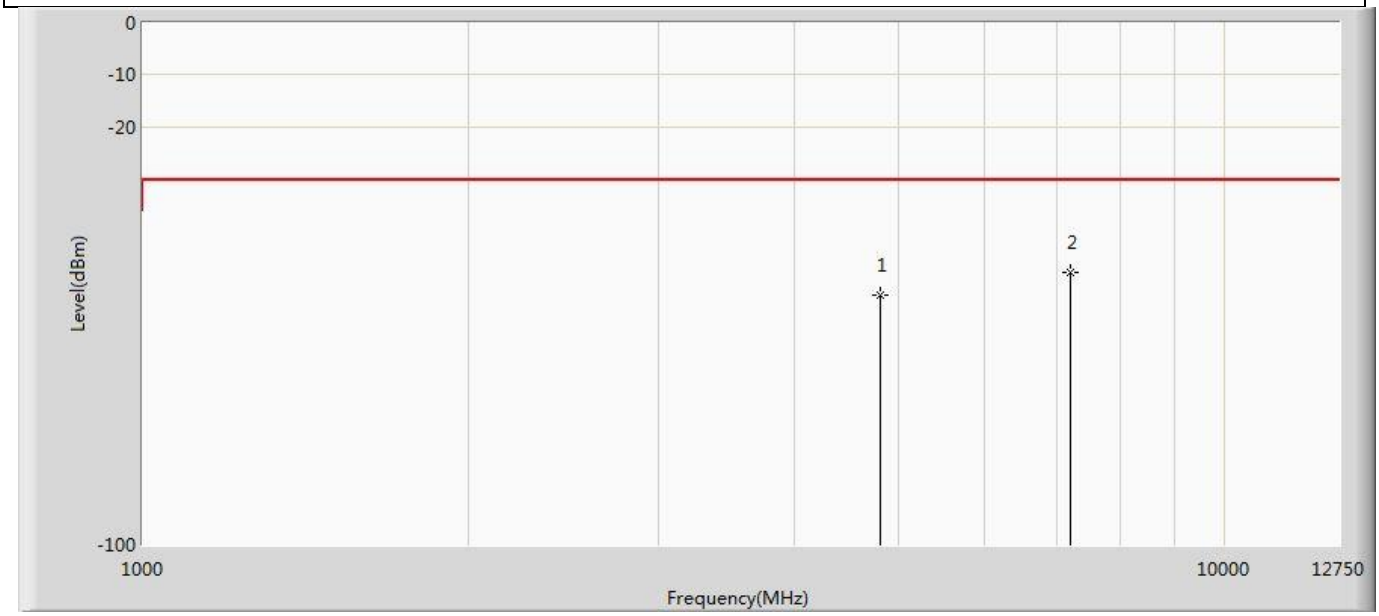
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4960.000	-52.172	-67.687	-22.172	-30.000	15.515	PK
2	*	7440.000	-46.561	-68.709	-16.561	-30.000	22.148	PK

Site: AC6	Time: 2022/04/20 - 17:05
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-V	Polarity: Vertical
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 3:Transmit at 2402MHz by LE_Coded(S=8)	



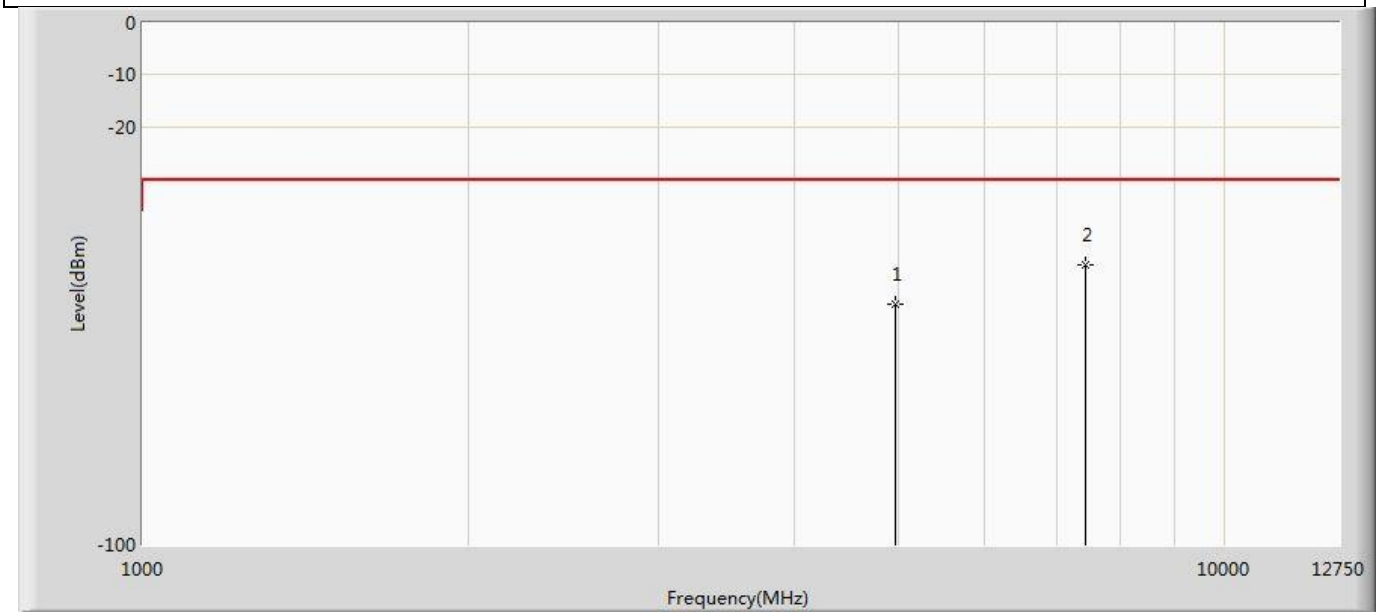
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4804.000	-53.417	-68.015	-23.417	-30.000	14.598	PK
2	*	7206.000	-48.415	-68.971	-18.415	-30.000	20.556	PK

Site: AC6	Time: 2022/04/20 - 17:05
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-H	Polarity: Horizontal
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 3:Transmit at 2402MHz LE_Coded(S=8)	



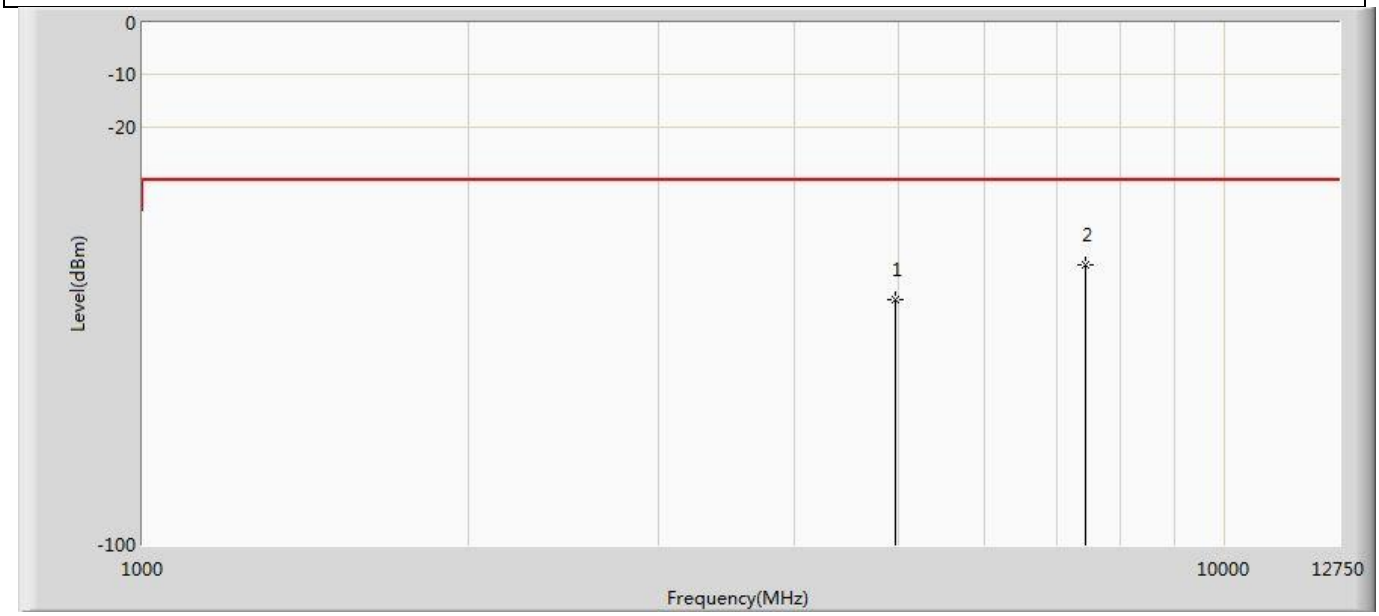
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4804.000	-52.212	-67.882	-22.212	-30.000	15.670	PK
2	*	7206.000	-47.694	-68.418	-17.694	-30.000	20.724	PK

Site: AC6	Time: 2022/04/20 - 17:05
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-V	Polarity: Vertical
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 3:Transmit at 2480MHz LE_Coded(S=8)	



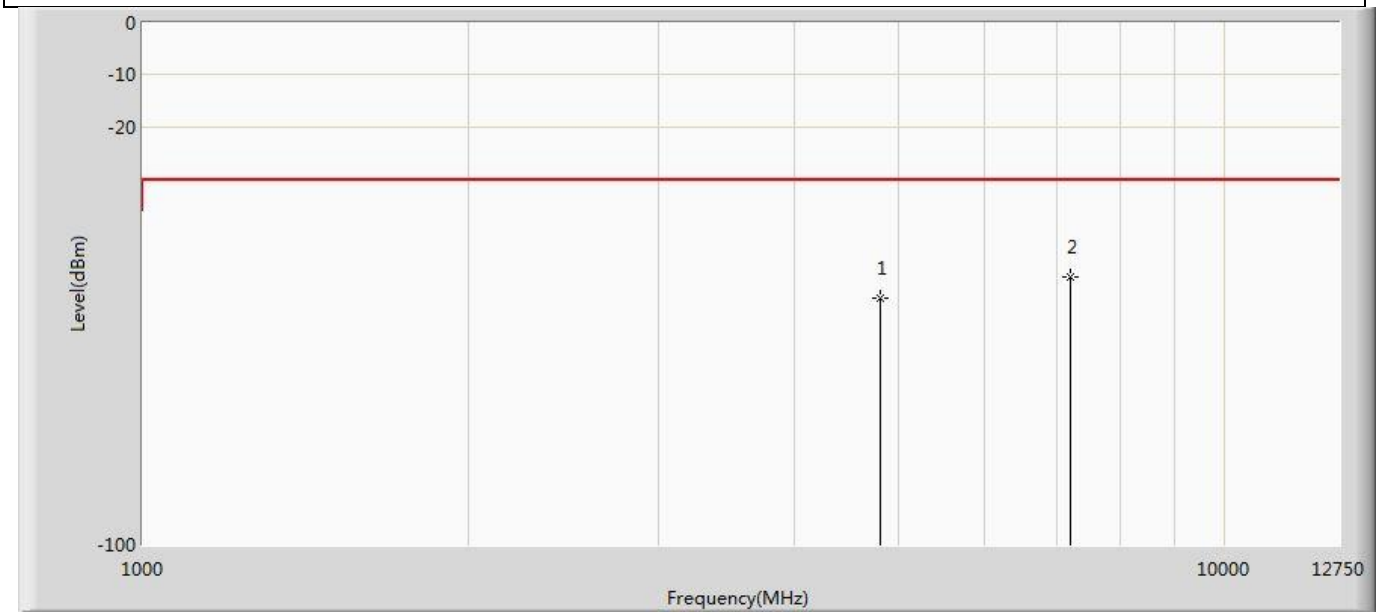
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4960.000	-53.963	-68.392	-23.963	-30.000	14.429	PK
2	*	7440.000	-46.456	-68.142	-16.456	-30.000	21.686	PK

Site: AC6	Time: 2022/04/20 - 17:05
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-H	Polarity: Horizontal
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 3:Transmit at 2480MHz LE_Coded(S=8)	



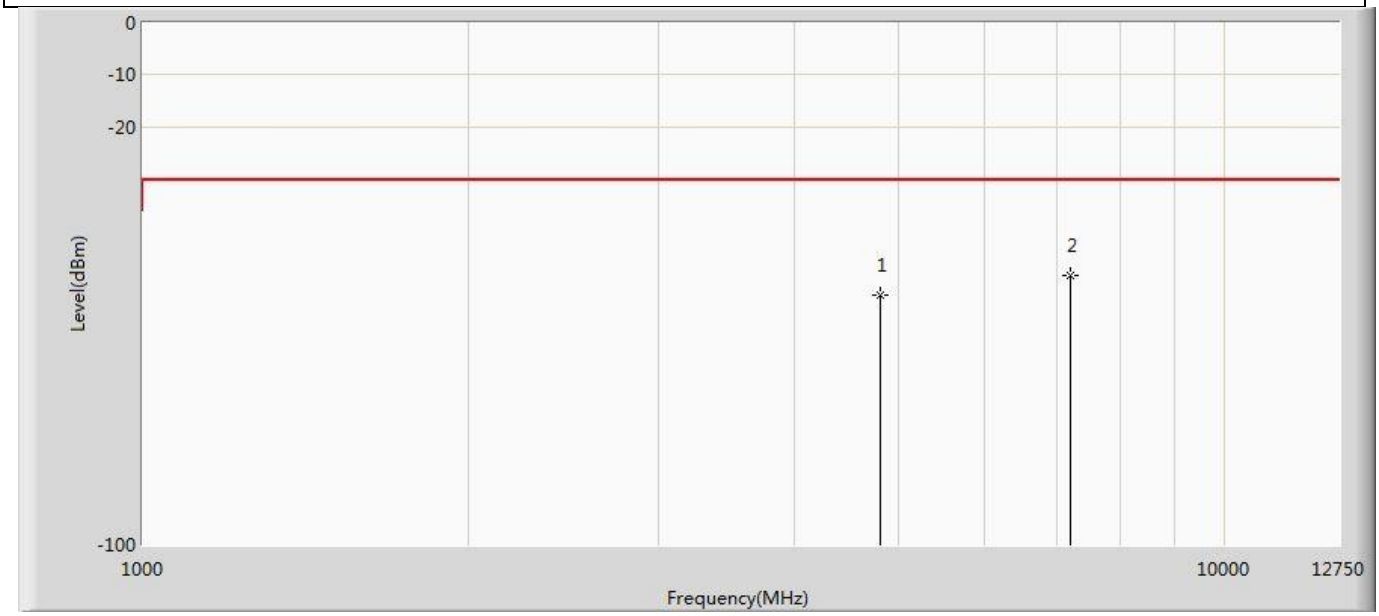
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4960.000	-53.056	-68.571	-23.056	-30.000	15.515	PK
2	*	7440.000	-46.367	-68.515	-16.367	-30.000	22.148	PK

Site: AC6	Time: 2022/04/20 - 17:05
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-V	Polarity: Vertical
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 4:Transmit at 2402MHz LE_Coded(S=2)	



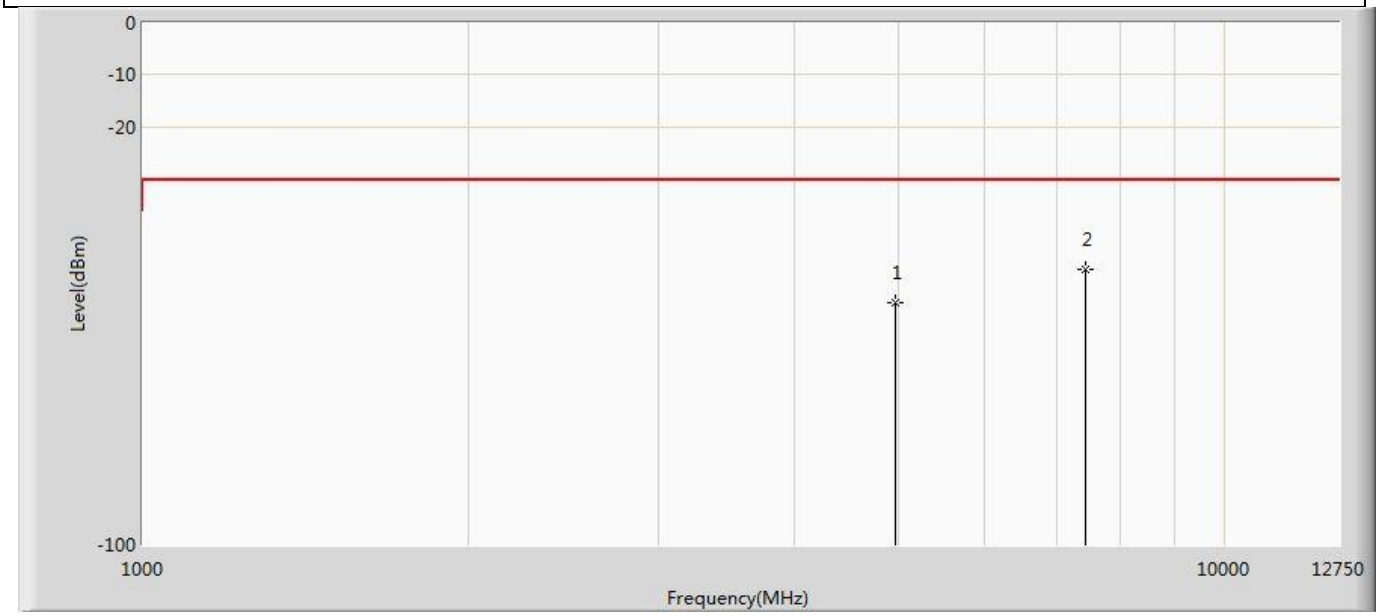
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4804.000	-52.642	-67.240	-22.642	-30.000	14.598	PK
2	*	7206.000	-48.815	-69.371	-18.815	-30.000	20.556	PK

Site: AC6	Time: 2022/04/20 - 17:05
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-H	Polarity: Horizontal
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 4:Transmit at 2402MHz LE_Coded(S=2)	



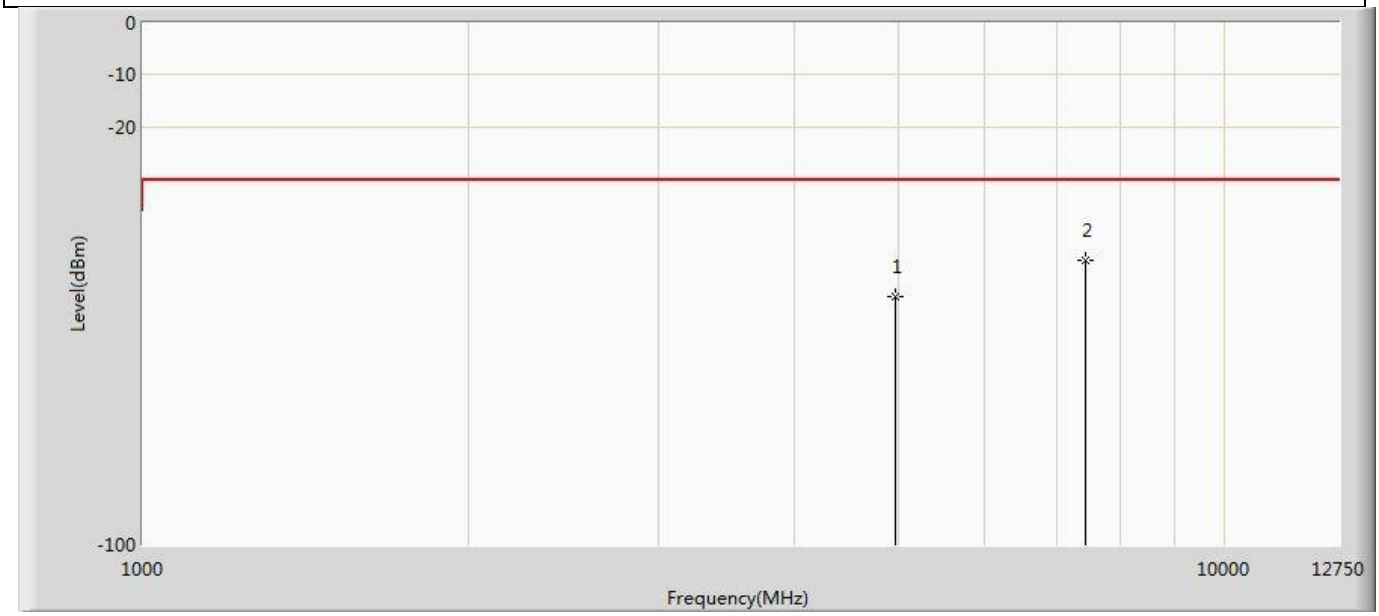
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4804.000	-52.071	-67.741	-22.071	-30.000	15.670	PK
2	*	7206.000	-48.357	-69.081	-18.357	-30.000	20.724	PK

Site: AC6	Time: 2022/04/20 - 17:05
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-V	Polarity: Vertical
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 4:Transmit at 2480MHz LE_Coded(S=2)	



No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4960.000	-53.542	-67.971	-23.542	-30.000	14.429	PK
2	*	7440.000	-47.130	-68.816	-17.130	-30.000	21.686	PK

Site: AC6	Time: 2022/04/20 - 17:05
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-H	Polarity: Horizontal
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 4:Transmit at 2480MHz LE_Coded(S=2)	

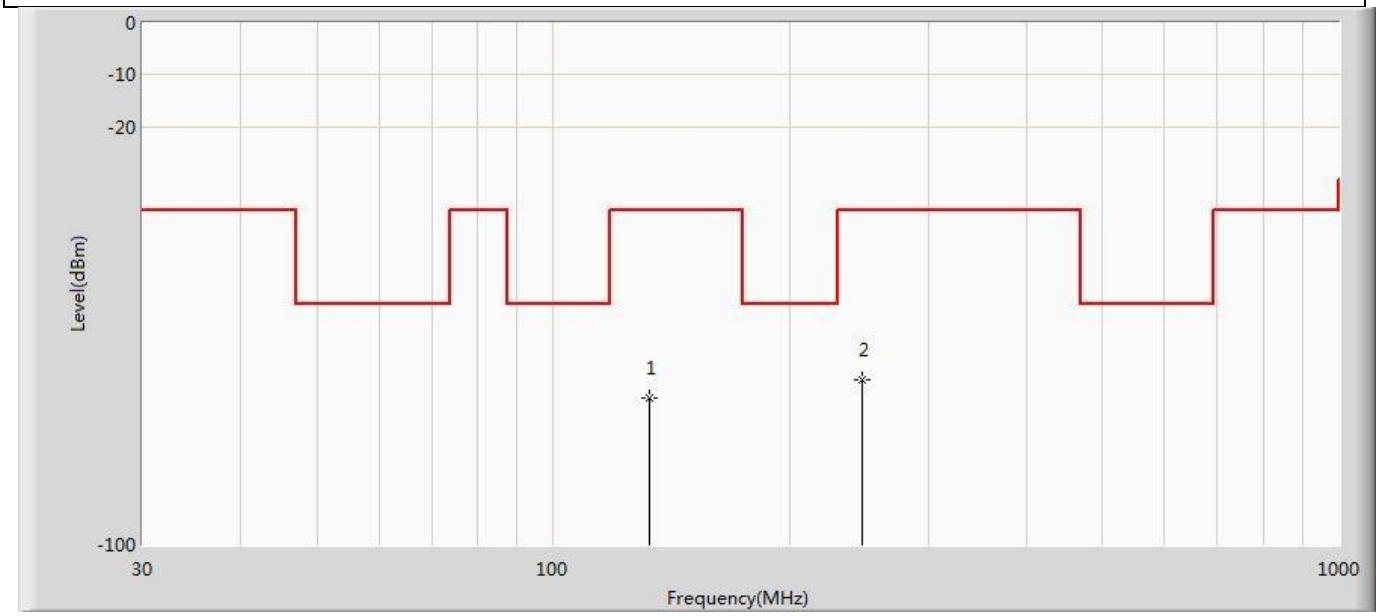


No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4960.000	-52.342	-67.857	-22.342	-30.000	15.515	PK
2	*	7440.000	-45.637	-67.785	-15.637	-30.000	22.148	PK

1. " * ", means this data is the worst emission level.
2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).
3. The final result only applies for using RMS detector , if the pre-test result on peak is lower than limit, then RMS measurement needn't be performed.

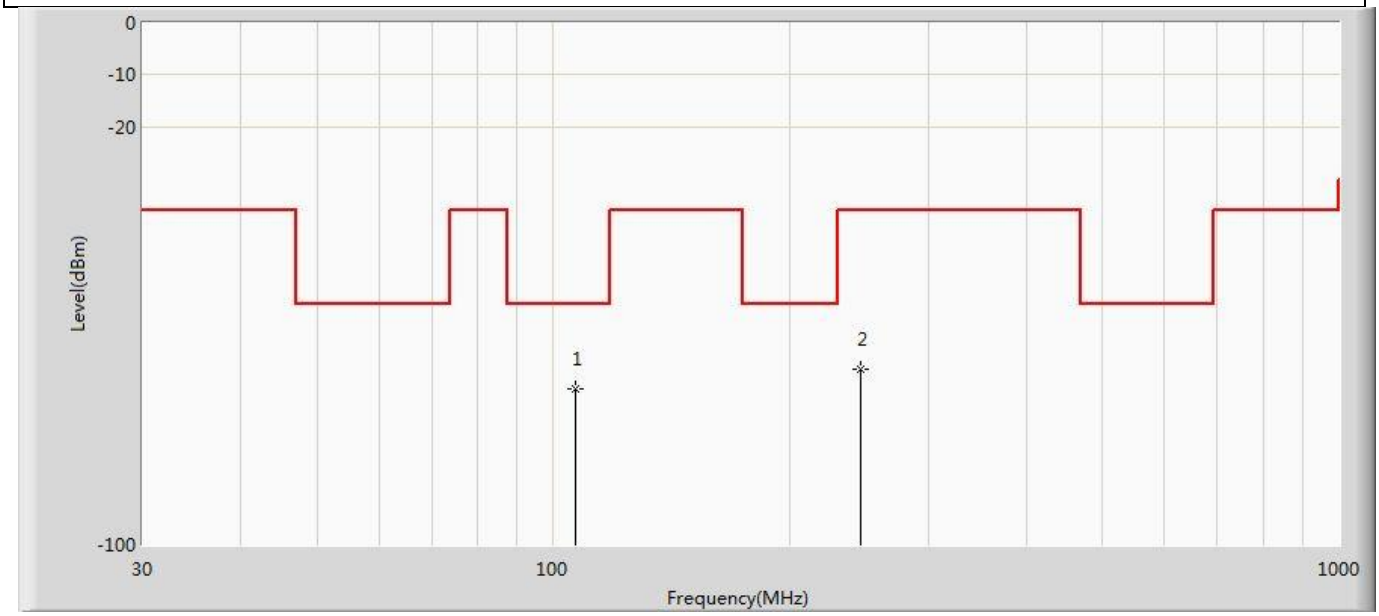
The worst case of Radiated Emission below 1GHz:

Site: AC6	Time: 2022/04/20 - 17:06
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: RF_Substitution_(DC 30-1000MHz)	Polarity: Vertical
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 1:Transmit at 2402MHz by LE_1Mbps	



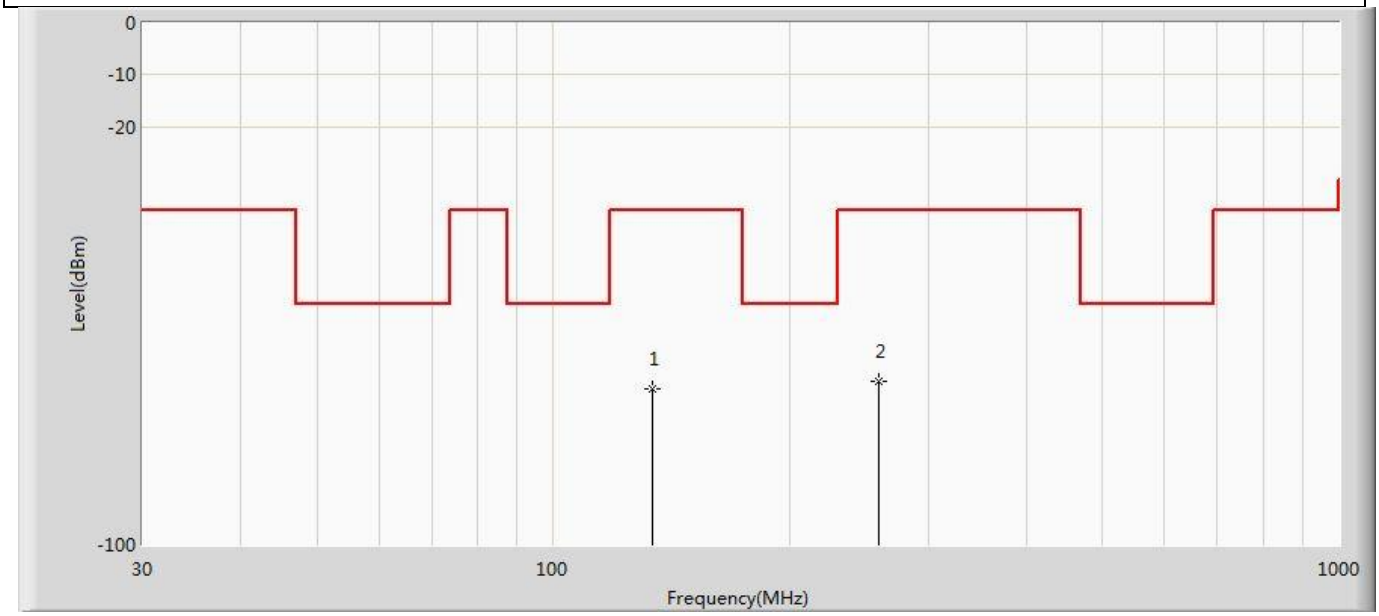
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		132.820	-71.792	-95.552	-35.792	-36.000	23.760	PK
2	*	247.280	-68.426	-94.699	-32.426	-36.000	26.273	PK

Site: AC6	Time: 2022/04/20 - 17:06
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: RF_Substitution_(DC 30-1000MHz)	Polarity: Horizontal
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 1:Transmit at 2402MHz by LE_1Mbps	



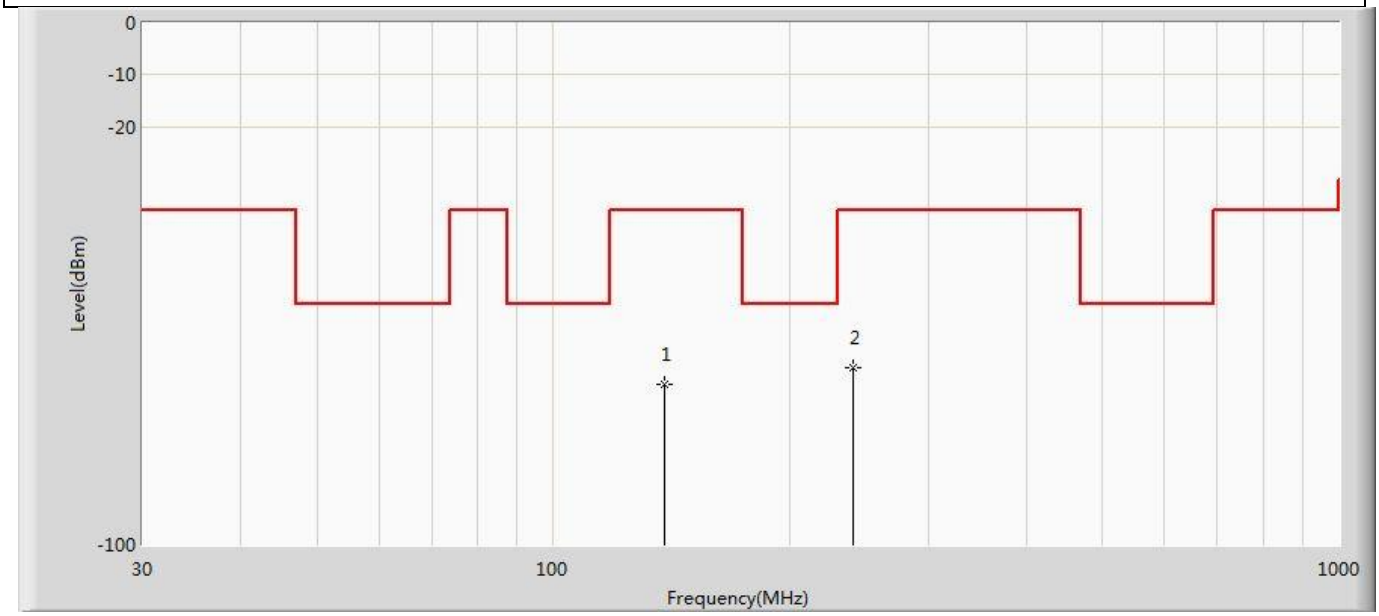
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1	*	106.630	-70.026	-95.342	-16.026	-54.000	25.316	PK
2		246.310	-66.334	-95.168	-30.334	-36.000	28.834	PK

Site: AC6	Time: 2022/04/20 - 17:06
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: RF_Substitution_(DC 30-1000MHz)	Polarity: Vertical
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 1:Transmit at 2480MHz by LE_1Mbps	



No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		133.790	-70.023	-93.740	-34.023	-36.000	23.717	PK
2	*	259.890	-68.622	-93.984	-32.622	-36.000	25.362	PK

Site: AC6	Time: 2022/04/20 - 17:06
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: RF_Substitution_(DC 30-1000MHz)	Polarity: Horizontal
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 1:Transmit at 2480MHz by LE_1Mbps	



No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		138.640	-69.238	-94.137	-33.238	-36.000	24.899	PK
2	*	240.490	-65.943	-93.581	-29.943	-36.000	27.638	PK

Note:

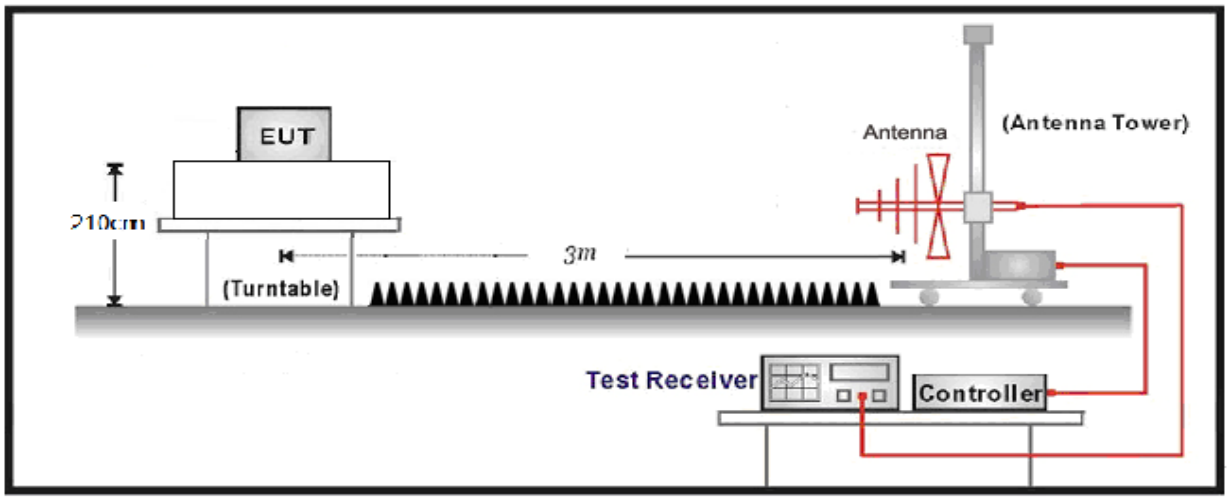
1. " * ", means this data is the worst emission level.
2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).
3. The final result only applies for using RMS detector , if the pre-test result on peak is lower than limit, then RMS measurement needn't be performed.

4.9 **Receiver Spurious Emissions**	**VERDICT: PASS**

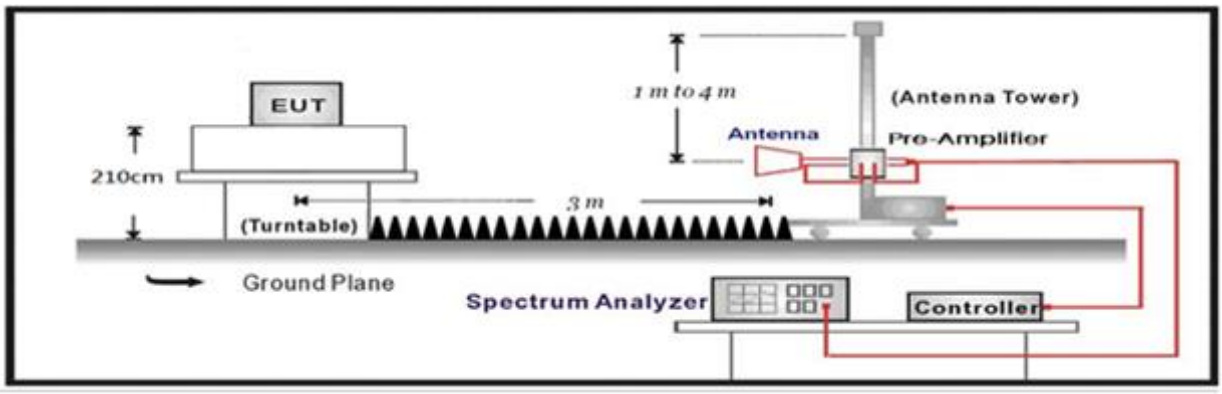
4.9.1 **Limit**		
Standard	ETSI EN 300 328 V2.2.2	
Frequency range	**Maximum power**	**Bandwidth**
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12,75 GHz	-47 dBm	1 MHz

4.9.2 Test Setup

Receiver Spurious Emissions / AC6 (Below 1G)



Receiver Spurious Emissions / AC6 (Above 1G)



4.9.3 **Test Procedure**

	References Rule	Chapter	Description
☒	ETSI EN 300 328 V2.2.2	5.4.10.2.2	Radiated measurement

Step 1

The sensitivity of the spectrum analyser should be such that the noise floor is at least 12 dB below the limits given in table 5 or table 13.

Step 2

The emissions over the range 30 MHz to 1 000 MHz shall be identified.
Spectrum analyzer settings:
(1),Resolution bandwidth: 100 kHz
(2),Video bandwidth: 300 kHz
(3),Filter type: 3 dB (Gaussian)
(4),Detector mode: Peak
(5),Trace Mode: Max Hold
(6),Sweep Points: ≥ 19 400
(7)Sweep time: Auto
Wait for the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.10.2.1.3 and compared to the limits given in table 5 or table 13.

Step 3

The emissions over the range 1 GHz to 12,75 GHz shall be identified.
Spectrum analyzer settings:
(1),Resolution bandwidth: 1 MHz (2),Video bandwidth: 3 MHz
(3),Filter type: 3 dB (Gaussian) (4),Detector mode: Peak
(5),Trace Mode: Max Hold
(6),Sweep Points: ≥ 23 500
NOTE 3: For spectrum analyzers not supporting this high number of sweep points, the frequency band may need to be segmented.
(7),Sweep time: Auto
Wait for the trace to stabilize. Any emissions identified during the sweeps above that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.10.2.1.3 and compared to the limits given in table 5 or table 13.
FHSS equipment may generate a block (or several blocks) of spurious emissions anywhere within the spurious domain. If this is the case, only the highest peak of each block of emissions shall be measured using the procedure in clause 5.4.10.2.1.3.

Step 4

In case of conducted measurements on smart antenna systems (equipment with multiple receive chains), step 2 and step 3 need to be repeated for each of the active receive chains (Ach)The limits used to identify emissions during this pre-scan need to be reduced with 10 × log10 (Ach) (number of active receive chains).

Measurement of the emissions identified during the pre-scan

The steps below shall be used to accurately measure the individual unwanted emissions identified during the pre-scan measurements above. This method assumes the spectrum analyzer has a Time Domain Power function

Step 1

		The level of the emissions shall be measured using the following spectrum analyzer settings: (1),Measurement Mode: Time Domain Power (2),Centre Frequency: Frequency of the emission identified during the pre-scan (3),Resolution Bandwidth: 100 kHz (< 1 GHz) / 1 MHz (> 1 GHz) (4),Video Bandwidth: 300 kHz (< 1 GHz) / 3 MHz (> 1 GHz) (5),Frequency Span: Zero Span (6),Sweep mode: Single Sweep (7),Sweep time: 30 ms (8),Sweep points: ≥ 30 000 (9),Trigger: Video (burst signals) or Manual (continuous signals) (10),Detector: RMS
		Step 2
		Set a window where the start and stop indicators match the start and end of the burst with the highest level and record the value of the power measured within this window. If the spurious emission to be measured is a continuous transmission, the measurement window shall be set to match the start and stop times of the sweep.
		Step 3
		In case of conducted measurements on smart antenna systems (equipment with multiple receive chains), step 2 needs to be repeated for each of the active receive chains (Ach). Sum the measured power (within the observed window) for each of the active receive chains
		Step 4
		The value defined in step 3 shall be compared to the limits defined in tables 5 and 13.

4.9.4 **Test Data**

Note: The data of receive spurious below the limit 6dbm , so no receive data was showed.

Receiver Blocking	**VERDICT: PASS**

4.10.1 **Limit**

Standard	ETSI EN 300 328 V2.2.2

☐ Receiver Category 1

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 Pmin + 26 dB where Pmin 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

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 dBm + 10 × $\log_{10}$(OCBW) + 10 dB) or (-74 dBm + 10 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW

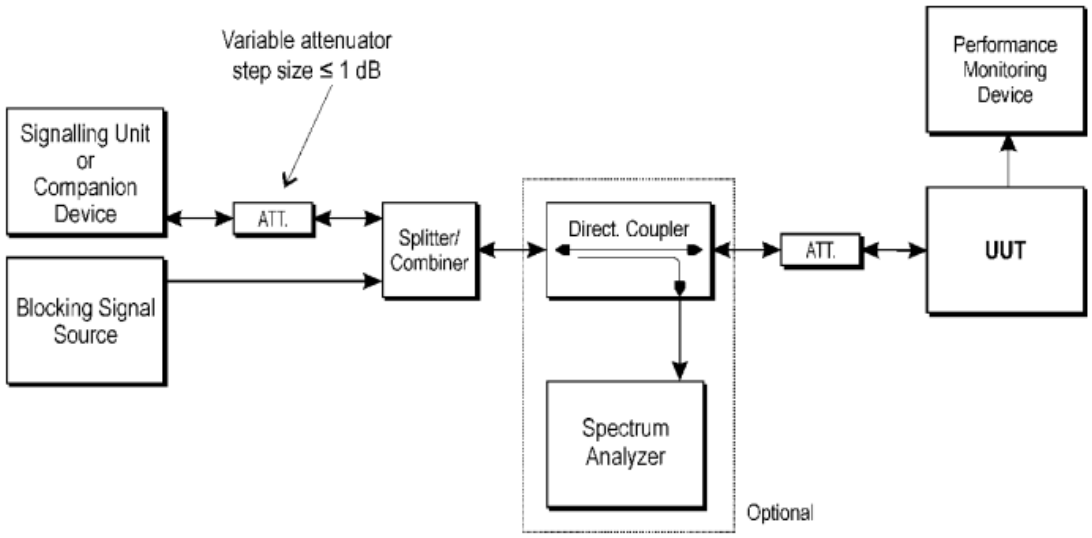
NOTE 1: OCBW is in Hz.
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal 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

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 dBm + 10 × $\log_{10}$(OCBW) + 10 dB) or (-74 dBm + 10 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 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

4.10.2 **Test Setup**



4.10.3 **Procedure**

References Rule		Chapter	Description
☒	ETSI EN 300 328 V2.2.2	5.4.11.2.1	Receiver Blocking

For systems using multiple receive chains only one chain (antenna port) need to be tested. All other receiver inputs shall be terminated.

The procedure in step 1 to step 6 below shall be used to verify the receiver blocking requirement as described in clause 4.3.1.12 or clause 4.3.2.11. The performance monitoring device is capable of verifying the performance criteria as defined in clause 4.3.1.12.3 or clause 4.3.2.11.3.

Step 1

For non-FHSS equipment, the UUT shall be set to the lowest operating channel on which the blocking test has to be performed (see clause 5.4.11.1).

Step 2

The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.

Step 3

1,With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in figure 6.

2,Unless the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the level of the wanted signal shall be set to the value provided in the table corresponding to the receiver category and type of equipment. The test procedure defined in clause 5.4.2, and more in particular clause 5.4.2.2.1.2, can be used to measure the (conducted) level of the wanted signal however no correction shall be made for antenna gain of the companion device (step 6 in clause 5.4.2.2.1.2 shall be ignored). This level may be measured directly at the output of the companion device and a correction is made for the coupling loss into the UUT. The actual level for the wanted signal shall be recorded in the test report

3, When the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still met. The resulting level for the wanted signal at the input of the UUT is P_{min}. This signal level (P_{min}) is increased by the value provided in note 2 of the applicable table corresponding to the receiver category and type of equipment.

Step 4

The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment.

If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 are met then proceed to step 6

Step 5

1, If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been increased with a value equal to the Occupied Channel Bandwidth except:

Note 1: For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB.

Note 2: For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB.

2, If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been decreased with a value equal to the Occupied Channel Bandwidth except:

Note 3：For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB. Note 4：For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB. If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, the UUT fails to comply with the Receiver Blocking requirement and step 6 and step 7 are no longer required. It shall be recorded in the test report whether the shift of blocking frequencies as described in the present step was used
Step 6
Repeat step 4 and step 5 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.
Step 7
For non-FHSS equipment, repeat step 2 to step 6 with the UUT operating at the highest operating channel on which the blocking test has to be performed (see clause 5.4.11.1)
Step 8
It shall be assessed and recorded in the test report whether the UUT complies with the Receiver Blocking requirement.

4.10.4 **Test Data**

Test Mode	Frequency (MHz)	Wanted signal power (dBm) (see note 1)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	PER Measure Value (%)	PER Limit (%)
Mode 9	2 402	-69	2 380	-34	6	⩽10
			2 504	-34	3	⩽10
			2 300	-34	6	⩽10
			2 584	-34	7	⩽10
	2 480	-69	2 380	-34	7	⩽10
			2 504	-34	5	⩽10
			2 300	-34	8	⩽10
			2 584	-34	7	⩽10

Note 1: Wanted signal power is (-139 dBm + 10 × $\log_{10}$(OCBW) + 10 dB) or (-74 dBm + 10 dB) whichever is less

Note 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.

5 IDENTIFICATION OF THE EQUIPMENT UNDER TEST

The photographs show the tested device.


PHILIPS
hue
(6) IINCA G125LG EU
ESR3 APT F 025


PHILIPS
hue
(8) IINCA T125LG EU
ESR3 APT H 034

6 ANNEX 1 - MEASUREMENT UNCERTAINTIES

The table(s) below show(s) measurment uncertainties of the RF test set-ups. The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Emission tests	**ULAB**
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1,5 dB
Power Spectral Density, conducted	±3 dB
Unwanted Emissions, conducted	±3 dB
All emissions, radiated	±6 dB

7 ANNEX 2 – USED EQUIPMENT

Keysight ETSI EN 300328 / 301893 Test System / TR8

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
4TX MIMO Power Sensor	Keysight	U2063X	MY58000119	2023.03.16	2024.03.15
4TX MIMO Power Sensor	Keysight	U2063X	MY58000120	2023.03.16	2024.03.15
4TX MIMO Power Sensor	Keysight	U2063X	MY58000121	2023.03.16	2024.03.15
4TX MIMO Power Sensor	Keysight	U2063X	MY58000122	2023.03.16	2024.03.15
Adaptivity Test Unit	Agilent	N/A	11607310008	N/A	N/A
Rx PER Monitoring Unit	Agilent	N/A	11706190075	N/A	N/A

RF Output Power/ Power Spectral Density/ Duty cycle, Tx-Sequence, Tx-gap/ Medium Utilisation (MU) factor/ Occupied Channel Bandwidth/ Transmitter unwanted emissions in the out-of-band domain / TR8

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2023.07.11	2024.07.10
MAX Signal Analyzer	Keysight	N9020B	MY59050482	2023.11.18	2024.11.17
Temperature/Humidity Meter	RTS	RTS-8S	RF08	2023.07.09	2024.07.08

Transmitter unwanted emissions in the spurious domain/ Receiver Spurious Emissions/ AC6

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal analyzer	R&S	FSV30	104212	2023.11.18	2024.11.17
Preamplifier	Agilent	8449B	3008A02597	2023.06.08	2024.06.07
Bilog Antenna	Schaffner	CBL6112B	2932	2023.11.16	2024.11.15
Half Wave Tuned Dipole Antenna	COM-POWER	AD-100	40137	2023.02.19	2024.02.18
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	737	2023.04.11	2024.04.10
Temperature/Humidity Meter	RTS	RTS-8S	RF06	2023.07.09	2024.07.08
EMI Test Software	Dekra	-	-	-	-

Adaptivity/ Blocking / TR8

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2023.07.11	2024.07.10
MAX Signal Analyzer	Keysight	N9020B	MY59050482	2023.11.18	2024.11.17
Wideband Radio Communication Tester	R＆S	CMW500	1201.0002K50-158243-jb	2023.10.20	2024.10.19
Splitter/Combiner (Qty: 2)	Mini-Circuits	ZAPD-50W	NN256400424	N/A	N/A
Dual Directional Coupler	Agilent	778D	20160	2023.07.11	2024.07.10
PSG Analog Signal Generator	Agilent	E8257D	MY44321116	2023.07.11	2024.07.10
ESG Vector Signal Generator	Agilent	E4438C	MY49070163	2023.07.11	2024.07.10
Temperature/Humidity Meter	RTS	RTS-8S	RF08	2023.07.09	2024.07.08

----------END----------

DEKRA Testing and Certification (Shanghai) Ltd.
No.250, Jiangchangsan Road, Jing'an District, Shanghai, China
TEL: +86-21-6056 7666 / FAX: +86-21-6056 7555

r

Test report No:
6174543.53

TEST REPORT
Radio Spectrum Matters (RF)

Identification of item tested	LED lamp
Trademark	PHILIPS
Model and /or type reference	9290031511A, 9290031512A, 9290031514A, 9290031515A
Ratings	220-240 Vac, 50/60 Hz, 6.8W
Test Laboratory	DEKRA Testing and Certification (Shanghai) Ltd. No.250, Jiangchangsan Road, Jing'an District, Shanghai, China
Applicant´s name / address	Signify (China) Investment Co., Ltd. Building No.9, Lane 888, Tianlin Road, Minhang district, 200233 Shanghai, China
Test method requested, standard	ETSI EN 300 328 V2.2.2 (2019-07)
Verdict Summary	IN COMPLIANCE
Tested by (name / position & signature)	Kaiyuan Dai Test Engineer
Approved by (name / position & signature)	Zuyao Fan Project Manager
Date of issue	2024-01-09
Report template No	TRF_EN300328_RF V1.0

INDEX

page

COMPETENCES AND GUARANTEES

DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

GENERAL CONDITIONS

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA.
5. The information provided by the customer in this report may affect the validity of the results, the test lab is not responsible for it.
6. The test results presented in this report relate only to the object tested.
7. Samples undergoing test have been provided by: The client.

UNCERTAINTY

For all measurements where guidance for the calculation of the instrumentation uncertainty of a measurement is specified in a product standard, the measurement instrumentation uncertainty has been calculated and applied in accordance with these standards.

Uncertainties have been calculated according to the DEKRA internal document. The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%. Refer to the Annex 1 for furter information.

The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to calculate the uncertainty associated with the measurement result, unless the specification, standard or customer have special requirements.

ENVIRONMENTAL CONDITIONS

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Ambient temperature	15 °C – 35 °C
Relative Humidity air	30% - 60%
Atmospheric pressure	86 kPa – 106 kPa

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

POSSIBLE TEST CASE VERDICTS

Test case does not apply to test object	N/A
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not measured	N/M

DEFINITION OF SYMBOLS USED IN THIS TEST REPORT

☒ Indicates that the listed condition, standard or equipment is applicable for this report/test/EUT.				
☐ Indicates that the listed condition, standard or equipment is not applicable for this report/test/EUT.				
Decimal separator used in this report	☐	Comma (,)	☒	Point (.)

ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

EUT	:	Equipment Under Test
QP	:	Quasi-Peak
CAV	:	CISPR Average
AV	:	Average
SAC	:	Semi-Anechoic Chamber
OATS	:	Open Area Test Site
BW	:	Bandwidth
Cat	:	Receiver Category
DC		Duty Cycle
MU		Medium Utilization Factor
U_N	:	Nominal voltage
N/A	:	Not Applicable
N/M	:	Not Measured

DOCUMENT HISTORY

Report nr.	Date	Description
6174543.53	2024-01-09	First release.

DATA PROVIDED BY THE APPLICANT

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested", "Applicant´s name / address", “Ratings” and "Derived model(s)", "Antenna Gain").
2. Derived model not tested. These models have been declared by the applicant as being the same as the model under test.

DEKRA declines any responsibility with respect to the information provided by the applicant and that may affect the validity of results.

CONCLUSION, REMARKS AND COMMENTS

The equipment under test (EUT) does meet the requirements of the stated standard(s)/test(s).
This report shall not be reproduced, except in full, without the written approval.

The tests described in this report do not result in the right to use any approval mark as conferred by DEKRA. As far as the tests were based on certain specifications, these are mentioned in the report.

According to the declaration from manufacturer, all models are identical except for appearance and model name.

After review, all tests were carried out on the following model 9290031515A. The test results stated in this report are also representative for models which can be derived using model list given in Annex 4.

Amendment 1 report:

The report is issued to base on original test report Ref. No. 2231095R-RF-CE-P17V02 issued by DEKRA Testing and Certification (Suzhou) Co., Ltd. dated on 2022-05-24 including the following changes and additions, which were considered technical modifications:

- New model 9290031511A, 9290031512A, 9290031514A and 9290031515A were added to replace the original model 9290031511, 9290031512, 9290031514 and 9290031515

These new models are the same as original ones except only plastic reflector in original models while both plastic and glass reflectors exist in these new models.

After review, no additional tests were considered necessary. The test results stated in this report are also representative for models which can be derived using model list given in Annex 4.

1 GENERAL INFORMATION

1.1 General Description of the Item(s)

Description of the item.....:	LED lamp
Test model / type number.....:	9290031515A
Serial number .....:	N/A
Trademark.....:	PHILIPS
Manufacturer.....:	Signify (China) Investment Co., Ltd. Building No.9, Lane 888, Tianlin Road, Minhang district, 200233 Shanghai, China

Test model.....:	9290031515A						
Mode of Operation.....:	Zigbee						
Data Rate.....:	250 Kbps						
Operating frequency range(s) – Tx.:	2400 – 2483.5 MHz						
Operating frequency range(s) – Rx :	2400 – 2483.5 MHz						
Type of Modulation .....:	DSSS, O-QPSK						
Antenna Type .....:	PCB						
Antenna Gain.....:	0.32 dBi						
Number of channel .....:	16						
Operating Temperature Range.....:	-20 to 45 ℃						
Geo-location capability	Not Supported						
Rated power supply.....:	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☒	AC: 220 – 240 V, 50/60 Hz	☒	☐	☐	☒	☐
	☐	AC: 100 – 277 V, 50/60 Hz	☐	☐	☐	☐	☐
	☐	DC: 12 V, 24 V, 12 / 24 V					
	☐	Battery:					
Software version.....:	Not provided						
Hardware version.....:	Not provided						

Intended use of the Equipment Under Test (EUT)
The product is LED lamp and it uses Zigbee and Bluetooth technology.

No	Module/parts of test item	Type	Manufacturer
	N/A		

1.2 **Test data**

Location	DEKRA Testing and Certification (Suzhou) Co., Ltd.
Address	No.99 Hongye Rd., Suzhou Industrial Park, Suzhou, 215006, Jiangsu, China
Date of receipt of test item	2022-03-31
Date(s) of performance of tests	2022-04-01 to 2022-04-30

1.3 Channel List

Zigbee

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
11	2405 MHz	12	2410 MHz	13	2415 MHz	14	2420 MHz
15	2425 MHz	16	2430 MHz	17	2435 MHz	18	2440 MHz
19	2445 MHz	20	2450 MHz	21	2455 MHz	22	2460 MHz
23	2465 MHz	24	2470 MHz	25	2475 MHz	26	2480 MHz

2 DESCRIPTION OF TEST SETUP

2.1 Operating mode(s) used for tests

During the tests the following operating mode(s) has(have) been used.

Operating mode	Operating mode description
1	Transmit by Zigbee
2	Receive by Zigbee
3	Normal operation
Supplemental information: ---	

2.2 Support / Auxiliary equipment / unit / software for the EUT

The EUT has been tested with the following auxiliary equipment / unit / software:

Auxiliary equipment / unit / software	Type / Version	Manufacturer	Supplied by
Notebook	Think pad L440	Lenovo	Adapter
Software	Type / Version	Manufacturer	Supplied by
Hueapprobtiontool	N/A	N/A	N/A
Supplemental information: ---			

3 VERDICT SUMMARY SECTION

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

3.1 Standards

Standard	Year	Description
ETSI EN 300 328 V2.2.2	2019-07	Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum

3.2 Deviation(s) from the Standard(s) / Test Specification(s)

The following deviation(s) was / were made from the published requirements of the listed standards:

No Deviation.

3.3 Overview of results

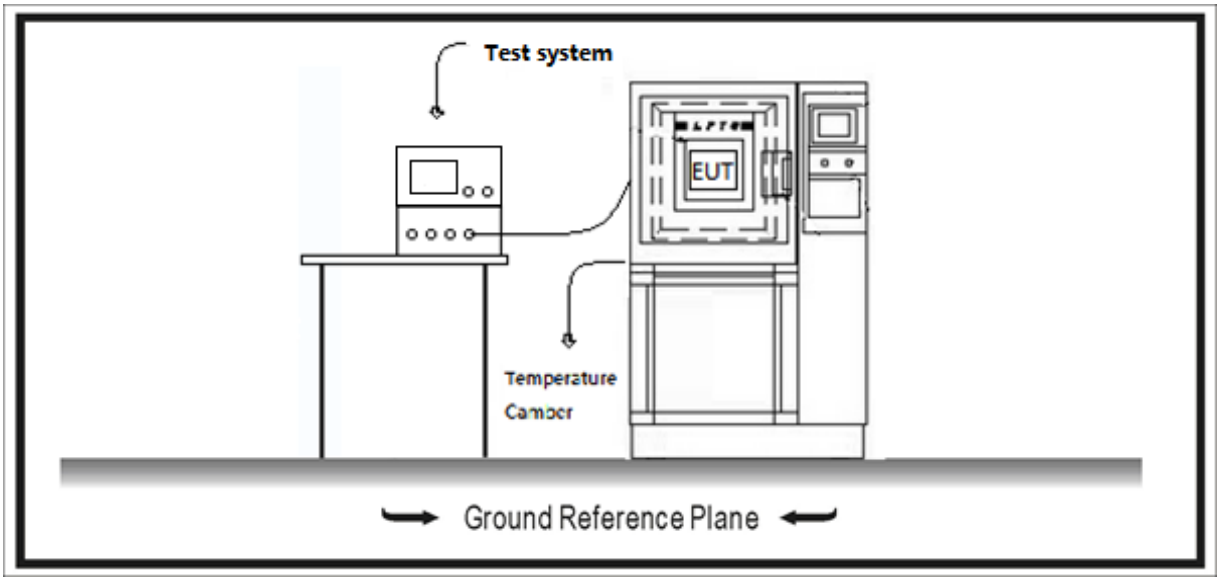
Test Item – ETSI EN 300 328 V2.2.2						
Performed Test Item	**Test Procedure**	**Adaptive**		**Non-Adaptive**		**Verdict**
		(≥10dBm)	**(<10dBm)**	**(≥10dBm)**	**(<10dBm)**	
RF Output Power	Claus 5.4.2	Yes	**Yes**	Yes	Yes	**PASS**
Power Spectral Density	Claus 5.4.3	Yes	**Yes**	Yes	Yes	**PASS**
Duty cycle, Tx-Sequence, Tx-gap	Claus 5.4.2	N/A	**N/A**	Yes	N/A	**N/A**
Medium Utilisation (MU) factor	Claus 5.4.2	N/A	**N/A**	Yes	N/A	**N/A**
Adaptivity	Claus 5.4.6	Yes	**N/A**	N/A	N/A	**N/A**
Occupied Channel Bandwidth	Claus 5.4.7	Yes	**Yes**	Yes	Yes	**PASS**
Transmitter unwanted emissions in the out-of-band domain	Claus 5.4.8	Yes	**Yes**	Yes	Yes	**PASS**
Transmitter unwanted emissions in the spurious domain	Claus 5.4.9	Yes	**Yes**	Yes	Yes	**PASS**
Receiver Spurious Emissions	Claus 5.4.10	Yes	**Yes**	Yes	Yes	**PASS**
Receiver Blocking	Claus 5.4.11	Yes	**Yes**	N/A	N/A	**PASS**
Geo-location capability	N/A	N/A	**N/A**	N/A	N/A	**N/A**
Supplementary information: 1) Geo-location capability should be implemented by manufacturer.						

4 TEST RESULT

4.1 **RF Output Power**	**VERDICT: PASS**

4.1.1 **Limit**	
Standard	ETSI EN 300 328 V2.2.2
☒	For adaptive equipment using wide band modulations other than FHSS
The maximum RF output power shall be 20 dBm.	
☐	For non-adaptive equipment using wide band modulations other than FHSS
The maximum RF output power for non-adaptive equipment shall be declared by the supplier and shall not exceed 20 dBm. See clause 5.4.1 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.	

4.1.2 **Test Setup**



4.1.3 **Test Procedure**			
References Rule		Chapter	Description
☒	ETSI EN 300 328 V2.2.2	5.4.2.2.1.2	RF Output Power
Step 1			
1, Use a fast power sensor with a minimum sensitivity of -40 dBm and capable of minimum 1 MS/s 2,Use the following settings: (1)Sample speed 1 MS/s or faster (2)The samples shall represent the RMS power of the signal. (3)Measurement duration: For non-adaptive equipment: equal to the observation period defined in clause 4.3.1.3.2 or clause 4.3.2.4.2. For adaptive equipment, the measurement duration shall be long enough to ensure a minimum number of bursts (at least 10) are captured. Note 1: For adaptive equipment, to increase the measurement accuracy, a higher number of bursts			

may be used.

Step 2

1, For conducted measurements on devices with one transmit chain:
(1), Connect the power sensor to the transmit port, sample the transmit signal and store the raw data. Use these stored samples in all following steps.
2,For conducted measurements on devices with multiple transmit chains:
(1)Connect one power sensor to each transmit port for a synchronous measurement on all transmit ports.
(2)Trigger the power sensors so that they start sampling at the same time. Make sure the time difference between the samples of all sensors is less than 500 ns.
(3) For each individual sampling point (time domain), sum the coincident power samples of all ports and store them. Use these summed samples as the new stored data set.

Step 3

Find the start and stop times of each burst in the stored measurement samples.
The start and stop times are defined as the points where the power is at least 30 dB below the highest value of the stored samples in step 2.
NOTE 2: In case of insufficient dynamic range, the value of 30 dB may need to be reduced appropriately.

Step 4

Between the start and stop times of each individual burst calculate the RMS power over the burst using the formula below. The start and stop points shall be included. Save these Pburst values, as well as the start and stop times for each burst.

$$P_{burst} = \frac{1}{k}\sum_{n=1}^{k} P_{sample}(n)$$

with 'k' being the total number of samples and 'n' the actual sample number

Step 5

The highest of all Pburst values (value "A" in dBm) will be used for maximum e.i.r.p. calculation

Step 6

1,Add the (stated) antenna assembly gain "G" in dBi of the individual antenna
2, In case of smart antenna systems operating in mode with beamforming (see clause 5.3.2.2.4), add the additional beamforming gain Y in dB.

If more than one antenna assembly is intended for this power setting, the maximum overall antenna gain (G or G + Y) shall be used.
The RF Output Power (P) shall be calculated using the formula: P = A + G + Y
This value, which shall comply with the limit given in clause 4.3.1.2.3 or clause 4.3.2.2.3, shall be recorded in the test report.

4.1.4 **Test Data**

Test Mode	Test Conditions	Frequency (MHz)	Measured Power (dBm)	EIRP (dBm)	Limit (dBm)
Mode1	Tnom (25℃)	2405	8.25	8.57	≦20
		2440	8.51	8.83	≦20
		2480	8.17	8.49	≦20
	Tmax (45℃)	2405	7.99	8.31	≦20
		2440	8.27	8.59	≦20
		2480	7.95	8.27	≦20
	Tmin (-20℃)	2405	8.55	8.87	≦20
		2440	8.78	9.1	≦20
		2480	8.33	8.65	≦20

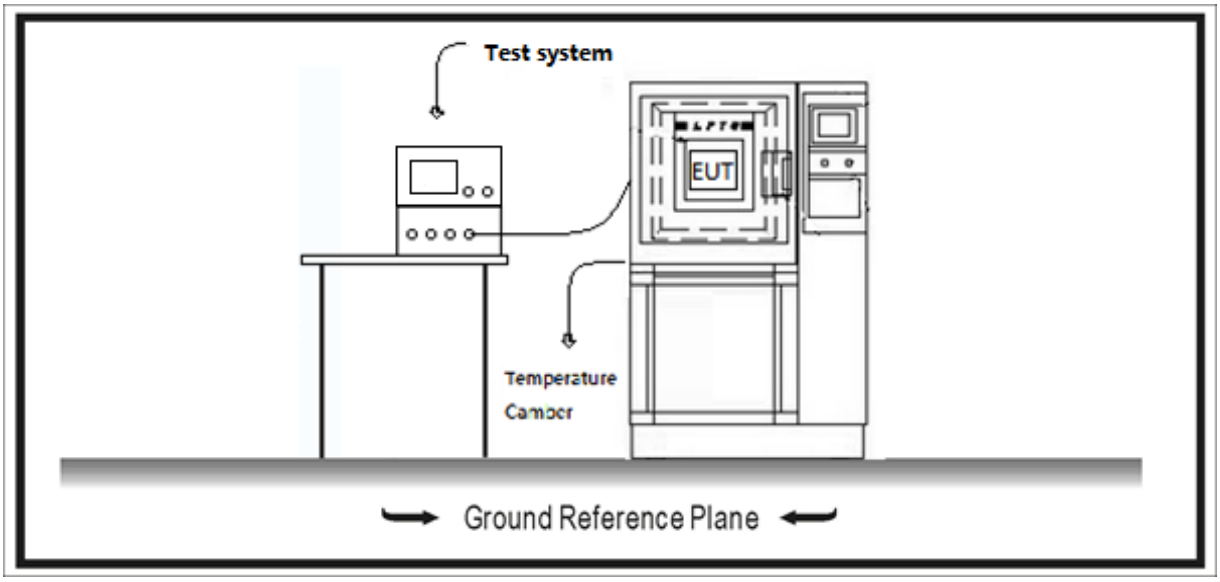
Note 1: EIRP=Measured power+Antenna gain.

Note 2: The antenna gain please refer to clause 1.2.

4.2 **Power Spectral Density**	**VERDICT: PASS**

4.2.1 **Limit**	
Standard	ETSI EN 300 328 V2.2.2
The maximum Power Spectral Density is limited to 10dBm per MHz.	

4.2.2 **Test Setup**



4.2.3 **Test Procedure**

	References Rule		Chapter	Description
☒	ETSI EN 300 328 V2.2.2		5.4.3.2.1	Power Spectral Density
	☒	Option 1:	For equipment with continuous and non-continuous transmissions	
	☐	Option 2:	For equipment with continuous transmission capability or for equipment operating with a constant duty cycle	

Step 1

1, Connect the UUT to the spectrum analyzer and use the following settings:

Start Frequency: 2 400 MHz Stop Frequency: 2 483,5 MHz

Resolution BW: 10 kHz Video BW: 30 kHz

Sweep Points: > 8 350

NOTE: For spectrum analyzers not supporting this number of sweep points, the frequency band may be segmented.

Detector: RMS Trace Mode: Max Hold

Sweep time: 10 s; the sweep time may be increased further until a value where the sweep time

has no impact on the RMS value of the signal

For non-continuous signals, wait for the trace to stabilize.

Save the data (trace data) set to a file.

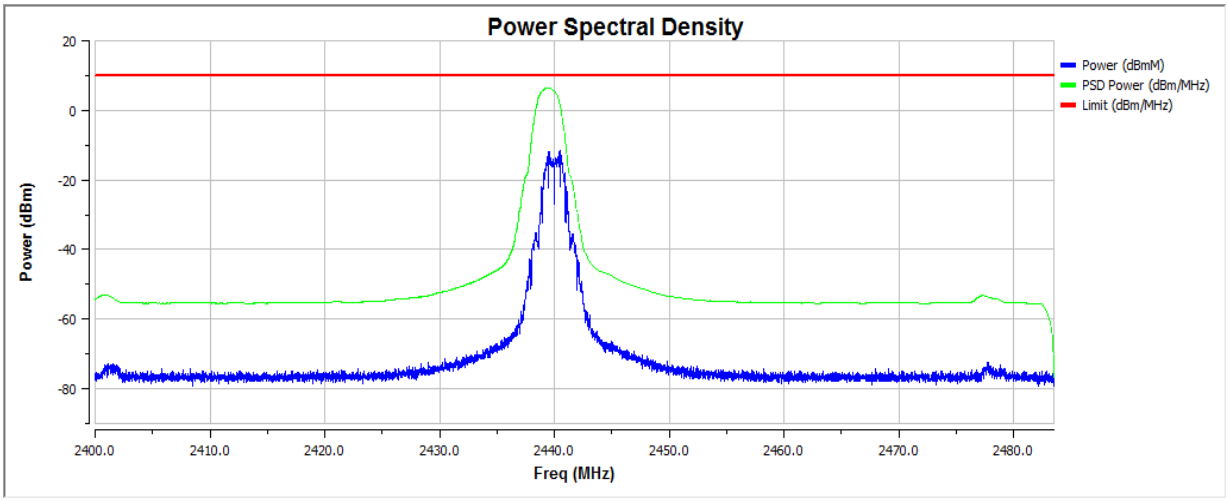
Step 2
For conducted measurements on smart antenna systems using either operating mode 2 or operating mode 3 (see clause 5.3.2.2), repeat the measurement for each of the transmit ports. For each sampling point, add up the coincident power values (in mW) for the different transmit chains and use this as the new data set.
Step 3
Add up the values for power for all the samples in the file using the formula below. $P_{Sum} = \sum_{n=1}^{k} P_{sample}(n)$ with 'k' being the total number of samples and 'n' the actual sample number
Step 4
Normalize the individual values for power (in dBm) so that the sum is equal to the RF Output Power (e.i.r.p.) measured in clause 5.4.2 and save the corrected data. The following formulas can be used: $C_{corr}=P_{sum}-P_{e.r.i.p.}$ $P_{samplecorr}(n)=P_{sample}(n)-C_{corr}$ with 'n' being the actual sample number
Step 5
Starting from the first sample $P_{Samplecorr}(n)$ (lowest frequency), add up the power (in mW) of the following samples representing a 1 MHz segment and record the results for power and position (i.e. sample #1 to sample #100). This is the Power Spectral Density (e.i.r.p.) for the first 1 MHz segment which shall be recorded.
Step 6
Shift the start point of the samples added up in step 5 by one sample and repeat the procedure in step 5 (i.e. sample #2 to sample #101).
Step 7
Repeat step 6 until the end of the data set and record the Power Spectral Density values for each of the 1 MHz segments. From all the recorded results, the highest value is the maximum Power Spectral Density for the UUT. This value, which shall comply with the limit given in clause 4.3.2.3.3, shall be recorded in the test report.

4.2.4 **Test Data**

Test Mode	Test Conditions	Frequency (MHz)	Power Spectral Density (dBm/MHz)	Limit (dBm)
Mode1	Tnom (25℃)	2405	6.31	≦10
		2440	6.55	≦10
		2480	6.24	≦10

Note 1: The worst data plot as below:

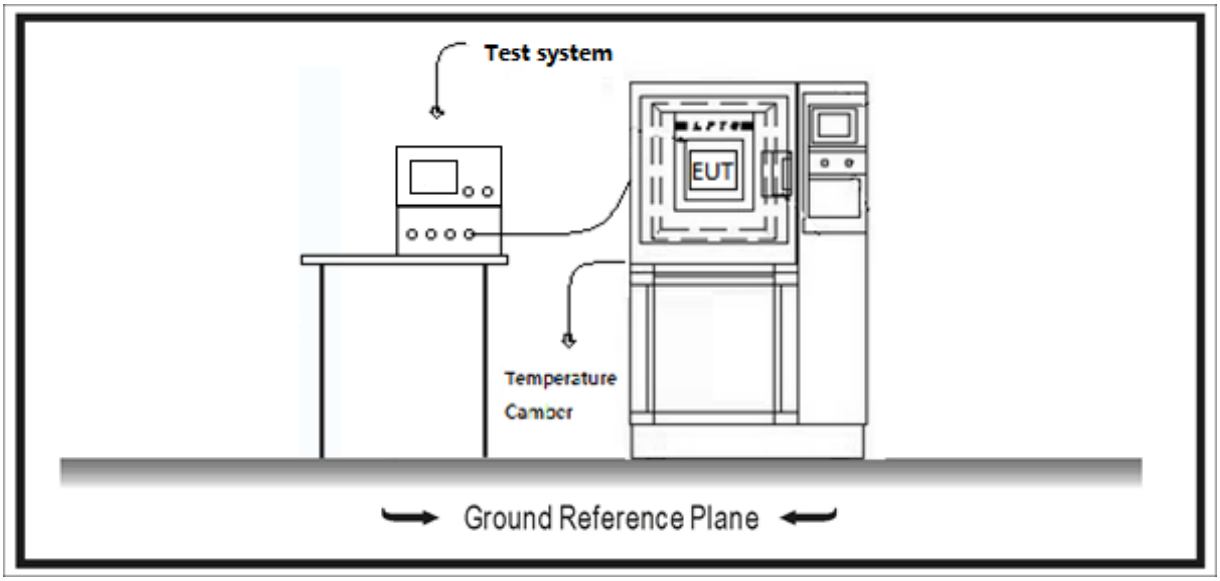
Mode1/CH18/2440MHz



4.3 **Duty Cycle, Tx-sequence, Tx-gap**	**VERDICT: N/A**

4.3.1 **Limit**	
Standard	ETSI EN 300 328 V2.2.2
☒	For adaptive equipment using wide band modulations other than FHSS / For non-adaptive equipment using wide band modulations other than FHSS and EIRP lower than 10dBm.
N/A	
☐	For non-adaptive equipment using wide band modulations other than FHSS and EIRP higher than 10dBm.
1,The Duty Cycle shall be equal to or less than the maximum value declared by the supplier. 2,The maximum Tx-sequence Time and the minimum Tx-gap Time shall be according to the formula below: 3,Maximum Tx-Sequence Time = Minimum Tx-gap Time = M where M is in the range of 3,5 ms to 10 ms.	

4.3.2 **Test Setup**



4.3.3 **Test Procedure**			
References Rule		Chapter	Description
☒	ETSI EN 300 328 V2.2.2	5.4.2.2.1.3	Duty Cycle, Tx-sequence, Tx-gap
Step 1			
1, Use the same stored measurement samples from the procedure described in clause 5.4.2.2.1.2. 2, The start and stop times are defined as the points where the power is at least 30 dB below the highest value of the stored samples. In case of insufficient dynamic range, the value of 30 dB may need to be reduced appropriately.			
Step 2			
Between the saved start and stop times of each individual burst, calculate the TxOn time. Save these TxOn values.			

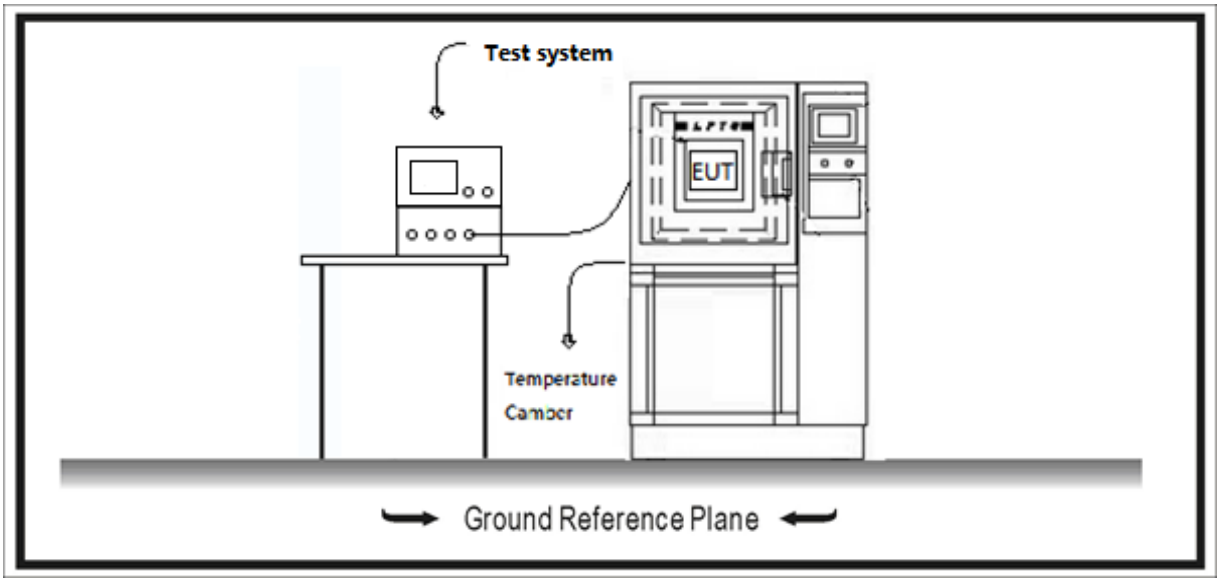
Step 3
Duty Cycle is the sum of all TxOn times between the end of the first gap (which is the start of the first burst within the observation period) and the start of the last burst (within this observation period) divided by the observation period. The observation period is defined in clause 4.3.1.3.2 or clause 4.3.2.4.2.
Step 4
1, For FHSS equipment using blacklisting, the TxOn time measured for a single (and active) hopping frequency shall be multiplied by the number of blacklisted frequencies. This value shall be added to the sum calculated in step 3 above. If the number of blacklisted frequencies cannot be determined, the minimum number of hopping frequencies (N) as defined in clause 4.3.1.4.3 shall be assumed 2, The calculated value for Duty Cycle (DC) shall be recorded in the test report. This value shall be equal to or less than the maximum value declared by the manufacturer
Step 5
1, Use the same stored measurement samples from the procedure described in clause 5.4.2.2.1.2. 2, Identify any TxOff time that is equal to or greater than the minimum Tx-gap time as defined in clause 4.3.1.3.3 or clause 4.3.2.4.3. These are the potential valid gap times to be further considered in this procedure. 3, Starting from the second identified gap, calculate the time from the start of this gap to the end of the preceding gap. This time is the Tx-sequence time for this transmission. Repeat this procedure until the last identified gap within the observation period is reached. 4, A combination of consecutive Tx-sequence times and Tx-gap times followed by a Tx-gap time, which is at least as long as the duration of this combination, may be considered as a single Tx-sequence time and in which case it shall comply with the limits defined in clause 4.3.1.3.3 or clause 4.3.2.4.3. 5, It shall be noted in the test report whether the UUT complies with the limits for the maximum Tx-sequence time and minimum Tx-gap time as defined in clause 4.3.1.3.3 or clause 4.3.2.4.3.

4.3.4 **Test Data**

Applicability requirement:
These requirements apply to non-adaptive equipment or to adaptive equipment when operating in a non-adaptive mode.The equipment is using wide band modulations other than FHSS.
These requirements do not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.
Applicability judgment: Not Application

4.4 **Medium Utilisation (MU) factor**	**VERDICT: N/A**

4.4.1 **Limit**	
Standard	ETSI EN 300 328 V2.2.2
☒	For adaptive equipment using wide band modulations other than FHSS / For non-adaptive equipment using wide band modulations other than FHSS and EIRP lower than 10dBm.
N/A	
☐	For non-adaptive equipment using wide band modulations other than FHSS and EIRP higher than 10dBm.
the maximum Medium Utilisation factor shall be 10 %.	

4.4.2 **Test Setup**


4.4.3 **Test Procedure**			
References Rule		Chapter	Description
☒	ETSI EN 300 328 V2.2.2	5.4.2.2.1.4	Medium Utilisation (MU) factor
Step 1			
Use the same stored measurement samples from the procedure described in clause 5.3.2.2.1.2.			
Step 2			
For each burst calculate the product of (P_{burst} / 100 mW) and the Tx_{On} time. P_{burst} is expressed in mW. TxOn time is expressed in ms.			
Step 3			
Medium Utilization is the sum of all these products divided by the observation period (expressed in ms) which is defined in clause 4.3.1.3.2 or clause 4.3.2.4.2. This value, which shall comply with the limit given in clause 4.3.1.6.3 or clause 4.3.2.5.3, shall be recorded in the test report. If, in case of FHSS equipment, operation without blacklisted frequencies is not possible, the power of the bursts on blacklisted hopping frequencies (for the calculation of the Medium Utilization) is assumed to be equal to the average value of the RMS power of the bursts on all active hopping frequencies.			

4.4.4 **Test Data**

Applicability requirement:

These requirements apply to non-adaptive equipment or to adaptive equipment when operating in a non-adaptive mode.The equipment is using wide band modulations other than FHSS.

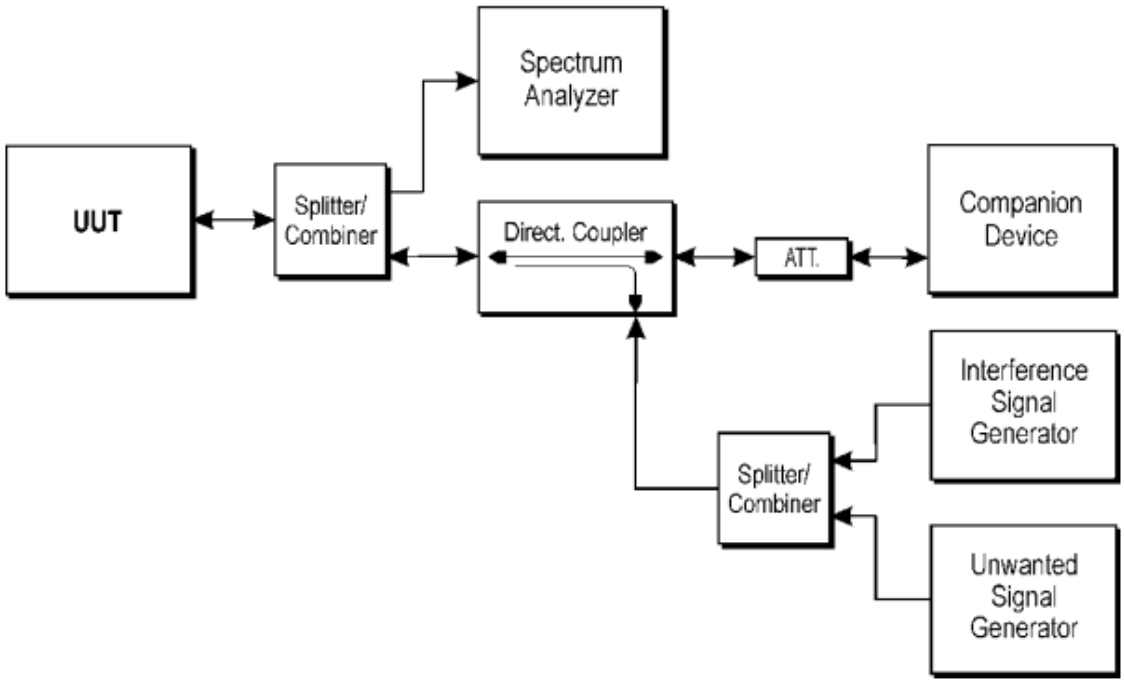
These requirements do not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

Applicability judgment: Not Application

4.5 **Adaptivity**	**VERDICT: N/A**

4.5.1 **Limit**		
Standard		ETSI EN 300 328 V2.2.2
☐	For adaptive equipment using wide band modulations other than FHSS	
	☐	Non-LBT based Detect and Avoid
		(1) 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; (2) COT ≤ 40 ms; (3) Idle Period shall be minimum 5% of COT with a minimum of 100μs; (4) Detection threshold level =-70 dBm/MHz + 10 × $\log_{10}$ (100 mW / P_{out}) (Pout in mW e.i.r.p.); (5) To verify that the UUT is not resuming normal transmissions as long as the interference and blocking signals are present, the monitoring time may need to be 60 s or more.
	☐	LBT based Detect and Avoid(Frame Based Equipment)
		(1) The CCA observation time shall be not less than 18μs; (2) The CCA time used by the equipment shall be declared by the supplier; (3) COT = 1-10 ms; (4) Idle Period = 5% of COT; (5) Detection threshold level =-70 dBm/MHz + 10 × $\log_{10}$ (100 mW / P_{out}) (Pout in mW e.i.r.p.); (6) To verify that the UUT is not resuming normal transmissions as long as the interference and blocking signals are present, the monitoring time may need to be 60 s or more.
	☐	LBT based Detect and Avoid(Load Based Equipment)
		(1) The CCA observation time shall be not less than 18μs; (2) Extended CCA time shall be between 18μs and 160μs; (3) COT ≤ 13ms; (4) Detection threshold level =-70 dBm/MHz + 10 × $\log_{10}$ (100 mW / P_{out}) (Pout in mW e.i.r.p.); (5) To verify that the UUT is not resuming normal transmissions as long as the interference and blocking signals are present, the monitoring time may need to be 60 s or more.
	☐	Short Control Signalling Transmissions:
		Short Control Signalling Transmissions of adaptive non-FHSS equipment shall have a maximum Tx_{On} / (Tx_{On} + Tx_{Off}) ratio of 10 % within any observation period of 50 ms.
	☐	Unwanted Signal
		Single power≥-35dBm

4.5.2 **Test Setup**



4.5.3 **Test Procedure**			
References Rule		Chapter	Description
☒	ETSI EN 300 328 V2.2.2	5.4.6.2.1.3	Adaptivity

The different steps below define the procedure to verify the efficiency of the LBT based adaptive mechanism of equipment using wide band modulations other than FHSS. This method can be applied on Load Based Equipment and Frame Based Equipment.

For systems using multiple receive chains only one chain (antenna port) need to be tested. All other receiver inputs shall be terminated.

Step 1

1, The UUT shall connect to a companion device during the test. The interference signal generator, the unwanted signal generator, the spectrum analyser, the UUT and the companion device are connected using a set-up equivalent to the example given by figure 5 although the interference and unwanted signal generator do not generate any signals at this point in time. The spectrum analyser is used to monitor the transmissions of both the UUT and the companion device and it should be possible to distinguish between either transmission. In addition, the spectrum analyser is used to monitor the transmissions of the UUT in response to the interfering and the unwanted signals.

2, Adjust the received signal level (wanted signal from the companion device) at the UUT to the value defined in table 10 (clause 4.3.2.6.3.2.2) for Frame Based Equipment or in table 11 (clause 4.3.2.6.3.2.3) for Load Based Equipment.

NOTE 1: Testing of Unidirectional equipment does not require a link to be established with a companion device.

3, The analyzer shall be set as follows:

(1)RBW: ≥ Occupied Channel Bandwidth (if the analyzer does not support this setting, the highest available setting shall be used)

(2)VBW: 3 × RBW (if the analyzer does not support this setting, the highest available setting shall be used)

(3)Detector Mode: RMS

(4)Centre Frequency: Equal to the centre frequency of the operating channel

(5)Span: 0 Hz

(6)Sweep time: > maximum Channel Occupancy Time

(7)Trace Mode: Clear Write

(8)Trigger Mode: Video

Step 2

1, Configure the UUT for normal transmissions with a sufficiently high payload resulting in a minimum transmitter activity ratio (TxOn / (TxOn + TxOff)) of 0,3. Where this is not possible, the UUT shall be configured to the maximum payload possible.

2, For Frame Based Equipment, using the procedure defined in clause 5.4.7.2.1.4, it shall be verified that the UUT complies with the maximum Channel Occupancy Time and minimum Idle Period defined in clause 4.3.2.6.3.2.2 step 3). When measuring the Idle Period of the UUT, only transmissions from the UUT shall be considered.

3, For Load Based equipment, using the procedure defined in clause 5.4.6.2.1.5, it shall be verified that the UUT complies with the maximum Channel Occupancy Time and minimum Idle Period defined in clause 4.3.2.6.3.2.3, step 2 and step 3. When measuring the Idle Period of the UUT, only transmissions from the UUT shall be considered.

NOTE 2: For the purpose of testing Load Based Equipment referred to in the first paragraph of clause 4.3.2.6.3.2.3 (IEEE 802.11™ [i.3] or IEEE 802.15.4™ [i.4] equipment), the limits to be applied for the minimum Idle Period and the maximum Channel Occupancy Time are the same as defined for other types of Load Based Equipment (see clause 4.3.2.6.3.2.3 step 2) and step 3). The Idle Period is considered to be equal to the CCA or Extended CCA

time defined in clause 4.3.2.6.3.2.3 step 1) and step 2).
Step 3: Adding the interference signal
An interference signal as defined in clause B.6 is injected on the current operating channel of the UUT. The power spectral density level (at the input of the UUT) of this interference signal shall be equal to the detection threshold defined in clause 4.3.2.6.3.2.2 step 5) (frame based equipment) or clause 4.3.2.6.3.2.3 step 5) (load based equipment).
Step 4: Verification of reaction to the interference signal
1, The spectrum analyzer shall be used to monitor the transmissions of the UUT on the selected operating channel with the interfering signal injected. This may require the spectrum analyzer sweep to be triggered by the start of the interfering signal. 2,Using the procedure defined in clause 5.4.7.2.1.4, it shall be verified that: i) The UUT shall stop transmissions on the current operating channel. NOTE 3: The UUT is assumed to stop transmissions within a period equal to the maximum Channel Occupancy Time defined in clause 4.3.2.6.3.2.2 (frame based equipment) or clause 4.3.2.6.3.2.3 (load based equipment). ii) Apart from Short Control Signalling Transmissions, there shall be no subsequent transmissions while the interfering signal is present. NOTE 4: To verify that the UUT is not resuming normal transmissions as long as the interference signal is present, the monitoring time may need to be 60 s or more. iii) The UUT may continue to have Short Control Signalling Transmissions on the operating channel while the interfering signal is present. These transmissions shall comply with the limits defined in clause 4.3.2.6.4.2. NOTE 5: The verification of the Short Control Signalling transmissions may require the analyzer settings to be changed (e.g. sweep time). iv) Alternatively, the equipment may switch to a non-adaptive mode.
Step 5: Adding the unwanted CW signal
1, With the interfering signal present, a 100 % duty cycle CW signal is inserted as the unwanted signal. The frequency and the level are provided in table 10 (clause 4.3.2.6.3.2.2) for Frame Based Equipment or in table 11 (clause 4.3.2.6.3.2.3) for Load Based Equipment. 2, The spectrum analyzer shall be used to monitor the transmissions of the UUT on the selected operating 3,Using the procedure defined in clause 5.4.7.2.1.4, it shall be verified that: i) The UUT shall not resume normal transmissions on the current operating channel as long as both the interference and blocking signals remain present. NOTE 6: To verify that the UUT is not resuming normal transmissions as long as the interference and blocking signals are present, the monitoring time may need to be 60 s or more. ii) The UUT may continue to have Short Control Signalling Transmissions on the operating channel while the interfering and blocking signals are present. These transmissions shall comply with the limits defined in clause 4.3.2.6.4.2. NOTE 7: The verification of the Short Control Signalling transmissions may require the analyzer settings to be changed (e.g. sweep time).
Step 6: Removing the interference and unwanted signal
On removal of the interference and unwanted signal the UUT is allowed to start transmissions again on this channel however this is not a requirement and therefore does not require testing.
Step 7: Removing the interference and unwanted signal
Step 2 to step 6 shall be repeated for each of the frequencies to be tested.

4.5.4 **Test Data**

Applicability requirement:

This requirement does not apply to non-adaptive non-FHSS equipment or adaptive non-FHSS equipment operating in a non-adaptive mode.

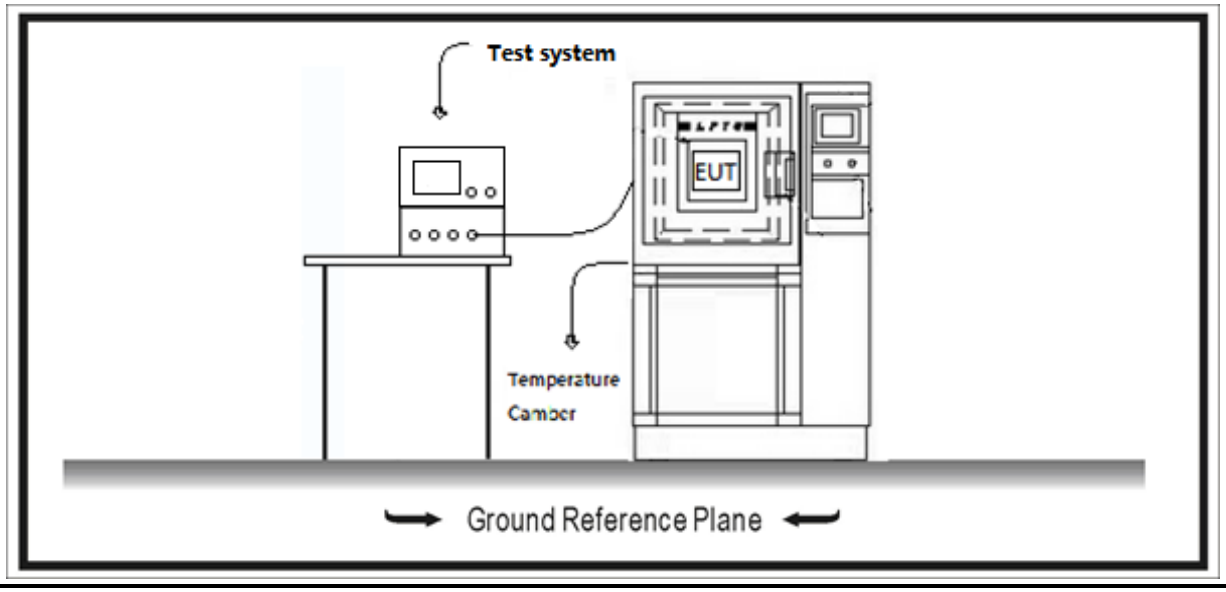
In addition, this requirement does not apply for non-FHSS equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for non-FHSS equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

Applicability judgment: Not Application

4.6 **Occupied Channel Bandwidth**	**VERDICT: PASS**

4.6.1 **Limit**	
Standard	ETSI EN 300 328 V2.2.2
☒	For adaptive equipment using wide band modulations other than FHSS
The Occupied Channel Bandwidth shall fall completely within the band given in 2.4GHz to 2.4835GHz.	
☐	For non-adaptive equipment using wide band modulations other than FHSS
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.	

4.6.2 **Test Setup**



4.6.3 **Test Procedure**

References Rule		Chapter	Description
☒	ETSI EN 300 328 V2.2.2	5.4.7.2.1	Occupied Channel Bandwidth

Step 1

1, Connect the UUT to the spectrum analyzer and use the following settings
(1),Centre Frequency: The centre frequency of the channel under test
(2),Resolution BW: ~ 1 % of the span without going below 1 %
(3),Video BW: 3 × RBW
(4),Frequency Span : 2 × Nominal Channel Bandwidth
(5), Detector Mode: RMS
(6), Trace Mode: Max Hold
(7), Sweep time: 1 s

Step 2

Wait for the trace to stabilize.
Find the peak value of the trace and place the analyzer marker on this peak.

Step 3

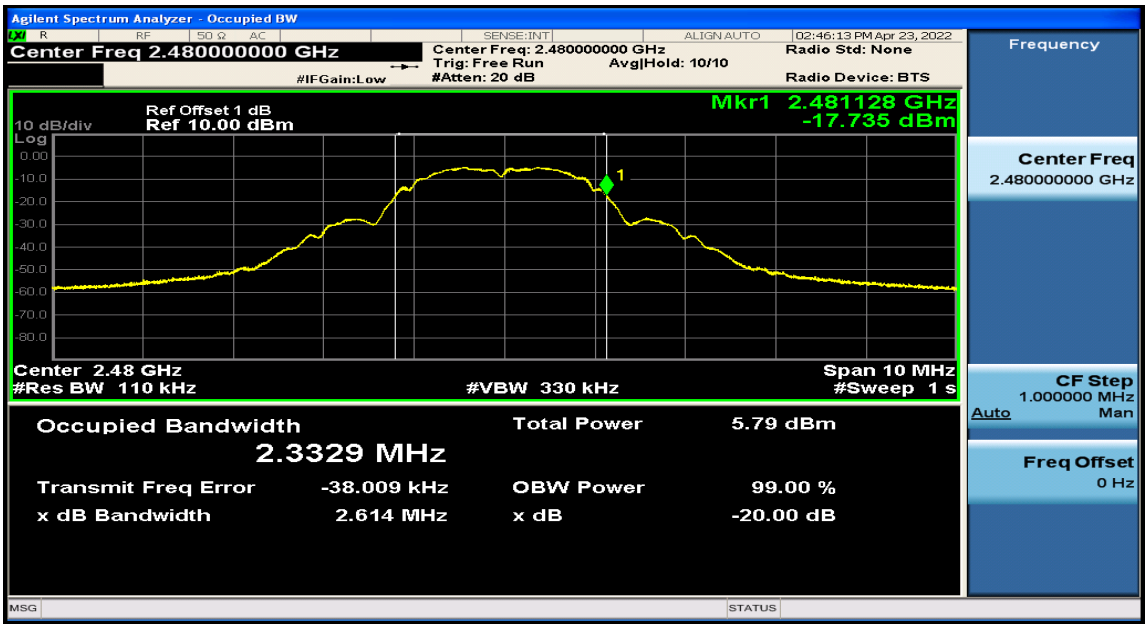
Use the 99 % bandwidth function of the spectrum analyzer to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded.
NOTE: Make sure that the power envelope is sufficiently above the noise floor of the analyzer to avoid the noise signals left and right from the power envelope being taken into account by this measurement.

4.6.4 **Test Data**

Test Mode	Frequency (MHz)	99% Bandwidth (MHz)	Frequency near the operating band (MHz)	Limit (MHz)
Mode1	2405	2.331	2403.798	Within 2400-2483.5MHz
	2480	2.333	2481.128	Within 2400-2483.5MHz

Note 1: The worst data plot as below:

Mode1/CH26/2480MHz



4.7 **Transmitter unwanted emissions in the out-of-band domain**	**VERDICT: PASS**

4.7.1 **Limit**	
Standard	ETSI EN 300 328 V2.2.2

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.

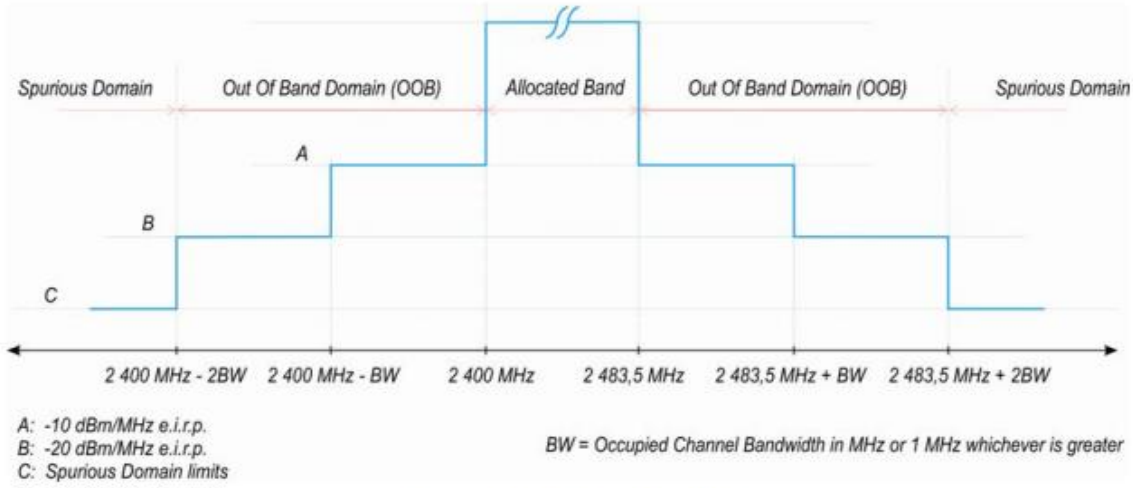
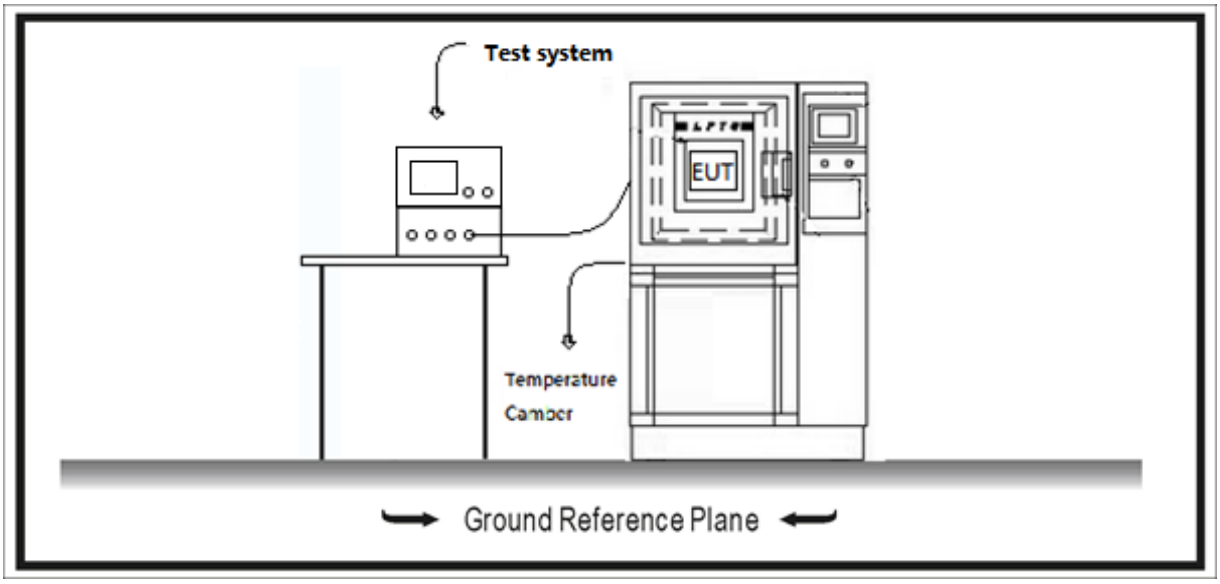


Figure 3: Transmit mask

4.7.2 Test Setup



4.7.3 **Test Setup**

	References Rule	Chapter	Description
☒	ETSI EN 300 328 V2.2.2	5.4.8.2.1	Transmitter unwanted emissions in the out-of-band domain

The applicable mask is defined by the measurement results from the tests performed under clause 5.4.7 (Occupied Channel Bandwidth).

The Out-of-band emissions within the different horizontal segments of the mask provided in figure 1 and figure 3 shall be measured using the procedure in step 1 to step 6 below. This method assumes the spectrum analyser is equipped with the Time Domain Power option

Step 1

1, Connect the UUT to the spectrum analyzer and use the following settings
(1), Centre Frequency: 2 484 MHz
(2), Span: 0 Hz
(3), Resolution BW: 1 MHz
(4), Video BW: 3 MHz
(5), Detector Mode: RMS
(6), Trace Mode: Max Hold
(7), Sweep Mode: Single Sweep
(8), Sweep Points: Sweep time [µs] / (1 µs) with a maximum of 30 000
(9), Trigger Mode: Video trigger
(10), Sweep Time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power

Step 2(segment 2 483,5 MHz to 2 483,5 MHz + BW):

1, Adjust the trigger level to select the transmissions with the highest power level.
2,For frequency hopping equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.
3,Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function.
4,Select RMS power to be measured within the selected window and note the result which is the RMS power within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.
5,Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 3(segment 2 483,5 MHz + BW to 2 483,5 MHz + 2BW):

Change the centre frequency of the analyzer to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483,5 MHz + BW to 2 483,5 MHz + 2BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW - 0,5 MHz (which means this may partly overlap with theprevious 1 MHz segment).

Step 4 (segment 2 400 MHz - BW to 2 400 MHz):

Change the centre frequency of the analyzer to 2 399,5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 5 (segment 2 400 MHz - 2BW to 2 400 MHz - BW):
Change the centre frequency of the analyzer to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).
Step 6 (segment 2 400 MHz - 2BW to 2 400 MHz - BW):
1,In case of conducted measurements on equipment with a single transmit chain, the declared antenna assembly gain "G" in dBi shall be added to the results for each of the 1 MHz segments and compared with the limits provided by the mask given in figure 1 or figure 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered. 2,In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain "G" in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered. Comparison with the applicable limits shall be done using any of the options given below: (1),Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain "Y" in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figure 1 or figure 3. (2)Option 2: the limits provided by the mask given in figure 1 or figure 3 shall be reduced by 10 × log10(Ach) and the additional beamforming gain "Y" in dB. The results for each of the transmit chains shall be individually compared with these reduced limits. NOTE 2: Ach refers to the number of active transmit chains. It shall be recorded whether the equipment complies with the mask provided in figure 1 or figure 3.

4.7.4 **Test Data**

Test Mode	Frequency Range (MHz)	Measured Values (dBm/MHz)	Limit (dBm/MHz)
Mode1	2400–2BW~2400-BW	-48.00	≤ -20
	2400–BW~2400	-42.97	≤ -10
	2483.5~2483.5+BW	-38.40	≤ -10
	2483.5+BW~2483.5+2BW	-44.94	≤ -20

4.8 Transmitter unwanted emissions in the spurious domain — VERDICT: PASS

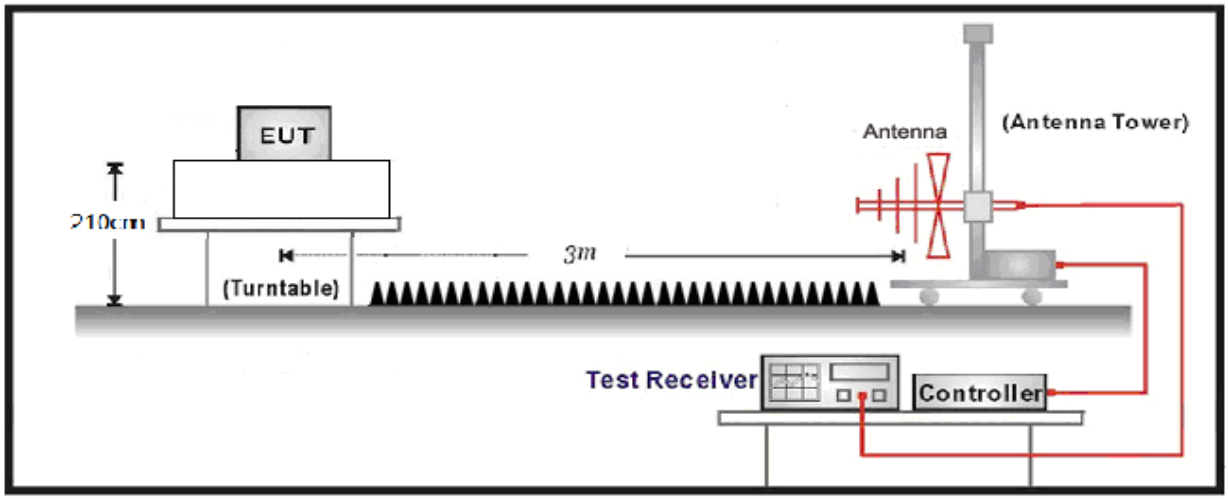
4.8.1 Limit

Standard ETSI EN 300 328 V2.2.2

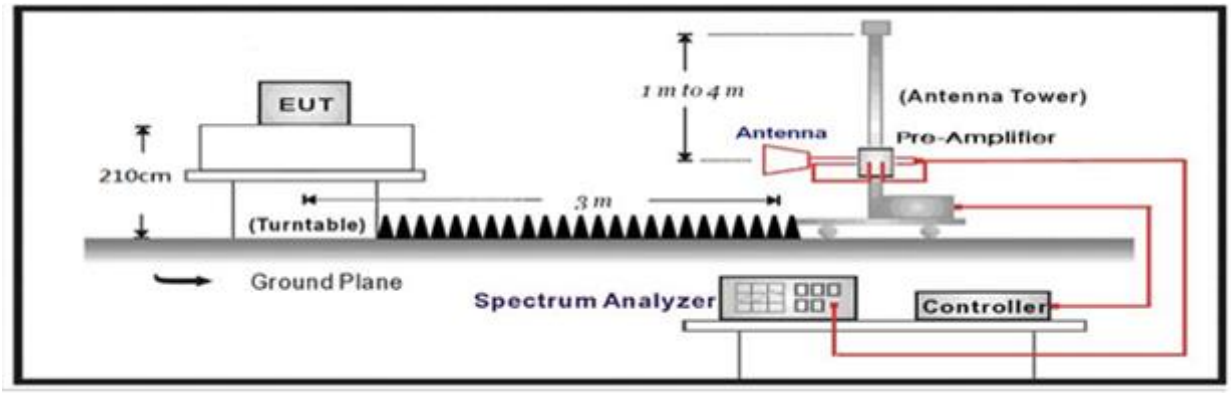
Frequency range	Maximum power	Bandwidth
30 MHz to 47 MHz	-36 dBm	100kHz
47 MHz to 74 MHz	-54 dBm	100kHz
74 MHz to 87,5 MHz	-36 dBm	100kHz
87,5 MHz to 118 MHz	-54 dBm	100kHz
118 MHz to 174 MHz	-36 dBm	100kHz
174 MHz to 230 MHz	-54 dBm	100kHz
230 MHz to 470 MHz	-36 dBm	100kHz
470 MHz to 694 MHz	-54 dBm	100kHz
694 MHz to 1 GHz	-36 dBm	100kHz
1 GHz to 12,75 GHz	-30 dBm	1MHz

4.8.2 **Test Setup**

Transmitter unwanted emissions in the spurious domain / AC6 (Below 1G)



Transmitter unwanted emissions in the spurious domain / AC6 (Above 1G)



4.8.3 Test Procedure

4.8.4	References Rule	Chapter	Description
	ETSI EN 300 328 V2.2.2	5.4.9.2.2	Radiated measurement

4.8.5

Step 1

The sensitivity of the measurement set-up should be such that the noise floor is at least 12 dB below the limits given in table 4 or table 12.

Step 2

The emissions over the range 30 MHz to 1 000 MHz shall be identified.
Spectrum analyzer settings:
(1),Resolution bandwidth: 100 kHz
(2),Video bandwidth: 300 kHz
(3),Filter type: 3 dB (Gaussian)
(4),Detector mode: Peak
(5),Trace Mode: Max Hold
(6),Sweep Points: ≥ 19 400
NOTE 1: For spectrum analyzers not supporting this high number of sweep points, the frequency band may need to be segmented.
(7)Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 100 kHz frequency step, the measurement time is greater than two transmissions of the UUT, on any channel.
For Frequency Hopping equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on any of the hopping frequencies.
NOTE 2: The above sweep time setting may result in long measuring times in case of frequency hopping equipment. To avoid such long measuring times, an FFT analyzer could be used.
Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.9.2.1.3 and compared to the limits given in table 4 or table 12.

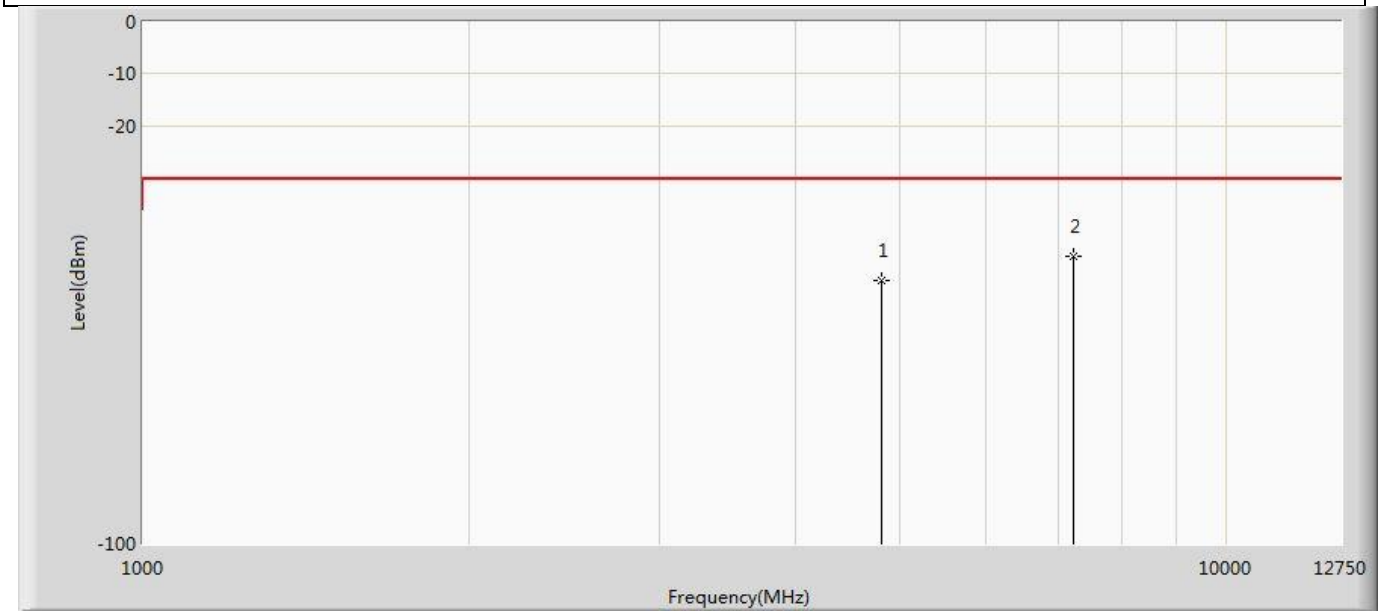
Step 3

The emissions over the range 1 GHz to 12,75 GHz shall be identified.
Spectrum analyzer settings:
(1),Resolution bandwidth: 1 MHz
(2),Video bandwidth: 3 MHz
(3),Filter type: 3 dB (Gaussian)
(4),Detector mode: Peak
(5),Trace Mode: Max Hold
(6),Sweep Points: ≥ 23 500
NOTE 3: For spectrum analyzers not supporting this high number of sweep points, the frequency band may need to be segmented.
(7)Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 1 MHz frequency step, the measurement time is greater than two transmissions of the UUT, on any channel.
For Frequency Hopping equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on any of the hopping frequencies.

		NOTE 4: The above sweep time setting may result in long measuring times in case of frequency hopping equipment. To avoid such long measuring times, an FFT analyzer could be used. Allow the trace to stabilize. Any emissions identified during the sweeps above that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.9.2.1.3 and compared to the limits given in table 4 or table 12. FHSS equipment may generate a block (or several blocks) of spurious emissions anywhere within the spurious domain. If this is the case, only the highest peak of each block of emissions shall be measured using the procedure in clause 5.4.9.2.1.3.
		Step 4
		In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), step 2 and step 3 need to be repeated for each of the active transmit chains (Ach).The limits used to identify emissions during this pre-scan need to be reduced with 10 × $\log_{10}$ (Ach) (number of active transmit chains).
		Measurement of the emissions identified during the pre-scan
		The procedure in step 1 to step 4 below shall be used to accurately measure the individual unwanted emissions identified during the pre-scan measurements above. This method assumes the spectrum analyser has a Time Domain Power function.
		Step 1
		The level of the emissions shall be measured using the following spectrum analyzer settings: (1),Measurement Mode: Time Domain Power (2),Centre Frequency: Frequency of the emission identified during the pre-scan (3),Resolution Bandwidth: 100 kHz (< 1 GHz) / 1 MHz (> 1 GHz) (4),Video Bandwidth: 300 kHz (< 1 GHz) / 3 MHz (> 1 GHz) (5),Frequency Span: Zero Span (6),Sweep mode: Single Sweep (7),Sweep time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power (8),Sweep points: Sweep time [µs] / (1 µs) with a maximum of 30 000 (9),Trigger: Video (burst signals) or Manual (continuous signals) (10),Detector: RMS
		Step 2
		Set a window where the start and stop indicators match the start and end of the burst with the highest level and record the value of the power measured within this window. If the spurious emission to be measured is a continuous transmission, the measurement window shall be set to match the start and stop times of the sweep.
		Step 3
		In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), step 2 needs to be repeated for each of the active transmit chains (Ach). Sum the measured power (within the observed window) for each of the active transmit chains.
		Step 4
		The value defined in step 3 shall be compared to the limits defined in tables 4 and 12.

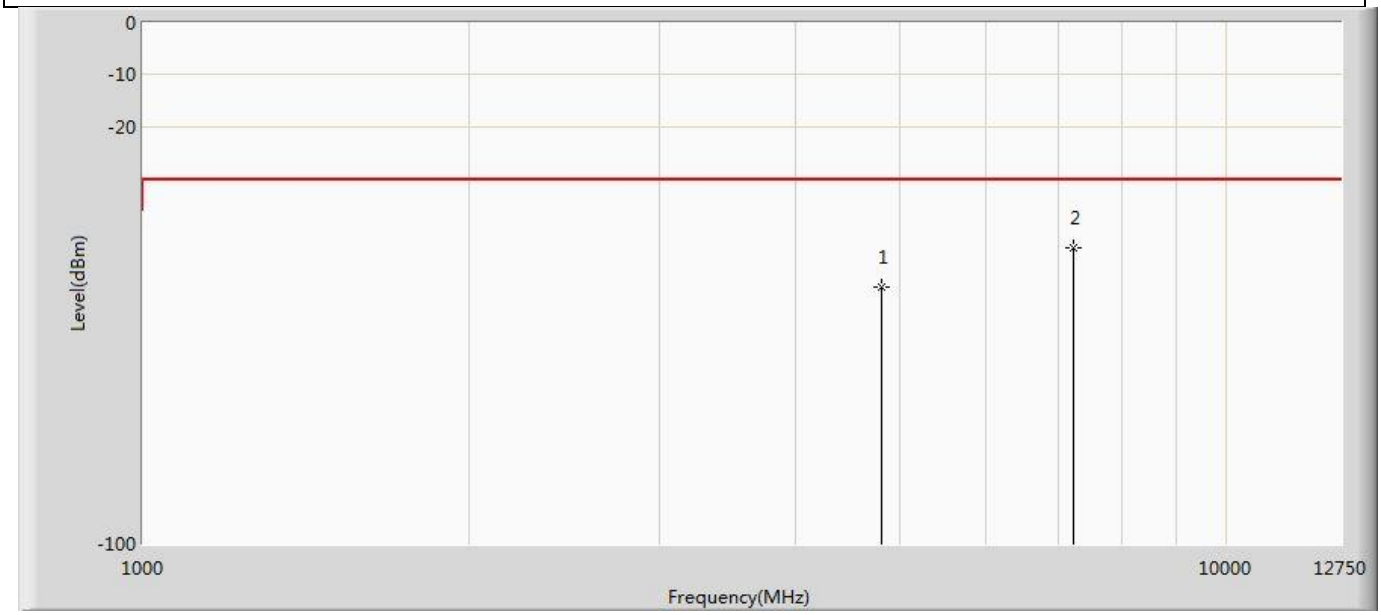
4.8.6 **Test Data**

Site: AC6	Time: 2022/04/20 - 17:08
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-H	Polarity: Horizontal
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 1: Transmit at 2405MHz by Zigbee	



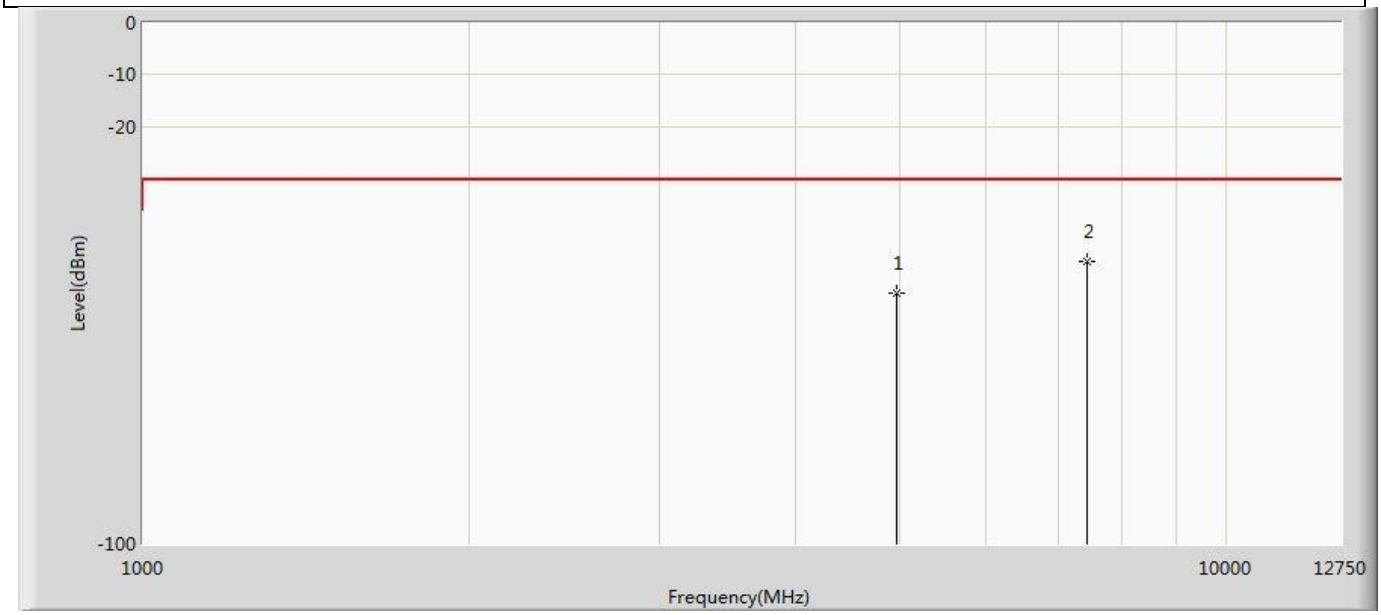
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4810.000	-49.666	-65.328	-19.666	-30.000	15.662	PK
2	*	7215.000	-44.970	-65.911	-14.970	-30.000	20.941	PK

Site: AC6	Time: 2022/04/20 - 17:08
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-V	Polarity: Vertical
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 1: Transmit at 2405MHz by Zigbee	



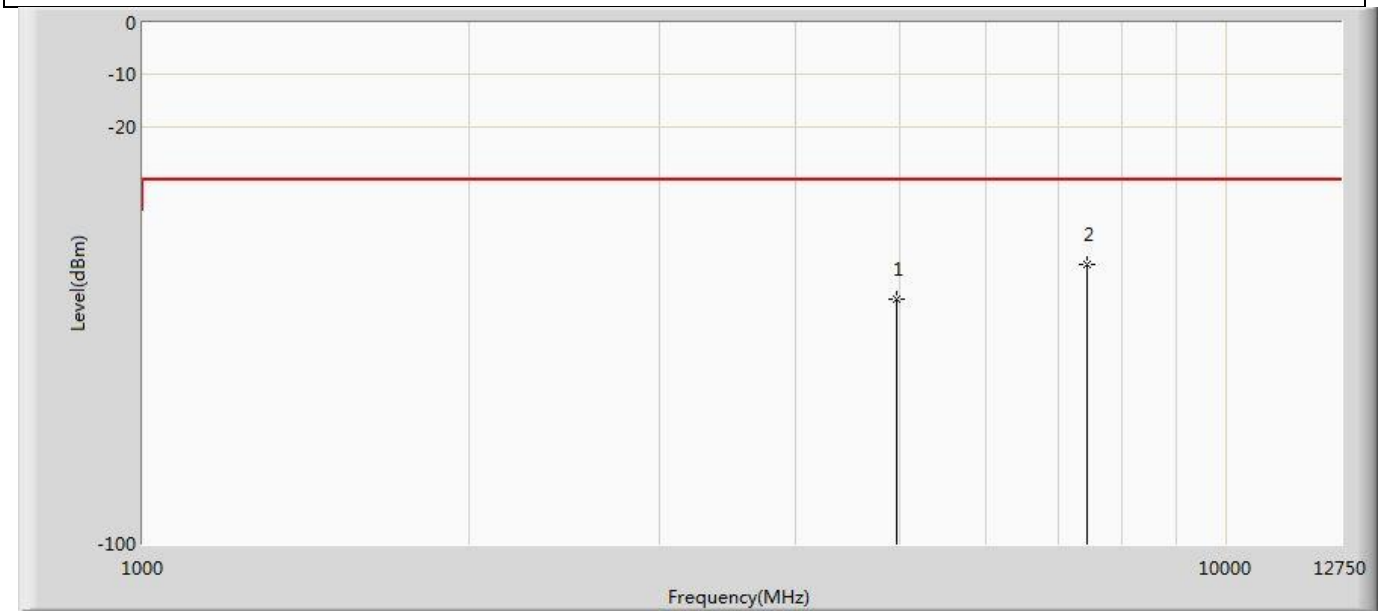
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4810.000	-50.670	-65.177	-20.670	-30.000	14.507	PK
2	*	7215.000	-43.232	-63.931	-13.232	-30.000	20.699	PK

Site: AC6	Time: 2022/04/20 - 17:08
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-H	Polarity: Horizontal
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 1: Transmit at 2480MHz by Zigbee	



No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4960.000	-52.013	-67.528	-22.013	-30.000	15.515	PK
2	*	7440.000	-45.684	-67.832	-15.684	-30.000	22.148	PK

Site: AC6	Time: 2022/04/20 - 17:08
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: 1-18G AMP-V	Polarity: Vertical
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 1: Transmit at 2480MHz by Zigbee	



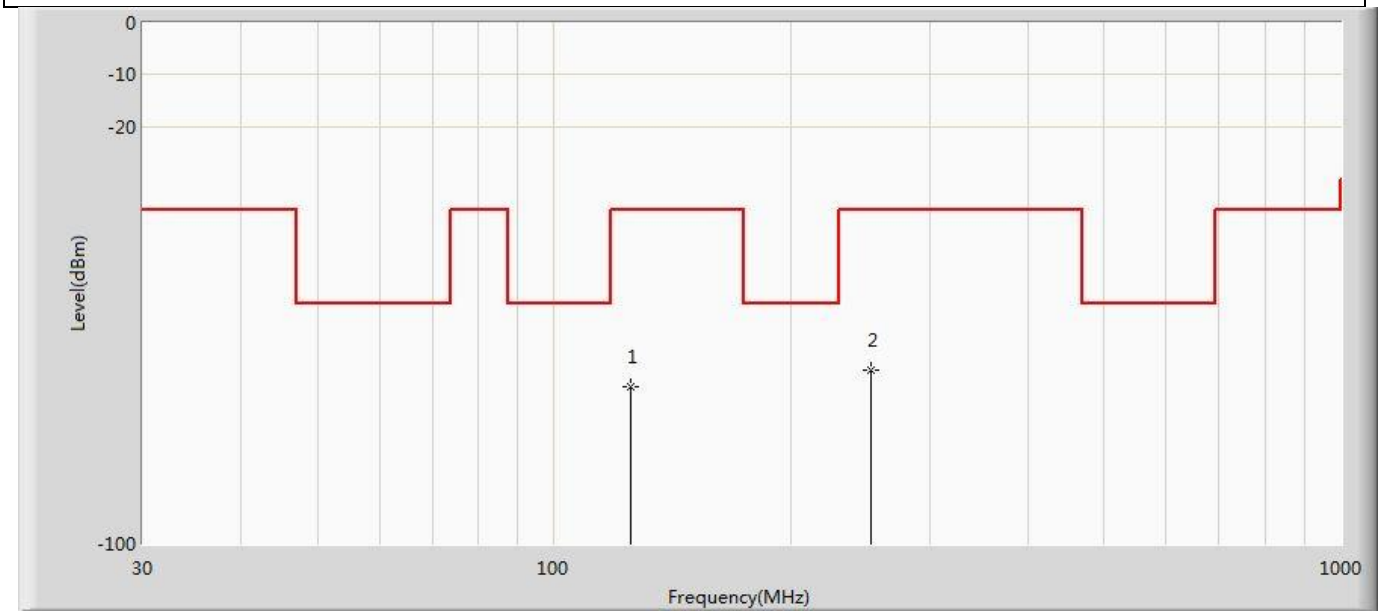
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		4960.000	-53.076	-67.505	-23.076	-30.000	14.429	PK
2	*	7440.000	-46.445	-68.131	-16.445	-30.000	21.686	PK

Note:

1. " * ", means this data is the worst emission level.
2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).
3. The final result only applies for using RMS detector , if the pre-test result on peak is lower than limit, then RMS measurement needn't be performed.

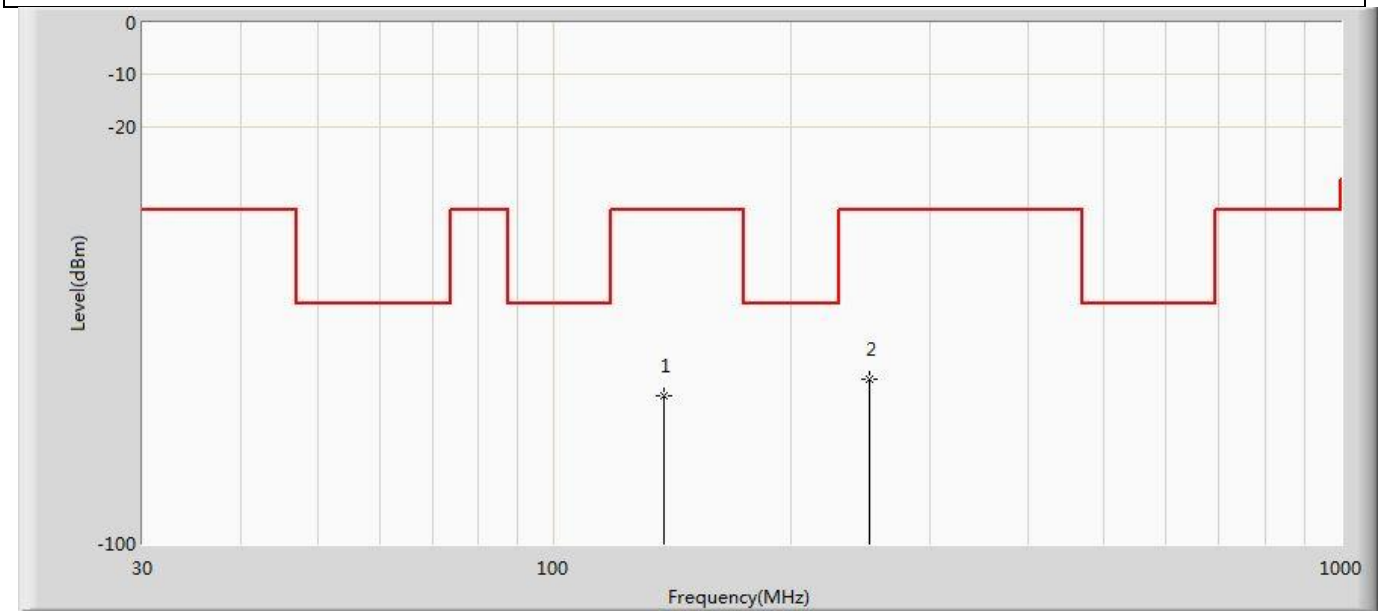
The worst case of Radiated Emission below 1GHz:

Site: AC6	Time: 2022/04/20 - 17:08
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: RF_Substitution_(DC 30-1000MHz)	Polarity: Horizontal
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 1: Transmit at 2405MHz by Zigbee	



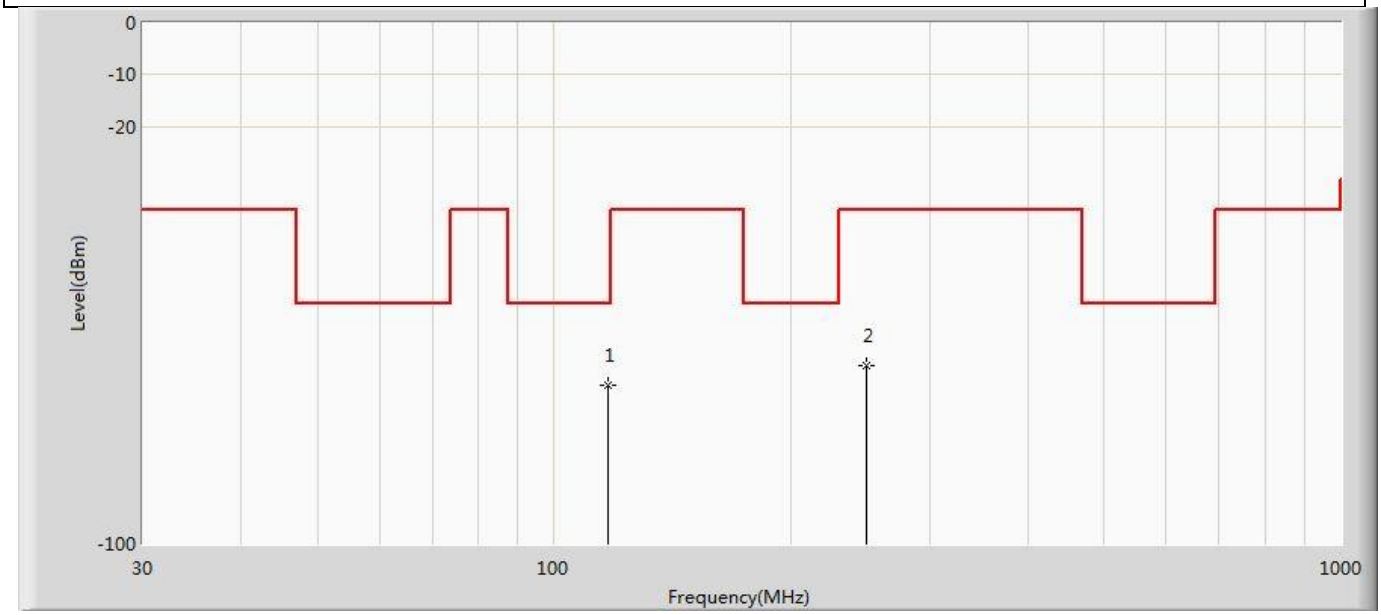
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		125.060	-69.805	-94.503	-33.805	-36.000	24.698	PK
2	*	253.100	-66.573	-94.977	-30.573	-36.000	28.404	PK

Site: AC6	Time: 2022/04/20 - 17:08
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: RF_Substitution_(DC 30-1000MHz)	Polarity: Vertical
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 1: Transmit at 2405MHz by Zigbee	



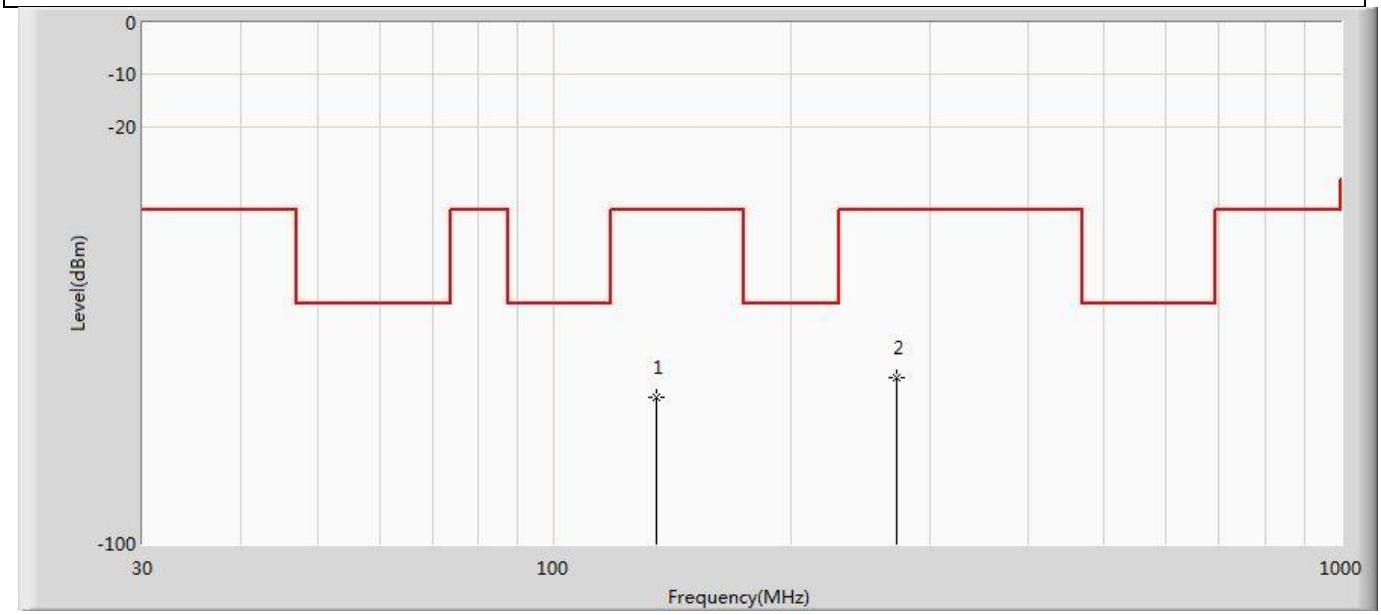
No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		137.670	-71.475	-95.111	-35.475	-36.000	23.636	PK
2	*	252.130	-68.510	-94.406	-32.510	-36.000	25.896	PK

Site: AC6	Time: 2022/04/20 - 17:08
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: RF_Substitution_(DC 30-1000MHz)	Polarity: Horizontal
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 1: Transmit at 2480MHz by Zigbee	



No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1	*	117.300	-69.523	-94.408	-15.523	-54.000	24.885	PK
2		249.220	-65.865	-94.597	-29.865	-36.000	28.732	PK

Site: AC6	Time: 2022/04/20 - 17:08
Limit: ETSI_EN300328_V2.2.2_RSE(3m)_Tx(Operating)	Margin: 0
Probe: RF_Substitution_(DC 30-1000MHz)	Polarity: Vertical
EUT: LED LAMP	Power: AC 230V/50Hz
Note: Mode 1: Transmit at 2480MHz by Zigbee	



No	Mark	Frequency (MHz)	Measure Level (dBm)	Reading Level (dBm)	Over Limit (dB)	Limit (dBm)	Factor (dB)	Type
1		134.760	-71.843	-95.503	-35.843	-36.000	23.660	PK
2	*	272.500	-68.223	-94.207	-32.223	-36.000	25.984	PK

Note:

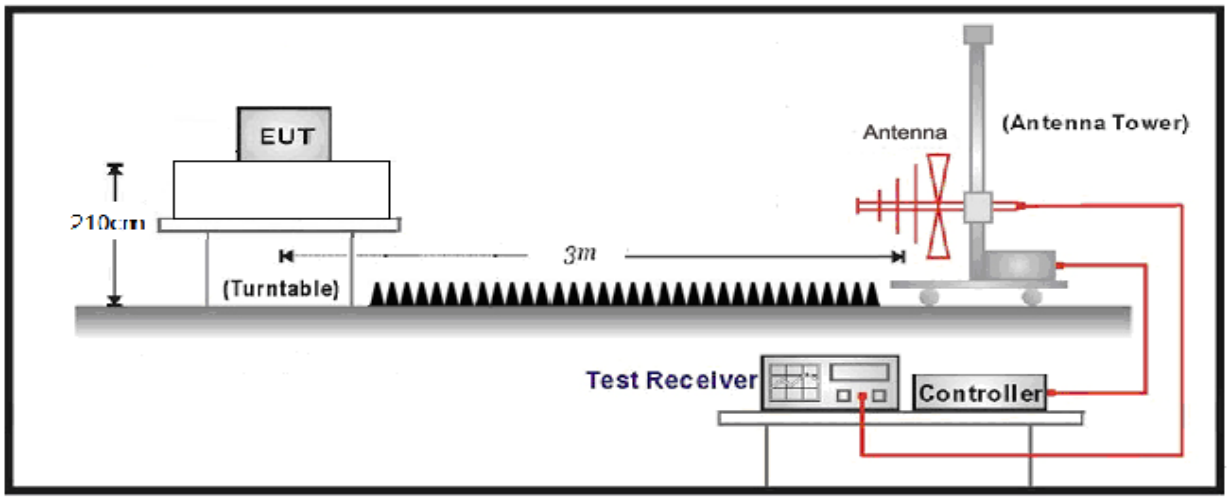
1. " * ", means this data is the worst emission level.
2. Measurement Level = Reading Level + Factor(Probe+Cable-Amp).
3. The final result only applies for using RMS detector , if the pre-test result on peak is lower than limit, then RMS measurement needn't be performed.

4.9 **Receiver Spurious Emissions**	**VERDICT: PASS**

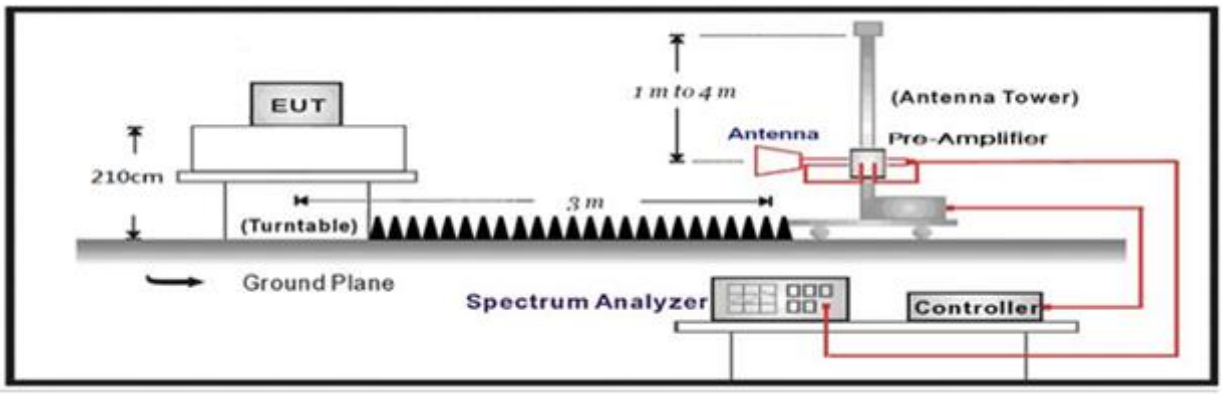
4.9.1 **Limit**		
Standard	ETSI EN 300 328 V2.2.2	
Frequency range	**Maximum power**	**Bandwidth**
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12,75 GHz	-47 dBm	1 MHz

4.9.2 **Test Setup**

Receiver Spurious Emissions / AC6 (Below 1G)



Receiver Spurious Emissions / AC6 (Above 1G)



4.9.3 **Test Procedure**

	References Rule	Chapter	Description
☒	ETSI EN 300 328 V2.2.2	5.4.10.2.2	Radiated measurement

Step 1

The sensitivity of the spectrum analyser should be such that the noise floor is at least 12 dB below the limits given in table 5 or table 13.

Step 2

The emissions over the range 30 MHz to 1 000 MHz shall be identified.
Spectrum analyzer settings:
(1),Resolution bandwidth: 100 kHz
(2),Video bandwidth: 300 kHz
(3),Filter type: 3 dB (Gaussian)
(4),Detector mode: Peak
(5),Trace Mode: Max Hold
(6),Sweep Points: ≥ 19 400
(7)Sweep time: Auto
Wait for the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.10.2.1.3 and compared to the limits given in table 5 or table 13.

Step 3

The emissions over the range 1 GHz to 12,75 GHz shall be identified.
Spectrum analyzer settings:
(1),Resolution bandwidth: 1 MHz (2),Video bandwidth: 3 MHz
(3),Filter type: 3 dB (Gaussian) (4),Detector mode: Peak
(5),Trace Mode: Max Hold
(6),Sweep Points: ≥ 23 500
NOTE 3: For spectrum analyzers not supporting this high number of sweep points, the frequency band may need to be segmented.
(7),Sweep time: Auto
Wait for the trace to stabilize. Any emissions identified during the sweeps above that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.10.2.1.3 and compared to the limits given in table 5 or table 13.
FHSS equipment may generate a block (or several blocks) of spurious emissions anywhere within the spurious domain. If this is the case, only the highest peak of each block of emissions shall be measured using the procedure in clause 5.4.10.2.1.3.

Step 4

In case of conducted measurements on smart antenna systems (equipment with multiple receive chains), step 2 and step 3 need to be repeated for each of the active receive chains (Ach)The limits used to identify emissions during this pre-scan need to be reduced with 10 × log10 (Ach) (number of active receive chains).

Measurement of the emissions identified during the pre-scan

The steps below shall be used to accurately measure the individual unwanted emissions identified during the pre-scan measurements above. This method assumes the spectrum analyzer has a Time Domain Power function

Step 1

		The level of the emissions shall be measured using the following spectrum analyzer settings: (1),Measurement Mode: Time Domain Power (2),Centre Frequency: Frequency of the emission identified during the pre-scan (3),Resolution Bandwidth: 100 kHz (< 1 GHz) / 1 MHz (> 1 GHz) (4),Video Bandwidth: 300 kHz (< 1 GHz) / 3 MHz (> 1 GHz) (5),Frequency Span: Zero Span (6),Sweep mode: Single Sweep (7),Sweep time: 30 ms (8),Sweep points: ≥ 30 000 (9),Trigger: Video (burst signals) or Manual (continuous signals) (10),Detector: RMS
		Step 2
		Set a window where the start and stop indicators match the start and end of the burst with the highest level and record the value of the power measured within this window. If the spurious emission to be measured is a continuous transmission, the measurement window shall be set to match the start and stop times of the sweep.
		Step 3
		In case of conducted measurements on smart antenna systems (equipment with multiple receive chains), step 2 needs to be repeated for each of the active receive chains (Ach). Sum the measured power (within the observed window) for each of the active receive chains
		Step 4
		The value defined in step 3 shall be compared to the limits defined in tables 5 and 13.

4.9.4 **Test Data**

Note:The data of receive spurious below the limit 6dbm , so no receive data was showed.

4.10 **Receiver Blocking** — **VERDICT: PASS**

4.10.1 Limit

Standard | ETSI EN 300 328 V2.2.2

☐ Receiver Category 1

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 Pmin + 26 dB where Pmin 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

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 dBm + 10 × $\log_{10}$(OCBW) + 10 dB) or (-74 dBm + 10 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW

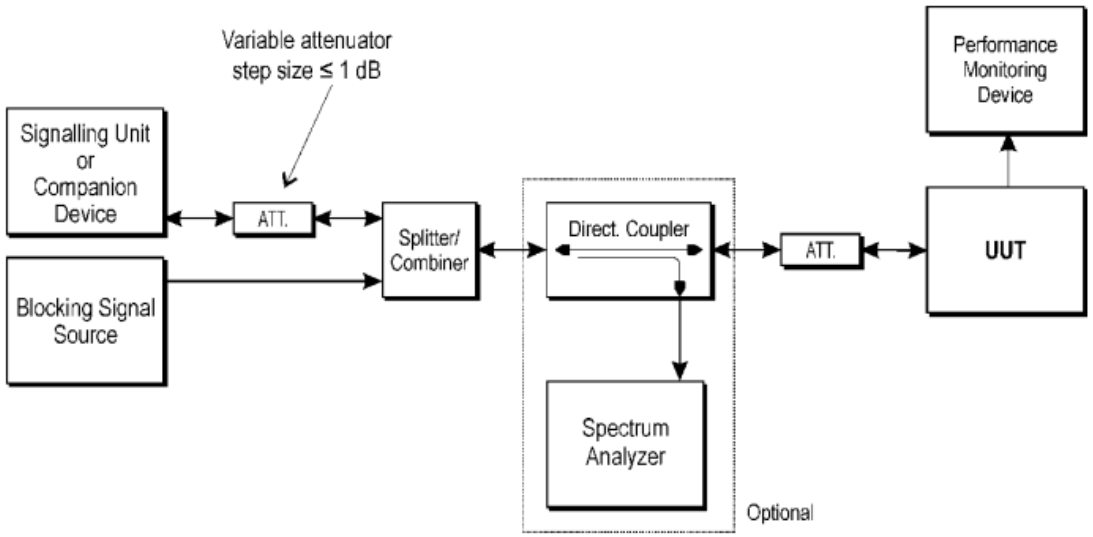
NOTE 1: OCBW is in Hz.
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal 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

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 dBm + 10 × $\log_{10}$(OCBW) + 10 dB) or (-74 dBm + 10 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 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

4.10.2 Test Setup



4.10.3 Procedure

References Rule		Chapter	Description
☒	ETSI EN 300 328 V2.2.2	5.4.11.2.1	Receiver Blocking

For systems using multiple receive chains only one chain (antenna port) need to be tested. All other receiver inputs shall be terminated.

The procedure in step 1 to step 6 below shall be used to verify the receiver blocking requirement as described in clause 4.3.1.12 or clause 4.3.2.11. The performance monitoring device is capable of verifying the performance criteria as defined in clause 4.3.1.12.3 or clause 4.3.2.11.3.

Step 1

For non-FHSS equipment, the UUT shall be set to the lowest operating channel on which the blocking test has to be performed (see clause 5.4.11.1).

Step 2

The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.

Step 3

1,With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in figure 6.

2,Unless the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the level of the wanted signal shall be set to the value provided in the table corresponding to the receiver category and type of equipment. The test procedure defined in clause 5.4.2, and more in particular clause 5.4.2.2.1.2, can be used to measure the (conducted) level of the wanted signal however no correction shall be made for antenna gain of the companion device (step 6 in clause 5.4.2.2.1.2 shall be ignored). This level may be measured directly at the output of the companion device and a correction is made for the coupling loss into the UUT. The actual level for the wanted signal shall be recorded in the test report

3, When the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still met. The resulting level for the wanted signal at the input of the UUT is P_{min}. This signal level (P_{min}) is increased by the value provided in note 2 of the applicable table corresponding to the receiver category and type of equipment.

Step 4

The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment.

If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 are met then proceed to step 6

Step 5

1, If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been increased with a value equal to the Occupied Channel Bandwidth except:

Note 1: For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB.

Note 2: For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB.

2, If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been decreased with a value equal to the Occupied Channel Bandwidth except:

Note 3：For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB. Note 4：For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB. If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, the UUT fails to comply with the Receiver Blocking requirement and step 6 and step 7 are no longer required. It shall be recorded in the test report whether the shift of blocking frequencies as described in the present step was used
Step 6
Repeat step 4 and step 5 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.
Step 7
For non-FHSS equipment, repeat step 2 to step 6 with the UUT operating at the highest operating channel on which the blocking test has to be performed (see clause 5.4.11.1)
Step 8
It shall be assessed and recorded in the test report whether the UUT complies with the Receiver Blocking requirement.

4.10.4 Test Data

Test Mode	Frequency (MHz)	Wanted signal power (dBm) (see note 1)	Blocking signal Frequency (MHz)	Blocking signal power (dBm) (see note 2)	PER Measure Value (%)	PER Limit (%)
Mode 3	2 405	-66	2 380	-34	0	⩽10
			2 504	-34	0	⩽10
			2 300	-34	0	⩽10
			2 584	-34	0	⩽10
	2 480	-66	2 380	-34	4	⩽10
			2 504	-34	4	⩽10
			2 300	-34	6	⩽10
			2 584	-34	6	⩽10

Note 1: Wanted signal power is (-139 dBm + 10 × $\log_{10}$(OCBW) + 10 dB) or (-74 dBm + 10 dB) whichever is less

Note 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the levels have to be corrected by the actual antenna assembly gain.

5 IDENTIFICATION OF THE EQUIPMENT UNDER TEST

The photographs show the tested device.


PHILIPS
hue
(6) IINCA G125LG EU
ESR3 APT F 025


PHILIPS
hue
(8) IINCA T125LG EU
ESR3 APT H 034

6 ANNEX 1 - MEASUREMENT UNCERTAINTIES

The table(s) below show(s) measurment uncertainties of the RF test set-ups. The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

Emission tests	**ULAB**
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1,5 dB
Power Spectral Density, conducted	±3 dB
Unwanted Emissions, conducted	±3 dB
All emissions, radiated	±6 dB

7 ANNEX 2 – USED EQUIPMENT

Keysight ETSI EN 300328 / 301893 Test System / TR8

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
4TX MIMO Power Sensor	Keysight	U2063X	MY58000119	2023.03.16	2024.03.15
4TX MIMO Power Sensor	Keysight	U2063X	MY58000120	2023.03.16	2024.03.15
4TX MIMO Power Sensor	Keysight	U2063X	MY58000121	2023.03.16	2024.03.15
4TX MIMO Power Sensor	Keysight	U2063X	MY58000122	2023.03.16	2024.03.15
Adaptivity Test Unit	Agilent	N/A	11607310008	N/A	N/A
Rx PER Monitoring Unit	Agilent	N/A	11706190075	N/A	N/A

RF Output Power/ Power Spectral Density/ Duty cycle, Tx-Sequence, Tx-gap/ Medium Utilisation (MU) factor/ Occupied Channel Bandwidth/ Transmitter unwanted emissions in the out-of-band domain / TR8

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2023.07.11	2024.07.10
MAX Signal Analyzer	Keysight	N9020B	MY59050482	2023.11.18	2024.11.17
Temperature/Humidity Meter	RTS	RTS-8S	RF08	2023.07.09	2024.07.08

Transmitter unwanted emissions in the spurious domain/ Receiver Spurious Emissions/ AC6

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal analyzer	R&S	FSV30	104212	2023.11.18	2024.11.17
Preamplifier	Agilent	8449B	3008A02597	2023.06.08	2024.06.07
Bilog Antenna	Schaffner	CBL6112B	2932	2023.11.16	2024.11.15
Half Wave Tuned Dipole Antenna	COM-POWER	AD-100	40137	2023.02.19	2024.02.18
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	737	2023.04.11	2024.04.10
Temperature/Humidity Meter	RTS	RTS-8S	RF06	2023.07.09	2024.07.08
EMI Test Software	Dekra	-	-	-	-

Adaptivity/ Blocking / TR8

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2023.07.11	2024.07.10
MAX Signal Analyzer	Keysight	N9020B	MY59050482	2023.11.18	2024.11.17
Wideband Radio Communication Tester	R＆S	CMW500	1201.0002K50-158243-jb	2023.10.20	2024.10.19
Splitter/Combiner (Qty: 2)	Mini-Circuits	ZAPD-50W	NN256400424	N/A	N/A
Dual Directional Coupler	Agilent	778D	20160	2023.07.11	2024.07.10
PSG Analog Signal Generator	Agilent	E8257D	MY44321116	2023.07.11	2024.07.10
ESG Vector Signal Generator	Agilent	E4438C	MY49070163	2023.07.11	2024.07.10
Temperature/Humidity Meter	RTS	RTS-8S	RF08	2023.07.09	2024.07.08

----------END----------