TEST REPORT (Bluetooth)

Applicant:	DIGIVIEW TECHNOLOGY LIMITED
Address of Applicant:	Room 509, 5/F, Tian Shu Block, Xinggang Tongchuanghui, No.6099 Baoan District, Shenzhen, GuangDong, China
Manufacturer/Factory:	DIGIVIEW TECHNOLOGY LIMITED
Address of Manufacturer/Factory:	Room 509, 5/F, Tian Shu Block, Xinggang Tongchuanghui, No.6099 Baoan District, Shenzhen, GuangDong, China
Equipment Under Test (EUT)	
Product Name:	BLUETOOTH SPEAKER
Trade Mark:	DigiView
Model No.:	DSBT149-A
Applicable standards:	ETSI EN 300 328 V2.2.2 (2019-07)
Date of sample receipt:	November 27, 2023
Date of Test:	November 27, 2023 To December 1, 2023
Date of report issue:	December 1, 2023
Test Result:	PASS *

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EU Declaration of Conformity and compliance with all relevant EU Directives.

Authorized Signature

Kevin Wang
Laboratory Manager

2 Version

Version No.	Date	Description
01	*December 1, 2023*	*Original*

Prepared By:	Gary Wang	***Date:***	*December 1, 2023*
	Project Engineer		
Reviewed By:	Kevin wang	***Date:***	*December 1, 2023*
	Reviewer		

3 Contents

4 Test Summary

Radio Spectrum Matter (RSM) Part of Tx					
Test	**Test Requirement**	**Test method**	**Limit/Severity**	**Uncertainty**	**Result**
RF Output Power	Clause 4.3.2.2	Clause 5.4.2.2	20dBm	±1.5dB	PASS
Power Spectral Density	Clause 4.3.2.3	Clause 5.4.3.2	10dBm/MHz	±3dB	PASS
Duty Cycle, Tx-sequence, Tx-gap	Clause 4.3.2.4	Clause 5.4.2.2.1.3	Clause 4.3.2.4.3	±5 %	N/A
Medium Utilisation (MU) factor	Clause 4.3.2.5	Clause 5.4.2.2.1.4	≤ 10%	±5 %	N/A
Adaptivity	Clause 4.3.2.6	Clause 5.4.6.2	Clause 4.3.2.6.2.2 & Clause 4.3.2.6.3.2 & Clause 4.3.2.6.4.2	--	N/A
Occupied Channel Bandwidth	Clause 4.3.2.7	Clause 5.4.7.2	Clause 4.3.2.7.3	±5 %	PASS
Transmitter unwanted emissions in the OOB domain	Clause 4.3.2.8	Clause 5.4.8.2	Clause 4.3.2.8.3	±3dB	PASS
Transmitter unwanted emissions in the spurious domain	Clause 4.3.2.9	Clause 5.4.9.2	Clause 4.3.2.9.3	±6dB	PASS
Radio Spectrum Matter (RSM) Part of Rx					
Receiver spurious emissions	Clause 4.3.2.10	Clause 5.4.10.2	Clause 4.3.2.10.3	±6dB	PASS
Receiver Blocking	Clause 4.3.2.11	Clause 5.4.11.2	Clause 4.3.2.11.4	--	PASS
Geo-location capability	Clause 4.3.2.12	--	--	--	N/A

Remark:

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

Temperature (Uncertainty): ±1°C   Humidity(Uncertainty): ±5%

Uncertainty: ± 3%(for DC and low frequency voltages)

N/A:Not applicable

5 General Information

5.1 General Description of EUT

Product Name:	BLUETOOTH SPEAKER
Brand Name:	DigiView
Model No.:	DSBT149-A
Power Supply:	DC 5V⎓2A (power by type c port charging) or DC 3.7V 300mAh battery
Operation Frequency:	2402~2480MHz
Channel numbers:	40
Channel separation:	2MHz
Modulation technology:	GFSK
Antenna Type:	Integral Antenna
Antenna gain:	0 dBi (Declared by Applicant)

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	11	2422MHz	21	2442MHz	31	2462MHz
2	2404MHz	12	2424MHz	22	2444MHz	32	2464MHz
:	:	:	:	:	:	:	:
9	2418MHz	19	2438MHz	29	2458MHz	39	2478MHz
10	2420MHz	20	2440MHz	30	2460MHz	40	2480MHz

The test frequencies are below:

Channel	**Frequency (MHz)**
Lowest:	2402
Middle:	2440
Highest:	2480

5.2 Description of Support Units

None.

5.3 Deviation from Standards

None.

5.4 Abnormalities from Standard Conditions

None.

5.5 Other Information Requested by the Customer

None.

6 Test Instruments List

Radiated Emission:

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	Jul. 2 2022	Jul. 1 2025
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Jun. 27 2023	Jun. 26 2024
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	Jun. 27 2023	Jun. 26 2024
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	Jun. 27 2023	Jun. 26 2024
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	Jun. 27 2023	Jun. 26 2024
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	Jun. 27 2023	Jun. 26 2024
9	Coaxial Cable	GTS	N/A	GTS211	Jun. 27 2023	Jun. 26 2024
10	Coaxial cable	GTS	N/A	GTS210	Jun. 27 2023	Jun. 26 2024
11	Coaxial Cable	GTS	N/A	GTS212	Jun. 27 2023	Jun. 26 2024
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	Jun. 27 2023	Jun. 26 2024
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	Jun. 27 2023	Jun. 26 2024
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	Jun. 27 2023	Jun. 26 2024
15	Band filter	Amindeon	82346	GTS219	Jun. 27 2023	Jun. 26 2024
16	Power Meter	Anritsu	ML2495A	GTS540	Jun. 27 2023	Jun. 26 2024
17	Power Sensor	Anritsu	MA2411B	GTS541	Jun. 27 2023	Jun. 26 2024
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	Jun. 27 2023	Jun. 26 2024
19	Splitter	Agilent	11636B	GTS237	Jun. 27 2023	Jun. 26 2024
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	Jun. 27 2023	Jun. 26 2024
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Jun. 27 2023	Jun. 26 2024
22	Amplifier	TDK	PA-02-02	GTS574	Jun. 27 2023	Jun. 26 2024
23	Amplifier	TDK	PA-02-03	GTS576	Jun. 27 2023	Jun. 26 2024
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	Jun. 27 2023	Jun. 26 2024

RF Conducted Test:

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	Jun. 27 2023	Jun. 26 2024
2	EMI Test Receiver	R&S	ESCI 7	GTS552	Jun. 27 2023	Jun. 26 2024
3	Spectrum Analyzer	Agilent	E4440A	GTS533	Jun. 27 2023	Jun. 26 2024
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	Jun. 27 2023	Jun. 26 2024
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	Jun. 27 2023	Jun. 26 2024
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	Jun. 27 2023	Jun. 26 2024
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	Jun. 27 2023	Jun. 26 2024
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	Jun. 27 2023	Jun. 26 2024

General used equipment:

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	Jun. 27 2023	Jun. 26 2024
2	Barometer	ChangChun	DYM3	GTS255	Jun. 27 2023	Jun. 26 2024

7 Radio Technical Specification in ETSI EN 300 328

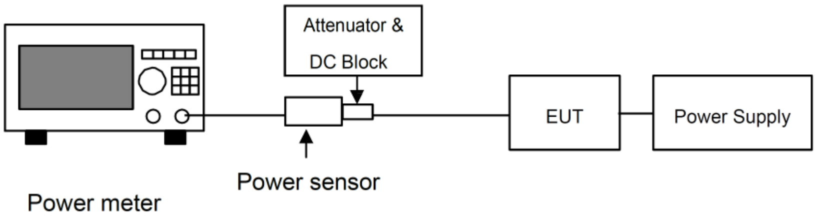
7.1 Test Environment and Mode

Test mode:			
Transmitting mode:	Keep the EUT in transmitting mode with modulation.		
Receiving mode	Keep the EUT in receiving mode.		
Operating Environment:			
Item	**Normal condition**	**Extreme condition**	
		NVHT	**NVLT**
Temperature	+15ºC to + 35ºC	+40ºC	-10ºC
Humidity	20%-95%		
Atmospheric Pressure:	1008 mbar		

Setting	Value
Modulation	GFSK
Adaptive	Yes
Antenna Gain	0 dBi
Nominal Channel Bandwidth	1.2MHz
DUT Frequency not configurable	No
Frequency Low	2402MHz
Frequency Mid	2440MHz
Frequency High	2480MHz

7.2 Transmitter Requirement

7.2.1 RF Output Power

Test Requirement:	ETSI EN 300 328 clause 4.3.2.2
Test Method:	ETSI EN 300 328 clause 5.4.2.2.1.2
Limit:	20dBm
Test setup:	
Test procedure:	**Step 1:** Use a fast power sensor suitable for 2,4 GHz and capable of 1 MS/s. Use the following settings: - Sample speed 1 MS/s or faster. - The samples must represent the power of the signal. - Measurement duration: For non-adaptive equipment: equal to the observation period defined in clauses 4.3.1.3.2 or 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. For adaptive equipment, to increase the measurement accuracy, a higher number of bursts may be used. **Step 2:** For conducted measurements on devices with one transmit chain: -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. For conducted measurements on devices with multiple transmit chains: -Connect one power sensor to each transmit port for a synchronous measurement on all transmit ports. -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 500ns. -For each individual smpling point(time domain), sum the coincident power samples of all ports and store them. Use these summed samples in all following steps. **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. In case of insufficient dynamic range,the value of 30dB 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. Save these P_{burst} 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 P_{burst} values (value "A" in dBm) will be used for maximum e.i.r.p. calculations. **Step 6:** Add the (stated) antenna assembly gain "G" in dBi of the individual antenna. If applicable, 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 below: P = A + G + Y **Step 7:** 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.
Measurement Record:	Uncertainty:0.65dB
Test Instruments:	See section 6.0
Test mode:	Transmitting mode

Measurement Data

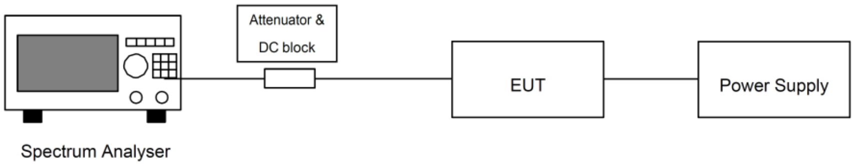
Test Mode	Test Condition	Test Frequency (MHz)	Ant No.	Power (dBm)	EIRP (dBm)	Limit (dBm)	Verdict
GFSK	NTNV	2402	1	4.06	4.06	20.00	PASS
		2440	1	3.47	3.47	20.00	PASS
		2480	1	2.48	2.48	20.00	PASS
	HTNV	2402	1	4.07	4.07	20.00	PASS
		2440	1	3.41	3.41	20.00	PASS
		2480	1	2.48	2.48	20.00	PASS
	LTNV	2402	1	4.04	4.04	20.00	PASS
		2440	1	3.83	3.83	20.00	PASS
		2480	1	2.49	2.49	20.00	PASS

Remark:

1>. Volt= Voltage, Temp= Temparature

2>. Antenna Gain=-0.0dBi

7.2.1 Power Spectral Density

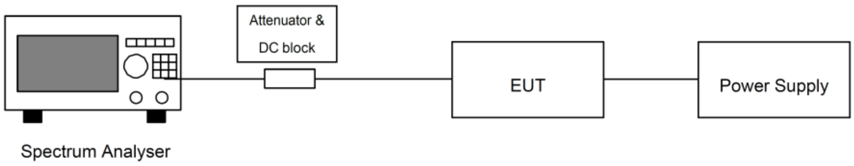
Test Requirement:	ETSI EN 300 328 clause 4.3.2.3
Test Method:	ETSI EN 300 328 clause 5.4.3.2.1
Limit:	10dBm/MHz
Test setup:	
Test procedure:	**Step 1:** Connect the UUT to the spectrum analyser and use the following settings: Start Frequency: 2400 MHz Stop Frequency: 2483.5 MHz Resolution BW: 10 kHz Video BW: 30 kHz Sweep Points: > 8350 For spectrum analysers not supporting this number of sweep points, the frequency band may be segmented. Detector: RMS Trace Mode: Max Hold Sweep time: 10s; 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 (trace data) set to a file. **Step 2:** For conducted measurements on smart antenna systems using either operating mode 2 or 3 (see clause 5.3.2.2), repeat the measurement for each of the transmit ports. For each sampling point(frequency domain) , 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: $$C_{Corr} = P_{Sum} - P_{e.i.r.p.}$$ $$P_{Samplecorr}(n) = P_{Sample}(n) - C_{Corr}$$ 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 #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 #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.
Measurement Record:	Uncertainty: 1.31dB
Test Instruments:	See section 6.0
Test mode:	Transmitting mode

Measurement Data

Test Mode	Test Condition	Test Frequency (MHz)	Ant No.	PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
GFSK	NTNV	2402	1	5.70	<=10.00	PASS
		2440	1	5.04	<=10.00	PASS
		2480	1	4.11	<=10.00	PASS

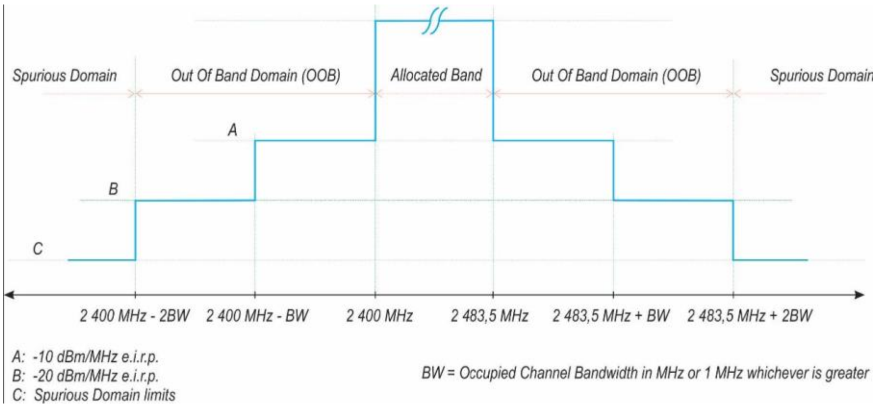
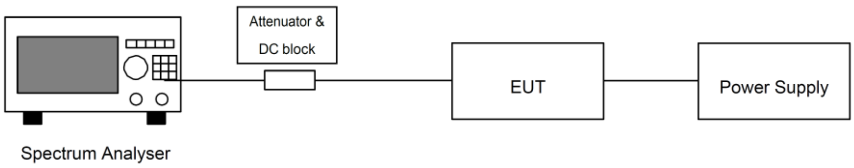
7.2.2 Occupied Channel Bandwidth

Test Requirement:	ETSI EN 300 328 clause 4.3.2.7
Limit:	The Occupied Channel Bandwidth for each hopping frequency shall fall completely within the band 2400MHz ~ 2483.5MHz. In addition, for non-adaptive equipment using wide band modulations other than FHSS and with e.i.r.p. greater than10 dBm, the occupied channel bandwidth shall be less than 20 MHz.
Test setup:	
Test Precedure:	**Step 1:** Connect the UUT to the spectrum analyser and use the following settings: Centre Frequency: The centre frequency of the channel under test Resolution BW: ~ 1 % of the span without going below 1 % Video BW: 3 × RBW Frequency Span 2 × Nominal Channel Bandwidth Detector Mode: RMS Trace mode: Max Hold Sweep time: 1 s **Step 2:** Wait for the trace to stabilize. Find the peak value of the trace and place the analyser marker on this peak. **Step 3:** Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded. Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left and right from the power envelope being taken into account by this measurement.
Test Instruments:	See section 6.0
Test mode:	Transmitting mode

Measurement Data:

Test Mode	Test Condition	Test Frequency (MHz)	Ant No.	OBW (MHz)	FL OBW (MHz)	FH OBW (MHz)	Limit (MHz)	Verdict
GFSK	NTNV	2402	1	1.05	2401.45	/	2400<FL, FH<2483.5	PASS
		2480	1	1.04	/	2480.53	2400<FL, FH<2483.5	PASS

7.2.3 Transmitter unwanted emissions in the OOB domain

Test Requirement:	ETSI EN 300 328 clause 4.3.2.8
Test Method:	ETSI EN 300 328 clause 5.4.8.2
Limit:	The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 1 Within the band specified in table 1, the Out-of-band emissions are fulfilled by compliance with the Occupied Channel Bandwidth requirement in clause 4.3.1.8. 
Test setup:	
Test procedure:	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 figures 1 and 3 shall be measured using the step 1 to step 6 below. This method assumes the spectrum analyser is equipped with the Time Domain Power option. **Step 1:** Connect the UUT to the spectrum analyser and use the following settings: Centre Frequency: 2 484 MHz Span: 0Hz Resolution BW: 1 MHz Filter mode: Channel filter Video BW: 3 MHz Detector Mode: RMS Trace Mode: Max Hold Sweep Mode: Continuous Sweep Points: Sweep Time [s] / (1 µs) or 5 000 whichever is greater

Trigger Mode: Video trigger

In case video triggering is not possible, an external trigger source may be used.

Sw ep Time: >120 % of the duration of the longest burst detected during the measurement of the F Output Power

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

Adjust the trigger level to select the transmissions with the highest power level.

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.

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.

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.

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 analyser 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 the previous 1 MHz segment).

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

Change the centre frequency of the analyser 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).

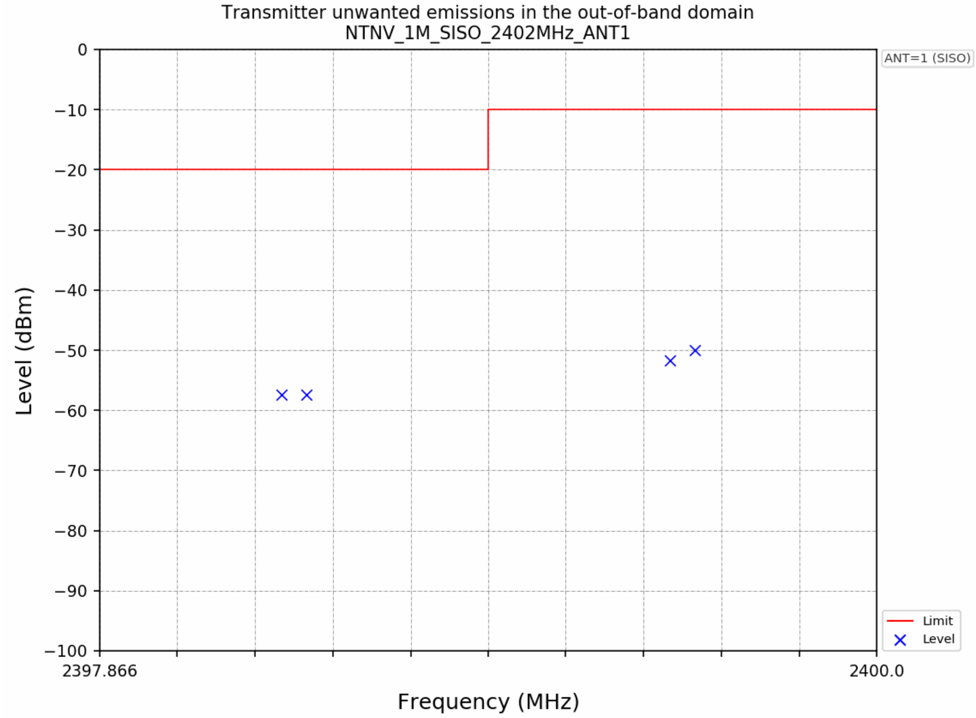
Step 5: (segment 2 400 MHz - 2BW to 2 400 MHz - BW)

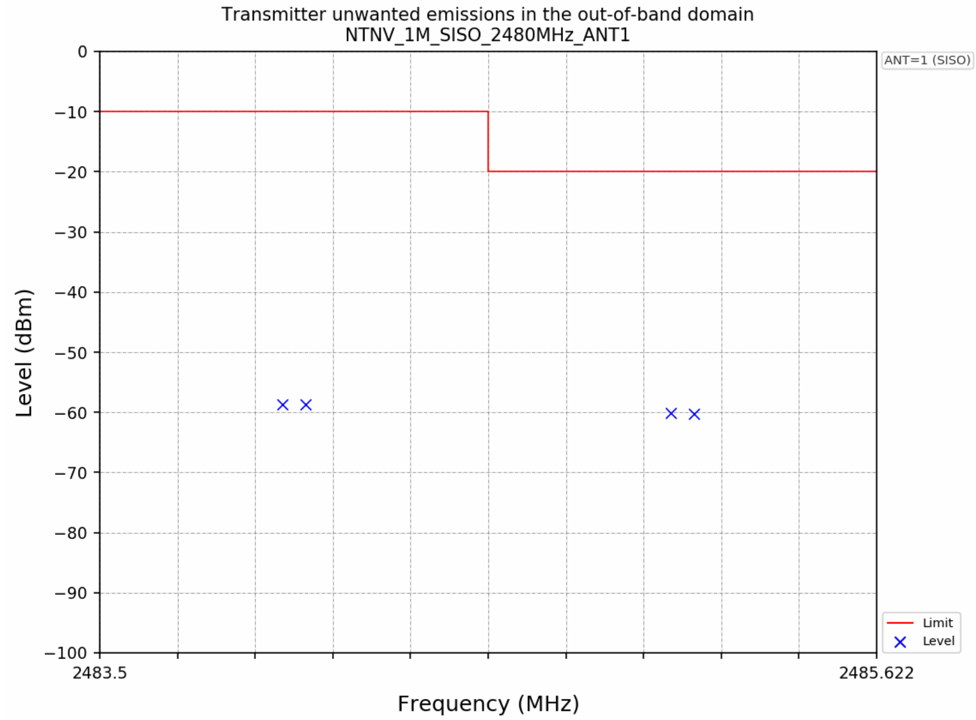
Change the centre frequency of the analyser to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 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: 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 figures 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. 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: 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. Option 2: the limits provided by the mask given in figure 1 or figure 3 shall be reduced by 10 x log10(A_{ch}) 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: A_{ch} 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.
Measurement Record:	Uncertainty: ± 1.5dB
Test Instruments:	See section 6.0
Test mode:	Transmitting mode
Test results:	Pass

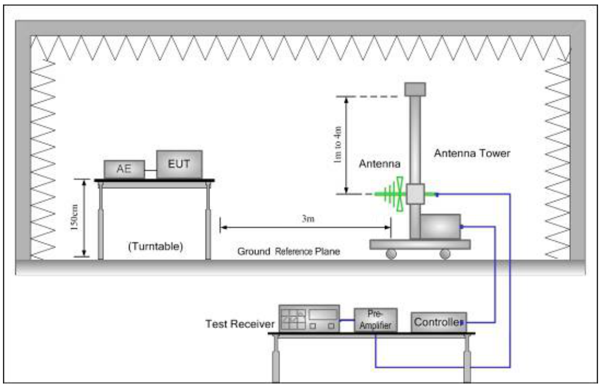
Measurement Data:

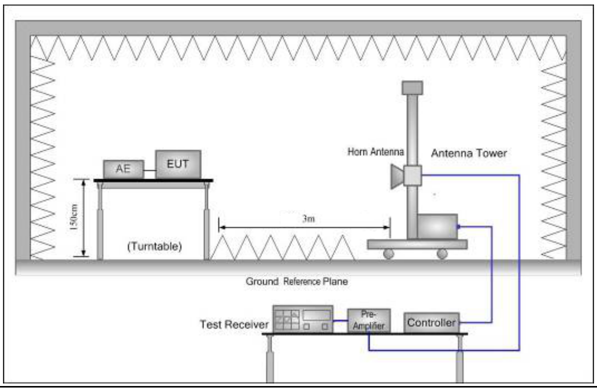
Test plots at normal condition are followed:





7.2.4 Transmitter unwanted emissions in the spurious domain

<table>
<tr><td>Test Requirement:</td><td>ETSI EN 300 328 clause 4.3.2.9</td></tr>
<tr><td>Test Method:</td><td>ETSI EN 300 328 clause 5.4.9.2</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th>Frequency Range</th><th>Maximum power
e.r.p. (≤ 1 GHz)
e.i.r.p. (> 1 GHz)</th><th>Bandwidth</th></tr>
<tr><td>30 MHz to 47 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>47 MHz to 74 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr>
<tr><td>74 MHz to 87.5 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>87.5 MHz to 118 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr>
<tr><td>118 MHz to 174 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>174 MHz to 230 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr>
<tr><td>230 MHz to 470 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>470 MHz to 694 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr>
<tr><td>694 MHz to 1 GHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>1 GHz to 12.75 GHz</td><td>-30 dBm</td><td>1 MHz</td></tr>
</table>
</td></tr>
<tr><td>Test Frequency range:</td><td>30MHz to 12.75GHz</td></tr>
<tr><td>Test setup:</td><td>Below 1GHz


Above 1GHz

</td></tr>
<tr><td>Test procedure:</td><td>1. Pre-scan
The test procedure below shall be used to identify potential unwanted emissions of the UUT.</td></tr>
</table>

	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 analyser settings: Resolution BW: 100 kHz Video BW 300 kHz Filter type: 3 dB (Gaussian) Detector mode: Peak Trace Mode: Max Hold Sweep Points: ≥19 400 For spectrum analysers not supporting this high number of sweep points, the frequency band may need to be segmented. 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 the same hopping frequency in different hopping sequences. 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 analyser 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 analyser settings: Resolution BW: 1 MHz Video BW 3 MHz Filter type: 3 dB (Gaussian) Detector mode: Peak Trace Mode: Max Hold Sweep Points: ≥ 23 500 For spectrum analysers not supporting this high number of sweep points, the frequency band may need to be segmented. 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 the same hopping frequencies 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 analyser 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. Frequency Hopping 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), the steps 2 and 3 need to be repeated for each of the active transmit chains (A_{ch}).The limits used to identify emissions during this pre-scan need to be reduced by $10 \times \log_{10}(A_{ch})$ **2. 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 analyser settings: Measurement Mode: Time Domain Power Centre Frequency: Frequency of emission identified during the pre-scan Resolution BW: 100 kHz (< 1 GHz) / 1 MHz (> 1 GHz) Video BW 300 kHz (< 1 GHz) / 3 MHz (> 1 GHz) Frequency Span: Zero Span Sweep mode: Single Sweep Sweep time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power Sweep points: Sweep time [μs] / (1 μs) with a maximum of 30 000 Trigger: Video (burst signals) or Manual (continuous

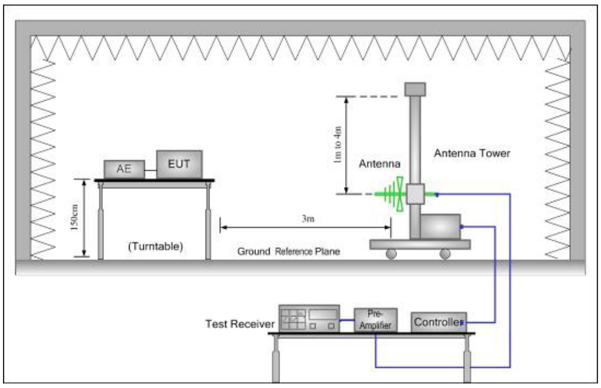
	signals) Detector: RMS **Step 2:** Set a window where the start and stop indicators match the start and end of the burst with the highest level and record the value of the power measured within this window.If the spurious emission to be measured is a continuous transmission, the measurement window shall 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 (A_{ch}). 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 table 4 or table 12.
Measurement Record:	Uncertainty: 4.64dB
Test Instruments:	See section 6.0
Test mode:	Transmitting mode

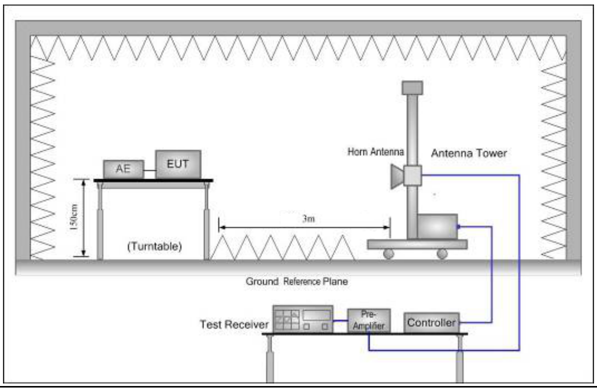
Measurement Data

The lowest channel				
Frequency (MHz)	**Spurious Emission**		**Limit (dBm)**	**Test Result**
	polarization	**Level(dBm)**		
101.52	Vertical	-69.63	-54.00	Pass
534.25	V	-65.67	-54.00	
4804.00	V	-50.38	-30.00	
7206.00	V	-45.67	-30.00	
9608.00	V	-42.06	-30.00	
12010.00	V	-43.47	-30.00	
92.23	Horizontal	-66.82	-54.00	
825.82	H	-67.86	-36.00	
4804.00	H	-49.98	-30.00	
7206.00	H	-46.20	-30.00	
9608.00	H	-41.88	-30.00	
12010.00	H	-44.06	-30.00	
The highest channel				
Frequency (MHz)	**Spurious Emission**		**Limit (dBm)**	**Test Result**
	polarization	**Level(dBm)**		
77.74	Vertical	-65.72	-36.00	Pass
676.62	V	-68.00	-54.00	
4960.00	V	-50.55	-30.00	
7440.00	V	-45.26	-30.00	
9920.00	V	-41.66	-30.00	
12400.00	V	-44.57	-30.00	
83.33	Horizontal	-67.31	-36.00	
845.64	H	-68.60	-36.00	
4960.00	H	-50.47	-30.00	
7440.00	H	-46.04	-30.00	
9920.00	H	-41.95	-30.00	
12400.00	H	-44.19	-30.00	

7.3 Receiver Requirement

7.3.1 Spurious Emissions

<table>
<tr><td>Test Requirement:</td><td colspan="3">ETSI EN 300 328 clause 4.3.2.10</td></tr>
<tr><td>Test Method:</td><td colspan="3">ETSI EN 300 328 clause 5.4.10.2</td></tr>
<tr><td rowspan="3">Limit:</td><td>Frequency</td><td>Maximum power
e.r.p. (≤ 1 GHz)
e.i.r.p. (> 1 GHz)</td><td>Measurement bandwidth</td></tr>
<tr><td>30MHz to 1000 MHz</td><td>-57 dBm</td><td>100 kHz</td></tr>
<tr><td>1GHz to 12.75GHz</td><td>-47 dBm</td><td>1 MHz</td></tr>
<tr><td>Test Frequency range:</td><td colspan="3">30MHz to 12.75GHz</td></tr>
<tr><td>Test setup:</td><td colspan="3">Below 1GHz


Above 1GHz

</td></tr>
</table>

<table>
<tr><td>Test procedure:</td><td>

1. Pre-scan

The procedure in step 1 to step 4 below shall be used to identify potential unwanted emissions of the UUT.

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 tables 5 or table13.

Step 2:

The emissions over the range 30 MHz to 1 000 MHz shall be identified.
Spectrum analyser settings:

Resolution BW: 100 kHz
Video BW 300 kHz
Filter type: 3dB (Gaussian)
Detector mode: Peak
Trace Mode: Max Hold
Sweep Points: ≥ 19 400
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 analyser settings:

Resolution BW: 1 MHz
Video BW 3 MHz
Filter type: 3 dB (Gaussian)
Detector mode: Peak
Trace Mode: Max Hold
Sweep Points: ≥ 23500; for spectrum analysers not supporting this high number of sweep points,the frequency band may be segmented
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.
Frequency Hopping 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 transmit chains), the steps 2 and 3 need to be repeated for each of the active transmit chains (A_{ch}).The limits used to

</td></tr>
</table>

	identifyemissions during this pre-scan need to be reduced with $10 \times \log_{10}(A_{ch})$ **2. 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 analyser settings: Measurement Mode: Time Domain Power Centre Frequency: Frequency of the emission identified during the pre-scan Resolution Bandwidth: 100 kHz (< 1 GHz) / 1 MHz (> 1 GHz) Video Bandwidth: 300 kHz (< 1 GHz) / 3 MHz (> 1 GHz) Frequency Span: Zero Span Sweep mode: Single Sweep Sweep time: 30 ms Sweep points: ⩾ 30 000 Trigger: Video (for burst signals) or Manual (for continuous signals 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 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 A_{ch}.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 table 5 and table 13.
Measurement Record:	Uncertainty: 4.64dB
Test mode:	Receiving mode
Test Instruments:	See section 6.0

Measurement Data:

The lowest channel				
Frequency (MHz)	**Spurious Emission**		**Limit (dBm)**	**Test Result**
	polarization	**Level(dBm)**		
94.07	Vertical	-71.97	2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Pass
508.22	V	-71.06		
4804.00	V	-62.52		
7206.00	V	-58.38		
9608.00	V	-53.20		
12010.00	H	-55.38		
86.43	Horizontal	-72.07		
813.91	H	-70.93		
4804.00	H	-65.63		
7206.00	H	-59.53		
9608.00	H	-54.91		
12010.00	H	-56.29		
The highest channel				
Frequency (MHz)	**Spurious Emission**		**Limit (dBm)**	**Test Result**
	polarization	**Level(dBm)**		
74.72	Vertical	-69.08	2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Pass
791.98	V	-67.17		
4960.00	V	-62.12		
7440.00	V	-56.85		
9920.00	V	-51.97		
12400.00	V	-54.07		
84.34	Horizontal	-71.95		
582.22	H	-69.50		
4960.00	H	-63.17		
7440.00	H	-56.37		
9920.00	H	-52.41		
12400.00	H	-54.12		

7.3.2 Receiver Blocking

Test Requirement:	ETSI EN300 328clause 4.3.1.12
Test Method:	ETSI EN300 328clause 5.4.11.2.
Limit:	While maintaining the minimum performance criteria as defined in clause 4.3.1.12.3, the blocking levels at specifiedfrequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided intable 6, table 7 or table 8.

Table 6: Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal
(-133 dBm + 10 × $\log_{10}$(OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW
(-139 dBm + 10 × $\log_{10}$(OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674		

NOTE 1: OCBW is in Hz.
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 20 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

Table 7: Receiver Blocking parameters receiver Category 2 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 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

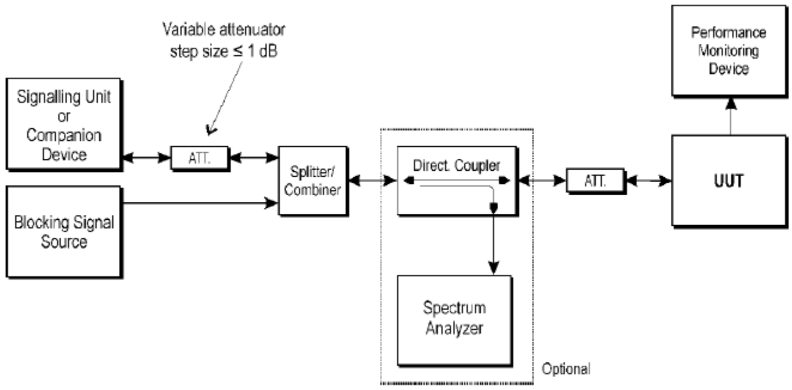
NOTE 1: OCBW is in Hz.
NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal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

Table 8: Receiver Blocking parameters receiver Category 3 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139 dBm + 10 × $\log_{10}$(OCBW) + 20 dB) or (-74 dBm + 20 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 the 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.

Test setup:



Test procedure:	Refer to the procedure of adaptivity
Measurement Record:	Uncertainty: N/A
Test Instruments:	See section 6.0
Test mode:	Normal link mode

Measurement Data:

Receiver Category	Test Channel	Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	PER (%)	Limit (%)	Result
2	Lowest	-72.7	2380	-34+ antenna assembly gain	4.2	10	Pass
			2300		3.7	10	Pass
			2504		3.8	10	Pass
			2584		3.3	10	Pass
	Highest	-78.7	2380		3.5	10	Pass
			2300		1.7	10	Pass
			2504		1.6	10	Pass
			2584		2.3	10	Pass

8 EUT Constructional Details

Please refer to Report No. EBO2311140-E297

------End------