TEST REPORT
ETSI EN 300 328 V2.1.1 (2016-11)

Report Reference No.....:	**TZ181200486-BLE**
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Supervised by (position+printed name+signature)..:	Technique principal Hugo Chen
Approved by (position+printed name+signature)..:	Manager Andy Zhang
Date of issue.....:	2018/12/14

Testing Laboratory Name.....:	Shenzhen Tongzhou Testing Co.,Ltd
Address.....:	1th Floor, Building 1, Haomai High-tech Park, Huating Road 387, Dalang Street, Longhua, Shenzhen, China

Applicant's name.....:	**Decade Smart Technology Co.,Ltd**
Address.....:	Floor 3th,Building 5th Haomai Hi-Tech Park Huating Road,Dalang Zone ,Longhua District, Shenzhen, China

Test specification ..... **:**	
Standard .....:	**ETSI EN 300 328 V2.1.1 (2016-11)**
TRF Originator.....:	Shenzhen Tongzhou Testing Co.,Ltd
Master TRF.....:	Dated 2017-01

Test item description .....:	**Smart Bracelet**
Trade Mark .....:	/
Model/Type reference.....:	SN66
List Model .....:	SN18, SN58, CNE-SB11BB
Hardware Version.....:	V2.0
Software Version .....:	V1.0
Operation Frequency.....:	From 2402MHz to 2480MHz
Ratings.....:	DC 3.7V by Battery
Result.....:	**Pass**

TEST REPORT

Test Report No. :	TZ181200486-BLE	2018/12/14 Date of issue

Equipment under Test	:	Smart Bracelet
Model /Type	:	SN66
Listed Models	:	SN18, SN58, CNE-SB11BB
Applicant	:	Decade Smart Technology Co.,Ltd
Address	:	Floor 3th,Building 5th Haomai Hi-Tech Park Huating Road,Dalang Zone ,Longhua District, Shenzhen, China
Manufacturer	:	Decade Smart Technology Co.,Ltd
Address	:	Floor 3th,Building 5th Haomai Hi-Tech Park Huating Road,Dalang Zone ,Longhua District, Shenzhen, China

Test Result:	**PASS**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

** Modifited History **

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	2018/12/14	Andy Zhang

Contents

1. TEST STANDARDS 5

2. SUMMARY 6

2.1. General Remarks 6
2.2. Product Description 6
2.3. Equipment Under Test 6
2.4. Description of the Equipment under Test (EUT) 7
2.5. EUT Classification: 7
2.6. EUT configuration 8
2.7. NOTE 8

3. TEST ENVIRONMENT 9

3.1. Address of the test laboratory 9
3.2. Environmental conditions 9
3.3. Test Description 9
3.4. Statement of the measurement uncertainty 11
3.5. Equipments Used during the Test 12

4. TEST CONDITIONS AND RESULTS 13

4.1. ETSI EN 300 328 REQUIREMENTS 13
4.1.1. RF Output Power 13
4.1.2. Duty Cycle,TX-sequence,TX-gap 15
4.1.3. Medium Utilisation (MU) factor 17
4.1.4. Power Spectral Density 18
4.1.5. Adaptivity (Adaptive equipment using modulations other than FHSS) 20
4.1.6. Occupied Channel Bandwidth 24
4.1.7. Transmitter unwanted emissions in the out-of-band domain 27
4.1.8. Transmitter unwanted emissions in the spurious domain 30
4.1.9. Receiver spurious emissions 33
4.1.10. Receiver Blocking 35
4.1.11. Geo-location capability 39

5. TEST SETUP PHOTOS OF THE EUT 40

6. EXTERNAL AND INTERNAL PHOTOS OF THE EUT 41

1. TEST STANDARDS

The tests were performed according to following standards:

ETSI EN 300 328 V2.1.1 (2016-11) –Wideband transmission systems;Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	2018/12/10
Testing commenced on	:	2018/12/10
Testing concluded on	:	2018/12/14

2.2. Product Description

Name of EUT	Smart Bracelet
Model(s) Number	SN66
List Models	SN18, SN58, CNE-SB11BB
Difference description	All the same except for the model name.
Hardware version	V2.0
Software version	V1.0
Antenna Type	Integral

Wireless Type	Working Frequency	Modulation Type	Version
Bluetooth	2402MHz-2480MHz	GFSK	BLE

2.3. Equipment Under Test

Power supply system utilised

Power supply voltage	:	○	230V / 50 Hz	○	120V / 60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

DC 3.7V by Battery

Description of the test mode

BLE used 40 channels and channel separation was 2MHz.

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

Test Frequency List

Type	Test Frequency					
	Lowest		Middle		Highest	
	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
BLE	00	2402	19	2440	39	2480

2.4. Description of the Equipment under Test (EUT)

Reference documents:	Bluetooth® Core Specification
Special test descriptions:	None
Configuration descriptions:	TX tests: Channel 00(2402MHz),Channel 19(2440MHz),Channel 39(2480MHz)
	RX/Standby tests: BLE test mode enabled, scan enabled, TX Idle
Test mode:	☐ Bluetooth Test mode loop back enabled (EUT is controlled over CBT/CMU)
	☒ Special software is used. EUT is transmitting pseudo random data by itself
Bluetooth standard capabilities:	40channels FHSS
	channel separation 2 MHz
	used freq. range 2402-2480 MHz
	Modulation types: GFSK
	Bandwidth appr. 1MHz for single hop frequency

2.5. EUT Classification:

Type of equipment:	☒	stand alone equipment	
	☐	plug in radio equipment	
	☐	combined equipment	
Modulation types:	☒	Wide Band Modulation (None Hopping – e.g. DSSS, OFDM)	
	☐	Frequency Hopping Spread Spectrum (FHSS)	
Adaptive equipment:	☒	Yes, LBT-based	☐ Frame Based Equipment
			☒ Load Based Equipment
	☐	Yes, non-LBT-based	
	☐	Yes (but can be disabled)	
	☐	No	
	☐	COT value	
	☒	CCA value	18μs
Antennas and transmit operating modes:	☐	Operating mode 1 (single antenna)	
		Equipment with 1 antenna, Equipment with 2 diversity antennas operating in switched diversity mode by which at any moment in time only 1 antenna is used, Smart antenna system with 2 or more transmit/receive chains, but operating in a mode where only 1 transmit/receive chain is used)	
	☒	Operating mode 2 (multiple antennas, no beamforming)	
		Equipment operating in this mode contains a smart antenna system using two or more transmit/receive chains simultaneously but without beamforming.	
	☐	Operating mode 3 (multiple antennas, with beamforming)	
		Equipment operating in this mode contains a smart antenna system using two or more transmit/receive chains simultaneously with beamforming. In addition to the antenna assembly gain (G), the beamforming gain (Y) may have to be taken into account when performing the measurements.	

2.6. EUT configuration

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

● - supplied by the manufacturer

○ - supplied by the lab

○	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/

Modifications
No modifications were implemented to meet testing criteria.

2.7. NOTE

Function	Test Standards	Reference Report
BLE	ETSI EN 300 328 V2.1.1 (2016-11)	TZ181200486-BLE
EMC	Draft ETSI EN 301 489-1 V2.2.0 (2017-03) Draft ETSI EN 301 489-17 V3.2.0 (2017-03) EN 55032: 2015 EN 55035: 2017 EN 61000-3-2: 2014 EN 61000-3-3: 2013	TZ181200486-RE
EMF	EN 62479: 2010	TZ181200486-EMF

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Shenzhen Tongzhou Testing Co.,Ltd
1th Floor, Building 1, Haomai High-tech Park, Huating Road 387, Dalang Street, Longhua, Shenzhen, China
The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2003) and CISPR Publication 22.

3.2. Environmental conditions

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

Normal Temperature/NT: 25 °C
High Temperature/HT: 40℃
Low Temperature/LT: -10℃
Normal Voltage: DC 3.7V
High Voltage/HV: DC 4.2V
Low Voltage/LV: DC 3.5V
Relative Humidity: 55 %
Air Pressure: 989 hPa

3.3. Test Description

3.3.1. Main Terms

Verdict	Verdict of each test cases.
Test Case	Test cases identification number description in ETSI specification.

3.3.2. Terms used in Condition column

NTC Normal voltage, Normal Temperature
HTHV High voltage, High Temperature
LTHV High voltage, Low Temperature
HTLV Low voltage, High Temperature
LTLV Low voltage, Low Temperature

3.3.3. Terms used in Verdict column

Pass	This test cases has been tested, and EUT is conformant to the applied standards in the given frequency band.
Fail	This test cases has been tested, but EUT is not conformant to the applied standards in the given frequency band.
N/A	This test case is either not required/not applicable in the specified band or is not applicable according to the specific PICS/PIXIT for the EUT.
Inc	Test case result is ambiguous in the given frequency band.
Decl	Declaration is received from the client to demonstrate the conformity to the relevant specification in the given frequency band.
BR	This test cases is not tested in the given frequency band, but this testcases was tested with pass result for the initial model in the given frequency band.

3.3.4. Sumarry of measurement results

☒ **No deviations from the technical specifications were ascertained**
☐ **There were deviations from the technical specifications ascertained**

Test Specification Clause	Test Case	Test Condition	Mode	Pass	Fail	N/A	NP	Remark
5.4.2	RF output power	NTC	GFSK	☒	☐	☐	☐	
		LT		☒	☐	☐	☐	
		HT		☒	☐	☐	☐	
5.4.3	Power Spectral Density	NTC	GFSK	☒	☐	☐	☐	
5.4.2	Duty Cycle, Tx-sequence, Tx-gap	NTC	--	☐	☐	☒	☐	Note 1
5.4.2	Medium Utilisation (MU) factor	NTC	--	☐	☐	☒	☐	Note 1
5.4.6	Adaptivity (adaptive equipment using modulations other than FHSS)	NTC	--	☐	☐	☒	☐	Note 2
5.4.7	Occupied Channel Bandwidth	NTC	GFSK	☒	☐	☐	☐	
5.3.8	Transmitter unwanted emissions in the out-of-band domain	NTC	GFSK	☒	☐	☐	☐	
		LT		☐	☐	☒	☐	
		HT		☐	☐	☒	☐	
5.3.9	Transmitter unwanted emissions in the spurious domain (conducted & radiated)	NTC	GFSK	☒	☐	☐	☐	
5.3.10	Receiver spurious emissions (conducted & radiated)	NTC	GFSK	☒	☐	☐	☐	
5.3.11	Receiver Blocking	NTC	GFSK	☒	☐	☐	☐	

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

Note 1: These requirements apply to non-adaptive equipment or to adaptive equipment when operating in a non-adaptive mode. These requirements do not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p.

Note 2: This requirement does not apply to non-adaptive equipment or adaptive equipment operating in a non-adaptive mode. These requirements do not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p.

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Mode	Data Rate
GFSK	1 Mbps

3.4. Statement of the measurement uncertainty

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

No.	Item	Uncertainty
1	Occupied Channel Bandwidth	±3.6dB
2	RF power, conducted	±0.16dB
3	Power Spectral Density, conducted	±1.3dB
4	Unwanted Emissions, conducted	±1.3dB
5	All emissions, radiated	±4.7dB
6	Temperature	±0.5°C
7	Humidity	±2%
8	DC and low frequency voltages	±1.5%
9	Time	±1.0%
10	Duty Cycle	±3.0%

3.5. Equipments Used during the Test

RF output power & PSD & OOB & OBW & Hoping & Duty Cycle, Tx-sequence, Tx-gap & Adaptively & Blocking						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	MXA Signal Analyzer	Keysight	N9020A	MY49100060	2017/12/29	2018/12/28
2	Signal Generator	Keysight	N5182A	MY47420864	2018/11/14	2019/11/13
3	Signal Generator	Agilent	83752A	3610A01069	2018/11/14	2019/11/13
4	Power Sensor	Agilent	U2021XA	MY5365004	2018/11/14	2019/11/13
5	Power Meter	Agilent	U2531A	TW53323507	2018/11/14	2019/11/13
6	Climate Chamber	KRUOMR	KRM-1000	KRM16072901	2017/11/29	2018/12/28

Transmitter spurious emissions & Receiver spurious emissions						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
1	Wideband Antenna	schwarzbeck	VULB 9163	A061713	2018/11/20	2019/11/19
2	Horn Antenna	schwarzbeck	9120D-1141	1574	2018/11/20	2019/11/19
3	EMI Test Receiver	R&S	ESCI	100849/003	2018/1/11	2019/1/10
4	Controller	MF	MF7802	N/A	N/A	N/A
5	Amplifier	schwarzbeck	BBV 9743	209	2017/12/29	2018/12/28
6	Amplifier	Tonscend	TSAMP-0518SE	--	2018/01/06	2019/01/05
7	Temperature/Humidity Meter	Lexiang	HTC-1	165137	2018/01/09	2019/01/08
8	High-Pass Filter	K&L	9SH10-2700/X12750-O/O	N/A	2017/12/29	2018/12/28
9	High-Pass Filter	K&L	41H10-1375/U12750-O/O	N/A	2017/12/29	2018/12/28
10	RF Cable	HUBER+SUHNER	RG214	N/A	2018/1/6	2019/1/5
11	MXA Signal Analyzer	Keysight	N9020A	MY49100060	2017/12/29	2018/12/28
12	Horn Antenna	ETS	3117	00218874	2018/11/20	2020/11/19

4. TEST CONDITIONS AND RESULTS

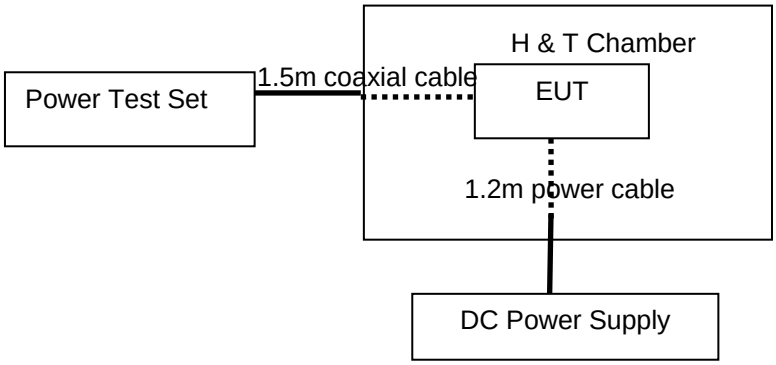
4.1. ETSI EN 300 328 REQUIREMENTS

4.1.1. RF Output Power

LIMIT

According to ETSI EN 300 328 V2.1.1 §4.3.2.2.3
For adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be 20 dBm.
The maximum RF output power for non-adaptive equipment shall be declared by the supplier and shall not exceed 20 dBm. See clause 5.4.1 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.
This limit shall apply for any combination of power level and intended antenna assembly.

TEST CONFIGURATION



TEST PROCEDURE

According to ETSI EN 300 328 V2.1.1 (2016-11) §5.4.2.2.1.1, conducted method.

EUT DESCRIPTION:

Mode:	BT Test mode
Test Channel	Channel 00(2402MHz),Channel 19(2440MHz),Channel 39(2480MHz)
Modulation:	GFSK

MEASUREMENT DESCRIPTION

Instrument:	Power Meter measuring burst Power(RMS) of a least 10 packets	
Performed:	☒	Conducted
	☐	Radiated (only if no conducted sample is provided)

TEST RESULTS

Test environmental		Maximum conducted Burst Power in 15 measured Bursts (RMS) [dBm]		
Test Channel	**Test Condition**	**Antenna Measured Power (dBm)**	**EIRP(dBm)**	**Limit(dBm)**
00	NTC	4.18	4.18	20
00	LT/NV	4.14	4.14	20
00	HT/NV	4.04	4.04	20
19	NTC	-0.09	-0.09	20
19	LT/NV	0.18	0.18	20
19	HT/NV	0.21	0.21	20
39	NTC	2.32	2.32	20
39	LT/NV	2.33	2.33	20
39	HT/NV	2.04	2.04	20
Result		**Pass**		

Note:.Cable loss and antenna gain was combined in the calculated result.

4.1.2. Duty Cycle,TX-sequence,TX-gap

LIMIT

ETSI EN 300 328 (V2.1.1) Sub-clause 4.3.2.4.3
The Duty Cycle shall be equal to or less than the maximum value declared by the manufacturer.
The Tx-sequence time shall be equal to or less than 10 ms. The minimum Tx-gap time following a Tx-sequence shall be equal to the duration of that proceeding Tx-sequence with a minimum of 3,5 ms.

These requirements apply to non-adaptive frequency hopping equipment or to adaptive frequency hopping equipment operating in a non-adaptive mode.These requirements do not apply for equipment with a maximum declared RF Output power 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.

TEST PROCEDURE

Please refer to ETSI EN 300 328 (V2.1.1) Sub-clause 5.4.2.2.1.3
For systems using wide band modulations other than FHSS, the measurement shall be performed at the lowest, the middle, and the highest channel on which the equipment can operate. These frequencies shall be recorded.
The test procedure, which shall only be performed for non-adaptive systems and only to be performed at normal environmental conditions, shall be as follows:
Step 1:
• Use the same stored measurement samples from the procedure described in clause 5.4.2.2.1.2.
• 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 (DC) 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:
• For 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.
• 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:
• Use the same stored measurement samples from the procedure described in clause 5.4.2.2.1.2.
• 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.
• 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.
• 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.
• 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.

EUT DESCRIPTION:

Mode:	BT Test mode
Test Channel	Channel 00(2402MHz),Channel 19(2440MHz),Channel 39(2480MHz)
Modulation:	GFSK

MEASUREMENT DESCRIPTION

Instrument:	Power Meter measuring average burst Power of a least 10 packets	
Performed:	☒	Conducted
	☐	Radiated (only if no conducted sample is provided)

TEST RESULTS

Not Applicable

4.1.3. Medium Utilisation (MU) factor

LIMIT

ETSI EN 300 328 V2.1.1 (2016-11) Sub-clause 4.3.2.5.3
For non-adaptive equipment using wide band modulations other than FHSS, the maximum Medium Utilization factor shall be 10 %.
This requirement does not apply to adaptive equipment unless operating in a non-adaptive mode. In addition, this requirement does 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.

TEST PROCEDURE

Please refer to ETSI EN 300 328 V2.1.1 (2016-11) Sub-clause 5.4.2.2.1.4
Step 1:
• Use the same stored measurement samples from the procedure described in clause 5.4.2.2.1.2.
Step 2:
• For each burst calculate the product of (Pburst / 100 mW) and the TxOn time. Pburst 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 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.

EUT DESCRIPTION:

Mode:	BT Test mode
Test Channel	Channel 00(2402MHz),Channel 19(2440MHz),Channel 39(2480MHz)
Modulation:	GFSK

MEASUREMENT DESCRIPTION

Instrument:	Power Meter measuring average burst Power of a least 10 packets	
Performed:	☒	Conducted
	☐	Radiated (only if no conducted sample is provided)

TEST RESULTS

Not Applicable according to ETSI EN 300 328 V2.1.1 (2016-11) Sub-clause 4.3.2.5.1

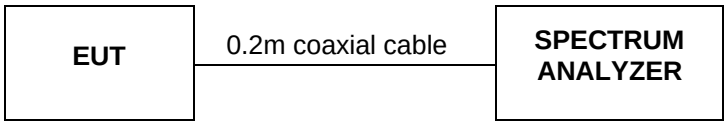
This requirement does not apply to adaptive equipment unless operating in a non-adaptive mode.
In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for equipment when operating in a mode where the RF Output power is less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

4.1.4. Power Spectral Density

LIMIT

According to ETSI EN 300 328 V2.1.1 (2016-11) §4.3.2.3.3,
For equipment using wide band modulations other than FHSS, the maximum Power Spectral Density is limited to 10dBm/MHz.
These measurements shall only be performed at normal test conditions.

TEST CONFIGURATION



TEST PROCEDURE
According to ETSI EN 300 328 V2.1.1 (2016-11) §5.4.3.2.1, conducted method.
The test procedure shall be as follows:
Step 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 be completed. Save the (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 5.1.3.2), 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 5.3.2 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 PSamplecorr(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 1 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.

EUT DESCRIPTION:

Mode:	BT Test mode
Test Channel	Channel 00(2402MHz),Channel 19(2440MHz),Channel 39(2480MHz)
Modulation:	GFSK

MEASUREMENT DESCRIPTION

Instrument:	Spectrum Analyzer	
Detector:	RMS	
Sweep time:	10S	
Video bandwidth:	30KHz	
Resolution bandwidth:	10KHz	
Span:	83.5MHz	
Frequency range	2400-2483.5MHz	
Sweep Points	15000	
Performed:	☒	Conducted
	☐	Radiated (only if no conducted sample is provided)

TEST RESULTS

The Maximum Power Spectral Density				
Test Channel Number	**Test Condition**	**Measured Power Density (dBm/MHZ)**	**EIRP Density (dBm/MHz)**	**Limit(dBm/MHz)**
00	NTC	4.02	4.02	10
19	NTC	-0.49	-0.49	10
39	NTC	2.21	2.21	10
Result		**PASS**		

4.1.5. Adaptivity (Adaptive equipment using modulations other than FHSS)

LIMIT

Requirement	Operational Mode			
	Non-LBT based Detect and Avoid	LBT based Detect and Avoid		
		Frame Based Equipment	Load Based Equipment (CCA using 'energy detect')	Load Based Equipment (CCA not using any of the mechanisms referenced as note 2)
Minimum Clear Channel Assessment (CCA) Time	NA	18 us (see note 1)	18 us (see note 2)	18 us (see note 1)
Maximum Channel Occupancy (COT) Time	40 ms	1ms to 10 ms	13ms (see note 2)	13ms
Minimum Idle Period	At least 5% of COT and 100 μ s	5% of COT	NA	NA
Extended CCA check	NA	NA	(see note 2)	>CCA
Short Control Signaling Transmissions	Maximum duty cycle of 10% within an observation period of 50 ms (see note 3)			

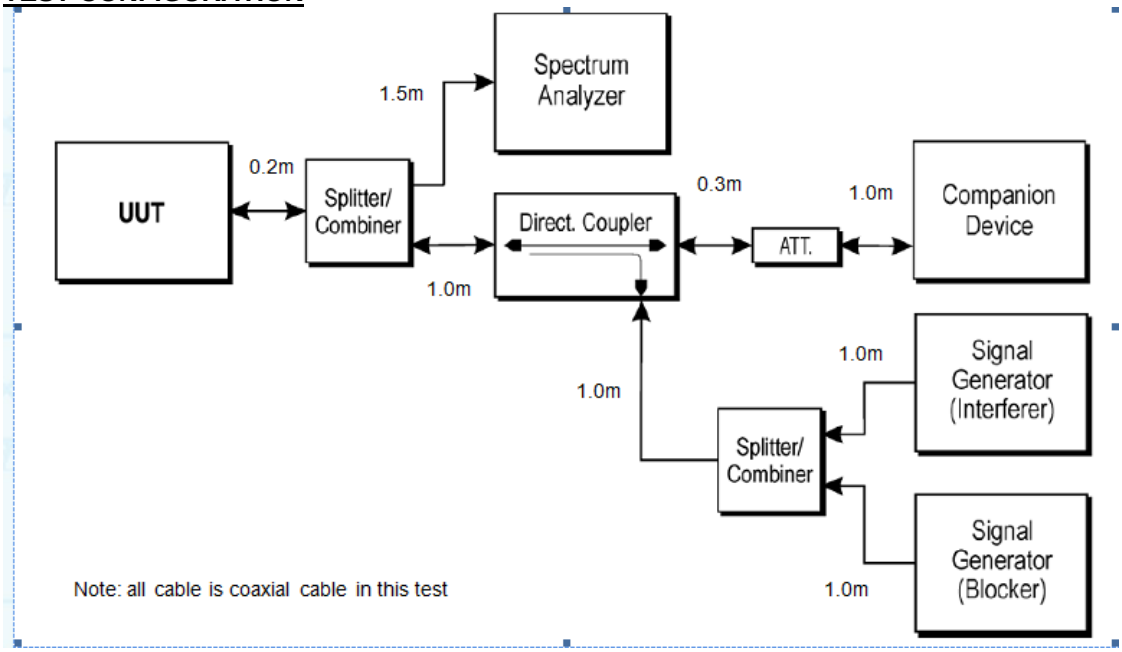
Note 1: The CCA time used by the equipment shall be declared by the supplier.
Note 2: Load Based Equipment may implement an LBT based spectrum sharing mechanism based on the Clear Channel Assessment (CCA) mode using energy detect, as described in IEEE Std. 802.11™-2007 clauses 9,15,18 or 19, in IEEE Std. 802.11n ™ -2009 clauses 9,11 and 20 or in IEEE Std. 802.15.4 ™ -2011, clauses 4 and 5.
Note 3: Adaptive equipment may or may not have Short Control Signaling Transmissions.

Wanted signal mean power from companion device:
TL = -70 dBm/MHz + 10 × log10 (100 mW / P_{out}) (Pout in mW e.i.r.p.)

Unwanted Signal parameters

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

TEST CONFIGURATION



MEASUREMENT DESCRIPTION

According to ETSI EN 300 328 V2.1.1 (2016-11) §5.4.6.2.1.4, Conducted measurements
Step 1:
The UUT may connect to a companion device during the test. The interference signal generator, the blocking signal generator, the spectrum analyzer, the UUT and the companion device are connected using a set-up equivalent to the example given by figure 5 although the interference and blocking signal generator do not generate any signals at this point in time. The spectrum analyzer is used to monitor the transmissions of the UUT in response to the interfering and the blocking signals.
• Adjust the received signal level (wanted signal from the companion device) at the UUT to the value defined in table 6 (clause 4).
NOTE 1: Testing of Unidirectional equipment does not require a link to be established with a companion device.
• The analyzer shall be set as follows:
- RBW: =20MHz for 802 .11b/g/n(20);
= 40MHz for 802.11n(40)
[≥ Occupied Channel Bandwidth (if the analyzer does not support this setting, the highest available setting shall be used)]
- VBW: =30MHz
[3 × RBW (if the analyzer does not support this setting, the highest available setting shall be used)]
- Detector Mode: RMS
- Centre Frequency: Equal to the centre frequency of the operating channel
- Span: 0 Hz
- Sweep time: > maximum Channel Occupancy Time
- Trace Mode: Clear Write
- Trigger Mode: Video

Step 2:

• 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.

• For Frame 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 4.3.2.6.3.2.2 step 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, it shall not include the transmission time of the companion device.

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

The spectrum analyser 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 analyser sweep to be triggered by the start of the interfering signal.

• Using the procedure defined in clause 5.4.6.2.1.5, it shall be verified that:

i) The UUT shall stop transmissions on the current operating channel.

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.

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.

The verification of the Short Control Signalling transmissions may require the analyser settings to be changed (e.g. sweep time).

iv) Alternatively, the equipment may switch to a non-adaptive mode.

Step 5: Adding the blocking signal

• With the interfering signal present, a 100 % duty cycle CW signal is inserted as the blocking 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.

• The spectrum analyser shall be used to monitor the transmissions of the UUT on the selected operating channel. This may require the spectrum analyser sweep to be triggered by the start of the blocking signal.

• Using the procedure defined in clause 5.4.6.2.1.5, 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.

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.

The verification of the Short Control Signalling transmissions may require the analyser settings to be changed (e.g. sweep time).

Step 6: Removing the interference and blocking signal

• On removal of the interference and blocking 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:

• The steps 2 to 6 shall be repeated for each of the frequencies to be tested.

TEST RESULTS

This requirement 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. So This requirement do not apply for EUT

4.1.6. Occupied Channel Bandwidth

LIMIT

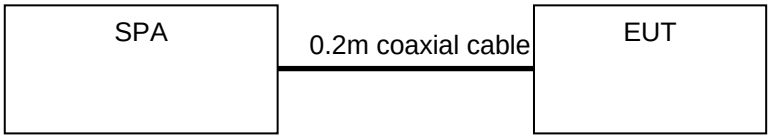
According to ETSI EN 300 328 V2.1.1 (2016-11) 4.3.2.7.3,
The Occupied Channel Bandwidth shall fall completely within the band given in table 1.

Table 1: Service frequency bands

	Service frequency bands
Transmit	2 400 MHz to 2 483,5 MHz
Receive	2 400 MHz to 2 483,5 MHz

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.
These measurements shall only be performed at normal test conditions.

TEST CONFIGURATION



TEST PROCEDURE

According to ETSI EN 300 328 V2.1.1 (2016-11) §5.4.7.2.1, conducted method.
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 for frequency hopping equipment: Lowest frequency separation that is used within the hopping sequence
• Frequency Span for other types of equipment: 2 × Nominal Channel Bandwidth (e.g. 40 MHz for a 20 MHz channel)
• 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.

EUT DESCRIPTION:

Mode:	BT Test mode
Test Channel	Channel 00(2402MHz), Channel 39(2480MHz)
Modulation:	GFSK

MEASUREMENT DESCRIPTION

Instrument:	Spectrum Analyzer	
Detector:	RMS	
Sweep time:	1S	
Video bandwidth:	☒20 MHz(Bandwith):1.5MHz	☒40 MHz(Bandwith):3MHz
Resolution bandwidth:	☒20 MHz(Bandwith):410KHz	☒40 MHz(Bandwith):820KHz
Span:	☒20 MHz(Bandwith):40MHz	☒40 MHz(Bandwith):80MHz
Center:	Transmit channel	
Trace:	Max hold	
Performed:	☒ Conducted	
	☐ Radiated (only if no conducted sample is provided)	

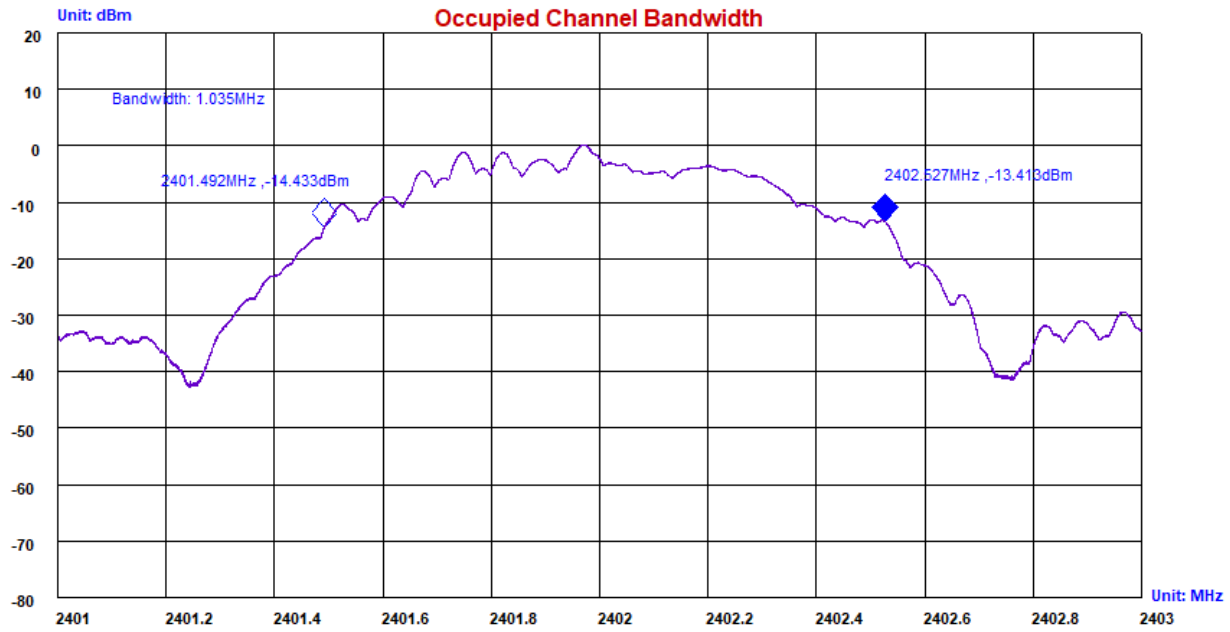
TEST RESULTS

Channel	Channel Frequency (MHz)	99% Occupied Bandwidth (MHz)	Measured Frequencies		Limit	Pass /Fail
			FL (MHz)	FH (MHz)		
00	2402	1.035	2401.492	2402.527	FL>2400MHz and FH<2483.5 MHz	PASS
39	2480	1.036	2479.49	2480.526		PASS

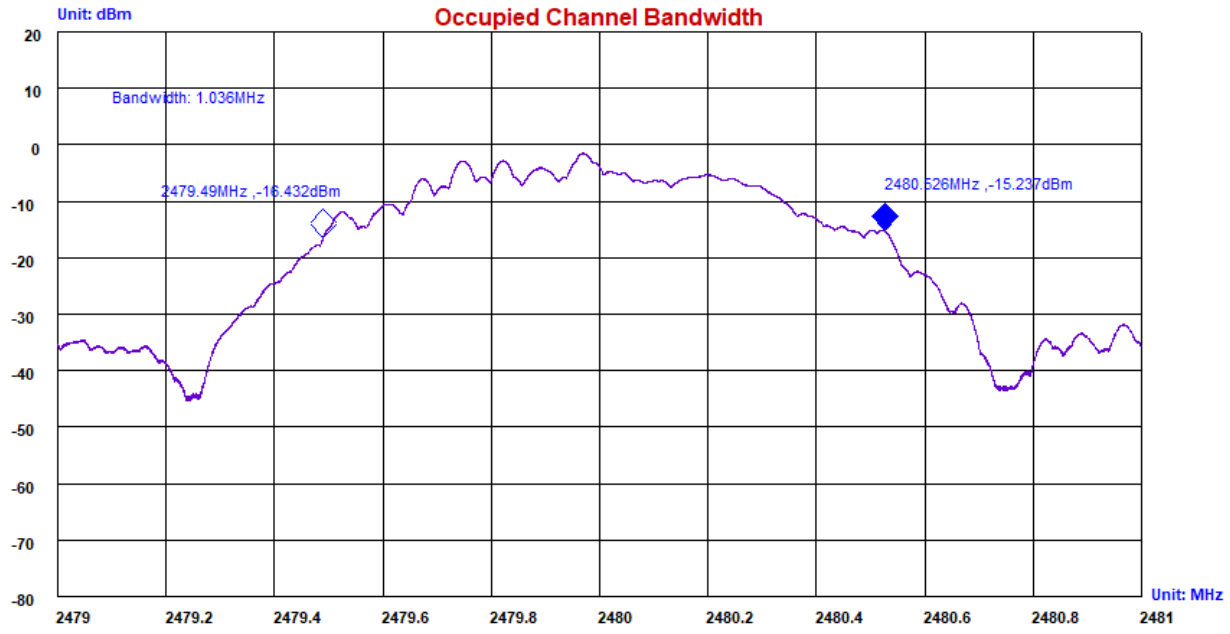
Test plot as follows:

GFSK

CH00



CH39



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

LIMIT

ETSI EN 300 328 (V2.1.1) Sub-clause 4.3.2.8.3
The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 3.
NOTE: Within the 2 400 MHz to 2 483,5 MHz band, the Out-of-band emissions are fulfilled by compliance with the Occupied Channel Bandwidth requirement in clause 4.3.2.7.

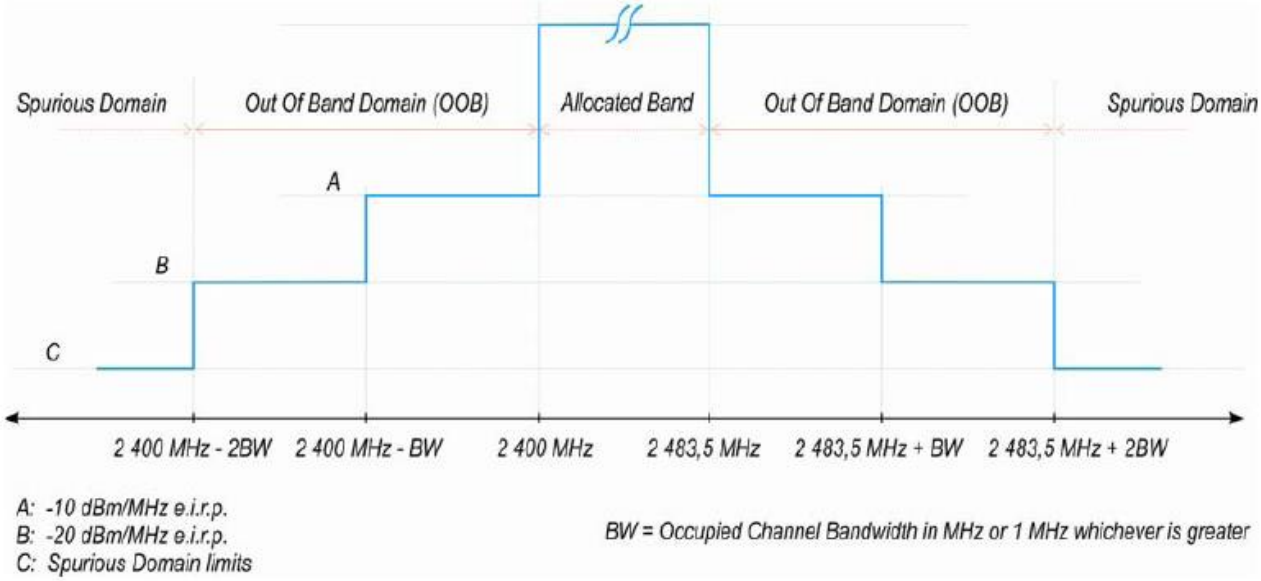
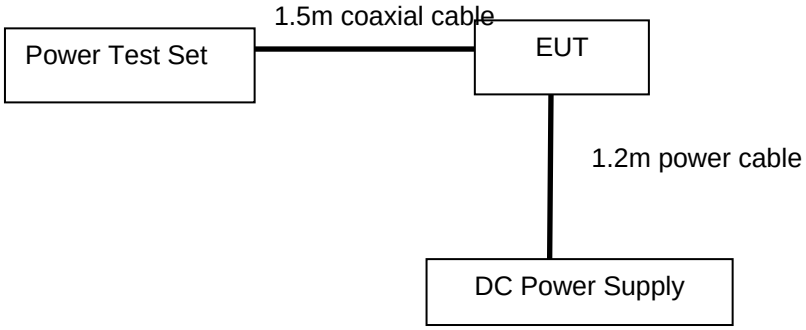


Figure 3: Transmit mask

Transmitter unwanted emissions in the out-of-band domain are emissions when the equipment is in Transmit mode, on frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding spurious.
These measurements shall only be performed at normal test conditions.
For systems using FHSS modulation, the measurements shall be performed during normal operation (hopping).
For systems using wide band modulations other than FHSS, the measurement shall be performed at the lowest and the highest channel on which the equipment can operate. These operating channels shall be recorded.
The equipment shall be configured to operate under its worst case situation with respect to output power.
If the equipment can operate with different Occupied Channel Bandwidths (e.g. 20 MHz and 40 MHz), than each channel bandwidth shall be tested separately.

TEST CONFIGURATION



TEST PROCEDURE

According to ETSI EN 300 328 V2.1.1 (2016-11) §5.4.8.2.1, conducted method.

Connect the UUT to the spectrum analyser and use the following settings:
- Centre Frequency: evaluated frequency
- Span: 0 Hz
- 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

NOTE 1: In case video triggering is not possible, an external trigger source may be used.
- 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)

● 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.

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.

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.

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 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 figures 1 or 3.

Option 2: the limits provided by the mask given in figures 1 or 3 shall be reduced by 10 x 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: 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.

EUT DESCRIPTION:

Mode:	BT Test mode
Test Channel	Channel 00(2402MHz), Channel 39(2480MHz)
Modulation:	GFSK

MEASUREMENT DESCRIPTION

Instrument:	Spectrum Analyzer	
Detector:	RMS	
Sweep time:	depending on packet length	
Video bandwidth:	3MHz	
Resolution bandwidth:	1MHz	
Span:	0Hz	
Trace:	Trigger to burst	
Sweep points:	Sweep Time [s] / (1 µs) or 5 000 whichever is greater	
Performed:	☒	Conducted
	☐	Radiated (only if no conducted sample is provided)

TEST RESULTS

Note: Cable loss and antenna gain was combined in the calculated result.

Channel frequency	2402MHz		2480MHz	
Test condition	OOB Emission(MHz)		OOB Emission(MHz)	
	2400-BW ~2400	2400-2BW ~2400-BW	2483.5 ~ 2483.5+BW	2483.5+BW ~ 2483.5+2BW
	Maximum power (dBm)	Maximum power (dBm)	Maximum power (dBm)	Maximum power (dBm)
NTC	-48.52	-52.54	-44.36	-52.70
Limits	-10.00	-20.00	-10.00	-20.00
PASS/FAIL	PASS	PASS	PASS	PASS

4.1.8. Transmitter unwanted emissions in the spurious domain

Limit

According to ETSI EN 300 328 V2.1.1(2016-11) §4.3.2.9.3
The transmitter unwanted emissions in the spurious domain shall not exceed the values given in table 4.

Table 1: Transmitter limits for spurious emissions

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

These measurements shall only be performed at normal test conditions.
The level of spurious emissions shall be measured as, either:
a) their power in a specified load (conducted spurious emissions) and their effective radiated power when radiated by the cabinet or structure of the equipment (cabinet radiation); or
b) their effective radiated power when radiated by cabinet and antenna in case of Integral antenna equipment with no antenna connectors.

For equipment using FHSS modulation, the measurements may be performed when normal hopping is disabled. In this case measurements need to be performed when operating at the lowest and the highest hopping frequency. When this is not possible, the measurement shall be performed during normal operation (hopping).

For systems using wide band modulations other than FHSS, the measurement shall be performed at the lowest and the highest channel on which the equipment can operate. These frequencies shall be recorded.

The equipment shall be configured to operate under its worst case situation with respect to output power.

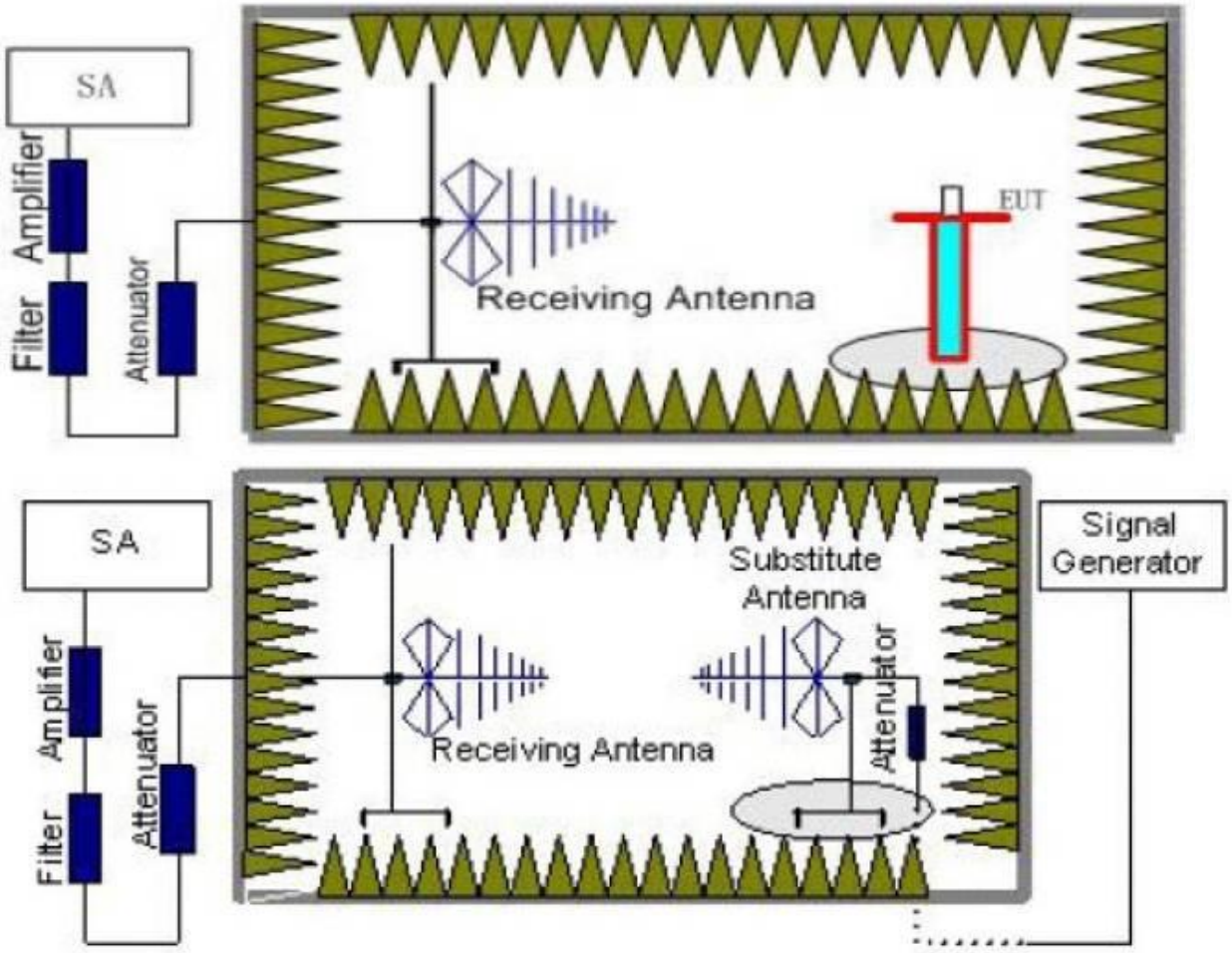
If the equipment can operate with different Nominal Channel Bandwidths (e.g. 20 MHz and 40 MHz), then the equipment shall be configured to operate under its worst case situation with respect to spurious emissions.

Test Procedure

According to ETSI EN 300 328 V2.1.1 (2016-11) §5.4.9.2.2, Radiated measurement.

Test Configuration

Effective Radiated Power measurement (30 MHz to 12.75 GHz)



Test Results

Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
Below 1GHz:					
583.58	V	-60.82	-54	6.82	PASS
574.83	H	-60.11	-54	6.11	PASS
Above 1GHz:					
Test Mode：Low Channel					
4804	H	-44.38	-30	14.38	PASS
4804	V	-46.34	-30	16.34	PASS
7206	H	-44.78	-30	14.78	PASS
7206	V	-44.30	-30	14.30	PASS
9608	H	-44.82	-30	14.82	PASS
9608	V	-45.17	-30	15.17	PASS
Test Mode：High Channel					
4960	H	-41.90	-30	11.90	PASS
4960	V	-43.90	-30	13.90	PASS
7440	H	-41.10	-30	11.10	PASS
7440	V	-42.67	-30	12.67	PASS
9920	H	-42.31	-30	12.31	PASS
9920	V	-41.39	-30	11.39	PASS

Note:
1. Cable loss and antenna gain was combined in the calculated result.
2. No record for margin above 20dB.

4.1.9. Receiver spurious emissions

LIMIT

According to ETSI EN 300 328 V2.1.1 (2016-11) §4.3.2.10.3
The spurious emissions of the receiver shall not exceed the values given in table 5.

Table 2: spurious emission limits for receivers

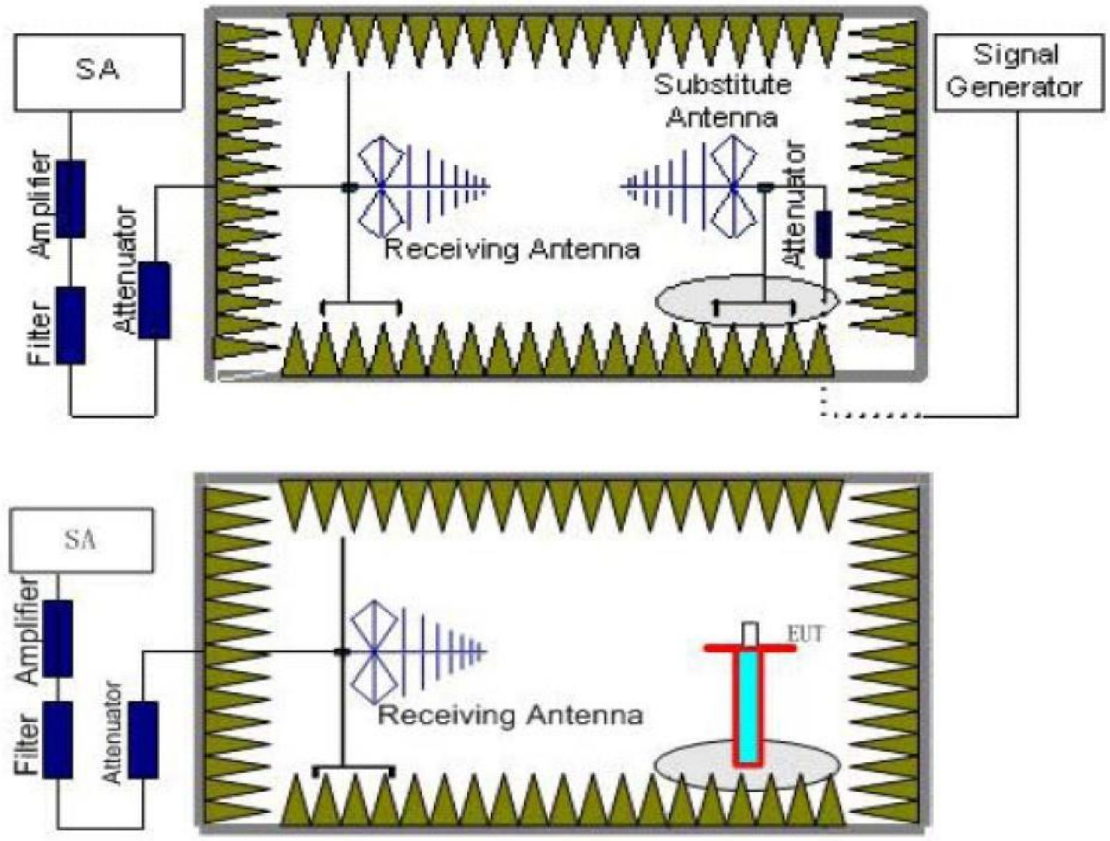
Frequency	Maximum power, e.r.p.	Measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 KHz
30 MHz to 12.75 GHz	-47 dBm	1 MHz

Test Procedure

The same as clause 4.1.8

Test Configuration

Effective Radiated Power measurement (30 MHz to 12.75 GHz)



The level of spurious emissions shall be measured as, either:
a) their power in a specified load (conducted spurious emissions) and their effective radiated power when radiated by the cabinet or structure of the equipment (cabinet radiation); or
b) their effective radiated power when radiated by cabinet and antenna in case of Integral antenna equipment withno temporary antenna connectors.
Testing shall be performed when the equipment is in a receive-only mode.
For equipment using wide band modulations other than FHSS, the measurement shall be performed at the lowest and the highest channel on which the equipment can operate. These frequencies shall be recorded.
For equipment using FHSS modulation, the measurements may be performed when normal hopping is disabled. In this case measurements need to be performed when operating at the lowest and the highest hopping frequency. These frequencies shall be recorded. When disabling the normal hopping is not possible, the measurement shall be performed during normal operation (hopping).

Test Results

Fre. (MHz)	ANT. Pol.	ERP (dBm)	Limit	Margin	Conclusion
Below 1GHz:					
108.05	V	-66.88	-57	9.88	PASS
737.12	H	-66.72	-57	9.72	PASS
Above 1GHz:					
Test Mode：Lowest frequency					
1801.02	H	-59.14	-47	-10.23	PASS
1801.02	V	-55.10	-47	-11.1	PASS
2950.78	H	-56.72	-47	-10.97	PASS
2950.78	V	-57.56	-47	-11.52	PASS
Test Mode： Highest frequency					
1643.78	H	-55.06	-47	-14.76	PASS
1643.78	V	-57.10	-47	-12.77	PASS
2598.68	H	-56.12	-47	-16.29	PASS
2598.68	V	-57.35	-47	-13.73	PASS

Note:
1. Cable loss and antenna gain was combined in the calculated result.
2. No record for margin above 20dB.

4.1.10. Receiver Blocking

LIMIT

According to ETSI EN 300 328 V2.1.1 (2016-11) §4.3.2.11.4

While maintaining the minimum performance criteria as defined in clause 4.3.2.11.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided in table 14, table 15 or table 16.

The minimum performance criterion shall be a PER less than or equal to 10 %. The manufacturer may declare alternative performance criteria as long as that is appropriate for the intended use of the equipment.

Table 14: Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 6 dB	2 380 2 503,5	-53	CW
P_{min} + 6 dB	2 300 2 330 2 360	-47	CW
P_{min} + 6 dB	2 523,5 2 553,5 2 583,5 2 613,5 2 643,5 2 673,5	-47	CW

NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal.

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.

Table 15: Receiver Blocking parameters receiver category 2 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 6 dB	2 380 2 503,5	-57	CW
P_{min} + 6 dB	2 300 2 583,5	-47	CW

NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal.

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.

Table 16: Receiver Blocking parameters receiver category 3 equipment

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 12 dB	2 380 2 503,5	-57	CW
P_{min} + 12 dB	2 300 2 583,5	-47	CW
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 in the absence of any blocking signal. 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.			

According to ETSI EN 300 328 V2.1.1 (2016-11) § 4.2.3 Receiver categories
4.2.3.2.1 Receiver category 1
Adaptive equipment with a maximum RF output power greater than 10 dBm e.i.r.p. shall be considered as receiver category 1 equipment.
4.2.3.2.2 Receiver category 2
Non-adaptive equipment with a Medium Utilization (MU) factor greater than 1 % and less than or equal to 10 % or adaptive equipment with a maximum RF output power of 10 dBm e.i.r.p. shall be considered as receiver category 2 equipment.
4.2.3.2.3 Receiver category 3
Non-adaptive equipment with a maximum Medium Utilization (MU) factor of 1 % or adaptive equipment with a maximum RF output power of 0 dBm e.i.r.p. shall be considered as receiver category 3 equipment.

These measurements shall only be performed at normal test conditions.
For non-frequency hopping equipment, having more than one operating channel, the equipment shall be tested operating at both the lowest and highest operating channels. Equipment which can change their operating channel automatically (adaptive channel allocation), and where this function cannot be disabled, shall be tested as a frequency hopping equipment.
If the equipment can be configured to operate with different Nominal Channel Bandwidths (e.g. 20 MHz and 40 MHz) and different data rates, then the combination of the smallest channel bandwidth and the lowest data rate for this channel bandwidth which still allows the equipment to operate as intended shall be used. This mode of operation shall be aligned with the performance criteria defined in clause 4.3.1.12.3 or clause 4.3.2.11.3 as declared by the manufacturer (see clause 5.4.1 t)) and shall be described in the test report.
It shall be verified that this performance criteria as declared by the manufacturer is achieved.

TEST CONFIGURATION

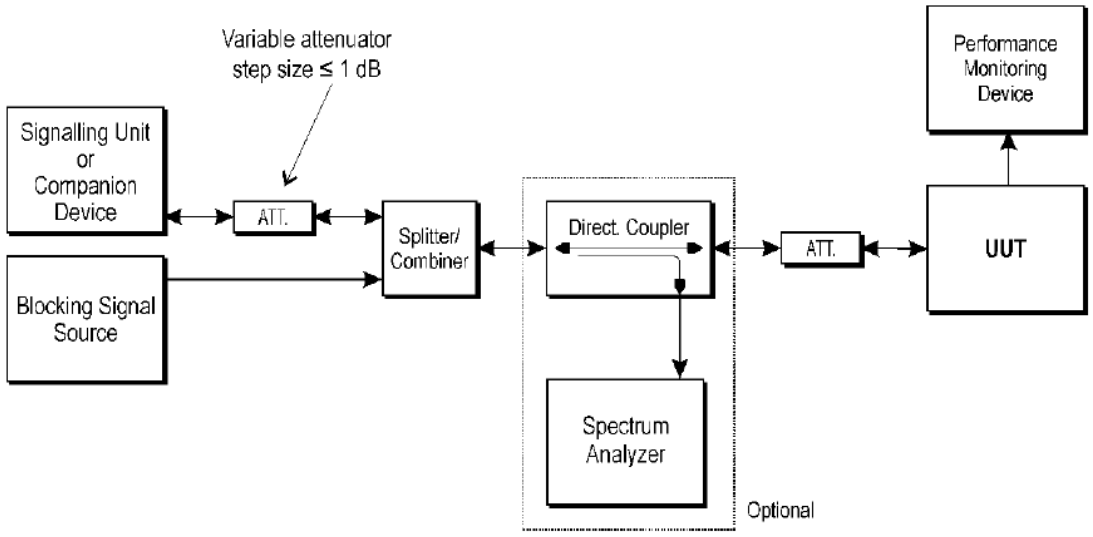


Figure 6: Test Set-up for receiver blocking

MEASUREMENT DESCRIPTION

According to ETSI EN 300 328 V2.1.1 (2016-11) §5.4.11.2.1, Conducted measurements

Step 1:

• For non-frequency hopping equipment, the UUT shall be set to the lowest operating channel.

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:

• 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. 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 Pmin.

• This signal level (Pmin) is increased by the value provided in the 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. It shall be verified and recorded in the test report that the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is met.

Step 5:

• Repeat step 4 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 6:

• For non-frequency hopping equipment, repeat step 2 to step 5 with the UUT operating at the highest operating channel.

TEST RESULTS

Channel 00@Result

Wanted signal mean power form companion device(dBm)	Blocking signal frequency(MHz)	Blocking sgnal power(dBm)	PER (%)	Limit (%)	Result
-70	2380	-57	0.00	10	Pass
-70	2503.5	-57	0.00	10	Pass
-70	2300	-47	0.00	10	Pass
-70	2583.5	-47	0.00	10	Pass
P_{min} = -82 dBm					

Channel 39@Result

Wanted signal mean power form companion device(dBm)	Blocking signal frequency(MHz)	Blocking sgnal power(dBm)	PER (%)	Limit (%)	Result
-70	2380	-57	0.00	10	Pass
-70	2503.5	-57	0.00	10	Pass
-70	2300	-47	0.00	10	Pass
-70	2583.5	-47	0.00	10	Pass
P_{min} = -82 dBm					

4.1.11. Geo-location capability

Definition& Requirements

ETSI EN 300 328 (V2.1.1) Sub-clause 4.3.2.12.2 &4.3.2.12.3

Geo-location capability is a feature of the equipment to determine its geographical location with the purpose to configure itself according to the regulatory requirements applicable at the geographical location where it operates.

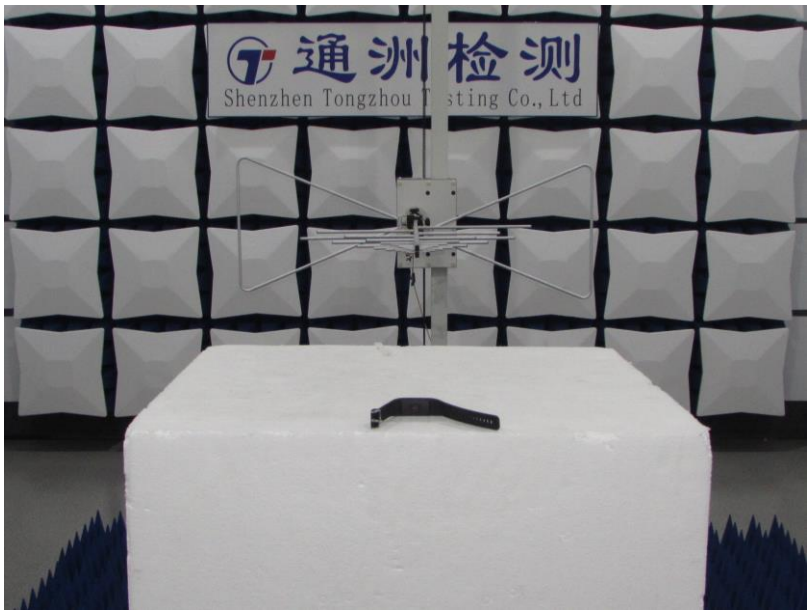
The geo-location capability may be present in the equipment or in an external device (temporary) associated with the equipment operating at the same geographical location during the initial power up of the equipment.

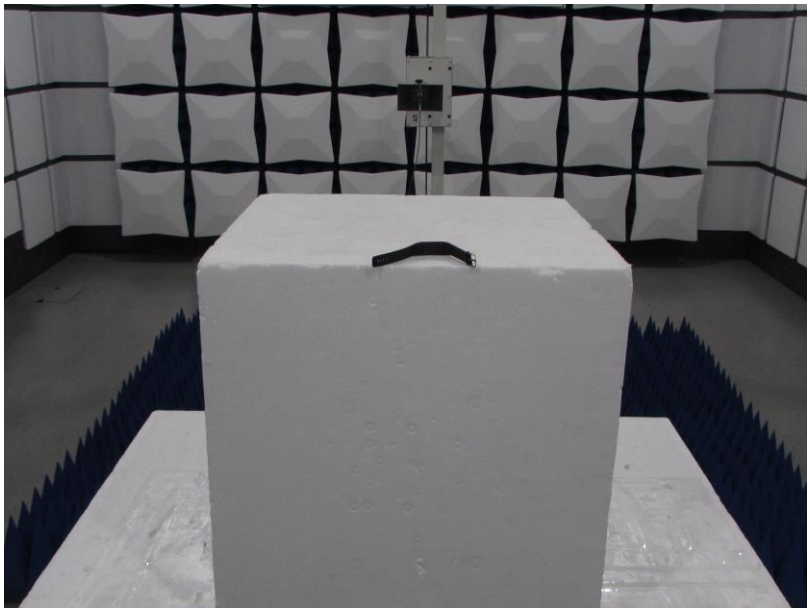
The geographical location may also be available in equipment already installed and operating at the same geographical location

RESULTS

This equipment does not support Geo-location.

5. Test Setup Photos of the EUT





6. External and Internal Photos of the EUT

Reference to the test report No. TZ181200486-RE

.....End of Report.....