



## TEST REPORT

### ETSI EN 300 220-1 V3.1.1 (2017-02) & ETSI EN 300 220-2 V3.2.1 (2018-06)

Report Reference No.: MTL23110100303E02

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Date of issue: 2023-12-04

Representative Laboratory Name: Shenzhen MTL Testing Technology Co., Ltd.

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Applicant's name: Meteca SA

Address: Via Alla Torre, 2 6850 Mendrisio (CH)

#### Test specification:

Standard: ETSI EN 300 220-1 V3.1.1 (2017-02) &amp; ETSI EN 300 220-2 V3.2.1 (2018-06)

TRF Originator: Shenzhen MTL Testing Technology Co., Ltd.

Master TRF: Dated 2017-05

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Product Name: MBC-LR

Trade Mark: MBC-LR01

Product Model: MBC-LR01

Serial Model: MBC-LR01-0001

Hardware Version: V2.0

Software Version: V2.0

Rating: DC 3.3V

Result: Positive

**TEST REPORT****Test Report No. : MTL231101100302E02**

2023/11/30

Date of issue

Product Name : MBC-LR

Product Model : MBC-LR01

Serial Model : MBC-LR01-0001

**Applicant** : Meteca SA

Address : Via Alla Torre, 2 6850 Mendrisio (CH)

**Manufacturer** : Meteca SA

Address : Via Alla Torre, 2 6850 Mendrisio (CH)

**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.



**\*\* Modified History \*\***

Revision	Description	Issued Data	Remark
Revision 1.0	Initial Test Report Release	2023/11/30	



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# 1 SUMMARY

## 1.1 TEST STANDARDS

The tests were performed according to following standards:

ETSI EN 300 220-1 V3.1.1 (2017-02)—Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 1: Technical characteristics and methods of measurement

ETSI EN 300 220-2 V3.2.1 (2018-06) —Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 2: Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU for non specific radio equipment

## 1.2 Test Description

Clause	Test Parameter	Condition	Result
<b>All equipment conformance requirements</b>			
4.2.1	Operating frequency	Apply to all equipment	PASS
4.2.2	Unwanted emissions in the spurious domain	Apply to all equipment	PASS
<b>Transmitters conformance requirements</b>			
4.3.1	Effective Radiated Power	Apply to transmitters	PASS
4.3.2	Maximum e.r.p. spectral density	Apply to transmitters using annex B bands I, L. Apply to transmitters using DSSS or wideband techniques other than FHSS modulation, in annex C band X.	N/A
4.3.3	Duty Cycle	Apply to all transmitters except EUT with polite spectrum access (described in clause 4.5) where permitted in annex B, table B.1 or annex C, table C.1 or any NRI.	PASS
4.3.4	Occupied Bandwidth	Apply to all transmitters.	PASS
4.3.5	Tx Out of Band Emissions	Apply to all transmitters with OCW > 25 kHz.	PASS
4.3.6	Transient power	Transient power applies to all transmitters.	PASS
4.3.7	Adjacent Channel Power	Apply to all transmitters with OCW ≤ 25 kHz.	N/A
4.3.8	TX behaviour under Low Voltage Conditions	Apply to battery powered EUT.	PASS
4.3.9	Adaptive Power Control	Apply to all EUT with adaptive power control using annex C band AA.	N/A
4.3.10	FHSS equipment	Apply to all FHSS equipment.	N/A
4.3.11	Short term behaviour	Apply to EUT for operation in bands where T <sub>on</sub> or T <sub>off</sub> limits are specified in annex C, table C.1 or NRI.	N/A
<b>Receivers conformance requirements</b>			
4.4.1	RX sensitivity	Apply to EUT with polite spectrum access instead of duty cycle where permitted by table B.1 in annex B, or table C.1 in annex C or any NRI.	N/A
4.4.2	Blocking	Apply to all receivers	PASS
<b>Polite spectrum access conformance requirement</b>			
4.5.2	Clear Channel Assessment threshold	Apply to EUT with polite spectrum access instead of duty cycle where permitted by table B.1 in annex B, or table C.1 in annex C or any NRI.	N/A
4.5.3	Polite spectrum access timing parameters	Apply to EUT with polite spectrum access instead of duty cycle where permitted by table B.1 in annex B, or table C.1 in annex C or any NRI.	N/A
4.5.4	Adaptive Frequency Agility	Apply to EUT with AFA.	N/A





### 1.3 Test Facility

#### 1.3.1 Information of the Test Laboratory

Shenzhen MTL Testing Technology Co., Ltd.

6th Floor, Building 4, No. 22, Dawangshan Second Industrial Zone, Shajing, Baoan District, Shenzhen City, Guangdong Province, China.

#### 1.4 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 CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“and is documented in the MTL (Shenzhen) Product Service Limitedacc. 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 MTL (Shenzhen) Product Service Limitedfor Products Quality is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	3.90dB	(1)
Radiated Emission	Above 1GHz	4.26dB	(1)
Conducted Disturbance	0.15~30MHz	2.71dB	(1)

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



## 2 GENERAL INFORMATION

### 2.1 General Remarks

Date of receipt of test sample	:	2023/11/01
Testing commenced on	:	2023/11/01
Testing concluded on	:	2023/11/30

### 2.2 Environmental conditions

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

Temperature	NT: Normal Temperature	25°C
	HT: High Temperature	40°C
	LV: Low Temperature	-10°C
Voltage	NV: Normal Voltage	TX: DC 3.3V
	HV: High Voltage	TX: DC 3.6V
	LV: Low Voltage	TX: DC 3.0V
Other	Relative Humidity	55 %
	Air Pressure	101 kPa



### 2.3 General Description of EUT

Product Name:	MBC-LR	
Model/Type reference:	MBC-LR01	
List model	MBC-LR01-0001	
Difference description	All model's the function, software and electric circuit are the same, only with a product color and model named different. Test sample model: MBC-LR01.	
Power supply:	DC 3.3V	
Wireless technology		
Operating frequency:	863 to 870 MHz	
Modulation type:	LORA	
Operating channel width:	200KHz	
Maximum RF power:	N/A	
Spread spectrum method:	<input checked="" type="checkbox"/> Duty cycle <input type="checkbox"/> Polite spectrum access	
Receiver category:	<input type="checkbox"/> Category 1:	Category 1 is a high performance level of receiver. In particular to be used where the operation of a SRD may have inherent safety of human life implications.
	<input type="checkbox"/> Category 1.5:	Category 1.5 is an improved performance level of receiver category 2.
	<input checked="" type="checkbox"/> Category 2:	Category 2 is standard performance level of receiver.
	<input type="checkbox"/> Category 3:	Category 3 is a low performance level of receiver. Manufacturers have to be aware that category 3 receivers are not able to work properly in case of coexistence with some services such as a mobile radio service in adjacent bands. The manufacturer shall provide another mean to overcome the weakness of the radio link or accept the failure.
Antenna type:	Internal Antenna	

Note: For more details, refer to the user's manual of the EUT.

### 2.4 Description of Test Modes and Test Frequency

The EUT has been tested under typical operating condition. The user can control the EUT for staying in continuous transmitting & receiving mode for testing.





## 2.5 Equipments Used during the Test

Effective radiated power & Spurious Emissions						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Cal.Due
1	Spectrum analyzer	Agilent	N9020A	MTL-048	2022/12/27	2023/12/26
2	Receiver	R&S	ESR-7	MTL-010	2022/12/27	2023/12/26
3	Broadband antenna	Schwarzbeck	VULB 9163	MTL-012	2022/12/27	2023/12/26
4	Horn antenna	Schwarzbeck	9120D	MTL-013	2022/12/27	2023/12/26
5	Spectrum analyzer	R&S	FSP40	MTL-025	2022/12/27	2023/12/26
6	Preamplifier	Schwarzbeck	EMC0518 45SE	MTL-015	2022/12/27	2023/12/26
7	Preamplifier	Agilent	83051A	MTL-016	2022/12/27	2023/12/26
8	Power meter	Agilent	E4419B	MTL-085	2022/12/27	2023/12/26

Blocking						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Cal.Due
1	Spectrum Analyzer	Agilent	N9020	MTL-048	2022/12/27	2023/12/26
2	Wireless Communication Test Set	R&S	CMW500	MTL-027	2022/12/27	2023/12/26

PSD & TX Transient & OOB & OBW & Duty cycle & Adjacent channel power						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Cal.Due
1	Spectrum Analyzer	Agilent	N9020	MTL-048	2022/12/27	2023/12/26

TX behaviour under low voltage conditions						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Cal.Due
1	Spectrum Analyzer	Agilent	N9020	MTL-048	2022/12/27	2023/12/26

The calibration interval is one year. The calibration interval is one year.

## 2.6 Modifications

No modifications were implemented to meet testing criteria.



### 3 TEST CONDITIONS AND RESULTS

#### 3.1 All equipment conformance requirements

##### 3.1.1 Operating frequency

###### Limit

The manufacturer may declare either one or more operating frequencies and operating channels. Operating channel(s) shall be entirely within operational frequency bands allowed by annexes B, C or any NRI.

###### Manufacturer Declaration

Parameters	Value	Note
Operating Frequency	863 to 870 MHz	Declared by the manufacturer
Operating Channel width	200KHz	Declared by the manufacturer



### 3.1.2 Unwanted emissions in the spurious domain

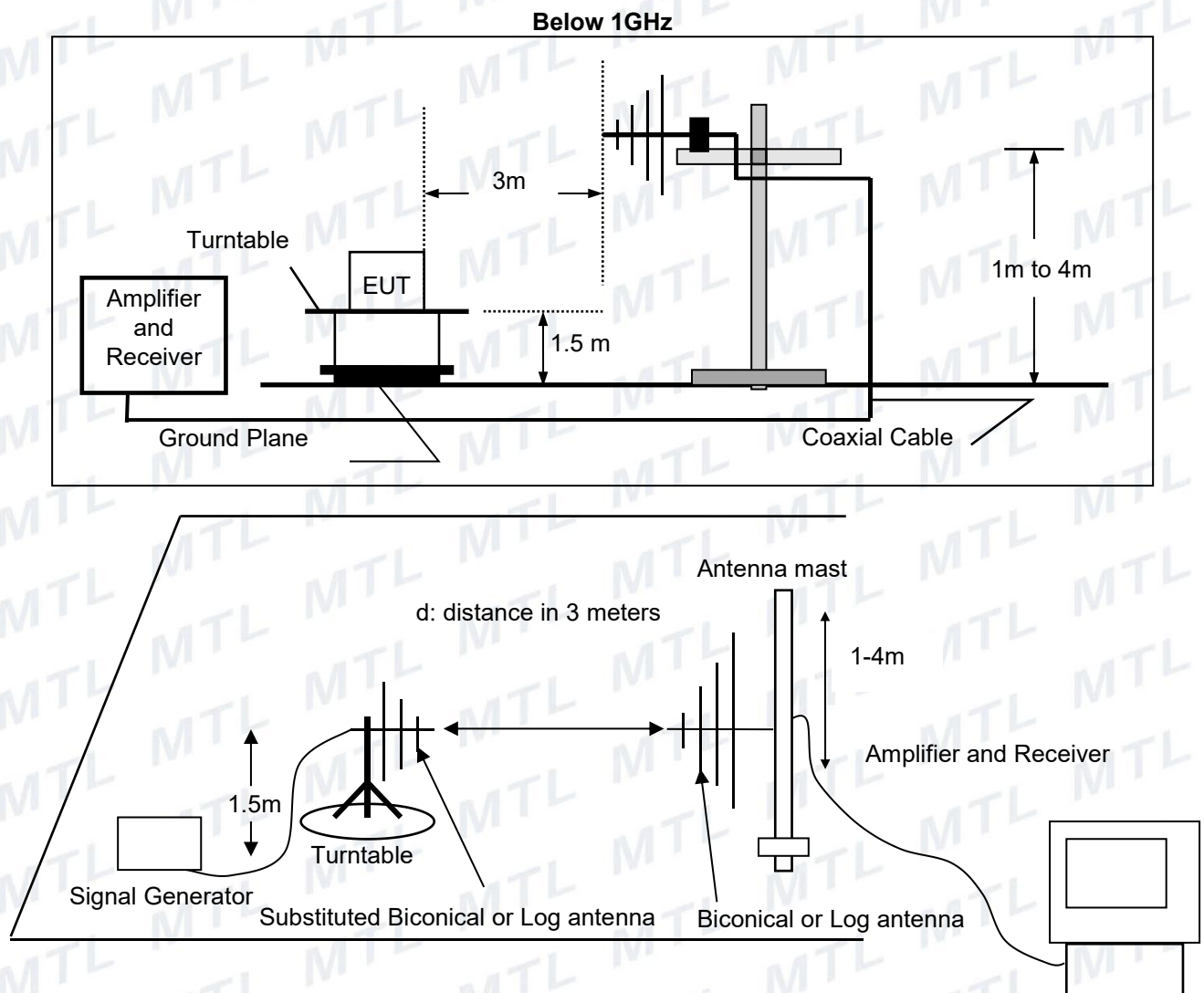
## Limit

The power of any unwanted emission in the spurious domain shall not exceed the values given as bellow

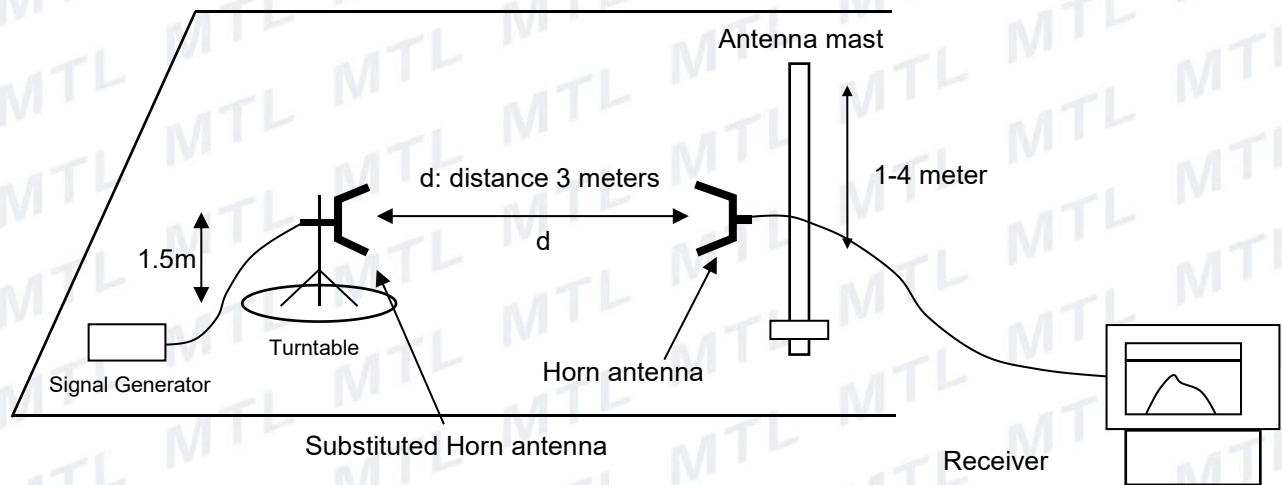
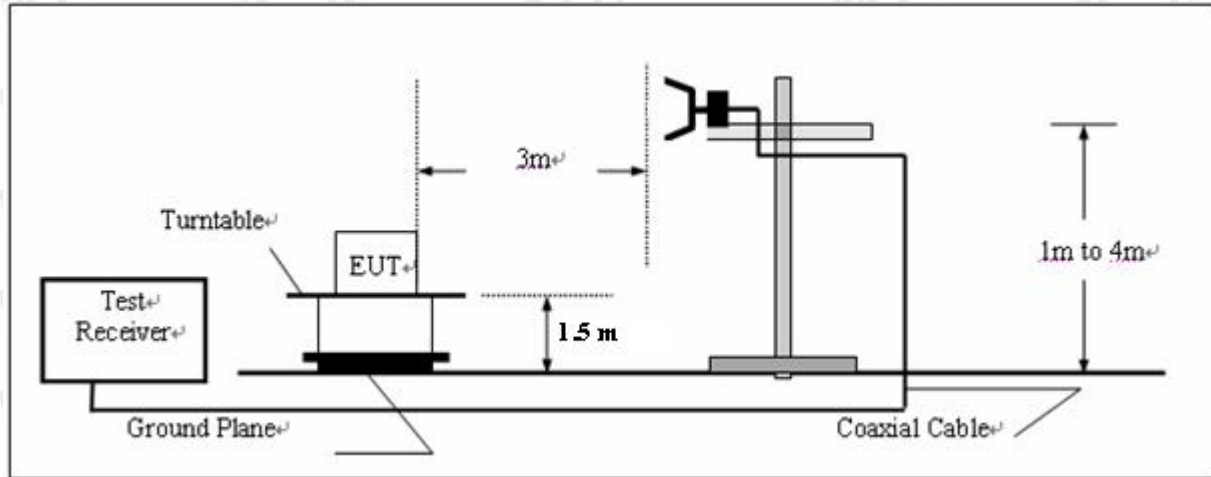
## Spurious domain emission limits

Frequency State	47 MHz to 74 MHz 87,5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 790 MHz	Other frequencies below 1 000 MHz	Frequencies above 1 000 MHz
TX mode	-54 dBm	-36 dBm	-30 dBm
RX and all other modes	-57 dBm	-57 dBm	-47 dBm

### Test Configuration



### Above 1GHz



### Test Procedure

1. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 4 for the test conditions.
2. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 5.9.3.3 for the measurement method.



**Test Results**

Remark: Measurement frequency from 25MHz to 6GHz and recorded worst at below:

Low Channel(868.1MHz)

TX mode					
Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
<b>Below 1GHz:</b>					
151.76	V	-70.23	-36	-34.23	PASS
273.57	V	-76.85	-36	-40.85	PASS
402.32	V	-73.17	-36	-37.17	PASS
447.30	V	-74.85	-36	-38.85	PASS
516.86	V	-73.83	-54	-19.83	PASS
857.44	V	-76.43	-54	-22.43	PASS
178.75	H	-75.11	-54	-21.11	PASS
234.40	H	-78.28	-54	-24.28	PASS
309.11	H	-73.48	-36	-37.48	PASS
448.61	H	-76.96	-36	-40.96	PASS
606.34	H	-77.56	-54	-23.56	PASS
805.63	H	-75.40	-54	-21.40	PASS
Note: 1.Cable loss and antenna gain was combined in the calculated result. 2. Other point of the measurements are below 20dB from the limit.					



Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
<b>Above 1GHz:</b>					
1140.99	V	-52.33	-30	-22.33	PASS
1475.33	V	-52.02	-30	-22.02	PASS
2590.63	V	-60.23	-30	-30.23	PASS
2475.96	V	-52.88	-30	-22.88	PASS
3583.43	V	-51.93	-30	-21.93	PASS
3960.33	V	-53.57	-30	-23.57	PASS
1365.04	H	-53.49	-30	-23.49	PASS
1638.03	H	-51.45	-30	-21.45	PASS
2347.33	H	-52.64	-30	-22.64	PASS
2776.56	H	-49.87	-30	-19.87	PASS
3675.11	H	-53.22	-30	-23.22	PASS
3814.27	H	-54.45	-30	-24.45	PASS
Note: 1.Cable loss and antenna gain was combined in the calculated result. 2. Other point of the measurements are below 20dB from the limit.					





High Channel (868.5MHz)

## TX mode

Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
<b>Below 1GHz:</b>					
147.09	V	-70.95	-36	-34.95	PASS
266.13	V	-76.77	-36	-40.77	PASS
405.86	V	-71.92	-36	-35.92	PASS
444.80	V	-74.80	-36	-38.80	PASS
516.98	V	-74.89	-54	-20.89	PASS
857.11	V	-75.88	-54	-21.88	PASS
175.66	H	-75.66	-54	-21.66	PASS
234.12	H	-78.23	-54	-24.23	PASS
306.62	H	-73.09	-36	-37.09	PASS
445.59	H	-76.13	-36	-40.13	PASS
597.63	H	-78.50	-54	-24.50	PASS
809.50	H	-74.71	-54	-20.71	PASS
Note: 1.Cable loss and antenna gain was combined in the calculated result. 2. Other point of the measurements are below 20dB from the limit.					



Fre. (MHz)	ANT. Pol.	Result (dBm)	Limit	Margin	Conclusion
<b>Above 1GHz:</b>					
1135.37	V	-53.17	-30	-23.17	PASS
1404.83	V	-51.43	-30	-21.43	PASS
2518.31	V	-59.64	-30	-29.64	PASS
2474.36	V	-52.80	-30	-22.80	PASS
3589.49	V	-52.62	-30	-22.62	PASS
3889.87	V	-52.82	-30	-22.82	PASS
1386.12	H	-53.19	-30	-23.19	PASS
1690.53	H	-51.71	-30	-21.71	PASS
2404.91	H	-51.66	-30	-21.66	PASS
2752.59	H	-48.84	-30	-18.84	PASS
3670.76	H	-53.34	-30	-23.34	PASS
3847.97	H	-53.34	-30	-23.34	PASS
Note: 1.Cable loss and antenna gain was combined in the calculated result. 2. Other point of the measurements are below 20dB from the limit.					



Low Channel(868.1MHz)

## RX mode

Fre. (MHz)	ANT. Pol.	EIRP (dBm)	Limit	Margin	Conclusion
<b>Below 1GHz:</b>					
233.36	V	-76.26	-57	-19.26	PASS
243.11	V	-75.58	-57	-18.58	PASS
303.29	V	-72.07	-57	-15.07	PASS
410.86	V	-74.64	-57	-17.64	PASS
483.47	V	-75.52	-57	-18.52	PASS
845.40	V	-77.64	-57	-20.64	PASS
175.60	H	-77.56	-57	-20.56	PASS
291.30	H	-74.86	-57	-17.86	PASS
355.49	H	-75.43	-57	-18.43	PASS
449.35	H	-71.98	-57	-14.98	PASS
563.44	H	-78.20	-57	-21.20	PASS
813.33	H	-79.09	-57	-22.09	PASS
<b>Note:</b> 1.Cable loss and antenna gain was combined in the calculated result. 2.Other point of the measurements are below 20dB from the limit.					

Fre. (MHz)	ANT. Pol.	EIRP (dBm)	Limit	Margin	Conclusion
<b>Above 1GHz:</b>					
1824.61	H	-64.57	-47	-17.57	PASS
2139.38	V	-66.93	-47	-19.93	PASS
2986.86	H	-60.81	-47	-13.81	PASS
2956.72	V	-65.49	-47	-18.49	PASS
3373.51	H	-64.79	-47	-17.79	PASS
3260.92	V	-67.80	-47	-20.80	PASS
4024.52	H	-62.08	-47	-15.08	PASS
4022.24	V	-66.46	-47	-19.46	PASS
4651.16	H	-66.51	-47	-19.51	PASS
4668.16	V	-64.66	-47	-17.66	PASS
5813.32	H	-67.81	-47	-20.81	PASS
6074.15	V	-59.65	-47	-12.65	PASS





High Channel (868.5MHz)

## RX mode

Fre. (MHz)	ANT. Pol.	EIRP (dBm)	Limit	Margin	Conclusion
<b>Below 1GHz:</b>					
227.63	V	-76.68	-57	-19.68	PASS
249.79	V	-75.39	-57	-18.39	PASS
307.03	V	-72.46	-57	-15.46	PASS
413.29	V	-75.69	-57	-18.69	PASS
488.41	V	-75.05	-57	-18.05	PASS
844.03	V	-77.27	-57	-20.27	PASS
182.17	H	-78.14	-57	-21.14	PASS
286.82	H	-75.12	-57	-18.12	PASS
361.54	H	-76.00	-57	-19.00	PASS
444.63	H	-71.79	-57	-14.79	PASS
559.78	H	-77.58	-57	-20.58	PASS
815.00	H	-80.21	-57	-23.21	PASS
Note: 1.Cable loss and antenna gain was combined in the calculated result. 2.Other point of the measurements are below 20dB from the limit.					

Fre. (MHz)	ANT. Pol.	EIRP (dBm)	Limit	Margin	Conclusion
<b>Above 1GHz:</b>					
1842.07	H	-66.44	-47	-19.44	PASS
2162.00	V	-66.80	-47	-19.80	PASS
3065.66	H	-61.03	-47	-14.03	PASS
2974.54	V	-65.54	-47	-18.54	PASS
3347.31	H	-65.59	-47	-18.59	PASS
3282.57	V	-69.00	-47	-22.00	PASS
3980.35	H	-62.18	-47	-15.18	PASS
4065.98	V	-65.60	-47	-18.60	PASS
4604.28	H	-65.52	-47	-18.52	PASS
4696.61	V	-65.22	-47	-18.22	PASS
5780.03	H	-68.60	-47	-21.60	PASS
6077.49	V	-59.79	-47	-12.79	PASS

Note: "--Other emission levels were very low against the limit and not reported.

### 3.2 Transmitters conformance requirements

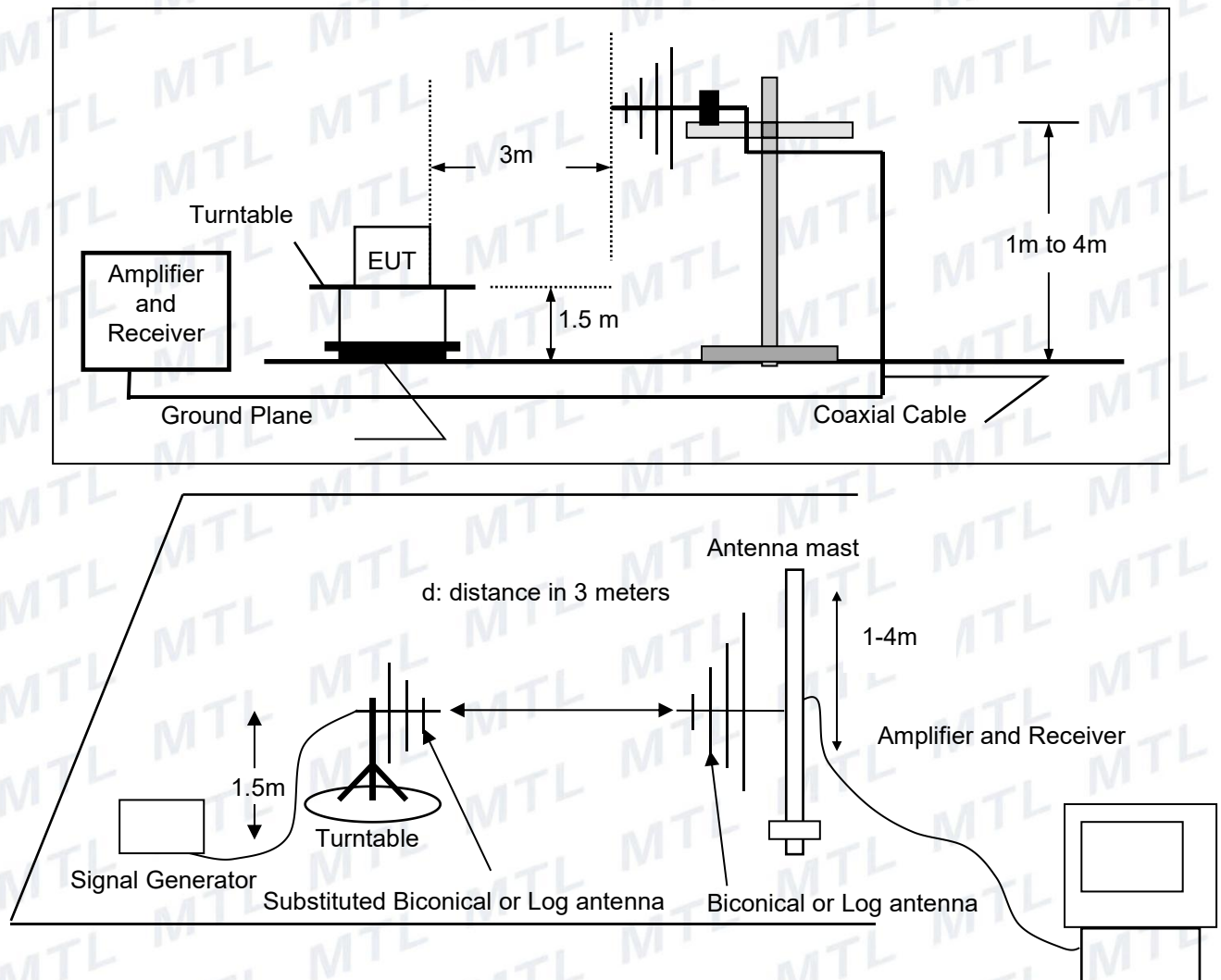
#### 3.2.1 Effective Radiated Power

##### Limit

The effective radiated power shall not be greater than the value allowed in annexes B or C for the chosen operational frequency band(s):

Frequency range	Radiated power, e.r.p
868-868.6MHz	25 mW

##### Test Configuration



##### Test Procedure

1. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 4 for the test conditions.
2. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 5.2.2.2 for the measurement method.

**Test Results**

Low Channel(868.1MHz)

Tests	ERP (dBm)	Limit (mW/dBm)	Tem.	Vol.	Result
Measured radiated power (dBm)	3.38	25/13.98	TN	VN	Pass
	4.68	25/13.98	TL	VL	Pass
	5.30	25/13.98	TH	VH	Pass
	2.77	25/13.98	TL	VH	Pass
	4.09	25/13.98	TH	VL	Pass

Middle Channel (868.3MHz)

Tests	ERP (dBm)	Limit (mW/dBm)	Tem.	Vol.	Result
Measured radiated power (dBm)	3.18	25/13.98	TN	VN	Pass
	4.77	25/13.98	TL	VL	Pass
	5.37	25/13.98	TH	VH	Pass
	2.80	25/13.98	TL	VH	Pass
	3.80	25/13.98	TH	VL	Pass

High Channel (868.5MHz)

Tests	ERP (dBm)	Limit (mW/dBm)	Tem.	Vol.	Result
Measured radiated power (dBm)	4.27	25/13.98	TN	VN	Pass
	5.56	25/13.98	TL	VL	Pass
	6.12	25/13.98	TH	VH	Pass
	3.78	25/13.98	TL	VH	Pass
	5.09	25/13.98	TH	VL	Pass





### 3.2.2 Duty cycle

#### Limit

The Duty Cycle at the operating frequency shall not be greater than values in annex B or C for the chosen operational frequency band(s).

Frequency range	Duty cycle
868-868.6MHz	up to 100%

#### Test Results

N/A

Note: Since the duty cycle limit is up to 100% for the device, it is deemed to comply without testing



### 3.2.3 Occupied Bandwidth

#### Limit

The occupied bandwidth of the EUT according to ETSI EN 300 220-1 [1], clause 5.6.2 shall comply with the limits in annex B or C.

The Operating Channel shall be declared and shall reside entirely within the Operational Frequency Band.

The Maximum Occupied Bandwidth at 99 % shall reside entirely within the Operating Channel defined by  $F_{low}$  and  $F_{high}$ .

#### Test Configuration



#### Test Procedure

1. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 4 for the test conditions.
2. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 5.6.3.4 for the measurement method.

#### Test Results

Test CONDITION		Frequency Range	
Temperature	Voltage	Low Frequency(MHz)	High Frequency(MHz)
25℃	DC 3.3V	868.0490	868.5738
-10℃	DC 3.6V	868.0492	868.5732
	DC 3.0V	868.0501	868.5728
40℃	DC 3.6V	868.0496	868.5734
	DC 3.0V	868.0504	868.5729
Messured frequencies(Lowset and Highest)		868.0490	868.5738
Limit		FL>868	FH<868.6







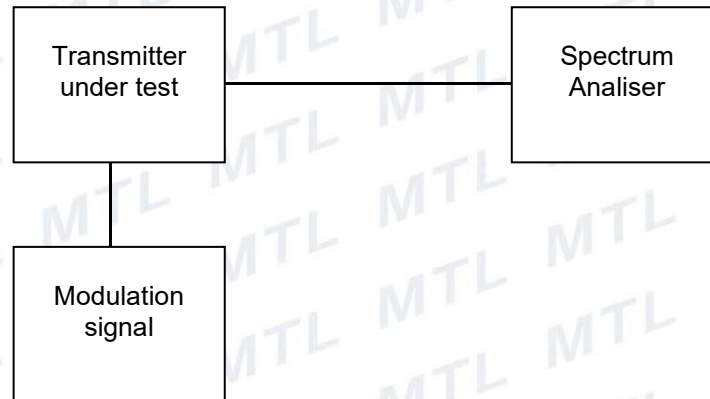
### 3.2.4 Transient power

#### Limit

The transient power shall not exceed the values given in Table below:

Absolute offset from centre frequency	RBW <sub>REF</sub>	Peak power limit applicable at measurement points
≤ 400 kHz	1 kHz	0 dBm
> 400 kHz	1 kHz	-27 dBm

#### Test Configuration



#### Test Procedure

1. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 4 for the test conditions.
2. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 5.10.3.2 for the measurement method.

**Test Results**

## Low Channel(868.1MHz)

Measurement points	Measurement Power (dBm)	Limit	Test result
-0.5 x OCW - 3kHz	-4.22	0	PASS
0.5 x OCW + 3kHz	-6.90	0	PASS
-12.5 kHz or -OCW	-10.94	0	PASS
+12.5 kHz or +OCW	-11.25	0	PASS
-0.5 x OCW - 400kHz	-28.63	-27	PASS
0.5 x OCW + 400kHz	-28.41	-27	PASS
-0.5 x OCW -1200kHz	-43.34	-27	PASS
0.5 x OCW + 1200kHz	-37.91	-27	PASS

## Middle Channel(868.3MHz)

Measurement points	Measurement Power (dBm)	Limit	Test result
-0.5 x OCW - 3kHz	-5.08	0	PASS
0.5 x OCW + 3kHz	-6.90	0	PASS
-12.5 kHz or -OCW	-10.84	0	PASS
+12.5 kHz or +OCW	-11.15	0	PASS
-0.5 x OCW - 400kHz	-26.67	-27	PASS
0.5 x OCW + 400kHz	-27.29	-27	PASS
-0.5 x OCW -1200kHz	-42.99	-27	PASS
0.5 x OCW + 1200kHz	-37.69	-27	PASS

## High Channel (868.5MHz)

Measurement points	Measurement Power (dBm)	Limit	Test result
-0.5 x OCW - 3kHz	-4.13	0	PASS
0.5 x OCW + 3kHz	-6.85	0	PASS
-12.5 kHz or -OCW	-10.61	0	PASS
+12.5 kHz or +OCW	-11.90	0	PASS
-0.5 x OCW - 400kHz	-28.93	-27	PASS
0.5 x OCW + 400kHz	-28.17	-27	PASS
-0.5 x OCW -1200kHz	-43.45	-27	PASS
0.5 x OCW + 1200kHz	-37.71	-27	PASS

### 3.2.5 Tx Out of Band Emissions

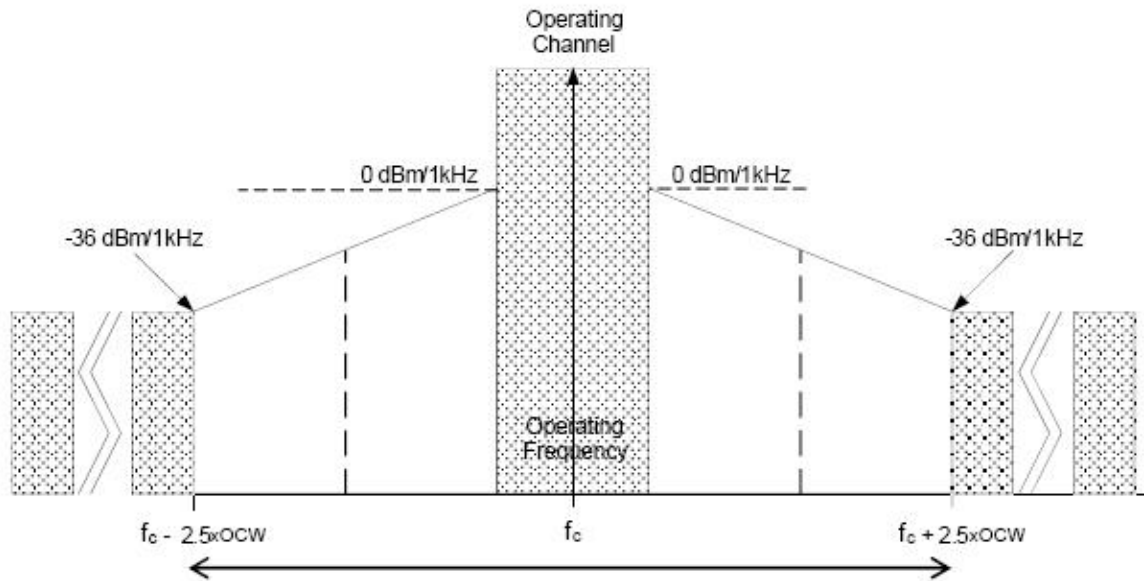
#### Limit

The EUT emissions level in OOB domains for the Operating Channel and the Operational Frequency Band shall be less or equal to Table 15 spectrum mask.

**Table 15: Emission limits in the Out Of Band domains**

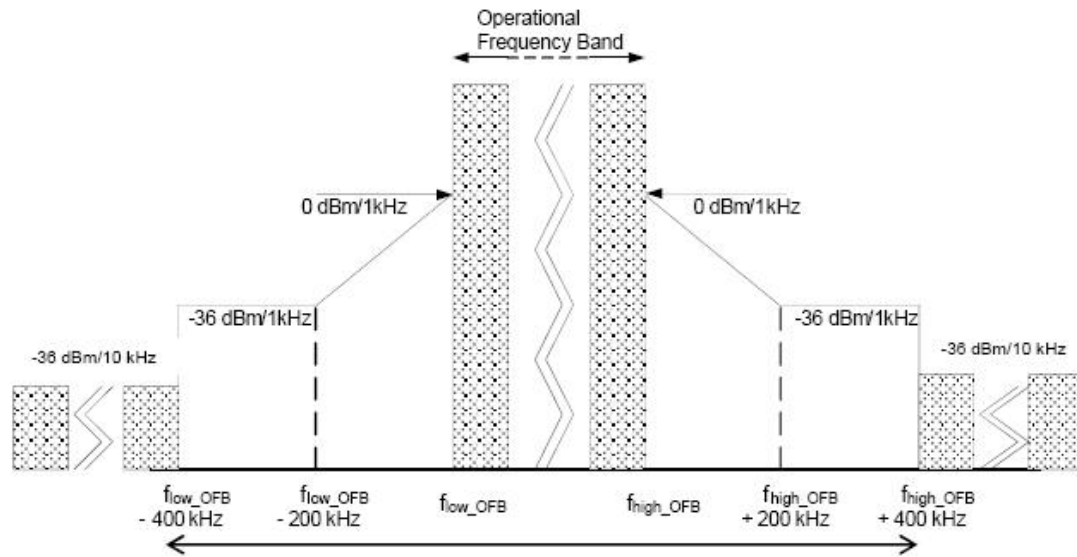
Domain	Frequency Range	RBW <sub>REF</sub>	Max power limit
OOB limits applicable to Operational Frequency Band (See Figure 6)	$f \leq f_{\text{low\_OFB}} - 400 \text{ kHz}$	10 kHz	-36 dBm
	$F_{\text{low\_OFB}} - 400 \text{ kHz} \leq f \leq f_{\text{low\_OFB}} - 200 \text{ kHz}$	1 kHz	-36 dBm
	$f_{\text{low}} - 200 \text{ kHz} \leq f < f_{\text{low\_OFB}}$	1 kHz	See Figure 6
	$f = f_{\text{low\_OFB}}$	1 kHz	0 dBm
	$f = f_{\text{high\_OFB}}$	1 kHz	0 dBm
	$F_{\text{high\_OFB}} < f \leq f_{\text{high\_OFB}} + 200 \text{ kHz}$	1 kHz	See Figure 6
	$F_{\text{high\_OFB}} + 200 \text{ kHz} \leq f \leq f_{\text{high\_OFB}} + 400 \text{ kHz}$	1 kHz	-36 dBm
OOB limits applicable to Operating Channel (See Figure 5)	$F_{\text{high\_OFB}} + 400 \text{ kHz} \leq f$	10 kHz	-36 dBm
	$f = f_c - 2.5 \times \text{OCW}$	1 kHz	-36 dBm
	$f_c - 2.5 \times \text{OCW} \leq f \leq f_c - 0.5 \times \text{OCW}$	1 kHz	See Figure 5
	$f = f_c - 0.5 \times \text{OCW}$	1 kHz	0 dBm
	$f = f_c + 0.5 \times \text{OCW}$	1 kHz	0 dBm
	$f_c + 0.5 \times \text{OCW} \leq f \leq f_c + 2.5 \times \text{OCW}$	1 kHz	See Figure 5
	$f = f_c + 2.5 \times \text{OCW}$	1 kHz	-36 dBm

NOTE:  $f$  is the measurement frequency.  
 $f_c$  is the Operating Frequency.  
 $F_{\text{low\_OFB}}$  is the lower edge of the Operational Frequency Band.  
 $F_{\text{high\_OFB}}$  is the upper edge of the Operational Frequency Band.  
OCW is the operating channel bandwidth.



**Figure 5: Out Of Band Domain for Operating Channel with reference BW**





**Figure 6: Out Of Band Domain for Operational Frequency Band with reference BW**

Specific limits apply at frequencies immediately above and below the Operational Frequency Band as shown in Figure 6.

NOTE:  $f_{low\_OFB}$  is the lower edge of the Operational Frequency Band.

$f_{high\_OFB}$  is the upper edge of the Operational Frequency Band.

### Test Configuration



### Test Procedure

1. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 4 for the test conditions.
2. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 5.11.3.2 for the measurement method.

**Test Results**

## Low Channel(868.1MHz)

Voltage Supply(Vdc)	Measurement Frequency (MHz)	Limit
f-15kHz	-45.03	0
f+15kHz	-33.95	0
-0.5 x OCW - 400kHz	-66.44	-36
0.5 x OCW + 400kHz	-62.56	-36
-0.5 x OCW -1200kHz	-75.12	-36
0.5 x OCW + 1200kHz	-70.14	-36

## Middle Channel (868.3MHz)

Voltage Supply(Vdc)	Measurement Frequency (MHz)	Limit
f-15kHz	-44.71	0
f+15kHz	-33.43	0
-0.5 x OCW - 400kHz	-66.09	-36
0.5 x OCW + 400kHz	-63.15	-36
-0.5 x OCW -1200kHz	-74.49	-36
0.5 x OCW + 1200kHz	-70.22	-36

## High Channel (868.5MHz)

Voltage Supply(Vdc)	Measurement Frequency (MHz)	Limit
f-15kHz	-44.84	0
f+15kHz	-33.71	0
-0.5 x OCW - 400kHz	-65.34	-36
0.5 x OCW + 400kHz	-62.35	-36
-0.5 x OCW -1200kHz	-75.87	-36
0.5 x OCW + 1200kHz	-71.80	-36

**3.2.6 ADJACENT CHANNEL POWER****Limit****Table 26: Adjacent channel power limits for transmitters with OCW  $\leq$  25 kHz**

		Adjacent Channel power integrated over 0,7 x OCW	Alternate Adjacent Channel power integrated over 0,7 x OCW
OCW < 20 kHz	Normal test conditions	-20 dBm	-20 dBm
	Extreme test conditions	-15 dBm	-20 dBm
OCW $\geq$ 20 kHz	Normal test conditions	-37 dBm	-40 dBm
	Extreme test conditions	-32 dBm	-37 dBm

**Test Configuration****Test Procedure**

- Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 4 for the test conditions.
- Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 5.11.3.2 for the measurement method.

**Test Results**

N/A

EUT OCB is more than 25KHz, so this test report is not applicable.



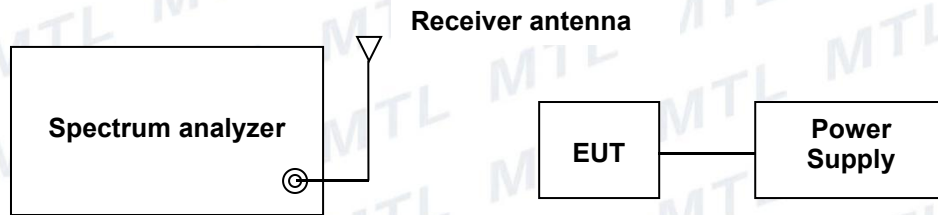
### 3.2.7 TX behaviour under Low Voltage Conditions

#### Limit

The equipment shall either:

- a) remain in the Operating Channel OC without exceeding any applicable limits (e.g. Duty Cycle); or
- b) reduce its effective radiated power below the Spurious Emission limits without exceeding any applicable limits (e.g. Duty Cycle); or
- c) shut down, (ceasing function); as the voltage falls below the manufacturers declared operating voltage.

#### Test Configuration



#### Test Procedure

- 5. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 4 for the test conditions.
- 6. Please refer to ETSI EN 300 220-1 V3.1.1 (2017-02) Sub-clause 5.12.3.2 for the measurement method.

**Test Results**

## Low Channel (868.1MHz)

Voltage Supply(Vdc)	Measurement Frequency(MHz)
3.60	868.014
3.30	868.008
3.00	No emission

## Middle Channel (868.3MHz)

Voltage Supply(Vdc)	Measurement Frequency(MHz)
3.60	868.295
3.30	868.278
3.00	No emission

## High Channel (868.5MHz)

Voltage Supply(Vdc)	Measurement Frequency(MHz)
3.60	868.453
3.30	868.441
3.00	No emission

### 3.3 Receivers conformance requirements

#### 3.3.1 Blocking

##### Limit

The blocking levels at the specified frequency offsets shall be equal to or greater than the limits show in below tables for each receiver category.

##### Limits for receiver category 3

Requirement	Limits
	Receiver category 3
Blocking at $\pm 2$ MHz from OC edge $f_{\text{high}}$ and $f_{\text{low}}$	$\geq -80$ dBm
Blocking at $\pm 10$ MHz from OC edge $f_{\text{high}}$ and $f_{\text{low}}$	$\geq -60$ dBm
Blocking at $\pm 5$ % of Centre Frequency or 15 MHz, whichever is the greater	$\geq -60$ dBm

##### Limits for receiver category 2

Requirement	Limits
	Receiver category 2
Blocking at $\pm 2$ MHz from OC edge $f_{\text{high}}$ and $f_{\text{low}}$	$\geq -69$ dBm
Blocking at $\pm 10$ MHz from OC edge $f_{\text{high}}$ and $f_{\text{low}}$	$\geq -44$ dBm
Blocking at $\pm 5$ % of Centre Frequency or 15 MHz, whichever is the greater	$\geq -44$ dBm

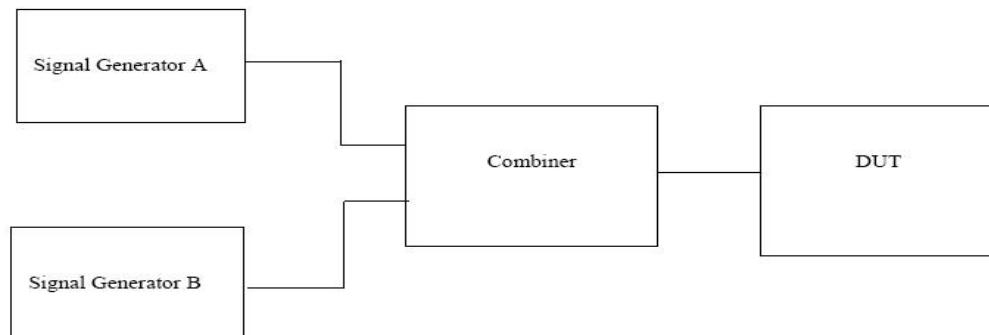
##### Limits for receiver category 1.5

Requirement	Limits
	Receiver category 1.5
Blocking at $\pm 2$ MHz from OC edge $f_{\text{high}}$ and $f_{\text{low}}$	$\geq -43$ dBm
Blocking at $\pm 10$ MHz from OC edge $f_{\text{high}}$ and $f_{\text{low}}$	$\geq -33$ dBm
Blocking at $\pm 5$ % of Centre Frequency or 15 MHz, whichever is the greater	$\geq -33$ dBm

##### Limits for receiver category 1

Requirement	Limits
	Receiver category 1
Blocking at $\pm 2$ MHz from Centre Frequency	$\geq -20$ dBm
Blocking at $\pm 10$ MHz from Centre Frequency	$\geq -20$ dBm
Blocking at $\pm 5$ % of Centre Frequency or 15 MHz, whichever is the greater	$\geq -20$ dBm

#### Test Configuration





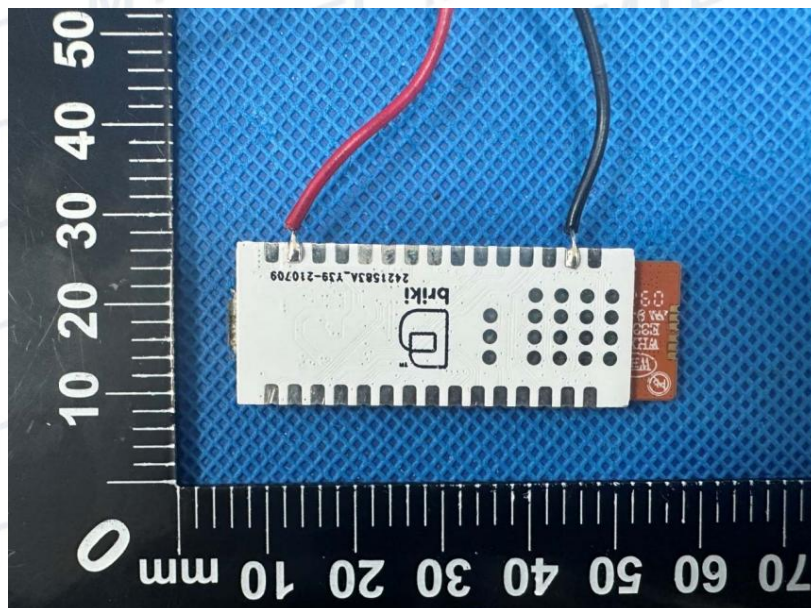
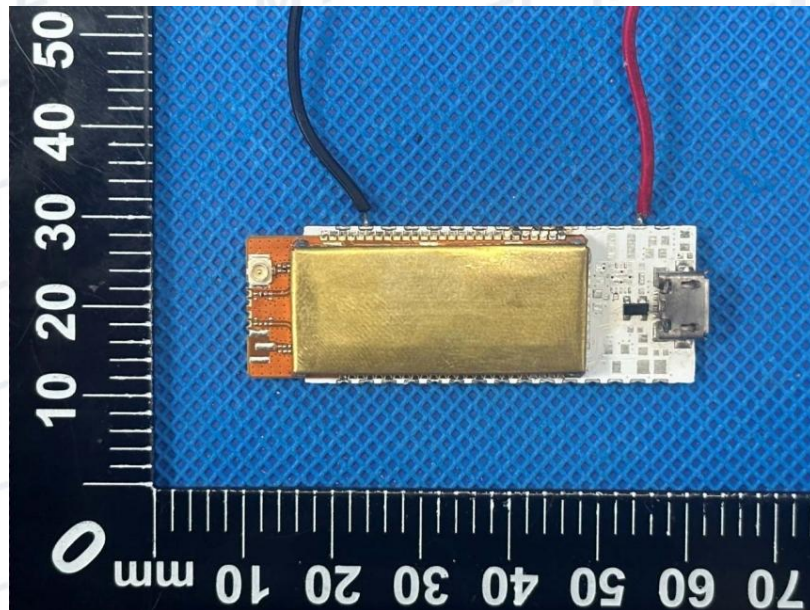
**TEST PROCEDURE**

1. Please refer to ETSI EN 300 220-1 V 2.4.1 (2012-05) Sub-clause 6 for the test conditions.
2. Please refer to ETSI EN 300 220-1 V 2.4.1 (2012-05) Sub-clause 8.4.2 for the measurement method.

**TEST RESULTS**

Test Channel	Blocking Signal Frequency(MHz)	Blocking Signal Power Level (dBm)	Limit (dBm)	Result
Low	866.1	-53.09	-69	PASS
	863.1	-42.37	-69	PASS
	824.7	-30.57	-44	PASS
High	870.5	-26.03	-44	PASS
	873.5	-29.52	-44	PASS
	911.9	-28.12	-44	PASS

#### 4 External and Internal Photos of the EUT



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