



# **TEST REPORT**

Applicant:	Shenzhen Dragino technology development Co., LTD.			
Address of Applicant:	Room 202, Block B, BaoChengTai industrial park, No.8 CaiYunRoad , LongCheng Street, LongGang District, Shenzhen 518116, China			
Manufacturer/Factory:	Shenzhen Dragino technology development Co., LTD.			
Address of Manufacturer/Factory:	Room 202, Block B, BaoChengTai industrial park, No.8 CaiYunRoad , LongCheng Street, LongGang District, Shenzh 518116, China			
Equipment Under Test (EU)	Г)			
Product Name:	LoRaWAN Sensor Node			
Model No.:	LSN50v2, LSN50v2-D20, LSN50v2-D22, LSN50v2-D23, CPL01, LDS03A, SW3L			
Trade Mark:	Dragino			
Applicable standards:	ETSI EN 300 220-1 V3.1.1 (2017-02) ETSI EN 300 220-2 V3.2.1 (2018-06)			
Date of sample receipt:	Jun. 11, 2022			
Date of Test:	Jun. 12, 2022 –Jun. 24, 2022			
Date of report issue:	Jun. 27, 2022			
Test Result :	PASS *			

\*In the configuration tested, the EUT 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 EC Declaration of Conformity and compliance with all relevant EC Directives. The protection requirements with respect to electromagnetic compatibility contained in Directive 2014/53/EU are considered.



CE

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver. Page 1 of 39



# 2 Version

Version No.	Date	Description
00	Jun. 27, 2022	Original

Prepared By:

kyle Wang

Date:

Jun. 27, 2022

Project Engineer

Check By:

W

Date:

Jun. 27, 2022

Reviewer



3

#### Report No.: CST2022050017E02

	Cor	itents	_
1	COV		Page 1
•			
2	VER	SION	2
3	CON	TENTS	3
4	TES	۲ SUMMARY	4
5	GEN	ERAL INFORMATION	5
	51	GENERAL DESCRIPTION OF FUT	5
	5.2	TEST MODE	
	5.3		6
	5.4	DESCRIPTION OF SUPPORT UNITS	6
	5.5	DEVIATION FROM STANDARDS	6
	5.6	ABNORMALITIES FROM STANDARD CONDITIONS	6
	5.7	OTHER INFORMATION REQUESTED BY THE CUSTOMER	6
6	TES	INSTRUMENTS LIST	7
7	RAD	IO TECHNICAL REQUIREMENTS SPECIFICATION IN ETSI EN 300 220-2	9
	7.1	TEST CONDITIONS	
	7.2	TRANSMITTER REQUIREMENT	9
	7.2.1	Operation Frequency	9
	7.2.2	Effective Radiated Power	10
	7.2.3	Duty Cycle	12
	7.2.4	Occupied Bandwidth	
	7.2.5	Frequency Error	
	7.2.6	IX Out Of Band Emissions	
	7.2.7	Transient power	
	7.2.0		
	731	Receiver sensitivity	
	7.3.2	Clear Channel Assessment threshold	
	7.3.3	Polite spectrum access timing parameters	
	7.3.4	Adaptive Frequency Agility	
	7.3.5	Adjacent channel selectivity	
	7.3.6	Receiver saturation at Adjacent Channel	
	7.3.7	Spurious response rejection	
	7.3.8	Behaviour at high wanted signal level	
	7.3.9	Bi-Directional Operation Verification	
	7.3.1	0 Blocking	
	7.3.1	1 Spurious emissions	
8	TES	Г ЅЕТИР РНОТО	
9	EUT	CONSTRUCTIONAL DETAILS	



4

## Report No.: CST2022050017E02

# Test Summary

Radio Spectrum Matter (RSM) Part of Tx							
Test item	Test Requirement	Test method	Limit/Severity	Result			
Operating frequency	ETSI EN 300 220-2	ETSI EN 300 220-1	Annexes B or C of EN 300 220-2	Pass			
Effective Radiated Power	ETSI EN 300 220-2	ETSI EN 300 220-1	Annexes B or C of EN 300 220-2	Pass			
Maximum e.r.p. Spectral Density	ETSI EN 300 220-2	ETSI EN 300 220-1	Annexes B or C of EN 300 220-2	N/A			
Duty cycle	ETSI EN 300 220-2	ETSI EN 300 220-1	Annexes B or C of EN 300 220-2	Pass			
Occupied Bandwidth	ETSI EN 300 220-2	ETSI EN 300 220-1	Annexes B or C of EN 300 220-2	Pass			
Frequency Error	ETSI EN 300 220-2	ETSI EN 300 220-1	Clause 5.7	Pass			
Tx Out of Band Emissions	ETSI EN 300 220-2	ETSI EN 300 220-1	Clause 5.8.2	Pass			
Transmit Spurious Emmisions	ETSI EN 300 220-2	ETSI EN 300 220-1	Clause 5.9.2	Pass			
Transient Power	ETSI EN 300 220-2	ETSI EN 300 220-1	Clause 5.10.2	Pass			
Adjacent Channel Power	ETSI EN 300 220-2	ETSI EN 300 220-1	Clause 5.11.2	N/A			
TX behaviour under Low Voltage Conditions	ETSI EN 300 220-2	ETSI EN 300 220-1	Clause 5.12.2	Pass			
Adaptive Power Control	ETSI EN 300 220-2	ETSI EN 300 220-1	Clause 5.13.2	N/A			
Short Term Behaviour	ETSI EN 300 220-2	N/A	annex C, table C.1	N/A			
FHSS Equipment Requirements	ETSI EN 300 220-2	N/A	Clause 4.3.10.2	N/A			
Ra	dio Spectrum Matter	(RSM) Part of Rx					
Test item	Test Requirement	Test method	Limit/Severity	Result			
Receiver sensitivity	ETSI EN 300 220-2	ETSI EN 300 220-1	Clause 5.14.2	N/A			
Adjacent channel selectivity	ETSI EN 300 220-1	ETSI EN 300 220-1	Clause 5.15.2	N/A			
Receiver saturation at Adjacent Channel	ETSI EN 300 220-1	ETSI EN 300 220-1	Clause 5.16.2	N/A			
Spurious response rejection	ETSI EN 300 220-1	ETSI EN 300 220-1	Clause 5.17.2	N/A			
Blocking	ETSI EN 300 220-2	ETSI EN 300 220-1	Clause 5.18.2	Pass			
Behaviour at high wanted signal level	ETSI EN 300 220-1	ETSI EN 300 220-1	Clause 5.19.2	N/A			
Clear Channel Assessment threshold	ETSI EN 300 220-2	ETSI EN 300 220-1	Clause 5.21.2.2	N/A			
Polite spectrum access timing parameters	ETSI EN 300 220-2	ETSI EN 300 220-1	Clause 5.21.3.1	N/A			
Adaptive Frequency Agility	ETSI EN 300 220-2	N/A	N/A	N/A			
Receive Spurious emmisions	ETSI EN 300 220-2	ETSI EN 300 220-1	Clause 5.9.2	Pass			
<b>Bi-Directional Operation Verification</b>	ETSI EN 300 220-1	ETSI EN 300 220-1	Clause 5.22.2	N/A			

*Pass: The EUT complies with the essential requirements in the standard. N/A: not applicable.* 



# 5 General Information

# 5.1 General Description of EUT

Product Name:	LoRaWAN Sensor Node
Model No.:	LSN50v2, LSN50v2-D20, LSN50v2-D22, LSN50v2-D23, CPL01, LDS03A, SW3L
Test Model:	LSN50v2 for all test, and all models for radiated emission test
Model difference:	Only the temperature probe configuration, sensor type is not the same, the internal motherboard, structure, circuit is completely the same.
Trademark:	Dragino
Hardware version:	N/A
Software version:	N/A
Operation Frequency:	867.1MHz-868.8MHz
Occupied bandwidth	200kHz
Number of Channels:	9
Modulation type:	FSK
Antenna Type:	Integral antenna
Antenna gain:	2.0dBi
Power Supply:	Powered by one 3.6VDC, 3.8Ah non-rechargeable 18505 battery



Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency		
1	867.1MHz	4	867.7MHz	7	868.3MHz		
2	867.3MHz	5	867.9MHz	8	868.5MHz		
3	867.5MHz	6	868.1MHz	9	868.7MHz		

Test Channel	Frequency(MHz)
Lowest channel	867.1
Middle channel	867.9
Highest channel	868.7

# 5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode
Receiving mode	Keep the EUT in continuously receiving mode

# 5.3 Test Location

All tests were performed at:
Shenzhen CST Testing Co., Ltd
Address: Room 202-203, Floor 2st, Building B, Baoan Zhigu Technology Park, Xixiang Street, Baoan
District, Shenzhen, China. 518101
Tel: 0755-27907627
Fax: 0755-27907627

# 5.4 Description of Support Units

None

# 5.5 Deviation from Standards

None

# 5.6 Abnormalities from Standard Conditions

None

# 5.7 Other Information Requested by the Customer

None



# 6 Test Instruments list

Rad	Radiated Emission:							
ltem	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)	CST250	Oct. 15, 2021	Oct. 14, 2026		
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	CST251	N/A	N/A		
3	EMI Test Receiver	Rohde & Schwarz	ESU26	CST203	Oct. 15, 2021	Oct. 14, 2022		
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	CST214	Oct. 15, 2021	Oct. 14, 2022		
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	CST208	Oct. 15, 2021	Oct. 14, 2022		
6	Horn Antenna	ETS-LINDGREN	3160	CST217	Oct. 15, 2021	Oct. 14, 2022		
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A		
8	Coaxial Cable	CST	N/A	CST213	Oct. 15, 2021	Oct. 14, 2022		
9	Coaxial Cable	CST	N/A	CST211	Oct. 15, 2021	Oct. 14, 2022		
10	Coaxial cable	CST	N/A	CST210	Oct. 15, 2021	Oct. 14, 2022		
11	Coaxial Cable	CST	N/A	CST212	Oct. 15, 2021	Oct. 14, 2022		
12	Amplifier(100kHz-3GHz)	HP	8347A	CST204	Oct. 15, 2021	Oct. 14, 2022		
13	Amplifier(2GHz-20GHz)	HP	84722A	CST206	Oct. 15, 2021	Oct. 14, 2022		
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	CST218	Oct. 15, 2021	Oct. 14, 2022		
15	Band filter	Amindeon	82346	CST219	Oct. 15, 2021	Oct. 14, 2022		
16	Power Meter	Anritsu	ML2495A	CST540	Oct. 15, 2021	Oct. 14, 2022		
17	Power Sensor	Anritsu	MA2411B	CST541	Oct. 15, 2021	Oct. 14, 2022		
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	CST575	Oct. 15, 2021	Oct. 14, 2022		
19	Splitter	Agilent	11636B	CST237	Oct. 15, 2021	Oct. 14, 2022		
20	Loop Antenna	ZHINAN	ZN30900A	CST534	Oct. 15, 2021	Oct. 14, 2022		
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	CST579	Oct. 18, 2021	Oct. 17, 2022		
22	Amplifier	TDK	PA-02-02	CST574	Oct. 18, 2021	Oct. 17, 2022		
23	Amplifier	TDK	PA-02-03	CST576	Oct. 18, 2021	Oct. 17, 2022		
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	CST578	Oct. 15, 2021	Oct. 14, 2022		



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	June. 25 2020	June. 24 2021	
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021	
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 25 2020	June. 24 2021	
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 25 2020	June. 24 2021	
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 25 2020	June. 24 2021	
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 25 2020	June. 24 2021	
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 25 2020	June. 24 2021	
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 25 2020	June. 24 2021	

General used equipment:							
ltem	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)	
1	Humidity/ Temperature Indicator	КТЈ	TA328	GTS243	June. 25 2020	June. 24 2021	
2	Barometer	ChangChun	DYM3	GTS255	June. 25 2020	June. 24 2021	



7

# Report No.: CST2022050017E02

# Radio Technical Requirements Specification in ETSI EN 300 220-2

# 7.1 Test conditions

ltom	Normal	Extreme condition					
nem	condition	HVHT LVHT		HVLT	LVLT		
Temperature	+25°C	+50°C	+50°C	-10ºC	-10ºC		
Voltage	AC 230V	AC 253V	AC 207V	AC 253V	AC 207V		
Humidity		20%-95%					
Atmospheric Pressure:		1008 mbar					

# 7.2 Transmitter Requirement

# 7.2.1 Operation Frequency

The Operational Frequency band was declared by the manufacturer which conforms annexes B, C or any NRI of ETSI EN 300220-2.



Test Method:ETSI EN 300 220-1 clause 5.2.2Test site:Measurement Distance: 3m (Semi-Anechoic Chamber)Receiver setup:RBW=120kHz, VBW=300kHz, Detector= peakLimit:10mW=10dBmTest setup:Image: Comparison of the test of test of the test of					
Test site:       Measurement Distance: 3m (Semi-Anechoic Chamber)         Receiver setup:       RBW=120kHz, VBW=300kHz, Detector= peak         Limit:       10mW=10dBm         Test setup:       Image: Comparison of Compari					
Receiver setup:     RBW=120kHz, VBW=300kHz, Detector= peak       Limit:     10mW=10dBm       Test setup:     Image: Comparison of the test of the test of test	Measurement Distance: 3m (Semi-Anechoic Chamber)				
Limit:         10mW=10dBm           Test setup:         Image: Comparison of the setup in the					
Test setup:					
Atenna Tower Antenna Tower I.50m (Turntable) Test Rocciver Test Rocciver Test Rocciver					
<ul> <li>Test procedure:</li> <li>Substitution method was performed to determine the actual ERP emislievels of the EUT. The following test procedure as below:</li> <li>1. On the test site as test setup graph above, the EUT shall be placed the 1.5m support on the turntable and in the position closest to no use as declared by the provider.</li> <li>2. The test antenna shall be oriented initially for vertical polarization shall be chosen to correspond to the frequency of the transmitter: output of the test antenna shall be connected to the measuring receiver.</li> <li>3. The transmitter shall be switched on, if possible, without modulatid and the measuring receiver shall be tuned to the frequency of the transmitter under test.</li> <li>4. The test antenna shall be raised and lowered from 1m to 4m until maximum signal level is detected by the measuring receiver. Ther turntable should be rotated through 360° in the horizontal plane, u the maximum signal level is detected by the measuring receiver.</li> <li>5. Repeat step 4 for test frequency with the test antenna polarized horizontally.</li> <li>6. Remove the transmitter and replace it with a substitution antenna antenna should be half-wavelength for each frequencies, where the substitution antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.</li> <li>7. Feed the substitution antenna and the transmitter end with a signal grearer or connected to the antenna how means of a portradiation of a portradiation of a portradiation of a portradiation of the antenna should be 0.3 m above the ground.</li> </ul>	ed at ormal and .The ion en the until a (the The same e to e				

# 7.2.2 Effective Radiated Power



	generator tuned to a particular test frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.
	8. Repeat step 7 with both antennas horizontally polarized for each test frequency.
	9. Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps 7 and 8 by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula:
	ERP(dBm) = Pg(dBm)) + antenna gain (dBd)
	where:
	Pg is the generator output power into the substitution antenna.
Measurement Record:	Uncertainty: 0.65dB
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

#### **Measurement Data**

Channel	ERP Level (dBm)	Limit (dBm)	Result
Lowest	11.45		
Middle	11.67	14.00	Pass
Highest	11.59		

Remark:Peak value is applicable.



# 7.2.3 Duty Cycle

Test Requirement:	ETSI EN 300 220-2 clause 4.3.3
Test Method:	ETSI EN 300 220-1 clause 5.4
Limit:	10%
Test setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

#### Measurement Data

Ton time(s)	Tcycle time(s)	Dutycycle	Limit	Result
0.366	1800	0.020%	0.1%	Pass

Note: The manufacturer declare transmit cycle is greater than 30min.

Plot:





Test Requirement:	ETSI EN 300 220-2 clause 4.3.4					
Test Method:	ETSI EN 300 220-1 clause 5.6					
Receive setup:	Table	12: Test Parameters for	r Max Occupied Bandwidth Measurement			
	Setting	Value	Notes			
	Centre frequency	The nominal Operating Frequency	The highest or lowest Operating Frequency as declared by the manufacturer			
	RBW	1 % to 3 % of OCW without being below 100 Hz				
	VBW	3 x RBW	Nearest available analyser setting to 3 x RBW			
	Span	At least 2 x Operating	Span should be large enough to include all major			
	Detector Mode	Channel width	components of the signal and its side bands			
	Trace	Max hold				
	Indee	max nord				
Limit:	<ul> <li>The Operating Channel shall be declared and shall reside entirely within the Operational Frequency Band.</li> <li>The Maximum Occupied Bandwidth at 99 % shall reside entirely within the Operating Channel defined by Flow and Fhigh.</li> <li>Note: For 865 MHz to 868 MHz FHSS equipment. The Maximum occupied bandwidth per hopping channel shell less or equal to 50kHz. For 863 MHz to 870 MHz FHSS equipment. The Maximum occupied bandwidth per</li> </ul>					
Tost sotup:	11 5					
Test setup.	Spectr	rum Analyzer				
			E.U.T			
		Non-Conducted	d Table			
		Ground Referen	ce Plane			
Toot Procedure:	Sten 1:					
Test Procedure.	Operation of th	o EUT aball ba at	arted on the highest operating frequency			
	Operation of the		arted, on the highest operating hequency			
	as declared by	the manufacturer	, with the appropriate test signal.			
	The signal atte	nuation shall be a	djusted to ensure that the signal power			
	envelope is su	fficiently above the	e noise floor of the analyser to avoid the			
	noise signals c	on either side of the	e power envelope being included in the			
	measurement		1 1 5			
	Ston 2:					
	Step 2.	, is some lated the	neek value of the trees shall be leasted			
	when the trace	e is completed the	peak value of the trace shall be located			
	and the analys	er marker placed of	on this peak.			
	Step 3:					
	The 99 % occu	ipied bandwidth fu	nction of the spectrum analyser shall be			
	used to measu	re the occupied ba	andwidth of the signal.			
Measurement Record:		•	Uncertainty: ±5%			
Test Instruments:	Refer to sectio	n 6.0 for details				
Test mode:	Refer to sectio	Refer to section 5.2 for details				
Test results:	Pass					

# 7.2.4 Occupied Bandwidth



#### **Measurement Data**

Test condition	Channel	99% Occupied Bandwidth(kHz)	F∟(MHz)	F <sub>н</sub> (MHz)	Limit	Result
	Lowest	127.22	867.0345	-		
NINV	Highest	126.81	-	868.7630		
	Lowest	127.42	867.0357	-		
	Highest	127.34	-	868.7425	F <sub>low</sub> and F <sub>high</sub> shall reside entirely within the operating	Pass
LTLV	Lowest	127.27	867.0420	-		
	Highest	127.38	-	868.7469		
	Lowest	127.19	867.0322	-	band	
HILV	Highest	127.26	-	868.7537	_	
	Lowest	127.33	867.0273	-		
	Highest	127.18	-	868.7571		









![](_page_15_Picture_0.jpeg)

#### Test Requirement: ETSI EN 300 220-2 clause 4.3.3 Test Method: ETSI EN 300 220-1 clause 5.7 Test setup: Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane Step 1: Test Procedure: Operation of the EUT shall be started on the nominal frequency as declared by the manufacturer under extreme high temperature and extreme voltage conditions. The frequency of the unmodulated carrier shall be measured and noted. Step 2: Operation of the EUT shall be started on the nominal frequency as declared by the manufacturer under extreme low temperature and extreme voltage conditions. Measurement Record: Uncertainty: ± 0.5ppm Refer to section 6.0 for details Test Instruments: Test mode: Refer to section 5.2 for details Test results: Pass

# 7.2.5 Frequency Error

# Measurement Data

Test conditions	Channel	Frequency(MHz)	A-N(KHz)	B-N(KHz)
	Lowest	867.1MHz	-	-
	Highest	868.7MHz	-	-
B(HTHV)	Lowest	867.1MHz	0	0
	Highest	868.7MHz	0	0
	Lowest	867.1MHz	0	0
A(LILV)	Highest	868.7MHz	0	0

![](_page_16_Picture_0.jpeg)

Test Requirement:	ETSI EN 300 220-2 clause 4.3.5						
Test Method:	ETSI EN 300 220	-1 clau	ise 5.8.3				
Receive setup:	Table 16: Test Parameters for Out Of Band for Operating Channel Measurement						
	Spectrum Analy Setting	/ser	Value		Notes		
	Centre frequency		Operating				
	Span		6 x Operating				
	RBW		1 kHz	Resolution ban	dwidth for Out O	f Band domain	
	Detector Function		(see note) RMS	measurements	measurements		
	Trace Mode	3	Linear AVG	Applies only for An appropriate averaged to giv	EUT generating number of samp e a stable readir	D-M2 test signal. bles should be	
			Max Hold	Applies only for test signal.	EUT generating	D-M2a or D-M3	
	NOTE: If the value	e of RBW	used is different fr	rom RBW <sub>REF</sub> in c	lause 5.8.2, use	the bandwidth	
	correction	in clause	4.3.10.1.				
		Table 15	- Emission limits	in the Out Of Bar	nd domains		
	Domain		Eroguopov Par		RBW	Max nower limit	
	Domain		f ≤ f <sub>low OEB</sub> - 400	kHz	10 kHz	-36 dBm	
		Flow_O	$_{FB} - 400 \text{ kHz} \le f \le f_{low}$	OFB - 200 kHz	1 kHz	-36 dBm	
	OOB limits applicable to		$f_{low} - 200 \text{ kHz} \le f < f_{low_OFB}$		1 kHz	See Figure 6	
	Operational Frequency Band (See Figure 6)		t = t <sub>low_OFB</sub>		1 kHz	0 dBm	
		F	$I = Ihigh_OFB$ E = < f < f = + 200 kHz		1 kHz	0 dBm	
		Europ	high_OFB + 200 kHz $\leq f \leq f_{high_OFB} + 400$ kHz		1 KHZ	36 dBm	
		high_OF	$F_{\text{bish}} = 1200 \text{ km} = 1200 \text{ km} = 100 \text{ km} = 1000 \text{ km} = 10000 \text{ km} = 1000 \text{ km} = 10000 \text{ km} = 10000 \text{ km} = 1000 \text{ km} = 1000 \text{ km} $		10 kHz	-36 dBm	
Limit:			$f = f_{e^-} 2.5 \times OCW$		1 kHz	-36 dBm	
		f <sub>c</sub> -	$f_c = 2.5 \text{ x OCW} \le f \le f_c = 0.5 \text{ x OCW}$		1 kHz	See Figure 5	
	OOB limits applicable to		$f = f_c - 0,5 \text{ x OCW}$		1 kHz	0 dBm	
	(See Figure 5)		$f = f_c + 0.5 \times OCW$		1 kHz	0 dBm	
		f <sub>c</sub> +	$0,5 \times OCW \le f \le f_c +$	2,5 x OCW	1 kHz	See Figure 5	
	NOTE: f is the measuren	ment freque	1 - 1 <sub>c</sub> + 2,5 X OC		1 KHZ	-36 dBm	
	f <sub>c</sub> is the Operating	g Frequenc	cy.				
	F <sub>low_OFB</sub> is the lower edge of the Operational Frequency Band. F <sub>high_OFB</sub> is the upper edge of the Operational Frequency Band. OCW is the operating channel bandwidth.						
Test setun:							
	Spectrum			E.U.T			
		Non-	Conducted Tabl	e			
		Groun	d Reference Pla	ine			
Test Procedure:	Refer to clause 5.	.8.3.4 c	of ETSI EN30	0220-1			
Test Instruments:	Refer to section 6	6.0 for 0	details				
Test mode:	Refer to section 5.2 for details						
Test results:	Pass						

# 7.2.6 TX Out Of Band Emissions

![](_page_17_Picture_0.jpeg)

## **Measurement Data**

# Report No.: CST2022050017E02

#### Lowest channel and Highest channel

Domain	Frequency Range	Result
	$f\leqslant~{\rm flow\_OFB}$ - 400 kHz	Pass
	Flow_OFB - 400 kHz $\leqslant~$ f $\leqslant~$ flow_OFB - 200 kHz	Pass
	flow - 200 kHz $\leqslant~$ f < flow_OFB	Pass
OOB limits applicable to	f = flow_OFB	Pass
Band	$f = fhigh_OFB$	Pass
	Fhigh_OFB < f $\leqslant~$ fhigh_OFB + 200 kHz	Pass
	<code>Fhigh_OFB</code> + 200 kHz $\leqslant~f\leqslant~$ fhigh_OFB + 400 kHz	Pass
	Fhigh_OFB + 400 kHz $\leqslant~f$	Pass
	f = fc- 2.5 x OCW	Pass
OOB limits applicable to Operating Channel	fc - 2,5 x OCW $\leqslant~f\leqslant~$ fc - 0,5 x OCW	Pass
	$f = f_c - 0.5 \times OCW$	Pass
	$f = f_c + 0.5 \times OCW$	Pass
	$f_{c} + 0, \overline{5} \text{ x OCW} \leqslant \ f \leqslant \ f_{c} + 2, 5 \text{ x OCW}$	Pass
	f = fc+ 2,5 x OCW	Pass

![](_page_18_Picture_0.jpeg)

# 7.2.7 Transient power

Test Requirement:	ETSI EN 300 220-2 Clause 4.3.6					
Test Method:	ETSI EN 300 220-1 Clause 5.10.3					
Limit:	Table 23: Transmitter Transient Power limits					
	Absolute offset from centre frequency	RBW <sub>REF</sub>	Peak power limi	t applicable at measur	ement points	
	≤ 400 kHz	1 kHz		0 dBm		
	> 400 KHZ	1 KHZ		-27 dBm		
Test procedure:	The output of the EUT shall be connected to a spectrum analyser or equivalent					
	The measurement shall be	o undortak	on in zoro cr	an mode. The	analysor's	
	centre frequency shall be	e unueriar	offeet from the		tre frequency	
	These offset values and the	set to an t	nonding RBV	e operating cern	are listed in	
	Table 24			v configurations		
	Table 24.	e 24: RBW fo	or Transient Me	easurement		
	Measurement points: offset from centre frequency		Analyser RE	3W	RBWREF	
	-0,5 x OCW - 3 kHz		1 kHz			
	0,5 x OCW + 3 kHz Not applicable for OCW < 25 kHz				1kHz	
	±12,5 kHz or ±OCW	Max (R	BW pattern 1, 3, 1	0 kHz) ≤ Offset	1 447	
	whichever is the greater		frequency/6 (see	e note)	T KI IZ	
	0,5 x OCW + 400 kHz	Hz 100 kHz 1 kH			1 kHz	
	-0,5 x OCW -1 200 kHz	1	300 kHz		1 kHz	
	NOTE: Max (RBW pattern 1.3.	10 kHz) mean	s the maximum b	andwidth that falls into	the commonly	
	implemented 1, 3, 10 kF EXAMPLE: If OCW is 25 kH 3 kHz. The rest of then the RBW va	Iz RBW filter b z then the RBV of the analyser alue correspon	oandwidth increme V value correspon settings are listed ding to one OCW	ental pattern of spectru ding to one OCW offs I in Table 25, and if O offset frequency is 30	im analysers. et frequency is CW is 250 kHz kHz.	
	Table 2	5: Parameter	s for Transient	Measurement		
	Spectrum Analyser Setting	Va	lue	Not	es	
	VBW/RBW	1	10	At higher RBW values clipped to its maximu	s VBW may be	
	Sweep time	500	) ms			
	RBW filter Trace Detector Function	Gau	ssian MS			
	Trace Mode	Max	hold			
	Sweep points	5 Continuo				
	NOTE: The ratio between the nun different number of sweep	nber of sweep points is used.	points and the swe	ep time shall be the sar	me ratio as above if	
	The used modulation shal	l be D-M3	. The analyse	er shall be set to	the settings	
	of Table 25 and a measur	ement sha	all be started	for each offset f	requency. The	
	EUT shall transmit at leas	t five D-M3	3 test signal.	The peak value	shall be	
	recorded and the measurement shall be repeated at each offset frequency					
	mentioned in Table 24.					
	The recorded power values shall be converted to power values measured in RBWREF by the formula in clause 4.3,10.1.					
Measurement Record:				Uncertai	nty: ± 1.5dB	
Test Instruments:	Refer to section 6.0 for de	etails				
Test mode:	Refer to section 5.2 for details					
Test results:	Pass					

![](_page_19_Picture_0.jpeg)

# Measurement Data

## Lowest Channel:

Frequency offset	Peak Power level (dBm)	Limit (dBm)	Result
F <sub>c</sub> -0.5*OCW-1200kHz	-49.430	-27	
F <sub>c</sub> -0.5*OCW-400kHz	-38.009	-27	
F <sub>c</sub> -OCW	-30.438	0	
F₀-0.5*OCW-3kHz	-34.913	0	Dasa
F <sub>c</sub> +0.5*OCW+3kHz	-35.352	0	Pass
F <sub>c</sub> +OCW	-30.362	0	
F <sub>c</sub> +0.5*OCW+400kHz	-36.911	-27	
F <sub>c</sub> +0.5*OCW+1200kHz	-49.389	-27	

# Highest Channel:

Frequency offset	Peak Power level (dBm)	Limit (dBm)	Result
Fc-0.5*OCW-1200kHz	-48.849	-27	
F <sub>c</sub> -0.5*OCW-400kHz	-37.849	-27	
F <sub>c</sub> -OCW	-30.869	0	
F₀-0.5*OCW-3kHz	-35.172	0	Dasa
F <sub>c</sub> +0.5*OCW+3kHz	-34.886	0	Pass
F <sub>c</sub> +OCW	-30.190	0	
F <sub>c</sub> +0.5*OCW+400kHz	-38.040	-27	
F <sub>c</sub> +0.5*OCW+1200kHz	-48.182	-27	

Note: OCW is 200kHz.

![](_page_20_Picture_0.jpeg)

Lowset channel:

## Report No.: CST2022050017E02

![](_page_20_Figure_2.jpeg)

 $F_{c}$ -0.5\*OCW-3kHz

🔤 Keysight Spectrum A	Analyzer - Swept SA		50				
Marker 1 931	50 Ω AC .840 ms		SENSE:INT	Avg Type: Lo	g-Pwr TRAC	E 1 2 3 4 5 6	Peak Search
	F	NO: Close Trig: FGain:Low Atte	Free Run n: 30 dB	Avg Hold:>1/1	TYP DE		
Ref 10 dB/div Ref	Offset 0.3 dB 20.00 dBm				Mkr1 93 -34.74	31.8 ms 47 dBm	NextPeak
10.0							Next Pk Right
-10.0							Next Pk Left
-20.0						1	Marker Delta
-40.0		ſŢĊĸŎŢŎŎŢŎŎŢŎ	v <sup>al</sup> nt (p		YIIIMIA	malia.	Mkr→CF
-60.0							Mkr→RefLvl
Center 867.20	3000 MHz		_		s	pan 0 Hz	More 1 of 2
Res BW 1.0 kH	Iz	#VBW 10 kH	z	Swe	eep 955.7 ms (	1001 pts)	
MSG					STATUS		

Fc+0.5\*OCW+3kHz

![](_page_21_Figure_2.jpeg)

F<sub>c</sub>-OCW

Keysight Spectrum Analyzer - Swept SA					- J -
Marker 1 50.6539 ms	SEN	Avg Type Run Avg Hold	: Log-Pwr TRAC >1/1 TYF	E 1 2 3 4 5 6 E MWWWW	Peak Search
	Gain:Low Atten: 30	dB	DE Mkr1 5	0.65 ms	Next Peak
10 dB/div Ref 20.00 dBm			-30.5	49 dBm	
10.0					Next Pk Right
0.00					Next Pk Left
-10.0					
-20.0	<u></u>				Marker Delta
-30.0					
					Mkr→CF
-60.0					Mkr→RefLvl
-70.0					
					More
Center 866.900000 MHz	#VBW 100 kHz		Sween 955.7 ms (	pan 0 Hz 1001 pts)	1 of 2
MSG	# CENTRO KITZ		STATUS	leer pro/	

F<sub>c</sub>+OCW

![](_page_22_Figure_2.jpeg)

Fc-0.5\*OCW-400kHz

![](_page_22_Figure_4.jpeg)

Fc+0.5\*OCW+400kHz

![](_page_23_Figure_2.jpeg)

Fc-0.5\*OCW-1200kHz

📕 Kej	ysight Spe	trum Analyzer	Swept SA			22					
(x) Mar	ker 1	RF 5	Ω AC		SEN	ISE:INT	Avg Type	: Log-Pw	r TRAC	E 1 2 3 4 5 6	Peak Search
				PNO: Fast	Trig: Free Atten: 30	dB	Avg Hold	:>1/1	TYI DI		
				II Gain.cow					Mkr1 9	07.9 ms	Next Peak
10 dE	3/div	Ref 20.0	0.3 dB 0 dBm						-49.3	96 dBm	
Log											
10.0											Next Pk Right
0.00											
											Next Pk Left
-10.0											
2010							-				
-20.0											Marker Delta
-30.0											
-40.0											Mkr→CF
50.0											
-50.0	nduhan	Wedgewingelalinge	white the way	phinescriptions	unationalis	the there will be	anti-lation	planallys	addenter all and a strategy and a st	www.Wranhald	
-60.0											Mkr→RefLvl
-70.0											
											More
Cen	ter 86	8.400000	MĤz						s	ipan 0 Hz	1 of 2
Res	BW 3	00 kHz		#VBW	3.0 MHz			Sweep	955.7 ms (	1001 pts)	
MSG								STA	rus		

Fc+0.5\*OCW+1200kHz

![](_page_24_Picture_0.jpeg)

![](_page_24_Figure_2.jpeg)

Fc-0.5\*OCW-3kHz

📕 Ke	ysight Spe	ctrum	Analyzer - Sw	ept SA			22					
<mark>w</mark> Mar	kor 1	RF 885	50 Ω	AC		SEI	ISE:INT		: Log-Pwr	TRAC	E 1 2 3 4 5 6	Peak Search
met	KGI I	003	.005 111	- - -	PNO: Close 🖵 FGain:Low	Trig: Free Atten: 30	e Run ) dB	Avg Hold	:>1/1	TYF DE		NextBack
10 di	B/div	Ref Ref	Offset 0.3 f 20.00 c	dB IBm					_	Mkr1 8 -34.9	85.0 ms 17 dBm	NextFeak
10.0												Next Pk Right
												Next Pk Left
												Marker Delta
	) Na ma	d h	hina <b>na</b> ki	Minina	n Ni ta kundur		n hi i ha ir		ita Milin	or <sup>a</sup> di <sup>f</sup> idina (h.	n nga nga nga nga nga nga nga nga nga ng	Mkr→CF
		U Į Į	4]] <mark>4</mark> ]]	u Mul	<sub>┪╋</sub> ┿┥┑┰╿╵╽┝╻╸	<b>///</b> / . ////I	M94 W	N TIM TATA	1 <mark>4</mark> 11   (* 114'	i, do. Milio	talità da	Mkr→RefLvl
												More
Cen	ter 86	8.80	3000 M	lz				~		s	pan 0 Hz	1 of 2
Res	BW 1.	.0 kl	Z		#VBW	10 kHz			Sweep	955.7 ms (	1001 pts)	
MSG									STAT	JS		

F<sub>c</sub>+0.5\*OCW+3kHz

![](_page_25_Figure_2.jpeg)

F<sub>c</sub>-OCW

Keysight Spectrum Analyzer - Swept SA				
₩ RF 50 Ω AC Marker 1 104.175 ms	SENS	Avg Type: Log-Pw Run AvglHold:>1/1	TRACE 123456	Peak Search
Ref Offset 0.3 dB	FGain:Low Atten: 30 o	dB	Mkr1 104.2 ms -30.144 dBm	NextPeak
10.0				Next Pk Right
-10.0				Next Pk Left
-20.0				Marker Delta
-40.0 -50.0		NA MARIANA ANA ANA ANA ANA ANA ANA ANA ANA ANA		Mkr→CF
-60.0				Mkr→RefLvl
Center 868.900000 MHz Res BW 10 kHz	#VBW 100 <u>kHz</u>	Sweep	Span 0 Hz 955.7 ms (1001 pts)	More 1 of 2
MSG		STAT	TUS	

F<sub>c</sub>+OCW

![](_page_26_Figure_2.jpeg)

Fc-0.5\*OCW-400kHz

🔤 Keysight Spe	ctrum Analyzer - Swept SA			No.					
L <mark>XI</mark>	RF 50 Ω AC		SENS	SE:INT	Ave Tune	I og Dug	TRAC		Peak Search
Marker 1	662.323 MS	PNO: Wide 🖵 IFGain:Low	Trig: Free Atten: 30	Run dB	Avg Hold:	>1/1	TYP	E I 2 3 4 5 6 E MWWWWW E P N N N N N	NextBeak
10 dB/div	Ref Offset 0.3 dB Ref 20.00 dBm						Mkr1 6	62.3 ms 54 dBm	NextPeak
10.0									Next Pk Right
-10.0									Next Pk Left
-20.0									Marker Delta
30.0	is without these start and a section of	unindu MAN Is al usual	.Utto canalar	ri0916 -1014	معالية ومعادية	1	illen Lad Tratisk	un litana minana	Mkr→CF
-60.0							1 - 19 - 19 - 19 - 19 - 19 - 19 - 19 -		Mkr→RefLvl
-70.0 Center 86	9.200000 MHz						s	pan 0 Hz	More 1 of 2
Res BW 1	00 kHz	#VBW 1	.0 MHz			Sweep	955.7 ms (	1001 pts)	
MSG						STAT	US		

Fc+0.5\*OCW+400kHz

![](_page_27_Figure_2.jpeg)

#### $F_c$ -0.5\*OCW-1200kHz

🔤 Keysight Spec	trum Analyzer - Swept SA						
(X) Markor 1	RF 50 Ω AC	SET	NSE:INT	Avg Type: Log-P	wr TRAC	E 1 2 2 4 5 6	Peak Search
Marker	766.410 ms	PNO: Fast Trig: Free IFGain:Low Atten: 30	e Run ) dB	Avg Hold:>1/1	TYF DE		NextPeak
10 dB/div Log <b>√</b>	Ref Offset 0.3 dB Ref 20.00 dBm				-48.4	32 dBm	
10.0							Next Pk Right
0.00							Next Pk Left
-20.0							Marker Delta
-30.0							Mkr. CE
-50.0 Acathroni	se helden den anna an al an	ตรปารที่สร้างไประกาศไปรักประเทศ จากระโกเสร็าสำหรัดเสร็าสำ	derer hen speldelikasker	mmuladahijinikasimanana	1 Anne-llockal Magnum	Magna-Unli	WIKI→CF
-60.0							Mkr→RefLvl
-70.0							More 1 of 2
Res BW 3	0.000000 MHZ 00 kHz	#VBW 3.0 MHz		Sweep	s 955.7 ms (	pan 0 Hz 1001 pts)	
MSG				ST	ATUS		

Fc+0.5\*OCW+1200kHz

![](_page_28_Picture_0.jpeg)

Test Requirement:	ETSI EN 300 220-2 Clause 4.2.2						
Test Method:	ETSI EN 300 220-1 Clau	se 5.9.1.2					
	Table 20: Parameters for TX Spurious Radiations Measurement						
	Operating Mode	RBW <sub>REF</sub>					
	Transmit mode	9 kUz < f < 150 kUz	(see note 2)				
	mansmit mode	150 kHz ≤ f < 30 MHz	7 10 kHz				
		30 MHz ≤ f < f <sub>a</sub> - m	100 kHz				
		fm≤f <fn< td=""><td>10 kHz</td></fn<>	10 kHz				
		f - n < f < f - n	1 1 1				
		f + n < f < f + n	1 1 1				
Receiver setup:		f + n < f < f + m	10.615				
			10 KH2				
			100 KHZ				
	NOTE 1: f is the measurement frequent	ency.	T MHZ				
	m is 10 x OCW or 500 kHz	whichever is the greater					
	n is 4 x OCW or 100 kHz, w	hichever is the greater.					
	p is 2,5 x OCW.						
	NOTE 2: If the value of RBW used fo	r measurement is different from RBW <sub>R</sub>	EF, use bandwidth correction from				
	clause 4.3.10.1.						
Test Frequency range:	25MHz to 6GHz						
Limit:	Frequency	Limit(operation)	Limit(standby)				
	47 MHz to 74 MHz	47 MHz to 74 MHz					
	87.5 MHz to 118 MHz						
		4nW(-54dBm)	2nW(-57dBm)				
	470 MHz to 790 MHz						
	Other frequencies	2E0mM(2CdDm)	$\Omega_{\rm m} M (EZdDm)$				
	below 1000 MHz	250NVV(-36dBM)	ZUAN(-2/gRW)				
		1u\//( 20dBm)	20nM/(47dPm)				
		TUVV(-300BIII)	201100(-47 0.011)				
Test setup:	Below 1GHz		7				
		· · · · · · · · · · · · · · · · · · ·					
		<					
		1 5					
	AF EUT	Antenna Antenna Tower					
	Ground Refere	ince Plane					
	Test Presiver	Pre-					
	TEST NECEIVEL						
	Above 1GHz						

# 7.2.8 Transmit spurious emissions

![](_page_29_Picture_0.jpeg)

	AE EUT Horn Artenna Tower Horn Artenna Tower Ground Reference Plane Test Receiver Controller
Test procedure:	Substitution method was performed to determine the actual ERP emission levels of the EUT. The following test procedure as below:
	Below 1GHz:
	<ol> <li>On the test site as test setup graph above, the EUT shall be placed at the 1.5m support on the turntable and in the position closest to normal use as declared by the provider.</li> </ol>
	2. The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter. The output of the test antenna shall be connected to the measuring receiver.
	3. The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the frequency of the transmitter under test.
	4. The test antenna shall be raised and lowered from 1m to 4m until a maximum signal level is detected by the measuring receiver. Then the turntable should be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
	5. Repeat step 4 for test frequency with the test antenna polarized horizontally.
	6. Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At the lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.
	7. Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends vertically polarized, and with the signal generator tuned to a particular test frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.
	8. Repeat step 7 with both antennas horizontally polarized for each test frequency.
	<ol> <li>Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps 7 and 8 by the power loss in</li> </ol>

![](_page_30_Picture_0.jpeg)

Report No.:	CST2022050017E02
1.00011110	0012022000011202

	the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half- wave dipole antenna by the following formula:
	ERP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)
	where:
	Pg is the generator output power into the substitution antenna.
	Above 1GHz:
	Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber, and the test antenna do not need to raise from 1 to 4m, just test in 1.5m height.
Measurement Record:	Uncertainty: 4.64dB
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

![](_page_31_Picture_0.jpeg)

#### **Measurement Data**

		The lowest cha	nnel	
	Spurious	Emission	Limit (dPm)	Toot Booult
	polarization	Level(dBm)	Liniit (dBiii)	Test Result
62.56	Vertical	-69.23	-54.00	
548.63	V	-65.30	-54.00	
1734.20	V	-50.05	-30.00	
2601.30	V	-45.38	-30.00	
3468.40	V	-41.83	-30.00	
4335.50	V	-42.22	-30.00	Deep
48.39	Horizontal	-66.44	-30.00	F 7855
838.70	Н	-67.52	-54.00	
1734.20	н	-49.69	-30.00	
2601.30	Н	-45.94	-30.00	
3468.40	н	-41.68	-30.00	
4335.50	н	-43.91	-30.00	
		The highest cha	annel	
Frequency (MHz)	Spurious	Emission	Limit (dBm)	Test Result
	polarization	Level(dBm)		rest Kesuit
49.99	Vertical	-66.75	-54.00	
696.37	V	-68.96	-54.00	
1737.40	V	-51.40	-30.00	
2606.10	V	-46.01	-30.00	
3474.80	V	-42.25	-30.00	
4343.50	V	-43.29	-30.00	Daga
51.71	Horizontal	-68.28	-30.00	F 455
861.04	Н	-69.46	-54.00	
1737.40	Н	-51.22	-30.00	
2606.10	Н	-46.69	-30.00	
3474.80	Н	-42.46	-30.00	
4343.50	Н	-44.58	-30.00	

![](_page_32_Picture_0.jpeg)

# 7.3 Receiver Requirements

Receiver Classification, Table 1 of ETSI EN 300 220-1.

,		
Rx Class	Risk assessment of Rx performance	
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.	
1.5	Category 1.5 is an improved performance level of receiver category 2.	
2	Category 2 is standard performance level of receiver.	
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.	
NOTE: The receiver category should be stated in both the test report and in the user's manual for the equipment. Receiver category 3 will be withdrawn after December 31 <sup>st</sup> , 2018.		
The EUT (Receiver part) belong to Category 2 with no Polite spectrum access function.		
7.3.1 Receiver sens	sitivity	
Not applicable, since the test applied to Polite spectrum access equipment.		

# 7.3.2 Clear Channel Assessment threshold

Not applicable, since the test applied to Polite spectrum access equipment.

#### 7.3.3 Polite spectrum access timing parameters

Not applicable, since the test applied to Polite spectrum access equipment.

#### 7.3.4 Adaptive Frequency Agility

Not applicable, since the test applied to AFA quipment.

# 7.3.5 Adjacent channel selectivity

Not applicable, since the test applied to Category 1 equipment.

# 7.3.6 Receiver saturation at Adjacent Channel

Not applicable, since the test applied to Category 1 equipment.

# 7.3.7 Spurious response rejection

Not applicable, since the test applied to Category 1 equipment.

# 7.3.8 Behaviour at high wanted signal level

Not applicable, since the test applied to Category 1 equipment.

# 7.3.9 Bi-Directional Operation Verification

Not applicable, since this product is not support Bi-Directional operation function.

![](_page_33_Picture_0.jpeg)

# 7.3.10 Blocking

Test Requirement:	ETSI EN 300 220-2 Clause 4.4.2		
Test Method:	ETSI EN 300 220-1 clause 5.18		
Limit:	Table 43: Blocking level parameters for RX category 1		
	Requirement	Limits	
	Blocking at +2 MHz from Centre Frequency	Receiver category 1 ≥ -20 dBm	
	Blocking at ±10 MHz from Centre Frequency	≥ -20 dBm	
	Blocking at ±5 % of Centre Frequency or 15 MHz, whichever is the greater	≥ -20 dBm	
	Table 42: Blocking level	parameters for RX category 1.5	
	Requirement	Limits	
	Blocking at ±2 MHz from OC edge fhigh and from	≥ -43 dBm	
	Blocking at ±10 MHz from OC edge fhigh and flow	≥ -33 dBm	
	Blocking at ±5 % of Centre Frequency or 15 MHz, whichever is the greater	≥ -33 dBm	
	Table 41: Blocking level	parameters for RX category 2	
	Requirement	Limits	
		Receiver category 2	
	Blocking at ±2 MHz from OC edge f <sub>high</sub> and f <sub>low</sub>	≥ -69 dBm	
	Blocking at ±10 MHz from OC edge f <sub>high</sub> and f <sub>low</sub>	≥ -44 dBm	
	Blocking at ±5 % of Centre Frequency or 15 MHz, whichever is the greater	≥ -44 dBm	
	Table 40: Blocking level	parameters for RX category 3	
	Requirement	Limits	
	Blocking at 12 MUz from OC adea f and f	Receiver category 3	
	Blocking at ±2 MHZ from OC edge I <sub>high</sub> and I <sub>low</sub>	≥ -80 dBm	
	Blocking at ±5 % of Centre Frequency or 15 MHz,	2 -00 dBm	
	whichever is the greater		
	A = 10 log (BW <sub>kHz</sub> / 16 kHz) BW is t	he receiver bandwidth	
Test setup:	Signal Generator A		
	Combiner	FUT	
	Signal Generator B		
Test procedure:	1. Two signal generators A and B s	hall be connected to the receiver via a	
	combining network to the receive	er antennaconnector.	
	2. Signal generator A shall be at the with normal modulation of the wa unmodulated.	e nominal frequency of the receiver, anted signal. Signal generator B shall be	
	3. Measurements shall be carried out at frequencies of the unwanted signal at approximately ±2 MHz and ±10 MHz, avoiding those frequencies at which spurious responses occur.		
	4. Initially signal generator B shall be generator A the level which still gestablished, however, the level a adjusted below the sensitivity lime level of generator A shall then be	be switched off and using signal gives sufficient response shall be t the receiver input shall not be it given in clause 8.1.4. The output e increased by 3 dB.	
	5. Signal generator B is then switch criteria (see clause 8.1.1) is just settings unchanged the power in replacing the receiver with a pow level shall be recorded. Alternativ	ed on and adjusted until the wanted exceeded. With signal generator B to the receiver is measured by ver meter or spectrum analyzer. This vely, equipment having a dedicated or	

![](_page_34_Picture_0.jpeg)

Report No.: CST2022050017E02
integral antenna may use a radiated measurement setup. For this, a test site from clause A.1 shall be selected and the requirements from clauses A.2 and A.3 apply.
6. Signal generators A and B together with a combiner shall be placed outside the anechoic chamber and a TX test antenna shall be placed with the EUT's antenna polarisation. The EUT shall be placed at the

Iocation of the turntable at the orientation of the most sensitive position. Generator A shall be set in order to reach the EUT sensitivity limit +3 dB.
7. The procedure shall be the same as for the conducted measurement. Bloking is the difference between signal generator B and signal

	generator A levels.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

#### Measurement data:

Receiver Category	Frequency Offset	Value(dBm)	Limit(dBm)	Result
2	+2MHz	-36	-69	Pass
2	-2MHz	-35	-69	Pass
2	+10MHz	-35	-44	Pass
2	-10MHz	-34	-44	Pass
2	+21.7MHz	-21	-44	Pass
2	-21.7MHz	-21	-44	Pass

![](_page_35_Picture_0.jpeg)

# 7.3.11 Spurious emissions

![](_page_35_Figure_3.jpeg)

![](_page_36_Picture_0.jpeg)

levels of the EUT. The following test procedure as below:

# Below 1GHz:

	Below IGnz.
	<ol> <li>On the test site as test setup graph above, the EUT shall be placed at the 1.5m support on the turntable and in the position closest to normal use as declared by the provider.</li> </ol>
	2. The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter.The output of the test antenna shall be connected to the measuring receiver.
	3. The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the frequency of the transmitter under test.
	4. The test antenna shall be raised and lowered from 1m to 4m until a maximum signal level is detected by the measuring receiver. Then the turntable should be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
	<ol><li>Repeat step 4 for test frequency with the test antenna polarized horizontally.</li></ol>
	6. Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At the lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.
	7. Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends vertically polarized, and with the signal generator tuned to a particular test frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.
	8. Repeat step 7 with both antennas horizontally polarized for each test frequency.
	9. Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps 7 and 8 by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half- wave dipole antenna by the following formula:
	ERP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBd) where:
	Pg is the generator output power into the substitution antenna.
	Above 1GHz:
	Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber, and the test antenna do not need to raise from 1 to 4m, just test in 1.5m height.
Measurement Record:	Uncertainty: 4.64dB
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details

![](_page_37_Picture_0.jpeg)

Test results:

Pass

#### **Measurement Data**

		The lowest cha	nnel	
	Spurious	Emission	limit (dDm)	Teet Decult
Frequency (MHZ)	polarization	Level(dBm)	сітіц (авті)	Test Result
48.01	Vertical	-68.91		
513.55	V	-68.29		
1734.20	V	-60.52		
2601.30	V	-56.63	2nW/ -57dBm	
3468.40	V	-51.71	below 1GHz,	
4335.50	V	-53.59		Daga
34.67	Horizontal	-69.14	20nW/ -47dBm	Pass
818.68	Н	-68.26	above 1GHz.	
1734.20	Н	-63.18		
2601.30	Н	-57.56		
3468.40	Н	-53.13		
4335.50	Н	-54.76		
		The highest cha	nnel	
	Spurious Emission			
	Spurious	Emission	Limit (dPm)	Toot Booult
Frequency (MHz)	Spurious polarization	Emission Level(dBm)	Limit (dBm)	Test Result
Frequency (MHz) 42.01	Spurious polarization Vertical	Emission Level(dBm) -69.43	Limit (dBm)	Test Result
<b>Frequency (MHz)</b> 42.01 799.31	Spurious polarization Vertical V	Emission Level(dBm) -69.43 -67.49	Limit (dBm)	Test Result
<b>Frequency (MHz)</b> 42.01 799.31 1737.40	Spurious polarization Vertical V V	Emission Level(dBm) -69.43 -67.49 -62.35	Limit (dBm)	Test Result
<b>Frequency (MHz)</b> 42.01 799.31 1737.40 2606.10	Spurious polarization Vertical V V V V V	Emission Level(dBm) -69.43 -67.49 -62.35 -57.05	Limit (dBm) 2nW/ -57dBm	Test Result
Frequency (MHz) 42.01 799.31 1737.40 2606.10 3474.80	Spurious polarization Vertical V V V V V V V V V	Emission Level(dBm) -69.43 -67.49 -62.35 -57.05 -52.14	Limit (dBm) 2nW/ -57dBm below 1GHz,	Test Result
Frequency (MHz) 42.01 799.31 1737.40 2606.10 3474.80 4343.50	Spurious polarization Vertical V V V V V V V V V V	Emission Level(dBm) -69.43 -67.49 -62.35 -57.05 -52.14 -52.87	Limit (dBm) 2nW/ -57dBm below 1GHz,	Test Result
Frequency (MHz) 42.01 799.31 1737.40 2606.10 3474.80 4343.50 47.03	Spurious polarization Vertical V V V V V V V V Horizontal	Emission Level(dBm) -69.43 -67.49 -62.35 -57.05 -52.14 -52.87 -72.29	Limit (dBm) 2nW/ -57dBm below 1GHz, 20nW/ -47dBm	Test Result Pass
Frequency (MHz)         42.01         799.31         1737.40         2606.10         3474.80         4343.50         47.03         587.93	Spurious polarization Vertical V V V V V V Horizontal H	Emission Level(dBm) -69.43 -67.49 -62.35 -57.05 -52.14 -52.87 -72.29 -69.81	Limit (dBm) 2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Test Result Pass
Frequency (MHz)         42.01         799.31         1737.40         2606.10         3474.80         4343.50         47.03         587.93         1737.40	Spurious polarization Vertical V V V V V V Horizontal H H	Emission Level(dBm) -69.43 -67.49 -62.35 -57.05 -52.14 -52.87 -72.29 -69.81 -63.45	Limit (dBm) 2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Test Result Pass
Frequency (MHz)         42.01         799.31         1737.40         2606.10         3474.80         4343.50         47.03         587.93         1737.40         2606.10	Spurious polarization Vertical V V V V V V Horizontal H H H	Emission Level(dBm) -69.43 -67.49 -62.35 -57.05 -52.14 -52.87 -72.29 -69.81 -63.45 -56.60	Limit (dBm) 2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Test Result Pass
Frequency (MHz)         42.01         799.31         1737.40         2606.10         3474.80         4343.50         47.03         587.93         1737.40         2606.10         3474.80	Spurious polarization Vertical V V V V V V Horizontal H H H H	Emission Level(dBm) -69.43 -67.49 -62.35 -57.05 -52.14 -52.87 -72.29 -69.81 -63.45 -56.60 -52.61	Limit (dBm) 2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Test Result         Pass

![](_page_38_Picture_0.jpeg)

# 8 Test Setup Photo

![](_page_38_Picture_3.jpeg)

![](_page_38_Picture_4.jpeg)

# 9 EUT Constructional Details

Reference to the **appendix II** for details.

-----End-----