

SRD Test Report
on
SR230
(433.92 MHz & 868.35MHz)

as per

ETSI EN 300 220-1 V3.1.1 (2017-02)
ETSI EN 300 220-2 V3.2.1 (2018-04)

Prepared for:
Paradox Security Systems
6 Milton Street,
Freeport, Bahamas



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Test Engineer	Jose Martinez-Ortega	23-03-2020	
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Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

EXECUTIVE SUMMARY

A sample of this product was tested and found to be in compliance with ETSI EN 300 220-1 V3.1.1 (2017-02) & ETSI EN 300 220-2 V3.2.0 (2018-04)



A2LA Cert. No. 2955.20

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1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	23 th March 2020

Table 1 – Modification Records

1.2 Acronyms & Definitions

The following definitions and acronyms are applicable in this report.

Acronyms:

AM	Amplitude Modulated
DCT	Duty Cycle Template
EUT	Equipment Under Test
F_{high}_OFB	The upper edge of the Operational Frequency Band
F_{low}_OFB	The lower edge of the Operational Frequency Ba
NA	No Applicable
NCR	No Calibration Required
NP	Number of Pulses
OCW	Operational Channel Width
OOB	Tx Out OF Band Spurious Emission
OOK	On/Of Keying modulation
RBW	Reading Bandwidth of RTSA
RTSA	Real Time Spectrum Analyzer
SE	Support Equipment
SRD	Short Range Devices
SWT	Sweep Time of RTSA
T_{obs}	Observation period
TR	Technical Report
VBW	Video Bandwidth of RTSA
WS	Wanted Signal, in dBm



1.3 Introduction

The following test report describes tests in compliance with electromagnetic compatibility directive 2014/53/EU. Following the former directive, the information contained in this report is intended to show verification of the SR230 – 433.92MHz and SR230 – 868.35MHz to the requirements of ETSI EN 300 220-1 V3.1.1 (2017-02) and ETSI EN 300 220-2 V3.2.1 (2018-04).

Number of Samples Tested	2
Test Specification/Issue/Date	ETSI EN 300 220-1 V3.1.1 (2017-02) ETSI EN 300 220-2 V3.2.1 (2018-04)
Test Plan/Issue/Date	N/A
Order Number	7169007312
Date:	20120-01-26
Date of Receipt of EUT	2020-02-06
Start of Test	2020-02-06
Finish of Test	2020-03-03
Name of Engineer(s)	Jose Martinez-Ortega Abdoulaye Nadine



1.3.1 Brief Summary

A brief summary of the tests carried out in the EUT in accordance with ETSI EN 300 220-1 V3.1.1 (2017-02) and ETSI EN 300 220-2 (2018-04) are summarized in Table 2 and Table 3 below.

Section	Clause	Test Name/ Base Standard	Results
-	5.1	Operating frequency	Pass <Note 1>
2.1	5.2	Effective radiated power	Pass
-	5.3	Maximum E.R.P. spectral density	N/A <Note 2>
2.2	5.4	Duty Cycle	Pass
2.3	5.5	Duty Cycle Template	Pass
2.4	5.6	Occupied Bandwidth	Pass
-	5.7	Frequency Error	N/A <Note 2>
2.5	5.8	Tx Out Of Band Emissions	Pass
2.6	5.9	Tx - Unwanted emissions in the spurious domain	Pass
		Rx - Unwanted emissions in the spurious domain	Pass
-	5.10	Transient power	N/A <Note 2>
-	5.11	Adjacent Channel Power (if OCW <25 kHz)	N/A <Note 3>
2.7	5.12	TX behaviour under Low Voltage Conditions	Pass
-	5.13	Adaptive Power Control	N/A <Note 4>
-	5.14	Rx Sensitivity Level	N/A <Note 4>
-	5.15	Adjacent Channel Selectivity	N/A Note 4
-	5.16	Receiver Saturation at Adjacent Channel	N/A <Note 4>
-	5.17	Spurious Response Rejection	N/A <Note 4>
2.8	5.18	Blocking	Pass
-	5.19	Behaviour at High Wanted Signal	N/A <Note 4>
-	5.20	Void	N/A <Note 4>
-	5.21	Polite Spectrum Access	N/A <Note 4>
-	5.22	Bi-Directional Operational Verification	N/A <Note 4>
Note 1. Self Declaration of the Manufacturer (See Appendix A) Note 2. Applicable for equipment wideband modulation Note 3. No applicable as OCW is 200kHz Note 4. No applicable for the EUT classification			

Table 2 – Test Summary Table – SR230– 433.92MHz



Section	Clause	Test Name/ Base Standard	Results
-	5.1	Operating frequency	Pass <Note 1>
2.1	5.2	Effective radiated power	Pass
-	5.3	Maximum E.R.P. spectral density	N/A <Note 2>
2.2	5.4	Duty Cycle	Pass
2.3	5.5	Duty Cycle Template	Pass
2.4	5.6	Occupied Bandwidth	Pass
-	5.7	Frequency Error	N/A <Note 2>
2.5	5.8	Tx Out Of Band Emissions	Pass
2.6	5.9	Tx - Unwanted emissions in the spurious domain	Pass
		Rx - Unwanted emissions in the spurious domain	Pass
-	5.10	Transient power	N/A <Note 2>
-	5.11	Adjacent Channel Power (if OCW <25 kHz)	N/A <Note 3>
2.7	5.12	TX behaviour under Low Voltage Conditions	Pass
-	5.13	Adaptive Power Control	N/A Note 4
-	5.14	Rx Sensitivity Level	N/A <Note 4>
-	5.15	Adjacent Channel Selectivity	N/A <Note 4>
-	5.16	Receiver Saturation at Adjacent Channel	N/A <Note 4>
-	5.17	Spurious Response Rejection	N/A <Note 4>
2.8	5.18	Blocking	Pass
-	5.19	Behaviour at High Wanted Signal	N/A <Note 4>
-	5.20	Void	N/A Note 4
-	5.21	Polite Spectrum Access	N/A <Note 4>
-	5.22	Bi-Directional Operational Verification	N/A <Note 4>
Note 1. Self Declaration of the Manufacturer (See Appendix A) Note 2. Only applicable for equipment wideband modulation Note 3. The OCW is higher than 25kHz Note 4. No applicable for the EUT classification			

Table 3 – Test Summary Table – SR230 – 868.35MHz



1.4 Declaration of Build Status

This report addresses the EMC verification testing and test results of the SR230 (433.92MHz and 868.35MHz) Models herein referred to as EUT (Equipment Under Test). The EUT was tested for immunity compliance against the following standards ETSI EN 300 220-2 V3.2.1 (2018-04) and ETSI EN 300 220-1 V3.2.1 (2017-02).

For a more detailed list of the standards and the revision used, see the "Applicable Standards, Specifications and Methods" section of this report.

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1.5 EUT Information

1.5.1 SR230– 433.92MHz

MODEL NAME:	SR230
MANUFACTURER:	Paradox Security Systems
TYPE:	Alarm System
Band number from EC Decision 2017/1483/EU [2]	44a, 45a
TUV NUMBER:	475760
PART NUMBER:	N/A
PCB MARKING	1N00000043F
SERUAL NUMBER	187244
Hardware Version	331-6301-991
Software Version	1.00
Operating Channel (MHz)	433.92
NUMBER OF OPERATING FREQUENCIES	1
Type of Equipment Designation	2
MODULATION TYPE	OOK
Bit Rate	1.67kbps
OCW (kHz)	200
VOLTAGE RATING:	4.5Vdc
EUT SIZE:	Width = 11.5cm Height = 20cm Depth = 4.5cm



Photo 1: EUT – SR230– 433.92MHz

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Photo 2: EUT – SR230– 433.92MHz – PCB



Photo 3: EUT – SR230– 433.92MHz – SN – 1N0000043F



1.5.2 SR230– 868.35MHz

MODEL NAME:	SR230 – 868.35MHz
MANUFACTURER:	Paradox Security Systems
TYPE:	Alarm System
Band number from EC Decision 2017/1483/EU [2]	48
TUV NUMBER:	475760
PART NUMBER:	N/A
PCB MARKING	1N00000043F
SERIAL NUMBER:	204243
Hardware Version	331-6301-991
Software Version	1.00
FREQUENCY (MHz)	433.35
NUMBER OF OPERATING FREQUENCIES	1
MODULATION TYPE	OOK
Bit Rate	1.67kbps
OCW (kHz)	200
VOLTAGE RATING:	4.5Vdc.
EUT SIZE:	Width = 11.5cm Height = 20cm Depth = 4.5cm



Photo 4: EUT – SR230– 868.35MHz

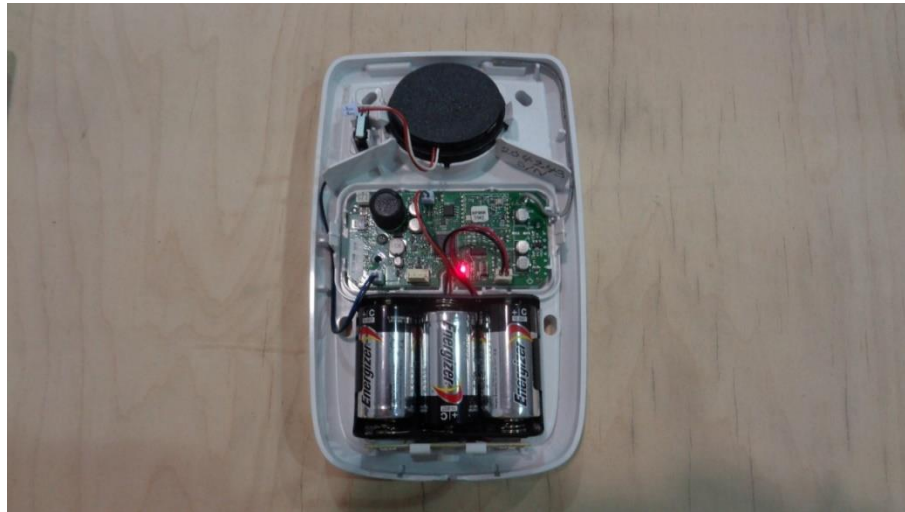


Photo 5: EUT – SR230– 868.35MHz – PCB



Photo 6: EUT – SR230– 868.35MHz – SN – 3B10000478

1.5.1 Antenna Details

MODEL	125-0433-950
MANUFACTURER	Paradox Security Systems
ANTENNA TYPE	Copper conductor (18AWG)
ANTENNA GAIN (dBi)	-2



Photo 7: EUT – SR230– Antenna – Grey Cable

1.5.2 Support Equipment

1.5.2.1 DCTXP2

The DCTXP2 was used in the receiving blocking test. Refer to the setup depicted in [section 2.10](#).

PRODUCT NAME:	DCTXP2
MANUFACTURER:	Paradox Security Systems
Model	DCTXP2
TYPE:	Magnetic door contact (specially modified to testing purposes)
TUV NUMBER:	NA
PART NUMBER:	DCTXP2-G3H
SERIAL NUMBER:	246120
VOLTAGE RATING:	2*AAA(1.5Vdc)
EUT SIZE:	Width = 11.4cm Height = 3.2cm Depth = 2.6cm



Photo 8: Support Equipment – DCTXP2

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1.6 Test Methodology

All measurements contained in this report were conducted with ETSI EN 300 220-1 V3.1.1 (2017-02), Electromagnetic compatibility and Radio spectrum Matters (ERM); Short range devices; Radio equipment to be used in the 25 MHz to 1 GHz frequency range with power levels ranging up to 500mW; Part 1: Technical characteristics and test methods.

For conducted– and radiated– emissions, the equipment under test (EUT) was configured to measure its highest possible emission level. This level was based on the maximized cable configuration from exploratory testing per ANSI C63.4-2014. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

1.7 Modes of Operation

During the EUT was exercised by powering to the rate voltage and connecting according to section Test Detail Section. Table 4 depicts the testing mode of operation dedicated for testing.

Mode No.	Name	Tests Mode(s)	Description
1	Constant Carrier	MOD1	Constant un-modulated signal
2	Pulsed Carrier	MOD2	Intermittent un-modulated signal
3	Constant Preamble	MOD3	Constant modulated signal
4	Tx Range	MOD4	Transmission mode for testing
5	Rx Range	MOD5	Receive mode for testing

Table 4 – EUT Configuration Description

1.8 Performance Criteria

The normal operation of the EUT shall be maintained and without interruption. Parameters measured during testing shall be maintained within specifications corresponding to each subsection of ETSI EN 300 220-2 V3.2.1 (2018-04) (2017-02) and ETSI EN 300 220-2 V3.2.1 (2018-04).

1.9 ENGINEERING COMMENTS

1.9.1 Modifications incorporated in the EUT

No modification was performed on the EUT during testing:

1.10 Deviations from the Standard

No deviations from the applicable test standard were made during testing.



1.11 Measurement Uncertainty

For the test methods, according to ETS EN 300220-1 & 2 standards, the measurement uncertainty figures shall be calculated in accordance with ETR 100028-1[4] and shall correspond to an expansion factor (coverage factor) $K = 1.96$ or $k = 22$ (which provide confidence levels of 95% and 95.45% in case where the distributions characterizing the actual measurement uncertainties are normal (gaussian). Uncertainty values are depicted in Table 5.

Test	Uncertainty
Occupied Channel Bandwidth	$\pm 5\%$
RF Output Power	$\pm 1.5\text{dB}$
All emission <Conducted>	$\pm 6\text{dB}$
All emission <Radiated>	$\pm 6\text{dB}$
Temperature	$\pm 1^\circ\text{C}$
Humidity	$\pm 5\%$
DC and low frequency voltages	$\pm 3\%$
Time	$\pm 5\%$
Duty Cycle	$\pm 5\%$

Table 5 – Maximum Measurement Uncertainty



1.12 Test Location

TÜV SÜD Product Service conducted the following tests at Laval Test Laboratory.

No.	Test Name	Test Specialist
1	Effective radiated power	Jose Martinez-Ortega Abdoulaye Ndiaye
2	Duty Cycle	Jose Martinez-Ortega Abdoulaye Ndiaye
3	Duty Cycle Template	Jose Martinez-Ortega Abdoulaye Ndiaye
4	Occupied Bandwidth	Jose Martinez-Ortega Abdoulaye Ndiaye
5	Tx Out Of Band Emissions	Jose Martinez-Ortega Abdoulaye Ndiaye
6	Tx unwanted emissions in the spurious domain	Jose Martinez-Ortega Abdoulaye Ndiaye
7	Rx unwanted emissions in the spurious domain	Jose Martinez-Ortega Abdoulaye Ndiaye
8	TX behaviour under Low Voltage Conditions	Jose Martinez-Ortega Abdoulaye Ndiaye
9	Blocking	Jose Martinez-Ortega Abdoulaye Ndiaye

Table 6 Tests location

Office Address:

2972, Joseph-A-Bombardier
Laval, Quebec, H7P 6E3
Canada
Tel: 450-687-4976



2 RADIO TESTING

2.1 Effective Radiated Power (ERP)

2.1.1 Test Details

REFERENCE	Clause 5.2.2 of ETSI EN 300 220-1 V3.1.1 (2017-02)
STANDARD	Clause 5.2.2.1 of ETSI EN 300 220-2 V3.2.1 (2018-04)

SPECIFICATIONS

RBW (kHz)	200
VBW (kHz)	500
SPAN(MHz)	1
Frequency	433.92MHz 868.35MHz
Installation	Tabletop Equipment
Limits	See Table 7

EUTs

Identification	SR230– 433.92MHz SR230– 868.35MHz
Test Mode	Mode #1 in Table 4 .
Voltage Input	4.5Vdc

ENVIROMENTAL & TEST INFO

Test Date (YYYY-MM-DD)	2020-02-17
Temperature °C (For Info Only)	23.2
Humidity %(For Info Only)	20
Atmospheric Pressure kPa (For Info Only)	102
Engineer	Jose Martinez Ortega
Client Witness	No witness

2.1.2 Limits

The effective radiate power shall not be greater than the value allowed Annex B in EN 300 220-2 for the chosen operation frequency band(s). The harmonized frequency bands and the specification for non-specific short-range devices are depicted in Table 7.

SDR Classification <Note 1>	Frequency Band (MHz)	Maximum Effective Radiate Power (mW)
H	433.050 to 434.790	10
M	868.000 to 868.600	25
Note 1. See page 22 in Annex B in EN 300 220-2 V3.2.1 (2018-04)		

Table 7 – ERP – Limits

2.1.3 Test Setup

The conducted measurement procedure is referred in Clause 5.2.2.1 of ETSI EN 300 220-1 V3.1.1. The measurement was performed in mode No. 3 (see [Table 4](#)). The test setup picture is illustrated in Photo 9.



Photo 9: Setup – ERP – SR230 – 433/868



2.1.4 Test Results

Test result are summarized in Table 8 below.

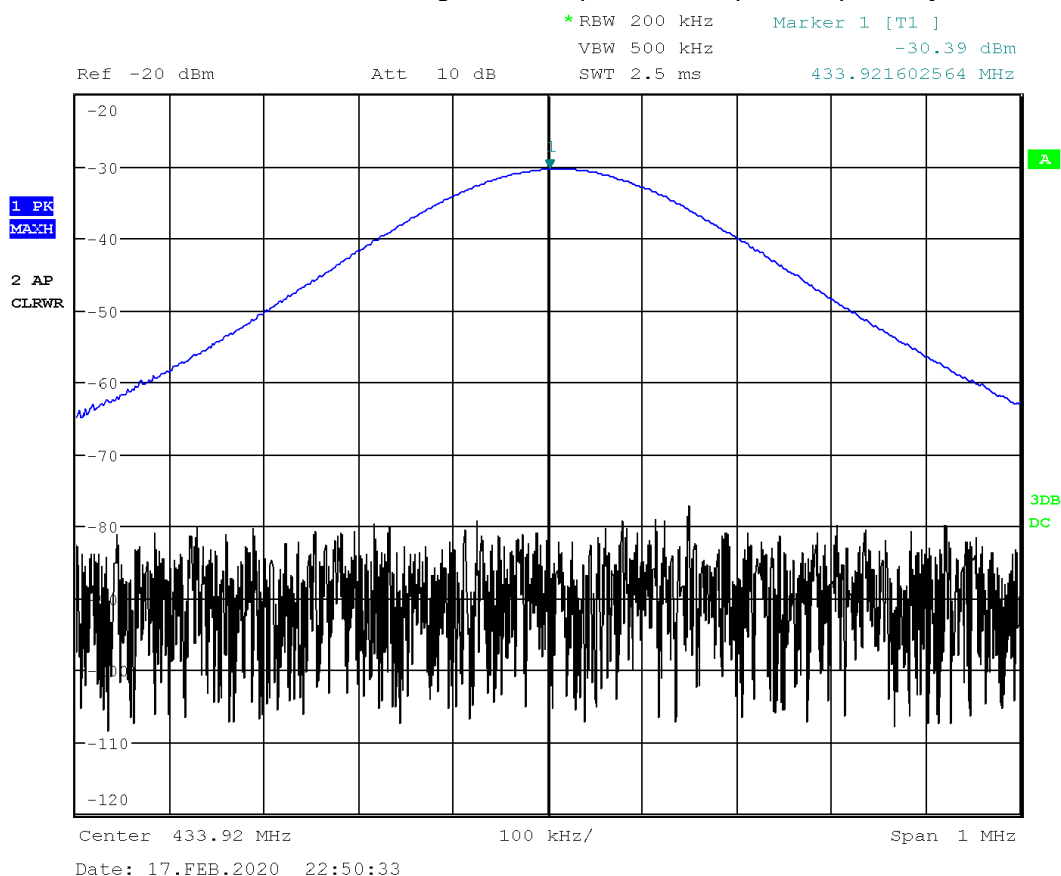
SRD Classification <Note 1>	SR230 Model	External Attenuation (dB)	SA - Reading (dB)	ERP dBm(mW)	Limit (mW)	Result
H	433.92MHz	40	-30.39	9.61(9.14)	10	Pass
M	868.35MHz	40	-28.08	1.92(15.56)	25	Pass

Note 1. According to Annex B in ETSI EN 300 220-1 V3.1.1 (2018-04)

Table 8 – ERP – Test Results – SR230

2.1.5 Test Data

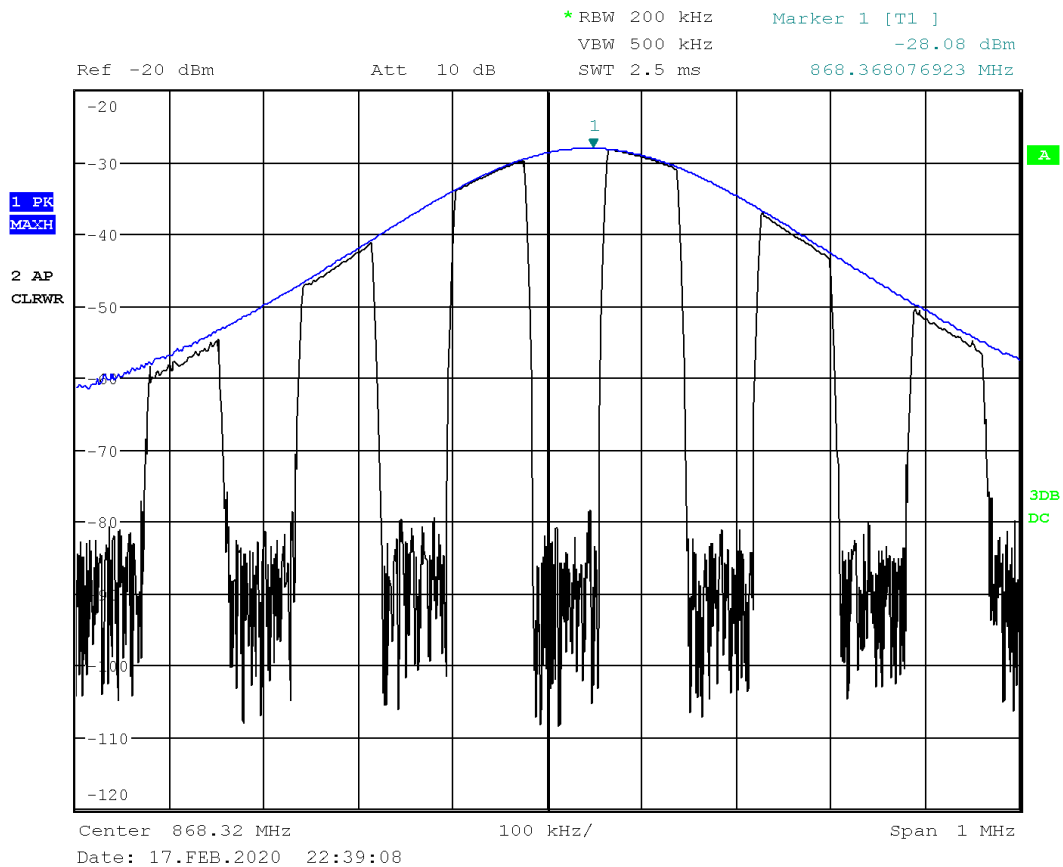
Test data recorded, with the environmental conditions given in [section 2.1.1](#), for SR230–433.92MHz and SR230–868.35MHz are given in Graph 1 and Graph 2, respectively.



Graph 1 : ERP – SR230 – 433.92MHz

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Graph 2 : ERP – SR230 – 868.35MHz

2.1.6 Test Method

Tests were conducted according to the method of the reference standard mentioned in [section 2.1.1](#).

2.1.7 Test Location and Test Equipment Used

Test location was TUV Laval office. Instrumentation used is depicted in Table

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due (YYY-MM-DD)
Cable 160 in SMA to N	FLORIDA RF LABS	Lab-Flex 335	4138	NA	NCR
Variable Attenuator Rotary Attenuator	ETLS System	VAT02BXP-4242	N/A	NA	NCR
Spectrum Analyzer	Rohde & Schwarz	ESU-40	4092	12	2020-06-06
Attenuator 10 dB	Narda	4779-10	4096	NCR	NCR

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Table 9 Inside the Designed Band Test Equipment

2.2 Duty Cycle

2.2.1 Test Details

REFERENCE Clause 4.3.3. of ETSI EN 300 220-1 V3.1.1 (2017-02)
STANDARD Clause 5.5 of ETSI EN 300 220-2 V3.2.1 (2018-04)

SPECIFICATIONS

Operating Frequency 433.92MHz
868.35MHz

Observation Time (h) 1

SPAN (Hz) 0

Detector Max Peak

Trace Max Hold

Sweep(s) 3600

T_{obs}(h) 1

EUT

Identification SR230(433.92MHz & 868.35MHz)

Voltage Input Battery Powered
+4.5Vdc

Test Mode Mode #1 in [Table 4.](#)

ENVIROMENTAL & TEST INFO

Test Date
(YYYY-MM-DD) 2020-02-18

Temperature
°C (For Info Only) 23

Humidity
%(For Info Only) 30

Atmospheric Pressure
kPa (For Info Only) 101.5

Engineer Jose Martinez Ortega

Client Witness No witness

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2.2.2 Limits

The duty cycle shall not be greater than the value allowed Annex B in EN 300 220-2 V3.2.1 (2018-04) for the chosen operation frequency band(s). The harmonized frequency bands for SR230 are depicted in Table 10.

SRD Classification <Note 1>	Frequency Band (MHz)	Duty Cycle (%)
H	433.050 – 434.790	10
M	863 – 870	1

Note 1. According to Annex B of EN 300 220-2 V3.2.1 (2018-04)

Table 10 – Duty Cycle – Limits

2.2.3 Test Setup Diagram

During testing the EUT was installed according to Figure 1.

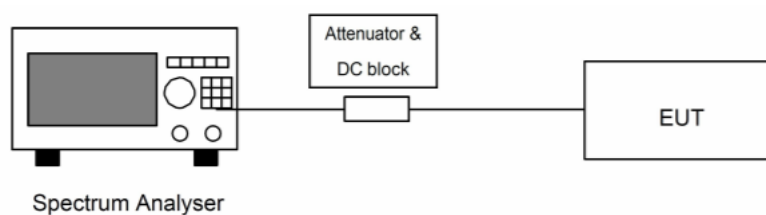


Figure 1: EUT – Setup Diagram – Conducted Measurements

2.2.4 Test Results

Values of Table 11 are in accordance with Graph 3 and 4. The duty cycle measured for SR230 models are depicted in Table 11 below.

Frequency (MHz)	T _{obs} (s)	T ₁ (s)	T ₂ (s)	T _{on} <T ₂ -T ₁ > (s)	NP	Duty Cycle <NP×T _{on} /T _{obs} > (%)	Limit <Note 1> (%)	Result
433.92	3600	1375.72	1381.52	5.8	2	0.3	10	Pass
868.35		100.84	108.04	72	3	0.6	1	Pass

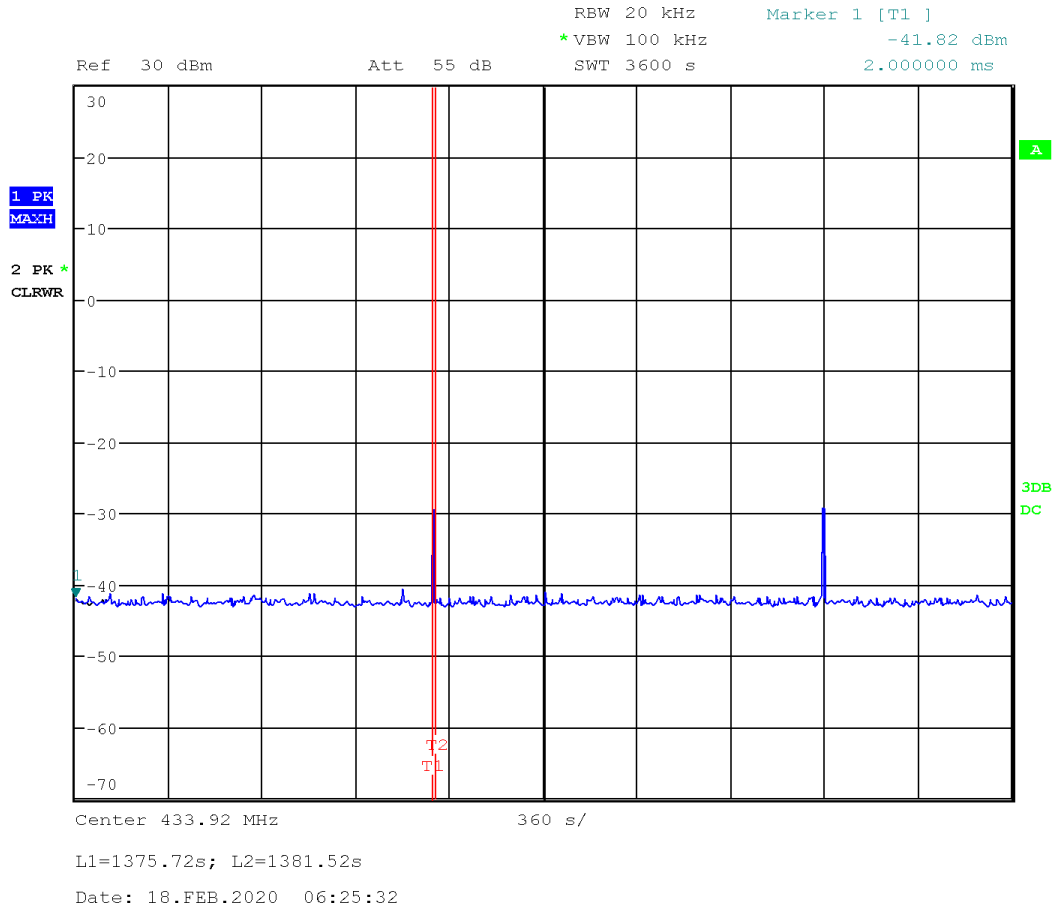
NP. Number of Pulses
T_{obs}. The observation period =1h.
Note 1. According to Annex B in EN 300 220-2 V3.2.1 (2018-04)

Table 11: T₁ & T₂ Measurements – Duty Cycle – SR230



2.2.5 Test Data

2.2.5.1 Model – 433.92MHz



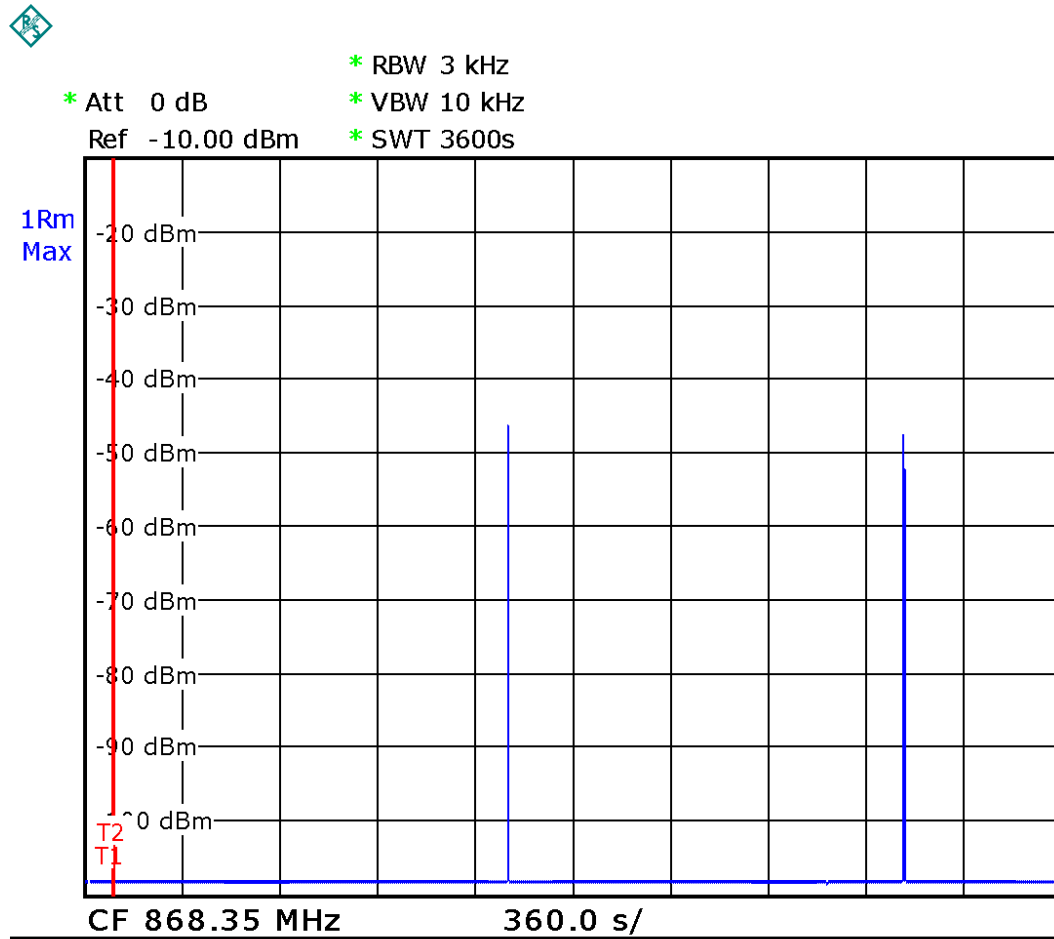
Graph 3 : T₁ & T₂ of Duty Cycle – SR230 – 433.92MHz

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2.2.5.1 Model 868.35MHz



T1=100.84s; T2=108.04s

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Graph 4 : T₁ & T₂ of Duty Cycle – SR230 – 868.35MHz

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2.2.6 Test Method

Tests were conducted according to the method of the reference standards mentioned in [Section 2.2.1](#).

2.2.7 Test Location and Test Equipment Used

This test was carried out in Laval test location.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due (YYY-MM-DD)
Cable 160 in SMA to N	FLORIDA RF LABS	Lab-Flex 335	4138	NA	NCR
Variable Attenuator Rotary Attenuator	ETLS System	VAT02BXP-4242	N/A	NA	NCR
Spectrum Analyzer	Rohde & Schwarz	ESU-40	4092	12	2020-06-06
Spectrum Analyzer	Rohde & Schwarz	FSL6	4095	24	2020-09-02
Attenuator 10 dB	Narda	4779-10	4096	NCR	NCR

Table 12 Throughput – Test Equipment



2.3 Duty Cycle Template (DCT)

2.3.1 Test Details

REFERENCE STANDARD Clause 5.5 of ETSI EN 300 220-1 V3.2.1 (2017-04)

SPECIFICATIONS

Operating Frequency	433.92MHz 868.35MHz
RBW(kHz)	3
VBW(kHz)	10
Span(Hz)	0
Trace	Clear White
T_{obs}(s)	1

EUT

Identification	SR230 – 433.92MHz SR230 – 868.35MHz
Voltage Input	Battery Powered +4.5Vdc
Test Mode	Mode #1 in Table 4 .

ENVIROMENTAL & TEST INFO

Test Date (YYYY-MM-DD)	2020-02-27
Temperature °C (For Info Only)	23
Humidity %(For Info Only)	30
Atmospheric Pressure kPa (For Info Only)	101.5
Engineer	Jose Martinez Ortega
Client Witness	No witness



2.3.2 Test Setup Diagram

During testing the EUT was installed according to Figure 2.



Figure 2: EUT – Setup Diagram – DCT Conducted Measurements

2.3.3 Test Results

The accumulative DCT template was measured for SR230 models as depicted in Graphs 5 – 8 depicted in Table 13 below.

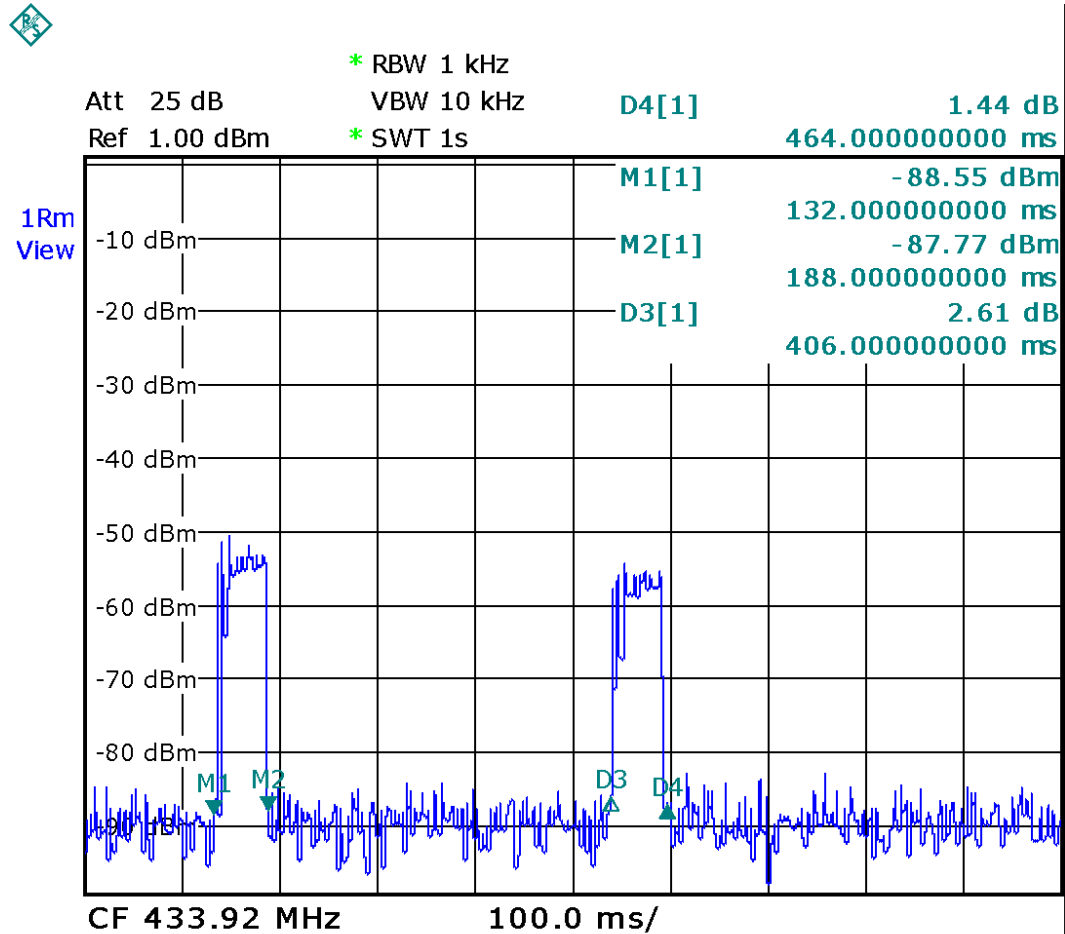
Frequency (MHz)	(T _{on}) ₁ M ₂ -M ₁ (ms)	(T ₁) ₁ D ₃ -M ₂ (ms)	(T _{on}) ₂ D ₃ -D ₄ (ms)	(T ₁) ₂ D ₃ -M ₂ (ms)	(T _{on}) _{Acc} (T _{on}) ₁ +(T _{on}) ₂ (ms)	(T) _{Acc} (T ₁) ₁ +(T ₁) ₂ (ms)	DCT (T _{on}) _{Acc} /(T) _{Acc} <Note 1>	Limit	Result
433.92	56 <Note 1>	218 <Note 1>	50 <Note 2>	746 <Note 2>	106	964	11.0%	<Note 5>	Pass
868.35	52 <Note 3>	168 <Note 3>	56 <Note 4>	584 <Note 4>	108	752	14.4%		Pass
Note 1. See Graph 5									
Note 2. See Graph 6									
Note 3. See Graph 7									
Note 4. See Graph 8									
Note 5. No requirement for these two-frequency bands according to any of the Annex of ETSI EN 300 220-2 (2018-04).									

Table 13: Test Results – DCT – SR230



2.3.4 Test Data

2.3.4.1 433.92MHz



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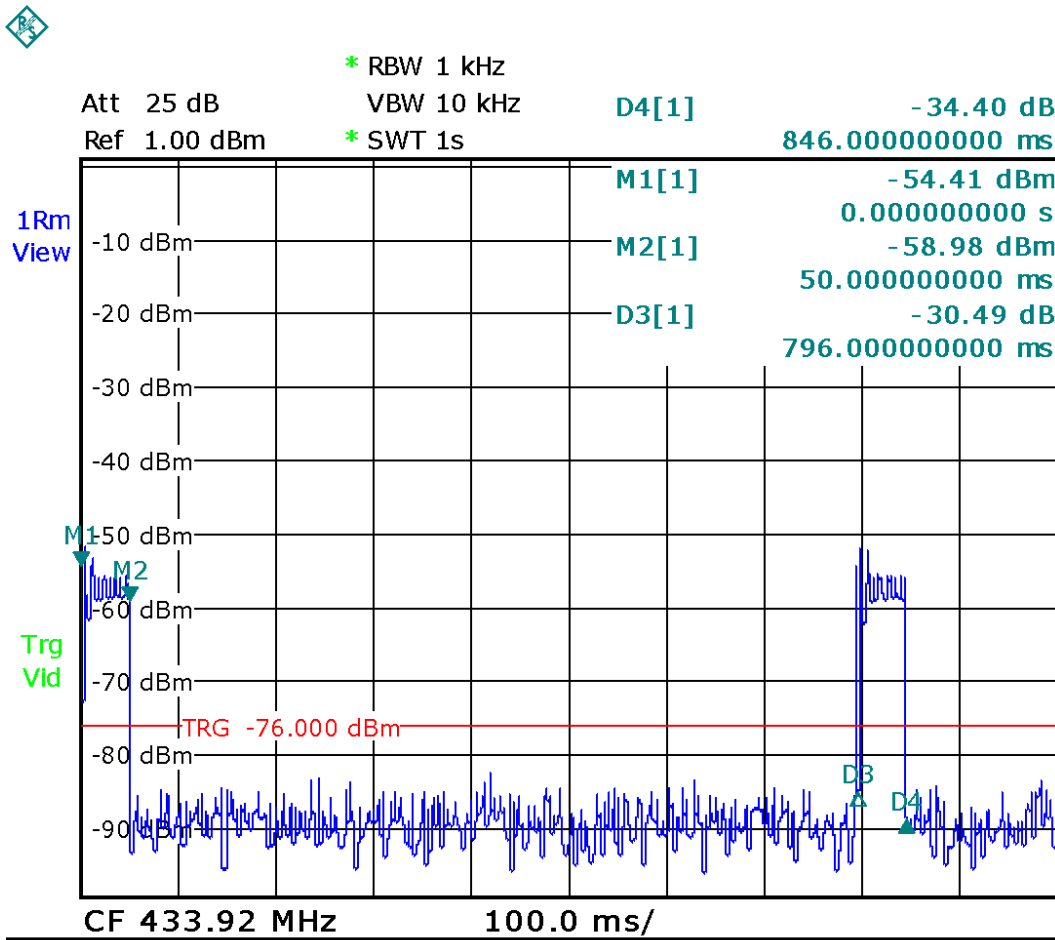
Graph 5 : DCT – T₁ – SR230 – 433.92MHz

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Graph 6 : DCT – (T₁)₂ – SR230 – 433.92MHz

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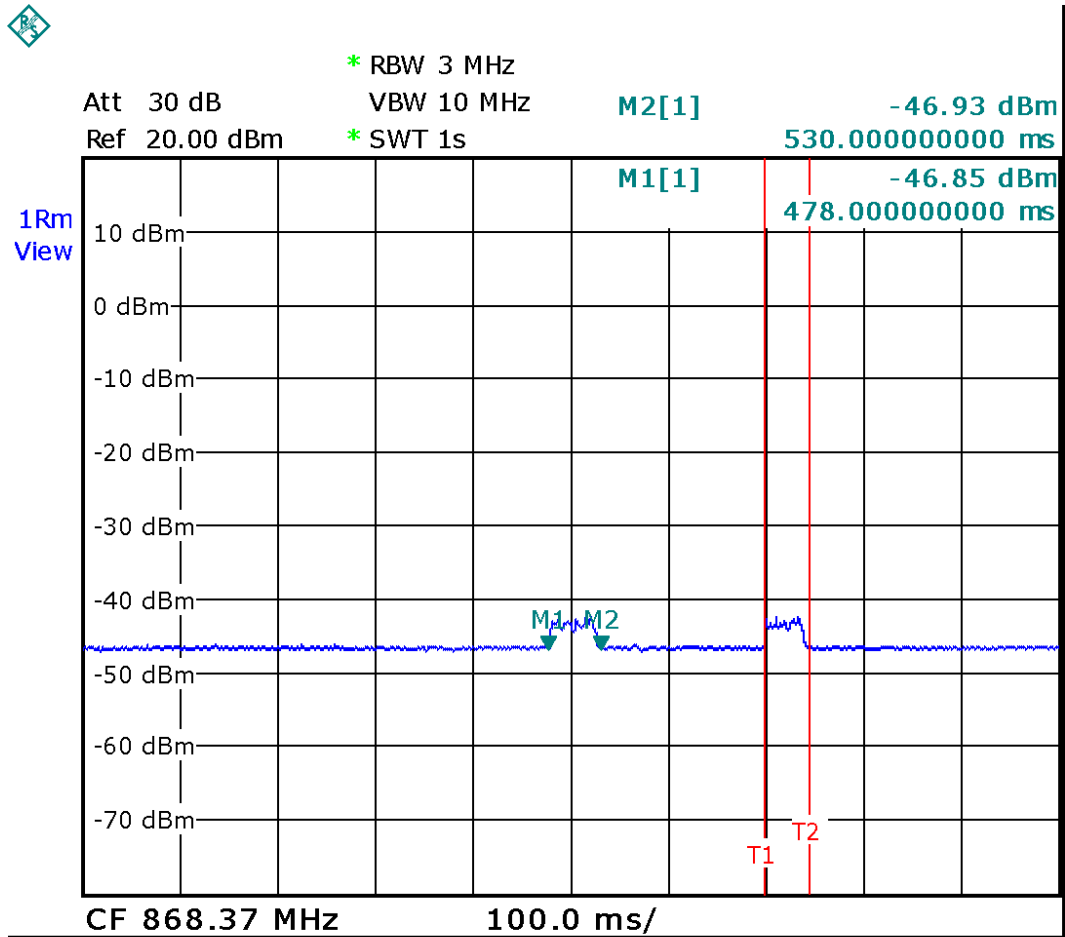
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2.3.4.1 868.35MHz



T1=698ms;T2=744ms

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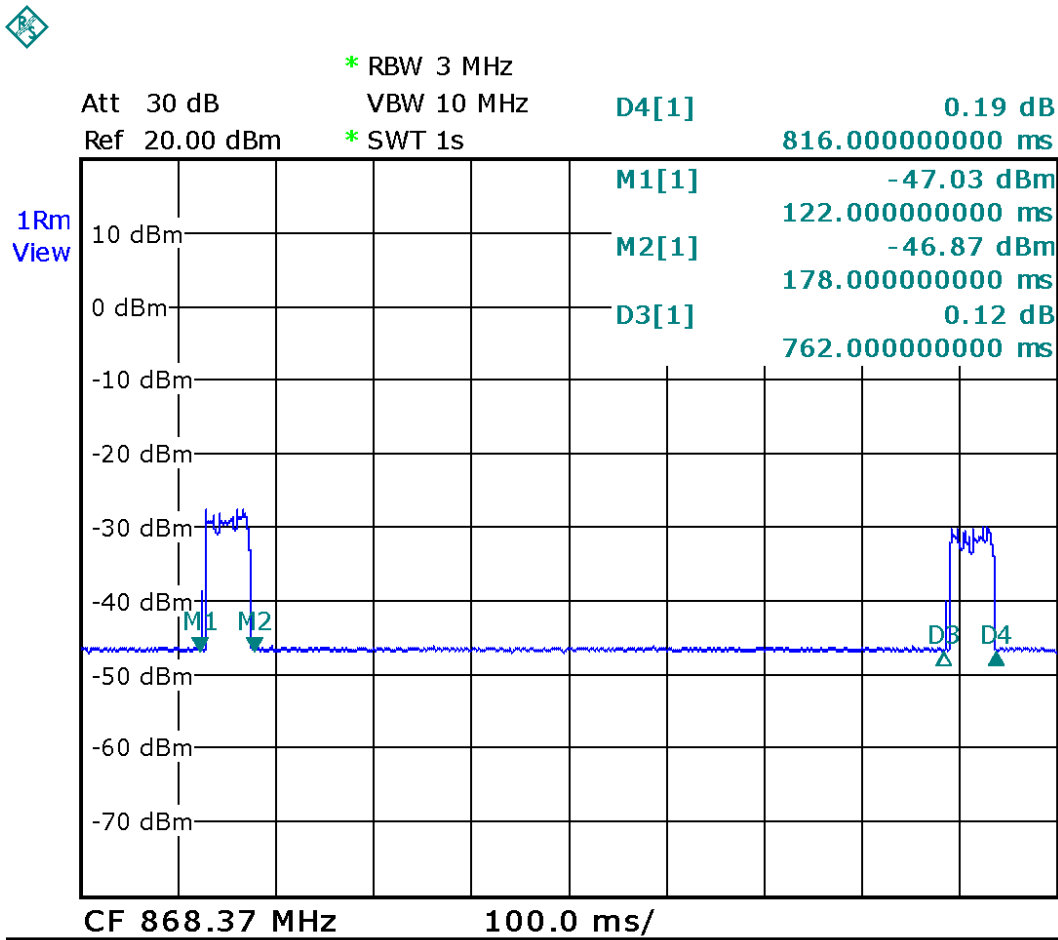
Graph 7 : DCT – T₁ – SR230 – 868.35MHz

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Graph 8 : (T_{on})₂ – SR230 – 868.35MHz

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2.3.5 Test Method

Tests were conducted according to the method of the reference standards in [section 2.3.1](#).

2.3.6 Test Location and Test Equipment Used

This test was carried out in Laval test location.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due (YYY-MM-DD)
Log Periodic Antenna	Electro-Metrics	LPA-25	4087	12	2020/11/29
Signal Generator	ROHDE & SCHWARZ	SMB100A	4135	12	2020/08/23
Cable 160 in SMA to N	FLORIDA RF LABS	Lab-Flex 335	4138	NA	NCR
Variable Attenuator Rotary Attenuator	ETLS System	VAT02BXP-4242	N/A	NA	NCR

Table 14 Throughput – Test Equipment



2.4 Occupied Bandwidth

2.4.1 Test Details

REFERENCE	Clause 5.6 of ETSI EN 300 220-1 V3.1.1 (2017-02)
STANDARD	Clause 4.3.4 of ETSI EN 300 200-2 V3.2.0 (2018-04)

SPECIFICATIONS

Frequency	433.92MHz 868.35MHz
RBW	(1.5% OCW) = 0.15x200=30kHz
VBW	3xRBW~100kHz
Spam	2xOCW = 400kHz
Detector	RMS
Trace	Max hold
RTSA – Function	Channel Bandwidth

EUTs

Identification	SR230– 433.92MHz SR230– 868.35MHz
Voltage Input	Battery Power 4.5Vdc
Test Mode	Mode #3 in Table 4 .

ENVIROMENTAL & TEST INFO

Test Date (YYYY-MM-DD)	2020-03-16
Temperature °C (For Info Only)	23
Humidity %(For Info Only)	11.4
Atmospheric Pressure kPa (For Info Only)	103.4
Engineer	Jose Martinez Ortega
Client Witness	No witness



2.4.2 Limits

The OBW shall be in accordance value allowed in Annex B in EN 300 220-1 for the chosen operation frequency band(s). The harmonized frequency bands and the specification for non specific SDR are depicted in Table 15.

SRD Classification <Note 1>	Frequency Band (MHz)	Limit (MHz)	OBW (%)
H	433.050 – 434.790	1.74	99
M	868.00 – 868.600	0.6	
Note 1. According to Appendix B in ETSI EN 300 220-1 V3.1.1 (2018-04)			

Table 15 – OBW – Limits

2.4.3 Test Procedure

The conducted measurement procedure in clause 5.6.3.4 of ETSI EN 300 220-1 V3.1.1. was used. The measurement was performed during continuously transmitting and mode no. 3 as depicted in [Table 4](#).

2.4.4 Test Procedure

The test setup was identical as depicted in [Section 2.1.3](#)

2.4.5 Test Results

Test results are summarized in Table 16 below.

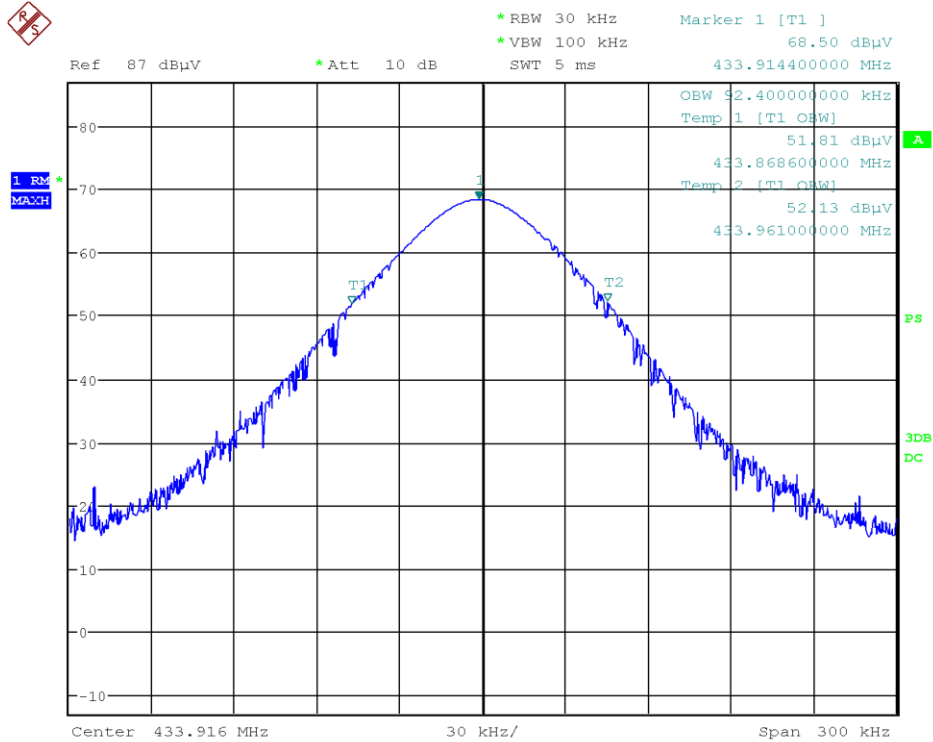
SRD Classification Reference	Operating Frequency (MHz)	OBW (kHz)	Limit (MHz)	Result
H Appendix B <Note 1>	433.92	92.4	1.74	Pass
M Appendix B <Note 1>	868.35	91.2	0.6	Pass
Note 1. See page 22 of ETSI EN 300 220-1 V3.1.1 (2018-04)				

Table 16 – OBW – Results – SR230



2.4.6 Test Data

2.4.6.1 Model – 433.92MHz



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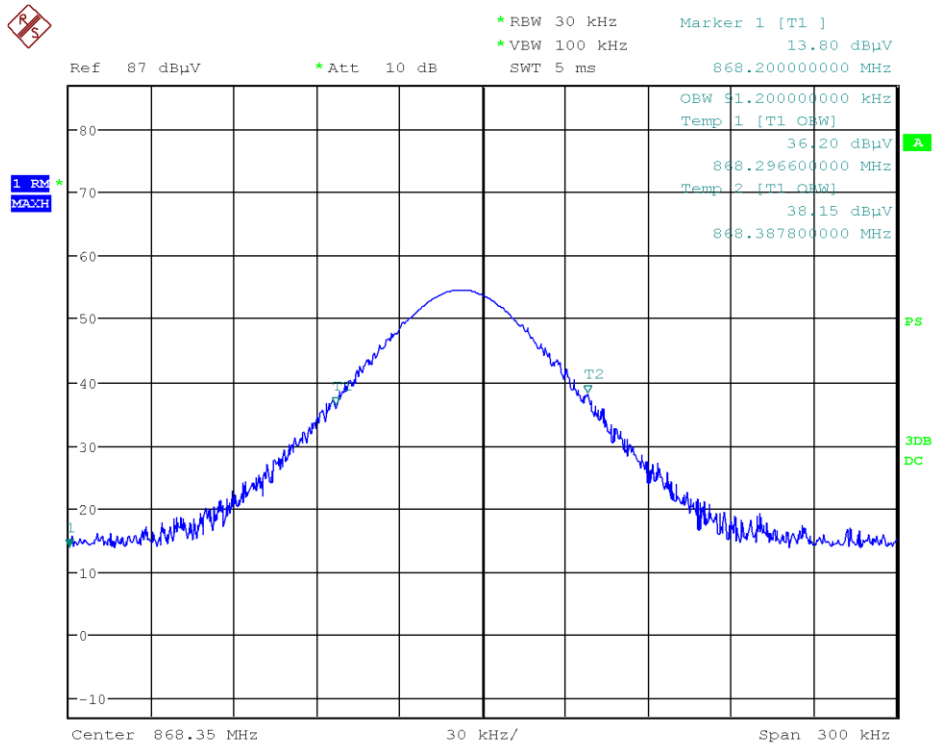
Graph 9 : OBW – SR230 – 433.92MHz

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2.4.6.2 Model 868.35MHz



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Graph 10 : OBW – SR230 – 868.35MHz

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2.4.7 Test Method

Tests were conducted according to the method of the reference standards mentioned in [Section 2.2.1](#).

2.4.8 Test Location and Test Equipment Used

This test was carried out in Laval test location.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due (YYY-MM-DD)
Cable 160 in SMA to N	FLORIDA RF LABS	Lab-Flex 335	4138	NA	NCR
Variable Attenuator Rotary Attenuator	ETLS System	VAT02BXP-4242	N/A	NA	NCR
Spectrum Analyzer	Rohde & Schwarz	ESU-40	4092	12	2020-06-06
Spectrum Analyzer	Rohde & Schwarz	FSL6	4095	24	2020-09-02

Table 17 Throughput – Test Equipment



2.5 Tx OOB Emissions

2.5.1 Test Details

REFERENCE	Clause 5.8 of ETSI EN 300 220-1 V3.1.1 (2017-02)
STANDARD	Clause 4.3.5 of ETSI EN 300 220 V3.2.1 (2018-04)

SPECIFICATIONS

Operating Frequencies	433.92
(MHz)	868.35
Limits	See Figure 3 & Figure 4 .
RBW	See Table 18
Spam	See Figure 3 & Figure 4 .
Detector	RMS

EUTs

Identification	SR230– 433.92MHz SR230– 868.35MHz
Voltage Input	4.5Vdc

ENVIROMENTAL & TEST INFO

Test Date (YYYY-MM-DD)	2020-03-12
Temperature °C (For Info Only)	23
Humidity %(For Info Only)	12
Atmospheric Pressure kPa (For Info Only)	103.4
Engineer	Jose Martinez Ortega
Client Witness	No witness

2.5.2 Limits

Limits of OOB domains are defined, one for Operating Channel (see Figure 3) and one for Operational Frequency band (see Figure 4).

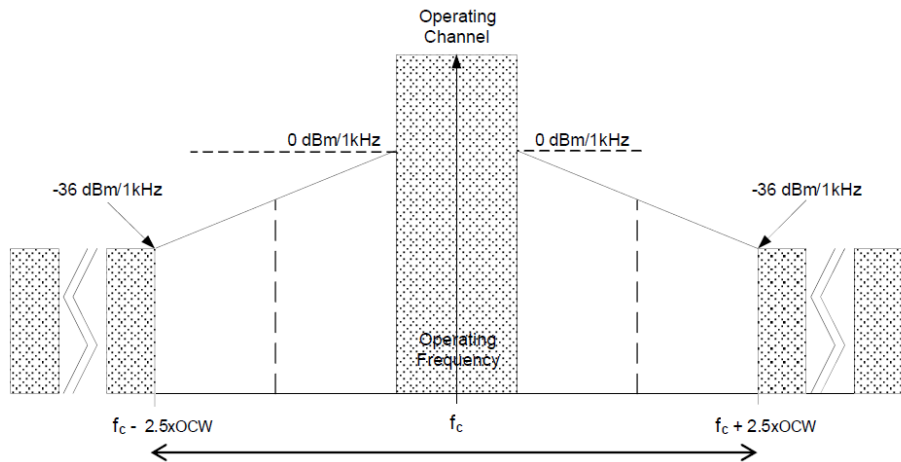


Figure 3: EUT – OOB Limits – Operating Channel with respect to RBW

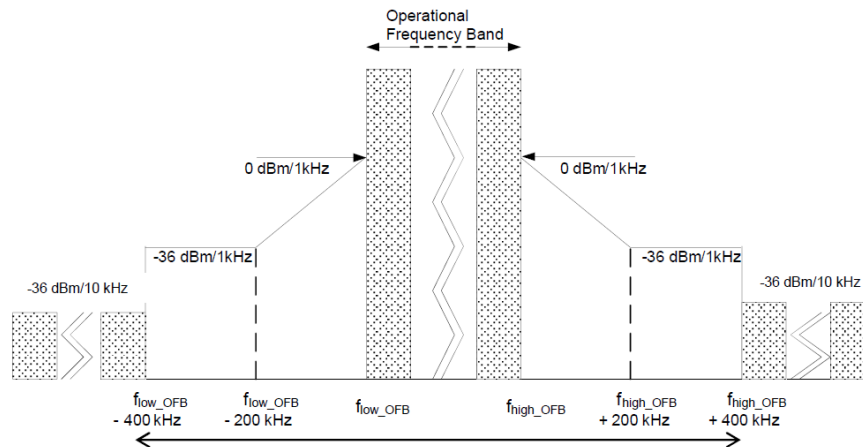


Figure 4: EUT – OOB Limits – Operating Frequency Band with respect to RBW



2.5.3 Test Results

2.5.3.1 Model – 433.92MHz

Domain	Frequency Range	RBW _{REF}	Max power limit	Result
OOB limits applicable to Operational Frequency Band (See Figure 4)	$f \leq f_{\text{low_OFB}} - 400 \text{ kHz}$	10 kHz	-36 dBm	Pass
	$f_{\text{low_OFB}} - 400 \text{ kHz} \leq f \leq f_{\text{low_OFB}} - 200 \text{ kHz}$	1 kHz	-36 dBm	Pass
	$f_{\text{low}} - 200 \text{ kHz} \leq f < f_{\text{low_OFB}}$	1 kHz	See Figure 4	Pass
	$f = f_{\text{low_OFB}}$	1 kHz	0 dBm	Pass
	$f = f_{\text{high_OFB}}$	1 kHz	0 dBm	Pass
	$f_{\text{high_OFB}} < f \leq f_{\text{high_OFB}} + 200 \text{ kHz}$	1 kHz	See Figure 4	Pass
	$f_{\text{high_OFB}} + 200 \text{ kHz} \leq f \leq f_{\text{high_OFB}} + 400 \text{ kHz}$	1 kHz	-36 dBm	Pass
	$f_{\text{high_OFB}} + 400 \text{ kHz} \leq f$	10 kHz	-36 dBm	Pass
OOB limits applicable to Operating Channel (See Figure 3)	$f = f_c - 2.5 \times \text{OCW}$	1 kHz	-36 dBm	Pass
	$f_c - 2.5 \times \text{OCW} \leq f \leq f_c - 0.5 \times \text{OCW}$	1 kHz	See Figure 3	Pass
	$f = f_c - 0.5 \times \text{OCW}$	1 kHz	0 dBm	Pass
	$f = f_c + 0.5 \times \text{OCW}$	1 kHz	0 dBm	Pass
	$f_c + 0.5 \times \text{OCW} \leq f \leq f_c + 2.5 \times \text{OCW}$	1 kHz	See Figure 3	Pass
	$f = f_c + 2.5 \times \text{OCW}$	1 kHz	-36 dBm	Pass
f is the measurement frequency. f_c is the Operating Frequency = 433.92MHz $f_{\text{low_OFB}}$ is the lower edge of the Operational Frequency Band. See Graph 9 T1= 433.869MHz $f_{\text{high_OFB}}$ is the upper edge of the Operational Frequency Band. See to Graph 9; T2 = 433.961MHz				

Table 18 – OBB – Results – 433.92MHz



2.5.3.1 Model – 868.35MHz

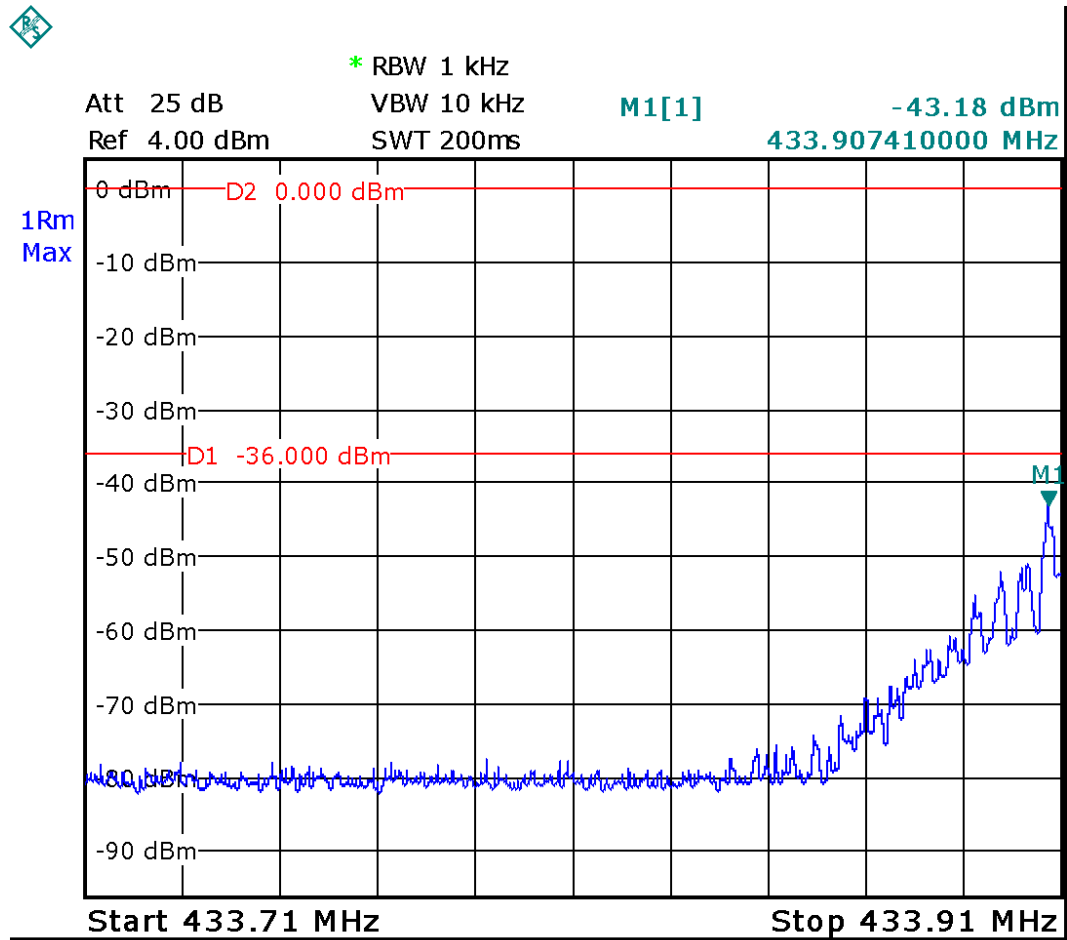
Domain	Frequency Range	RBW _{REF}	Max power limit	Result
OOB limits applicable to Operational Frequency Band (See Figure 4)	$f \leq f_{\text{low_OFB}} - 400 \text{ kHz}$	10 kHz	-36 dBm	Pass
	$f_{\text{low_OFB}} - 400 \text{ kHz} \leq f \leq f_{\text{low_OFB}} - 200 \text{ kHz}$	1 kHz	-36 dBm	Pass
	$f_{\text{low}} - 200 \text{ kHz} \leq f < f_{\text{low_OFB}}$	1 kHz	See Figure	Pass
	$f = f_{\text{low_OFB}}$	1 kHz	0 dBm	Pass
	$f = f_{\text{high_OFB}}$	1 kHz	0 dBm	Pass
	$f_{\text{high_OFB}} < f \leq f_{\text{high_OFB}} + 200 \text{ kHz}$	1 kHz	See Figure	Pass
	$f_{\text{high_OFB}} + 200 \text{ kHz} \leq f \leq f_{\text{high_OFB}} + 400 \text{ kHz}$	1 kHz	-36 dBm	Pass
	$f_{\text{high_OFB}} + 400 \text{ kHz} \leq f$	10 kHz	-36 dBm	Pass
OOB limits applicable to Operating Channel (See Figure 3)	$f = f_c - 2.5 \times \text{OCW}$	1 kHz	-36 dBm	Pass
	$f_c - 2.5 \times \text{OCW} \leq f \leq f_c - 0.5 \times \text{OCW}$	1 kHz	See Figure	Pass
	$f = f_c - 0.5 \times \text{OCW}$	1 kHz	0 dBm	Pass
	$f = f_c + 0.5 \times \text{OCW}$	1 kHz	0 dBm	Pass
	$f_c + 0.5 \times \text{OCW} \leq f \leq f_c + 2.5 \times \text{OCW}$	1 kHz	See Figure	Pass
	$f = f_c + 2.5 \times \text{OCW}$	1 kHz	-36 dBm	Pass
f is the measurement frequency. f_c is the Operating Frequency = 868.35MHz $f_{\text{low_OFB}}$ is the lower edge of the Operational Frequency Band. See Graph 10; T1 = 868.30MHz $f_{\text{high_OFB}}$ is the upper edge of the Operational Frequency Band. See Graph 10; T2 = 868.388MHz				

Table 19 – OBB – Results – 868.35MHz



2.5.4 Test Data

2.5.4.1 Model – 433.92MHz



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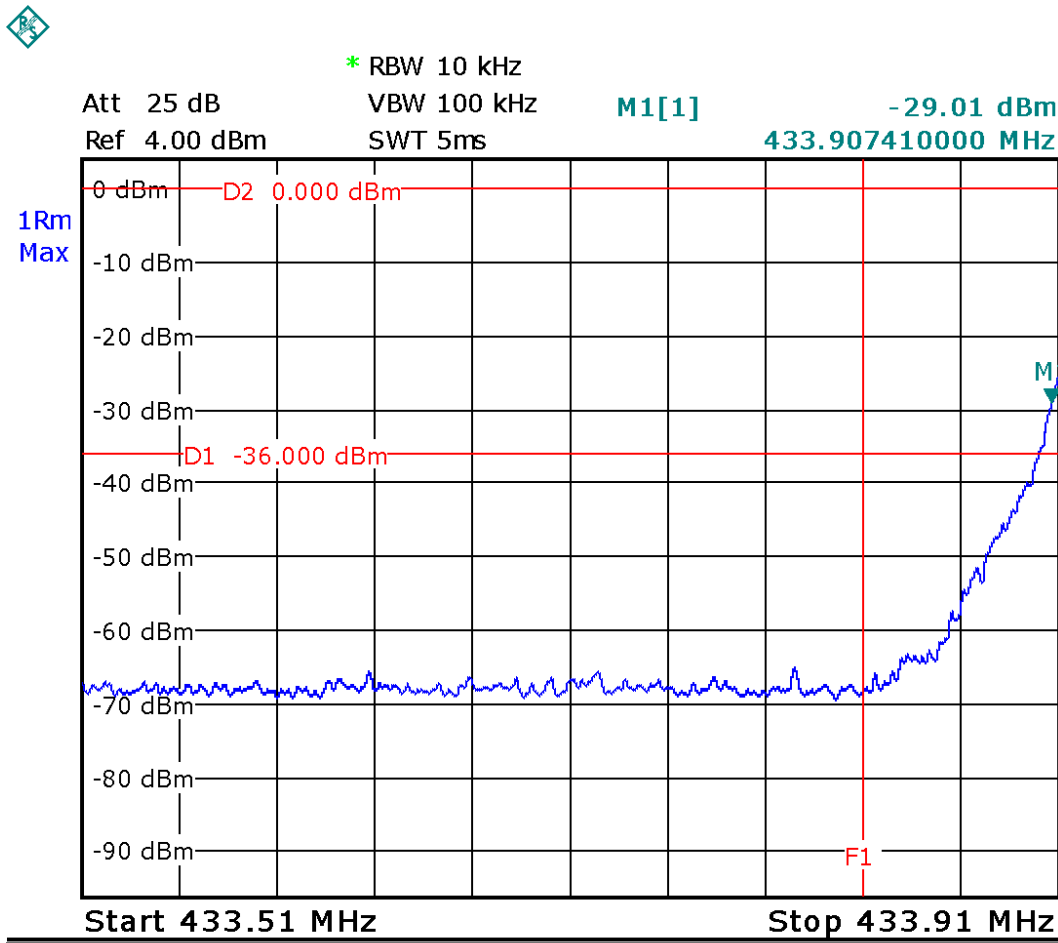
Graph 11 : OOB – Lower Band – RBW =1kHz – SR230 – 433.92MHz

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F1=433.83 MHz

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Graph 12 : OOB – Lower Band – RBW =10kHz – SR230 – 433.92MHz

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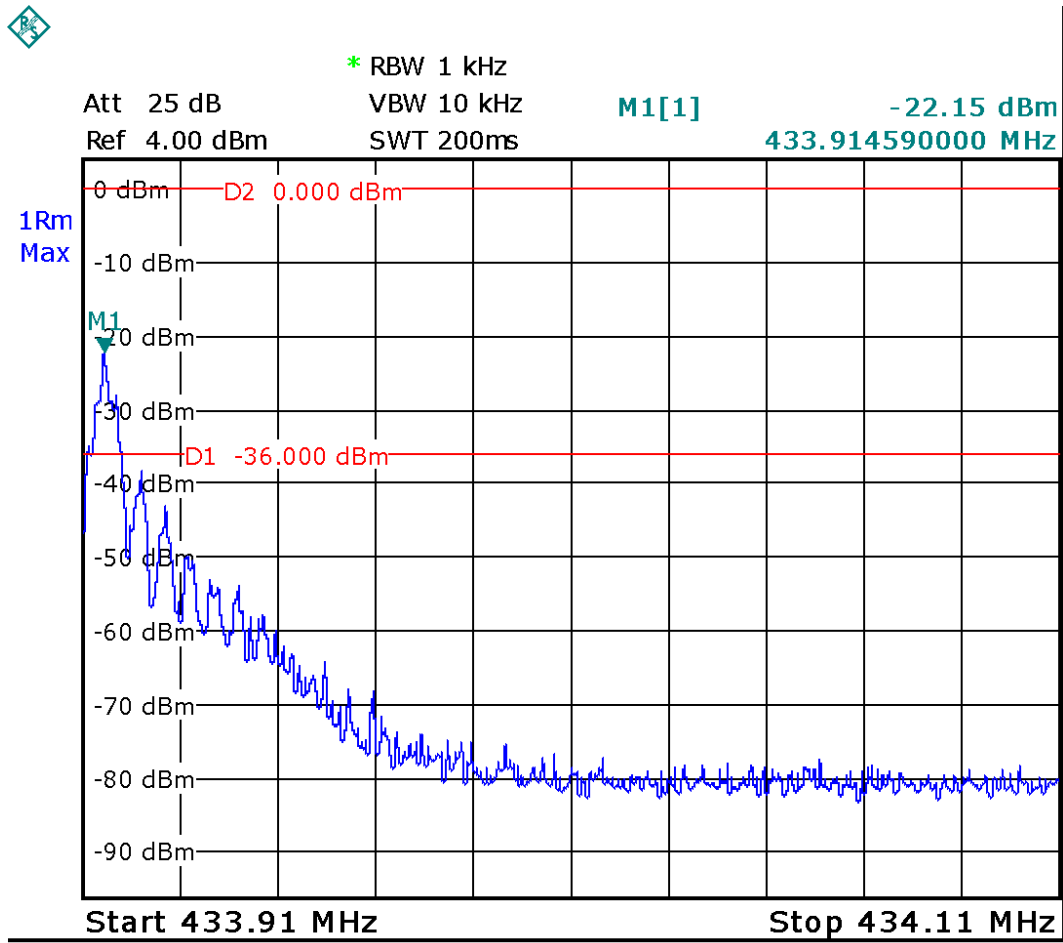
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Graph 13 : OOB – High Band – RBW =1kHz – SR230 – 433.92MHz

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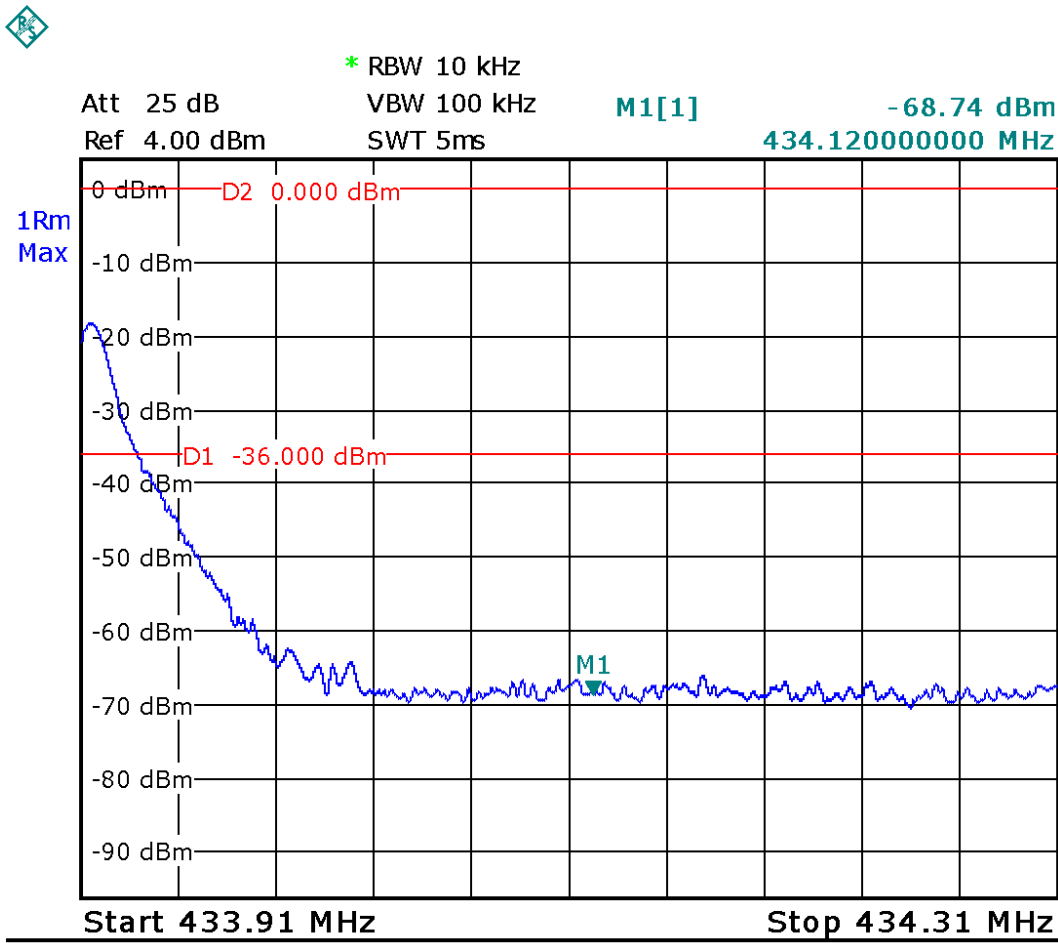
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Graph 14 : OOB – High Band – RBW =10KHz – SR230 – 433.92MHz

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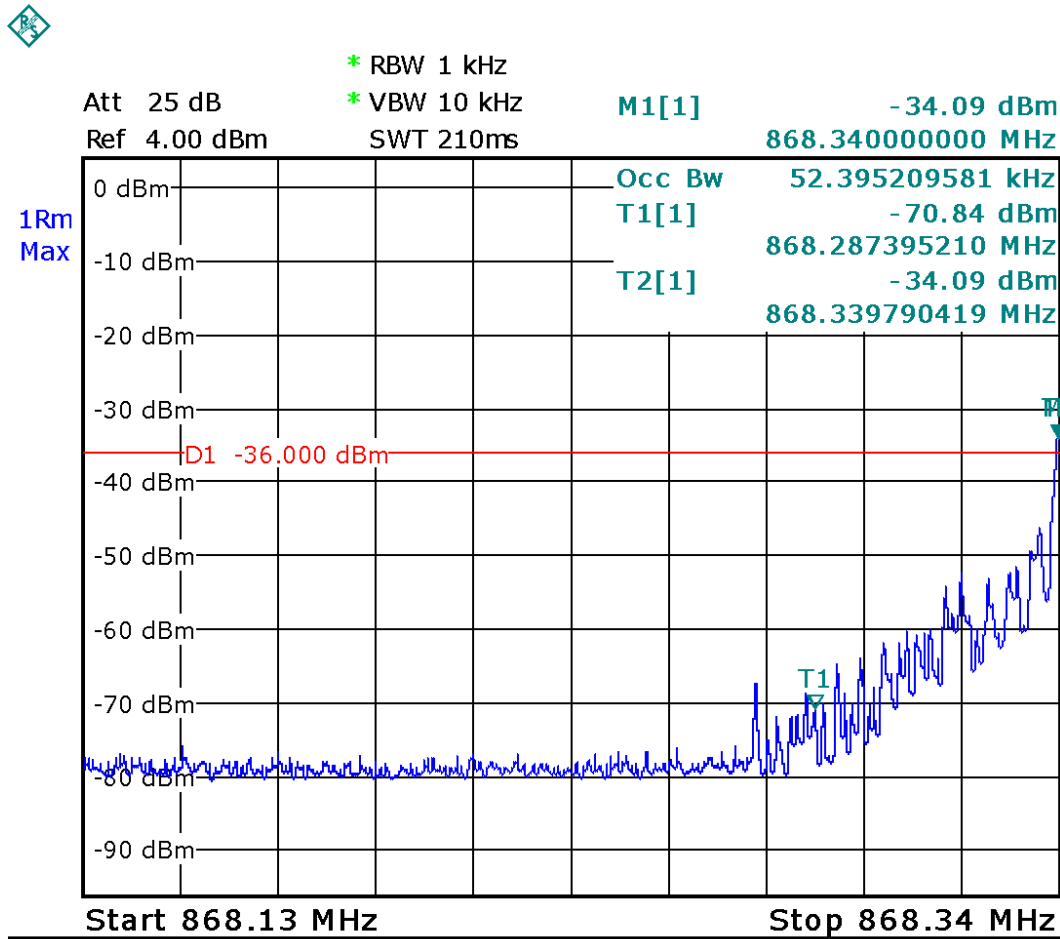
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2.5.4.2 Model – 868.35MHz



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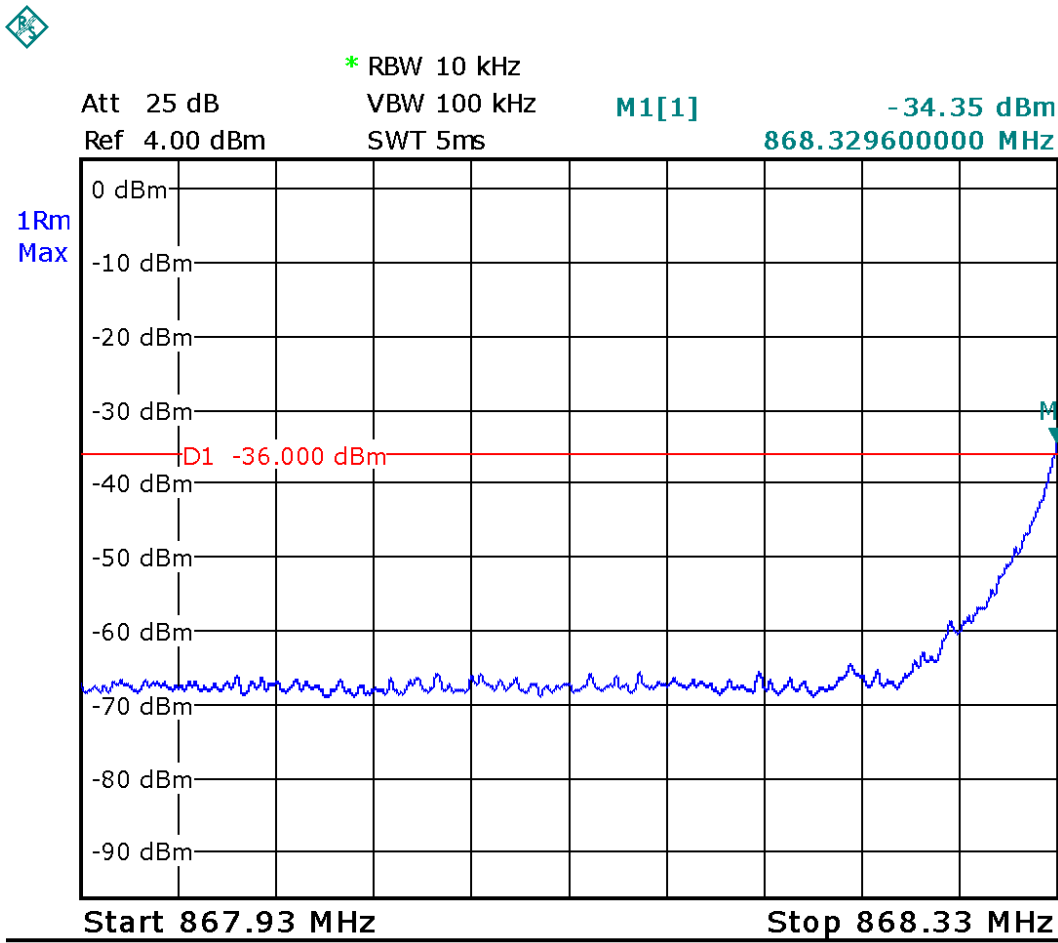
Graph 15 : OOB – Lower Band – RBW=1kHz – SR230 – 868.35MHz

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Graph 16 : OOB – Lower Band – RBW=10kHz – SR230 – 868.35MHz

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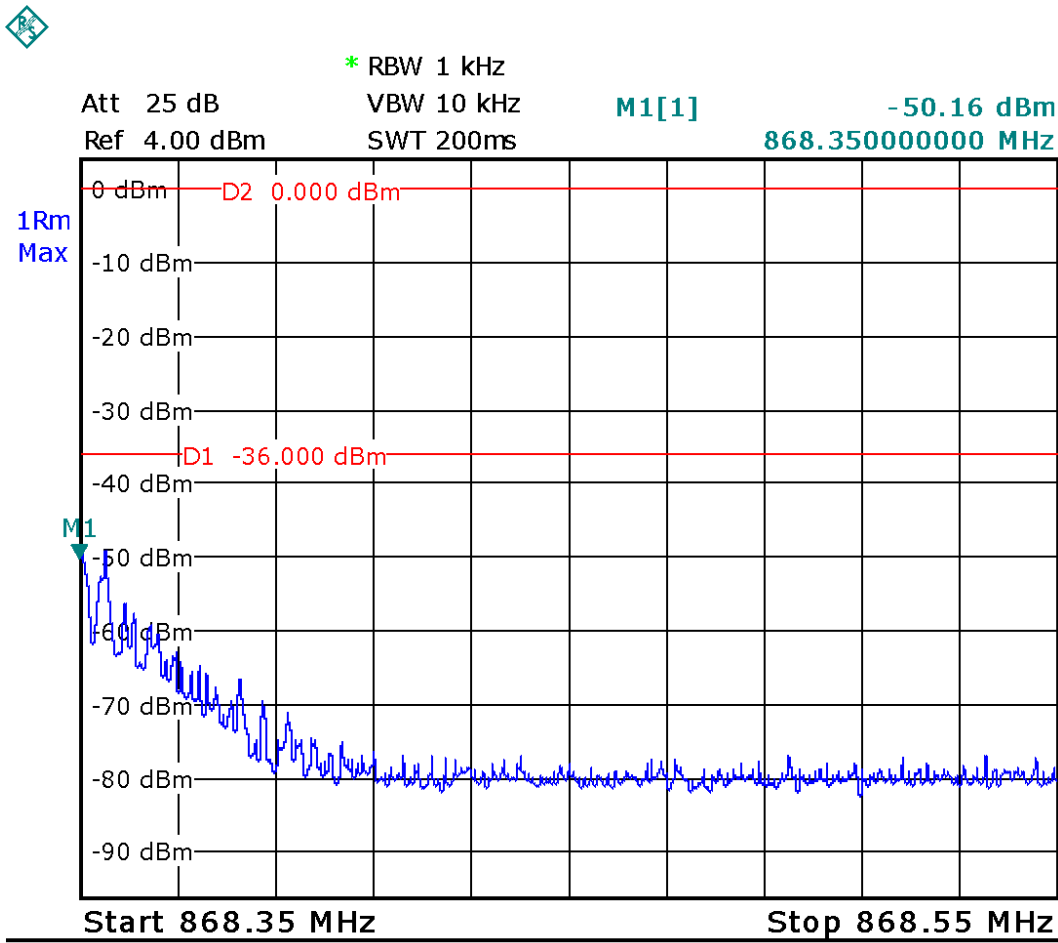
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Graph 17 : OOB – High Band – RBW=1kHz – SR230 – 868.35MHz

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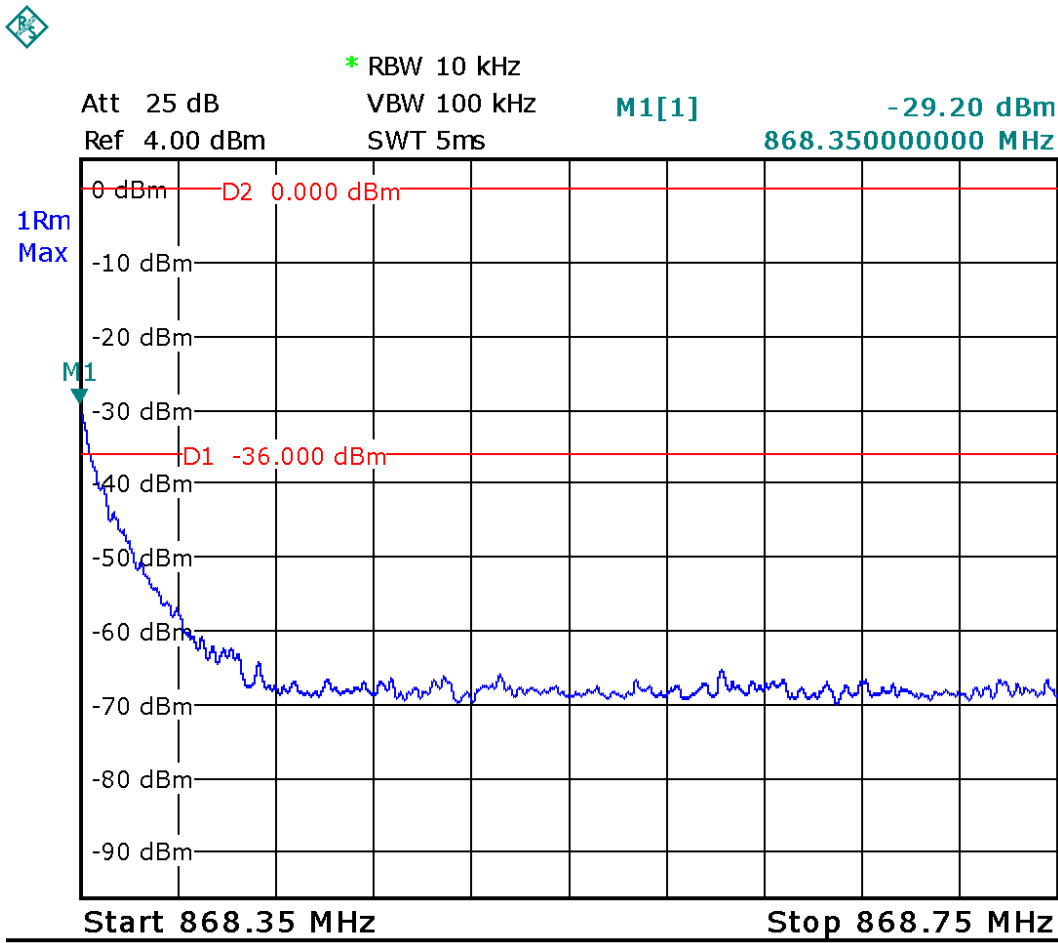
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Graph 18 : OOB – High Band – RBW=10kHz – SR230 – 868.35MHz

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2.5.1 Setup Diagram

The test setup was identical as depicted in [Section 2.1.3](#)

2.5.2 Test Method

Tests were conducted according to the method of the reference standards referred in [Section 2.5.1](#).

2.5.3 Test Location and Test Equipment Used

This test was carried out in Laval test location.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due (YYY-MM-DD)
Spectrum Analyzer	Rohde & Schwarz	FSL6	4095	24	2020-09-02
Cable 160 in SMA to N	FLORIDA RF LABS	Lab-Flex 335	4138	NA	NCR
Variable Attenuator Rotary Attenuator	ETLS System	VAT02BXP-4242	N/A	NA	NCR

Table 20 Interference Outside the Assigned Band – Test Equipment



2.6 Tx– & Rx– unwanted Spurious Emissions

2.6.1 Test Details

SPECIFICATION REFERENCE Clause 5.9.1.2 of ETSI EN 300 220-1 V3.2.1 (2017-02)

SPECIFICATIONS

Frequency 433.92MHz
868.35MHz
Limits See [Table 21](#)

EUTs

Identification SR230– 433.92MHz
SR230– 868.35MHz
Voltage Input 4.5Vdc

Test Mode Mode #5 in [Table 4](#).

ENVIROMENTAL & TEST INFO

Test Date
(YYYY-MM-DD) 2020-02-11

Temperature
°C (For Info Only) 23

Humidity
%(For Info Only) 14

Atmospheric Pressure
kPa (For Info Only) 103.4

Engineer Jose Martinez-Ortega

Client Witness No witness



2.6.1 Limits

The power of any unwanted emission in the spurious domain shall not exceed the values given in Table 19.

Table 19: 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

Table 21 Tx/Rx Spurious – Emission Limits

2.6.2 Test Results

2.6.2.1 Tx Spurious Emissions

Frequency (MHz)	Detector	Polarization	Limit(s) (dBm)	Results
25 – 30	RMS	N/A	-36	Pass
30 – 1000	RMS	Horizontal	Tx mode in Table 20	Pass
		Vertical		Pass
1 000 – 6000	RMS	Horizontal	-30	Pass
		Vertical		Pass

Table 22 Tx Spurious – Results – SR433.92MHz

Frequency (MHz)	Detector	Polarization	Limit(s) (dBm)	Results
25 – 30	RMS	N/A	-36	Pass
30 – 1000	RMS	Horizontal	Tx mode in Table 20	Pass
		Vertical		Pass
1 000 – 6000	RMS	Horizontal	-30	Pass
		Vertical		Pass

Table 23 Tx Spurious – Results – SR868.35MHz

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2.6.1 Rx Spurious Emissions

Frequency (MHz)	Detector	Limit(s) (dBm)	Results
25 – 1000	RMS	-57	Pass
1000 – 4000	RMS	-47	Pass

Table 24 Rx Spurious – Results – SR433.92MHz

Frequency (MHz)	Detector	Limit(s) (dBm)	Results
25 – 1000	RMS	-57	Pass
1000 – 4000	RMS	-47	Pass

Table 25 Rx Spurious – Results – SR868.35MHz



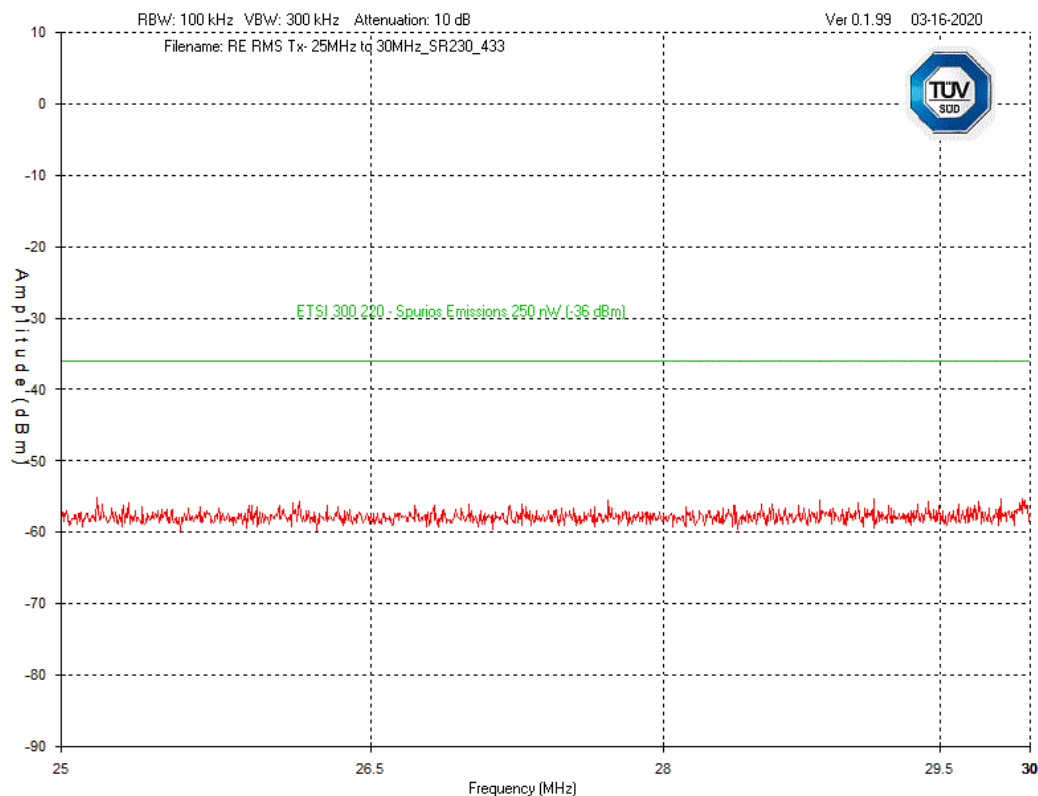
2.6.2 Test Data

2.6.2.1 Tx Spurious Emissions

The graphs shown below are maximized peak measurement graphs measured with a resolution bandwidth greater than or equal to the final required detector over a full 0-360°. This peaking process is done as a worst-case measurement and enables the detection of frequencies of concern for final measurement. For final measurements with the appropriate detector, where applicable, please refer to the tables under Final Measurements.

Worst-case scenario of measurements are given in [Appendix B](#)

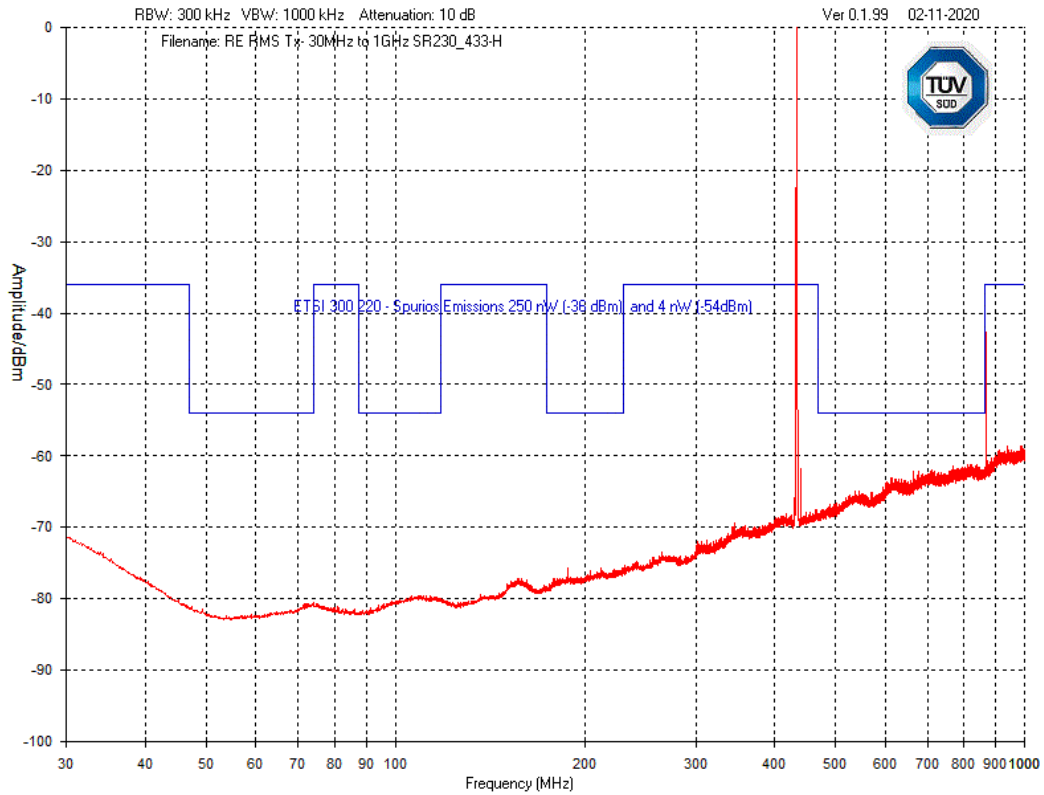
I. SR230-433.92MHz – Model



Graph 19 : Tx Spurious Emissions – 25MHz to 30MHz

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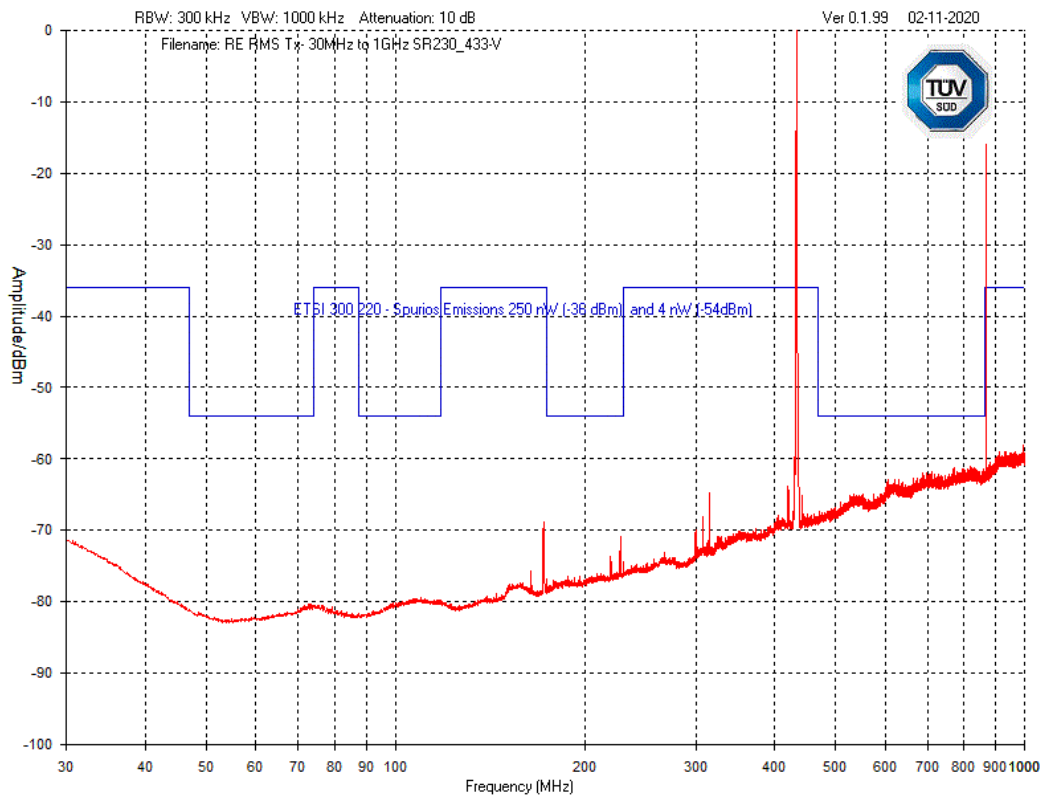
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Graph 20 : Tx Spurious Emissions – 30MHz to 1GHz – Horizontal Polarization

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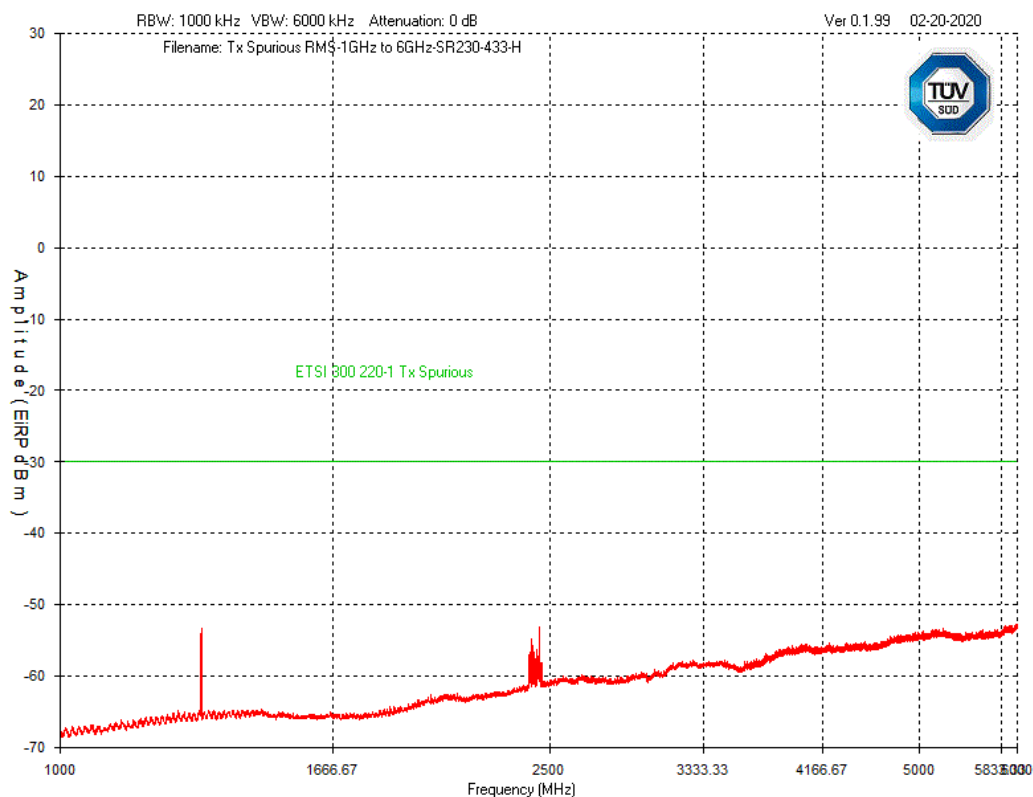
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Graph 21 : Tx Spurious Emissions – 30MHz to 1GHz – Vertical Polarization



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Graph 22 : Tx Spurious Emissions – 1GHz to 6GHz – Horizontal Polarization

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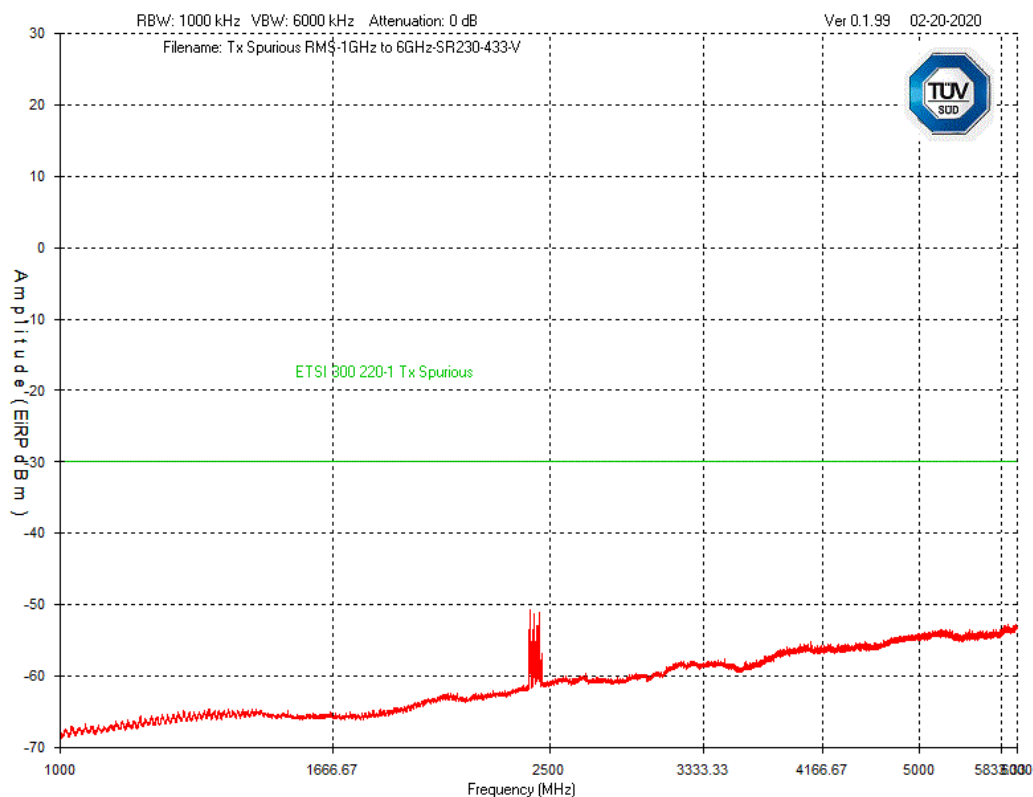
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Graph 23 : Tx Spurious Emissions – 1GHz to 6GHz – Vertical Polarization

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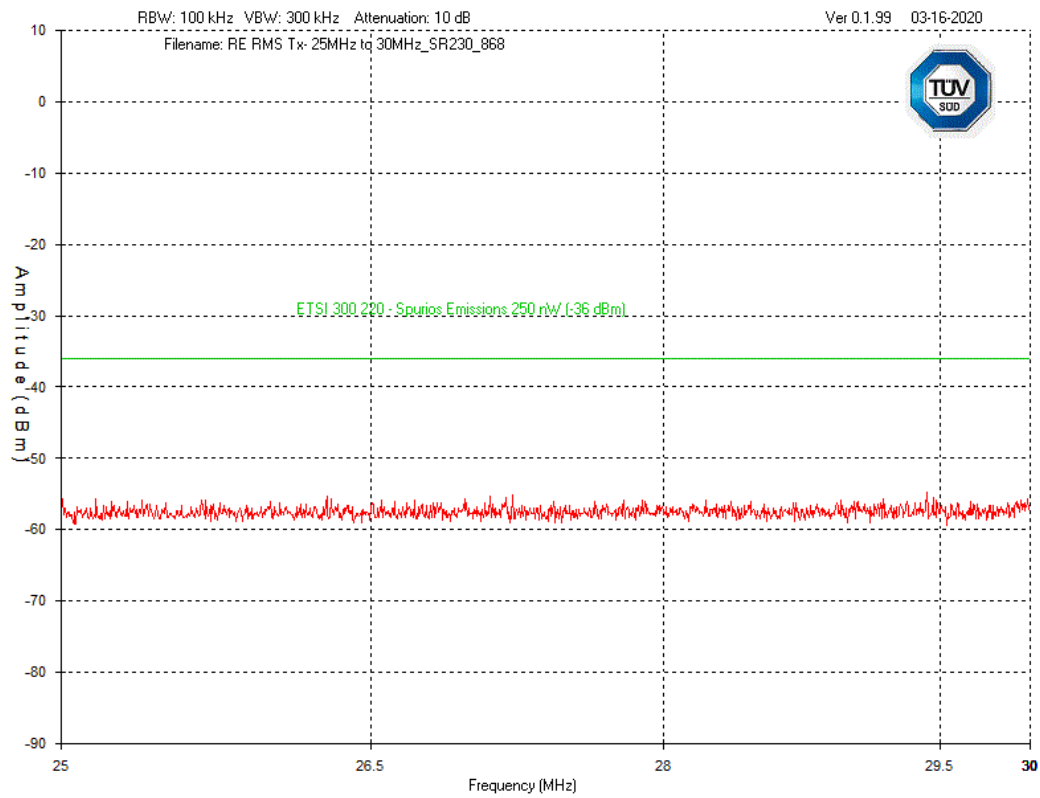
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II. SR230-868.35MHz – Model



Tx Spurious Emissions – 25MHz to 30MHz

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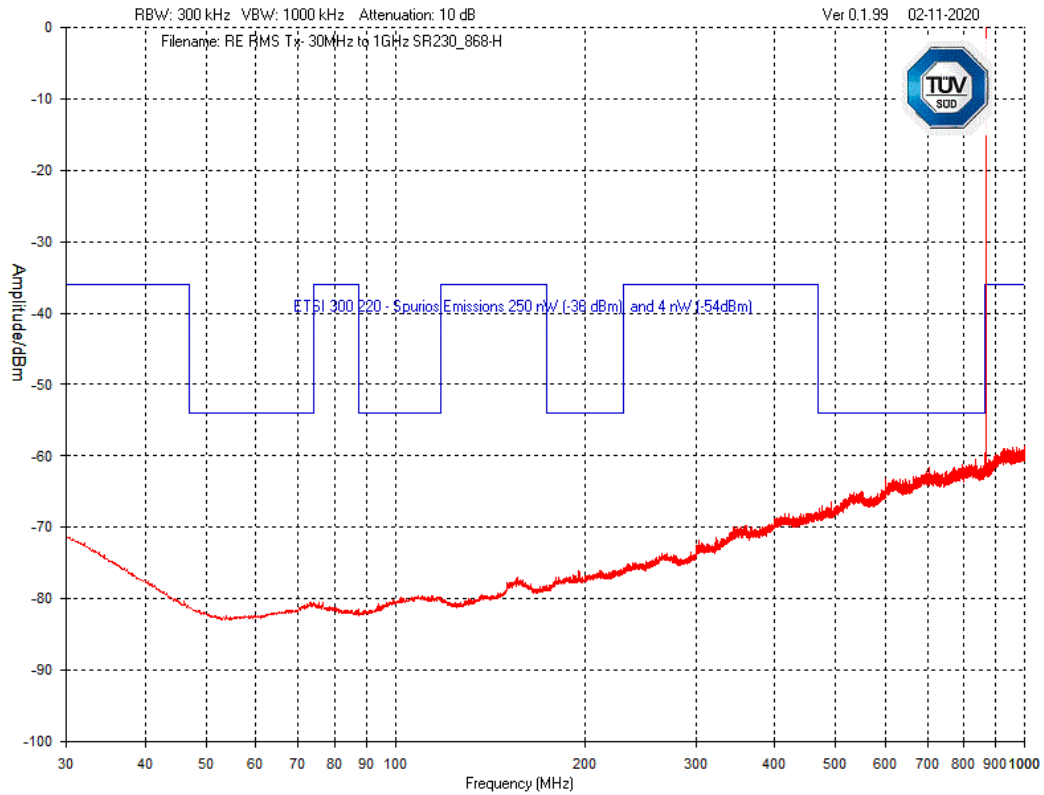
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Graph 24 : Tx Spurious Emissions – 30MHz to 1GHz – Horizontal Polarization

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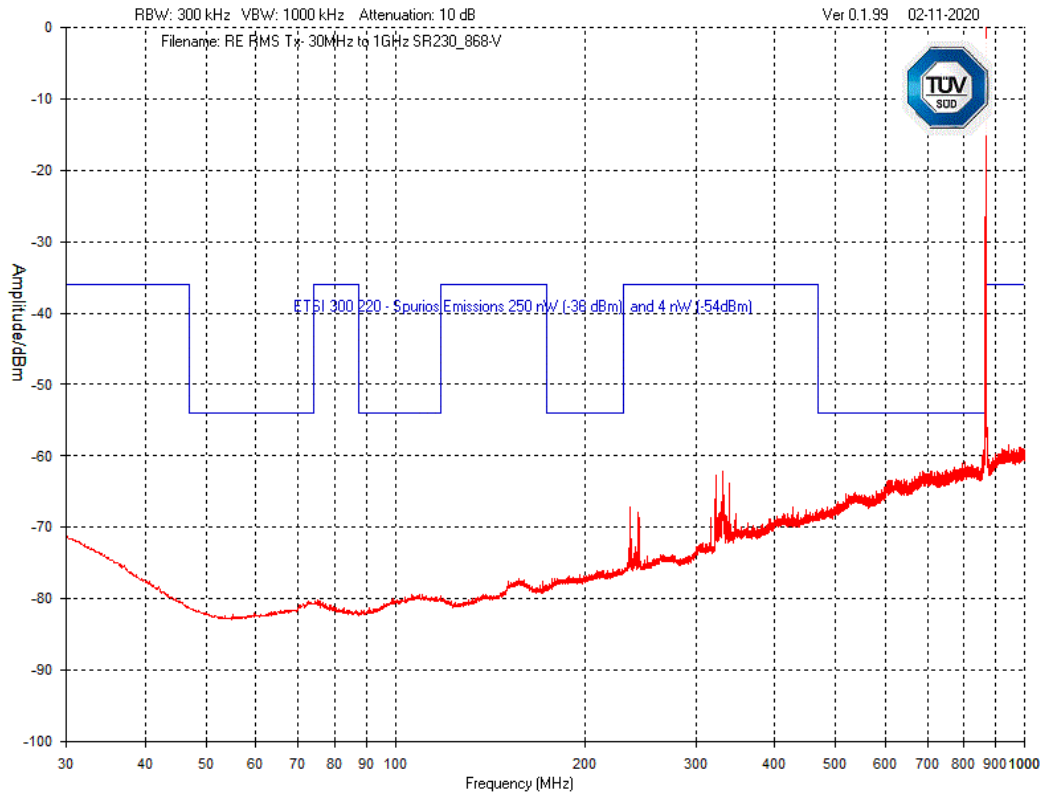
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Graph 25 : Tx Spurious Emissions – 30MHz to 1GHz – Vertical Polarization

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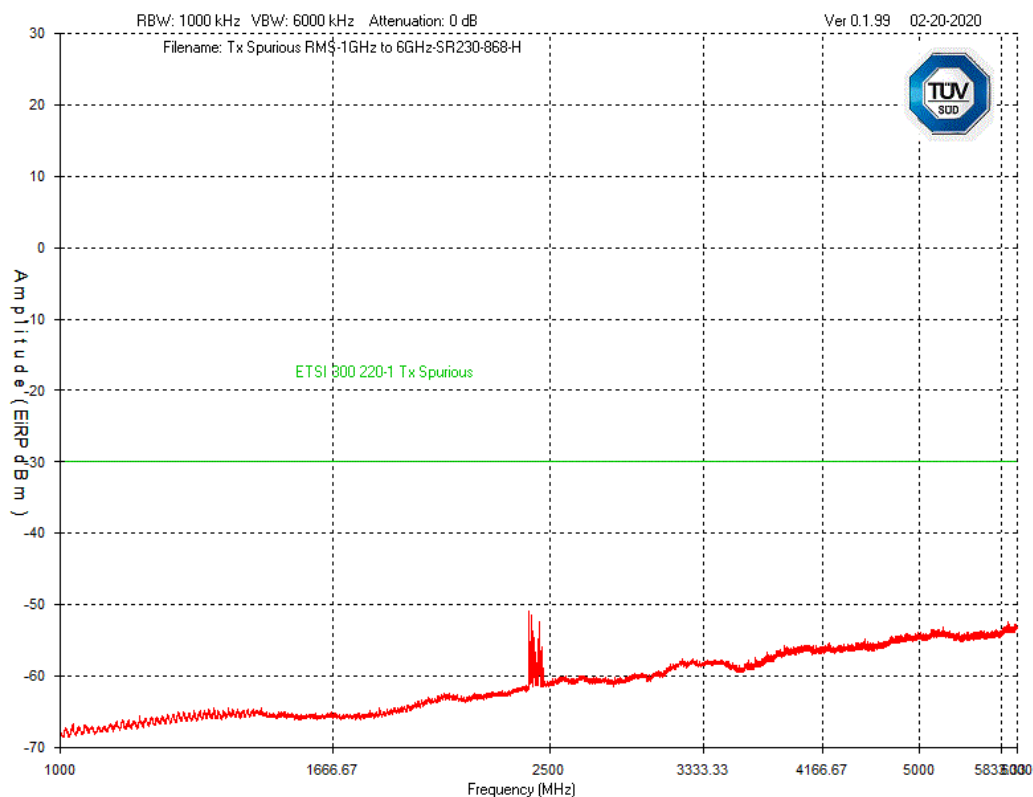
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Graph 26 : Tx Spurious Emissions – 1GHz to 6GHz – Horizontal Polarization

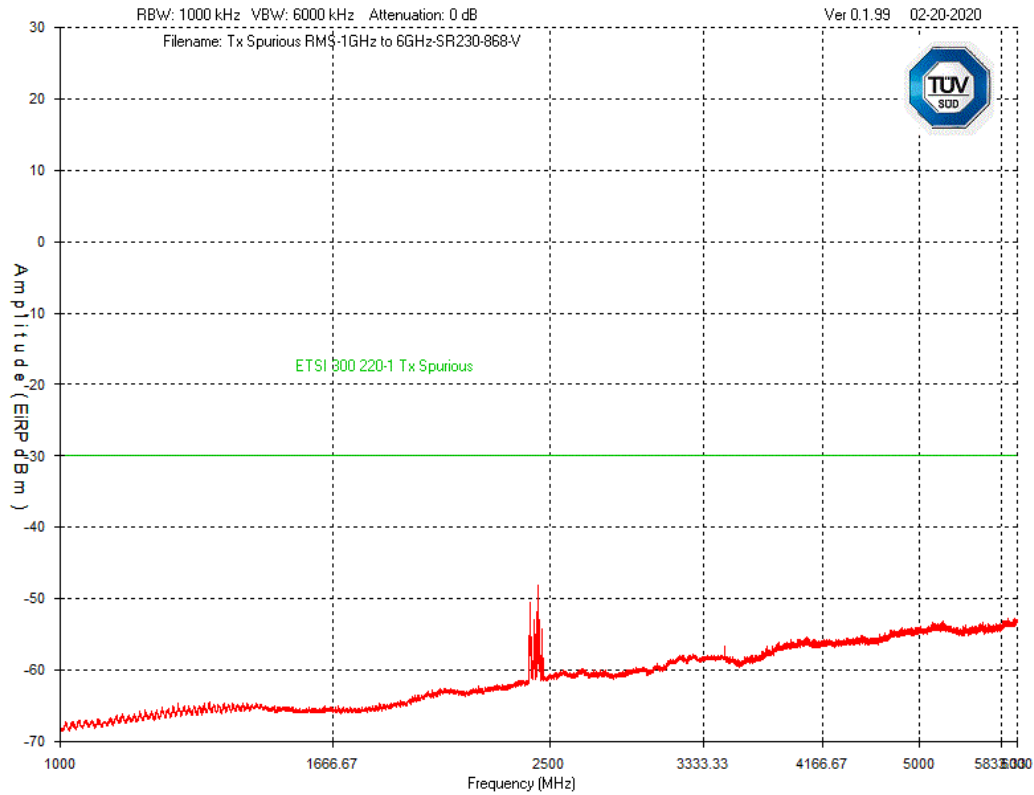
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Graph 27 : Tx Spurious Emissions – 1GHz to 6GHz – Vertical Polarization

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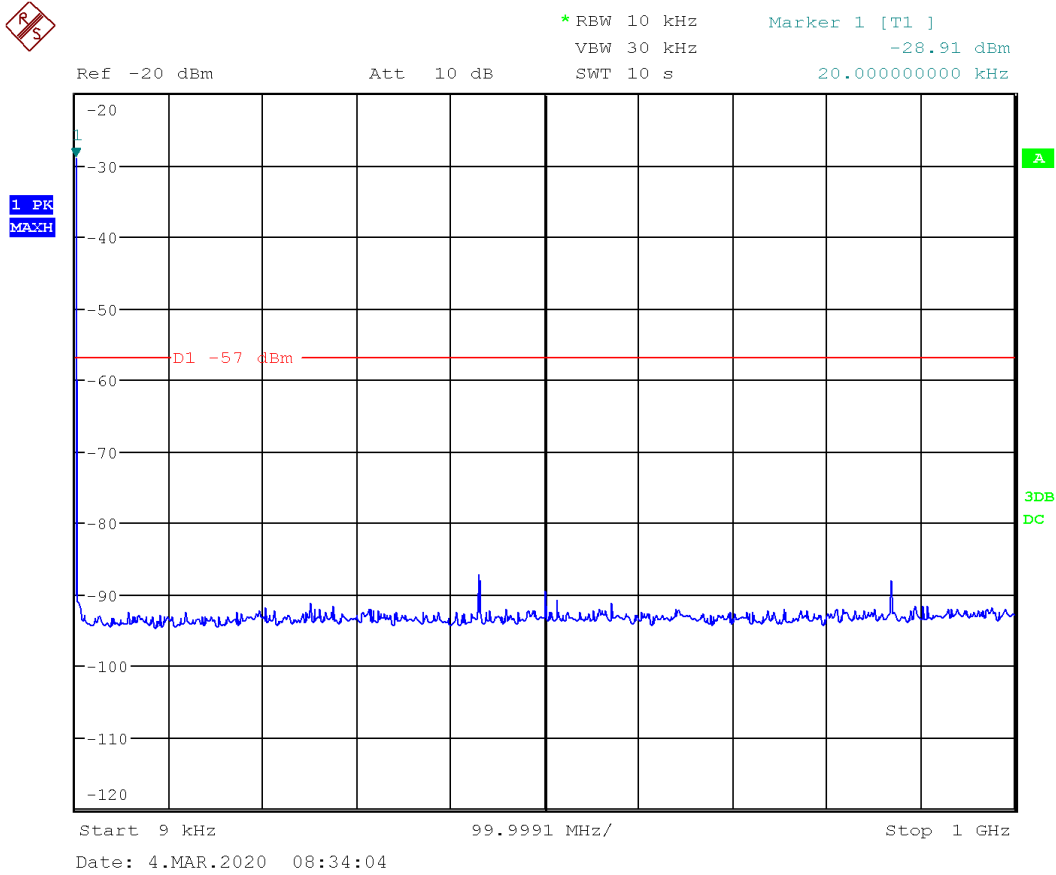
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2.6.2.2 Rx Spurious Emissions

I. SR230-433.92MHz – Model



Graph 28 : Rx Spurious Emissions – 9kHz to 1GHz

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* RBW 10 kHz

Marker 1 [T1]

VBW 30 kHz

-92.60 dBm

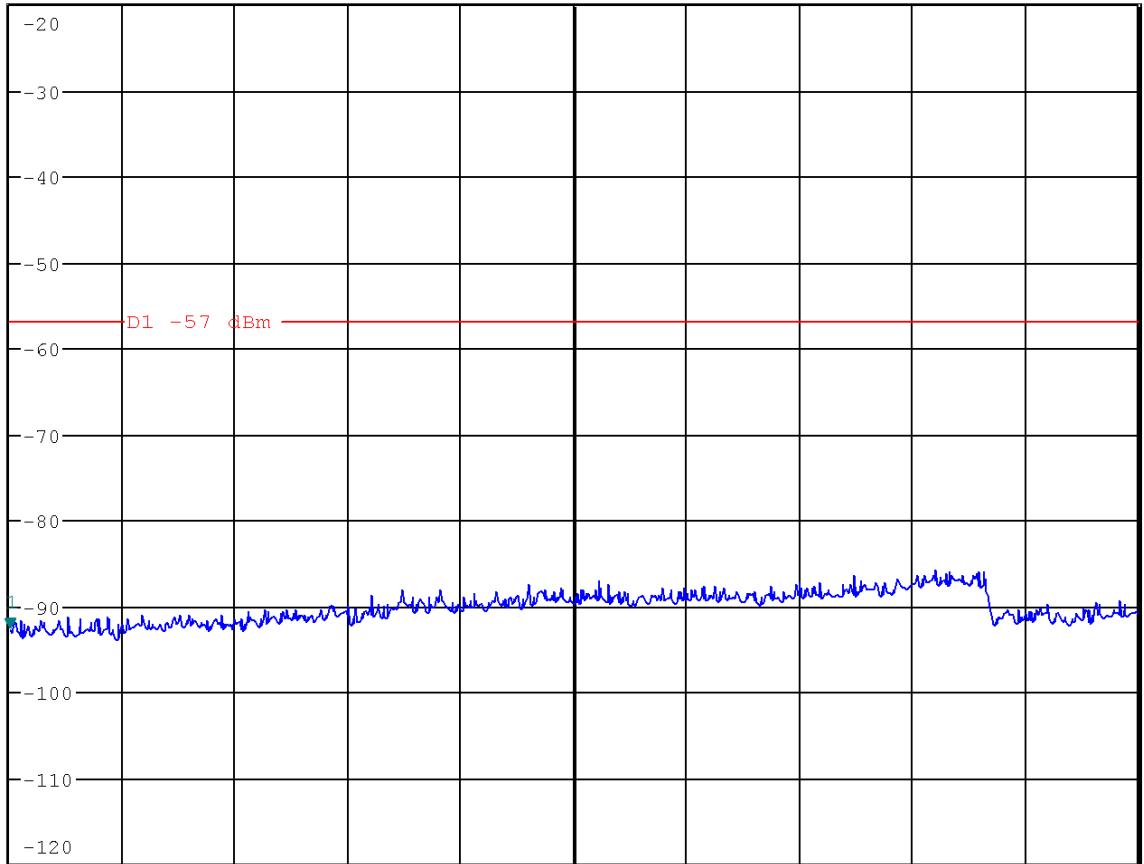
SWT 30 s

1.000000000 GHz

Ref -20 dBm

Att 10 dB

1 PK
MAXH



Start 1 GHz

300 MHz/

Stop 4 GHz

Date: 4.MAR.2020 08:36:37

Graph 29 : Rx Spurious Emissions – 1GHz to 4GHz

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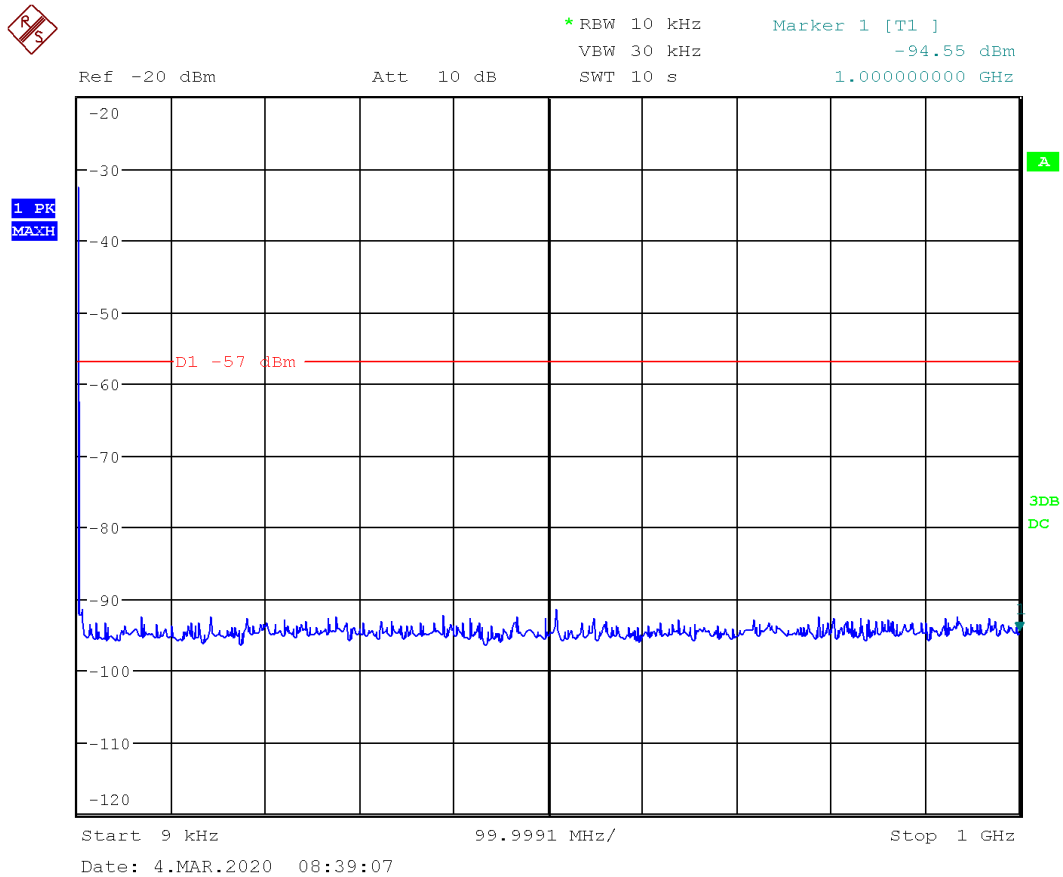
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I. SR230-868.35MHz – Model



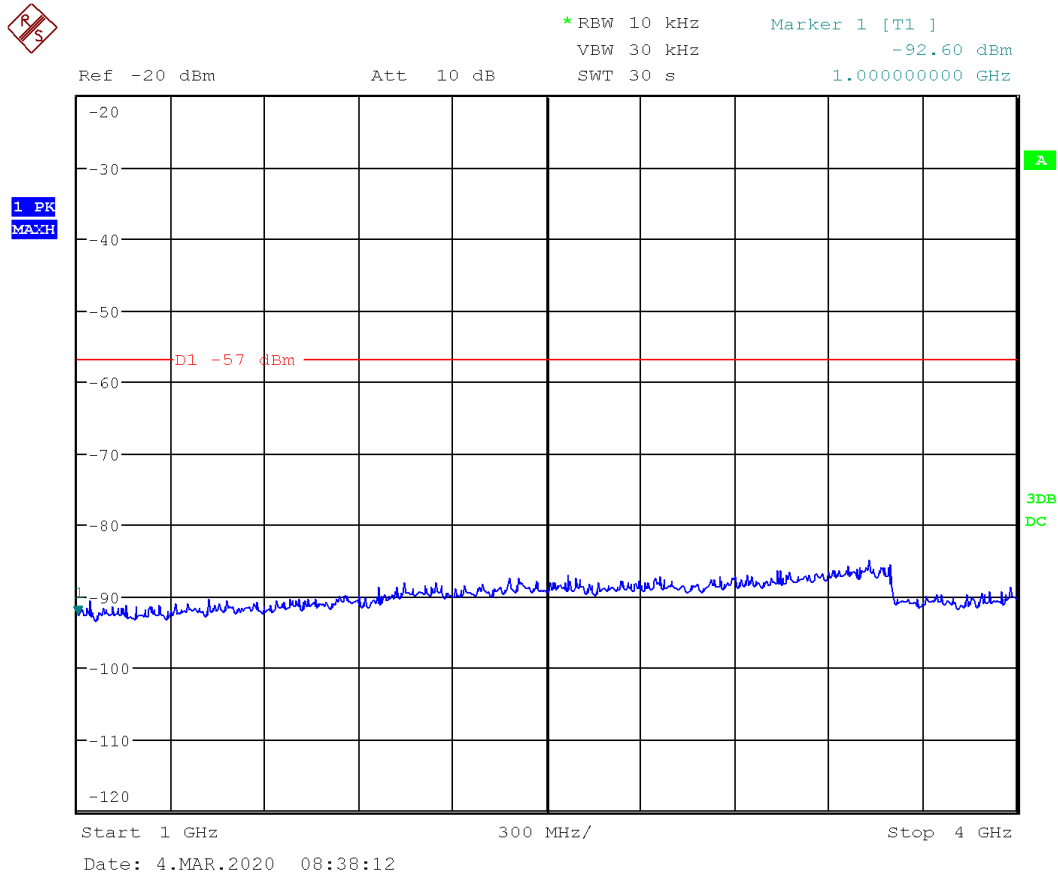
Graph 30 : Rx Spurious Emissions – 9kHz to 1GHz

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Graph 31 : Rx Spurious Emissions – 9kHz to 1GHz

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2.6.3 Test Setup

For Tx spurious emissions the SR230 was installed inside the Anechoic chamber and both Horizontal and Vertical polarization were tested. Photo 10 depict the setup for the range of 25MHz to 30MHz; while Photo 11 and 12 depict the horizontal– and vertical– polarization of the radiated emission scans, respectively.



Photo 10: Setup – Tx Unwanted Emissions – SR230 – 25MHz to 30MHz



Photo 11: Setup – Tx Unwanted Emissions – SR230 – 30MHz to 1GHz – Horizontal Polarization

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Photo 12: Setup – Tx Unwanted Emissions – SR230 – 30MHz to 1GHz – Vertical Polarization

2.6.4 Test Method

Th radiated method as per Clause ETSI EN 300 220-1 V3.1.1 for the Tx mode was used. Likewise, the conducted method as per clause 5.9.3.3.1 of the referred standard was used to test the Rx spurious.

2.6.5 Test Location and Test Equipment Used

This test was carried out in Laval test location.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due (YYY-MM-DD)
Variable Attenuator Rotary Attenuator	ETLS System	VAT02BXP-4242	N/A	NA	NCR
BiLog Antenna	Keytek	3142-E	4001	12	2020/11/29
Power Splitter/Combiner	Mini-Circuits	ZFRSC-183-S+	4131	N/	NCR
Cable 160 in SMA to N	FLORIDA RF LABS	Lab-Flex 335	4138	NA	NCR
RF Cable 10m	LexTec/Instacables	LMR-400-10M- 50OHM-MN-MN	4025	NA	NCR

Table 26 Unwanted Emissions in the Spurious – Test Equipment



2.7 Tx behaviour under Low Voltage Conditions

2.7.1 Test Details

REFERENCE	Clause 5.12 on ETSI EN 300 220-1 V3.1.1 (2017-02)
STANDARD	Clause 5.12 on ETSI EN 300 220-2 V3.2.1 (2018-04)

SPECIFICATIONS

RBW (kHz)	200
VBW (kHz)	500
SPAN(MHz)	1
Frequency	433.92MHz 868.35MHz
Installation	Tabletop equipment

EUTs

Identification	SR230– 433.92MHz SR230– 868.35MHz
Test Mode	Mode #1 in Table 4 .

ENVIROMENTAL & TEST INFO

Test Date (YYYY-MM-DD)	2020-02-26
Temperature °C (For Info Only)	22.6
Humidity %(For Info Only)	20.1
Atmospheric Pressure kPa (For Info Only)	101
Engineer	Jose Martinez Ortega
Client Witness	Emmanuel Stathopoulos (Paradox Security Systems)

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2.7.2 Setup Diagram

During testing the EUT was installed according to [section 2.3.1](#).

2.7.3 Test Results

The EUT was installed inside the Anechoic chamber according to Figure 4. Results of the test are depicted in Tables 27 & 28 below.

Frequency (MHz)	Vdc (V)	Attenuation (dB)	ERP (dBm)	Output ERP (dBm)
433.92	4.5	40	-30.93	9.07
	4.0		-30.98	9.02
	3.0		-31.33	8.67
	2.0		-34.28	5.72
	1.8		0	0

Table 27: Test Results – SR230 – 433.92MHz – Tx Low Voltage

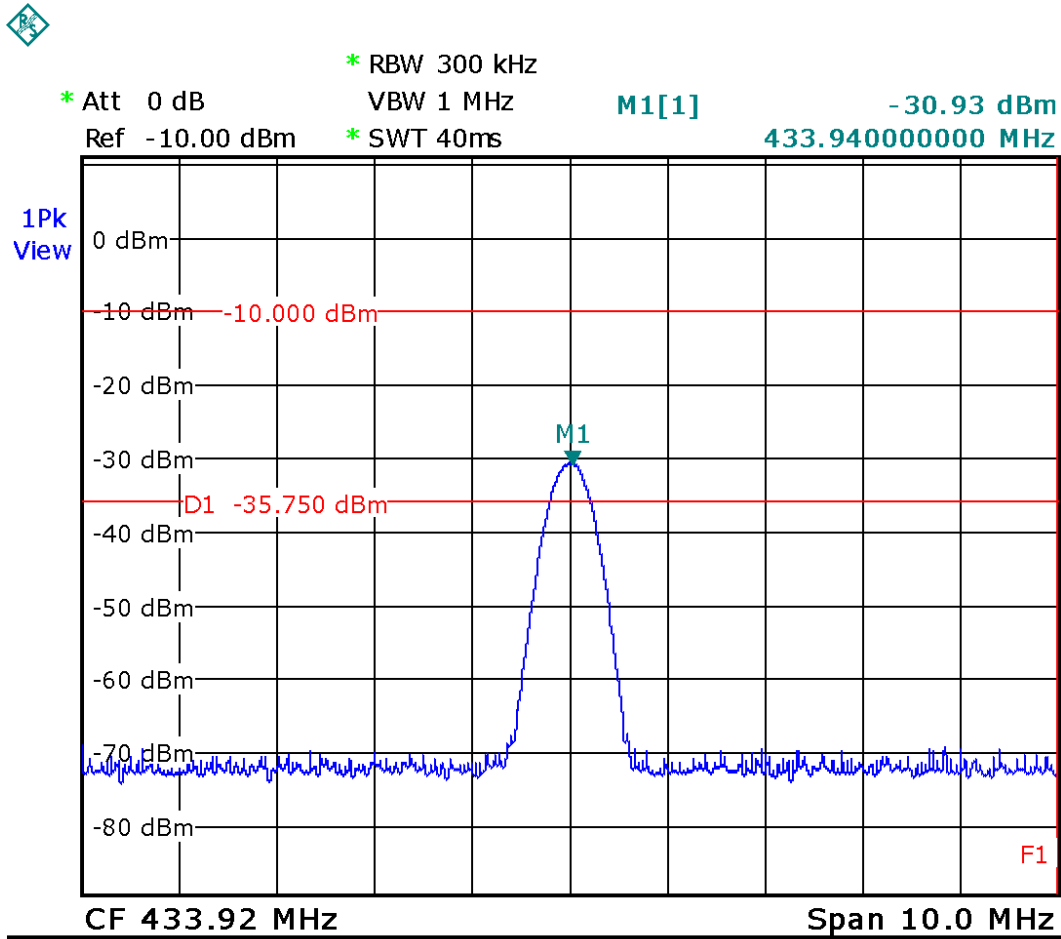
Frequency (MHz)	Vdc (V)	Attenuation (dB)	ERP (dBm)	Output ERP (dBm)
433.92	4.5	40	-28.75	11.25
	4.0		-28.70	11.3
	3.0		-29.43	10.57
	2.0		-34.53	5.47
	1.8		-47.45	-7.45

Table 28: Test Results Tx Low Voltage – SR230 – 868.35MHz



2.7.1 Test Data

2.7.1.1 Model – 433.92MHz



Date: 26.JAN.2020 12:39:28

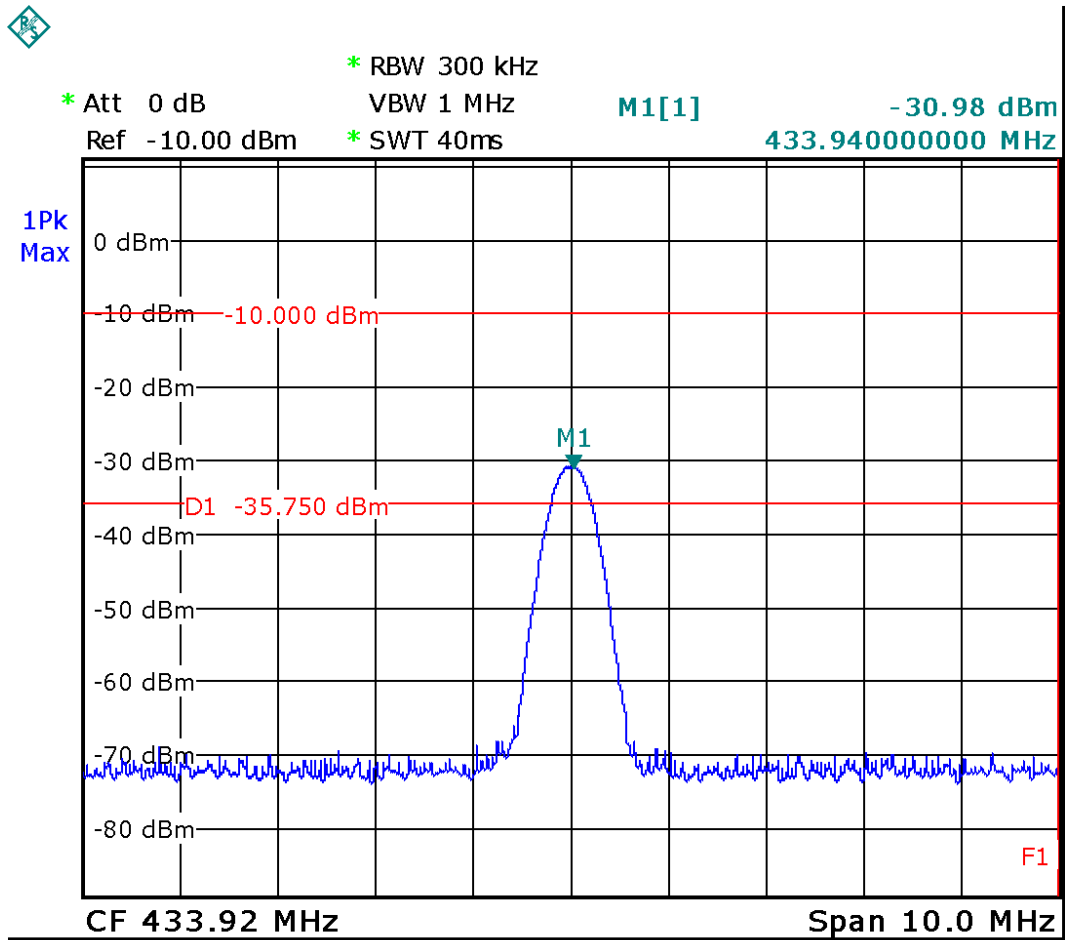
Graph 32 : SR230 Results – Tx Low Voltage – 4.5Vdc

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Date: 26.JAN.2020 12:37:09

Graph 33 : SR230 Results – Tx Low Voltage – 4.0Vdc

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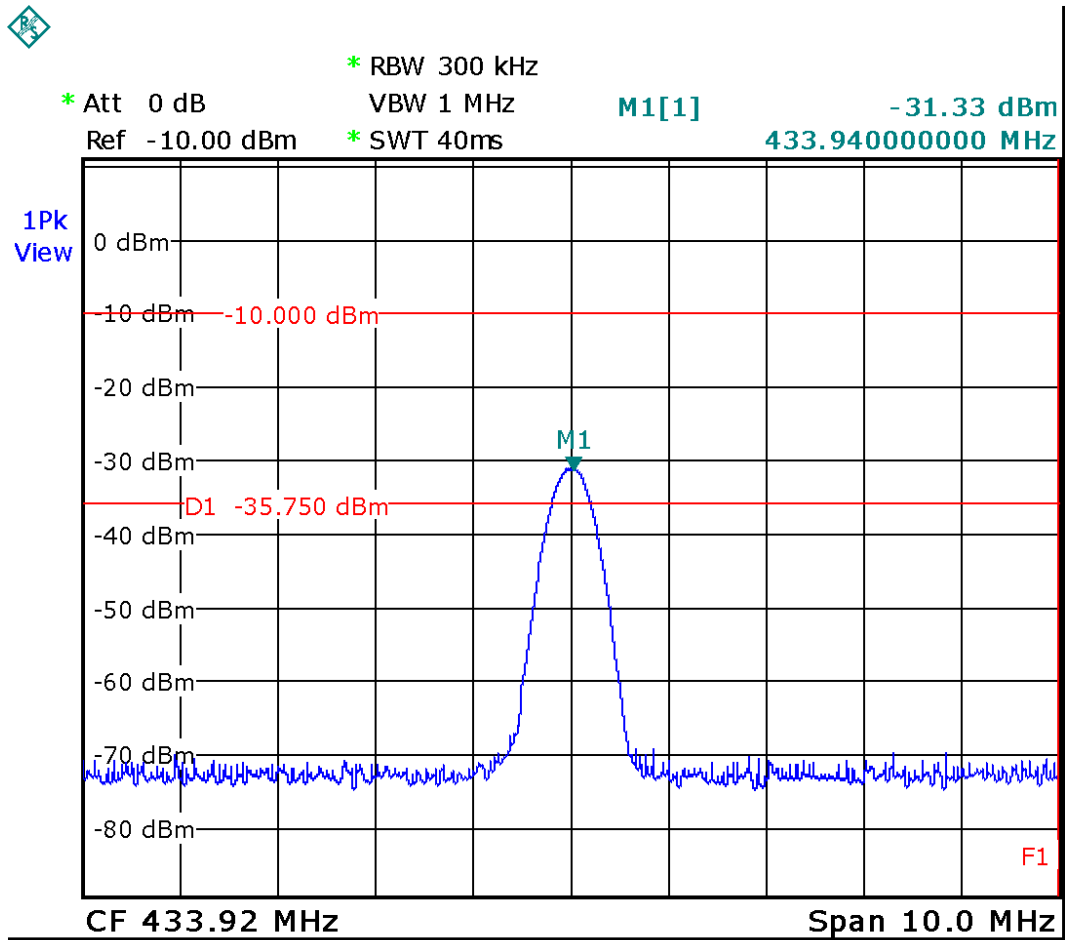
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Date: 26.JAN.2020 12:38:15

Graph 34 : SR230 Results – Tx Low Voltage – 3.0Vdc

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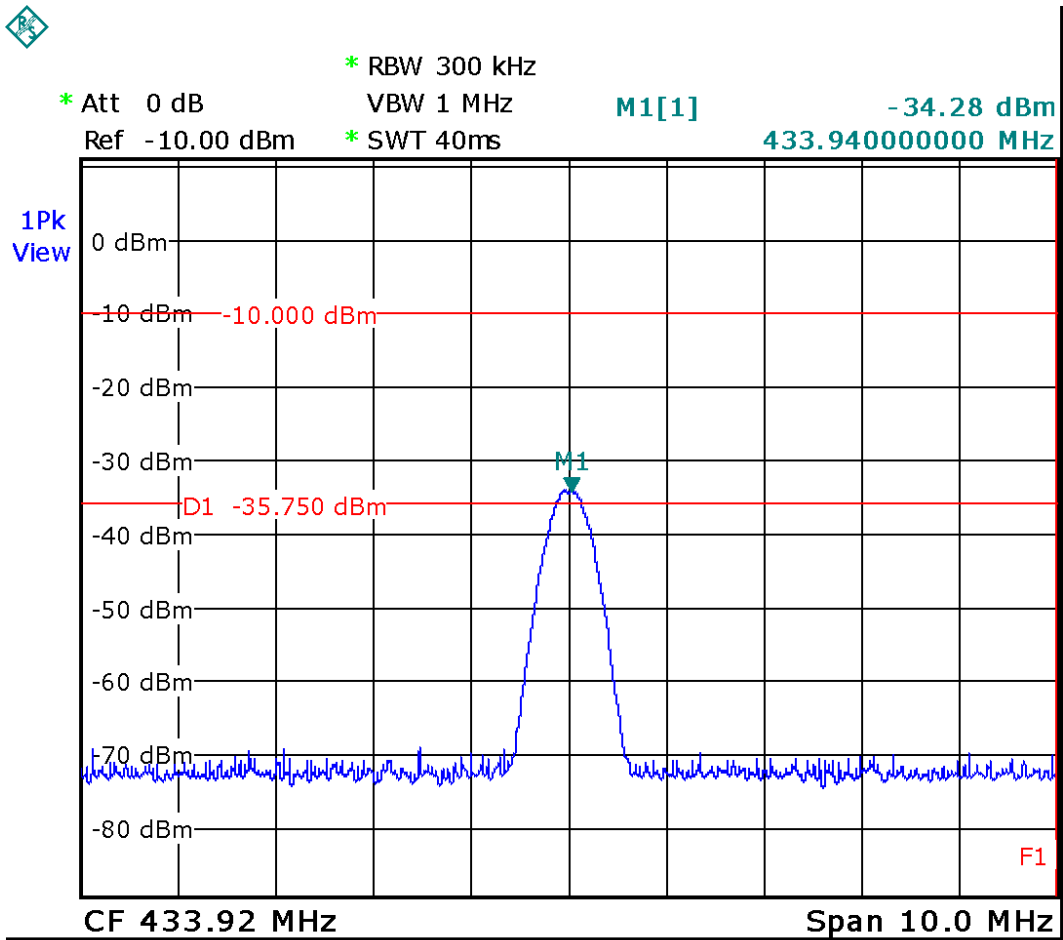
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Date: 26.JAN.2020 12:34:28

Graph 35 : SR230 Results – Tx Low Voltage – 2.0Vdc

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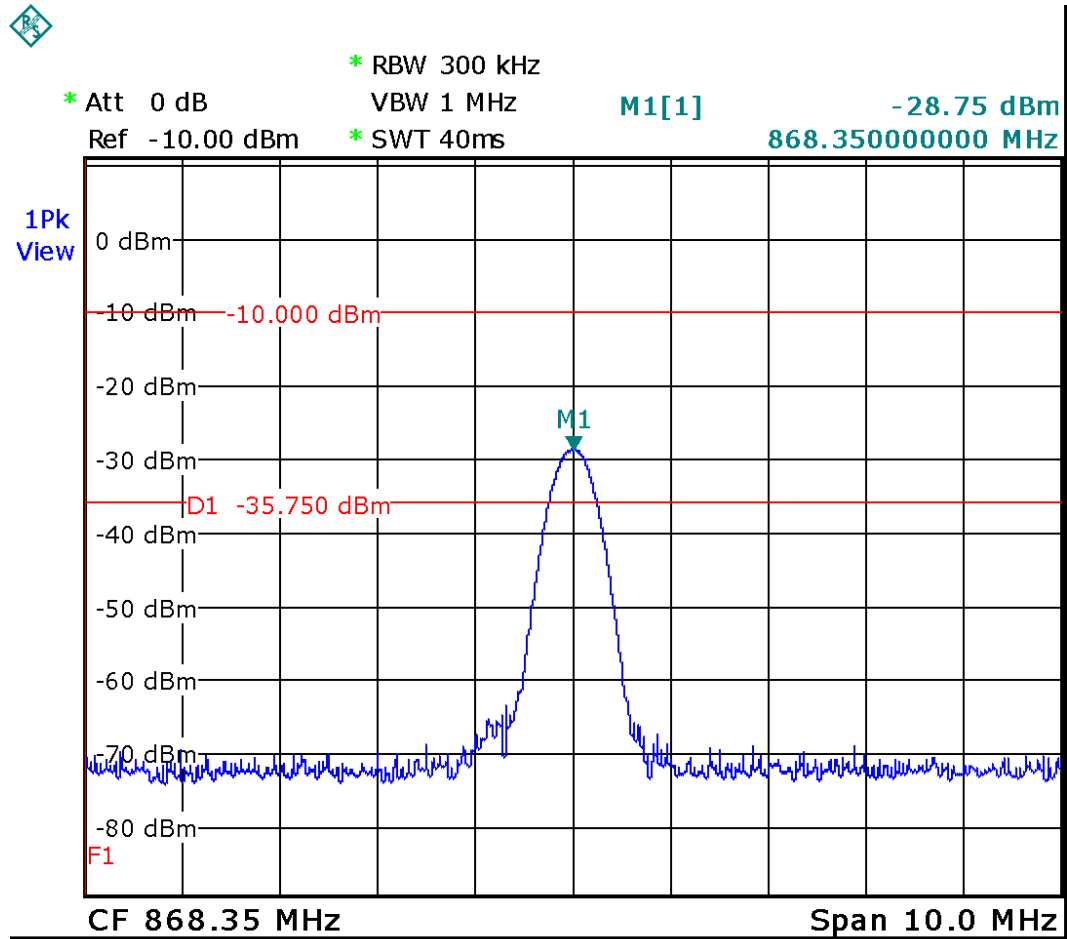
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2.7.1.1 Model – 868.35MHz



Date: 26.JAN.2020 12:29:55

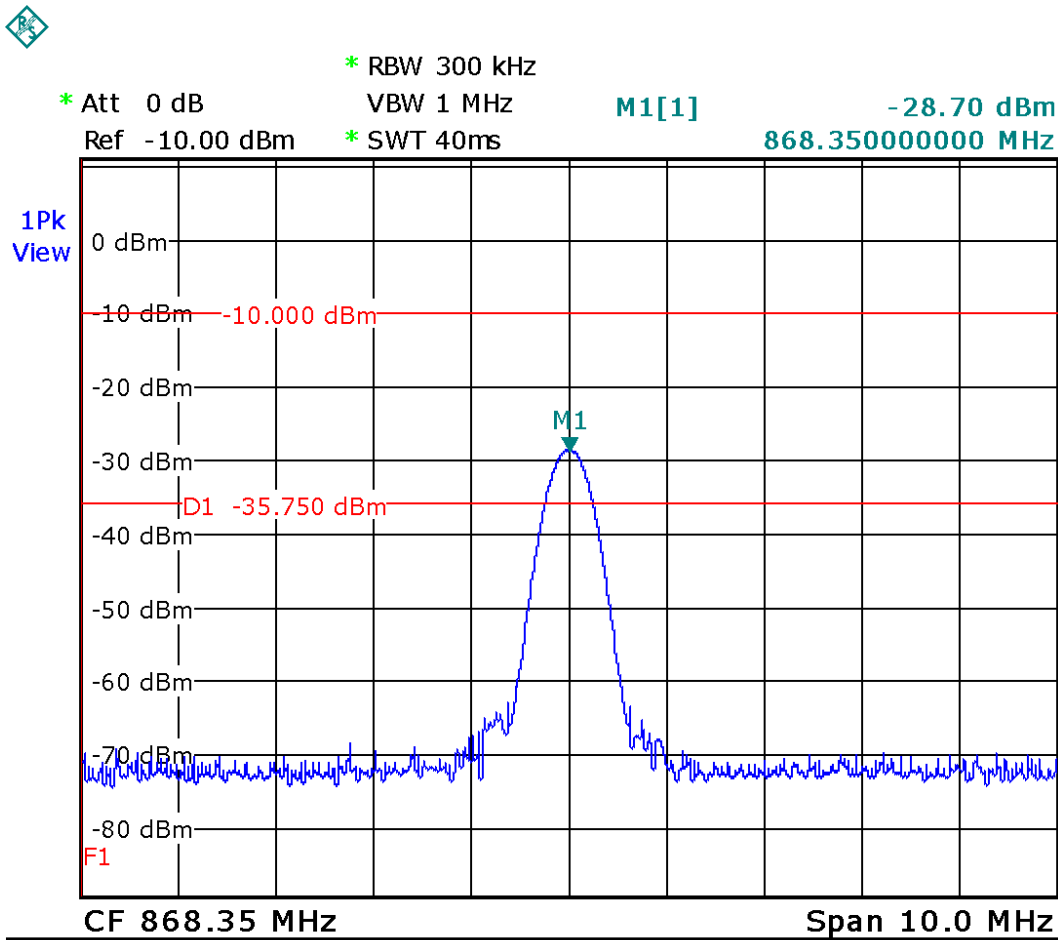
Graph 36 : SR230 Results – Tx Low Voltage – 4.5Vdc

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Date: 26.JAN.2020 12:29:02

Graph 37 : SR230 Results – Tx Low Voltage – 4.0Vdc

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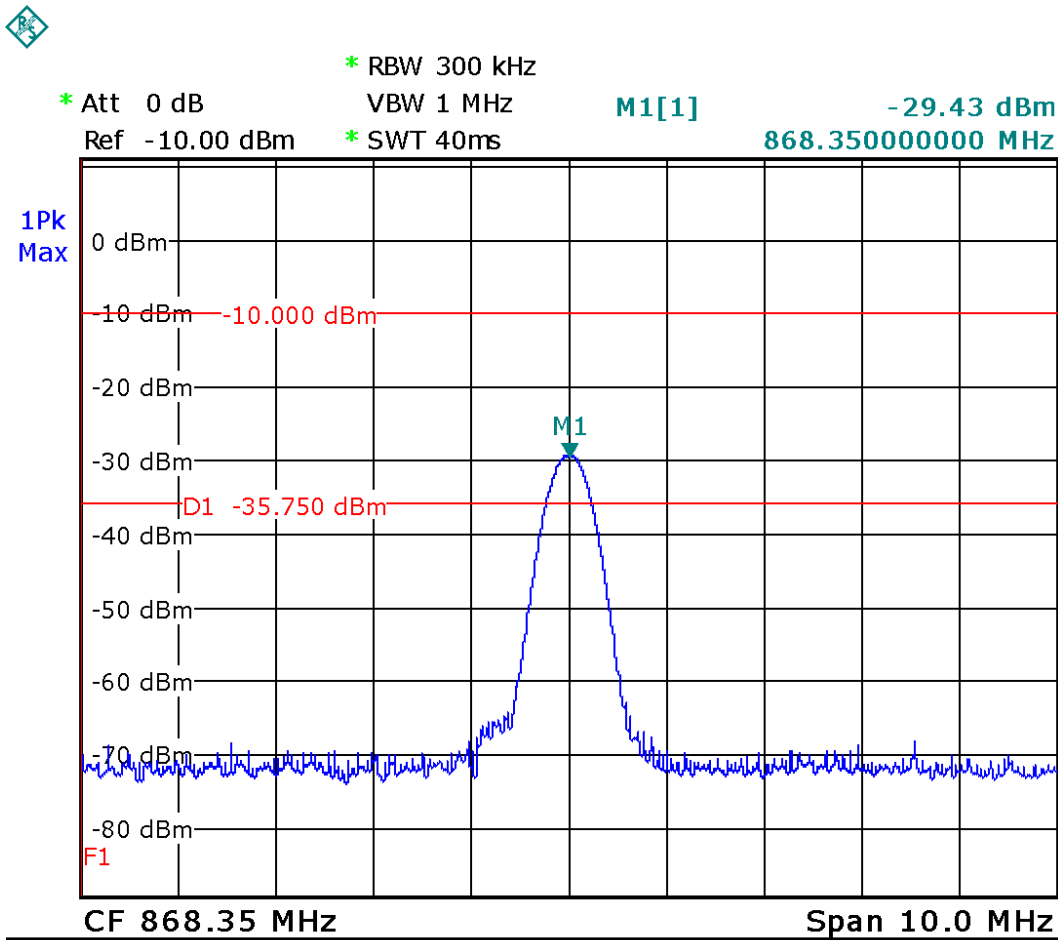
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Date: 26.JAN.2020 12:27:59

Graph 38 : SR230 Results – Tx Low Voltage – 3.0Vdc

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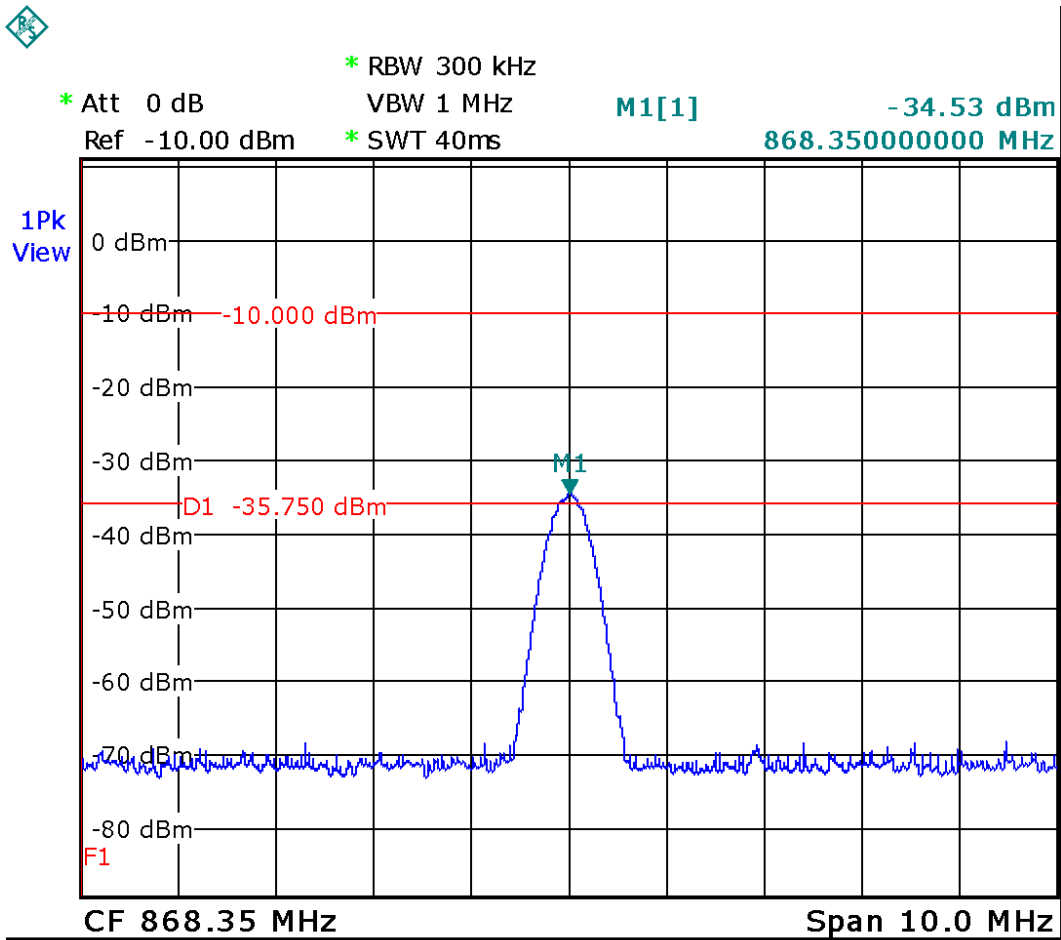
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Date: 26.JAN.2020 12:26:04

Graph 39 : SR230 Results – Tx Low Voltage – 2.0Vdc

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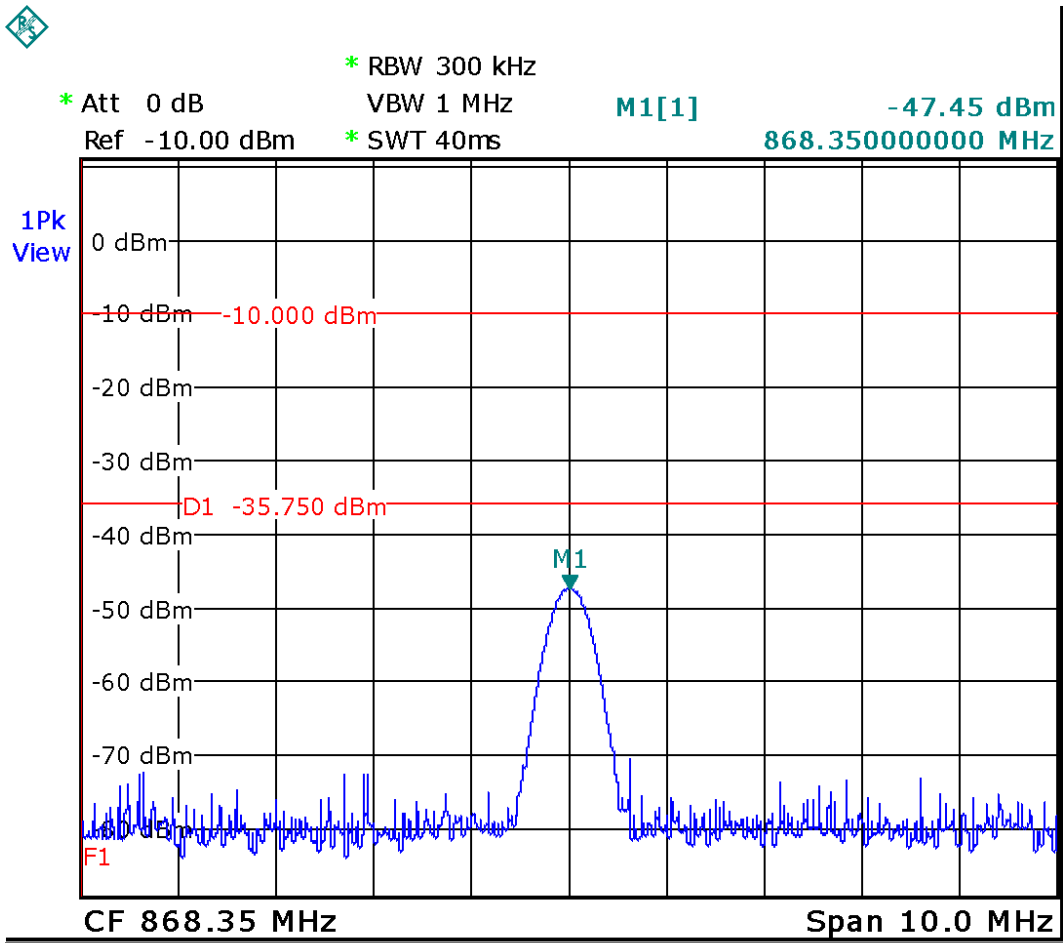
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F1=433.92MHz; D1=-36dBm

Date: 26.JAN.2020 09:27:01

Graph 40 : SR230 Results – Tx Low Voltage – 1.8Vdc

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2.7.2 Test Setup

During testing the EUT was installed according to [section 2.3.1](#).

2.7.3 Test Method

Tests were conducted according to the method of the reference standards.

2.7.4 Test Location and Test Equipment Used

This test was carried out in Laval test location.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due (YYY-MM-DD)
Log Periodic Antenna	Electro-Metrics	LPA-25	4087	12	2020/11/29
Power Splitter/Combiner	Mini-Circuits	ZFRSC-183-S+	4131	N/	NCR
Signal Generator	ROHDE & SCHWARZ	SMB100A	4135	12	2020/08/23
Cable 160 in SMA to N	FLORIDA RF LABS	Lab-Flex 335	4138	NA	NCR
RF Cable 10m	LexTec/Instacables	LMR-400-10M-50OHM-MN-MN	4025	NA	NCR

Table 29 Inside the Designed Band Test Equipment



2.8 Receiver Blocking

2.8.1 Test Details

REFERENCE	Clause 5.18.3 of ETSI 300 200- v.3.1.1 (2017-02)
STANDARD	Clause 4.4.2 of ETSI 300 200- v.3.2.1 (2018-04)
SPECIFICATIONS	See Table 30

Operating Frequency	433.92MHz 868.35MHz
Installation	Tabletop equipment
Test Mode	Mode #5 in Table 4 .

EUT

Identification	SR230 – 433.92MHz SR230 – 868.35MHz
Voltage Input	Battery Powered: 4.5Vdc

ENVIROMENTAL & TEST INFO

Test Date (YYYY-MM-DD)	2020-02-12
Temperature °C (For Info Only)	23
Humidity %(For Info Only)	20
Atmospheric Pressure kPa (For Info Only)	102.3
Engineer	Jose Martinez Ortega
Client Witness	Emmanuel Stathopoulos (Paradox Security Systems)

2.8.2 Purpose

Blocking is a measure of the capability of the receiver to receive a wanted modulated signal without exceeding a given degradation due to the presence of an unwanted input signal at any frequencies other than those of the spurious responses or the adjacent channels or bands.

2.8.3 Setup Diagram

A conducted method was used for receiver blocking and the EUT was installed according Figure 5. Note the signal trigger (RTX3 in Figure below) shall be within a shielded box to avoid unwanted RF interference on the SR230.

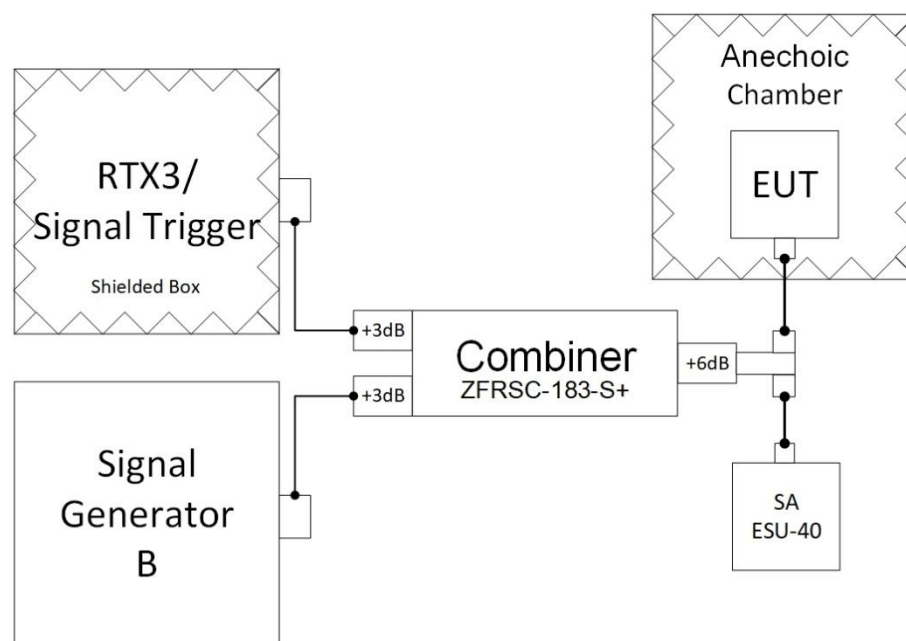


Figure 5: EUT – Setup Diagram – Receiver Blocking – Conducted Method



2.8.4 Limits

The blocking level shall be better or equal to category 2. Table 30 depicts the limits applied to Rx Category 2.

Requirement	Limits dBm
Blocking at ± 2 MHz from OC edge f_{high} and f_{low}	≥ -69
Blocking at ± 10 MHz from OC edge f_{high} and f_{low}	≥ -44
Blocking at ± 5 % of Centre Frequency or 15MHz, whichever is the greater	

Table 30 Limits for Receiver Blocking – Rx Category 2

The minimum power level which give the EUT the wanted performance are given in Table 31.

OF (MHz)	Combiner Attenuation (dBm)	Attenuation at the antenna input (dBm)	Level at Spectrum Analyzer (dBm)
433.92	3	-130	-19.45
868.35	3	-105	-62.5
OF: Operating Frequency.			

Table 31 Minimum Power Level – SR230



2.8.5 Test Results

Summary of test results are depicted in Table 32 and Table 33 below.

Requirement	Blocking Frequency (MHz)	Attenuation (dBm)	Combiner + Cable Losses (dBm)	Signal Generator B (dBm)	Power Level in the SA (dBm)	Limits ≥ (dBm)	Results
OF +2MHz	435.92	20	6.4	-27.0	-54.87	-69	Pass
OF -2MHz	431.92		6.4	-32	-59.71	-69	Pass
OF +10MHz	443.92		6.4	-4.0	-29.93	-44	Pass
OF -10MHz	423.92		6.4	-2	-27.67		Pass
OF + 5%	455.62		6.4	-2.0	-27.15		Pass
OF -5%	412.22		6.4	-2.0	-34.94		Pass
OF: Operating frequency SA. Spectrum Analyzer							

Table 32 SR230 – Blocking at OF = 433.92 MHz

Requirement	Blocking Frequency (MHz)	Attenuation (dBm)	Cable Losses (dBm)	Signal Generator B (dBm)	Power Level (dBm)	Limits ≥ (dBm)	Results
OF +2MHz	870.35	20	0.4	1	-27.90	-69	Pass
OF -2MHz	866.35		0.4	0	-29.15		Pass
OF +10MHz	878.35		0.4	25	-7.47	-44	Pass
OF -10MHz	858.35		0.4	8	-21.4		Pass
OF + 5%	911.77		0.4	25	-1.58		Pass
OF -5%	824.93		0.4	25	-1.43		Pass
OF: Operating frequency=868.35MHz							

Table 33 SR230 – Blocking at OF = 868.35 MHz

2.8.6 Test Setup

To avoid wireless communication between the transmitter module and the receiver and the latter was placed inside the Anechoic Chamber. Photo 13 (inside the chamber) and in Photo 14 (outside the chamber).

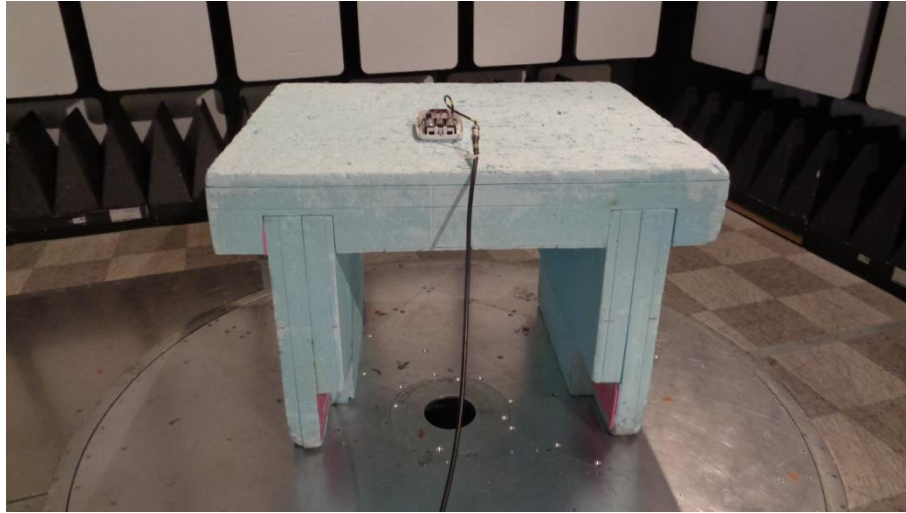


Photo 13 – Test Setup – Receiver Blocking – Inside the Chamber

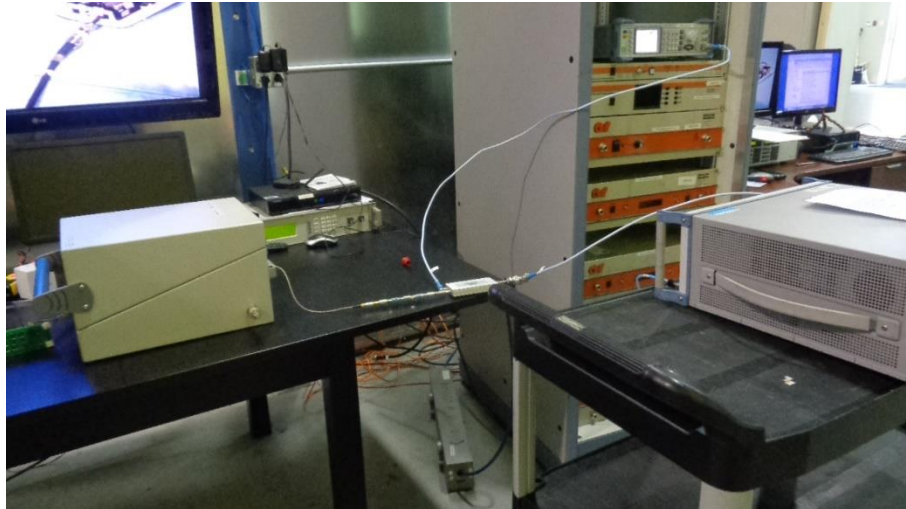


Photo 14 – Test Setup – Receiver Blocking – Outside the Chamber



2.8.7 Test Method

Tests were conducted according to the method of the reference standards.

2.8.8 Test Location and Test Equipment Used

This test was carried out in Laval test location.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Due (YYY-MM-DD)
Power Splitter/Combiner	Mini-Circuits	ZFRSC-183-S+	4131	NCR	NCR
RF Shielded Box	WillTek	M 248 348	N/A	NCR	NCR
Spectrum Analyzer	Rohde & Schwarz	ESU-40	4092	12	2020-06-06
Signal Generator	ROHDE & SCHWARZ	SMB100A	4135	12	2020/08/23
Cable 160 in SMA to N	FLORIDA RF LABS	Lab-Flex 335	4138	NA	NCR
RF Cable 10m	LexTec/Instacables	LMR-400-10M-50OHM-MN-MN	4025	NA	NCR

Table 34 Detection of Failure – Test Equipment



APPENDIX A: SR230 PARADOX DECLARATION

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APPENDIX B: Worst-Case Scenario of Tx Spurious Emission

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Frequency (MHz)	Detector	Raw Reading dB(μV)	Antenna - Bilog3142E_H Factor (dB)	Atten 10dB Factor (dB)	Cable 27 - 10m LMR400 Factor (dB)	Cable 28 - 7m LMR400 Factor (dB)	dBuV_Per meter to dBm EiRP 3 meter Factor	Preamp-LNA1450 Factor	Level dB(μV)	ETSI 300 220 - Spurious Emissions 250 nW (-36 dBm) and 4 nW (-54dBm) Limit	ETSI 300 220 - Spurious Emissions 250 nW (-36 dBm) and 4 nW (-54dBm) Margin
433.924	RMS	122	21.5	10	0.9	0.7	-95.2	-33.3	26.6	-36	-62.6 <Note 1>
867.948	RMS	30.5	26.7	10	1.3	0.9	-95.2	-32.5	-58.3	-36	22.3
420.136	RMS	14.5	21.7	10	0.9	0.7	-95.2	-33.3	-80.7	-36	44.7
315.66	RMS	14.6	18.2	10	0.8	0.6	-95.2	-33.3	-84.3	-36	48.3
171.859	RMS	17	13.4	10	0.6	0.4	-95.2	-33.4	-87.2	-36	51.2
Note 1. The operating Frequency is excluded from the Spurious limits.											

Table B.1 RMS Value of Tx- Spurious – SR230-433.92MHz – Vertical Polarization

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