EN 300 220 RF Test Report

Report No.: REAAGC-WTW-P23110065

Test Model: NOTE-LWEU

Received Date: Nov. 02, 2023

Test Date: Nov. 08, 2023 ~ Feb. 29, 2024

Issued Date: Aug. 13, 2024

Applicant: Blues Inc.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories

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Release Control Record

Issue No.	Description	Date Issued
REAAGC-WTW-P23110065	Original release.	Aug. 13, 2024

1 Certificate of Conformity

Product:	Notecard
Brand:	Blues Inc.
Test Model:	NOTE-LWEU
Sample Status:	Engineering sample
Applicant:	Blues Inc.
Test Date:	Nov. 08, 2023 ~ Feb. 29, 2024
Standards:	EN 300 220-1 V3.1.1 (2017-02) EN 300 220-2 V3.2.1 (2018-06)

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Polly Chien , **Date:** Aug. 13, 2024

Polly Chien / Specialist

Approved by : Jeremy Lin , **Date:** Aug. 13, 2024

Jeremy Lin / Project Engineer

2 Summary of Test Results

The EUT has been tested according to the following specifications:

EN 300 220-1 V3.1.1 (2017-02)		
Clause	Test Parameter	Result
	Transmitter Parameters	
5.2	Effective Radiated Power	Pass
5.4	Duty Cycle	Pass
5.6	Occupied Bandwidth	Pass
5.7	Frequency Error	Pass
5.8	Tx Out Of Band Emissions	Pass
5.9	Unwanted emissions in the spurious domain	Pass
5.10	Transient power	Pass
5.12	TX behaviour under Low Voltage Conditions	Pass
	Receiver Parameters	
5.14	RX Sensitivity Level	Pass
5.18	Blocking	Pass
5.21.2	Clear Channel Assessment threshold	Not Applicable
5.21.3	Polite spectrum access timing parameters	Not Applicable
5.9	Unwanted emissions in the spurious domain	Pass

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. Test Parameter items limits refer to EN 300 220-2 V3.2.1 (2018-06) standard

2.1 Test Instruments

For Effective Radiated Power

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Signal & Spectrum Analyzer R&S	FSV3044	101105	2024/2/27	2025/2/26
Temperature & Humidity Chamber Terchy	HRM-120RF	931022	2023/12/19	2024/12/18
Peak Power Analyzer Keysight	8990B	MY51000485	2024/1/21	2025/1/20
Wideband Power Sensor Keysight	N1923A	MY58020002	2024/1/18	2025/1/17

Note: 1. The test was performed in Oven room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested date: 2024/2/29

For Unwanted emissions test

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna and Turntable controller Max-Full	MF7802	MF780208363	N/A	N/A
Antenna tower Max-Full	MFA-440H	A440H102-019	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-161	2023/10/17	2024/10/16
Preamplifier Agilent	8447D	2944A10634	2023/7/8	2024/7/7
PXA Signal Analyzer Agilent	N9030A	MY53120770	2023/3/15	2024/3/14
RF Coaxial Cable Woken	8D-FB	Cable-RF2-01	2023/7/8	2024/7/7
Signal Analyzer R&S	FSV40	100980	2023/5/3	2024/5/2
Software ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Turn Table ADT	N/A	SN30303	N/A	N/A
Horn Antenna ETS-Lindgren	3117	00034130	2022/11/13	2023/11/12
Preamplifier Agilent	8449B	3008A01976	2023/7/8	2024/7/7
RF Coaxial Cable HUBER+SUHNER	SUCOFLEX 104	Cable-RF2-03(246272/4)	2023/7/8	2024/7/7
RF Coaxial Cable INFINET	CA3501-3501-G.90(3m)& CA3501-3501-F.90(2m)	INF090(3m)*2& TCF427S(2m)*1	2023/7/8	2024/7/7

Note:
1. The test was performed in HY - RF chamber 2
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested date: 2023/11/8

2.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

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

Parameter	Uncertainty
Radio frequency	±1.06x10^{-8}
RF power, conducted	±1.371 dB
Conducted spurious emission of transmitter, valid up to 6 GHz	±1.34 dB
Conducted emission of receivers	±1.34 dB
Radiated emission of transmitter, valid up to 6GHz	±3.294 dB
Radiated emission of receivers, valid up to 6GHz	±3.294 dB
Temperature	±0.23 °C
Humidity	±0.3 %
Occupied Bandwidth	±0.00036 %

2.3 Maximum Measurement Uncertainty

For the test methods, according to ETSI EN 300 220 standard, the measurement uncertainty figures shall be calculated in accordance with TR 100 028-1 [4] and shall correspond to an expansion factor (coverage factor) k = 1.96 or k = 2 (which provide confidence levels of respectively 95 % and 95.45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Maximum measurement uncertainty

Parameter	Uncertainty
Radio frequency	±0.5 ppm
RF power, conducted	±1.5 dB
Conducted spurious emission of transmitter, valid up to 6 GHz	±3.0 dB
Conducted emission of receivers	±3.0 dB
Radiated emission of transmitter, valid up to 6GHz	±6.0 dB
Radiated emission of receivers, valid up to 6GHz	±6.0 dB
Temperature	±2.5 ℃
Humidity	±10 %
Occupied Bandwidth	±5.0 %

2.4 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Notecard
Brand	Blues Inc.
Test Model	NOTE-LWEU
Sample Status	Engineering sample
Nominal Voltage	3.3Vdc 5Vdc (from host equipment)
Normal Testing Voltage	Vnom= 5.00 Vmin= 4.50 Vmax= 5.50
Temperature Operating Range	-40~85℃
Modulation Type	Chirp spread- spectrum (CSS)
Operating Frequency	868.3MHz, 869.525MHz
Number of Channel	2
Rated RF Output Power (ERP)	868.3MHz: 12.87dBm 869.525MHz: 14.12dBm
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	NA
Cable Supplied	NA

Note:

1. The EUT uses following antenna.

Antenna Type	Brand	Model	Connector	Gain(dBi)
Flexible adhesive	Molex	211140-0100	u.fl	0.3

2. The above antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

3.2 Description of Test Modes

2 channels are provided to this EUT:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	868.3	1	869.525

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to										Description
	FE	ERP	TP	OB	OOBE	RB	RSL	TXLV	SE<1G	SE≥1G	
-	√	√	√	√	√	√	√	-	√	√	-

Where FE: Frequency error
ERP: Effective Radiated Power
TP: Transient Power
OB: Occupied Bandwidth
OOBE: TX Out Of Band Emissions
RB: Receiver Blocking
RSL: RX Sensitivity Level
TXLV: TX behaviour under Low Voltage Conditions
SE<1G: Unwanted emissions in the spurious domain below 1GHz
SE≥1G: Unwanted emissions in the spurious domain above 1GHz

Note: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on X-plane.

Frequency Error:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 1	0, 1	CSS

Effective Radiated Power:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 1	0, 1	CSS

Transient Power:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 1	0, 1	CSS

Occupied Bandwidth:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 1	0, 1	CSS

TX out of Band Emissions:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 1	0, 1	CSS

Unwanted emissions in the spurious domain Test (Below 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 1	0, 1	CSS

Unwanted emissions in the spurious domain Test (Above 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 1	0, 1	CSS

TX behavior under Low Voltage Conditions:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 1	0, 1	CSS

Receiver Blocking and RX Sensitivity Level:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	0 to 1	0, 1	CSS

Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
FE	23 deg. C, 68% RH	5Vdc	Chris Lin
ERP	23 deg. C, 68% RH	5Vdc	Chris Lin
TP	23 deg. C, 68% RH	5Vdc	Chris Lin
OB	23 deg. C, 68% RH	5Vdc	Chris Lin
OOBE	23 deg. C, 68% RH	5Vdc	Chris Lin
CCA	23 deg. C, 68% RH	5Vdc	Chris Lin
RB	23 deg. C, 68% RH	5Vdc	Chris Lin
RSL	23 deg. C, 68% RH	5Vdc	Chris Lin
TXLV	23 deg. C, 68% RH	5Vdc	Chris Lin
SE<1G	25 deg. C, 64% RH	5Vdc	Jay Chang
SE≥1G	25 deg. C, 64% RH	5Vdc	Jay Chang

3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

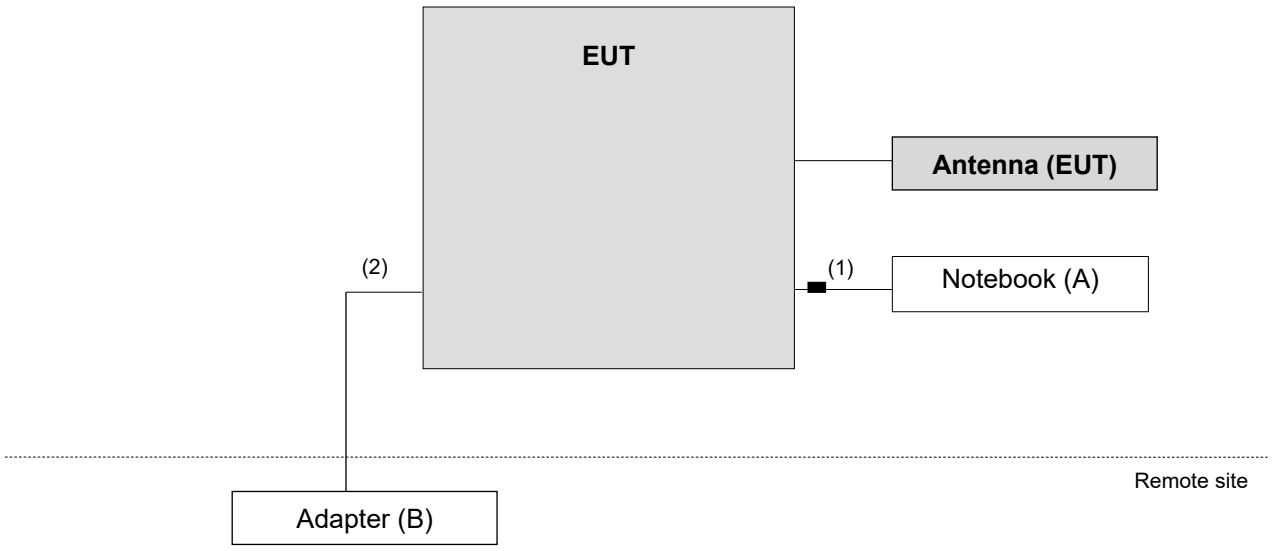
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	Lenovo	L470	PF0XEHC5	FCC DoC Approved	Provided by Lab
B.	Adapter	PHIHONG	PSAA05K-050	NA	NA	Supplied by applicant

Note:

1. All power cords of the above support units are non shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	1	N	1	Supplied by applicant
2.	Power Cord	1	1.5	N	0	Supplied by applicant

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

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

All test items have been performed and recorded as per the above standards.

4 Test Procedure and Results

Transmitter Parameters

4.1 Frequency Error

4.1.1 Limits of Frequency Error

Results of Limit
Manufacturer declare

4.1.2 Test Procedures

Refer to EN 300 220-1 V3.1.1 clause 5.7.2.4.

4.1.3 Deviation from Test Standard

No deviation.

4.1.4 Test Setup

The EUT was placed at a site with temperature control and supplied with power for extreme voltage testing. Antenna with suitable frequency range was used during the test.

4.1.5 Test Results

868.3MHz

Test Condition			Carrier Frequency (MHz)
Tnom(℃)	+25	Vnom(V)	863.3124
Tmin(℃)	-40	Vmin(V)	863.3122
		Vmax(V)	863.3121
Tmax(℃)	+85	Vmin(V)	863.3129
		Vmax(V)	868.3120

Note: This device is classified as wide band systems, and the frequency error is defined as the difference between the frequency measured of the device under normal test conditions and the frequency measured under extreme conditions relative to the maximum frequency of the assigned band.

869.525MHz

Test Condition			Carrier Frequency (MHz)
Tnom(℃)	+25	Vnom(V)	869.5253
Tmin(℃)	-40	Vmin(V)	869.5251
		Vmax(V)	869.5258
Tmax(℃)	+85	Vmin(V)	869.5249
		Vmax(V)	869.5255

Note: This device is classified as wide band systems, and the frequency error is defined as the difference between the frequency measured of the device under normal test conditions and the frequency measured under extreme conditions relative to the maximum frequency of the assigned band.

4.2 Effective Radiated Power

4.2.1 Limits of Effective Radiated Power

Operational Frequency Band		Maximum effective radiated power, e.r.p.	Channel access and occupation rules (e.g. Duty cycle or LBT + AFA)	Maximum occupied bandwidth	Other usage restrictions
A	26.957-27.283 MHz	10 mW e.r.p	No requirement	The whole band	
B	26.995, 27.045, 27.095, 27.145, 27.195 MHz	100 mW e.r.p	≤ 0.1 % duty cycle	10 kHz	Model control devices may operate without duty cycle restrictions
C	40.660-40.700 MHz	10 mW e.r.p.	No requirement	The whole band	Video applications excluded
D	169.400-169.475 MHz	500 mW e.r.p.	≤ 1.0 % duty cycle	50 kHz	
E	169.4000-169.4875MHz	10 mW	≤ 0.1 % duty	The whole band	Equipment that concentrates or multiplexes individual equipment is excluded
F	169.4875-169.5875MHz	10 mW	≤ 0.001% duty cycle Between 00.00 and 06.00 local time a duty cycle limit of 0,1 % may be used.	The whole band	Equipment that concentrates or multiplexes individual equipment is excluded.
G	169.5875-169.8125MHz	10 mW	≤ 0.1 % duty cycle	The whole band	Equipment that concentrates or multiplexes individual equipment is excluded
H	433,050-434,790 MHz	10 mW	10 %	The whole band	.
I	433,050-434,790 MHz	1 mW e.r.p. -13 dBm/10 kHz PSD for bandwidth modulation larger than 250 kHz	No requirement	The whole band	Audio and video applications are excluded.
J	434,040-434,790 MHz	10 mW	No requirement.	25 kHz	Audio and video applications are excluded.
K	863-865 MHz	25 mW e.r.p.	≤ 0.1% duty cycle or polite spectrum access	The whole band except for audio & video applications limited to 300kHz	
L	865-868 MHz	25 mW e.r.p.	≤ 1% duty cycle or polite spectrum access	The whole band	

Operational Frequency Band		Maximum effective radiated power, e.r.p.	Channel access and occupation rules (e.g. Duty cycle or LBT + AFA)	Maximum occupied bandwidth	Other usage restrictions
M	868.000-868.600 MHz	25 mW e.r.p.	≤ 1% duty cycle or polite spectrum access	The whole band	
N	868.700-869.200 MHz	25 mW e.r.p.	≤ 0.1% duty cycle or polite spectrum access	The whole sub-band	
O	869.400-869.650 MHz	500 mW e.r.p.	≤ 10% duty cycle or polite spectrum access	The whole band	
P	869.700-870.000 MHz	5 mW e.r.p.	No requirement	The whole band	Audio and video applications are excluded.
Q	869,700-870,000 MHz	25 mW e.r.p.	≤ 1 % duty cycle or polite spectrum access	The whole band	Audio and video applications are excluded. Analogue video applications are excluded.
R	34,995-35,225 MHz	100 mW e.r.p.	No requirement	10 kHz	Only for Flying radio models
S	40,665 MHz, 40,675 MHz, 40,685 MHz, 40,695 MHz	100 mW e.r.p.	No requirement	10 kHz	Only for Radio models
T	138,20-138,45 MHz	10 mW e.r.p.	≤ 1,0 % duty cycle	The whole band	
U	865-868 MHz	25 mW e.r.p.	≤ 1 % duty cycle or polite spectrum access	50 kHz for 58 or more channels	Applies only to equipment using FHSS technique
V	865-868 MHz	25 mW e.r.p. Power spectral density: +6,2 dBm/100 kHz.	≤ 1 % duty cycle or polite spectrum access	3 MHz except for audio and video limited to 300 kHz and voice limited to 25 kHz	Applies only to equipment using DSSS and any technique other than FHSS
W	865-868 MHz	10 mW e.r.p	≤ 1 % duty cycle or polite spectrum access	3 MHz except for audio and video limited to 300 kHz	Applies only to equipment using DSSS and any technique other than FHSS
X	865-868 MHz	25 mW e.r.p	≤ 1 % duty cycle or polite spectrum access	300 kHz except for video limited to 25kHz	

Operational Frequency Band		Maximum effective radiated power, e.r.p.	Channel access and occupation rules (e.g. Duty cycle or LBT + AFA)	Maximum occupied bandwidth	Other usage restrictions
Y	863-870 MHz	25 mW e.r.p.	≤ 0.1 % duty cycle or polite spectrum access	100 kHz for 47 or more channels.	
Z	863-870 MHz	25 mW e.r.p. Power spectral density: -4,5 dBm/100 kHz.	≤ 0.1 % duty cycle or polite spectrum access	7 MHz except for audio and video limited to 300 kHz and voice limited to 25 kHz	Applies only to equipment using DSSS and any technique other than FHSS Sub-bands [868,6 MHz to 868,7 MHz], [869,250 MHz to 869,4 MHz], [869,650 MHz to 869,700 MHz] for alarms are excluded
AA	863-870 MHz	25 mW e.r.p.	≤ 0.1 % duty cycle or polite spectrum access	300 kHz except for voice limited to 25 kHz	Sub-bands [868,6 MHz to 868,7 MHz], [869,250 MHz to 869,4 MHz], [869,650 MHz to 869,700 MHz] for alarms are excluded
AB	865-870 MHz	25 mW e.r.p. Power spectral density: -0,8 dBm/100 kHz.	≤ 0.1 % duty cycle or polite spectrum access	5 MHz except for audio and video limited to 300 kHz and voice limited to 25 kHz	Applies only to equipment using DSSS and any technique other than FHSS Sub-bands [868,6 MHz to 868,7 MHz], [869,250 MHz to 869,4 MHz], [869,650 MHz to 869,700 MHz] for alarms are excluded
AC	870.000-875.800MHz	25 mW e.r.p.	≤ 1 % duty cycle For ER-GSM protection (873 MHz to 875,8 MHz, where applicable), the duty cycle is limited to ≤ 0.01 % and T_{on}_max is limited to 5 ms/1 s	600 kHz	See note

Operational Frequency Band		Maximum effective radiated power, e.r.p.	Channel access and occupation rules (e.g. Duty cycle or LBT + AFA)	Maximum occupied bandwidth	Other usage restrictions
AD	875.8-876MHz	25 mW e.r.p.	≤ 0.1 % duty cycle For ER-GSM protection where applicable, the duty cycle is limited to ≤ 0.01 % and T_{on}_max is limited to 5 ms/1 s	200 kHz	See note
AE	870.000-875.800MHz	500 mW e.r.p. restricted to vehicle-to-vehicle applications. 100 mW e.r.p. is restricted to in-vehicle applications.	≤ 0.1 % duty cycle For ER-GSM protection (873 MHz to 875,8 MHz, where applicable), the duty cycle is limited to ≤ 0.01 % and T_{on}_max is limited to 5 ms/1 s	500 kHz	Only for tracking, tracing and data acquisition See note
AF	915-915.2MHz	25 mW e.r.p.	≤ 0.1 % duty cycle	200 kHz	See note
AG	920.8-921MHz	25 mW e.r.p.	≤ 0.1 % duty cycle For ER-GSM protection where applicable, the duty cycle is limited to ≤ 0.01 % and T_{on}_max is limited to 5 ms/1 s	200 kHz	See note
AH	915.200-920.800MHz	25 mW e.r.p. except for the 4 channels for the 4 channels identified in channel with centre frequencies at 916,3 MHz, 917,5 MHz, 918,7 MHz and 919,9 MHz, where 100 mW e.r.p. applies.	≤ 1 % duty cycle For ER-GSM protection (918 MHz to 920.8 MHz, where applicable), the duty cycle is limited to ≤ 0.01 % and T_{on}_max is limited to 5 ms/1 s	600 kHz except for the 4 channels identified in channel with centre frequencies at 916,3 MHz, 917,5 MHz, 918,7 MHz and 919,9 MHz. The channel bandwidth is limited to 400 kHz	See note
NOTE: To bands AD to AI: Use of all or part of sub-bands AD to AI may be denied in some European countries that use all or part of these sub-bands for defence/governmental systems. In some member states the upper sub-bands 873 MHz to 876 MHz and 918 MHz to 921 MHz are allocated to the railways for ER-GSM. For the case that a frequency allocation is available in those countries for SRDs, sharing of these sub-bands by SRDs with ER-GSM is permitted provided SRD systems operate in accordance with agreed mitigation measures such as transmission timing limitations as set out in ECC Report 200 [i.6]. The required timing restrictions are included in the column "Channel access and occupation rules". See Appendix 3 of CEPT/ERC/REC 70-03 [i.1] for national implementation concerning ER-GSM and defence/governmental services.					

The adjacent frequency bands below 862 MHz and above 870 MHz may be used by high power systems. The same applies to the bands below 915 MHz and above 876 MHz as well as above 921 MHz. Manufacturers should take this into account in the design of equipment and choice of power levels.

4.2.2 Test Procedures

Refer to EN 300 220-1 V3.1.1 clause 5.2.2.1.2.

4.2.3 Deviation of Test Standard

No deviation.

4.2.4 Test Setup

The measurements for RF output power was performed at both normal environmental conditions and at the extremes of the operating temperature. Controlling software has been activated to set the EUT on specific channel and power level.

4.2.5 Test Results

Frequency (MHz)	Antenna Gain (dBi)	Conducted Power (dBm)	Total Power (dBm) E.R.P	Limit of Power (dBm)	Pass / Fail
868.3	0.3	14.72	12.87	13.98	Pass
869.525	0.3	15.97	14.12	26.98	Pass

Note: EIRP=Conducted power + antenna gain, ERP=EIRP-2.15

Test Condition				Transmitter Power e.r.p (dBm)	
				868.3MHz	869.525 MHz
T_{nom}	25 ℃	V_{nom}	5.00V	12.87	14.12
T_{min}	-40 ℃	V_{max}	5.50 V	13.40	14.80
		V_{min}	4.50 V	13.29	14.62
T_{max}	85 ℃	V_{max}	5.50 V	13.39	14.78
		V_{min}	4.50 V	13.15	14.59
Limit of Power (dBm)				13.98 dBm	26.98 dBm

4.3 Occupied Bandwidth

4.3.1 Limit of Occupied Bandwidth

The Operating Channel shall be declared and shall reside entirely within the Operational Frequency Band. The Maximum Occupied Bandwidth at 99 % shall reside entirely within the Operating Channel defined by F_{low} and F_{high}.

4.3.2 Test Procedure

Refer to EN 300 220-1 V3.1.1 clause 5.6.3.4

4.3.3 Deviation from Test Standard

No deviation.

4.3.4 Test Setup

Under normal use condition, the transmitter will transmit power only when the EUT power on.

4.3.5 Test Results

Extreme Temp/Voltage				Freq. (MHz)	99% Occupied Bandwidth (MHz)	Measured frequencies		Limit		Pass /Fail
						F_L (MHz)	F_H (MHz)	F_L (MHz)	F_H (MHz)	
Tnom (℃)	25	Vnom (v)	5.00	868.3	0.126	868.238	868.364	868.00	868.60	Pass
				869.525	0.128	869.461	869.589	869.40	869.65	Pass
Tmin (℃)	-40	Vmax (v)	4.5	868.3	0.124	868.238	868.362	868.00	868.60	Pass
				869.525	0.126	869.461	869.587	869.40	869.65	Pass
		Vmin (v)	5.50	868.3	0.126	868.236	868.362	868.00	868.60	Pass
				869.525	0.128	869.461	869.589	869.40	869.65	Pass
Tmax (℃)	85	Vmax (v)	4.50	868.3	0.126	868.236	868.362	868.00	868.60	Pass
				869.525	0.128	869.461	869.589	869.40	869.65	Pass
		Vmin (v)	5.50	868.3	0.128	868.236	868.364	868.00	868.60	Pass
				869.525	0.124	869.463	869.587	869.40	869.65	Pass

4.4 Transient Power

4.4.1 Limit of Transient Power

Absolute offset from centre frequency	RBW $_{REF}$	Peak power limit applicable at measurement points
≤ 400 kHz	1 kHz	0 dBm
> 400 kHz	1 kHz	-27dBm

4.4.2 Test Procedure

Refer to EN 300 220-1 V3.1.1 clause 5.10.3.2.

4.4.3 Deviation from Test Standard

No deviation.

4.4.4 Test Setup

Under normal use condition, the transmitter will transmit power only when the EUT power on.

4.4.5 Test Result

Frequency	868.3 MHz	Operating Channel Bandwidth					126kHz			
Measurement points: offset from centre frequency	Analyser RBW	Measurement power level (dBm)					Maximun $RBW_{measured}$ Level (dBm)	RBW_{ref} Level (dBm)	Limit (dBm)	Test Result
		1	2	3	4	5				
+1263kHz	300kHz	-49.56	-49.46	-49.66	-49.39	-49.42	-49.39	-74.16	-27	Pass
+463kHz	100kHz	-45.18	-45.04	-45.18	-45.05	-45.20	-45.04	-65.04	-27	Pass
+126kHz	10kHz	-30.98	-30.98	-30.98	-31.12	-30.90	-30.90	-40.90	0	Pass
+ 66kHz	1kHz	-12.08	-12.19	-12.25	-12.09	-11.99	-11.99	-11.99	0	Pass
- 66kHz	1kHz	-11.48	-11.56	-11.42	-11.42	-11.34	-11.34	-11.34	0	Pass
-126kHz	10kHz	-32.32	-32.41	-32.18	-32.20	-32.35	-32.18	-42.18	0	Pass
-463kHz	100kHz	-45.78	-45.69	-45.82	-45.67	-45.66	-45.66	-65.66	-27	Pass
-1263kHz	300kHz	-49.53	-49.72	-49.59	-49.50	-49.46	-49.46	-74.23	-27	Pass

Frequency	869.525 MHz	Operating Channel Bandwidth					128kHz			
Measurement points: offset from centre frequency	Analyser RBW	Measurement power level (dBm)					Maximun $RBW_{measured}$ Level (dBm)	RBW_{ref} Level (dBm)	Limit (dBm)	Test Result
		1	2	3	4	5				
+1264kHz	300kHz	-48.91	-48.76	-48.92	-48.97	-49.06	-48.76	-73.53	-27	Pass
+464kHz	100kHz	-46.43	-46.52	-46.48	-46.34	-46.60	-46.34	-66.34	-27	Pass
+128kHz	10kHz	-30.76	-30.75	-30.71	-30.87	-30.91	-30.71	-40.71	0	Pass
+ 67kHz	1kHz	-12.75	-12.92	-12.86	-12.58	-12.63	-12.58	-12.58	0	Pass
- 67kHz	1kHz	-13.04	-12.92	-12.90	-12.92	-13.20	-12.90	-12.90	0	Pass
-128kHz	10kHz	-32.80	-32.82	-32.77	-32.70	-32.98	-32.70	-42.70	0	Pass
-464kHz	100kHz	-46.16	-46.20	-46.08	-45.96	-46.00	-45.96	-65.96	-27	Pass
-1264kHz	300kHz	-48.99	-49.00	-48.85	-48.97	-49.08	-48.85	-73.62	-27	Pass

4.5 Tx Out Of Band Emissions

4.5.1 Limit of Tx Out Of Band Emissions

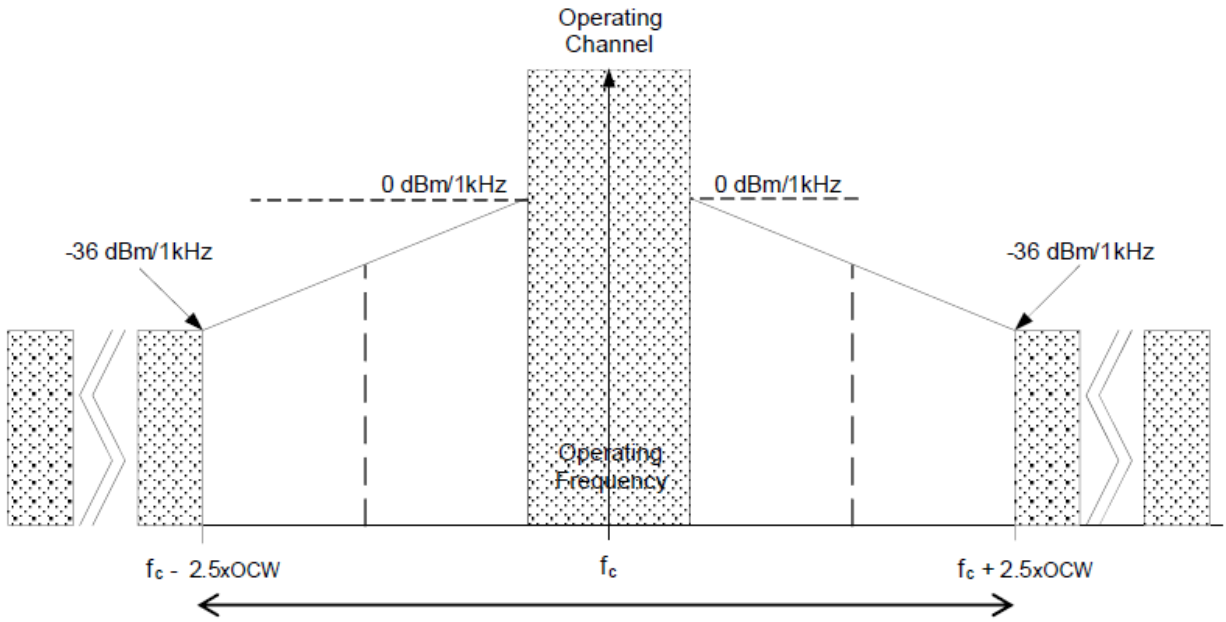


Figure 5: Out Of Band Domain for Operating Channel with reference BW

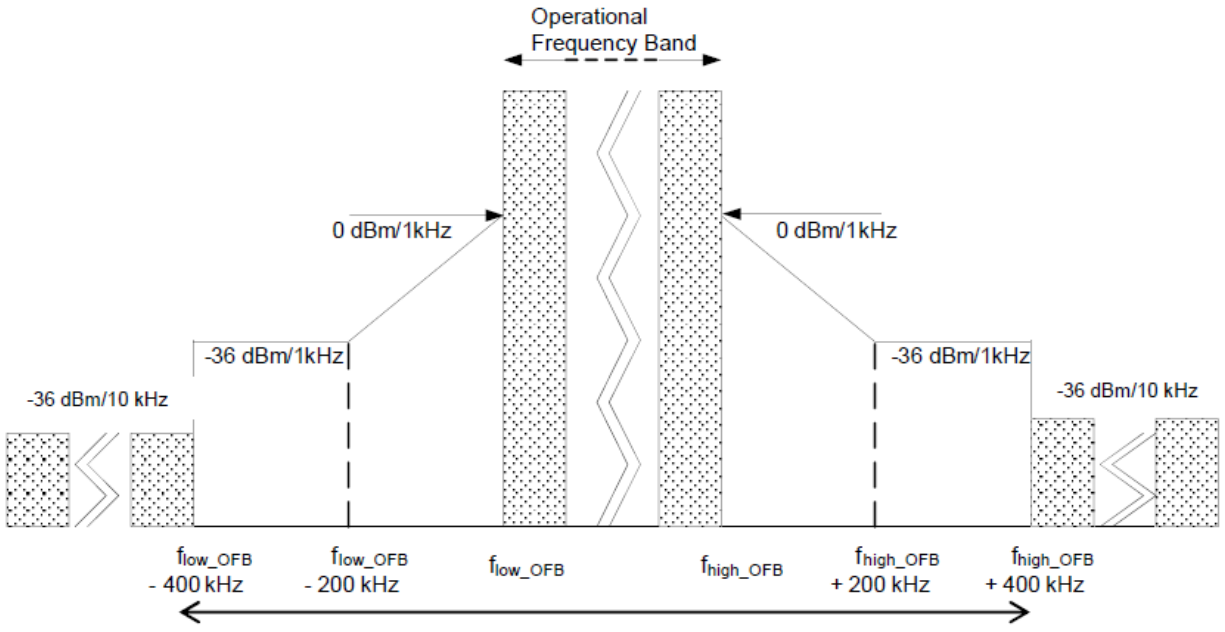


Figure 6: Out Of Band Domain for Operational Frequency Band with reference BW

Table 15: Emission limits in the Out Of Band domains

Domain	Frequency Range	RBW_{REF}	Max power limit
OOB limits aplicable to Operational Frequency Band (See Figure 6)	$f \leq f_{low}$ -400kHz	10 kHz	-36dBm
	$f_{low} - 400\ kHz \leq f \leq f_{low} - 200\ kHz$	1 kHz	-36dBm
	$f_{low} - 200\ kHz \leq f < f_{low}$	1 kHz	See figure 6
	$f = f_{low}$	1 kHz	0dBm
	$f = f_{high}$	1 kHz	0dBm
	$f_{high} < f \leq f_{high} + 200\ kHz$	1 kHz	See figure 6
	$f_{high} + 200\ kHz \leq f \leq f_{high} + 400\ kHz$	1 kHz	-36dBm
	$f_{high} + 400\ kHz \leq f$	10 kHz	-36dBm
OOB limits applicable to Operating Channel (See figure 5)	$f = f_c - 2.5xOCW$	1kHz	-36dBm
	$f_c - 2.5xOCW \leq f \leq f_c - 0.5xOCW$	1kHz	See figure 5
	$f = f_c - 0.5xOCW$	1kHz	0dBm
	$f = f_c + 0.5xOCW$	1kHz	0dBm
	$f_c + 0.5xOCW \leq f \leq f_c + 2.5xOCW$	1kHz	See figure 5
	$f = f_c + 2.5xOC$	1kHz	-36dBm

Note: f is the measurement frequency.
f_C is the Operating Frequency.
f_{low} is the lower edge of the Operational Frequency Band.
f_{high} is the upper edge of the Operational Frequency Band.
OCW is the operating channel bandwidth.

4.5.2 Test Procedure

Refer to EN 300 220-1 V3.1.1 clause 5.8.3.4.

4.5.3 Deviation from Test Standard

No deviation.

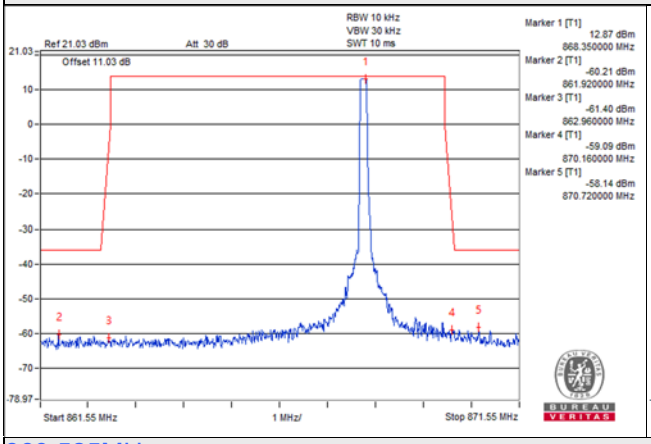
4.5.4 Test Setup

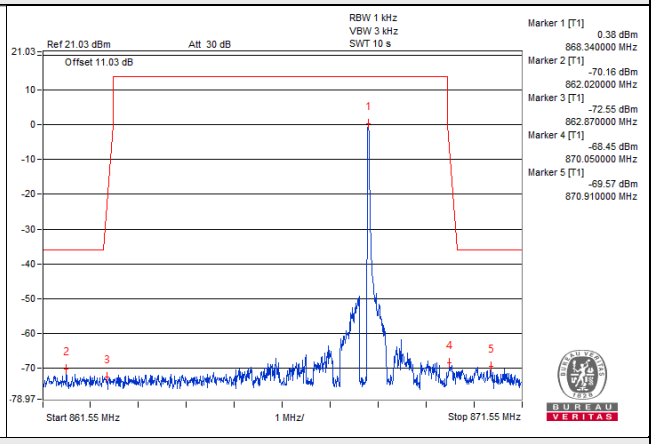
The EUT was placed at a site with temperature control and supplied with power for extreme voltage testing. Antenna with suitable frequency range was used during the test.

4.5.5 Test Results

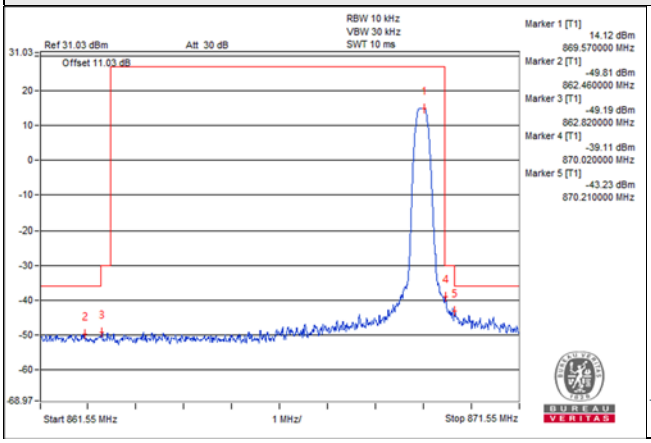
Out of Band Domain for Operation Frequency Band with reference BW

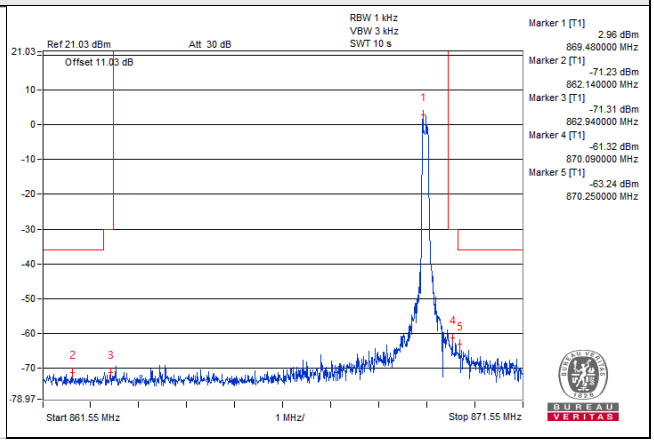
Tnom(℃)
Vnom(V)
868.3MHz





869.525MHz

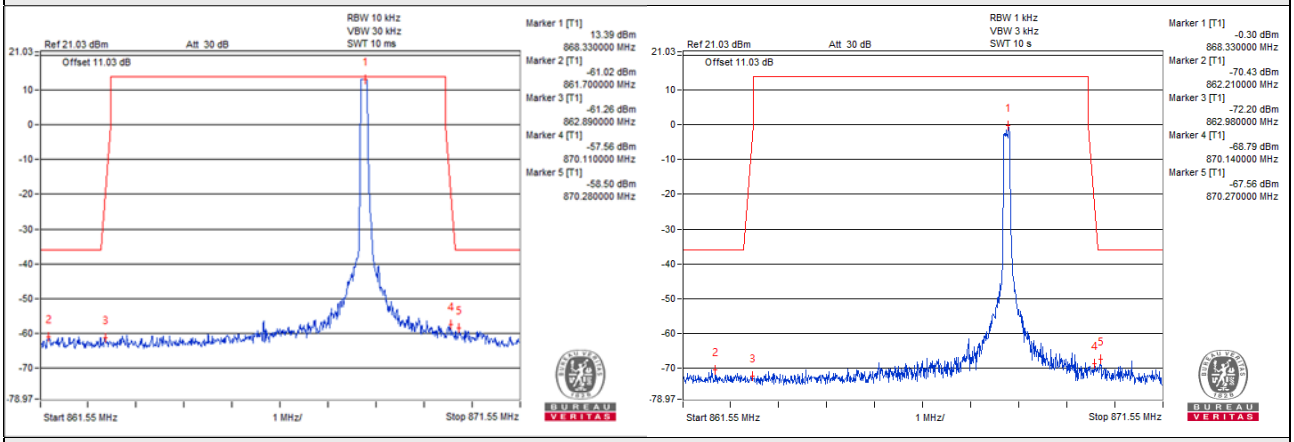




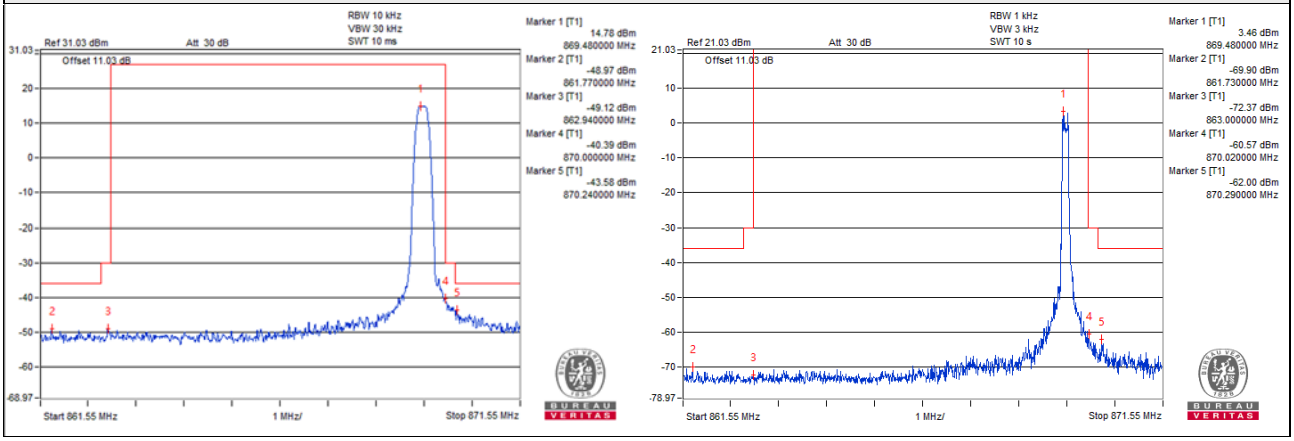
*Marker 2 to Marker 5 final reading, please use RBW/VBW set to 1kHz / 3kHz Test data photo.

Tmax(℃)
Vmax(V)

868.3MHz



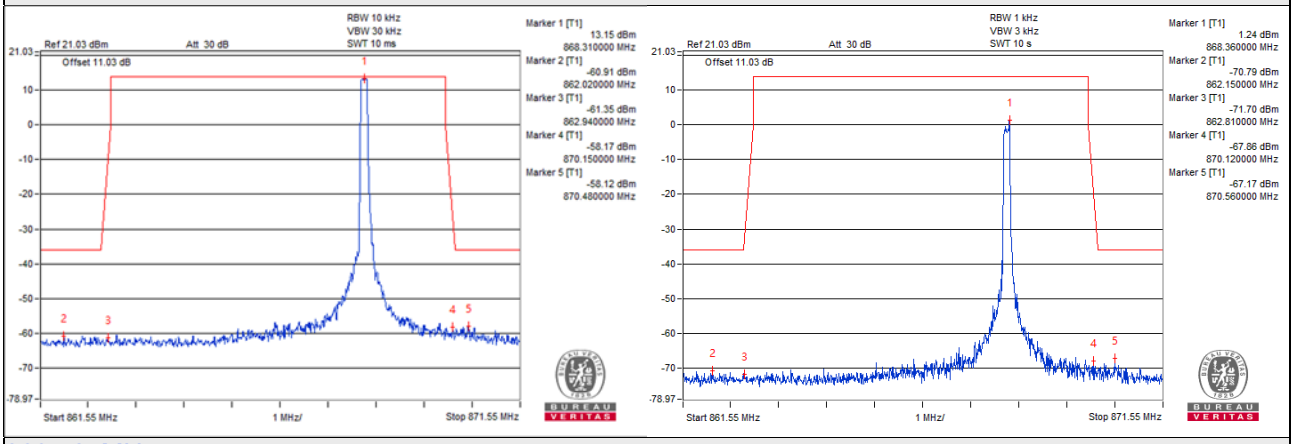
869.525MHz



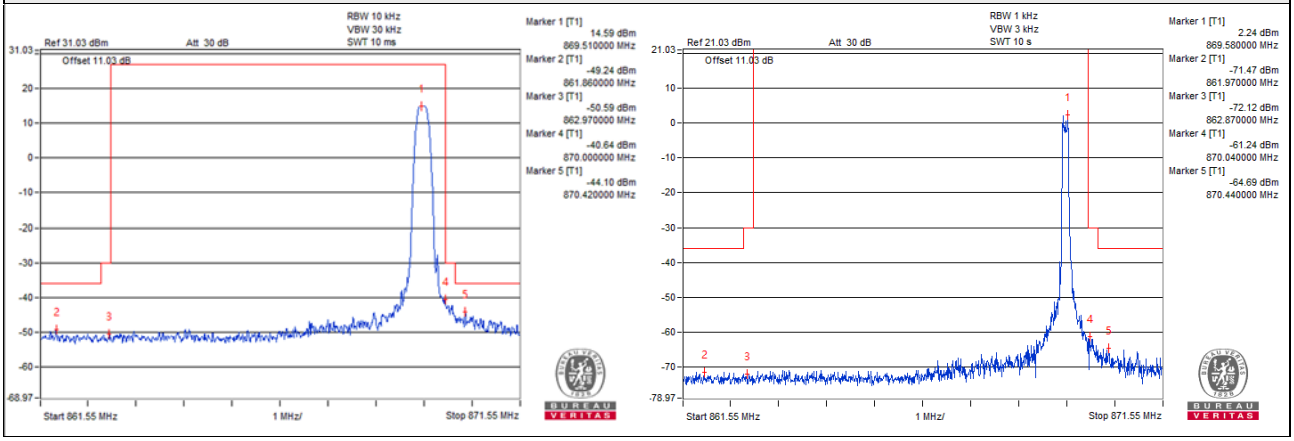
*Marker 2 to Marker 5 final reading, please use RBW/VBW set to 1kHz / 3kHz Test data photo.

Tmax(℃)
Vmin(V)

868.3MHz



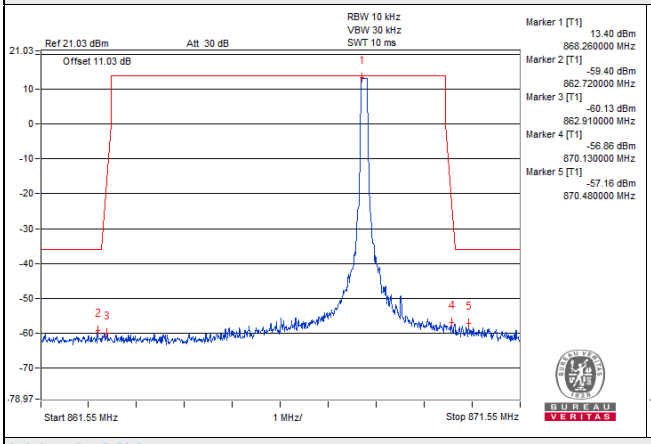
869.525MHz

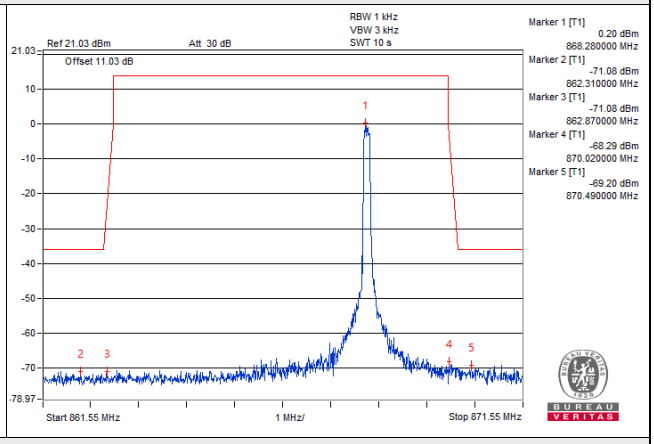


*Marker 2 to Marker 5 final reading, please use RBW/VBW set to 1kHz / 3kHz Test data photo.

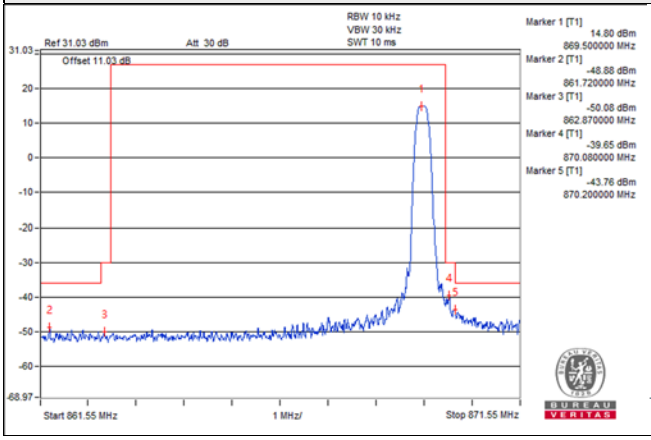
Tmin(℃)
Vmax(V)

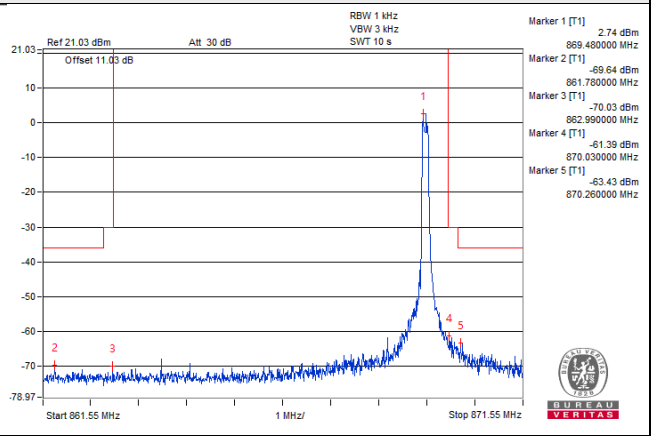
868.3MHz





869.525MHz

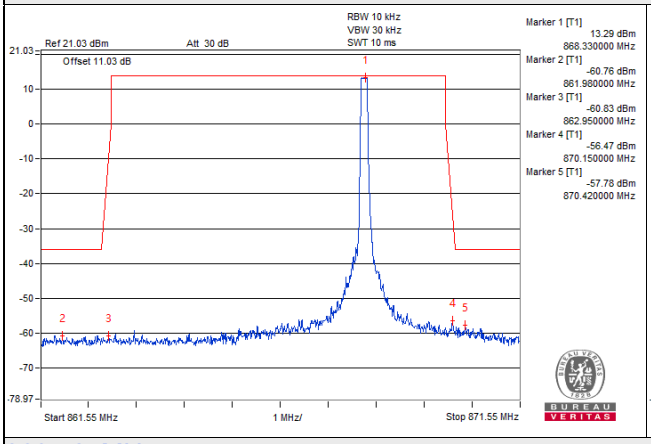


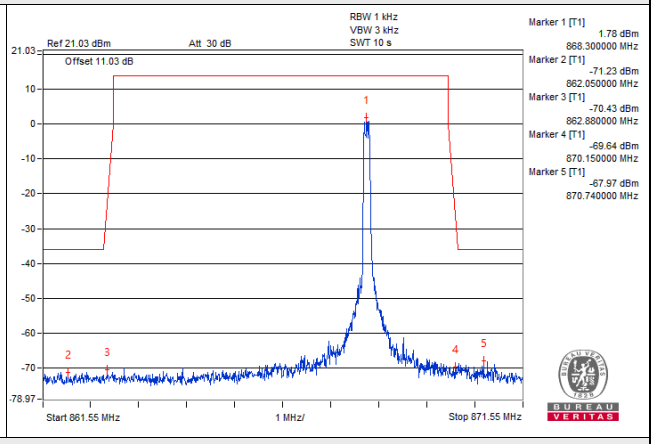


*Marker 2 to Marker 5 final reading, please use RBW/VBW set to 1kHz / 3kHz Test data photo.

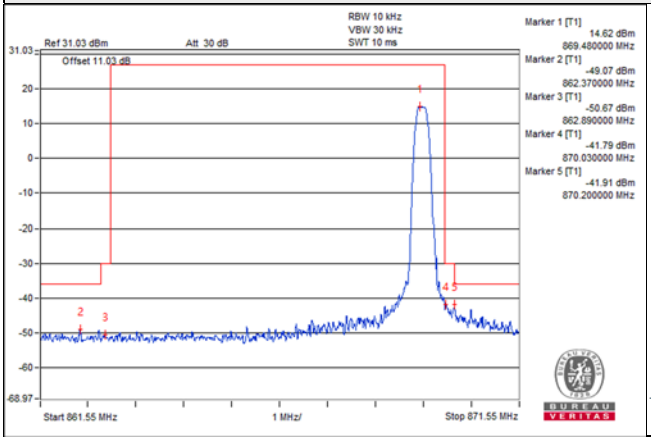
Tmin(℃)
Vmin(V)

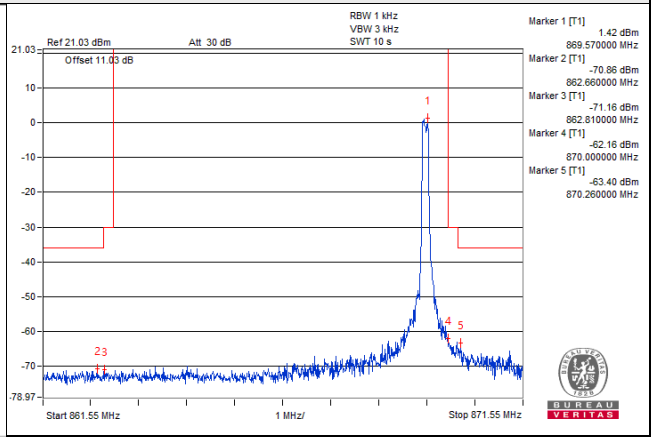
868.3MHz





869.525MHz



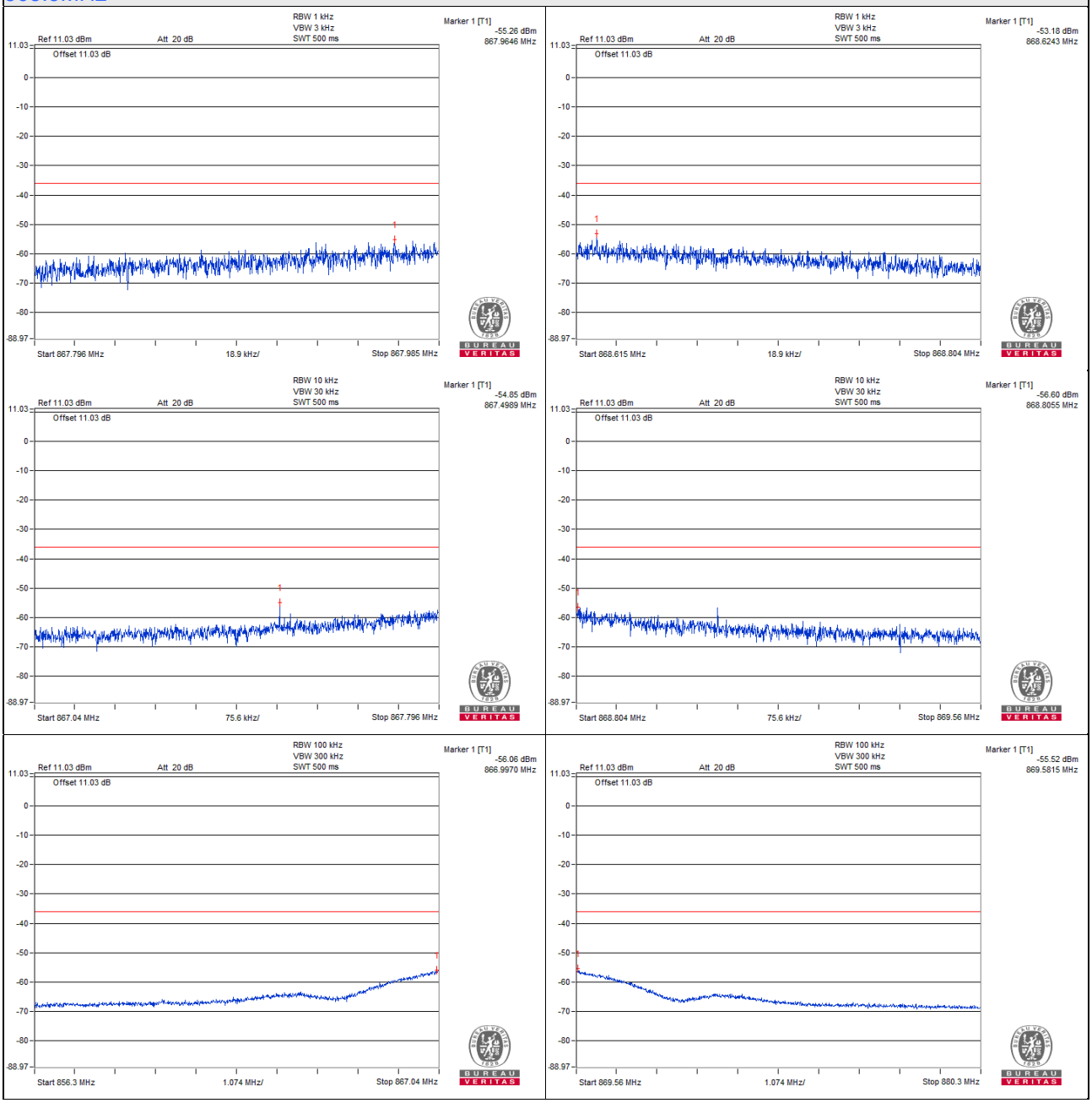


*Marker 2 to Marker 5 final reading, please use RBW/VBW set to 1kHz / 3kHz Test data photo.

Out of Band Domain for Operation Channel with reference BW

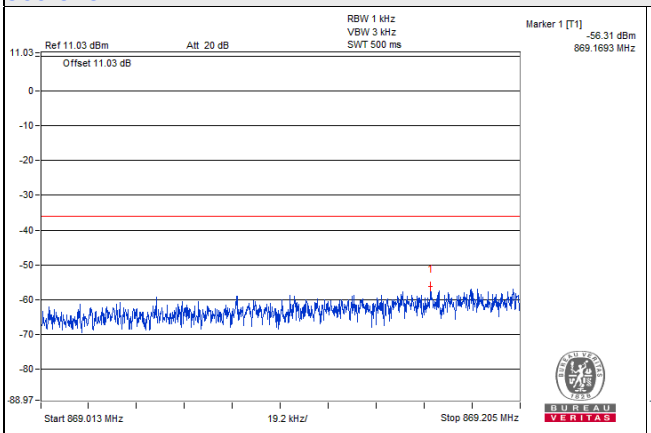
Tnom(℃)
Vnom(V)

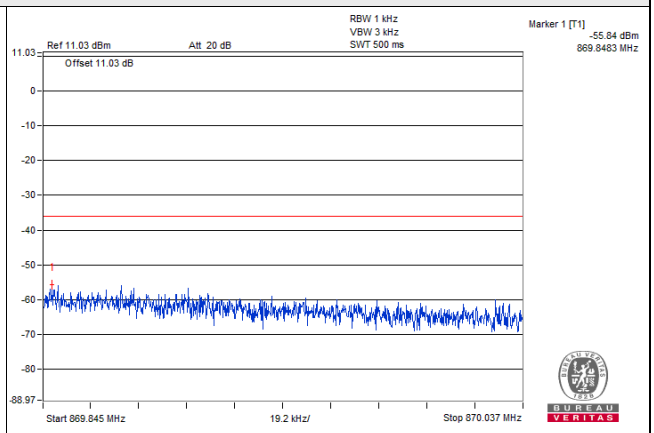
868.3MHz

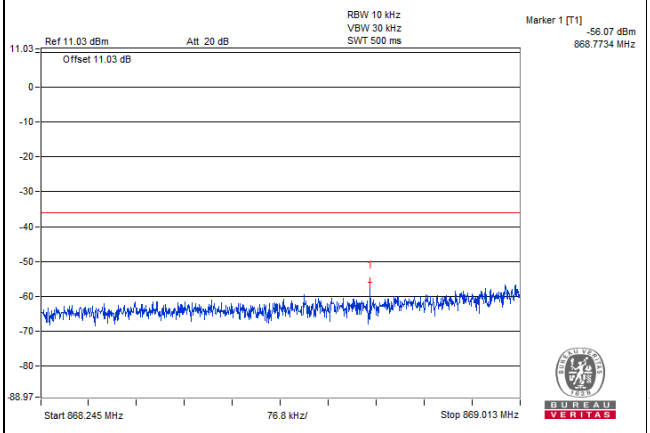


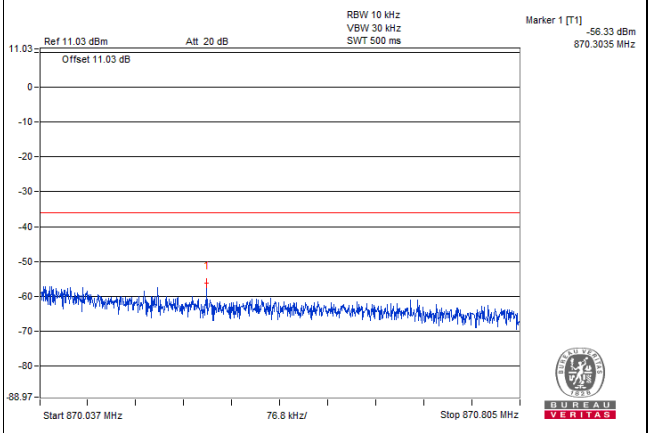
Tnom(℃)
Vnom(V)

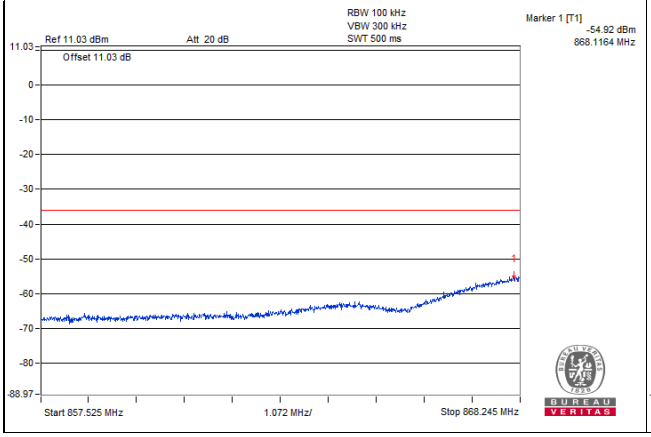
869.525MHz

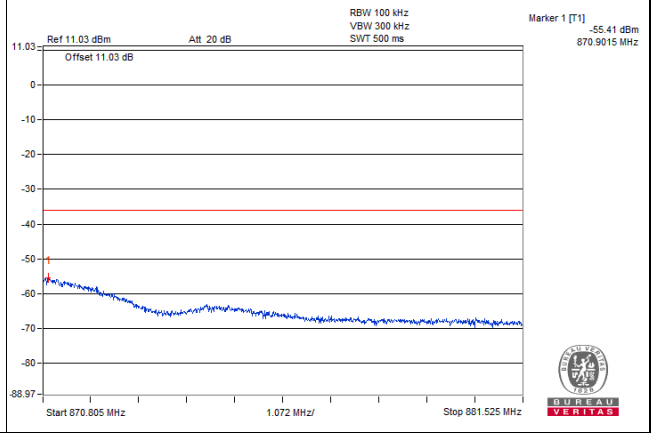










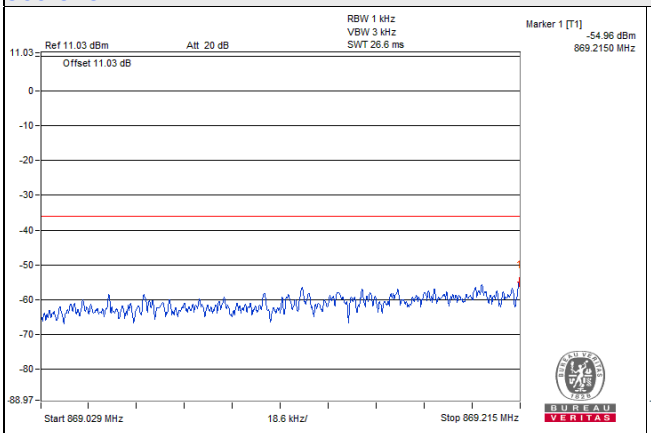


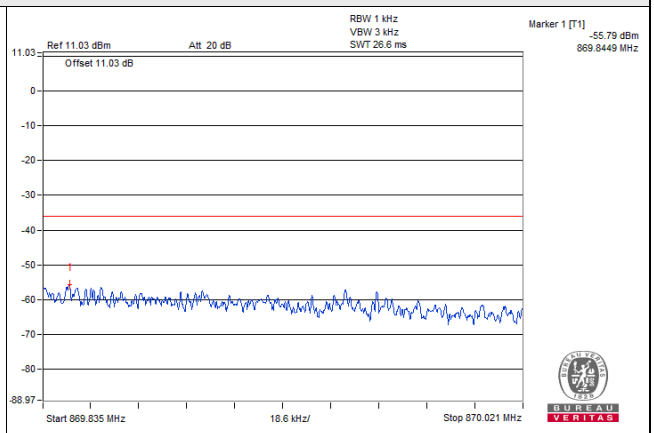
Tmax(℃)
Vmax(V)

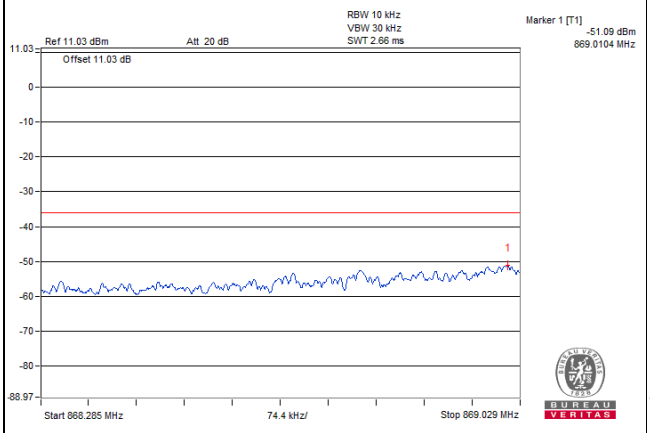
868.3MHz

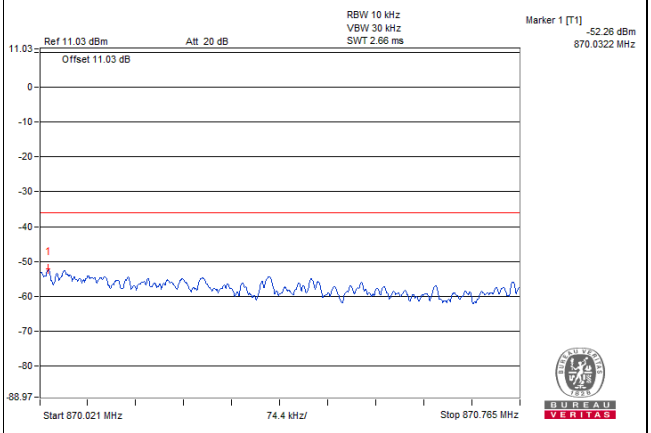
Tmax(℃)
Vmax(V)

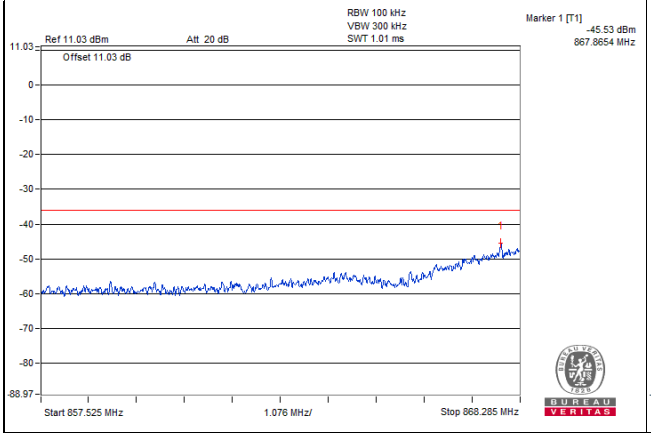
869.525MHz

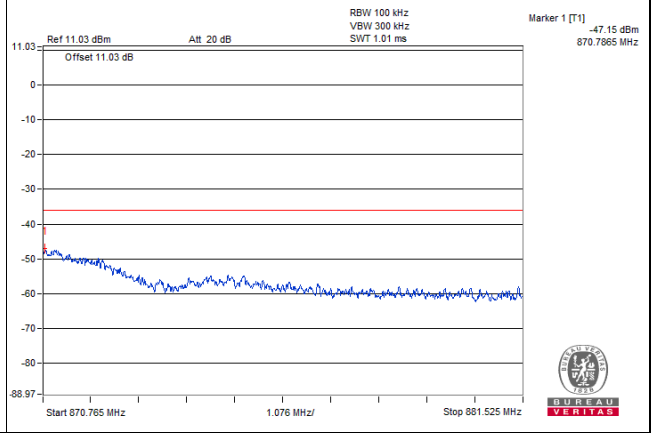






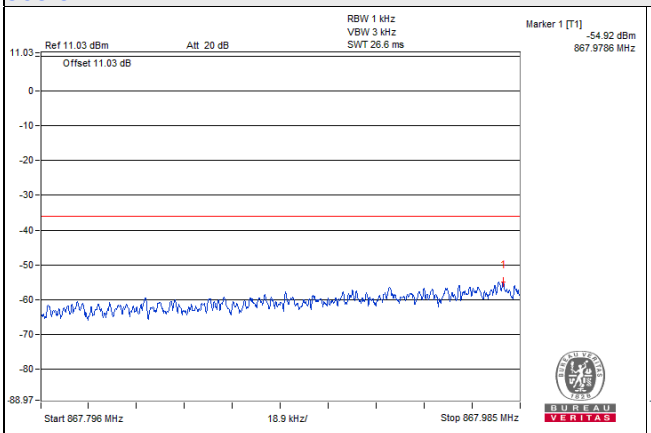


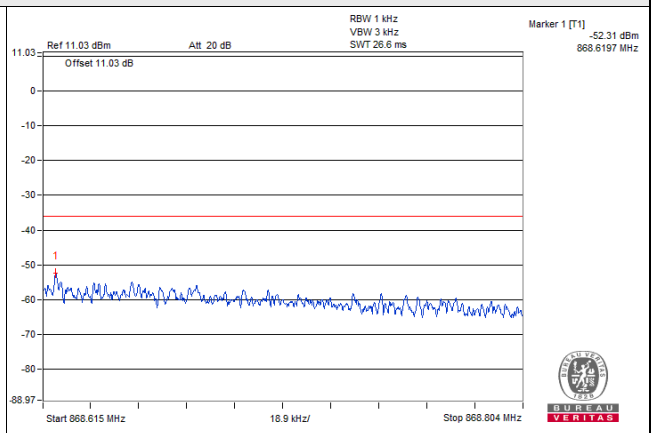


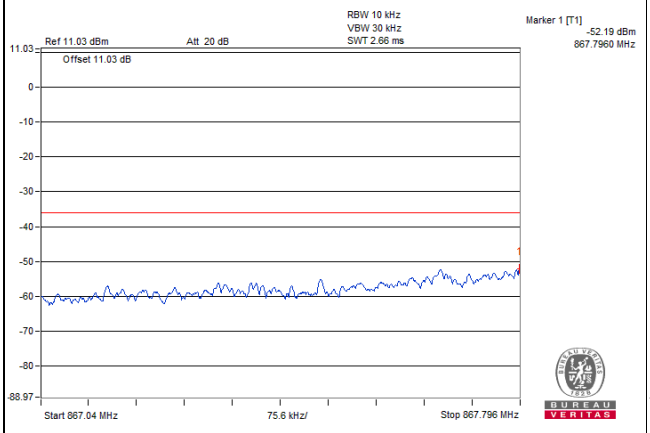


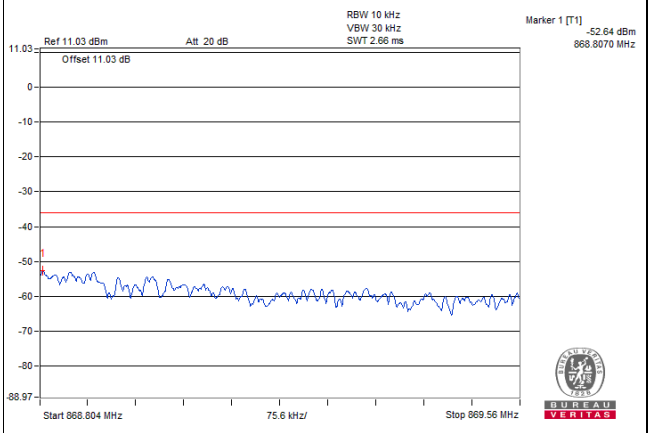
Tmax(℃)
Vmin(V)

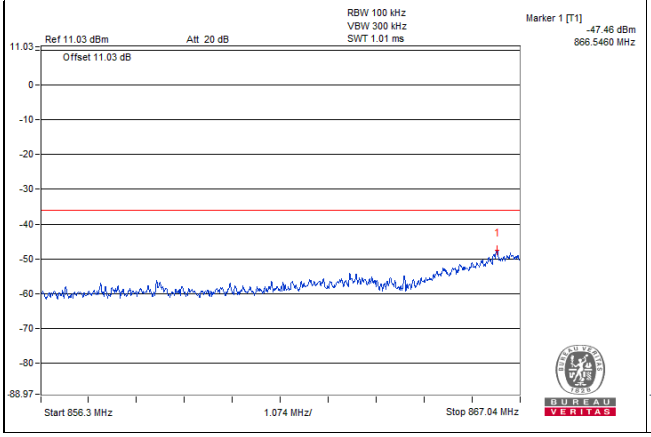
868.3MHz

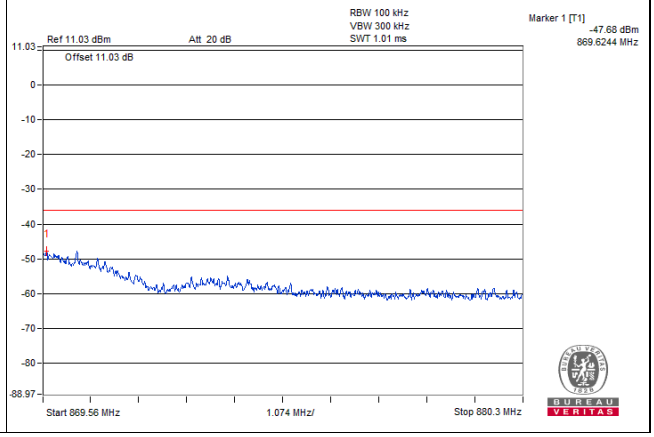










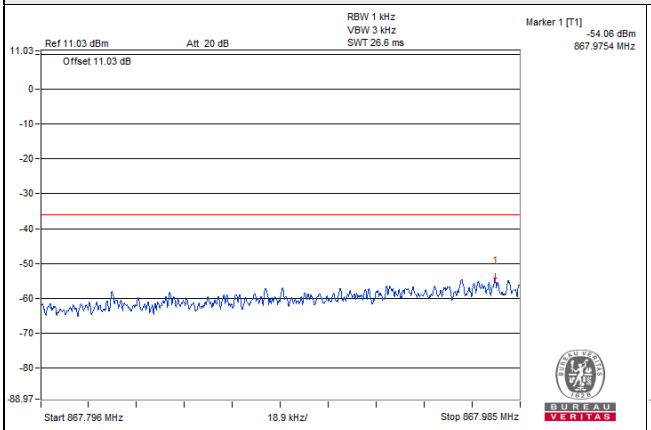


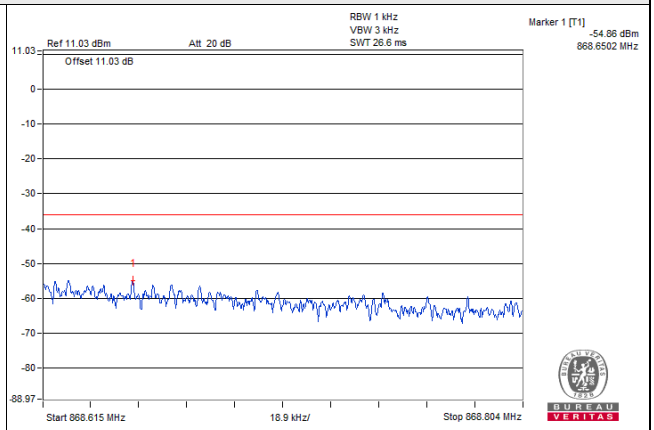
Tmax(℃)
Vmin(V)

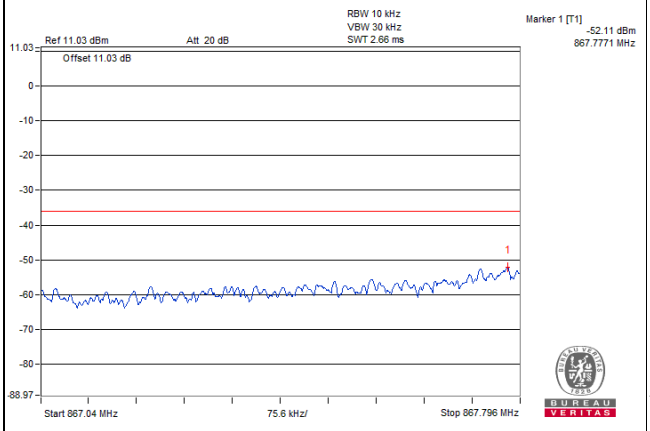
869.525MHz

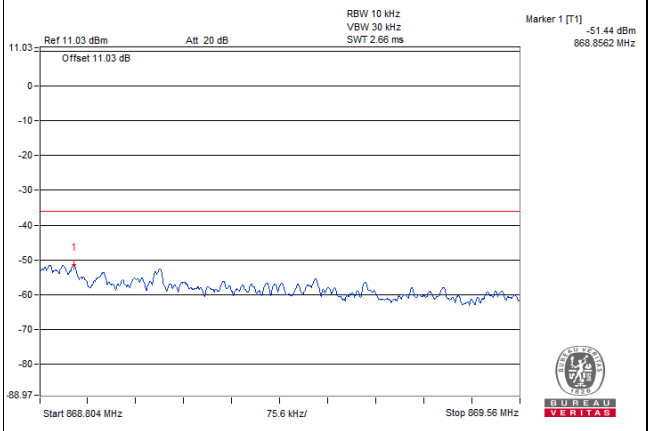
Tmin(℃)
Vmax(V)

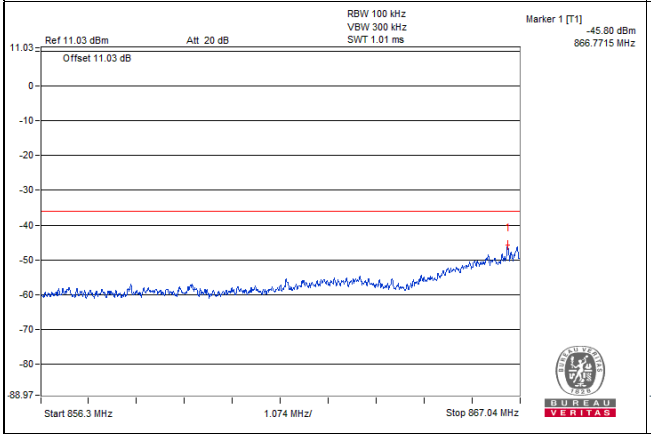
868.3MHz

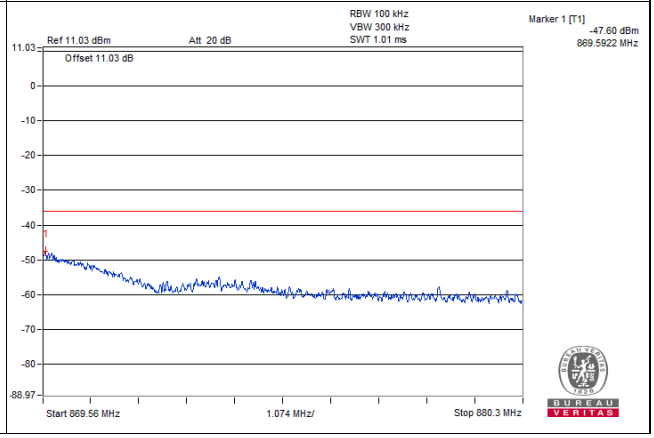






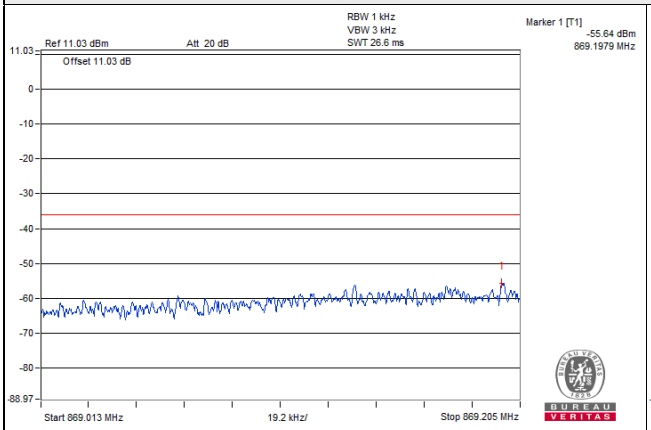


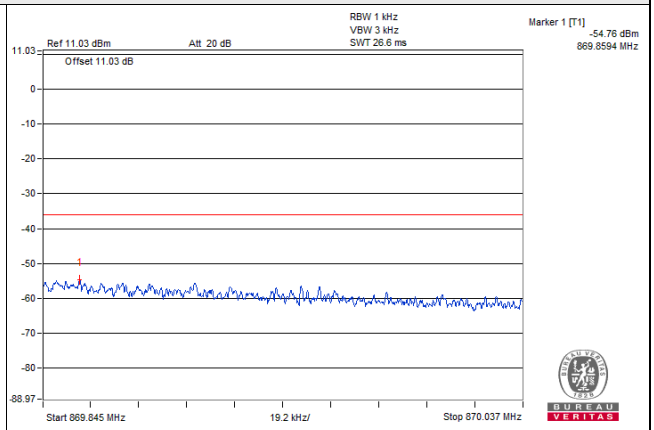


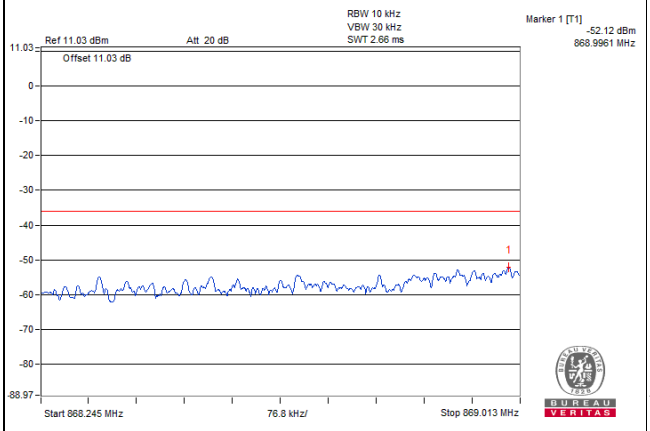


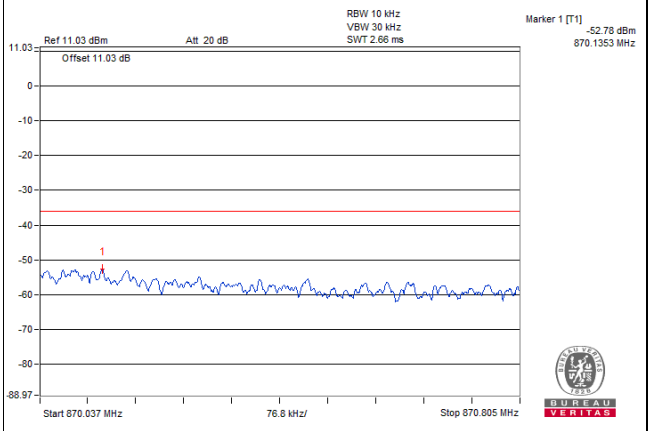
Tmin(℃)
Vmax(V)

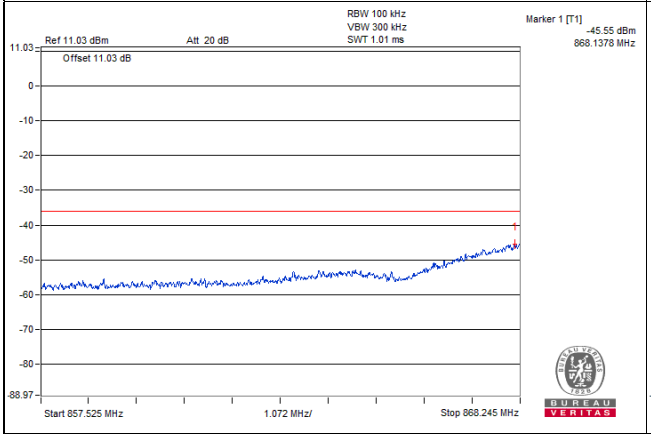
869.525MHz

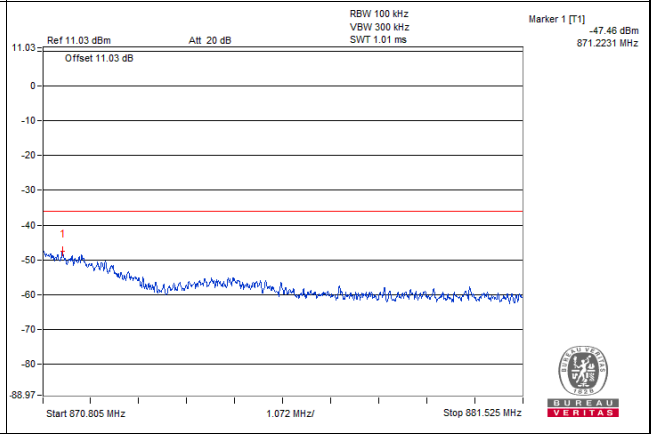






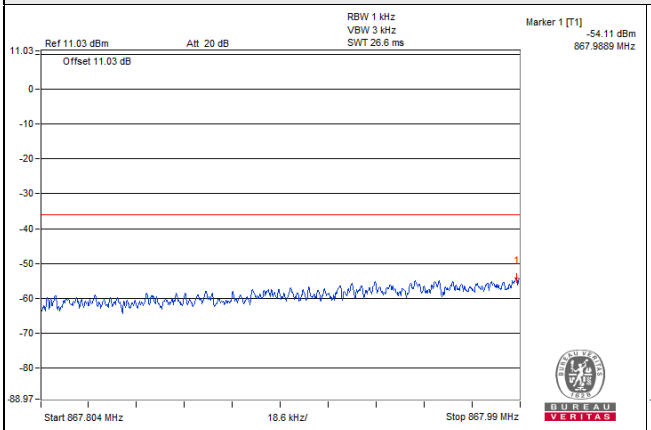


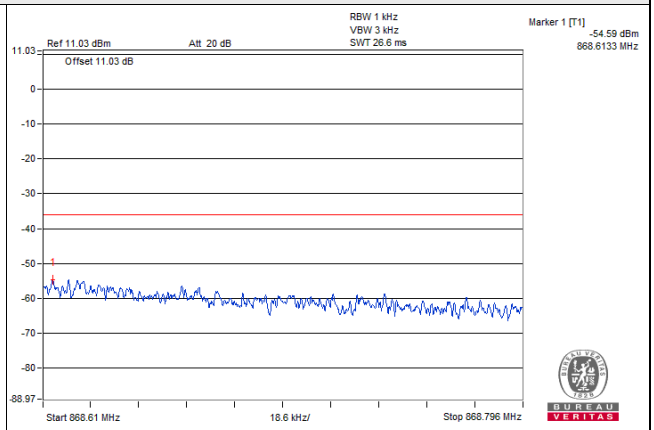


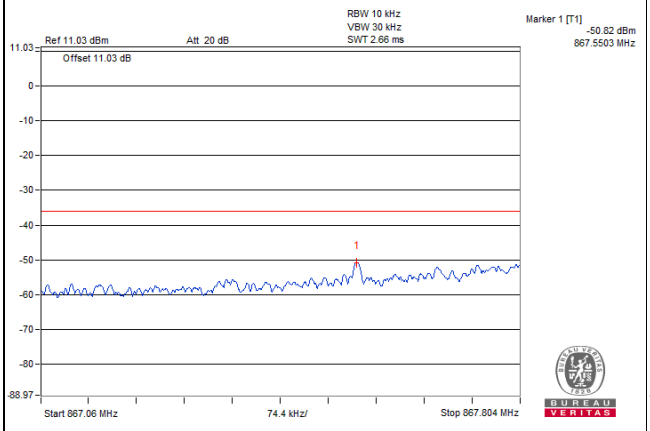


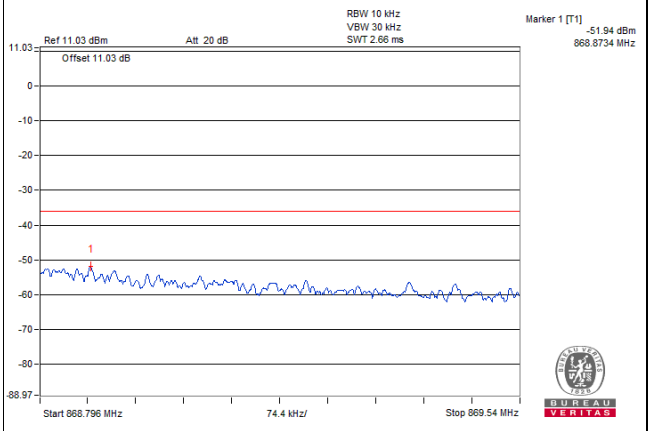
Tmin(℃)
Vmin(V)

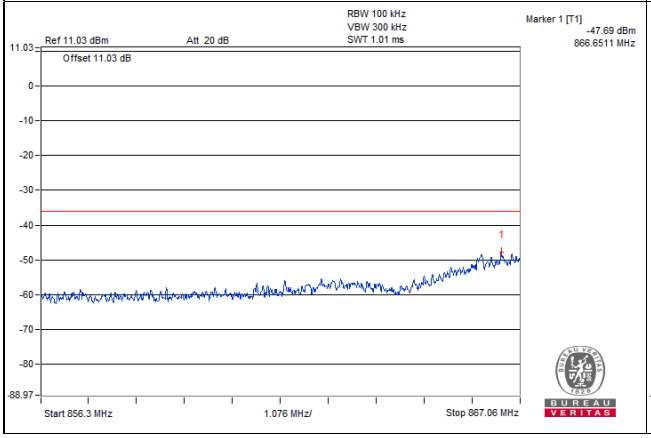
868.3MHz

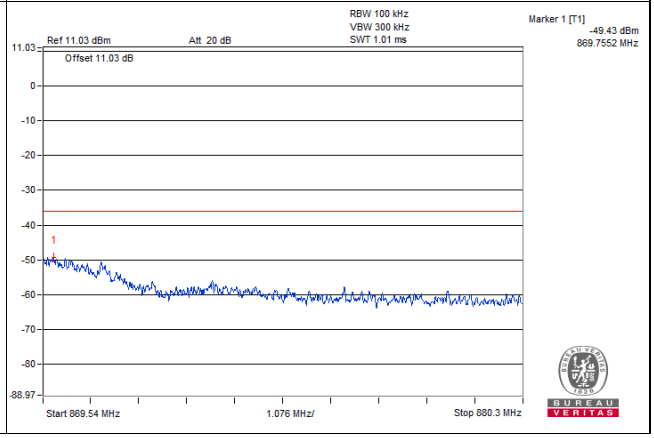






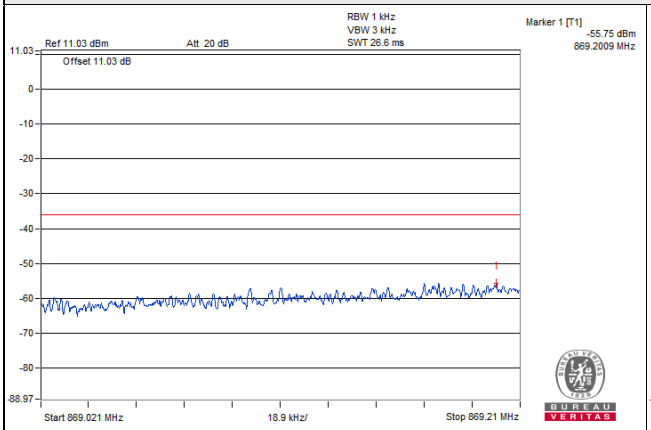


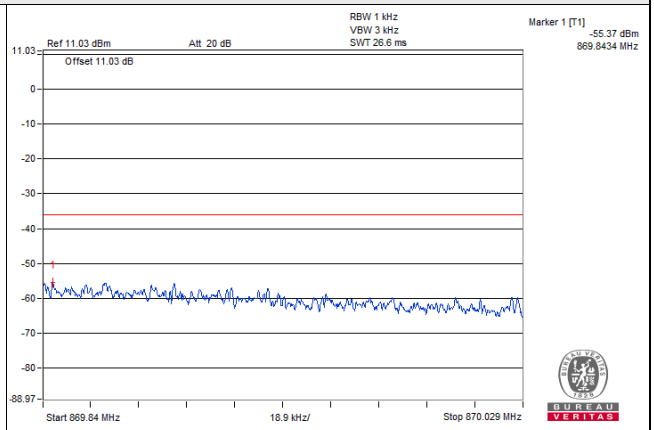


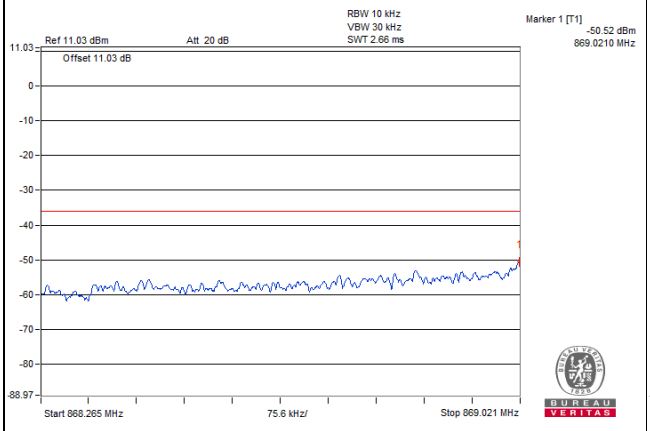


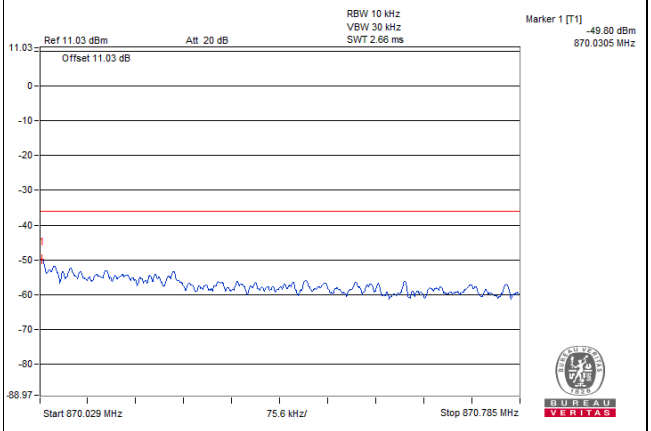
Tmin(℃)
Vmin(V)

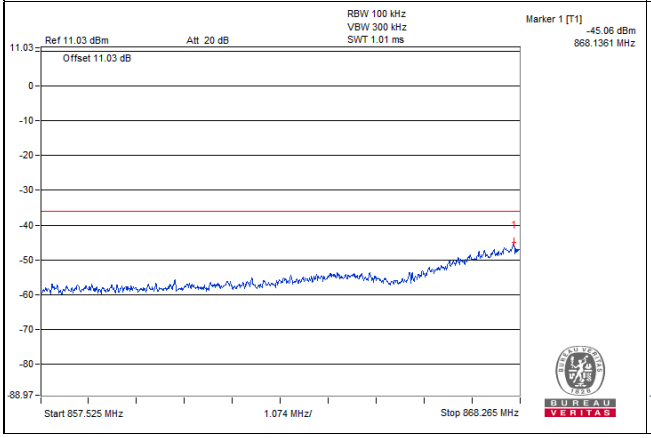
869.525MHz

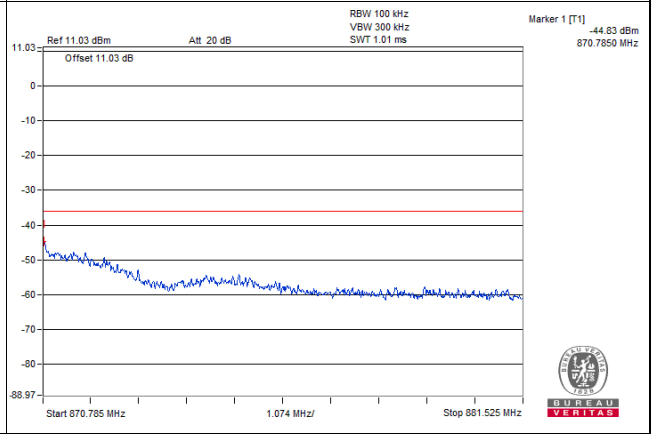












4.6 Unwanted emissions in the spurious domain (Transmitter)

4.6.1 Limits of Unwanted emissions in the spurious domain

Frequency range / Limit / State	47MHz to 74MHz 87.5MHz to 118MHz 174MHz to 230MHz 470MHz to 790MHz	Other frequencies below 1GHz	frequencies above 1GHz
TX mode	–54dBm	–36dBm	–30dBm
RX and all other mode	–57dBm	–57dBm	–47dBm

The measuring frequency range are tuned over the frequency range 25 MHz to 4 GHz, for equipment operating on frequencies below 470 MHz, or over the frequency range of 25 MHz to 6 GHz for equipment operating on frequencies above 470 MHz, except for the channel on which the transmitter is intended to operate and its adjacent channels.

4.6.2 Test Procedure

Refer to EN 300 220-1 V3.1.1 clause 5.9.3.3.2.

4.6.3 Deviation from Test Standard

No deviation.

4.6.4 Test Setup

For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).

4.6.5 Test Results

Operating Frequency	868.3MHz	Frequency Range	25MHz ~ 1GHz
Operating State	TX mode		

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
51.33	H	-82.56	-54.00	-28.56
51.33	V	-72.74	-54.00	-18.74
92.28	V	-77.09	-54.00	-23.09
119.58	H	-84.01	-36.00	-48.01
182.95	V	-74.01	-54.00	-20.01
185.87	H	-75.08	-54.00	-21.08
480.32	H	-79.16	-54.00	-25.16
492.02	V	-81.29	-54.00	-27.29
602.20	H	-76.76	-54.00	-22.76
669.48	V	-77.18	-54.00	-23.18
751.37	V	-75.20	-54.00	-21.20
773.80	H	-75.90	-54.00	-21.90

Operating Frequency	869.525MHz	Frequency Range	25MHz ~ 1GHz
Operating State	TX mode		

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
51.33	H	-79.57	-54.00	-25.57
51.33	V	-73.70	-54.00	-19.70
89.35	V	-77.34	-54.00	-23.34
120.55	H	-78.96	-36.00	-42.96
182.95	H	-78.18	-54.00	-24.18
182.95	V	-74.04	-54.00	-20.04
495.93	H	-81.13	-54.00	-27.13
503.73	V	-80.49	-54.00	-26.49
603.17	V	-79.03	-54.00	-25.03
612.92	H	-77.34	-54.00	-23.34
743.58	H	-70.52	-54.00	-16.52
748.45	V	-75.18	-54.00	-21.18

Operating Frequency	868.3MHz	Frequency Range	1GHz ~ 6GHz
Operating State	TX mode		

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1736.60	H	-52.77	-30.00	-22.77
1736.60	V	-49.29	-30.00	-19.29
2604.90	H	-49.10	-30.00	-19.10
2604.90	V	-47.38	-30.00	-17.38
3473.20	H	-48.09	-30.00	-18.09
3473.20	V	-47.12	-30.00	-17.12
4341.50	H	-39.26	-30.00	-9.26
4341.50	V	-44.50	-30.00	-14.50
5209.80	H	-44.39	-30.00	-14.39
5209.80	V	-47.91	-30.00	-17.91

Operating Frequency	869.525MHz	Frequency Range	1GHz ~ 6GHz
Operating State	TX mode		

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1739.05	H	-50.88	-30.00	-20.88
1739.05	V	-48.91	-30.00	-18.91
2608.50	H	-47.91	-30.00	-17.91
2608.50	V	-46.90	-30.00	-16.90
3478.10	H	-48.00	-30.00	-18.00
3478.10	V	-47.28	-30.00	-17.28
4347.60	H	-39.60	-30.00	-9.60
4347.60	V	-45.04	-30.00	-15.04
5217.10	H	-45.00	-30.00	-15.00
5217.10	V	-49.57	-30.00	-19.57

Operating Frequency	868.3MHz	Frequency Range	25MHz ~ 1GHz
Operating State	Standby mode		

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
49.37	V	-78.05	-57.00	-21.05
122.50	H	-80.22	-57.00	-23.22
168.32	H	-77.50	-57.00	-20.50
168.32	V	-82.27	-57.00	-25.27
247.30	V	-85.41	-57.00	-28.41
263.87	H	-76.68	-57.00	-19.68
393.55	V	-83.13	-57.00	-26.13
455.95	H	-77.49	-57.00	-20.49
492.02	V	-77.42	-57.00	-20.42
600.25	H	-76.77	-57.00	-19.77
688.00	V	-78.44	-57.00	-21.44
843.02	H	-75.71	-57.00	-18.71

Operating Frequency	869.525MHz	Frequency Range	25MHz ~ 1GHz
Operating State	Standby mode		

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
49.37	V	-77.53	-57.00	-20.53
64.00	H	-84.75	-57.00	-27.75
168.32	H	-77.51	-57.00	-20.51
168.32	V	-81.12	-57.00	-24.12
263.87	H	-80.95	-57.00	-23.95
360.40	V	-83.36	-57.00	-26.36
480.32	H	-78.92	-57.00	-21.92
540.77	V	-80.68	-57.00	-23.68
623.65	H	-79.10	-57.00	-22.10
645.10	V	-78.75	-57.00	-21.75
833.27	V	-76.17	-57.00	-19.17
841.08	H	-76.03	-57.00	-19.03

Operating Frequency	868.3MHz	Frequency Range	1GHz ~ 6GHz
Operating State	Standby mode		

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1736.60	H	-68.27	-47.00	-21.27
1736.60	V	-68.46	-47.00	-21.46

Operating Frequency	869.525MHz	Frequency Range	1GHz ~ 6GHz
Operating State	Standby mode		

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1739.05	H	-68.01	-47.00	-21.01
1739.05	V	-68.16	-47.00	-21.16

4.7 Duty Cycle

4.7.1 Limit of Duty Cycle

EU wide harmonized national radio interfaces from 25 MHz to 1 000 MHz

Operational Frequency Band		Maximum effective radiated power, e.r.p.	Channel access and occupation rules (e.g. Duty cycle or LBT + AFA)	Maximum occupied bandwidth	Other usage restrictions
A	26.957-27.283 MHz	10 mW e.r.p	No requirement	The whole band	
B	26.995, 27.045, 27.095, 27.145, 27.195 MHz	100 mW e.r.p	≤ 0.1 % duty cycle	10 kHz	Model control devices may operate without duty cycle restrictions
C	40.660-40.700 MHz	10 mW e.r.p.	No requirement	The whole band	Video applications excluded
D	169.400-169.475 MHz	500 mW e.r.p.	≤ 1.0 % duty cycle	50 kHz	
E	169.4000-169.4875MHz	10 mW	≤ 0.1 % duty	The whole band	Equipment that concentrates or multiplexes individual equipment is excluded
F	169.4875-169.5875MHz	10 mW	≤ 0.001% duty cycle Between 00.00 and 06.00 local time a duty cycle limit of 0,1 % may be used.	The whole band	Equipment that concentrates or multiplexes individual equipment is excluded.
G	169.5875-169.8125MHz	10 mW	≤ 0.1 % duty cycle	The whole band	Equipment that concentrates or multiplexes individual equipment is excluded
H	433,050-434,790 MHz	10 mW	10 %	The whole band	.
I	433,050-434,790 MHz	1 mW e.r.p. -13 dBm/10 kHz PSD for bandwidth modulation larger than 250 kHz	No requirement	The whole band	Audio and video applications are excluded.
J	434,040-434,790 MHz	10 mW	No requirement.	25 kHz	Audio and video applications are excluded.
K	863-865 MHz	25 mW e.r.p.	≤ 0.1% duty cycle or polite spectrum access	The whole band except for audio & video applications limited to 300kHz	

Operational Frequency Band		Maximum effective radiated power, e.r.p.	Channel access and occupation rules (e.g. Duty cycle or LBT + AFA)	Maximum occupied bandwidth	Other usage restrictions
L	865-868 MHz	25 mW e.r.p.	≤ 1% duty cycle or polite spectrum access	The whole band	
M	868.000-868.600 MHz	25 mW e.r.p.	≤ 1% duty cycle or polite spectrum access	The whole band	
N	868.700-869.200 MHz	25 mW e.r.p.	≤ 0.1% duty cycle or polite spectrum access	The whole sub-band	
O	869.400-869.650 MHz	500 mW e.r.p.	≤ 10% duty cycle or polite spectrum access	The whole band	
P	869.700-870.000 MHz	5 mW e.r.p.	No requirement	The whole band	Audio and video applications are excluded.
Q	869,700-870,000 MHz	25 mW e.r.p.	≤ 1 % duty cycle or polite spectrum access	The whole band	Audio and video applications are excluded. Analogue video applications are excluded.
R	34,995-35,225 MHz	100 mW e.r.p.	No requirement	10 kHz	Only for Flying radio models
S	40,665 MHz, 40,675 MHz, 40,685 MHz, 40,695 MHz	100 mW e.r.p.	No requirement	10 kHz	Only for Radio models
T	138,20-138,45 MHz	10 mW e.r.p.	≤ 1,0 % duty cycle	The whole band	
U	865-868 MHz	25 mW e.r.p.	≤ 1 % duty cycle or polite spectrum access	50 kHz for 58 or more channels	Applies only to equipment using FHSS technique
V	865-868 MHz	25 mW e.r.p. Power spectral density: +6,2 dBm/100 kHz.	≤ 1 % duty cycle or polite spectrum access	3 MHz except for audio and video limited to 300 kHz and voice limited to 25 kHz	Applies only to equipment using DSSS and any technique other than FHSS
W	865-868 MHz	10 mW e.r.p	≤ 1 % duty cycle or polite spectrum access	3 MHz except for audio and video limited to 300 kHz	Applies only to equipment using DSSS and any technique other than FHSS
X	865-868 MHz	25 mW e.r.p	≤ 1 % duty cycle or polite spectrum access	300 kHz except for video limited to 25kHz	

Operational Frequency Band		Maximum effective radiated power, e.r.p.	Channel access and occupation rules (e.g. Duty cycle or LBT + AFA)	Maximum occupied bandwidth	Other usage restrictions
Y	863-870 MHz	25 mW e.r.p.	≤ 0.1 % duty cycle or polite spectrum access	100 kHz for 47 or more channels.	
Z	863-870 MHz	25 mW e.r.p. Power spectral density: -4,5 dBm/100 kHz.	≤ 0.1 % duty cycle or polite spectrum access	7 MHz except for audio and video limited to 300 kHz and voice limited to 25 kHz	Applies only to equipment using DSSS and any technique other than FHSS Sub-bands [868,6 MHz to 868,7 MHz], [869,250 MHz to 869,4 MHz], [869,650 MHz to 869,700 MHz] for alarms are excluded
AA	863-870 MHz	25 mW e.r.p.	≤ 0.1 % duty cycle or polite spectrum access	300 kHz except for voice limited to 25 kHz	Sub-bands [868,6 MHz to 868,7 MHz], [869,250 MHz to 869,4 MHz], [869,650 MHz to 869,700 MHz] for alarms are excluded
AB	865-870 MHz	25 mW e.r.p. Power spectral density: -0,8 dBm/100 kHz.	≤ 0.1 % duty cycle or polite spectrum access	5 MHz except for audio and video limited to 300 kHz and voice limited to 25 kHz	Applies only to equipment using DSSS and any technique other than FHSS Sub-bands [868,6 MHz to 868,7 MHz], [869,250 MHz to 869,4 MHz], [869,650 MHz to 869,700 MHz] for alarms are excluded
AC	870.000-875.800MHz	25 mW e.r.p.	≤ 1 % duty cycle For ER-GSM protection (873 MHz to 875,8 MHz, where applicable), the duty cycle is limited to ≤ 0.01 % and T_{on}_max is limited to 5 ms/1 s	600 kHz	See note

Operational Frequency Band		Maximum effective radiated power, e.r.p.	Channel access and occupation rules (e.g. Duty cycle or LBT + AFA)	Maximum occupied bandwidth	Other usage restrictions
AD	875.8-876MHz	25 mW e.r.p.	≤ 0.1 % duty cycle For ER-GSM protection where applicable, the duty cycle is limited to ≤ 0.01 % and T_{on}_max is limited to 5 ms/1 s	200 kHz	See note
AE	870.000-875.800MHz	500 mW e.r.p. restricted to vehicle-to-vehicle applications. 100 mW e.r.p. is restricted to in-vehicle applications.	≤ 0.1 % duty cycle For ER-GSM protection (873 MHz to 875,8 MHz, where applicable), the duty cycle is limited to ≤ 0.01 % and T_{on}_max is limited to 5 ms/1 s	500 kHz	Only for tracking, tracing and data acquisition See note
AF	915-915.2MHz	25 mW e.r.p.	≤ 0.1 % duty cycle	200 kHz	See note
AG	920.8-921MHz	25 mW e.r.p.	≤ 0.1 % duty cycle For ER-GSM protection where applicable, the duty cycle is limited to ≤ 0.01 % and T_{on}_max is limited to 5 ms/1 s	200 kHz	See note
AH	915.200-920.800MHz	25 mW e.r.p. except for the 4 channels for the 4 channels identified in channel with centre frequencies at 916,3 MHz, 917,5 MHz, 918,7 MHz and 919,9 MHz, where 100 mW e.r.p. applies.	≤ 1 % duty cycle For ER-GSM protection (918 MHz to 920.8 MHz, where applicable), the duty cycle is limited to ≤ 0.01 % and T_{on}_max is limited to 5 ms/1 s	600 kHz except for the 4 channels identified in channel with centre frequencies at 916,3 MHz, 917,5 MHz, 918,7 MHz and 919,9 MHz. The channel bandwidth is limited to 400 kHz	See note
NOTE: To bands AD to AI: Use of all or part of sub-bands AD to AI may be denied in some European countries that use all or part of these sub-bands for defence/governmental systems. In some member states the upper sub-bands 873 MHz to 876 MHz and 918 MHz to 921 MHz are allocated to the railways for ER-GSM. For the case that a frequency allocation is available in those countries for SRDs, sharing of these sub-bands by SRDs with ER-GSM is permitted provided SRD systems operate in accordance with agreed mitigation measures such as transmission timing limitations as set out in ECC Report 200 [i.6]. The required timing restrictions are included in the column "Channel access and occupation rules". See Appendix 3 of CEPT/ERC/REC 70-03 [i.1] for national implementation concerning ER-GSM and defence/governmental services.					

The adjacent frequency bands below 862 MHz and above 870 MHz may be used by high power systems. The same applies to the bands below 915 MHz and above 876 MHz as well as above 921 MHz. Manufacturers should take this into account in the design of equipment and choice of power levels.

4.7.2 Test Procedures

Refer to EN 300 220-1 V3.1.1 clause 5.5.2.2.

4.7.3 Test Setup

The EUT was operated in normal operation condition.

4.7.4 Test Results

868.3MHz: The duty cycle of this device declared by client is <1%.

869.525MHz: The duty cycle of this device declared by client is <10%.

4.8 TX behaviour under Low Voltage Conditions

4.8.1 Limit of TX behaviour under Low Voltage Conditions

The equipment shall either:

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

as the voltage falls below the manufacturers declared operating voltage.

4.8.2 Test Procedures

Refer to EN 300 220-1 V3.1.1 clause 5.12.3.2.

4.8.3 Deviation from Test Standard

No deviation.

4.8.4 Test Setup

The EUT was supplied with an external power source for voltage control.

4.8.5 Test Results

Frequency (MHz)	Tnom (℃)	Lower Extreme Voltage Level	Lower Extreme Test Voltage	Result
868.3	25℃	2.3Vdc	4.5Vdc	Pass
869.525				

Receiver Parameters

4.9 Receiver Blocking & RX Sensitivity

4.9.1 Limits of Receiver Blocking & RX Sensitivity

Blocking Level Parameters for RX

Requirement	Limits
Blocking at ± 2 MHz from OC edge	≥ -69 dBm
Blocking at ±10 MHz from OC edge	≥ -44 dBm
Blocking at ±5% of Center Frequency or 15MHz, whichever is the greater	≥ -44 dBm

Limits for Receiver Sensitivity

$$S = 10\log RB_{kHz} - 4 \quad dB\mu V \ emf$$; or

$$S_P = 10\log RB_{kHz} - 117 dBm$$

where:

- Sp is the sensitivity in dBm,
- RB is the declared receiver bandwidth in kHz

The receiver bandwidth RB shall be declared by the manufacturer. RB is the usually 3 dB receiver bandwidth selectivity.

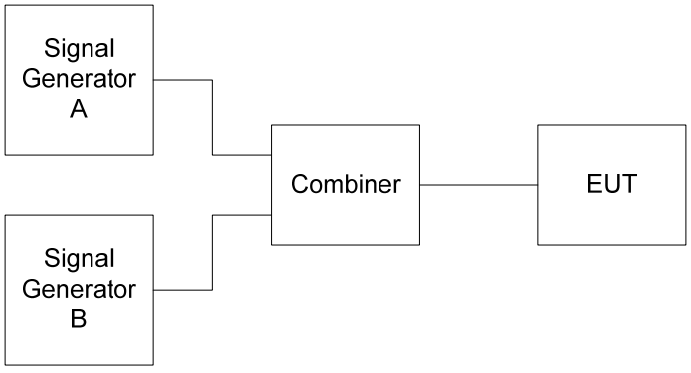
4.9.2 Test Procedure

Refer to EN 300 220-1 V3.1.1 clause 5.14.3.4 & 5.18.6.4

4.9.3 Deviation from Test Standard

No deviation.

4.9.4 Test Setup



4.9.5 Test Results

868.3MHz

Receiver input Power:		-93.03	dBm		
Receiver BW:		125	kHz		
Test Condition	Frequency Offset (MHz)	Power Level (dBm)	Limit (dB)		Pass / Fail
Upper Band Edge	+43.42	19	≧	-44	Pass
	+10	0	≧	-44	Pass
	+2	4	≧	-69	Pass
Lower Band Edge	-2	4	≧	-69	Pass
	-10	1	≧	-44	Pass
	-43.42	19	≧	-44	Pass

869.525MHz

Receiver input Power:		-93.00	dBm		
Receiver BW:		126	kHz		
Test Condition	Frequency Offset (MHz)	Power Level (dBm)	Limit (dB)		Pass / Fail
Upper Band Edge	+43.48	19	≧	-44	Pass
	+10	0	≧	-44	Pass
	+2	4	≧	-69	Pass
Lower Band Edge	-2	4	≧	-69	Pass
	-10	1	≧	-44	Pass
	-43.48	19	≧	-44	Pass

4.10 Unwanted emissions in the spurious domain (Receiver)

4.10.1 Limits of Unwanted emissions in the spurious domain

Frequency range / Limit / State	47MHz to 74MHz 87.5MHz to 118MHz 174MHz to 230MHz 470MHz to 790MHz	Other frequencies below 1GHz	frequencies above 1GHz
TX mode	–54dBm	–36dBm	–30dBm
RX and all other mode	–57dBm	–57dBm	–47dBm

4.10.2 Test Procedure

Refer to EN 300 220-1 V3.1.1 clause 5.9.3.3.2.

4.10.3 Deviation from Test Standard

No deviation.

4.10.4 Test Setup

For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).

4.10.5 Test Results

Operating Frequency	868.3MHz	Frequency Range	25MHz ~ 1GHz
Operating State	RX mode		

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
51.33	H	-76.34	-57.00	-19.34
51.33	V	-75.13	-57.00	-18.13
168.32	H	-76.97	-57.00	-19.97
168.32	V	-80.77	-57.00	-23.77
263.87	H	-76.21	-57.00	-19.21
323.35	V	-85.26	-57.00	-28.26
455.95	H	-76.69	-57.00	-19.69
455.95	V	-81.42	-57.00	-24.42
600.25	H	-77.40	-57.00	-20.40
636.33	V	-79.27	-57.00	-22.27
844.00	H	-75.82	-57.00	-18.82
883.00	V	-75.54	-57.00	-18.54

Operating Frequency	869.525MHz	Frequency Range	25MHz ~ 1GHz
Operating State	RX mode		

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
51.33	H	-81.59	-57.00	-24.59
51.33	V	-75.19	-57.00	-18.19
168.32	H	-77.98	-57.00	-20.98
168.32	V	-80.55	-57.00	-23.55
263.87	H	-76.88	-57.00	-19.88
383.80	V	-83.00	-57.00	-26.00
467.65	H	-76.47	-57.00	-19.47
535.90	V	-80.45	-57.00	-23.45
694.83	H	-79.12	-57.00	-22.12
771.85	V	-76.54	-57.00	-19.54
850.83	H	-76.07	-57.00	-19.07
912.25	V	-74.72	-57.00	-17.72

Operating Frequency	868.3MHz	Frequency Range	1GHz ~ 6GHz
Operating State	RX mode		

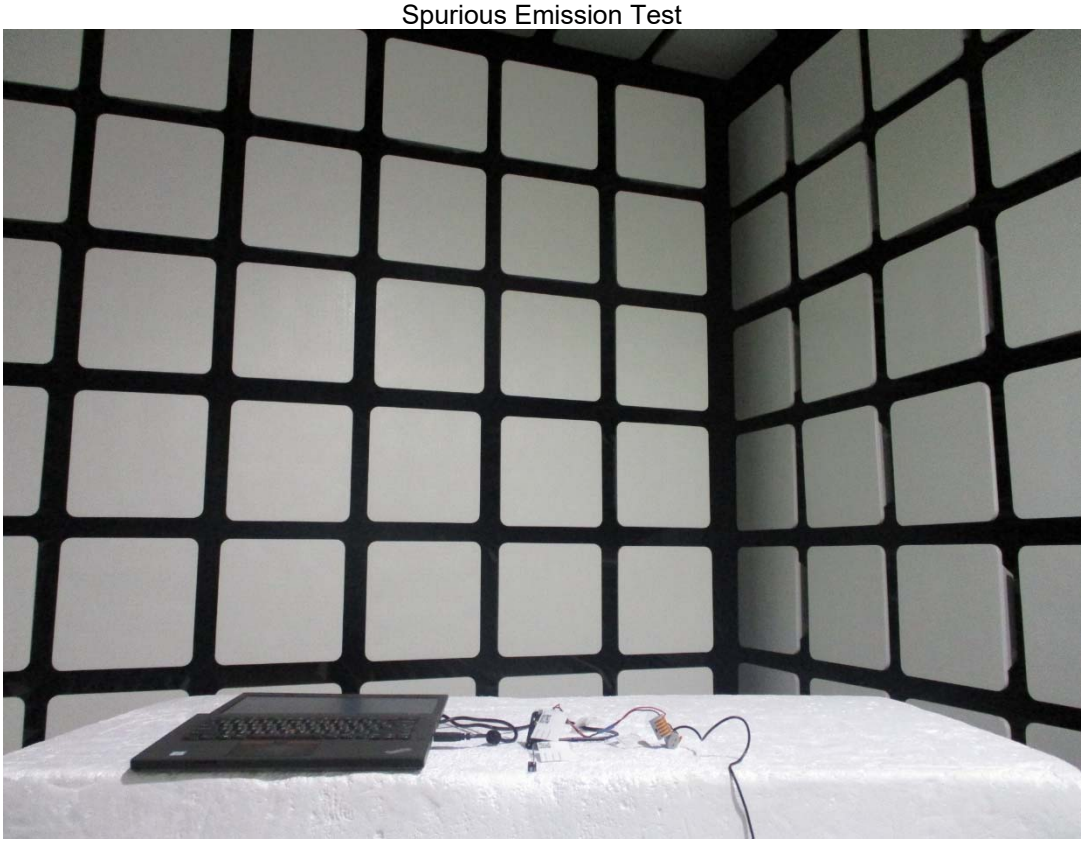
Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1736.60	H	-68.08	-47.00	-21.08
1736.60	V	-68.16	-47.00	-21.16

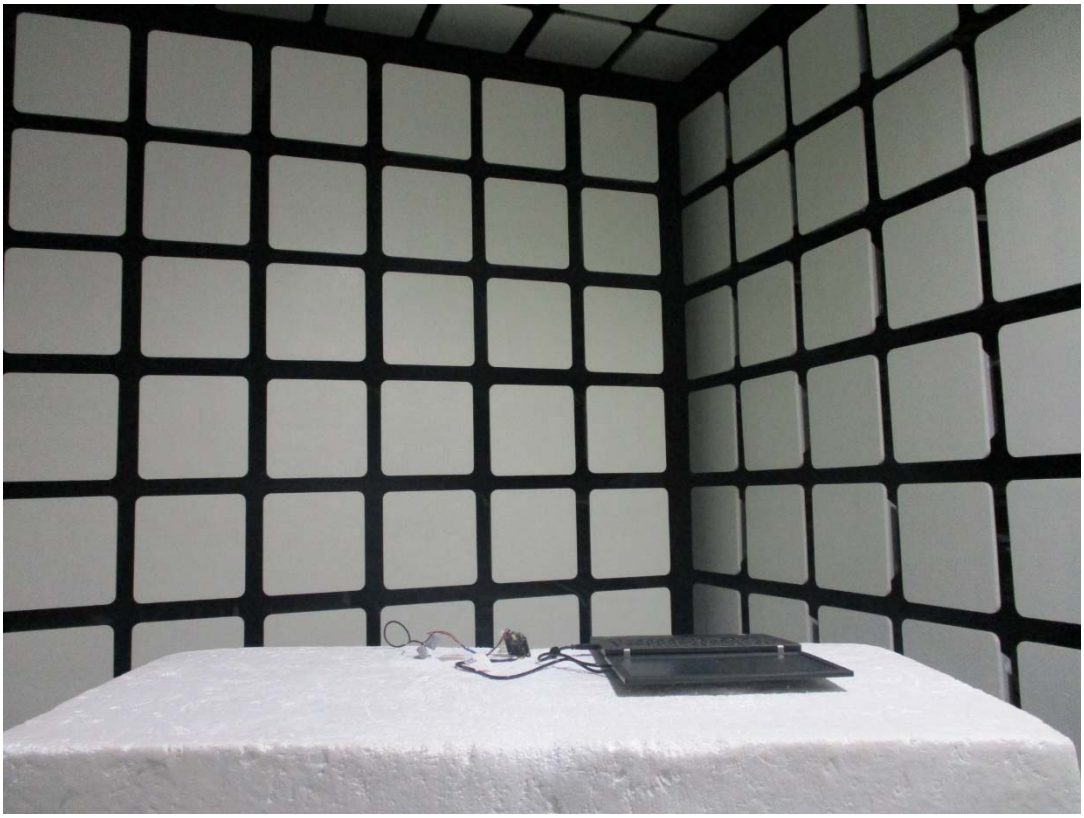
Operating Frequency	869.525MHz	Frequency Range	1GHz ~ 6GHz
Operating State	RX mode		

Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
1739.05	H	-68.22	-47.00	-21.22
1739.05	V	-68.14	-47.00	-21.14

5 Photographs of the Test Configuration

Spurious Emission Test





Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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