



BLUETOOTH TEST REPORT

Test report no.: EMC_397_BT_2002
Bluetooth RF Provisional Spec. Rev. 0.91

EUT: Bluetooth Headset
Model: PHS12101



TTI-P-G 081/94-A0

Accredited according to **ISO/IEC 17025**



**Bluetooth Qualification
Test Facility
(BQTF)**



FCC listed # 101450

IC recognized # 3925

CETECOM Inc.

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Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May

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1 General Information**1.1 Notes**

The test results of this test report relate exclusively to the test item specified in 1.5. The CETECOM Inc. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM Inc..

TEST REPORT PREPARED BY:**EMC & Radio Engineer: Harpreet Sidhu****1.2 Testing laboratory****CETECOM Inc.**

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E-mail: lothar.schmidt@cetecomusa.comInternet: www.cetecom.com

1.3 Details of applicant

Name : PrimeNet Co., Ltd.
Street : 9-21, Samsung-dong, Gangnam-gu
City / Zip Code : Seoul 135-090
Country : Korea
Contact : Gi-Young Kim
Telephone : +82 2 334 9751
Telefax : +82 2 320 1119
e-mail : kgyoung@primenet21.com

1.4 Application details

Date of receipt of application : 2002-12-02
Date of receipt test item : 2002-12-19
Date of test : 2002-12-19

1.5 Test item

Manufacturer : Applicant
Marketing Name of EUT : Bluetooth™ Headset
[Description](#) : [Bluetooth Headset](#)
Model No. : PHS12101
HW / SW : 1.0 / 1.0

Additional information

Frequency : 2402MHz – 2480MHz
Type of modulation : FHSS / GFSK
Antenna Type : Integrated
Power Supply : 4.2VDC
Number of channels : 79
Output Power : Power Class 2
Extreme Vol. Limits : 3.8VDC – 4.5VDC
Extreme Temp. Tolerance : -10°C to +50°C

1.6 Test standards : Bluetooth RF Provisional Spec. Ver. 0.91 July 2001 and
addendum Jan. 2002

Note: This test report only focus on Radiated spurious emissions as per specification mentioned under 1.6

2 Technical test**2.1 Summary of test results**

No deviations from the technical specification(s) were ascertained in the course of the tests
Performed

Final Verdict:
(Only “passed” if all single measurements are “passed”)

Passed

Technical responsibility for area of testing:

2003-03-06 EMC & Radio Lothar Schmidt (Manager)



Date

Section

Name

Signature

Responsible for test report and project leader:

2003-03-06 EMC & Radio Harpreet Sidhu (EMC Engineer)



Date

Section

Name

Signature

2.2 Test report

TEST REPORT

Test report no.: EMC_397_BT_2002

EUT: Bluetooth Headset
Model: PHS12101

TEST REPORT REFERENCE

LIST OF MEASUREMENTS

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**OUT-OF-BAND SPURIOUS EMISSIONS
FCC****SUBCLAUSE § TRC/CA/01/E****LIMITS**

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions that fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Limits**SUBCLAUSE § 15.209**

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

NOTE:

1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 3 and 25 GHz very short cable connections to the antenna was used to minimize the noise level.

2. All measurements were done in peak mode, unless specified with the plots.

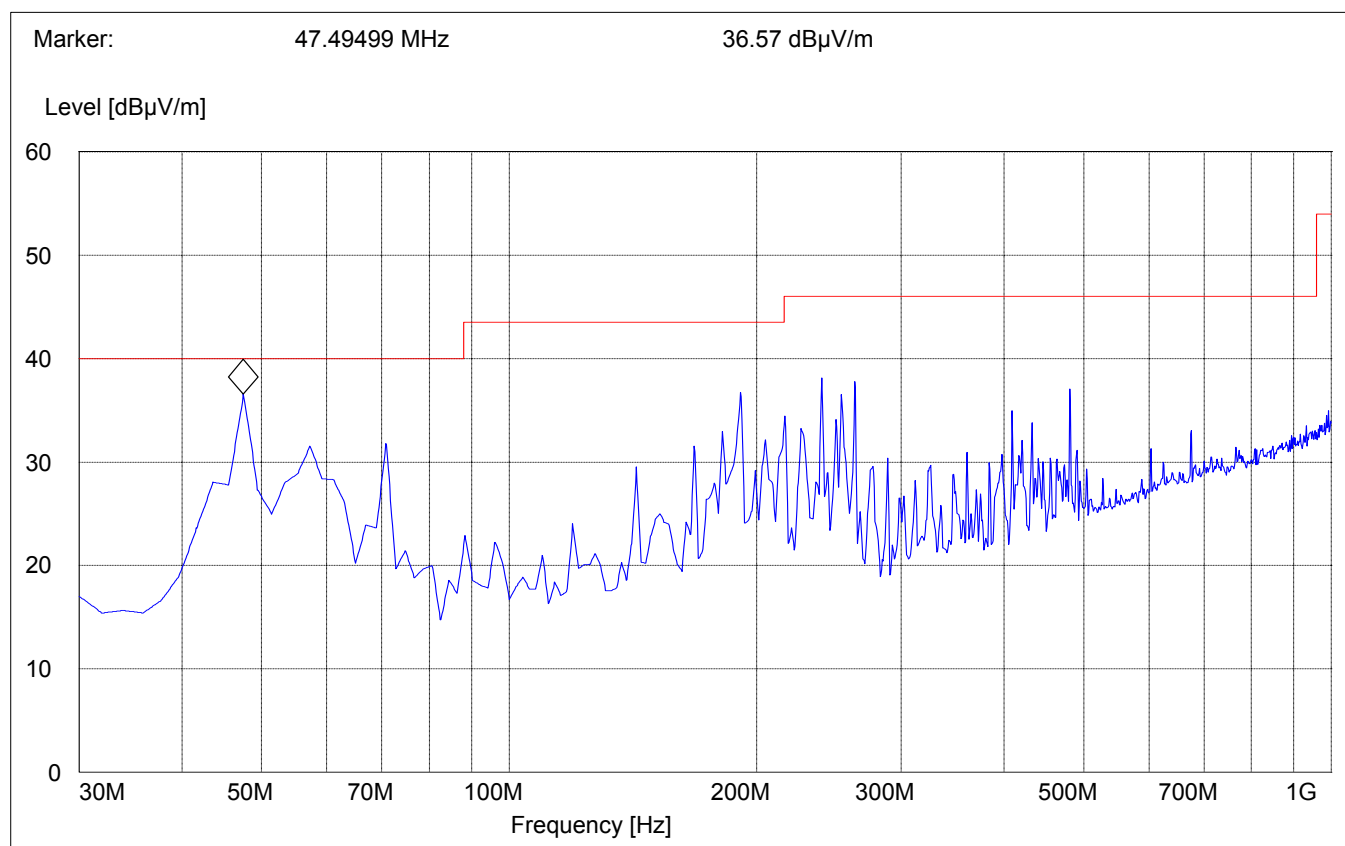
Out-of-Band Spurious Emissions FCC 15.209(Radiated)

SUBCLAUSE § TRC/CA/01/E

**Lowest Channel: 2402MHz
(30MHz – 1GHz)**

Note: This plot is valid for all three channels (worst case)

SWEEP TABLE:		"BT Spuri hi 30-1G"			
Short Description:		Bluetooth 30MHz-1GHz			
Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency		Time	VBW	
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	3141-#1186



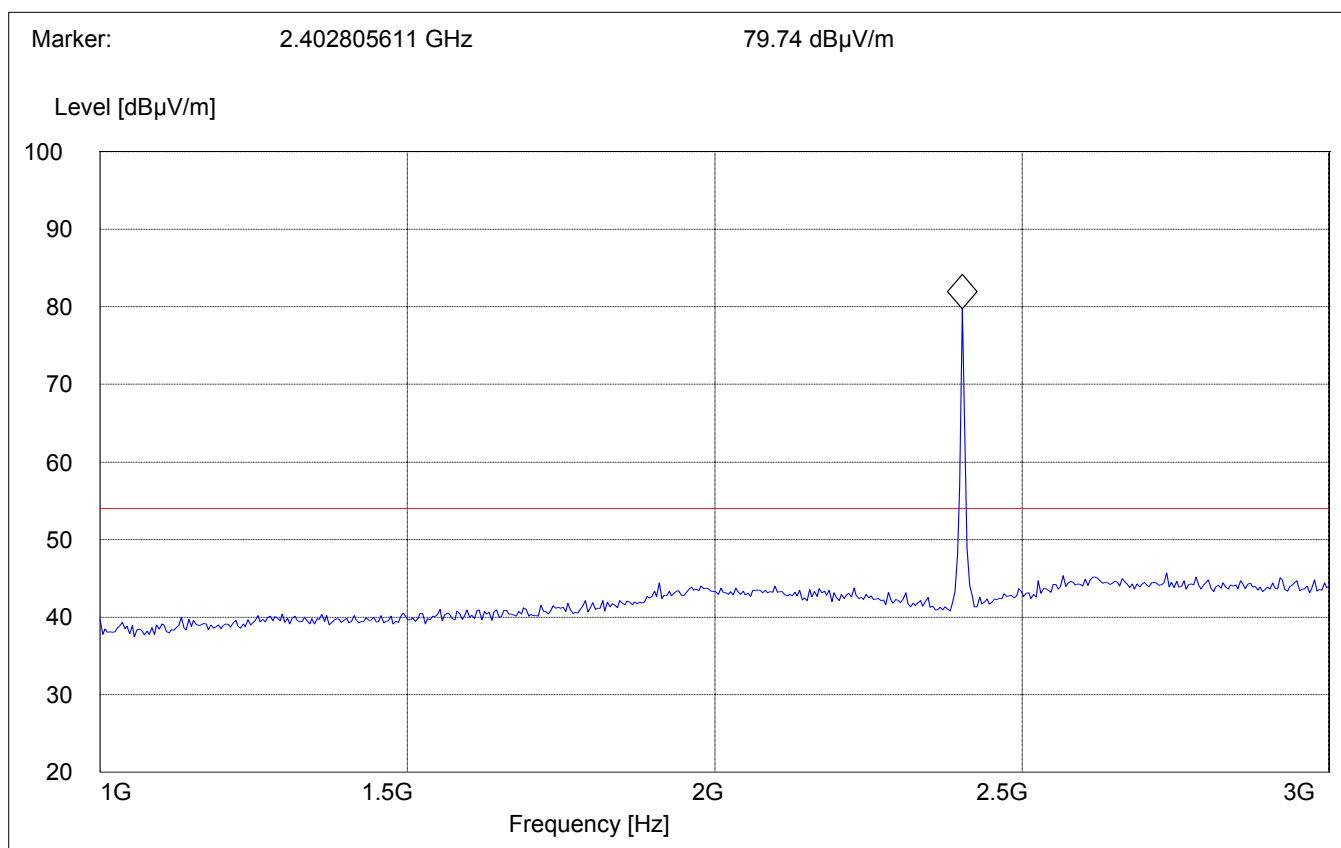
Out-of-Band Spurious Emissions FCC 15.209(Radiated)

SUBCLAUSE § TRC/CA/01/E

**Lowest Channel: 2402MHz
(1GHz – 3GHz)**

NOTE: The marked peak above the limit is the carrier frequency.

SWEEP TABLE:		"BT Spuri hi 1-3G"			
Short Description:		Bluetooth Spurious 1-3 GHz			
Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)



Out-of-Band Spurious Emissions FCC 15.209(Radiated)

SUBCLAUSE § TRC/CA/01/E

Lowest Channel: 2402MHz (3GHz – 18GHz)

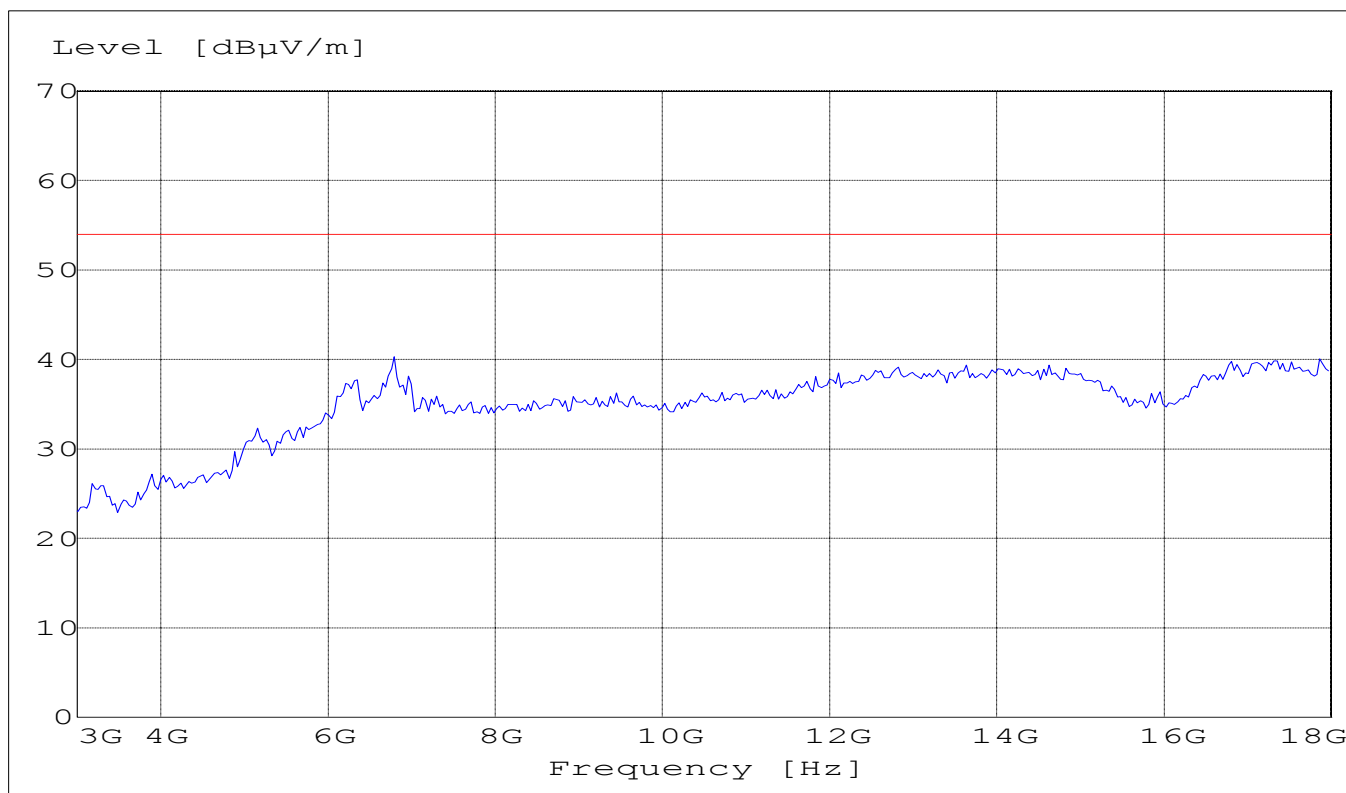
SWEEP TABLE:

"BT Spuri hi 3-18G"

Short Description:

Bluetooth Spurious 3-18GHz

Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
3.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)



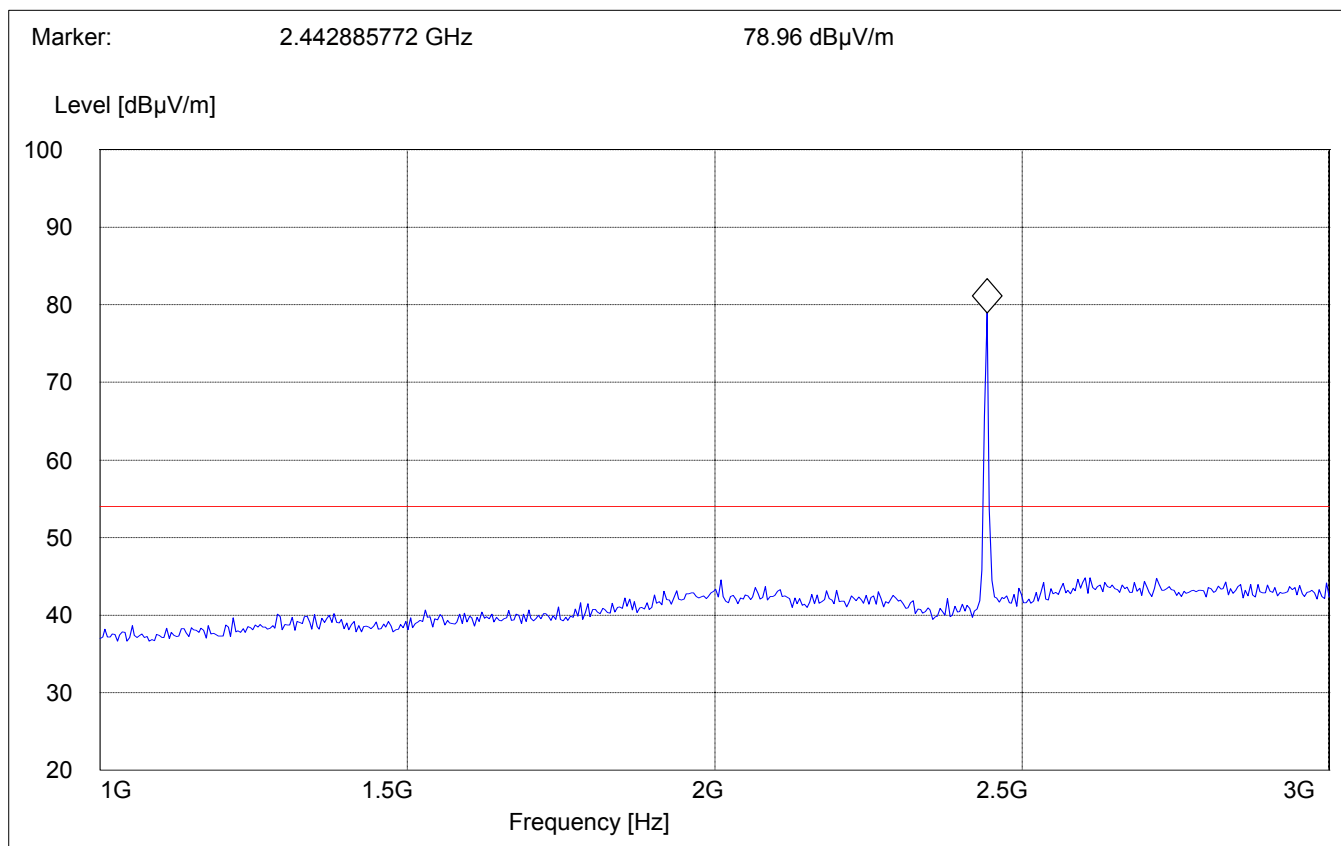
Out-of-Band Spurious Emissions FCC 15.209(Radiated)

SUBCLAUSE § TRC/CA/01/E

Mid Channel: 2441MHz (1GHz – 3GHz)

NOTE: The marked peak above the limit is the carrier frequency.

SWEEP TABLE:		"BT Spuri hi 1-3G"			
Short Description:		Bluetooth Spurious 1-3 GHz			
Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)



Out-of-Band Spurious Emissions FCC 15.209(Radiated)

SUBCLAUSE § TRC/CA/01/E

Mid Channel: 2441MHz (3GHz – 18GHz)

SWEEP TABLE:

Short Description:

"BT Spuri hi 3-18G"

Bluetooth Spurious 3-18GHz

Start Stop

Detector

Meas.

RBW

Transducer

Frequency Frequency

Time

Bandw.

VBW

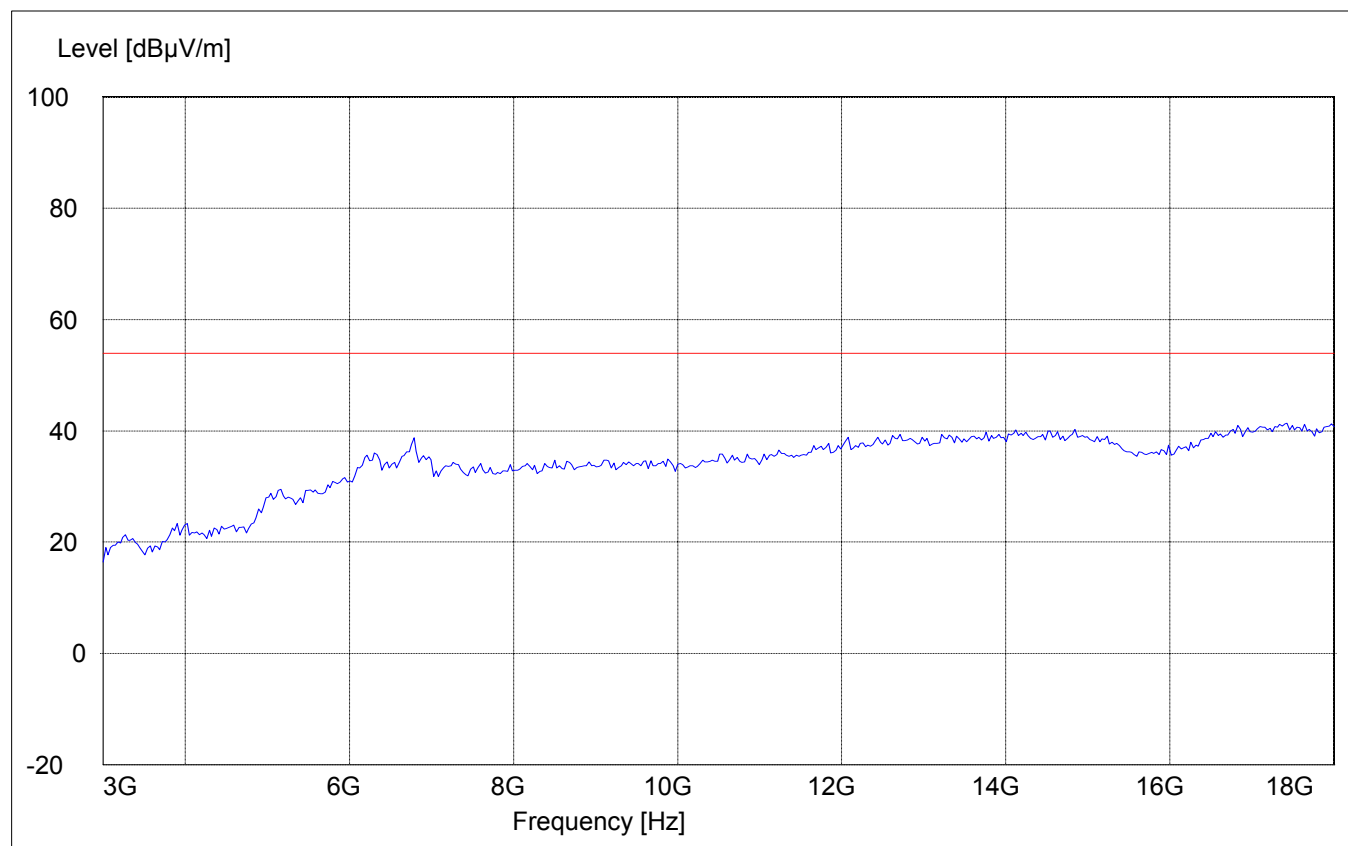
3.0 GHz 18.0 GHz

MaxPeak

Coupled

1 MHz

#326 horn (dBi)



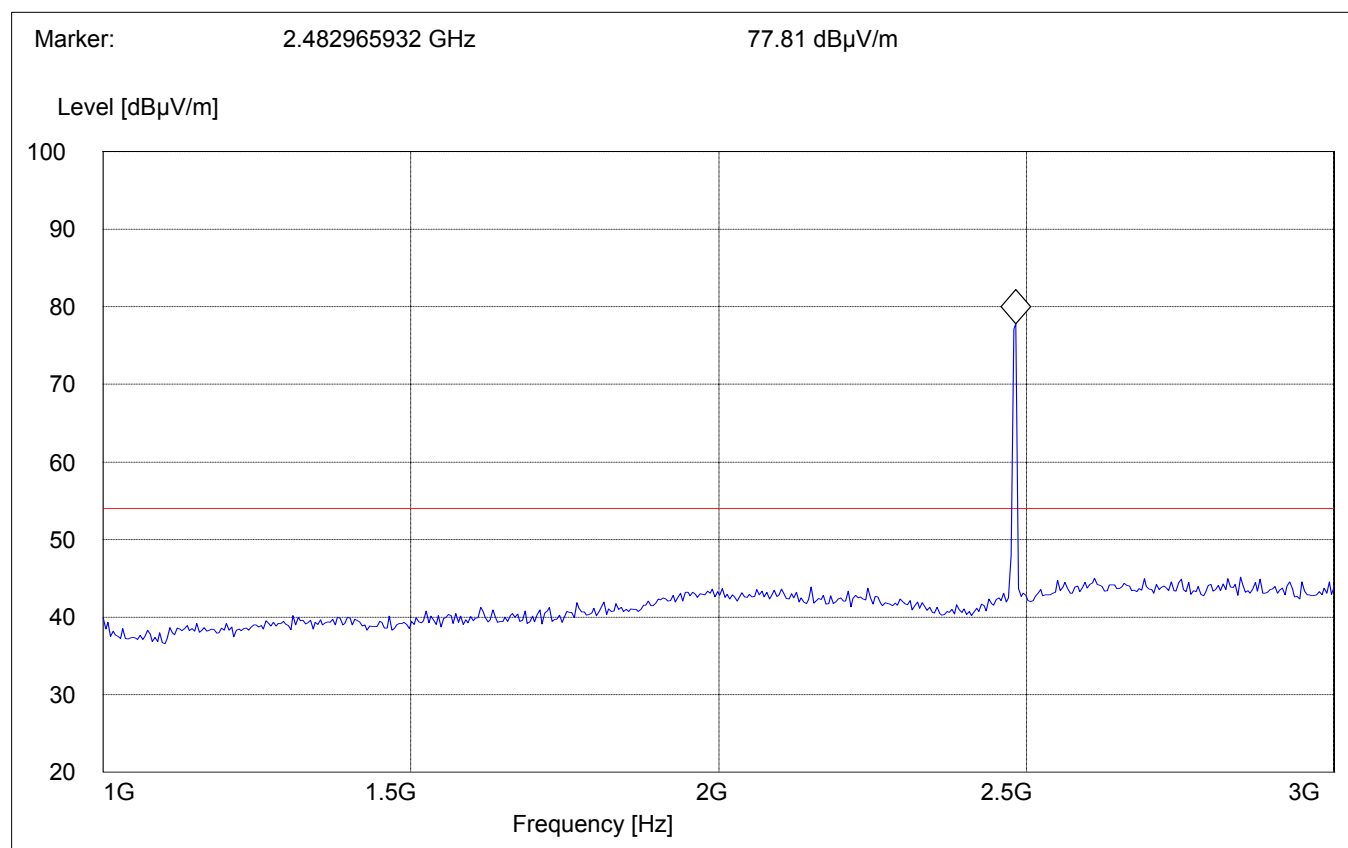
Out-of-Band Spurious Emissions FCC 15.209(Radiated)

SUBCLAUSE § TRC/CA/01/E

**Highest Channel: 2480MHz
(1GHz – 3GHz)**

NOTE: The marked peak above the limit is the carrier frequency.

SWEEP TABLE:		"BT Spuri hi 1-3G"			
Short Description:		Bluetooth Spurious 1-3 GHz			
Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
1.0 GHz	3.0 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)



Out-of-Band Spurious Emissions FCC 15.209(Radiated)

SUBCLAUSE § TRC/CA/01/E

Highest Channel: 2480MHz (3GHz – 18GHz)

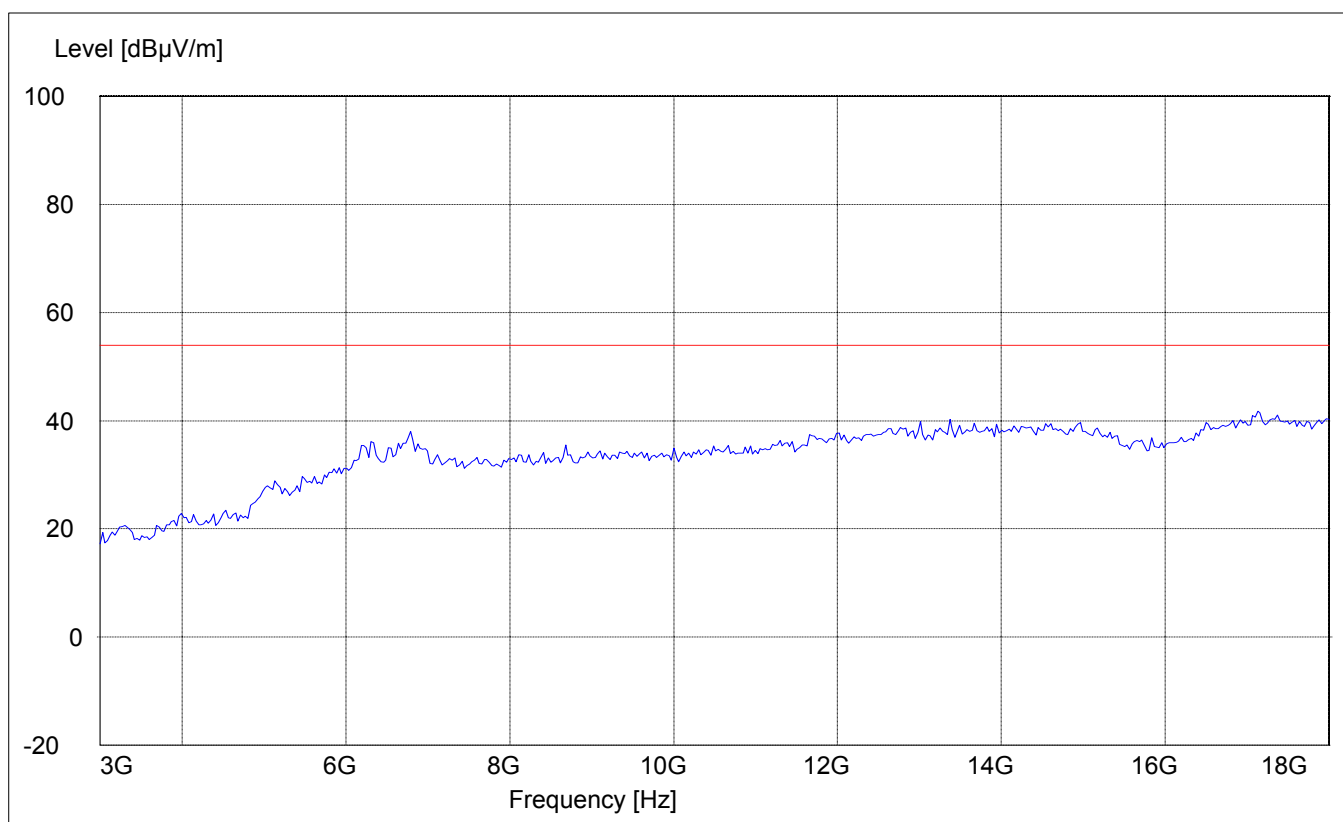
SWEEP TABLE:

Short Description:

"BT Spuri hi 3-18G"

Bluetooth Spurious 3-18GHz

Start	Stop	Detector	Meas.	RBW	Transducer
Frequency	Frequency	Time	Bandw.	VBW	
3.0 GHz	18.0 GHz	MaxPeak	Coupled	1 MHz	#326 horn (dBi)



Out-of-Band Spurious Emissions

SUBCLAUSE § TRC/CA/01/E

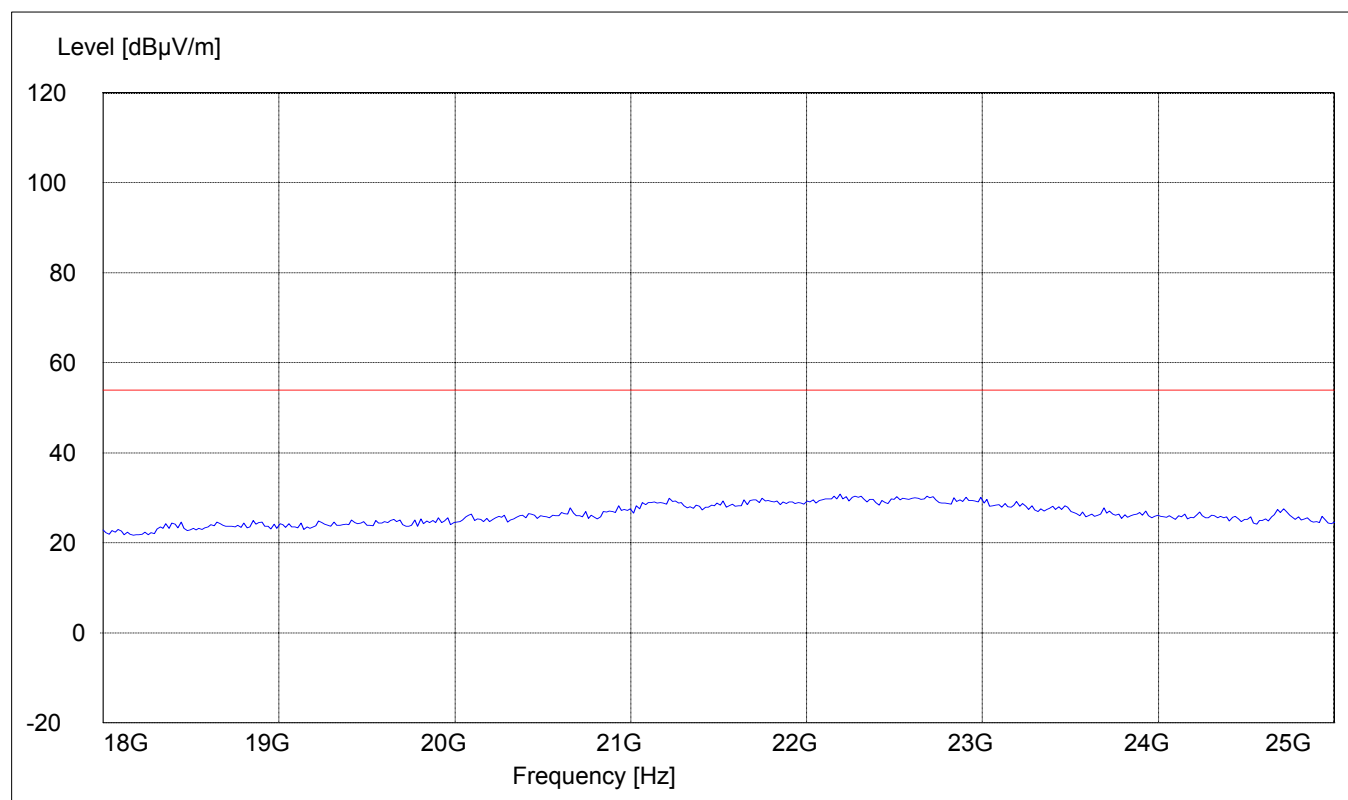
FCC 15.209(Radiated)

Lowest Channel: 2402MHz

(18GHz – 25GHz)

Note: This plot is valid for all three channels (worst case)

SWEEP TABLE:		"BT Spuri 18 - 25G"			
Short Description:		Bluetooth 18 - 25 GHz			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
18.0 GHz	25 GHz	MaxPeak	2.0 s	1 MHz	3160 Horn 18-26.5G



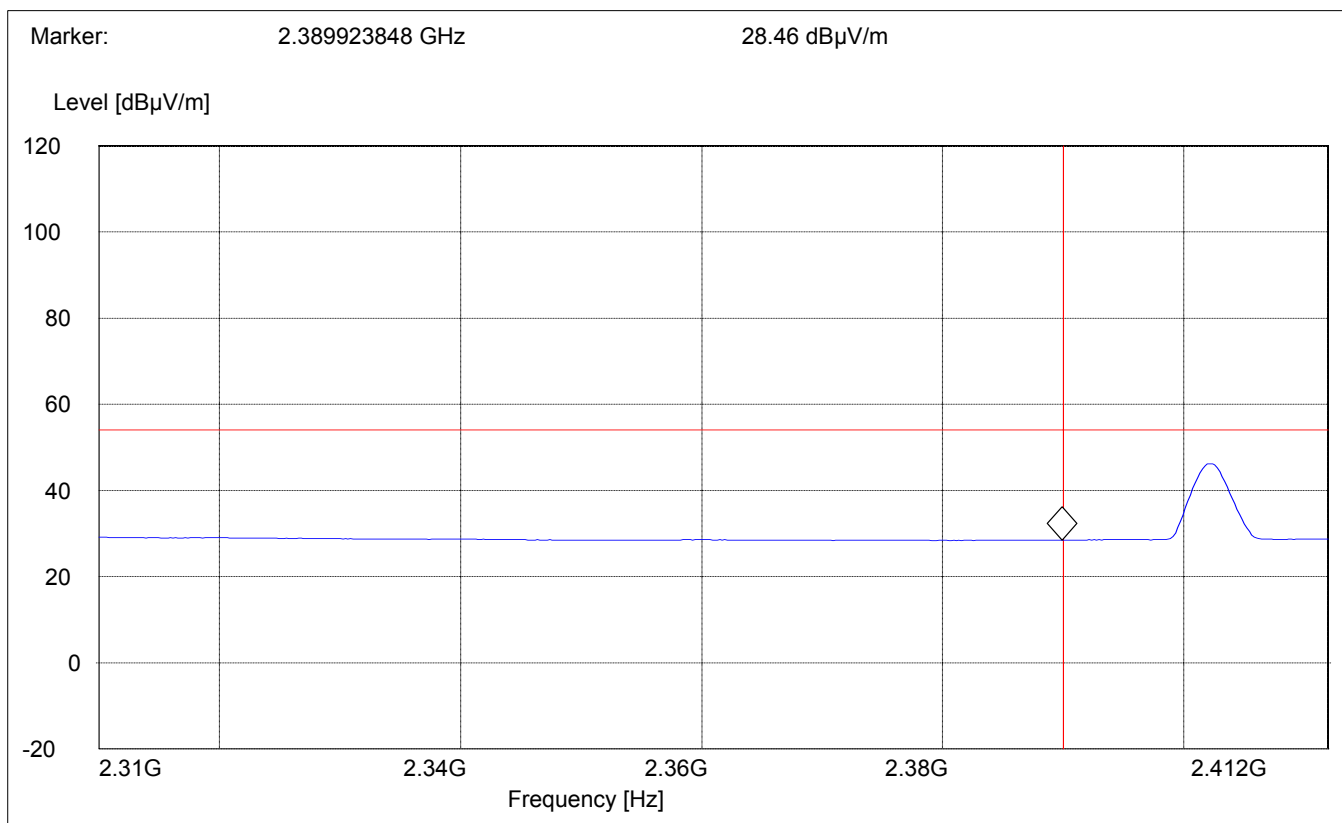
Out-of-Band Spurious Emissions FCC 15.247(c)(Radiated)

SUBCLAUSE § TRC/CA/01/E

Low frequency section (spurious in the restricted band 2310 – 2390 MHz) (Hopping – OFF, Average measurement)

Operating condition : Tx at 2402MHz
 SWEEP TABLE : "FCC15.247 LBE_AVG"
 Short Description : FCC15.247 BT Low-band-edge
 Limit Line : 54dBμV

Start Frequency	Stop Frequency	Detector	Meas. Bandw.	RBW	VBW	Transducer
2.31 GHz	2.412 GHz	MaxPeak	Coupled	1 MHz	10Hz	#326 horn (dBi)



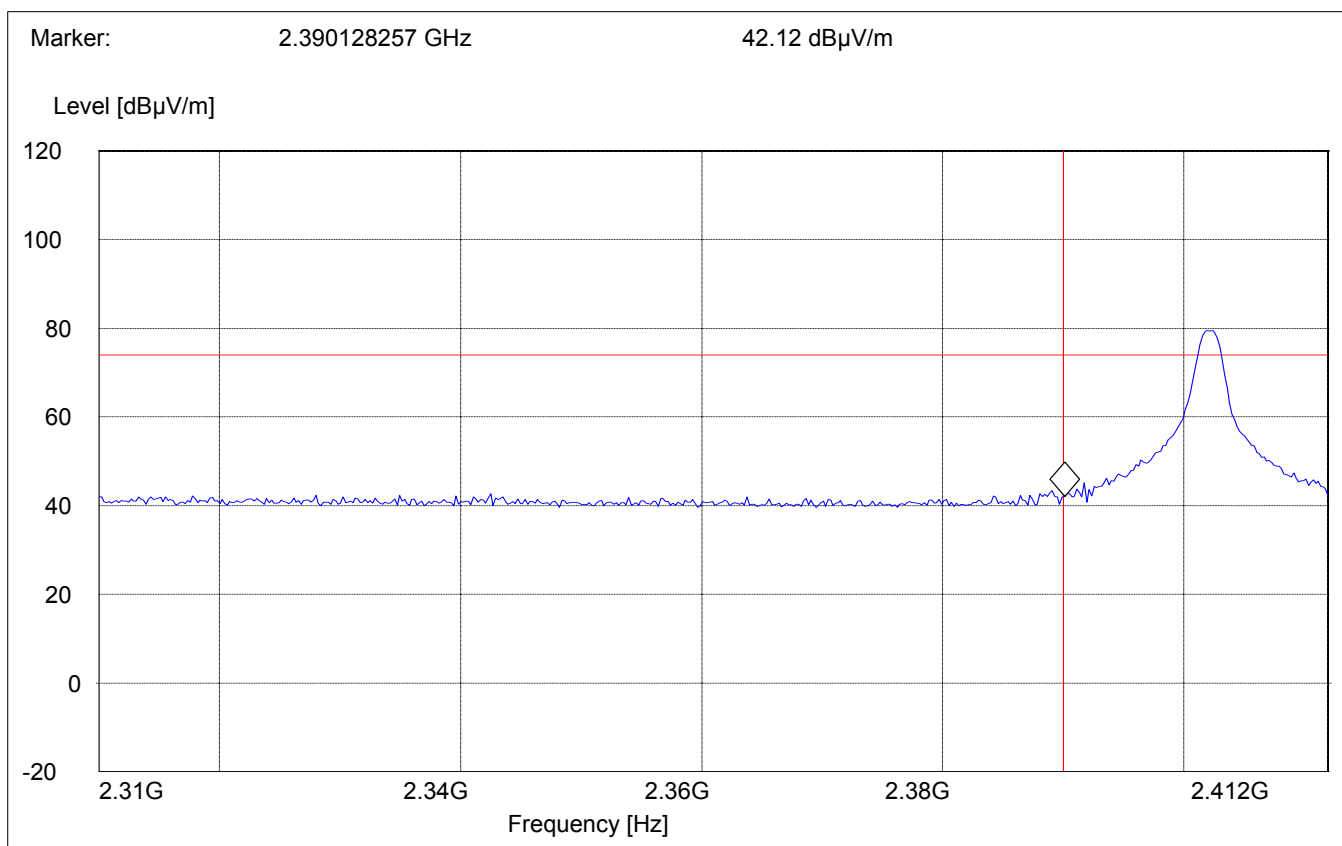
Out-of-Band Spurious Emissions FCC 15.247(c)(Radiated)

SUBCLAUSE § TRC/CA/01/E

Low frequency section (spurious in the restricted band 2310 – 2390 MHz) (Hopping – OFF, Peak measurement)

Operating condition : Tx at 2402MHz
 SWEEP TABLE : "FCC15.247 LBE_Pk"
 Short Description : FCC15.247 BT Low-band-edge
 Limit Line : 74dB μ V

Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW	VBW	Transducer
2.31 GHz	2.412 GHz	MaxPeak	Coupled	1 MHz	1MHz	#326 horn (dBi)



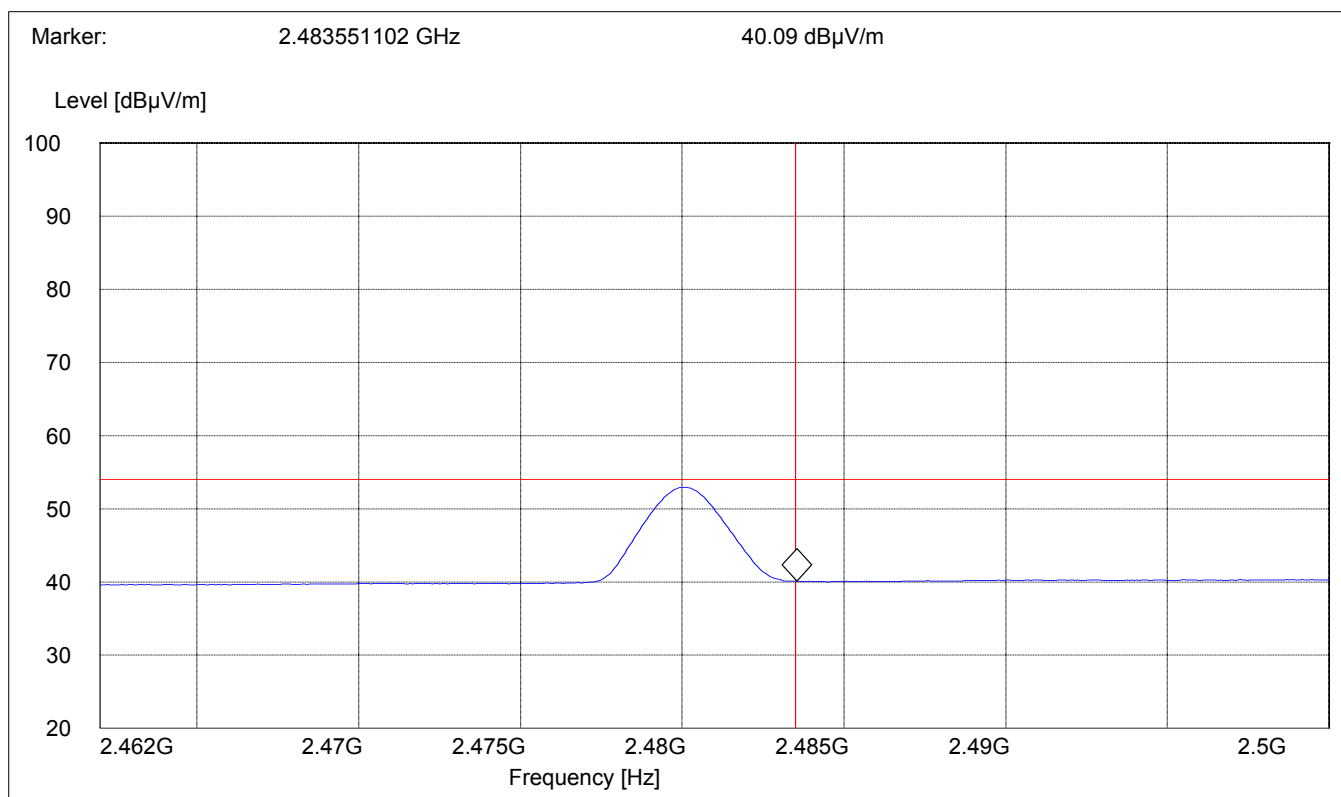
Out-of-Band Spurious Emissions FCC 15.247(c)(Radiated)

SUBCLAUSE § TRC/CA/01/E

High frequency section (spurious in the restricted band 2483.5 – 2500 MHz) (Hopping – OFF, Average measurement)

Operating condition : Tx at 2480MHz
 SWEEP TABLE : "FCC15.247 HBE_AVG"
 Short Description : FCC15.247 BT High-band-edge
 Limit Line : 54dBμV

Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW	VBW	Transducer
2.462 GHz	2.5 GHz	MaxPeak	Coupled	1 MHz	10Hz	#326 horn (dBi)



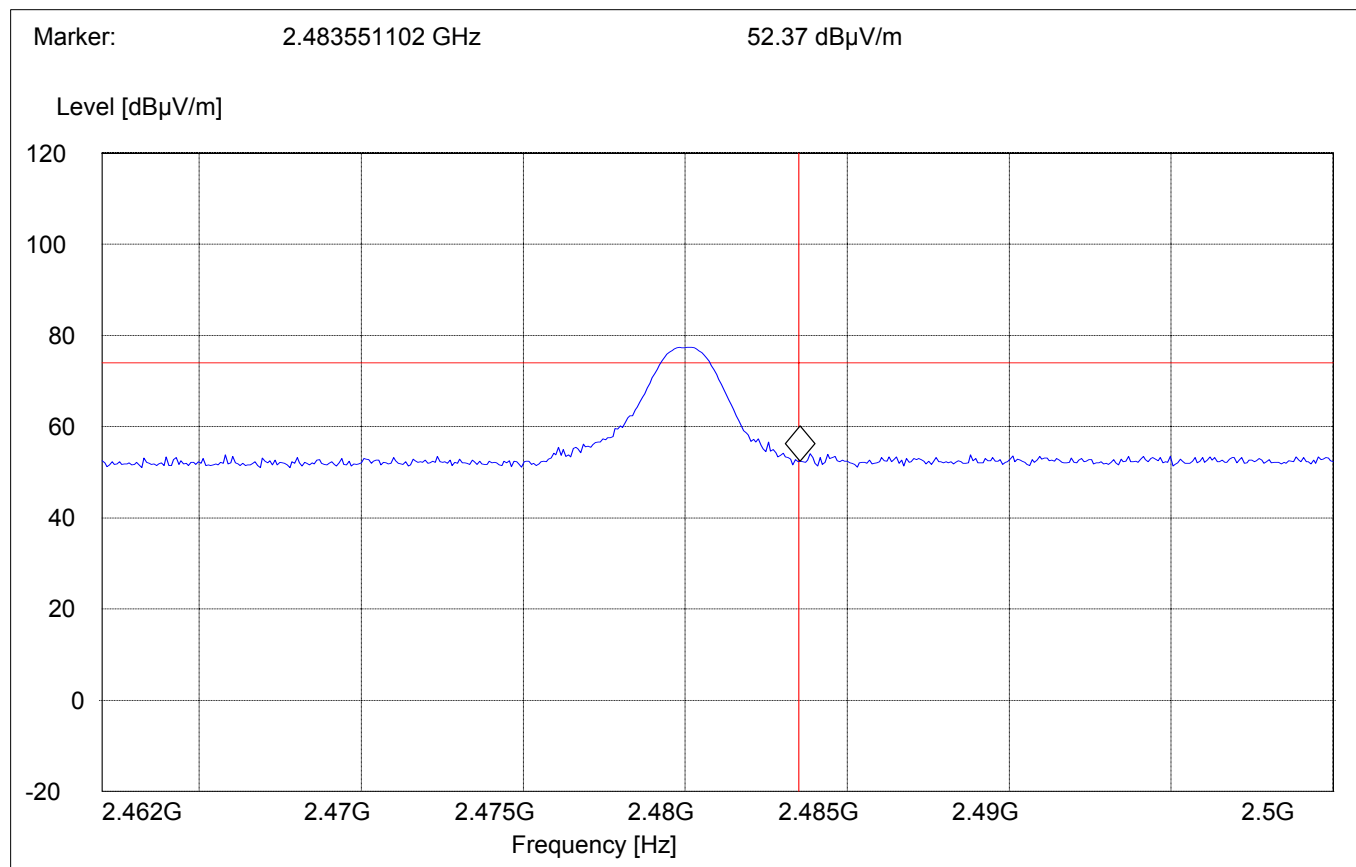
Out-of-Band Spurious Emissions FCC 15.247(c)(Radiated)

SUBCLAUSE § TRC/CA/01/E

High frequency section (spurious in the restricted band 2483.5 – 2500 MHz) (Hopping – OFF, Peak measurement)

Operating condition : Tx at 2480MHz
 SWEEP TABLE : "FCC15.247 HBE_PK"
 Short Description : FCC15.247 BT High-band-edge
 Limit Line : 74dBμV

Start Frequency	Stop Frequency	Detector Time	Meas. Bandw.	RBW	VBW	Transducer
2.462 GHz	2.5 GHz	MaxPeak	Coupled	1 MHz	1MHz	#326 horn (dBi)



**Out-of-Band Spurious Emissions
ETSI EN 300 328 (Transmitter)****SUBCLAUSE § TRC/CA/01/E****LIMITS: Clause 5.2.4**

Frequency Range	Narrowband spurious emissions		Wideband spurious emissions	
	Limit when operating	Limit when in standby	Limit when operating	Limit when in standby
30 MHz - 1 GHz	-36 dBm	-57 dBm	-86 dBm/Hz	-107 dBm/Hz
above 1 GHz - 12,75 GHz	-30 dBm	-47 dBm	-80 dBm/Hz	-97 dBm/Hz
1,8 - 1,9 GHz 5,15 - 5,3 GHz	-47 dBm	-47 dBm	-97 dBm/Hz	-97 dBm/Hz

Out-of-Band Spurious Emissions ETSI EN 300 328 (Transmitter)

SUBCLAUSE § TRC/CA/01/E

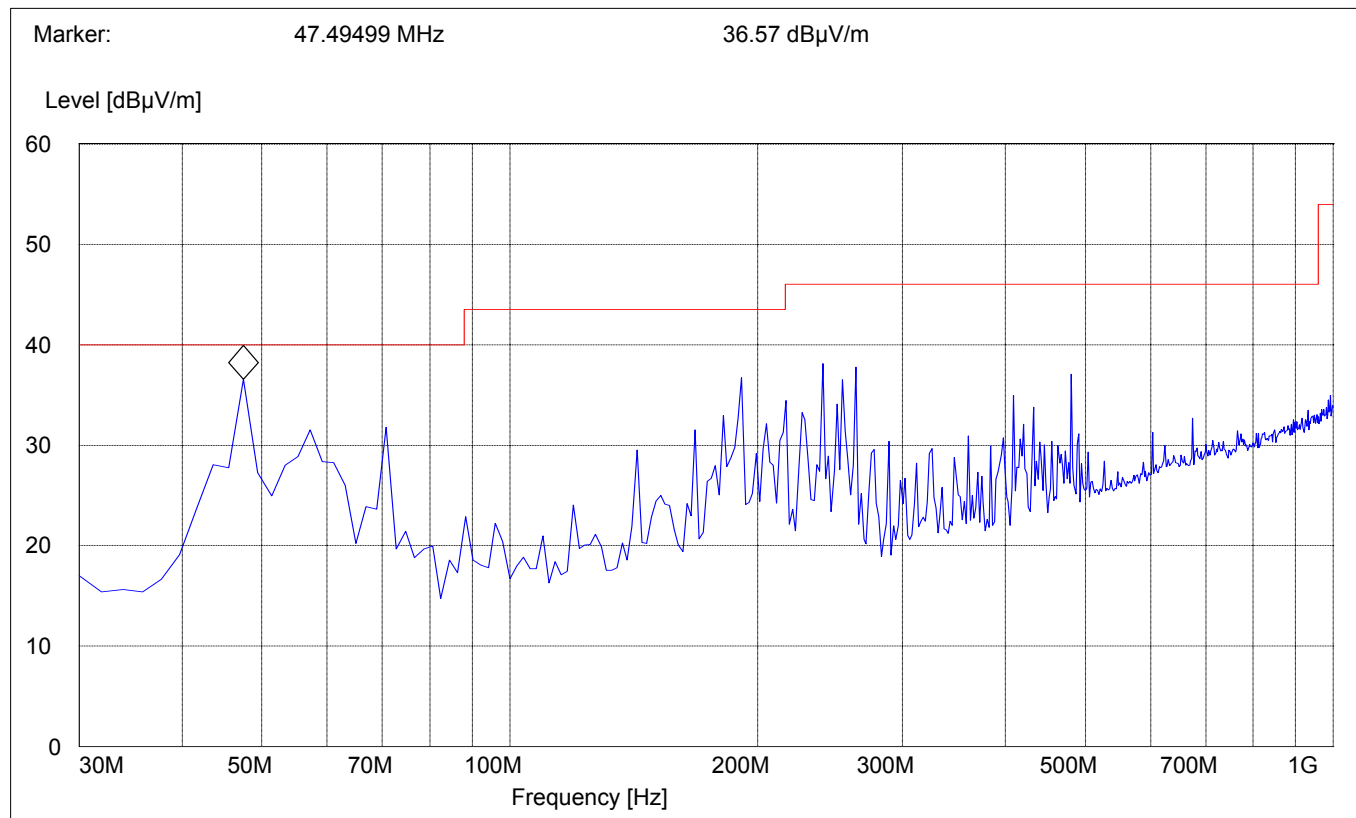
Lowest Channel: 2402MHz

30MHz – 1GHz (Radiated)

Note: This plot is valid for all three channels (worst case)

SWEEP TABLE: "ETS 328 30M-1GTx"

Short Description:		ETS 300 328 30MHz-1GHz TX mode			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	DUMMY-DBM



Out-of-Band Spurious Emissions ETSI EN 300 328 (Transmitter)

SUBCLAUSE § TRC/CA/01/E

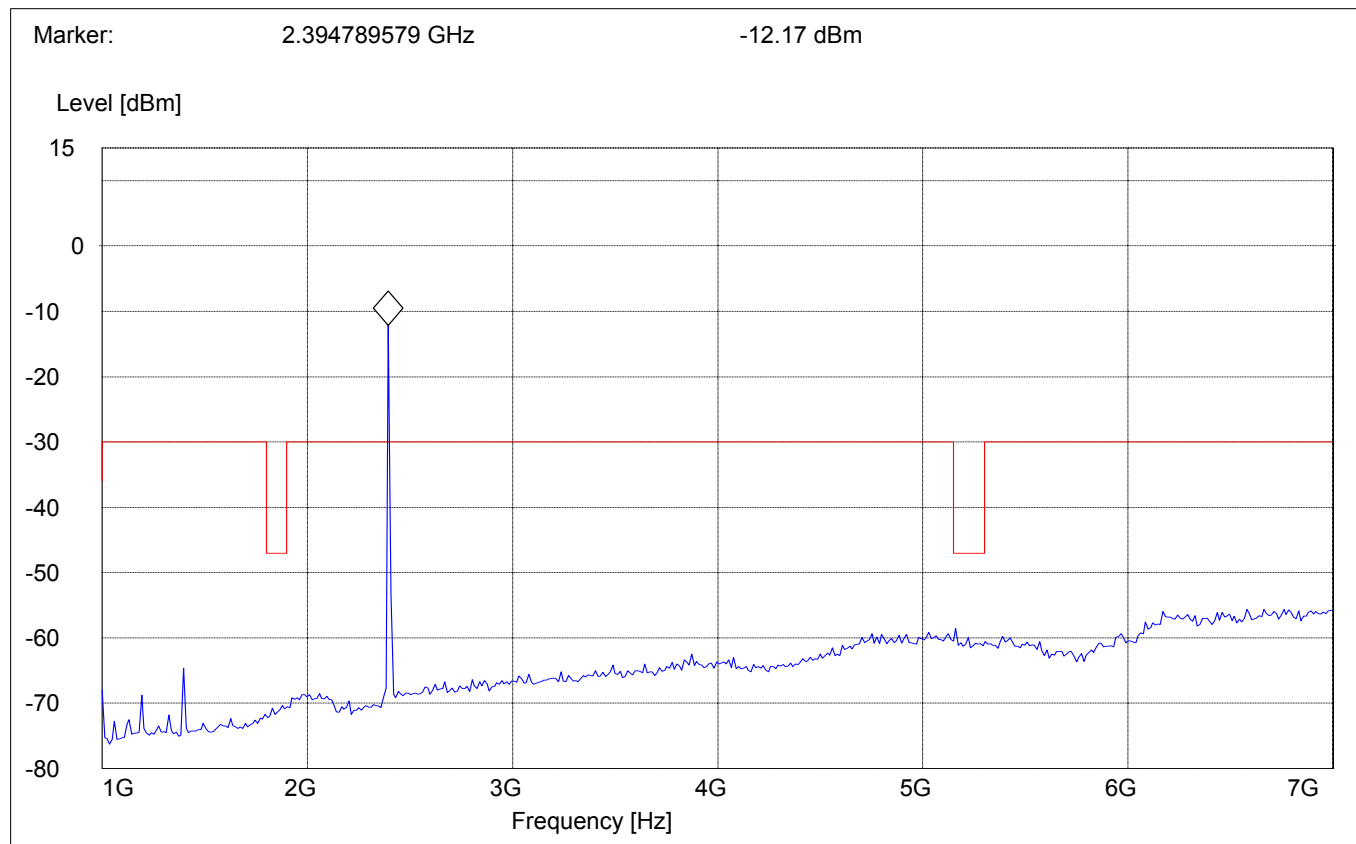
Lowest Channel: 2402MHz

1GHz – 7GHz (Radiated)

Note: The peak above the limit line is the carrier freq.

SWEEP TABLE: "ETS Spuri 1-7G"

Short Description:		ETS 328 1GHz-7GHz TX mode			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
1.0 GHz	7.0 GHz	MaxPeak	Coupled	100 kHz	DUMMY-DBM



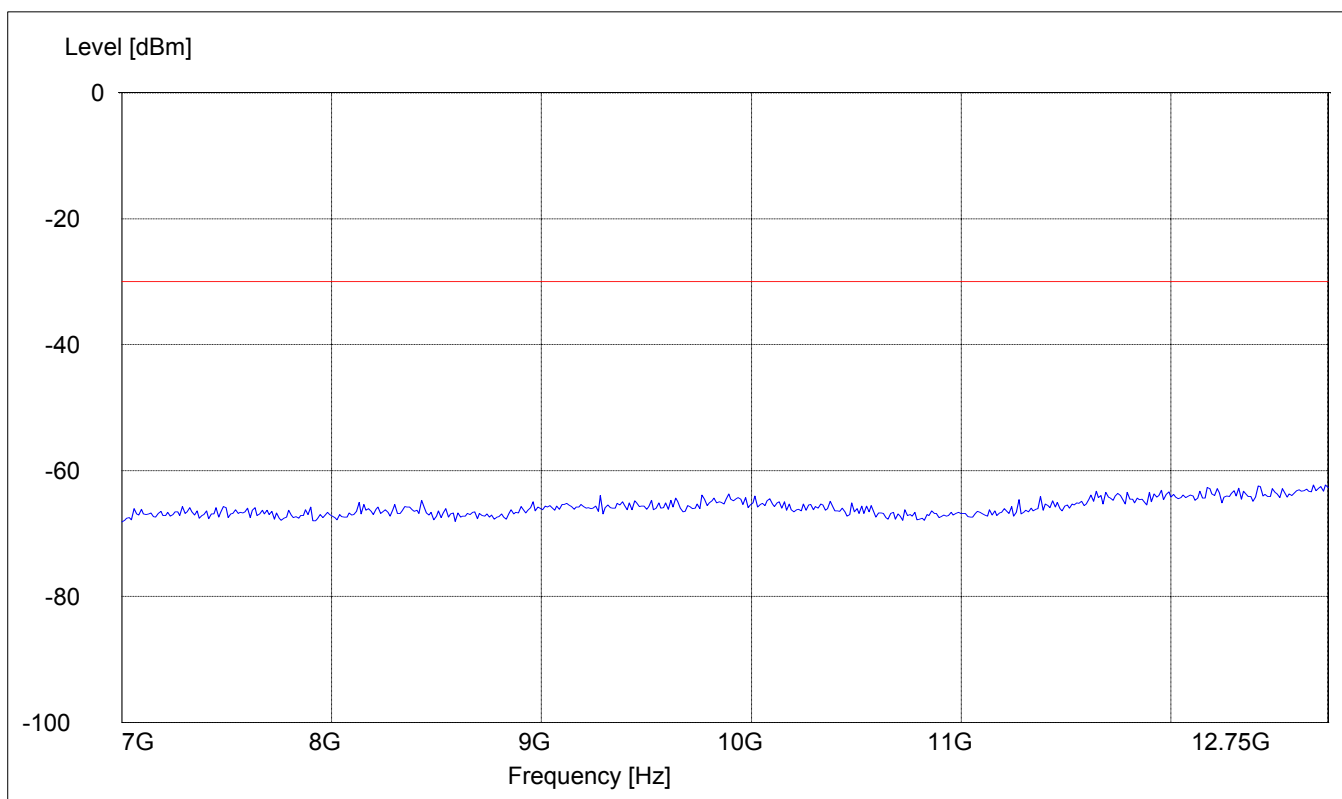
Out-of-Band Spurious Emissions ETSI EN 300 328 (Transmitter)

SUBCLAUSE § TRC/CA/01/E

Lowest Channel: 2402MHz 7GHz – 12.75GHz (Radiated)

SWEEP TABLE: "ETS Spuri 3-7G"

Short Description:		ETS 328 3GHz-7GHz TX mode			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
3.0 GHz	7.0 GHz	MaxPeak	Coupled	100 kHz	DUMMY-DBM



Out-of-Band Spurious Emissions ETSI EN 300 328 (Transmitter)

SUBCLAUSE § TRC/CA/01/E

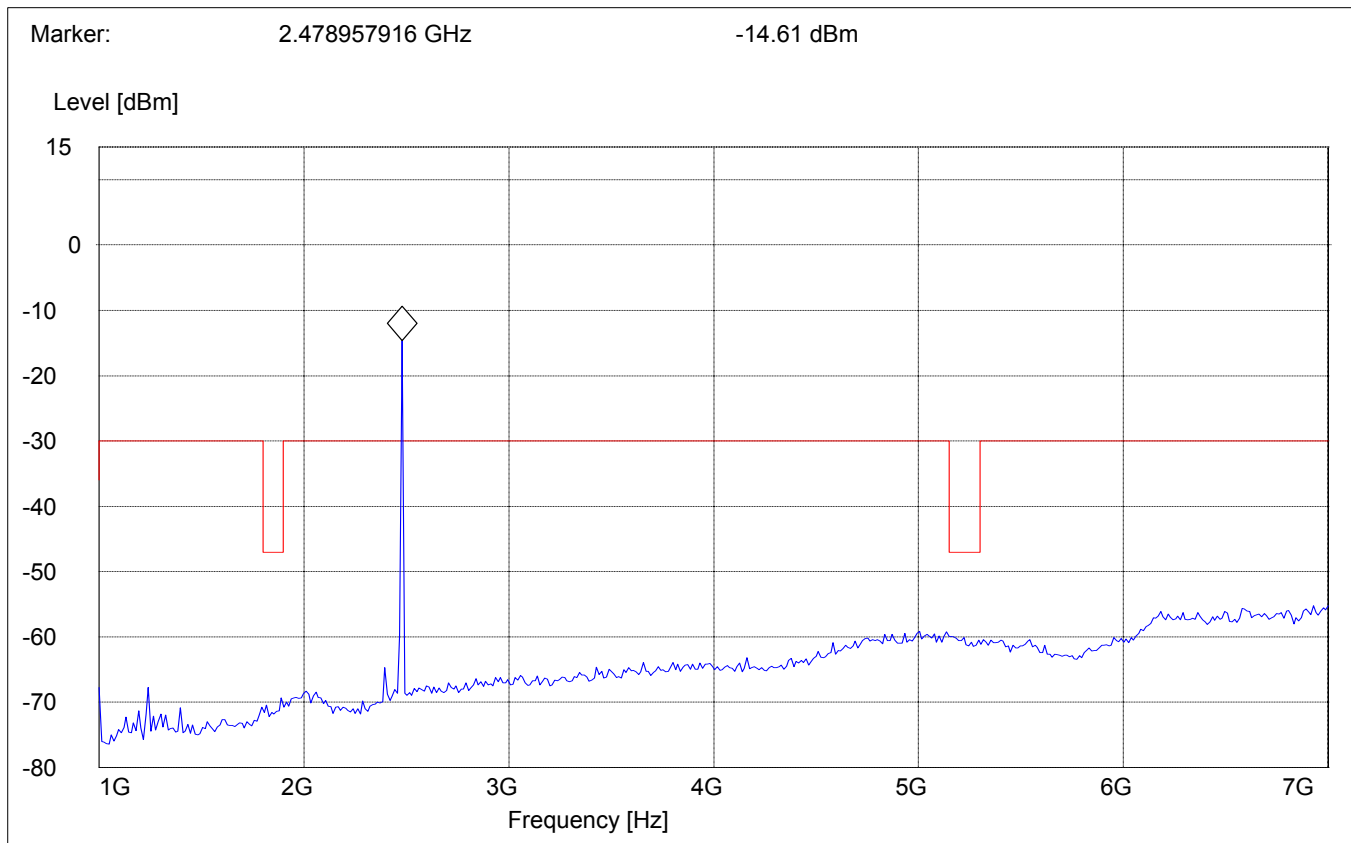
Highest Channel: 2480MHz

1GHz – 7GHz (Radiated)

Note: The peak above the limit line is the carrier freq.

SWEEP TABLE: "ETS Spuri 1-7G"

Short Description:		ETS 328 1GHz-7GHz TX mode			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
1.0 GHz	7.0 GHz	MaxPeak	Coupled	100 kHz	DUMMY-DBM



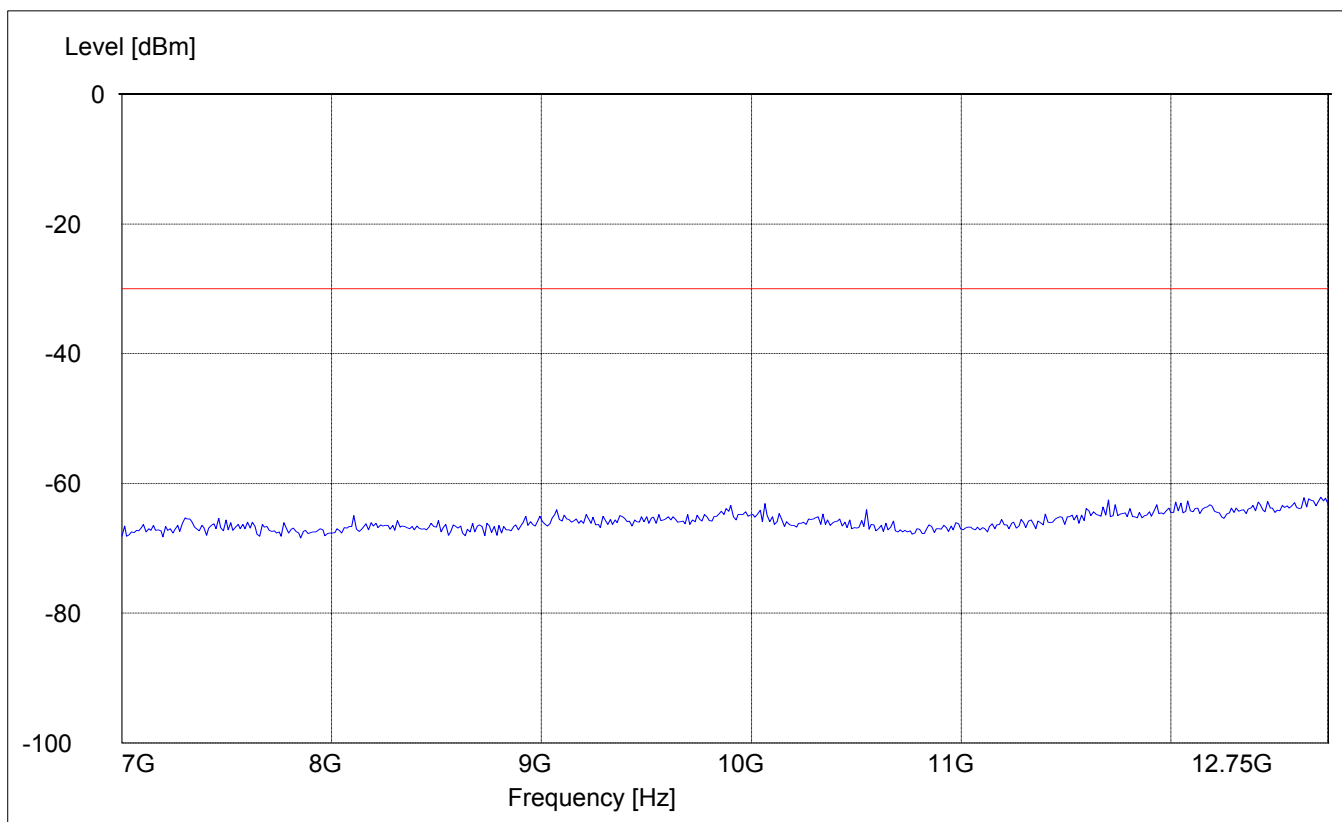
Out-of-Band Spurious Emissions ETSI EN 300 328 (Transmitter)

SUBCLAUSE § TRC/CA/01/E

Highest Channel: 2480MHz
7GHz – 12.75GHz (Radiated)

SWEEP TABLE: "ETS Spuri 3-7G"

Short Description:		ETS 328 3GHz-7GHz TX mode			
Start	Stop	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency				
3.0 GHz	7.0 GHz	MaxPeak	Coupled	100 kHz	DUMMY-DBM



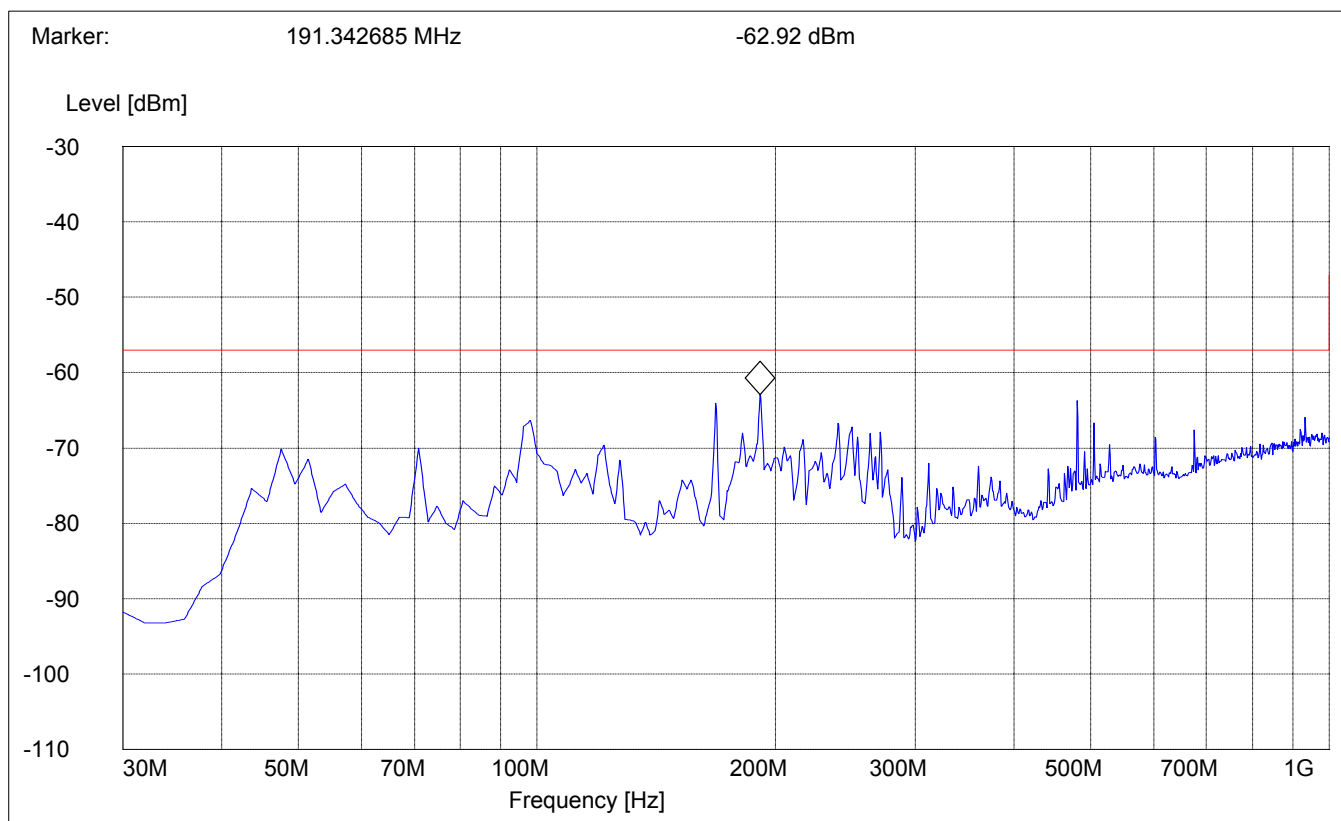
Out-of-Band Spurious Emissions ETSI EN 300 328 (Receiver)

SUBCLAUSE § TRC/CA/01/E

30MHz – 1GHz (Radiated)

SWEEP TABLE: "ETS 328 30M-1GTx"

Short Description:		ETS 300 328 30MHz-1GHz TX mode			
Start	Stop	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency				
30.0 MHz	1.0 GHz	MaxPeak	Coupled	100 kHz	DUMMY-DBM



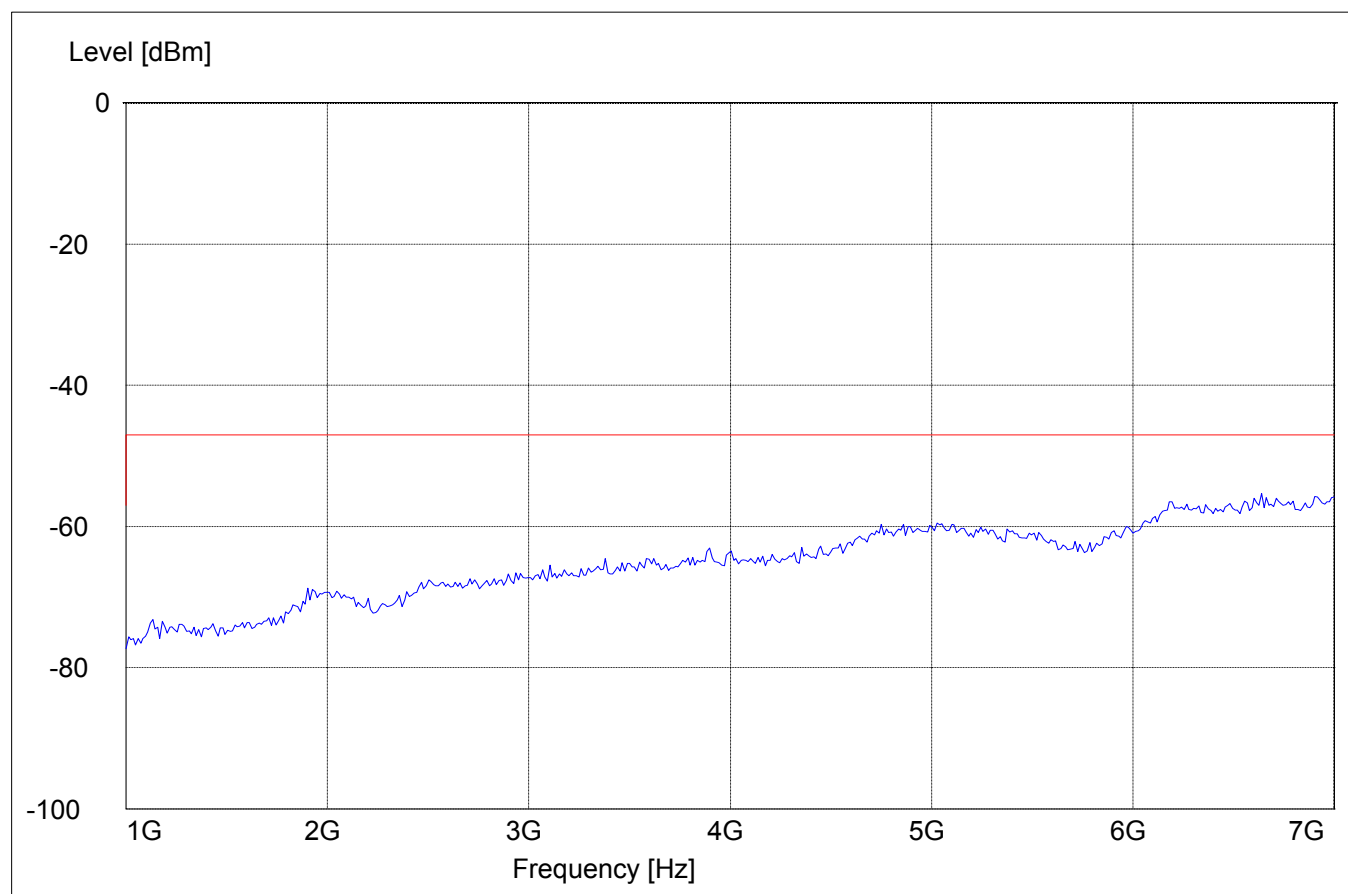
Out-of-Band Spurious Emissions ETSI EN 300 328 (Receiver)

SUBCLAUSE § TRC/CA/01/E

1GHz – 7GHz (Radiated)

SWEEP TABLE: "ETS Spuri 1-7G"

Short Description:		ETS 328 1GHz-7GHz TX mode			
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
1.0 GHz	7.0 GHz	MaxPeak	Coupled	100 kHz	DUMMY-DBM



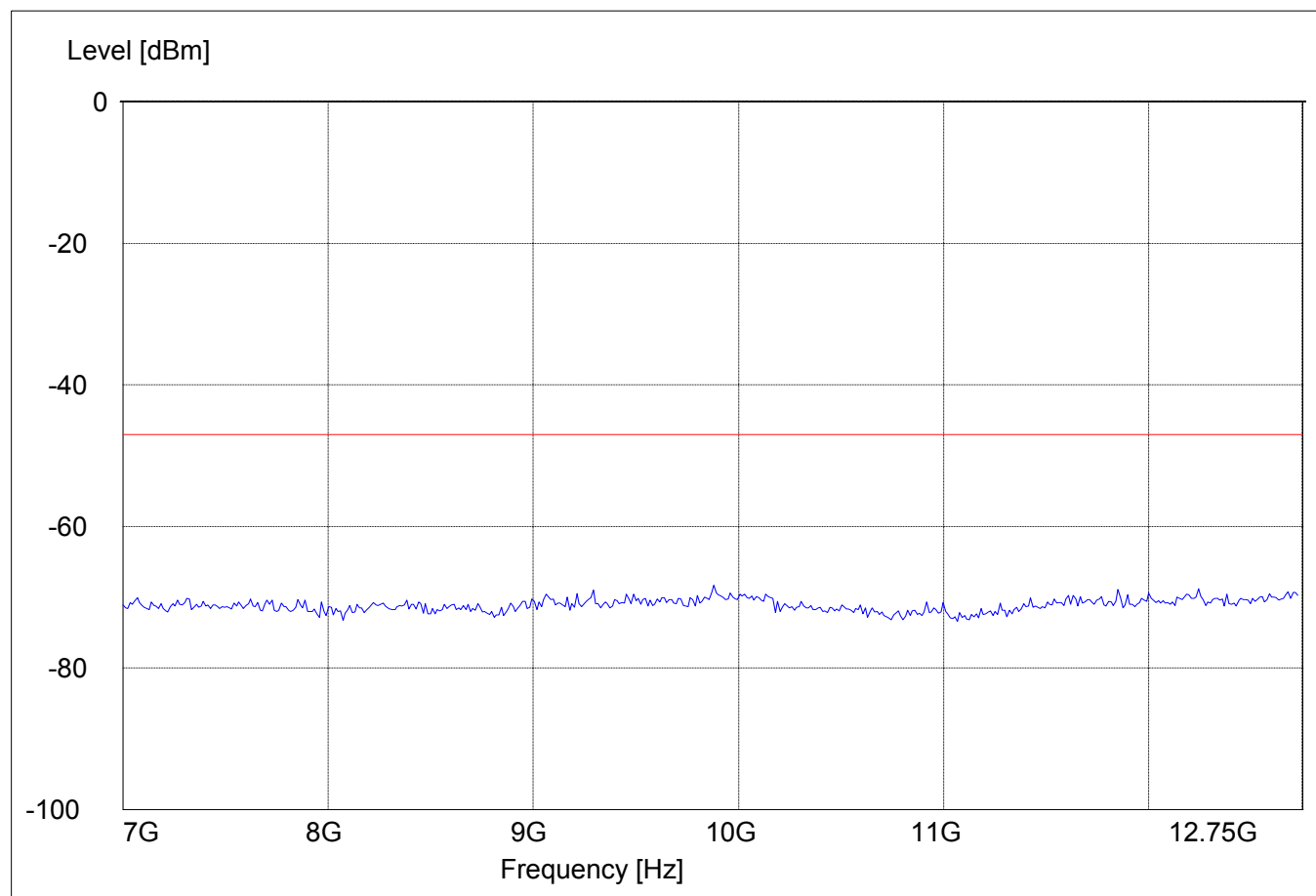
Out-of-Band Spurious Emissions ETSI EN 300 328 (Receiver)

SUBCLAUSE § TRC/CA/01/E

7GHz – 12.75GHz (Radiated)

SWEEP TABLE: "ETS Spuri 3-7G"

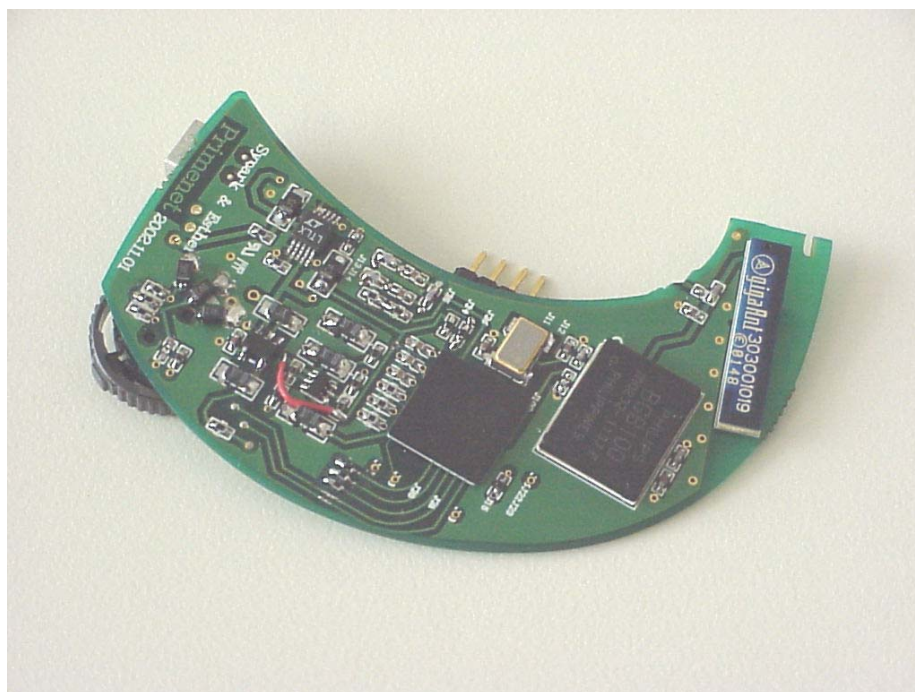
Short Description:			ETS 328 3GHz-7GHz TX mode		
Start	Stop	Detector	Meas.	IF	Transducer
Frequency	Frequency		Time	Bandw.	
3.0 GHz	7.0 GHz	MaxPeak	Coupled	100 kHz	DUMMY-DBM



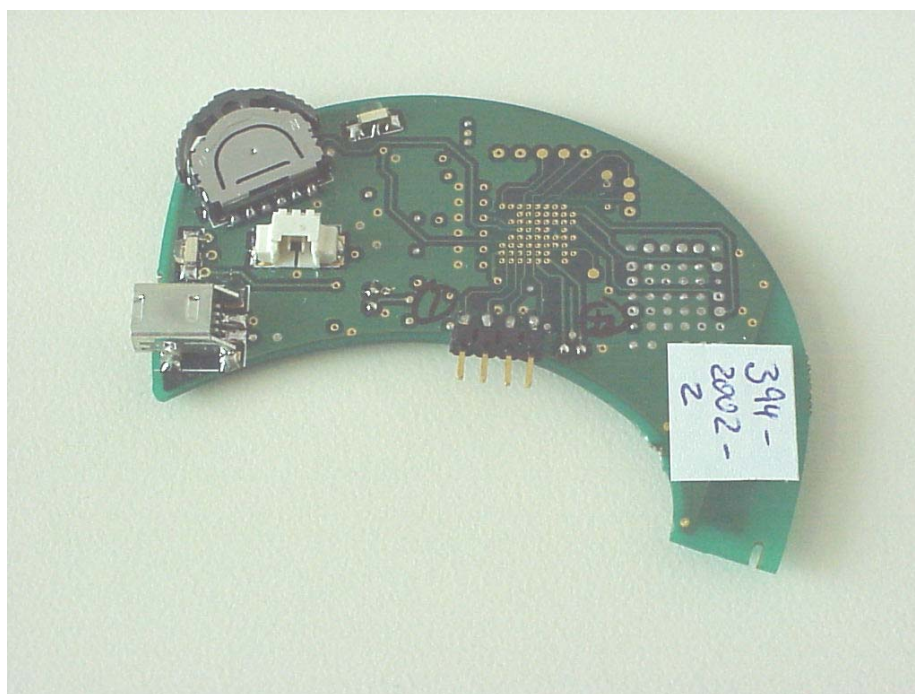
TEST EQUIPMENT LISTING

No	Instrument/Ancillary	Type	Manufacturer	Serial No.
01	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107
02	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	826880/010
03	Biconilog Antenna	3141	EMCO	0005-1186
04	Horn Antenna	SAS-200/571	AH Systems	325
05	Digital Radio Communication tester	CMU-200	Rhode & Schwarz	101821
06	Pre-Amplifier	JS4-00102600	Miteq	00616

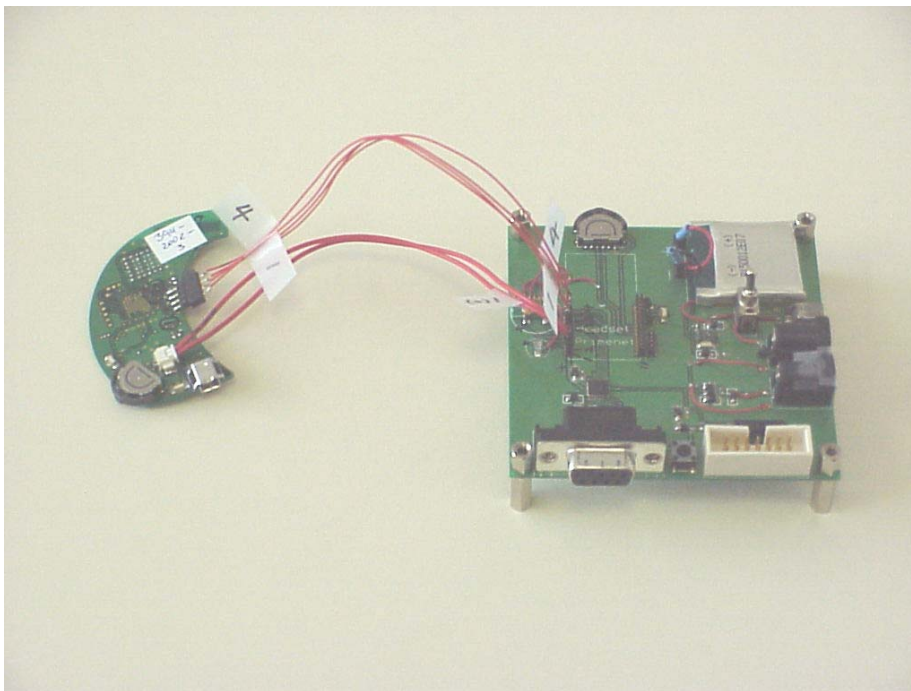
PHOTOGRAPHS



EUT – Top view



EUT – Bottom view



EUT with Test fixture

BLOCK DIAGRAM
Radiated Measurements

ANECHOIC CHAMBER

