



FCC Test Report

Test report no.: EMC_551FCC24_2003

FCC Part 24 / RSS 133
Model: Prism TM

FCC ID: NIUATLTRC



Accredited according to ISO/IEC 17025



FCC listed # 101450

IC recognized # 3925

CETECOM Inc.

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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 generalisations 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 Engineer: Harpreet Sidhu****1.2 Testing laboratory**

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1.3 Details of applicant

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City / Zip Code	:	Garden Grove CA
Country	:	USA
Contact	:	Frank Cruz
Telephone	:	714 890 7631
e-mail	:	Fcruz@teletrac.net

1.4 Application details

Date of receipt test item	:	2003-09-15
Date of test	:	2003-09-16/17/18, 2003-10-15

1.5 Test item

Manufacturer	:	Applicant
Marketing Name	:	Prism TM
Model No.	:	Prism TM
Description	:	GSM / GPRS Vehicle Tracking Unit
FCC-ID	:	NIUATLRC

Additional information

Frequency	:	1850.2MHz – 1909.8MHz for PCS 1900
Type of modulation	:	GMSK
Number of channels	:	299 for PCS-1900
Antenna	:	External
Power supply	:	12VDC Nominal voltage
Output power	:	25.4dBm (346.73mW) max. EIRP measured in PCS-1900
Extreme voltage limits	:	9.6VDC to 16.5VDC
Extreme temp. Tolerance	:	Lower: -30°C Upper: +60°C

1.6 Test standards

FCC Part 22,24 / RSS133 r1

Note: All radiated measurements were made in all three orthogonal planes. The values reported are the maximum values.

The EUT (Prism TM) carries pre-certified Siemens GSM module model# MC45 with FCC ID: QIPMC45

This test report covers full radiated testing as per FCC 24 on EUT with GSM module. All conducted measurements are covered under test report# 2-20542043b/02

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:

2004-04-05 EMC & Radio **Siegfried Lehmann**
(Technical Manager) 

Date	Section	Name	Signature
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Responsible for test report and project leader:

2004-04-05 EMC & Radio **Harpreet Sidhu (EMC Engineer)** 

Date	Section	Name	Signature
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2.2 Test report**TEST REPORT**

Test report no.: EMC_551FCC24_2003
Model: Prism TM

TEST REPORT REFERENCE

PARAMETER TO BE MEASURED	PARAGRAPH	PAGE
POWER OUTPUT	§22.913(a) / § 24.232 (b)	7
EMISSION LIMITS TRANSMITTER	§2.1051 / §24.238	12
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POWER OUTPUT**§ 22.913(a) / § 24.232 (b)****Summary:**

During the process of testing, the EUT was controlled via Rhode & Schwarz Universal Radio Communication tester (CMU 200) to ensure max. Power transmission and proper modulation.

This paragraph contains EIRP measurements for the EUT.

Method of Measurements:

The EUT was set up for the max. Output power with pseudo random data modulation.

The power was measured with R&S Spectrum Analyzer ESIB 40 (peak)

These measurements were done at 3 frequencies,

1850.2 MHz, 1880.0 MHz and 1909.8 MHz (bottom, middle and top of operational frequency range) for PCS-1900

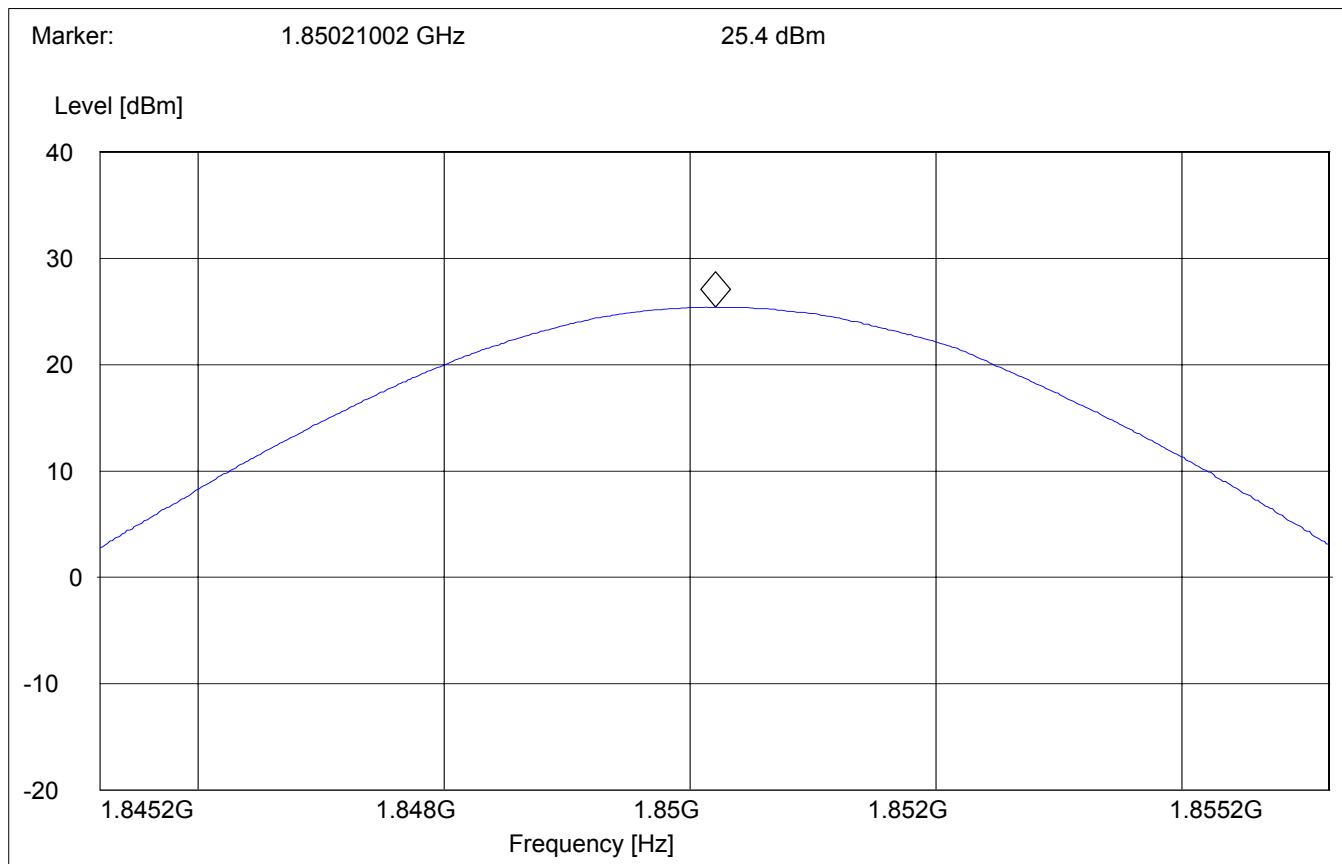
EIRP (PCS-1900)**§24.232(b)****Limits:**

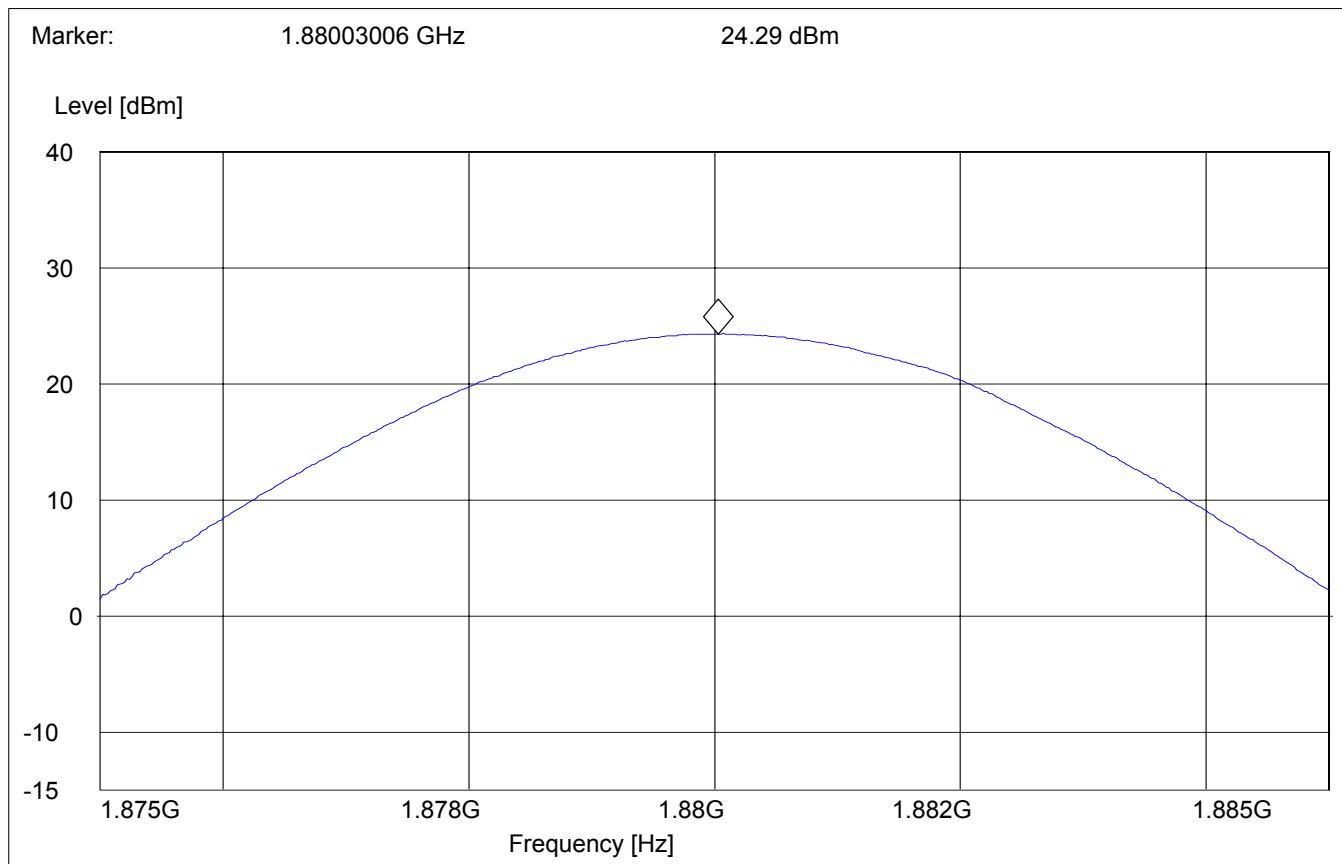
Power Control Level	Burst Peak EIRP
0	≤33dBm (1W)

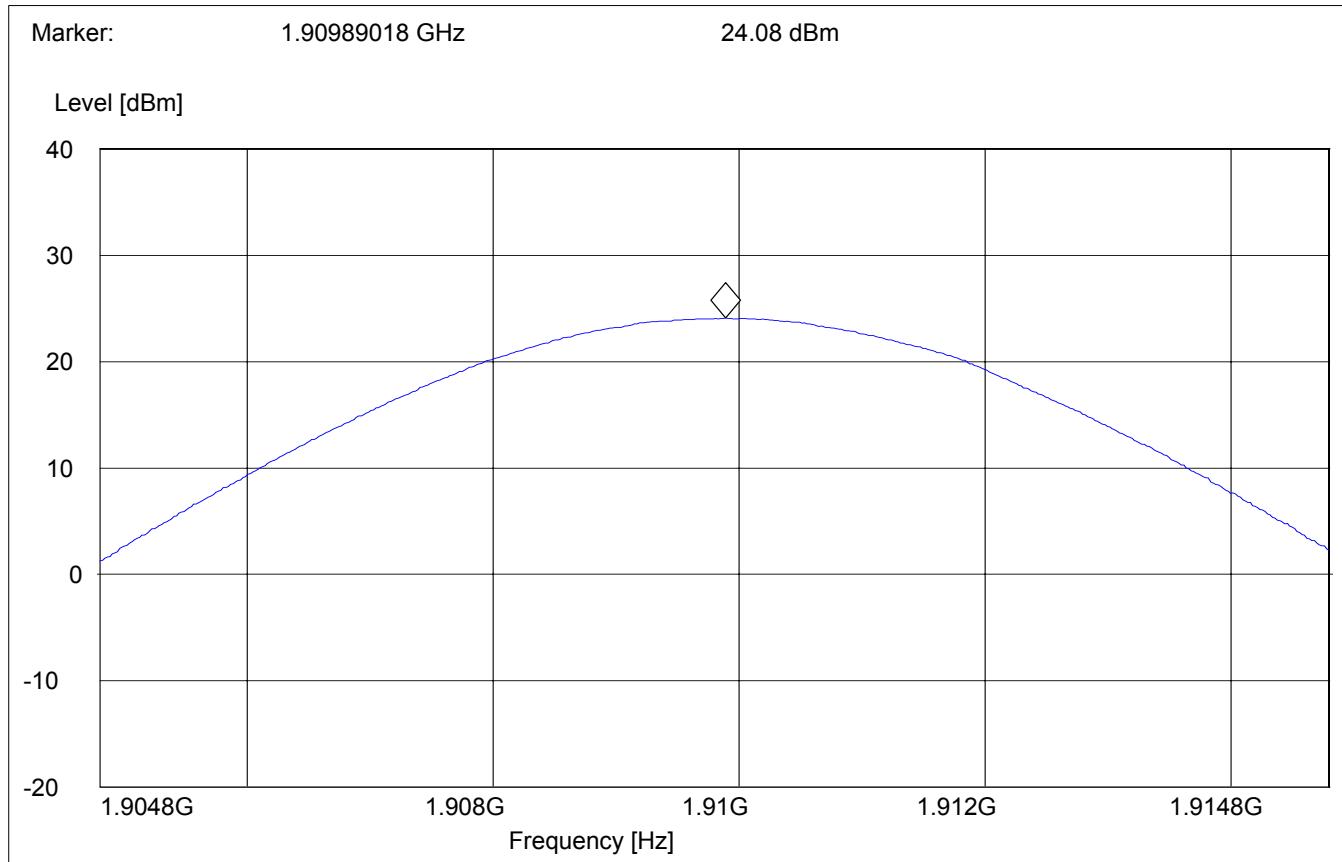
EIRP

Frequency (MHz)	Power Control Level	Burst Peak
		(dBm)
1850.2	0	25.40
1880.0	0	24.29
1909.8	0	24.08
Measurement uncertainty		±0.5 dB

ANALYZER SETTINGS: RBW = VBW = 3MHz

**EIRP (PCS-1900)
CHANNEL 512****§24.232(b)**

**EIRP (PCS-1900)
CHANNEL 661****§24.232(b)**

**EIRP (PCS-1900)
CHANNEL 810****§24.232(b)**

EMISSION LIMITS TRANSMITTER**\$2.1051 / §24.238****Measurement Procedure:**

The following steps outline the procedure used to measure the radiated emissions from the EUT. The site is constructed in accordance with ANSI C63.4 – 1992 requirements and is recognised by the FCC. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz for PCS-1900. The resolution bandwidth is set as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the PCS-1900 band.

The final Radiated emission test procedure is as follows:

- a) The test item was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna.
- b) The antenna output was terminated in a 50-ohm load.
- c) A double-ridged wave guide antenna was placed on an adjustable height antenna mast 3 meters from the test item for emission measurements.
- d) Detected emissions were maximized at each frequency by rotating the test item and adjusting the receive antenna height and polarization. The maximum meter reading was recorded. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and 1MHz bandwidth. If the harmonic could not be detected above the noise floor, the ambient level was recorded. The equivalent power into a dipole antenna was determined by the substitution method described for EIRP measurements.

Measurement Limit:

Sec. 24.238 Emission Limits.

- (a) On any frequency outside a licensee's frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least $43 + 10\log(P)$ dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

Measurement Results:

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the PCS-1900 band. It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the PCS-1900 band into any of the other blocks respectively. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

RESULTS OF RADIATED TESTS PCS-1900:

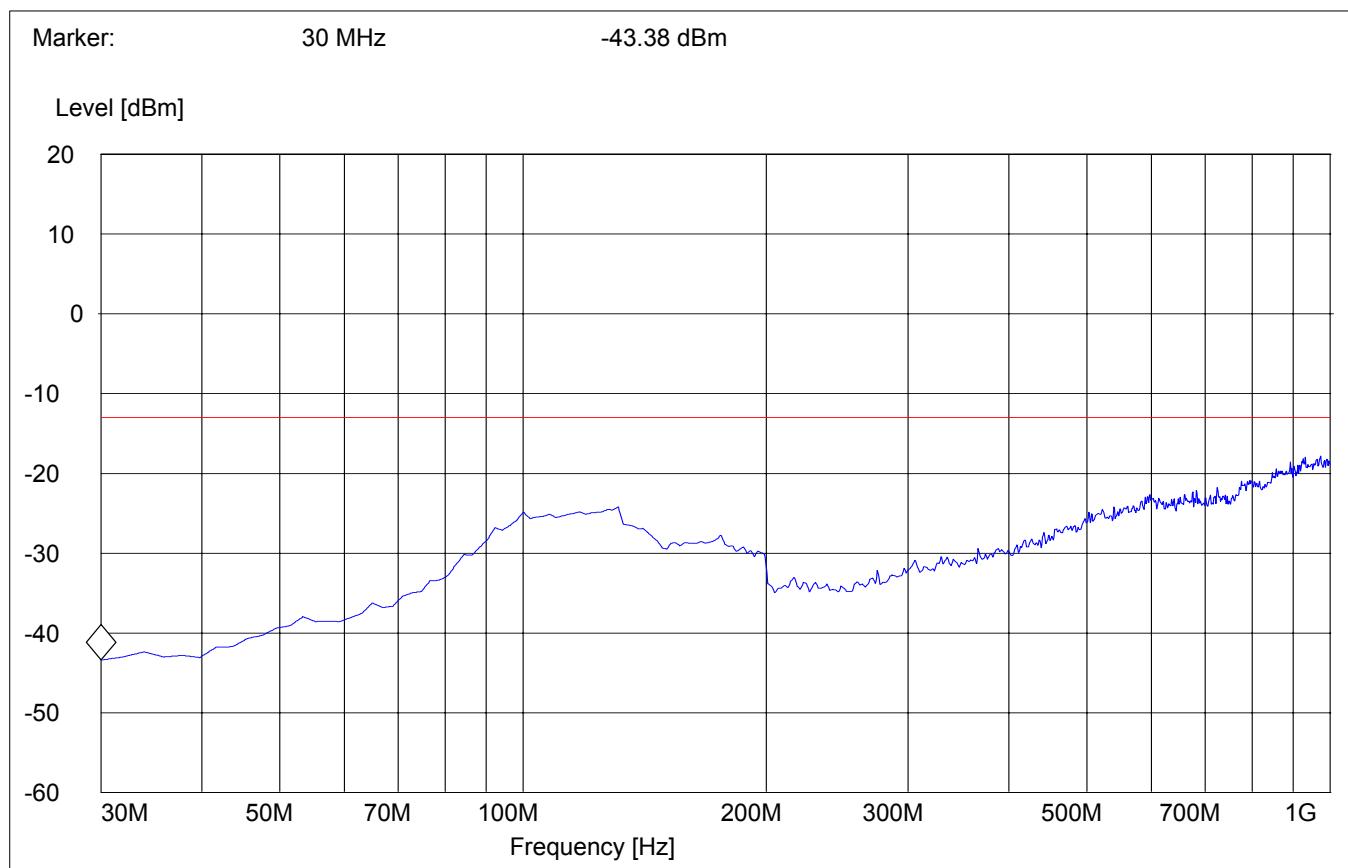
Harmonic	Tx ch-512 Freq.(MHz)	Level (dBm)	Tx ch-661 Freq. (MHz)	Level (dBm)	Tx ch-810 Freq. (MHz)	Level (dBm)
2	3700.4	-38.07	3760	-39.89	3819.6	-44.07
3	5550.6	-33.52	5640	-39.33	5729.4	-29.87
4	7400.8	-33.33	7520	-31.77	7639.2	-26.86
5	9251	-35.91	9400	-36.46	9549	-36.75
6	11101.2	-23.46	11280	-16.91	11458.8	-18.32
7	12951.4	-35.37	13160	-31.53	13368.6	-36.66
8	14801.6	-34.70	15040	-34.44	15278.4	-39.97
9	16651.8	-43.05	16920	-37.02	17188.2	-41.29
10	18502	-71.59	18800	-71.25	19098	-70.21

RADIATED SPURIOUS EMISSIONS**Tx @ 1850.2MHz: 30MHz - 1GHz**

Spurious emission limit -13dBm

Antenna: vertical***SWEEP TABLE: "FCC 24 Spur 30M-1G"***

Start Frequency	Stop Frequency	Detector	Meas.	RBW/VBW
30MHz	1GHz	Max Peak	Coupled	1 MHz

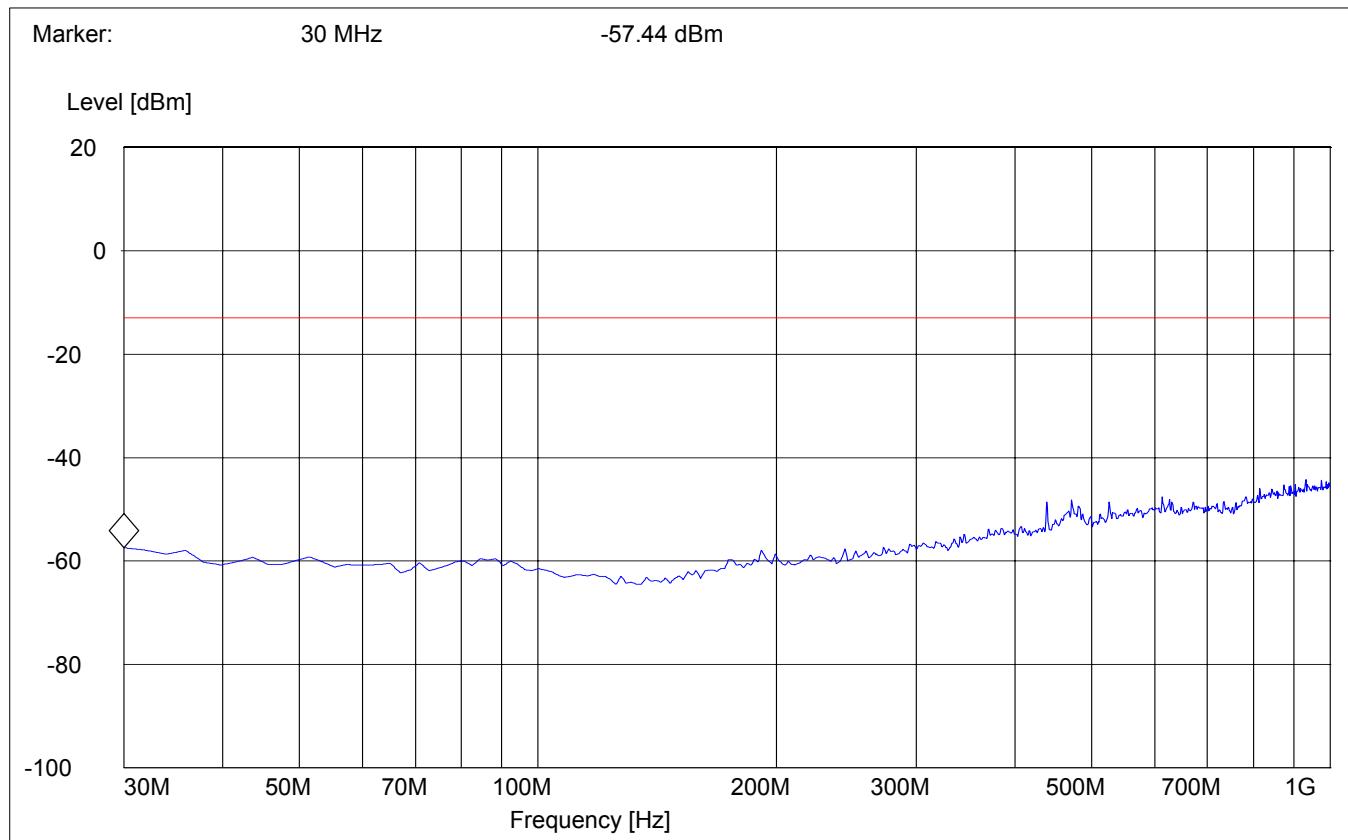
Note: This plot is valid for low, mid & high channels (worst-case plot)

RADIATED SPURIOUS EMISSIONS**Tx @ 1850.2MHz: 30MHz - 1GHz**

Spurious emission limit -13dBm

Antenna: horizontal***SWEEP TABLE: "FCC 24 Spur 30M-1G"***

Start Frequency	Stop Frequency	Detector	Meas.	RBW/VBW
30MHz	1GHz	Max Peak	Coupled	1 MHz

Note: This plot is valid for low, mid & high channels (worst-case plot)

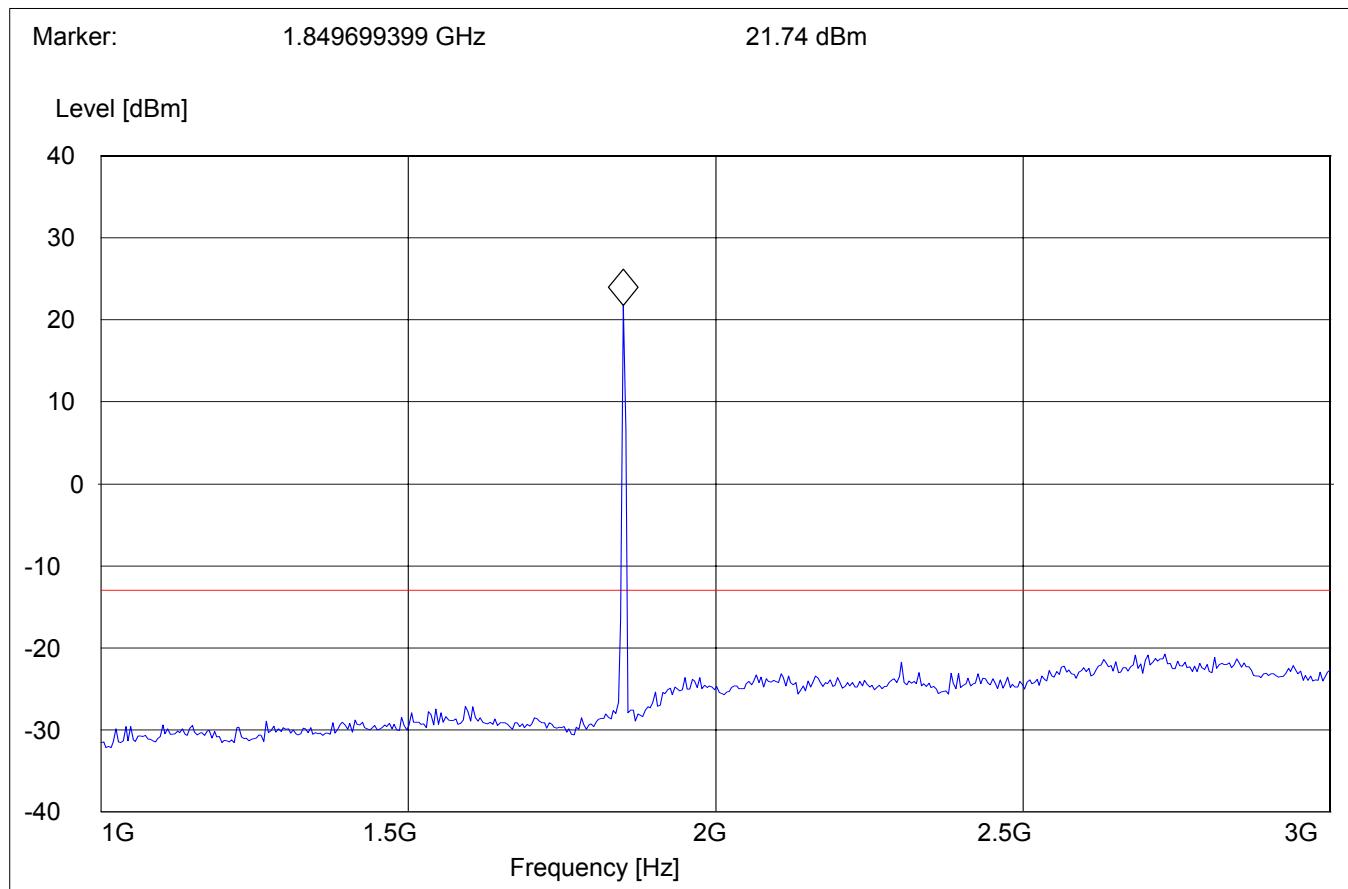
RADIATED SPURIOUS EMISSIONS**Tx @ 1850.2MHz: 1GHz – 3GHz**

Spurious emission limit –13dBm

SWEEP TABLE: "FCC24 Spuri 1-3G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
1GHz	3GHz	Max Peak	Coupled	1 MHz

Note: The peak above the limit line is the carrier freq. at ch-512.

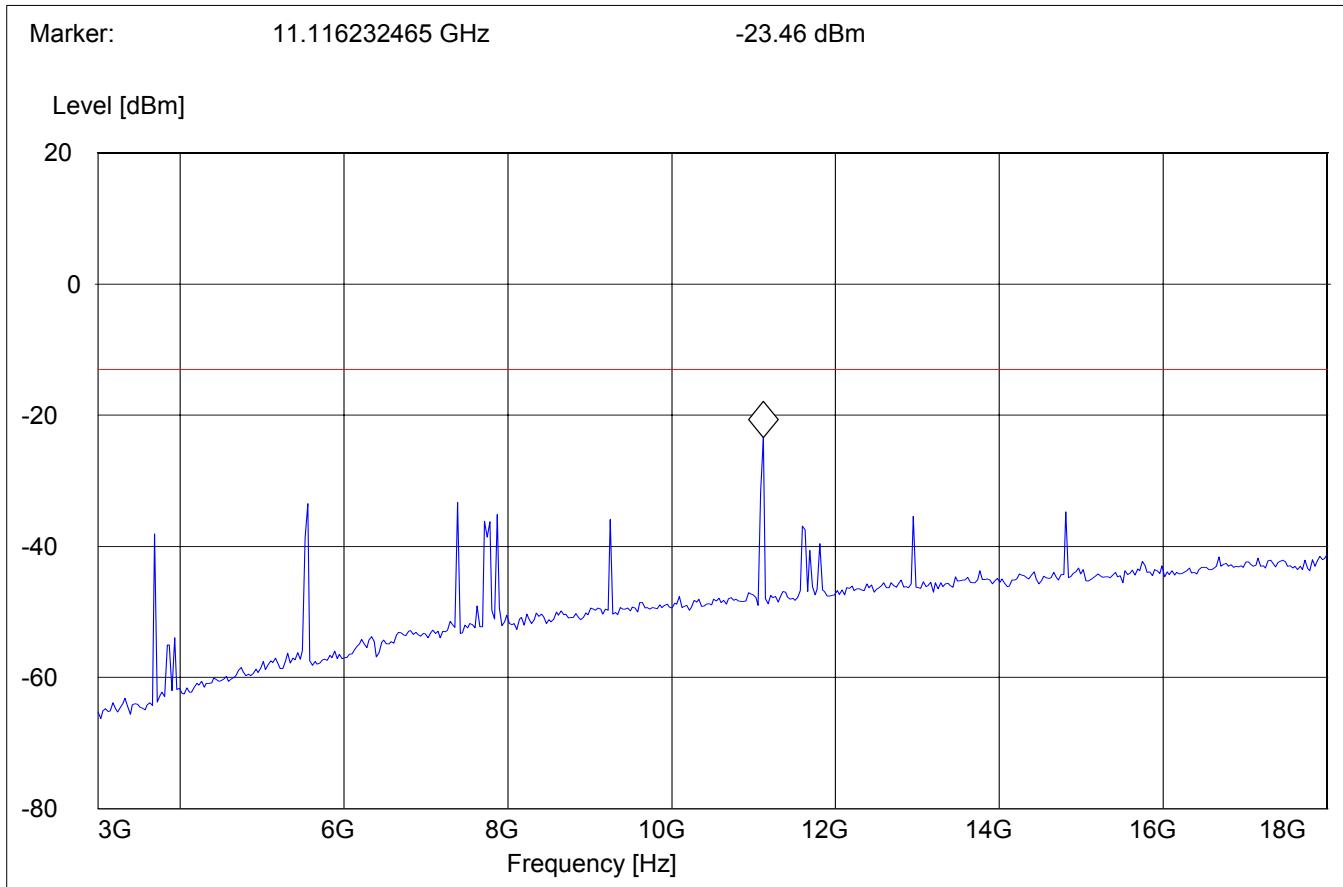


RADIATED SPURIOUS EMISSIONS**Tx @ 1850.2MHz: 3GHz – 18GHz**

Spurious emission limit –13dBm

SWEEP TABLE: "FCC24 Spuri 3-18G"

Start Frequency	Stop Frequency	Detector	Meas.	RBW/VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz



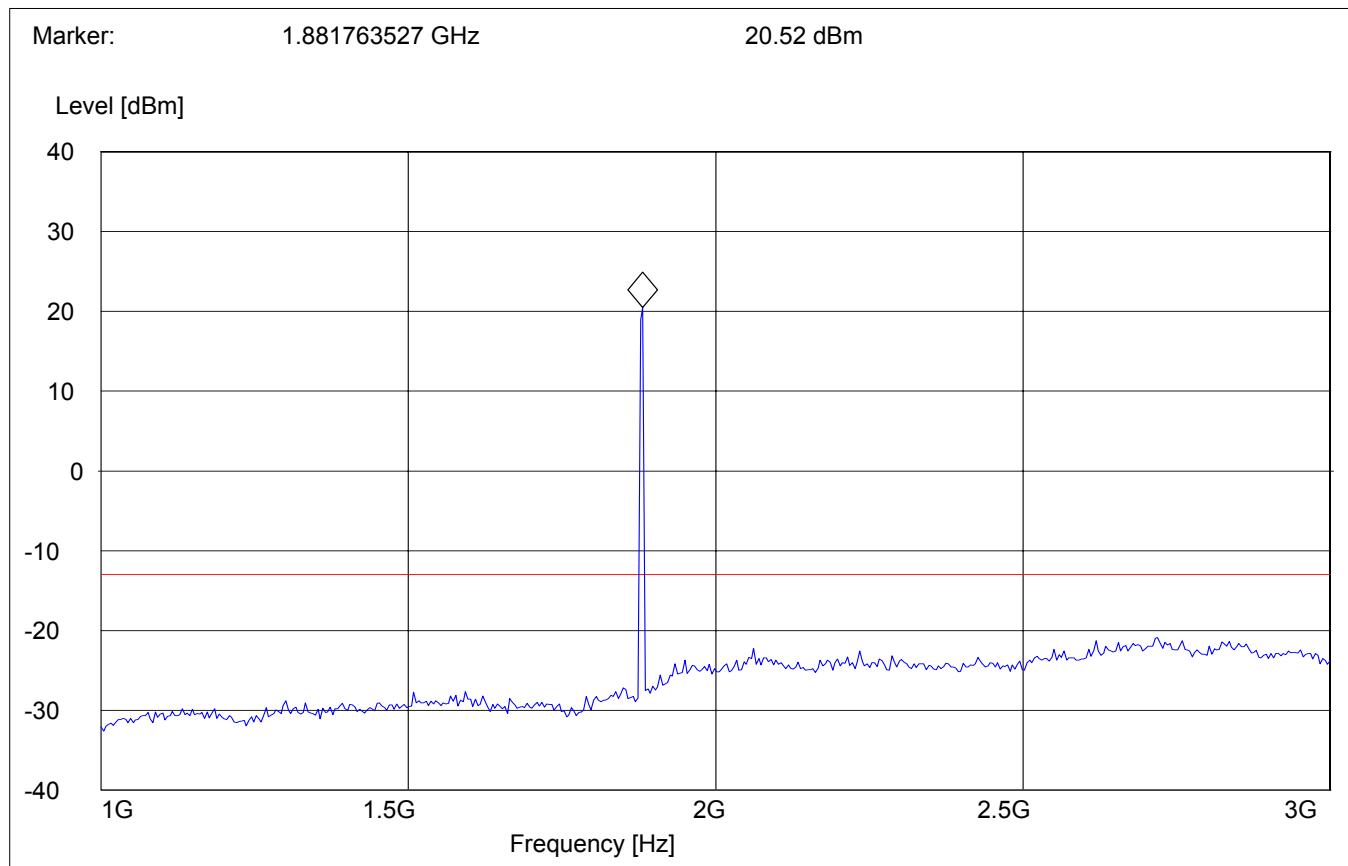
RADIATED SPURIOUS EMISSIONS**Tx @ 1880MHz: 1GHz – 3GHz**

Spurious emission limit –13dBm

SWEEP TABLE: "FCC24 Spuri 1-3G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
1GHz	3GHz	Max Peak	Coupled	1 MHz

Note: The peak above the limit line is the carrier freq. at ch-661.

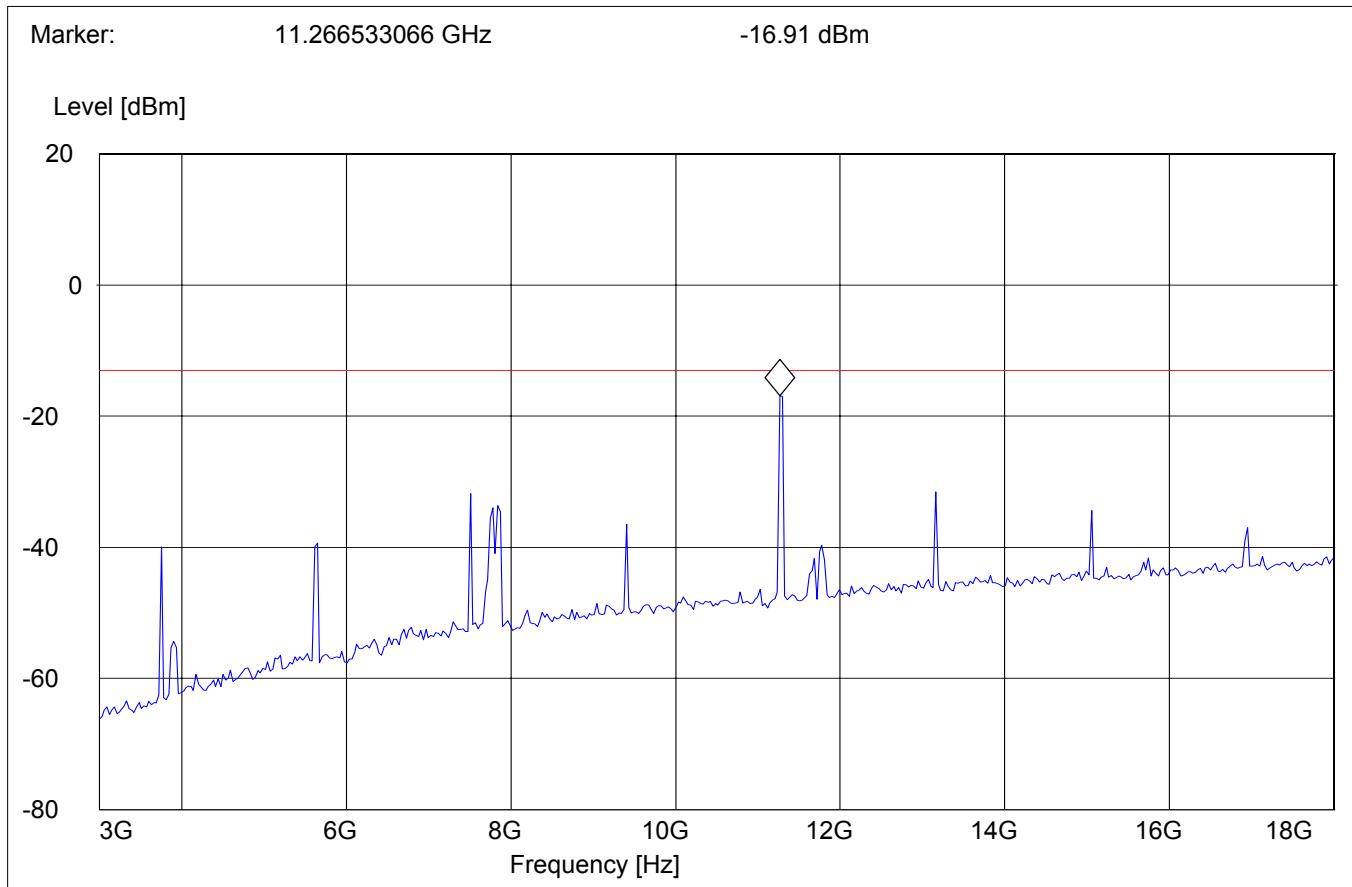


RADIATED SPURIOUS EMISSIONS**Tx @ 1880MHz: 3GHz – 18GHz**

Spurious emission limit –13dBm

SWEEP TABLE: "FCC24 Spuri 3-18G"

Start Frequency	Stop Frequency	Detector	Meas.	RBW/VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz



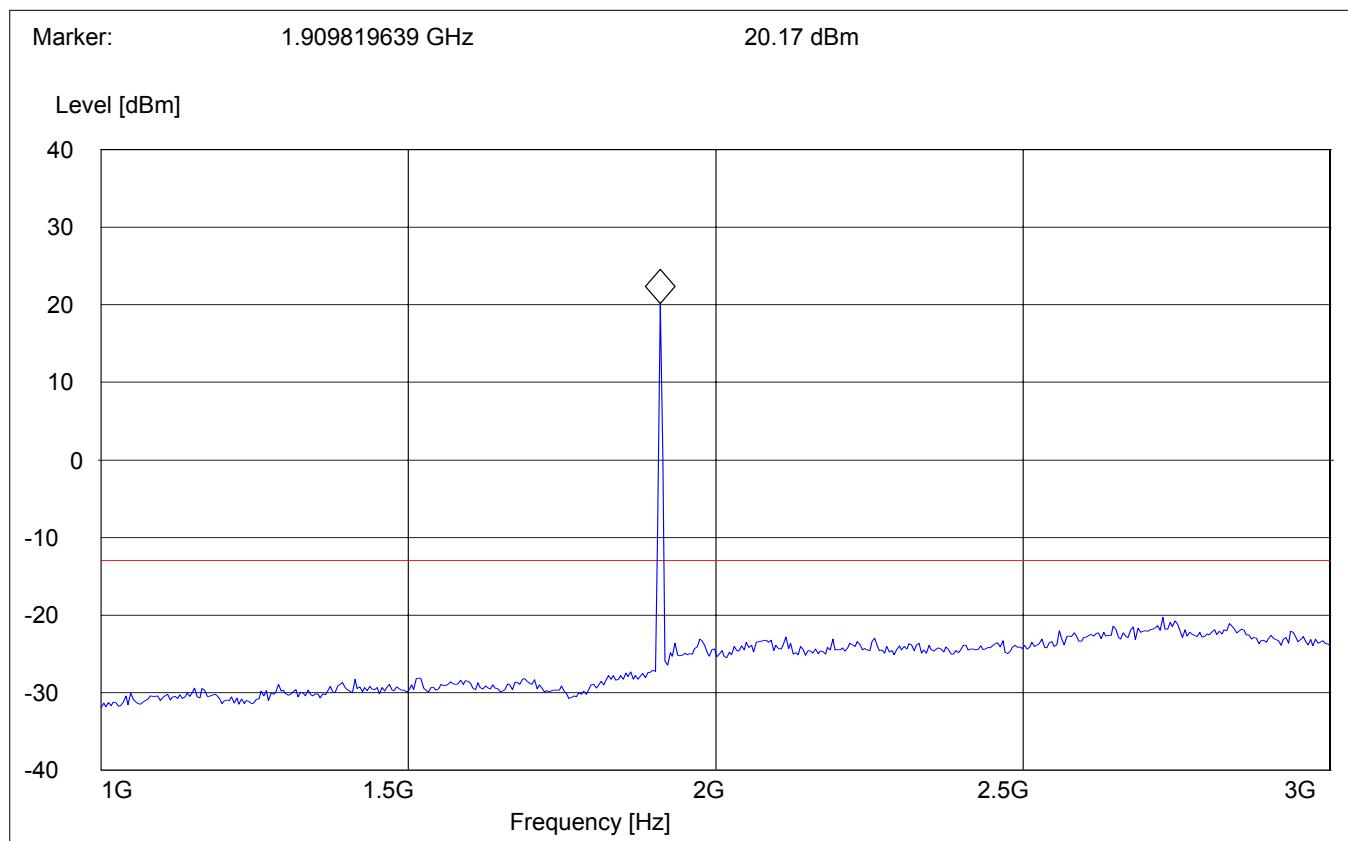
RADIATED SPURIOUS EMISSIONS**Tx @ 1909.8MHz: 1GHz – 3GHz**

Spurious emission limit –13dBm

SWEEP TABLE: "FCC24 Spuri 1-3G"

Start Frequency	Stop Frequency	Detector	Meas.	RBW/VBW
			Time	
1GHz	3GHz	Max Peak	Coupled	1 MHz

Note: The peak above the limit line is the carrier freq. at ch-810.

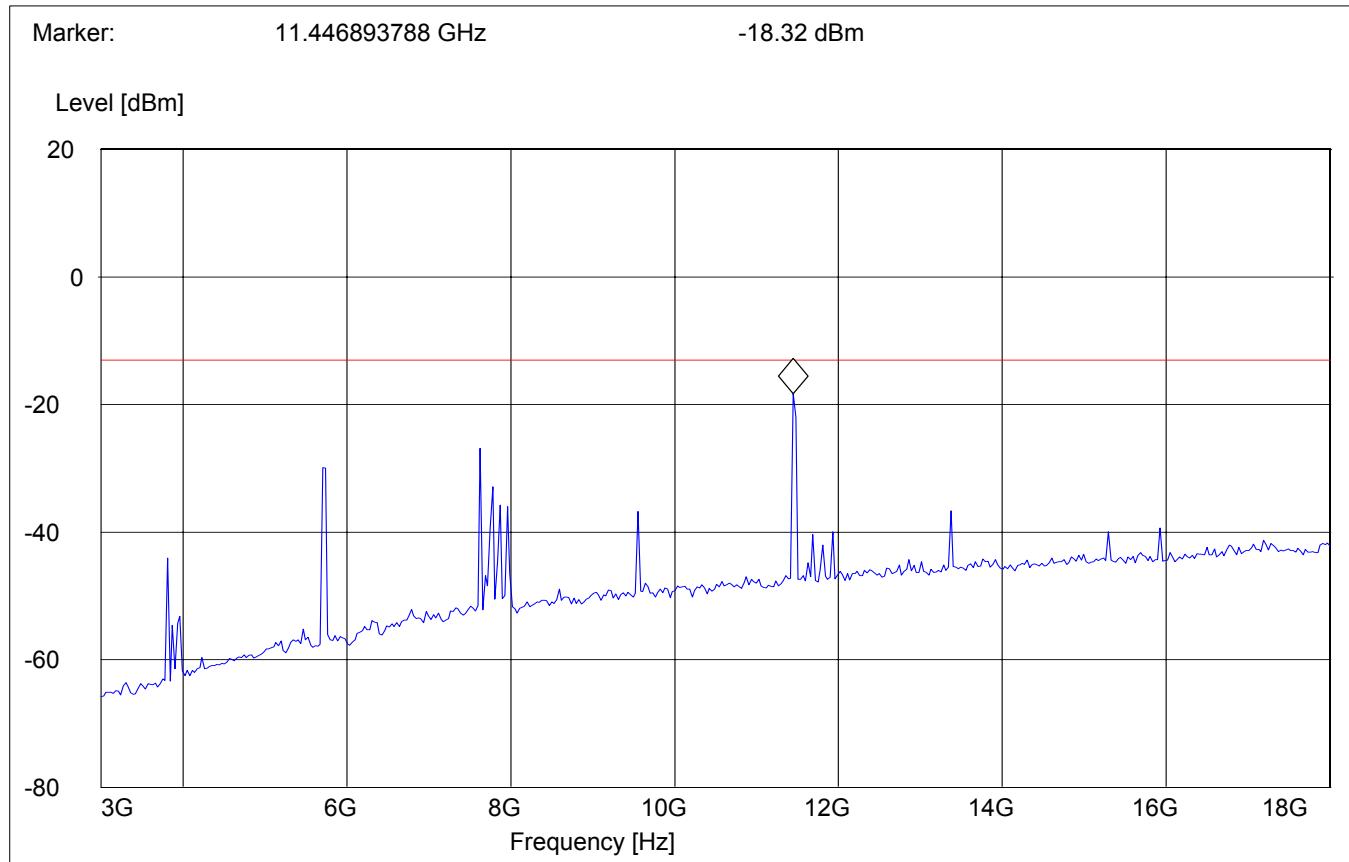


RADIATED SPURIOUS EMISSIONS**Tx @ 1909.8MHz: 3GHz – 18GHz**

Spurious emission limit –13dBm

SWEEP TABLE: "FCC24 Spuri 3-18G"

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW/VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz

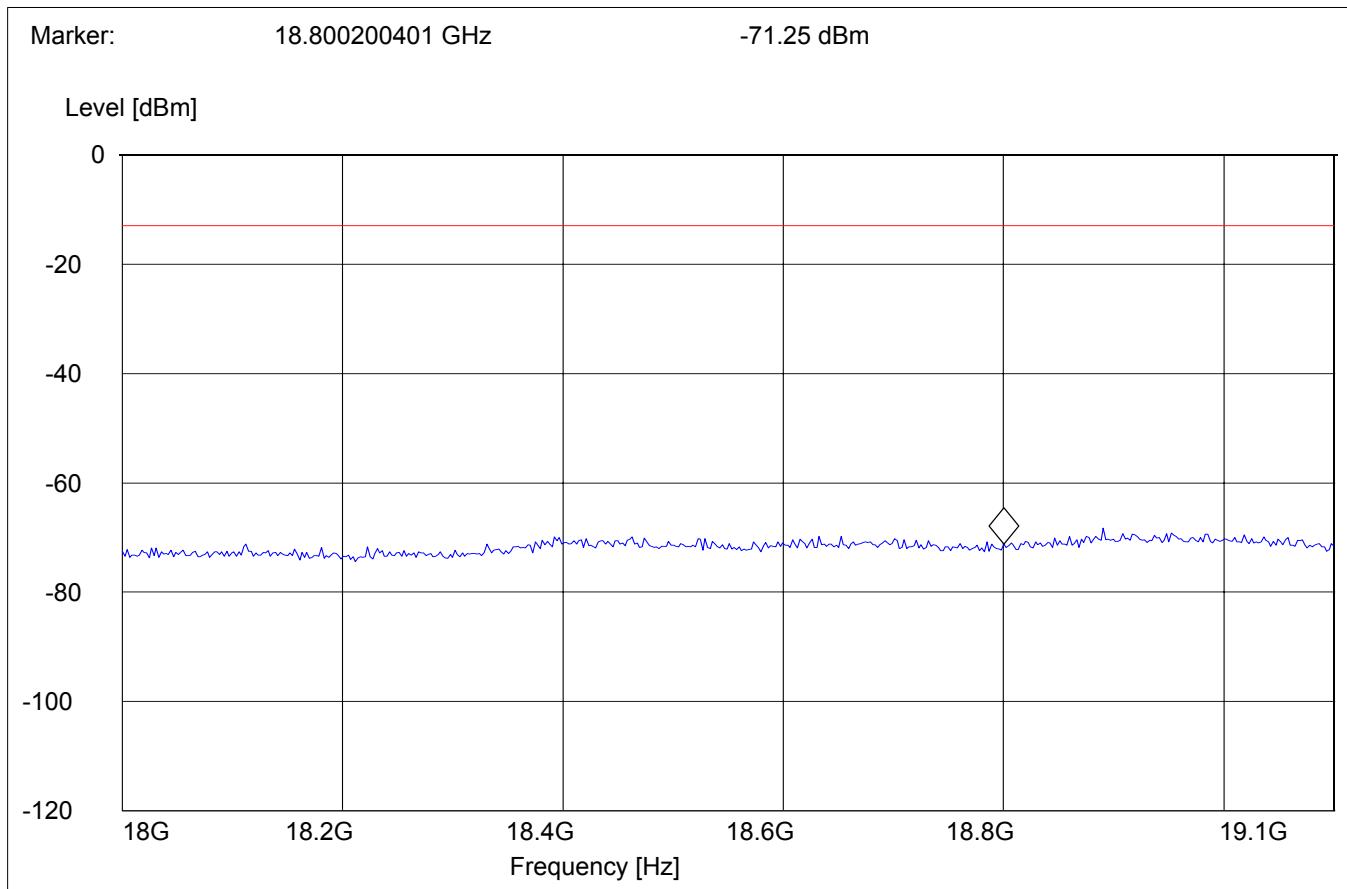


RADIATED SPURIOUS EMISSIONS**18GHz – 19.1GHz**

Spurious emission limit –13dBm

SWEET TABLE: "FCC24 spuri 18-19.1G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
18GHz	19.1GHz	Max Peak	Coupled	1 MHz

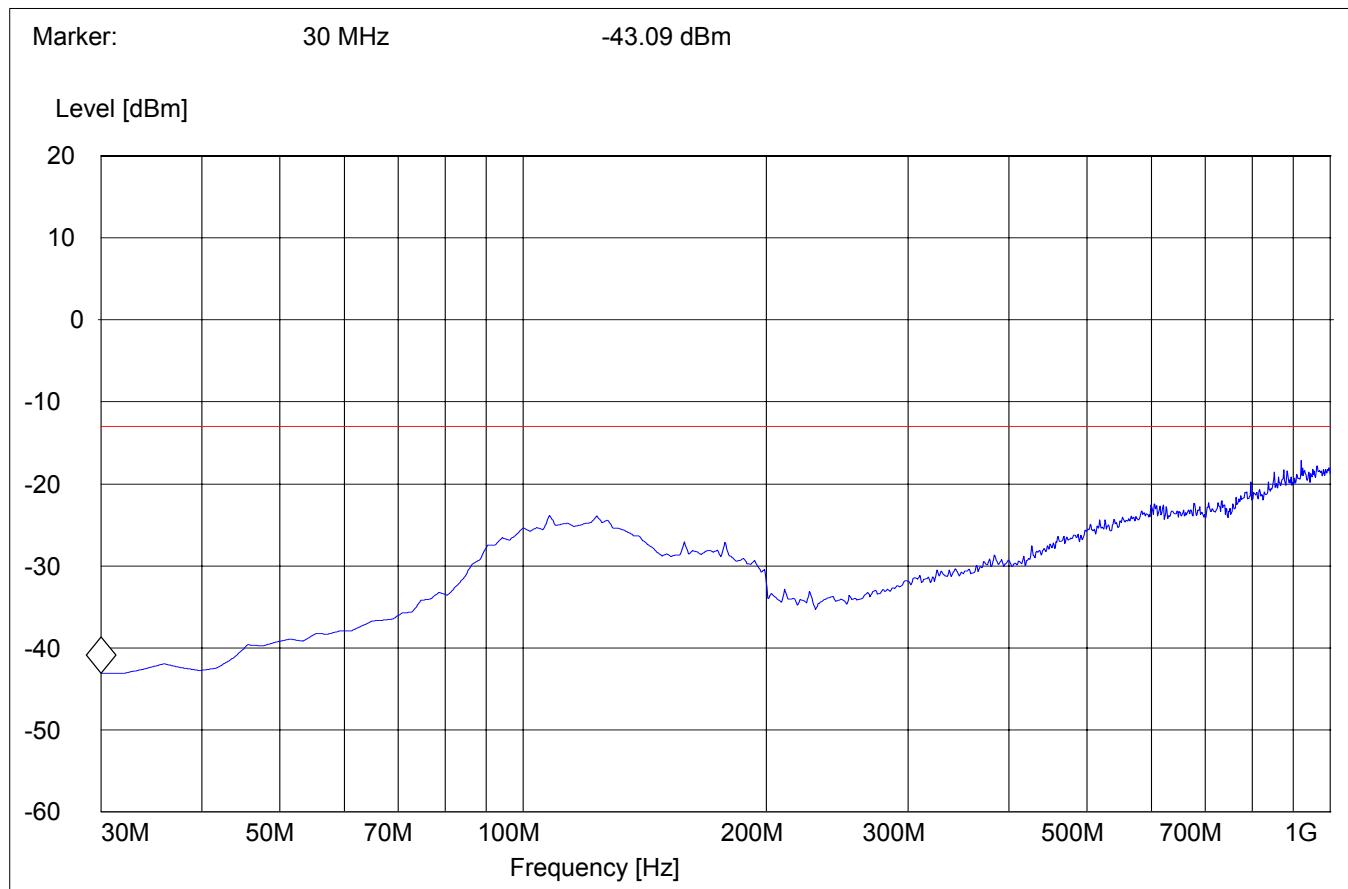
Note: This plot is valid for low, mid & high channels (worst-case plot)

RADIATED SPURIOUS EMISSIONS (IDLE MODE – GSM 1900)**Antenna: vertical****EUT in Idle Mode: 30MHz – 1GHz**

Spurious emission limit –13dBm

SWEEP TABLE: "FCC 24 Spur 30M-1G"

Start Frequency	Stop Frequency	Detector	Meas.	RBW/VBW
30MHz	1GHz	Max Peak	Coupled	1 MHz

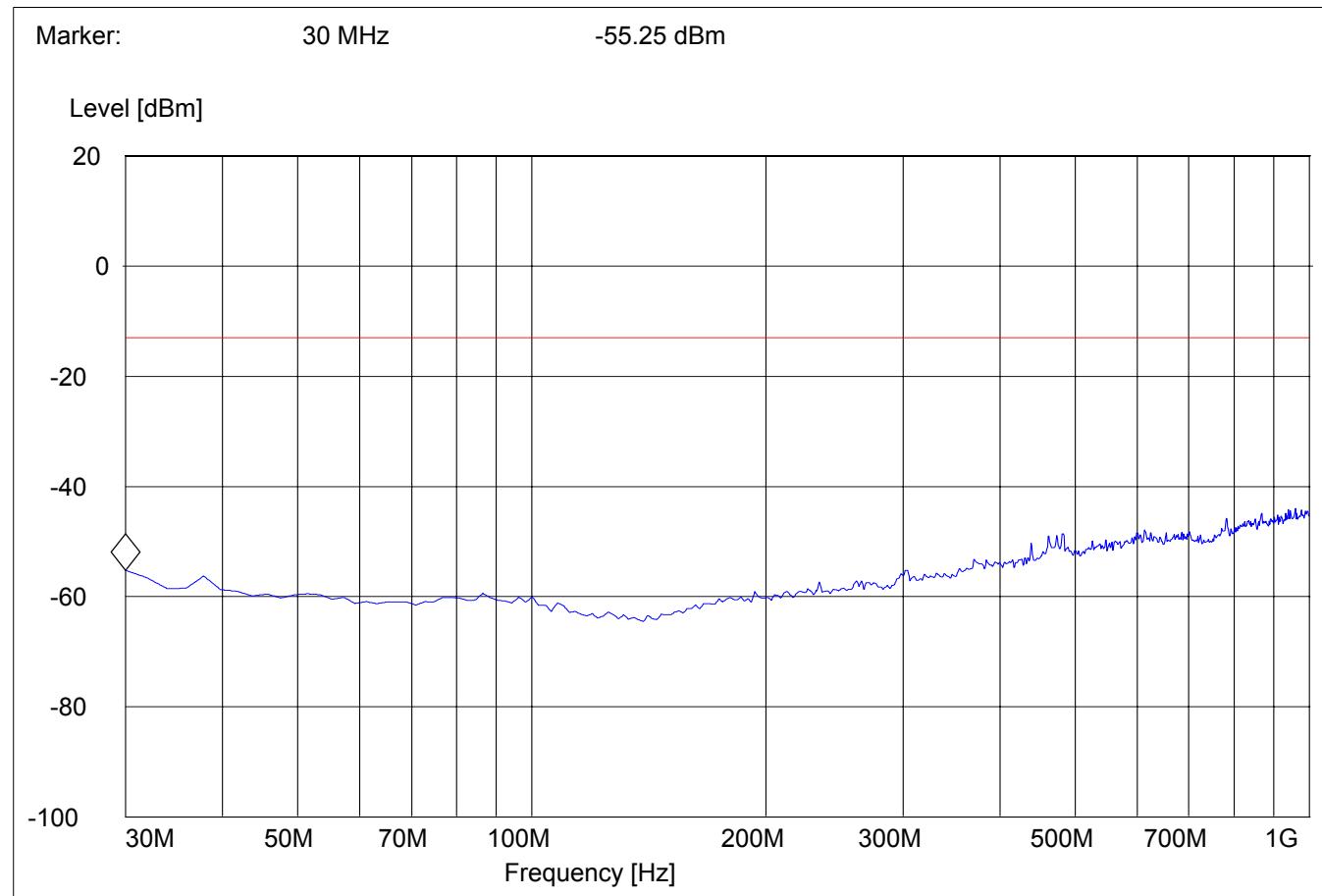


RADIATED SPURIOUS EMISSIONS (IDLE MODE – GSM 1900)**Antenna: horizontal****EUT in Idle Mode: 30MHz – 1GHz**

Spurious emission limit –13dBm

SWEEP TABLE: "FCC 24 Spur 30M-1G"

Start Frequency	Stop Frequency	Detector	Meas.	RBW/VBW
30MHz	1GHz	Max Peak	Coupled	1 MHz

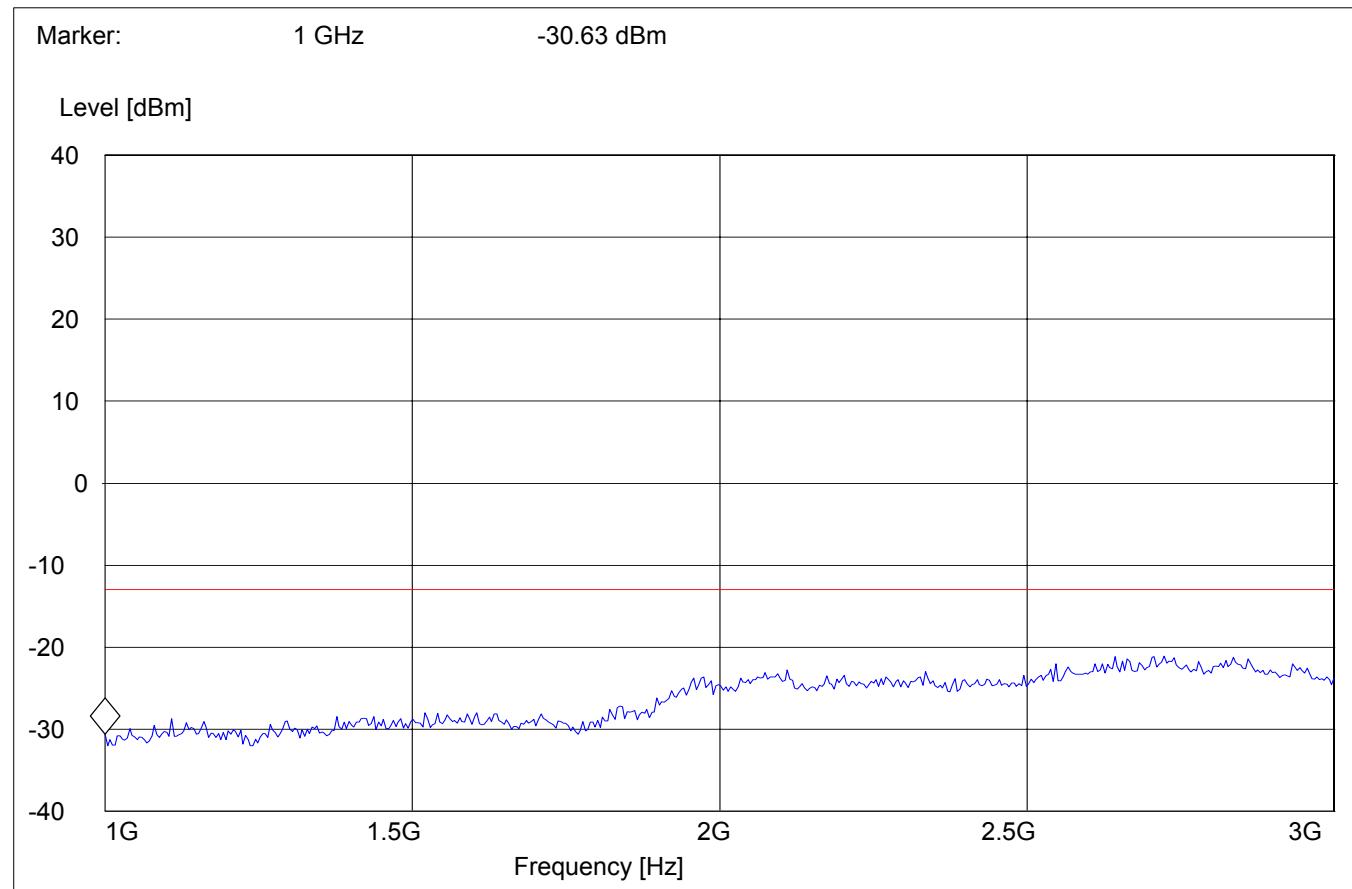


RADIATED SPURIOUS EMISSIONS (IDLE MODE – GSM 1900)**EUT in Idle Mode: 1GHz – 3GHz**

Spurious emission limit –13dBm

SWEEP TABLE: "FCC24 Spuri 1-3G"

Start Frequency	Stop Frequency	Detector	Meas.	RBW/VBW
1GHz	3GHz	Max Peak	Time Coupled	1 MHz

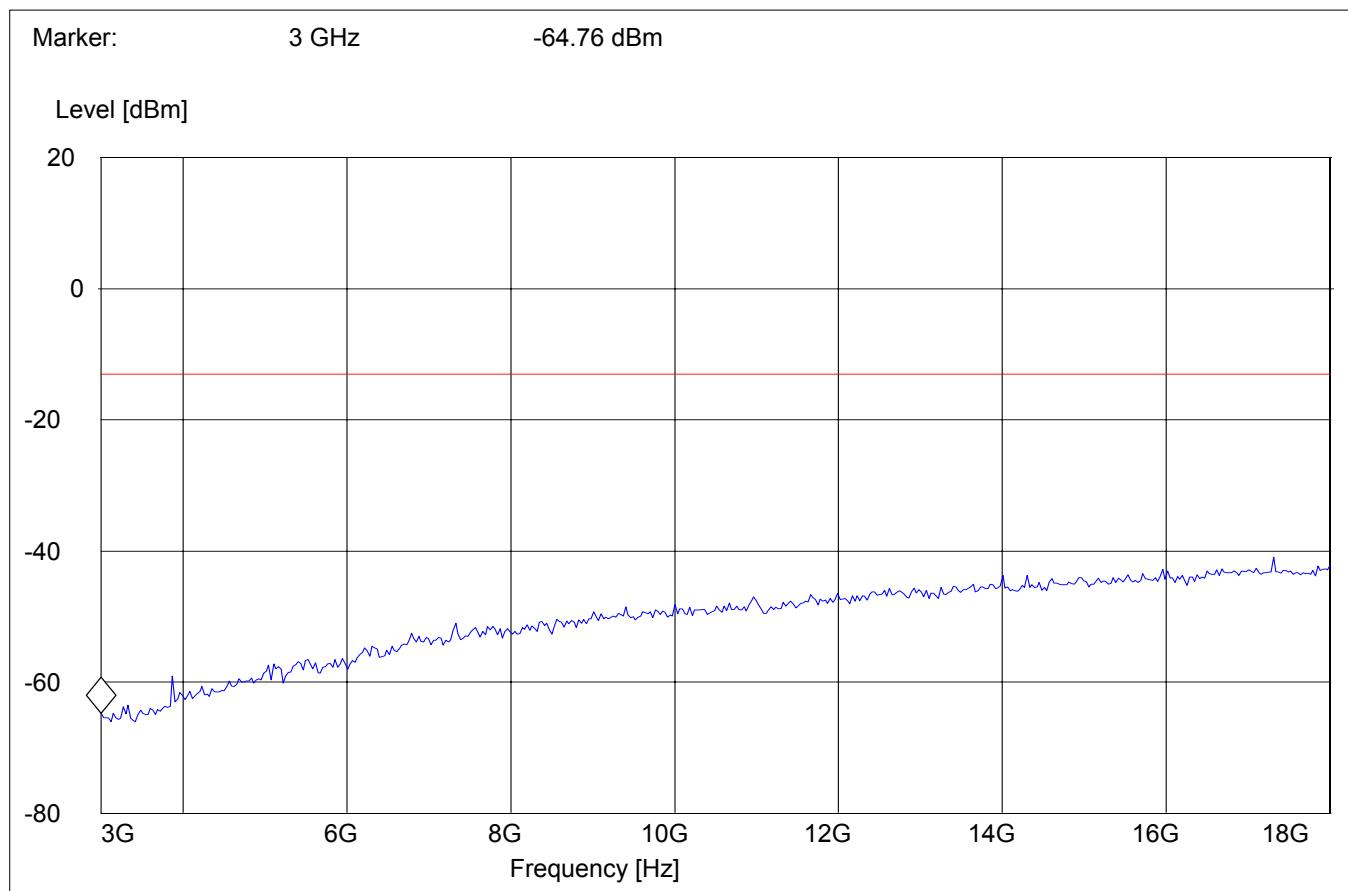


RADIATED SPURIOUS EMISSIONS (IDLE MODE – GSM 1900)**EUT in Idle Mode: 3GHz – 18GHz**

Spurious emission limit –13dBm

SWEET TABLE: "FCC 24 spuri 3-18G"

Start Frequency	Stop Frequency	Detector	Meas.	RBW/VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz

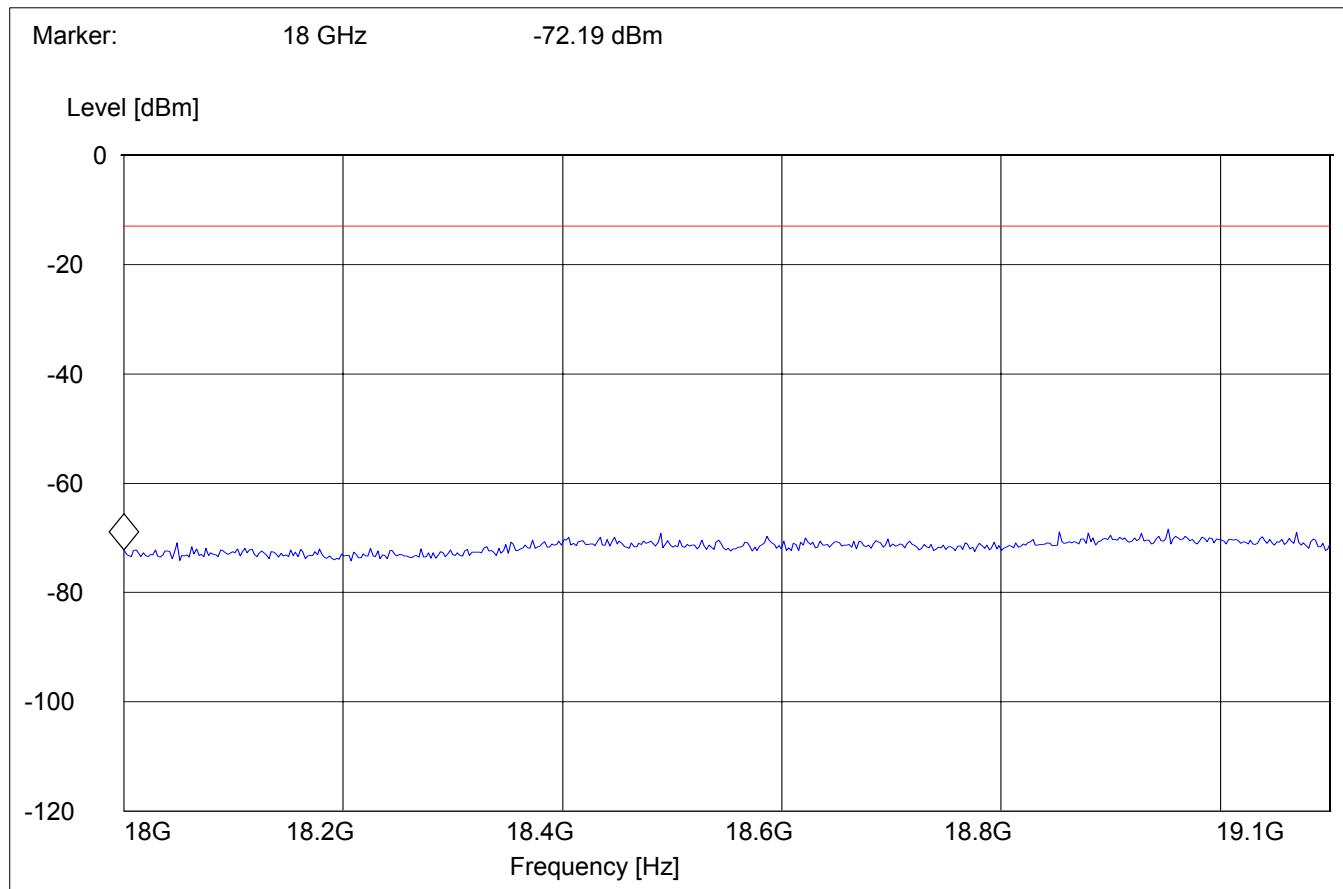


RADIATED SPURIOUS EMISSIONS (IDLE MODE – GSM 1900)**EUT in Idle Mode: 18GHz – 19.1GHz**

Spurious emission limit –13dBm

SWEEP TABLE: "FCC 24 spuri 18-19.1G"

Start Frequency	Stop Frequency	Detector	Meas.	RBW/VBW
18GHz	19.1GHz	Max Peak	Coupled	1 MHz



RECEIVER RADIATED EMISSIONS**§ 2.1053 / RSS-133**

NOTE: 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 3GHz and 19.1GHz very short cable connections to the antenna was used to minimize the noise level.

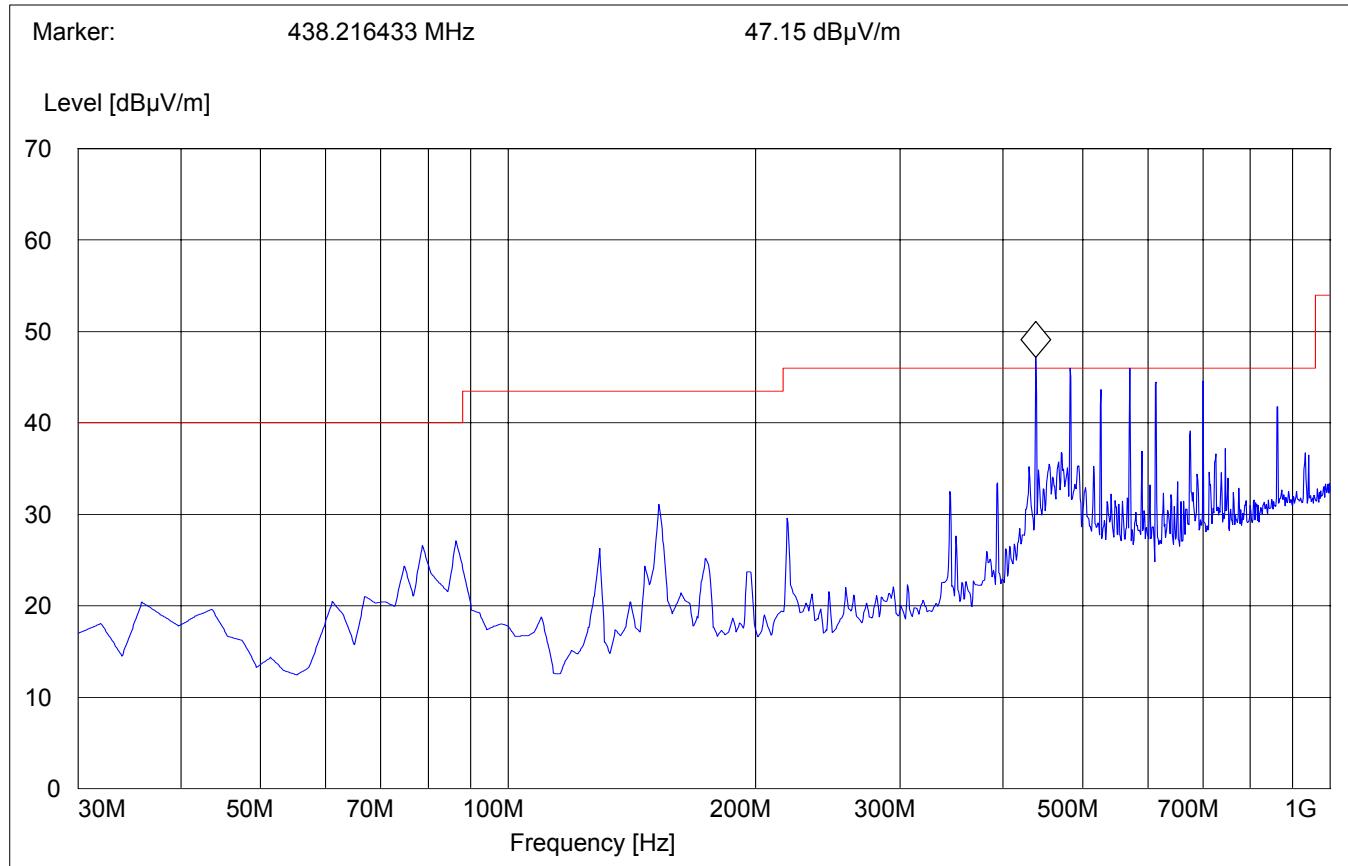
Limits**SUBCLAUSE § 15.209**

Frequency (MHz)	Field strength (μ V/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

RECEIVER RADIATED EMISSIONS**EUT in Idle Mode: 30MHz – 1GHz****Antenna: vertical****SWEEP TABLE: "FCC 15 Spur 30M-1G"**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW/VBW
30MHz	1GHz	Max Peak	Coupled	100KHz

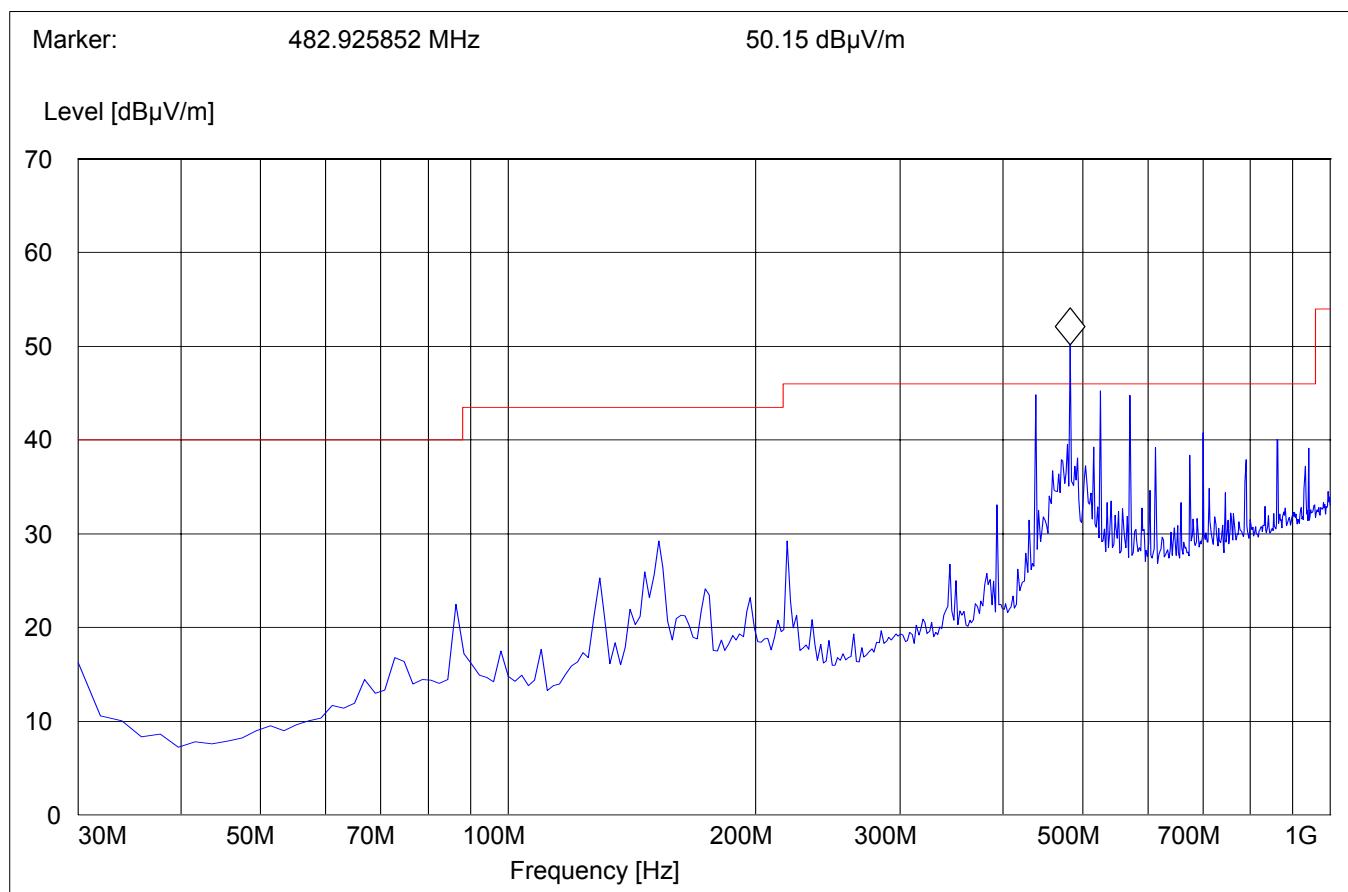
Frequency	MaxPeak	Quasi-Peak
438.216MHz	47.15dB μ V/m	41.68dB μ V/m
482.926MHz	46.01dB μ V/m	40.31dB μ V/m
570.401MHz	45.97dB μ V/m	39.85dB μ V/m
700.641MHz	44.62dB μ V/m	39.37dB μ V/m



RECEIVER RADIATED EMISSIONS**EUT in Idle Mode: 30MHz – 1GHz****Antenna: horizontal****SWEEP TABLE: "FCC 15 Spur 30M-1G"**

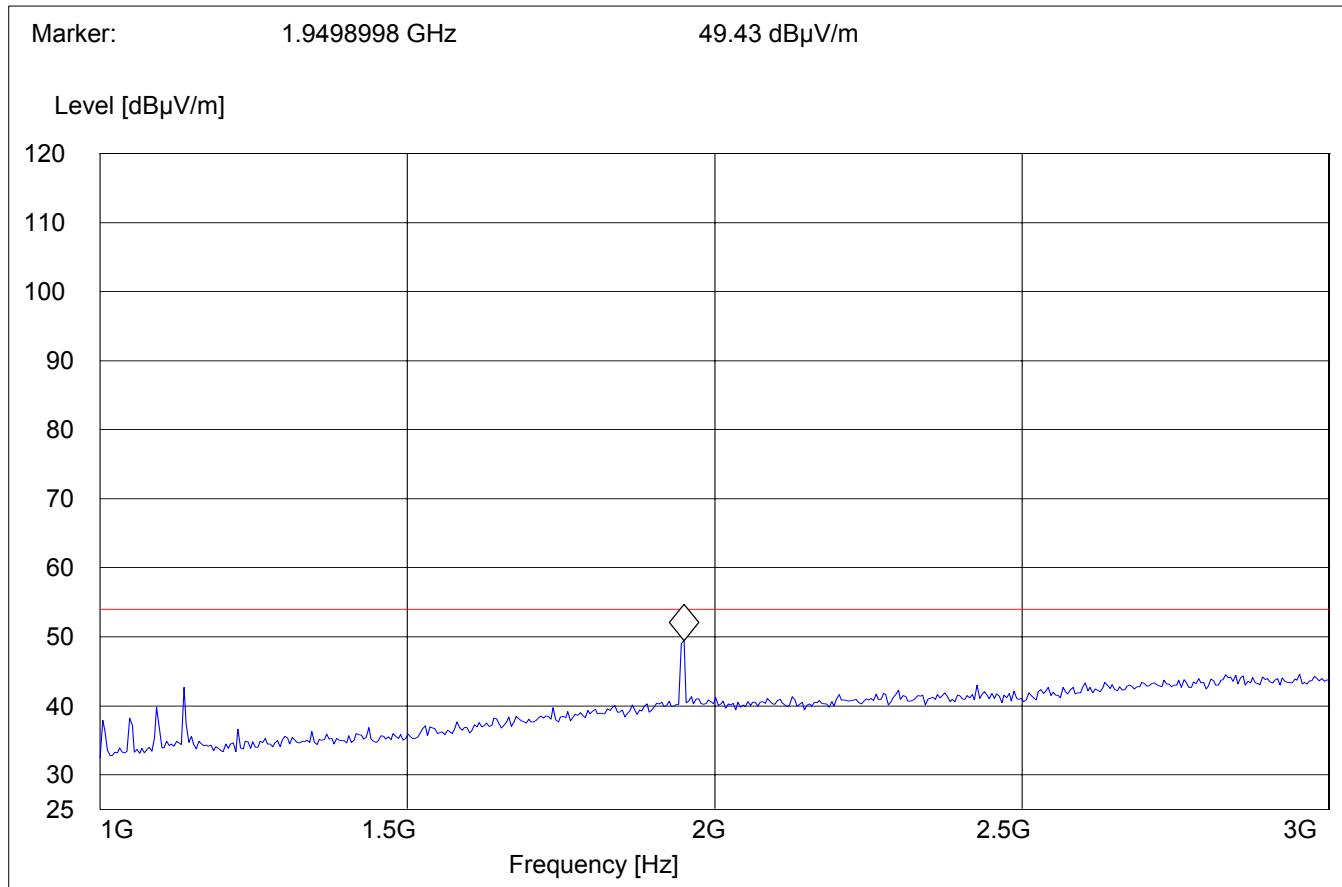
Start Frequency	Stop Frequency	Detector	Meas.	RBW/VBW
30MHz	1GHz	Max Peak	Coupled	100KHz

Frequency	Maxpeak	QuasiPeak
482.93MHz	50.15dB μ V/m	44.45dB μ V/m



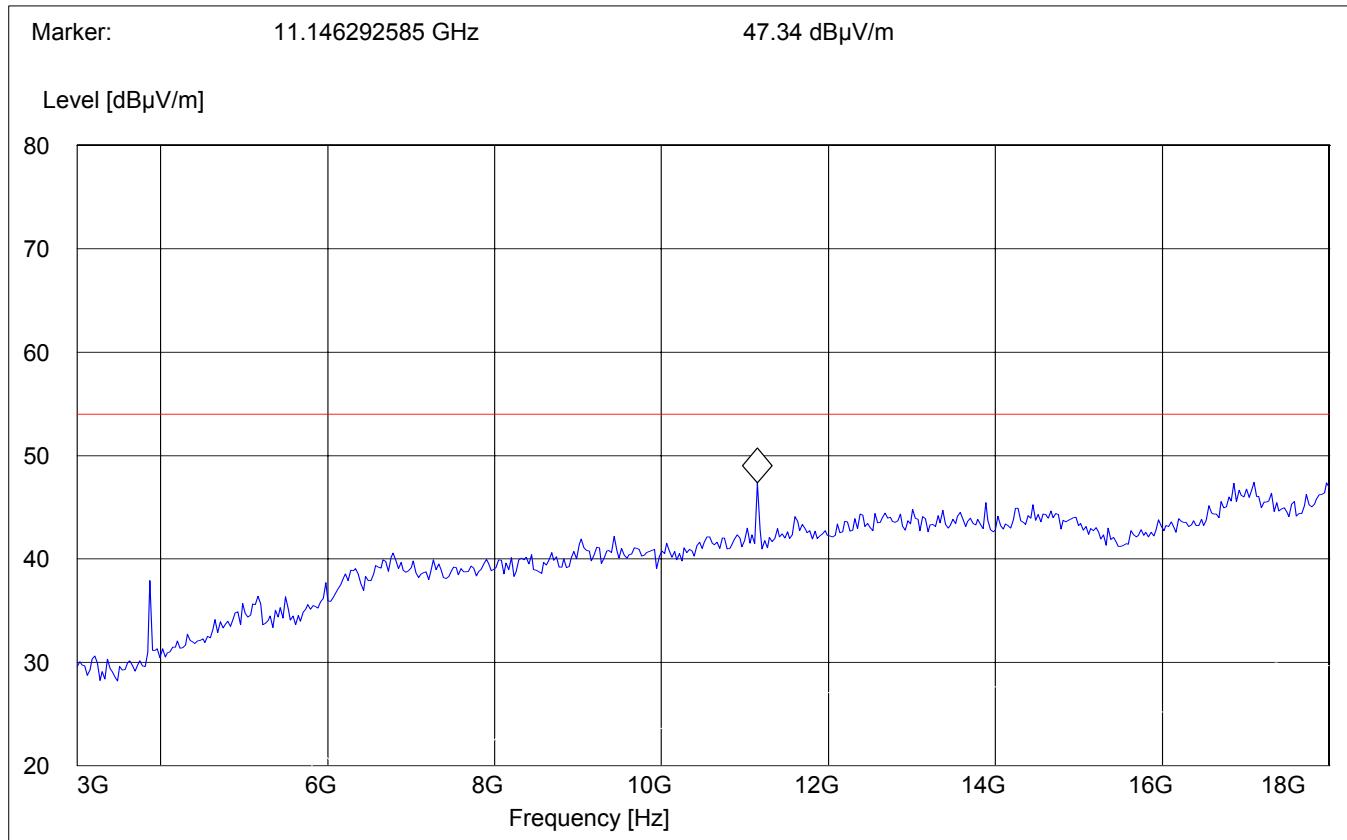
RECEIVER RADIATED EMISSIONS**EUT in Idle Mode: 1GHz – 3GHz****Note: marked peak is downlink from the base station*****SWEEP TABLE: "FCC15 Spuri 1-3G"***

Start Frequency	Stop Frequency	Detector	Meas.	RBW/VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz



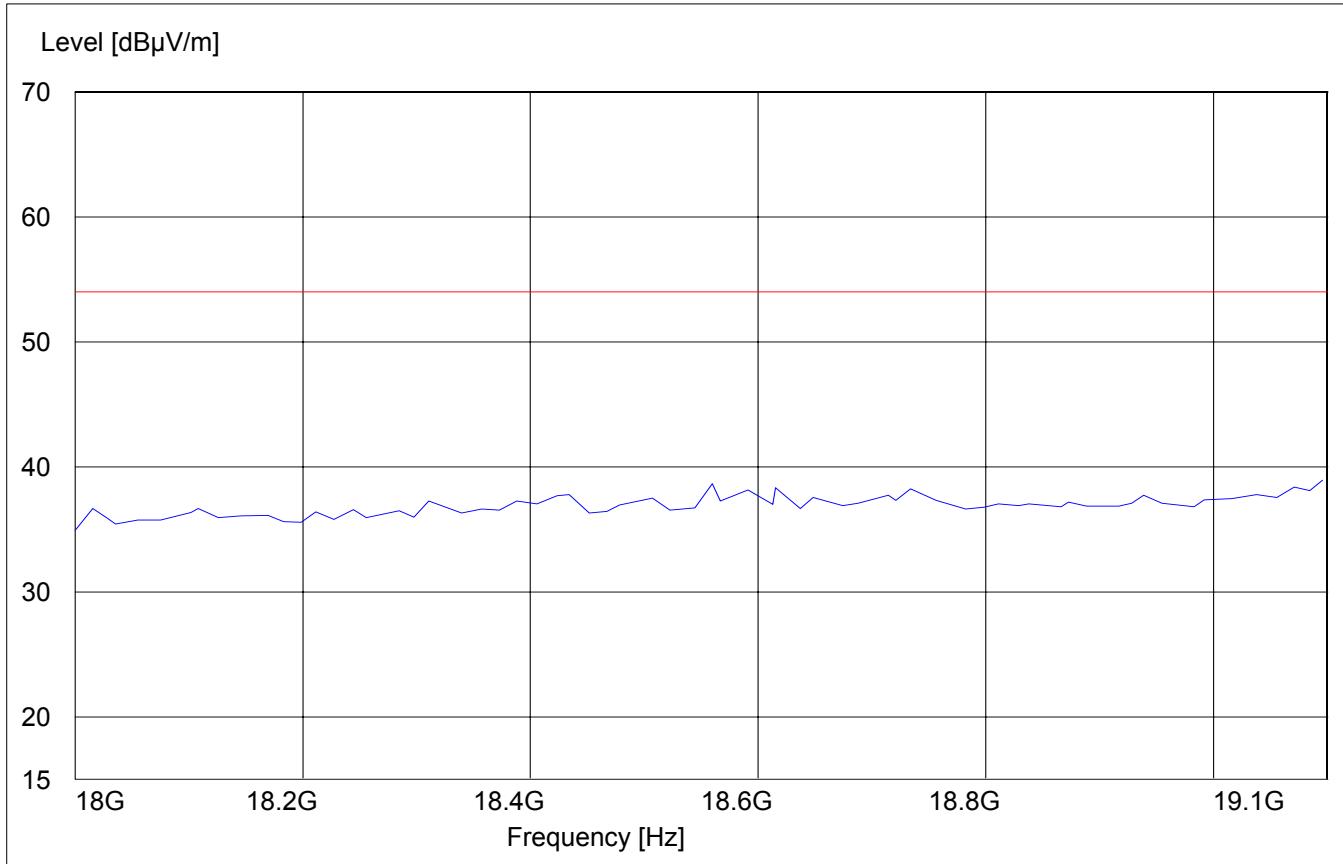
RECEIVER RADIATED EMISSIONS
EUT in Idle Mode: 3GHz – 18GHz***SWEEP TABLE: "FCC 15spuri 3-18G"***

Start Frequency	Stop Frequency	Detector	Meas.	RBW/VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz



**RECEIVER RADIATED EMISSIONS
EUT in Idle Mode: 18GHz – 19.1GHz*****SWEEP TABLE: "FCC 15 spuri 18-19.15G"***

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW/VBW
18GHz	19.1GHz	Max Peak	Coupled	1 MHz



CONDUCTED EMISSIONS**§ 15.107/207**

This test is not applicable for the EUT

TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

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	Signal Generator	SMY02	Rohde & Schwarz	836878/011
04	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02
05	Biconilog Antenna	3141	EMCO	0005-1186
06	Horn Antenna (1-18GHz)	SAS-200/571	AH Systems	325
07	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240
08	Power Splitter	11667B	Hewlett Packard	645348
09	Climatic Chamber	VT4004	Voltsch	G1115
10	High Pass Filter	5HC2700	Trilithic Inc.	9926013
11	High Pass Filter	4HC1600	Trilithic Inc.	9922307
12	Pre-Amplifier	JS4-00102600	Miteq	00616
13	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30807
14	Digital Radio Comm. Tester	CMD-55	Rohde & Schwarz	847958/008
15	Universal Radio Comm. Tester	CMU 200	Rohde & Schwarz	832221/06

BLOCK DIAGRAMS**Radiated Testing****ANECHOIC CHAMBER**