FCC Test Report

FCC Part 22,24 / RSS 132,133

FOR:

SOCKETMODEM®EDGE
MODEL #: MTSMC-E

MULTI-TECH SYSTEMS, INC.
2205 WOODALE DRIVE
MOUNDS VIEW, MN 55112
U.S.A

FCC ID: AU792U05E06800
IC ID: 125A-0011

TEST REPORT #: EMC_918_2005_FCC22/24_MTSMC
DATE: JULY 20, 2005

Deutscher Akkreditierungs Rat

TTI-P-G 081/94-A0
Accredited according to **ISO/IEC 17025**

Bluetooth Qualification Test Facility (BQTF)

CTIA Authorized Testing Laboratory

FCC listed # 101450

IC recognized # 3925

***CETECOM* Inc.**
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CETECOM Inc. is a Delaware Corporation with Corporation number: 2113686
Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May

Table of Contents

1 Assessment

The following is in compliance with the applicable criteria specified in FCC rules Parts 2, 22 and 24 of Title 47 of the Code of Federal Regulations and in compliance with the applicable criteria specified in Industry Canada rules RSS132 and RSS133.

Company	Description	Model #
Multi-tech Systems, Inc.	**SocketModem®Edge**	**MTSMC-E**

2005-07-20
Neelesh Raj
Project Leader

2005-07-20
Lothar Schmidt
Test Lab Manager

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	EMC
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Responsible Test Lab Manager:	Lothar Schmidt
Responsible Project Leader:	Neelesh Raj
Date of test:	2005-05-05 to 2005-07-20

2.2 Identification of the Client

Applicant's Name:	Multi-tech Systems, Inc.
Street Address:	2205 Woodale Drive
City/Zip Code	Mounds View, MN 55112
Country	U.S.A
Contact Person:	Terry Boe
Phone No.	763-717-5506
Fax:	763-717-5814
e-mail:	tboe@multitech.com

2.3 Identification of the Manufacturer

Manufacturer's Name:	Multi-tech Systems, Inc.
Manufacturers Address:	2205 Woodale Drive
City/Zip Code	Mounds View, MN 55112
Country	U.S.A

3 Equipment under Test (EUT)

3.1 Identification of the Equipment under Test

Marketing Name:	SOCKETMODEM®EDGE
Description:	Quad-band EDGE Class 10 Embedded Wireless Modem
Model No:	MTSMC-E
FCC ID:	AU792U05E06800
IC ID:	125A-0011
Frequency Range:	824.2MHz – 848.8MHz for GSM 850, 1850.2MHz – 1909.8MHz for PCS 1900
Type(s) of Modulation:	GMSK
Number of Channels:	124 for GSM-850 & 299 for PCS-1900
Antenna Type:	EXTERNAL
Output Power:	EIRP FCC 22: 0.484W EIRP FCC 24: 0.507W

4 Subject of Investigation

All testing was performed on the The SocketModem®Edge model# MTSMC-E. The SocketModem®Edge model# MTSMC-E referred to as EUT was evaluated as the worst case configuration including the additional units MTCBA-E and MTCBA-E-U. This test report provides full data for MTSMC-E and spot checks for the other units MTCBA-E-U and MTCBA-E. The only difference between MTCBA-E and MTCBA-E-U is the interface type to connect to the wireless modem. MTCBA-E uses a RS 232 and the MTCBA-E-U uses an USB interface.

All three units use a pre-certified Siemens MC75 module. This report contains only radiated data, for all conducted measurements please refer to Siemens MC75 module (FCC ID: QIPMC75) report 4_Siem_0504_GSM_FCCa for the 1900MHZ band and 4_Siem_0504_GSM_FCCc for the 850MHz band.

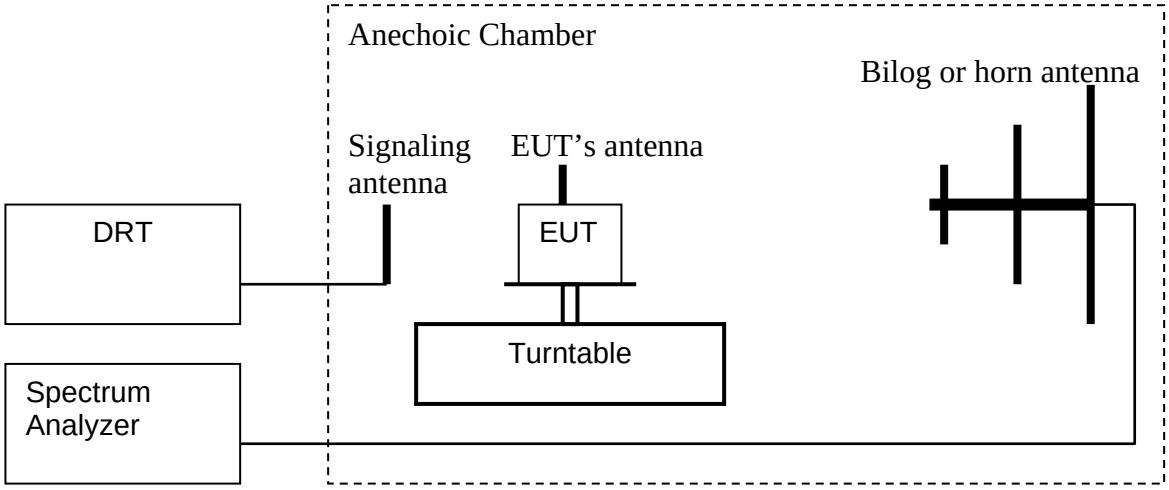
The objective of the measurements done by Cetecom Inc. was to measure the performance of the EUT as specified by requirements listed in FCC rules Parts 2, 22 and 24 of Title 47 of the Code of Federal Regulations and Industry Canada rules RSS132 and RSS133.

5 Measurements

5.1 Radiated Power

5.1.1 Radiated Output Power Measurement procedure:

Based on TIA-603B November 2002
2.2.17.2 Effective Radiated Power (ERP) or Effective Isotropic Radiated Power (EIRP)



1. Connect the equipment as shown in the above diagram with the EUT's antenna in a vertical orientation.
2. Adjust the settings of the Digital Radiocommunication Tester (DRT) to set the EUT to its maximum power at the required channel.
3. Set the spectrum analyzer to the channel frequency. Set the analyzer to measure peak hold with the required settings.
4. Rotate the EUT 360°. Record the peak level in dBm (**LVL**).
5. Replace the EUT with a vertically polarized half wave dipole or known gain antenna. The center of the antenna should be at the same location as the center of the EUT's antenna.
6. Connect the antenna to a signal generator with known output power and record the path loss in dB (**LOSS)**. **LOSS** = Generator Output Power (dBm) – Analyzer reading (dBm).
7. Determine the ERP using the following equation:
   ERP (dBm) = **LVL** (dBm) + **LOSS** (dB)
8. Determine the EIRP using the following equation:
   EIRP (dBm) = **ERP** (dBm) + 2.14 (dB)
9. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band. **Spectrum analyzer settings = rbw=vbw=3MHz**

(**note:** Steps 5 and 6 above are performed prior to testing and **LOSS** is recorded by test software. Steps 3, 4, 7 and 8 above are performed with test software.)

5.1.2 ERP Results 850 MHz band:

Power Control Level	Burst Peak ERP
5	≤38.45dBm (7W)

Frequency (MHz)	Effective Radiated Power (dBm)
824.2	26.85
836.6	26.7
848.8	26.4

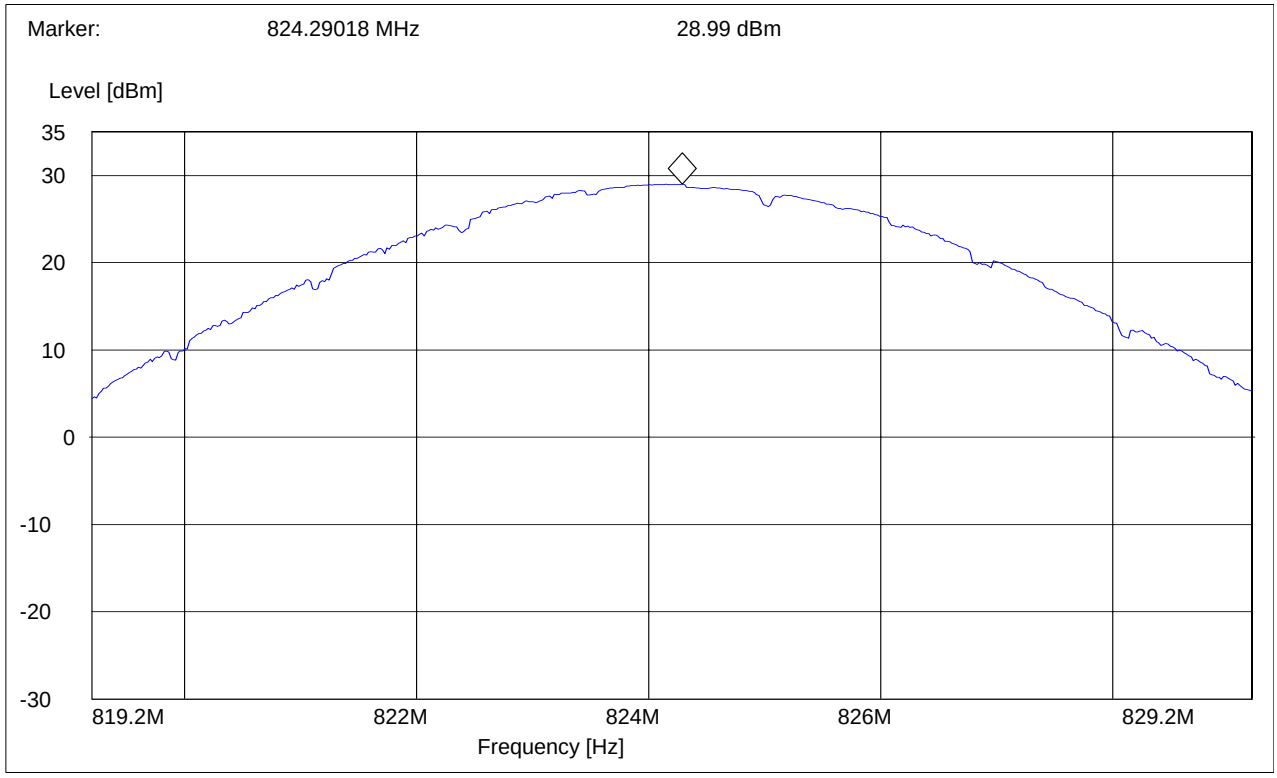
5.1.3 EIRP Results 1900 MHz band:

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

Frequency (MHz)	Effective Isotropic Radiated Power (dBm)
1850.2	25.77
1880.0	26.56
1909.8	27.05

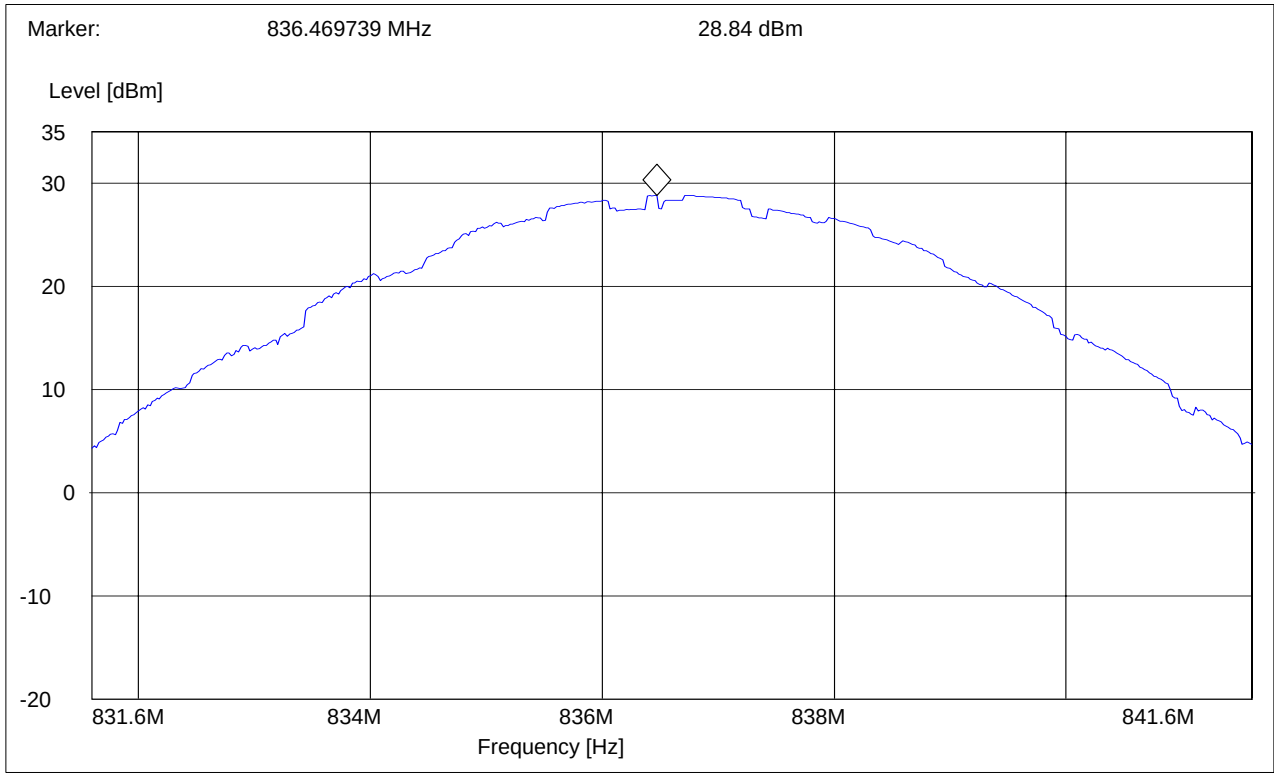
EIRP (GSM-850) **§22.913(a)**
CHANNEL 128

Start Frequency	Stop Frequency	Detector	Meas. Time	IF BW
819.2 MHz	829.2 MHz	Max Peak	Coupled	3 MHz



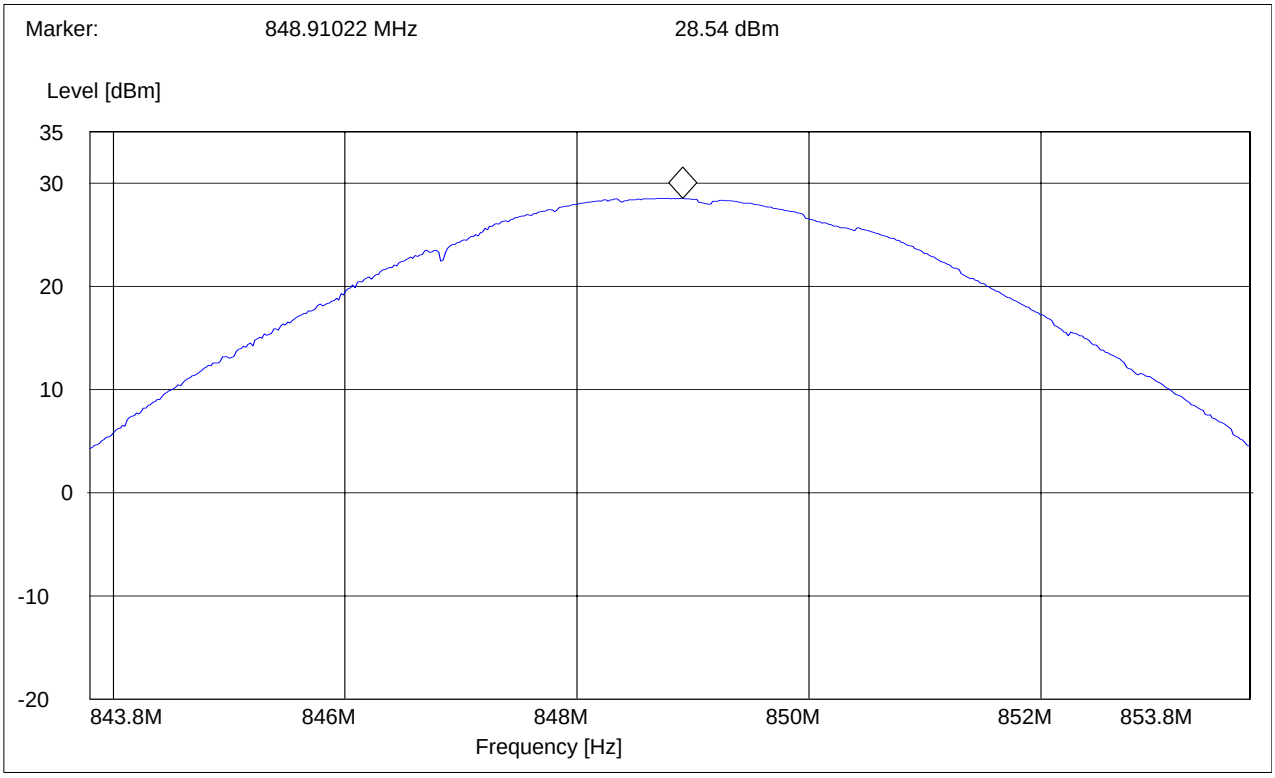
EIRP (GSM-850) **§22.913(a)**
CHANNEL 190

Start Frequency	Stop Frequency	Detector	Meas. Time	IF BW
831.6 MHz	841.6 MHz	Max Peak	Coupled	3 MHz



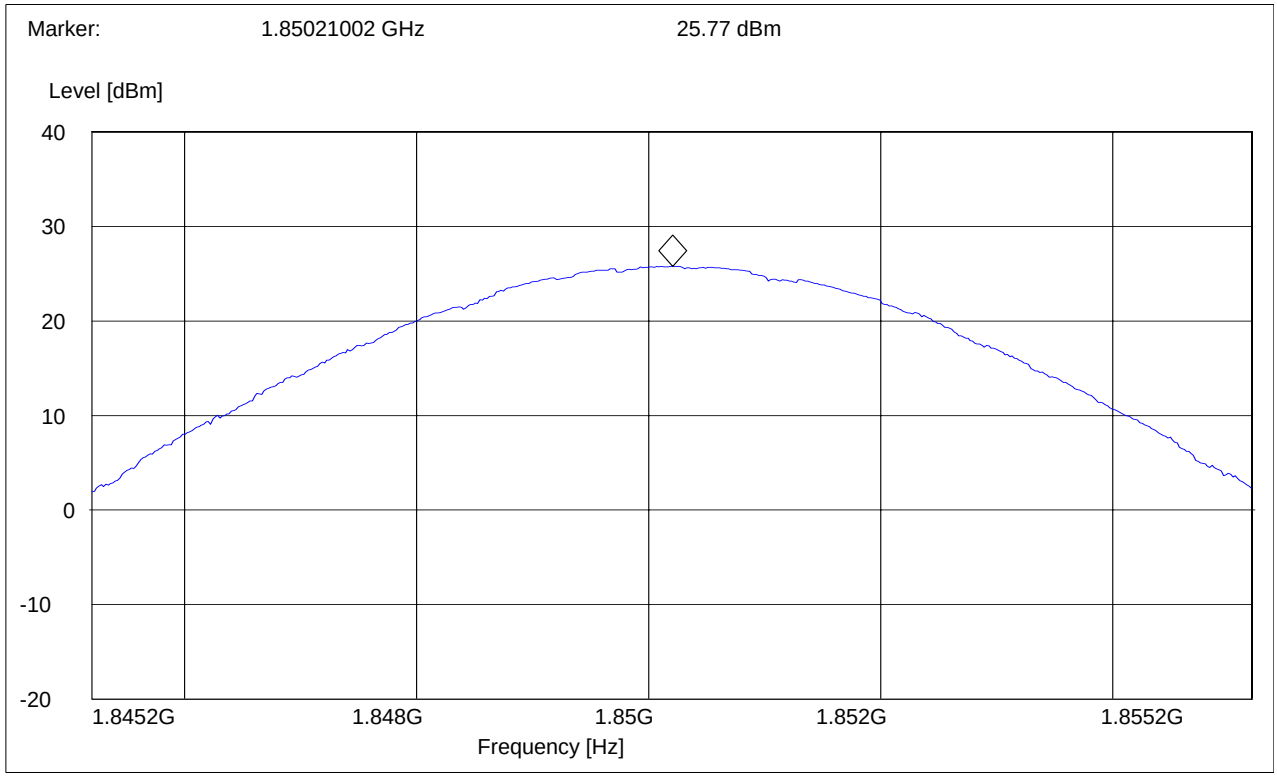
EIRP (GSM-850) **§22.913(a)**
CHANNEL 251

Start Frequency	Stop Frequency	Detector	Meas. Time	IF BW
843.8 MHz	853.8 MHz	Max Peak	Coupled	3 MHz



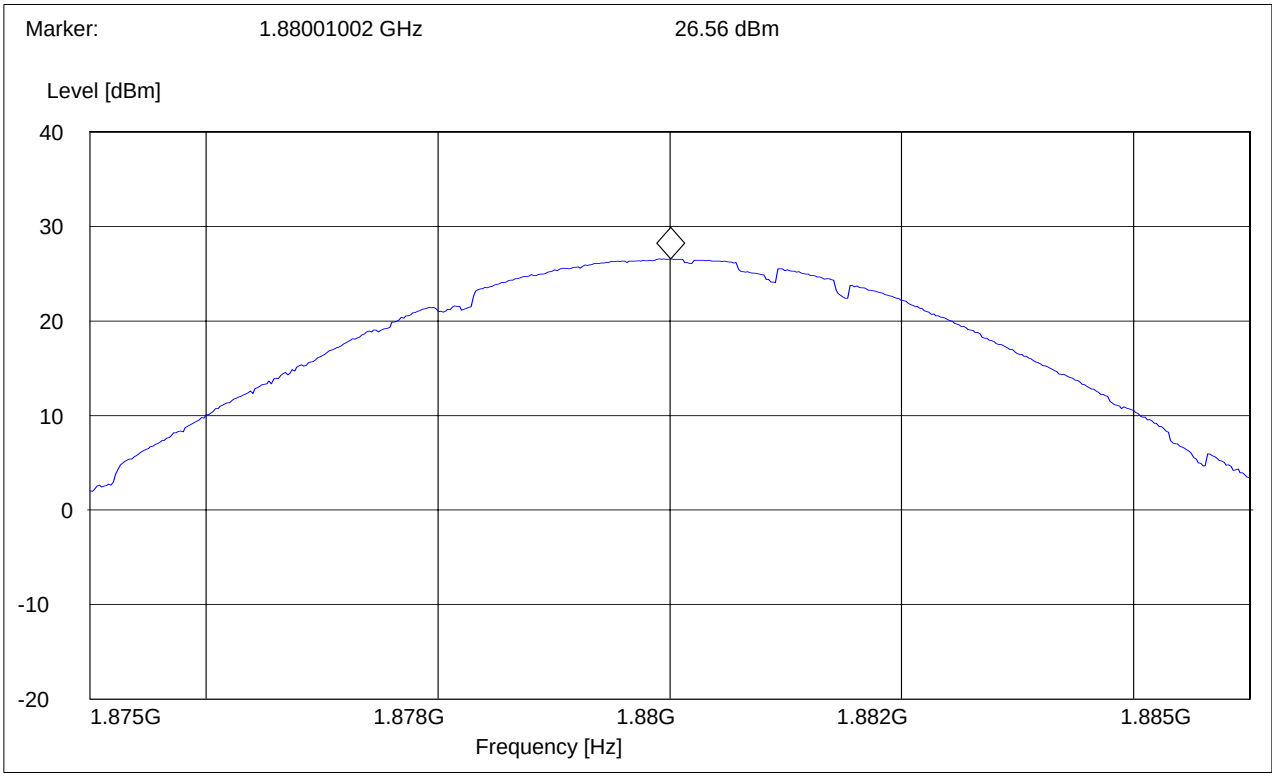
EIRP (PCS-1900) **§24.232(b)**
CHANNEL 512

Start Frequency	Stop Frequency	Detector	Meas. Time	IF BW
1.8452 GHz	1.8552 MHz	Max Peak	Coupled	3 MHz



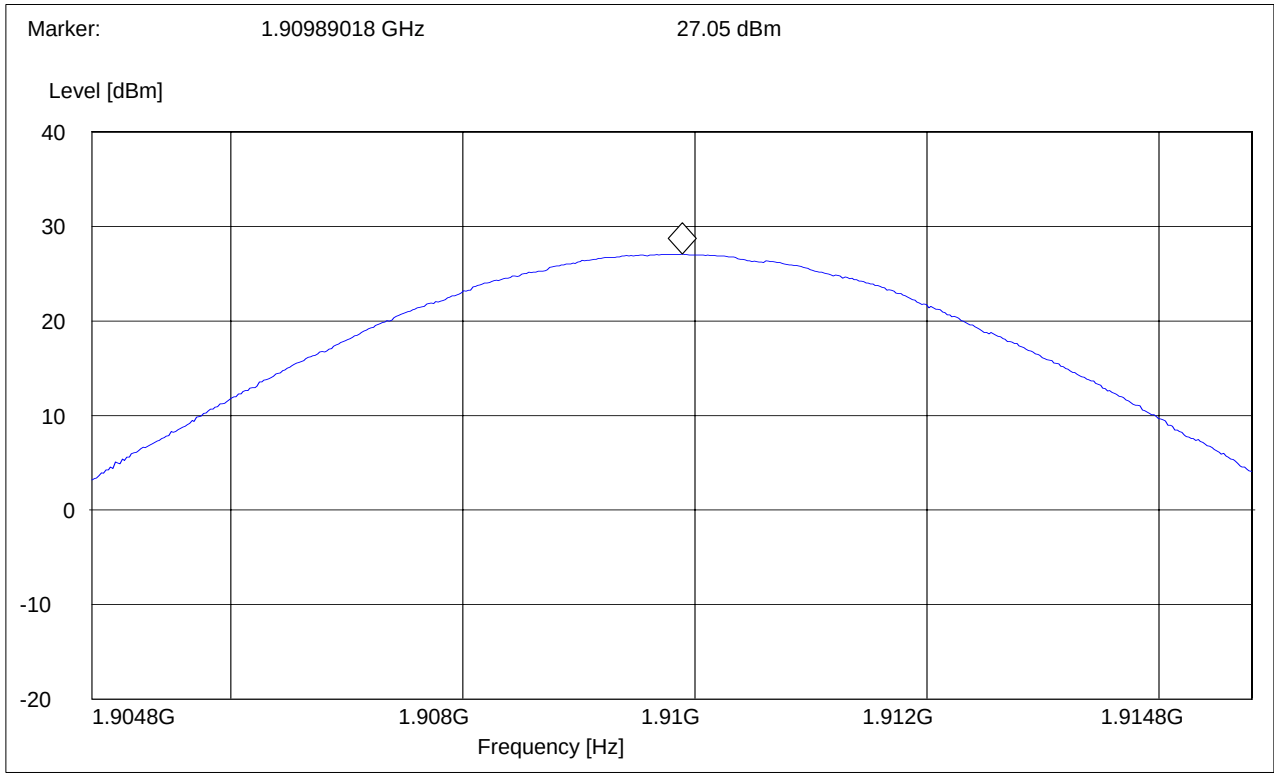
EIRP (PCS-1900) **§24.232(b)**
CHANNEL 661

Start Frequency	Stop Frequency	Detector	Meas. Time	IF BW
1.875 GHz	1.885 MHz	Max Peak	Coupled	3 MHz



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

Start Frequency	Stop Frequency	Detector	Meas. Time	IF BW
1.9048 GHz	1.9148 MHz	Max Peak	Coupled	3 MHz



5.2 Spurious Emissions Radiated

5.2.1 FCC 2.1053 Measurements required: Field strength of spurious radiation.

(a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission.

5.2.2 Limits:

5.2.2.1 FCC 22.917 Emission limitations for cellular equipment.

The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

(b) *Measurement procedure.* Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 100 kHz of 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

5.2.2.2 FCC 24.238 Emission limitations for Broadband PCS equipment.

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

(a) *Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

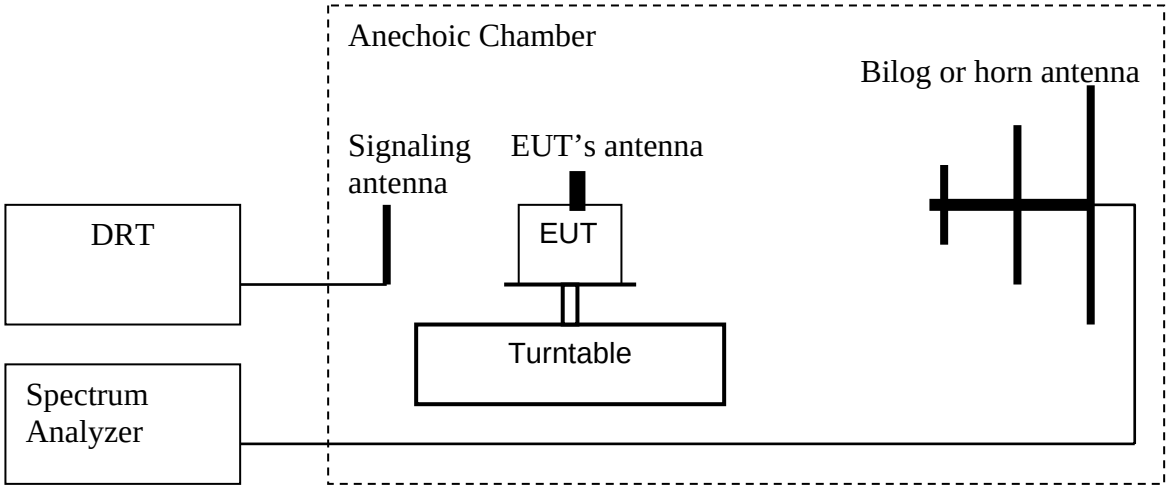
(b) Measurement procedure. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 100 kHz of 1 percent of emission bandwidth, as specified). The

emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

5.2.3 Radiated out of band measurement procedure:

Based on TIA-603B November 2002

2.2.12 Unwanted emissions: Radiated Spurious



1. Connect the equipment as shown in the above diagram with the EUT's antenna in a horizontal orientation.
2. Adjust the settings of the Digital Radiocommunication Tester (DRT) to set the EUT to its maximum power at the required channel.
3. Set the spectrum analyzer to measure peak hold with the required settings.
4. Place the measurement antenna in a horizontal orientation. Rotate the EUT 360°. Raise the measurement antenna up to 4 meters in 0.5 meters increments and rotate the EUT 360° at each height to maximize all emissions. Measure and record all spurious emissions (**LVL**) up to the tenth harmonic of the carrier frequency.
5. Replace the EUT with a horizontally polarized half wave dipole or known gain antenna. The center of the antenna should be at the same location as the center of the EUT's antenna.
6. Connect the antenna to a signal generator with known output power and record the path loss in dB (**LOSS)**. **LOSS** = Generator Output Power (dBm) – Analyzer reading (dBm).
7. Determine the level of spurious emissions using the following equation: **Spurious** (dBm) = **LVL** (dBm) + **LOSS** (dB):
8. Repeat steps 4, 5 and 6 with all antennas vertically polarized.
9. Determine the level of spurious emissions using the following equation: **Spurious** (dBm) = **LVL** (dBm) + **LOSS** (dB):
10. Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band.

(**note:** Steps 5 and 6 above are performed prior to testing and **LOSS** is recorded by test software. Steps 3, 4 and 7 above are performed with test software.)

Spectrum analyzer settings:
Res B/W: 1 MHz
Vid B/W: 1 MHz

Measurement Survey:

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the GSM-850 & PCS-1900 bands. 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 GSM-850 & 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.

5.2.4 Radiated out of band emissions results on EUT:

RESULTS OF RADIATED TESTS GSM-850:

Harmonics	Tx ch-128 Freq. (MHz)	Level (dBm)	Tx ch-190 Freq. (MHz)	Level (dBm)	Tx ch-251 Freq. (MHz)	Level (dBm)
2	**1648.4**	-37.89	**1673.2**	-38.76	**1697.6**	-39.35
3	**2472.6**	-41.12	**2509.8**	-41.8	**2546.4**	-42.60
4	**3296.8**	-44.71	**3346.4**	-45.31	**3395.2**	-46.34
5	**4121**	-40.36	**4183**	-41.48	**4244**	-41.28
6	**4945.2**	-37.67	**5019.6**	-37.98	**5092.8**	-40.30
7	**5769.4**	-42.02	**5856.2**	-39.83	**5941.6**	-39.02
8	**6593.6**	-36.01	**6692.8**	-34.91	**6790.4**	-34.25
9	**7417.8**	-39.38	**7529.4**	-38.91	**7639.2**	-37.27
10	**8242**	-48.83	**8366**	-42.89	**8488**	-44.73
NF = NOISE FLOOR						

Note: Below 30 MHz no signals were detected .

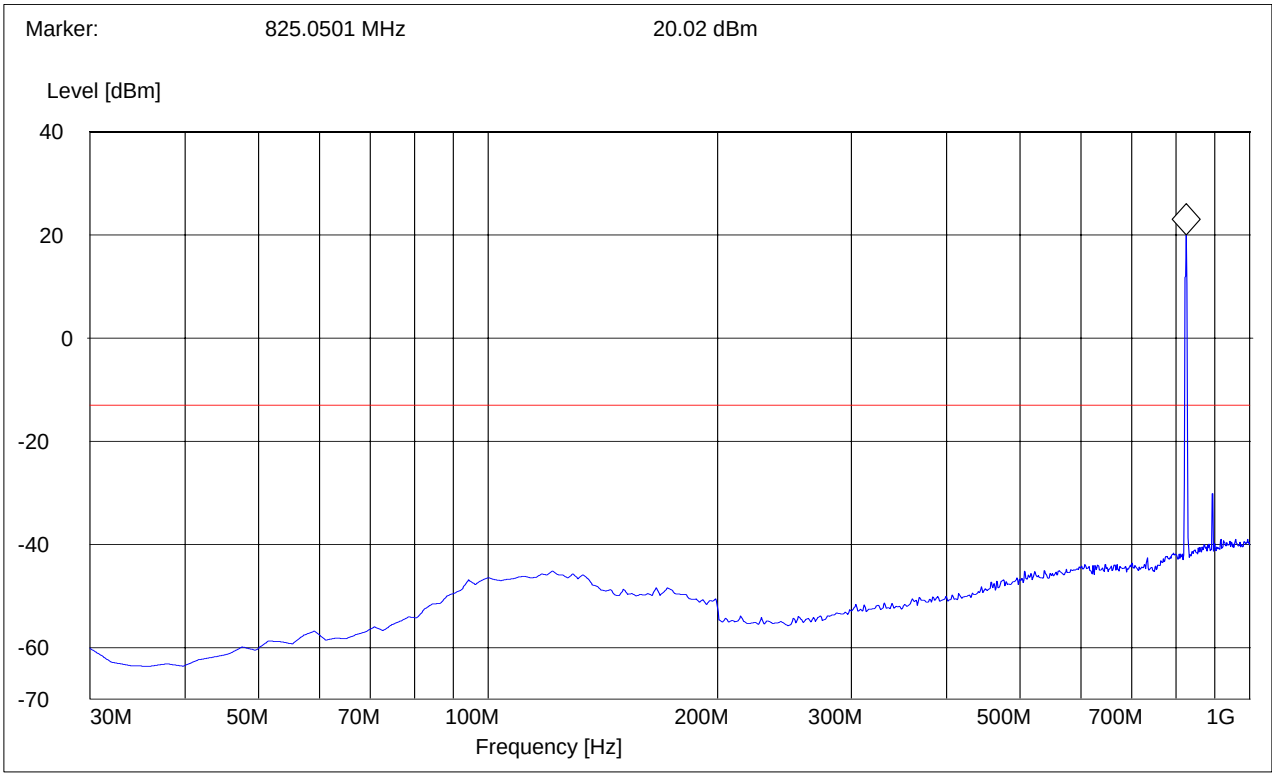
RADIATED SPURIOUS EMISSIONS (GSM-850)
30MHz - 1GHz
Spurious emission limit –13dBm
Antenna: vertical

SWEEP TABLE: "FCC 22 Spur 30M-1G"

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

Note:

1.The peak above the limit line is the carrier freq.
2.This plot is valid for low, mid & high channels (worst-case plot)



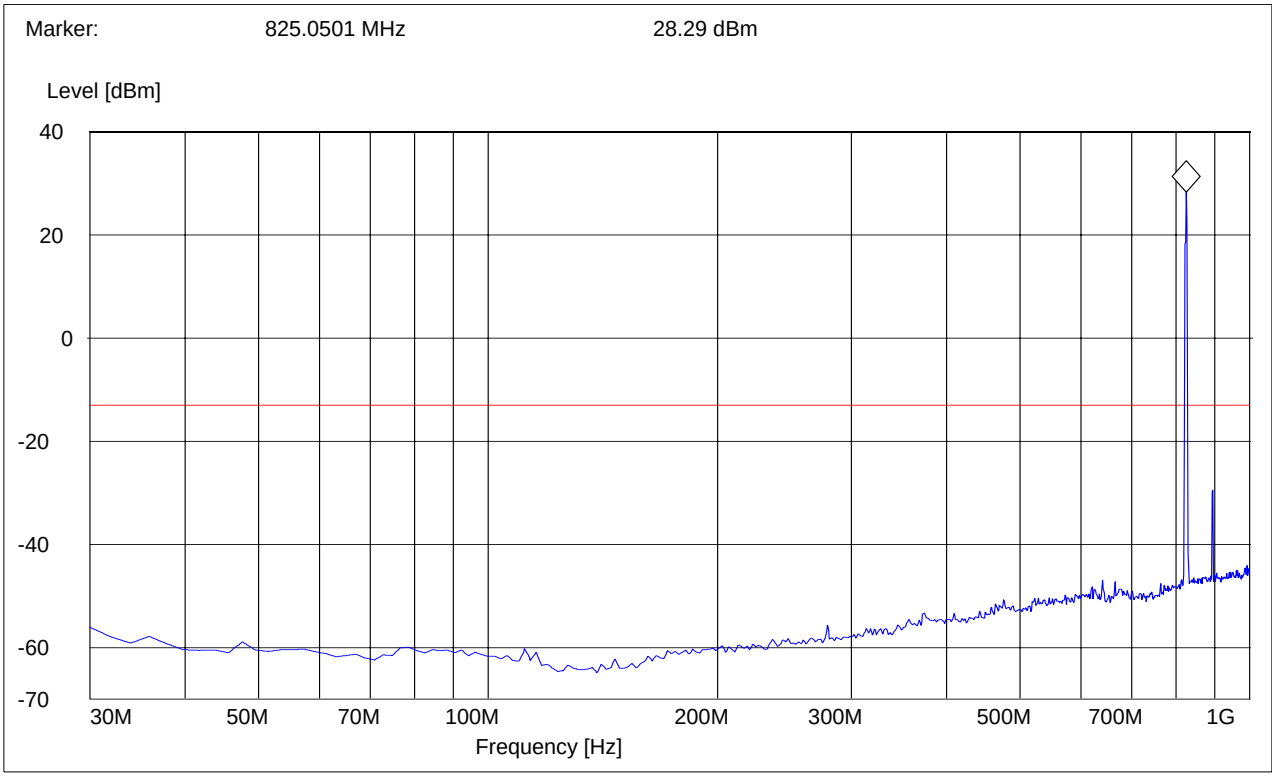
RADIATED SPURIOUS EMISSIONS (GSM-850)
30MHz - 1GHz
Spurious emission limit –13dBm
Antenna: horizontal

SWEEP TABLE: "FCC 22 Spur 30M-1G"

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

Note:

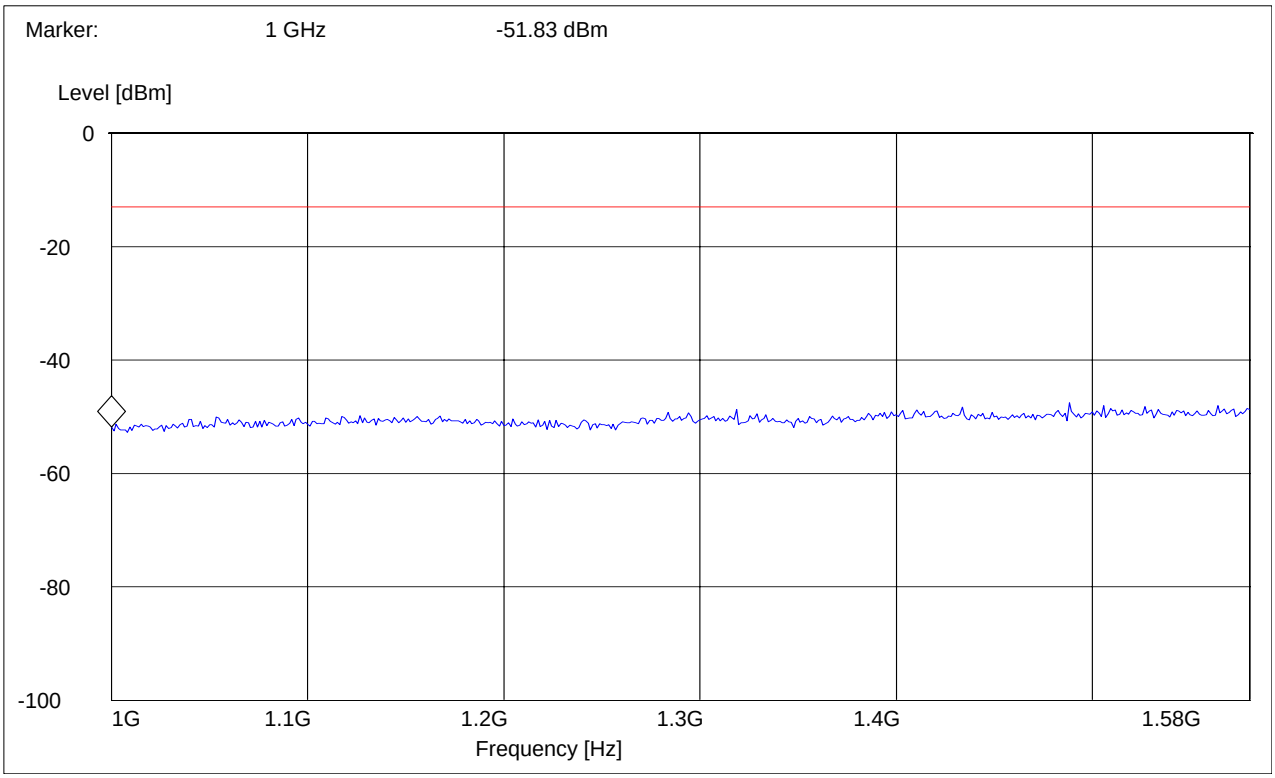
1.The peak above the limit line is the carrier freq.
2.This plot is valid for low, mid & high channels (worst-case plot)



RADIATED SPURIOUS EMISSIONS (GSM-850)
Tx @ 824.2MHz: 1GHz – 1.58GHz
Spurious emission limit –13dBm

SWEEP TABLE: "FCC 22 Spur 1-1.58G"

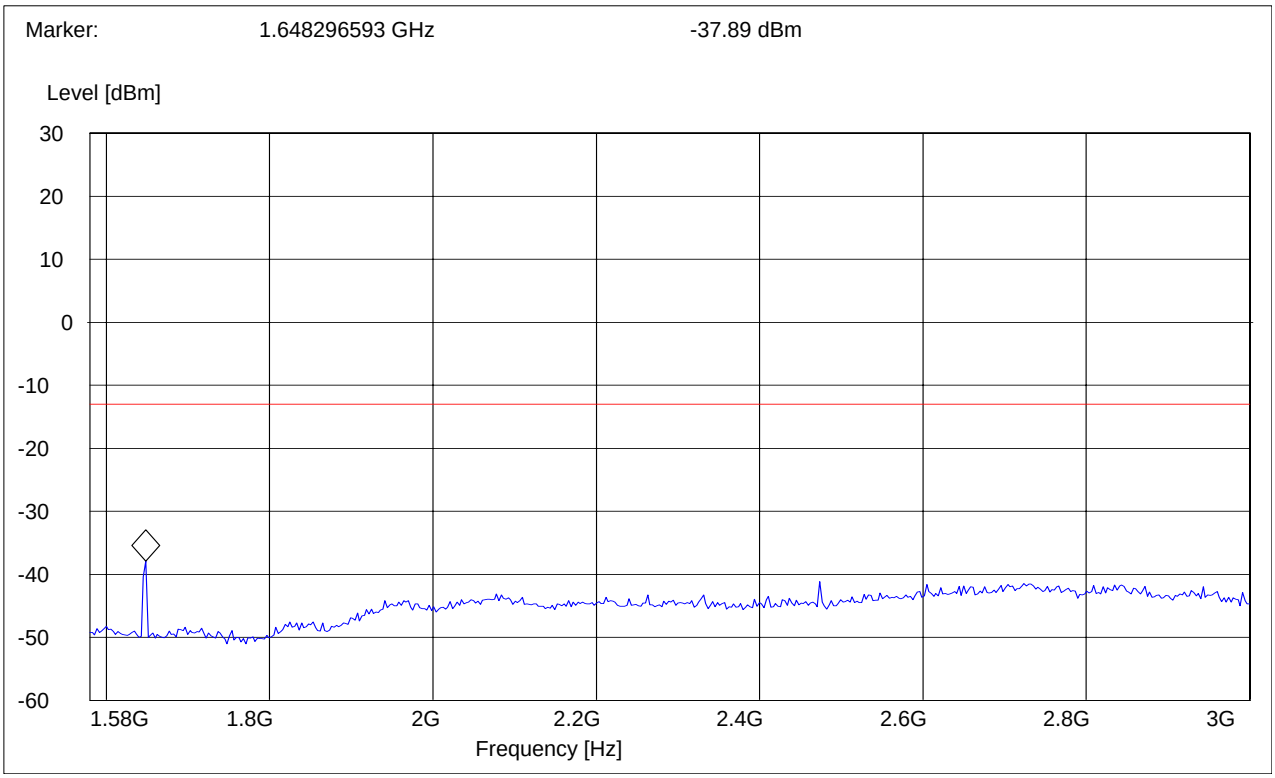
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	1.58GHz	Max Peak	Coupled	1 MHz	1 MHz



RADIATED SPURIOUS EMISSIONS (GSM-850)
Tx @ 824.2MHz: 1.58GHz – 3GHz
Spurious emission limit –13dBm

SWEEP TABLE: "FCC 22 Spur 1.58-3G"

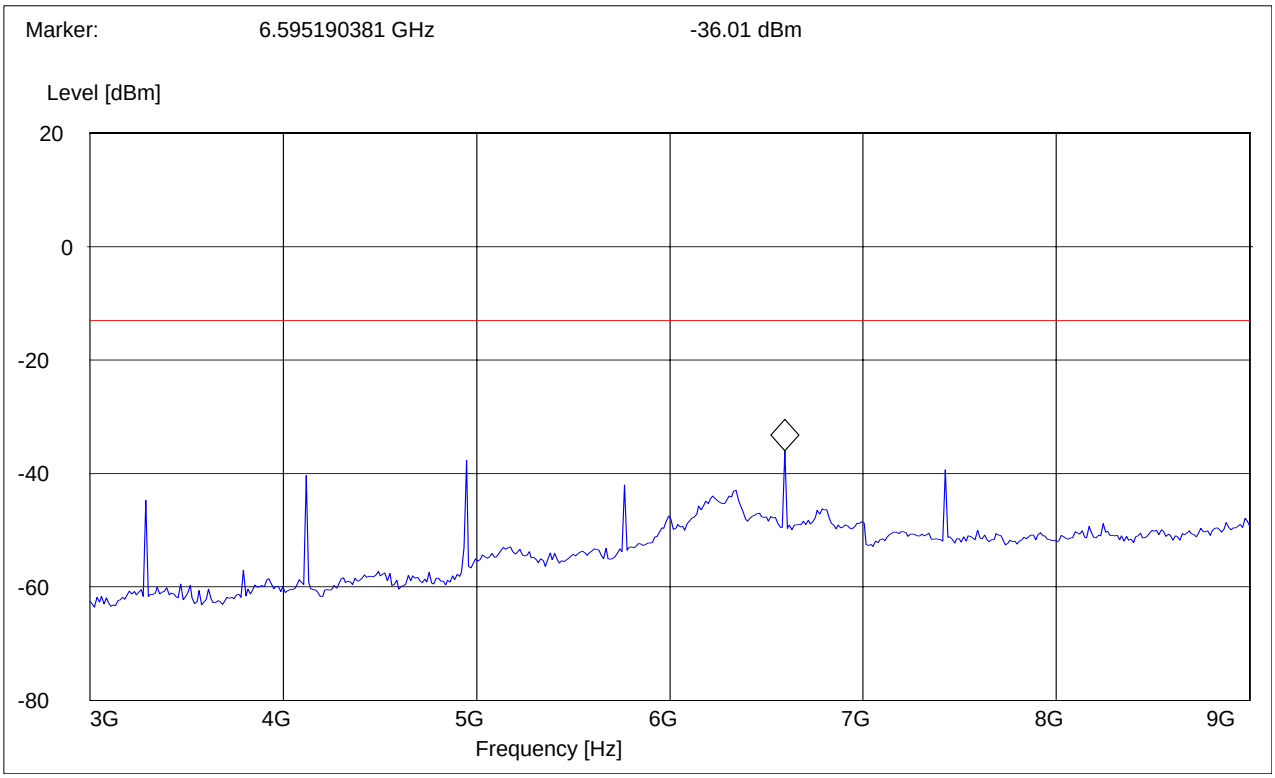
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1.58GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz



RADIATED SPURIOUS EMISSIONS (GSM-850)
Tx @ 824.2MHz: 3GHz – 9GHz
Spurious emission limit –13dBm

SWEEP TABLE: "FCC 22 Spur 3-9G"

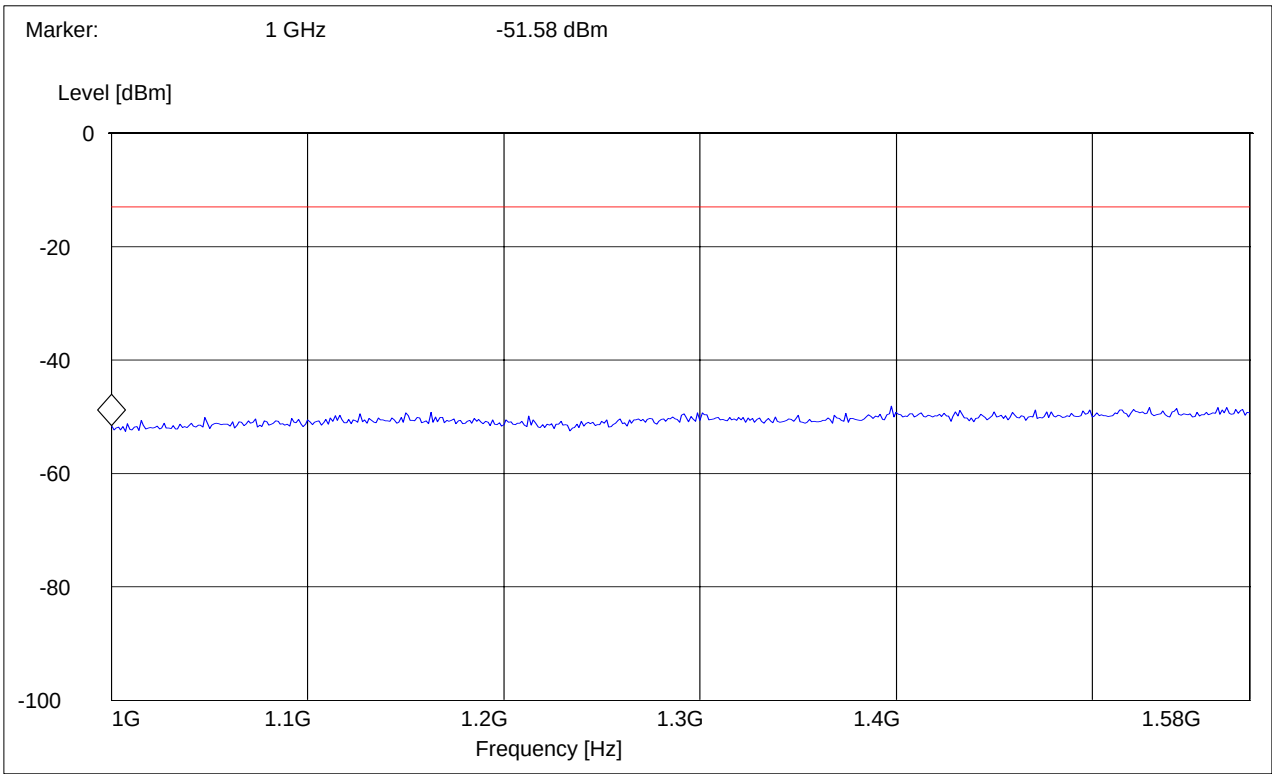
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	9GHz	Max Peak	Coupled	1 MHz	1 MHz



RADIATED SPURIOUS EMISSIONS (GSM-850)
Tx @ 836.6MHz: 1GHz – 1.58GHz
Spurious emission limit –13dBm

SWEEP TABLE: "FCC 22 Spur 1-1.58G"

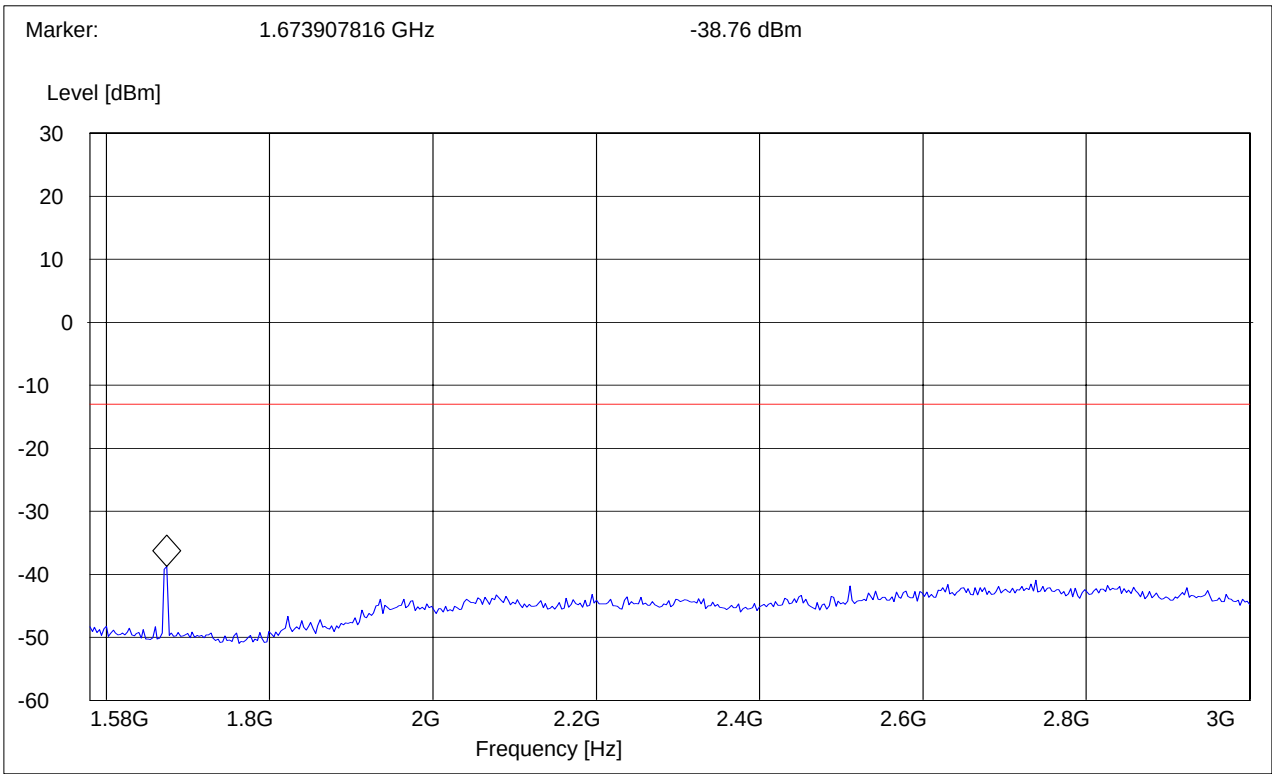
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	1.58GHz	Max Peak	Coupled	1 MHz	1 MHz



RADIATED SPURIOUS EMISSIONS (GSM-850)
Tx @ 836.6MHz: 1.58GHz – 3GHz
Spurious emission limit –13dBm

SWEEP TABLE: "FCC 22 Spur 1.58-3G"

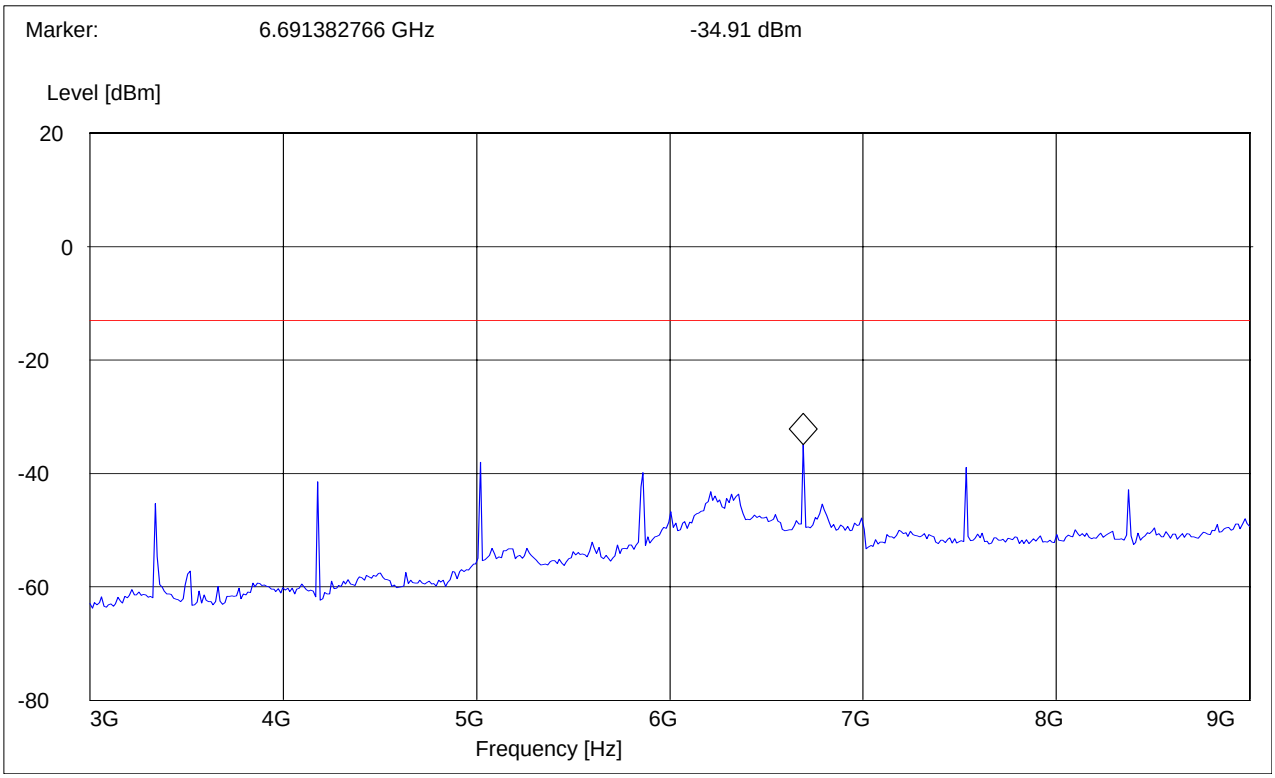
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1.58GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz



RADIATED SPURIOUS EMISSIONS (GSM-850)
Tx @ 836.6MHz: 3GHz – 9GHz
Spurious emission limit –13dBm

SWEEP TABLE: "FCC 22 Spur 3-9G"

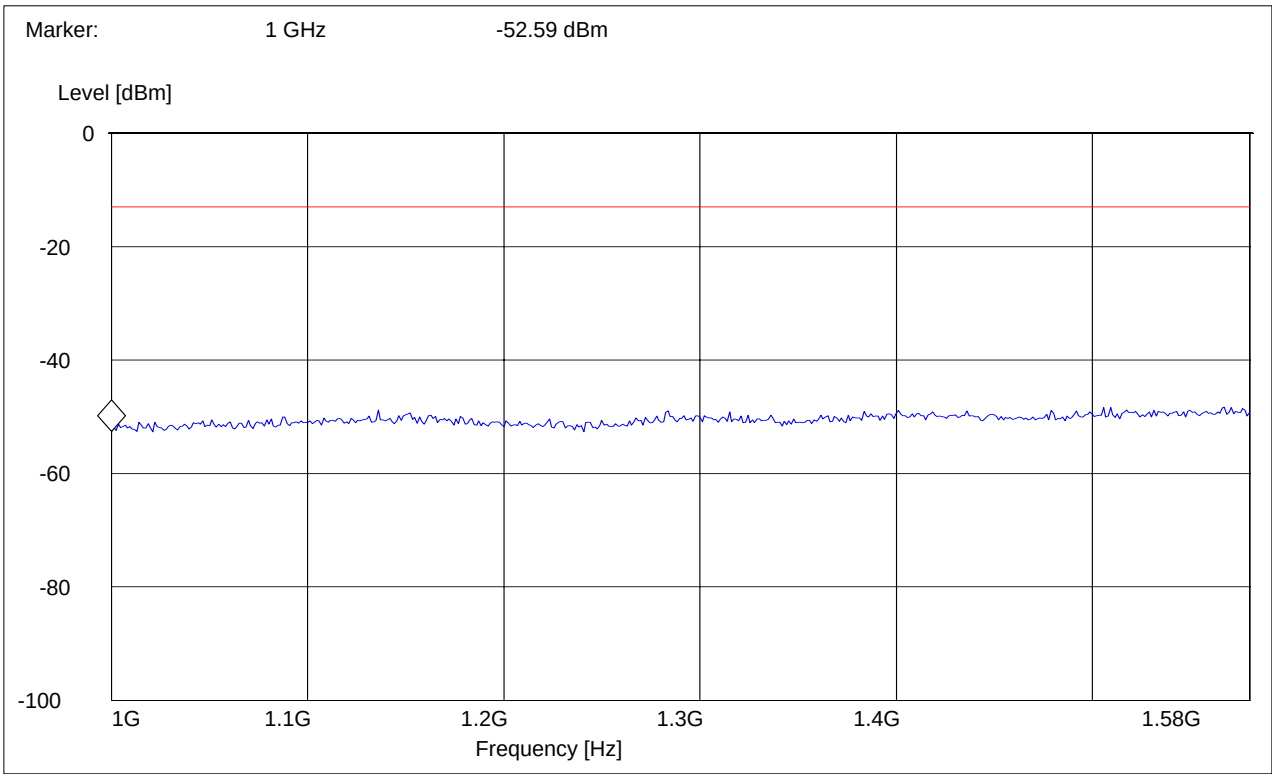
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	9GHz	Max Peak	Coupled	1 MHz	1 MHz



RADIATED SPURIOUS EMISSIONS (GSM-850)
Tx @ 848.8MHz: 1GHz – 1.58GHz
Spurious emission limit –13dBm

SWEEP TABLE: "FCC 22 Spur 1-1.58G"

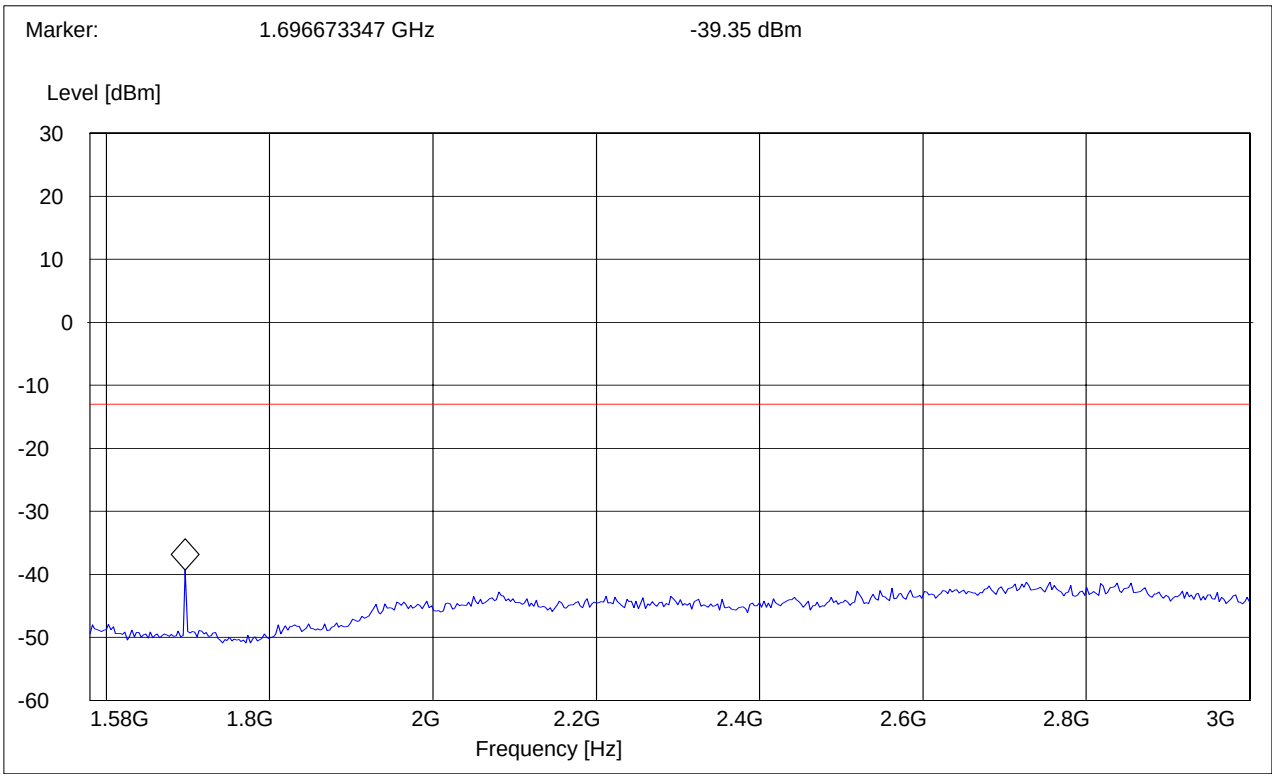
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	1.58GHz	Max Peak	Coupled	1 MHz	1 MHz



RADIATED SPURIOUS EMISSIONS (GSM-850)
Tx @ 848.8MHz: 1.58GHz – 3GHz
Spurious emission limit –13dBm

SWEEP TABLE: "FCC 22 Spur 1.58-3G"

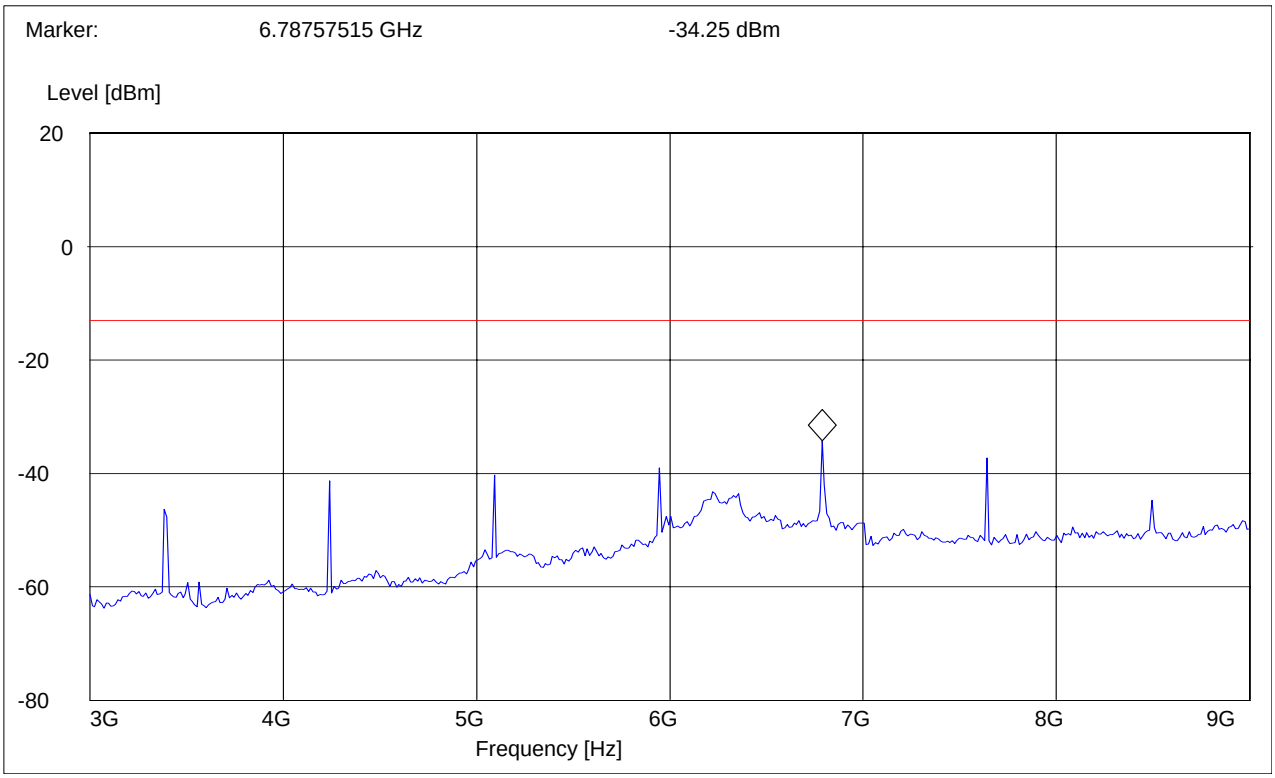
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1.58GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz



RADIATED SPURIOUS EMISSIONS (GSM-850)
Tx @ 848.8MHz: 3GHz – 9GHz
Spurious emission limit –13dBm

SWEEP TABLE: "FCC 22 Spur 3-9G"

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	9GHz	Max Peak	Coupled	1 MHz	1 MHz



RESULTS OF RADIATED TESTS PCS-1900:

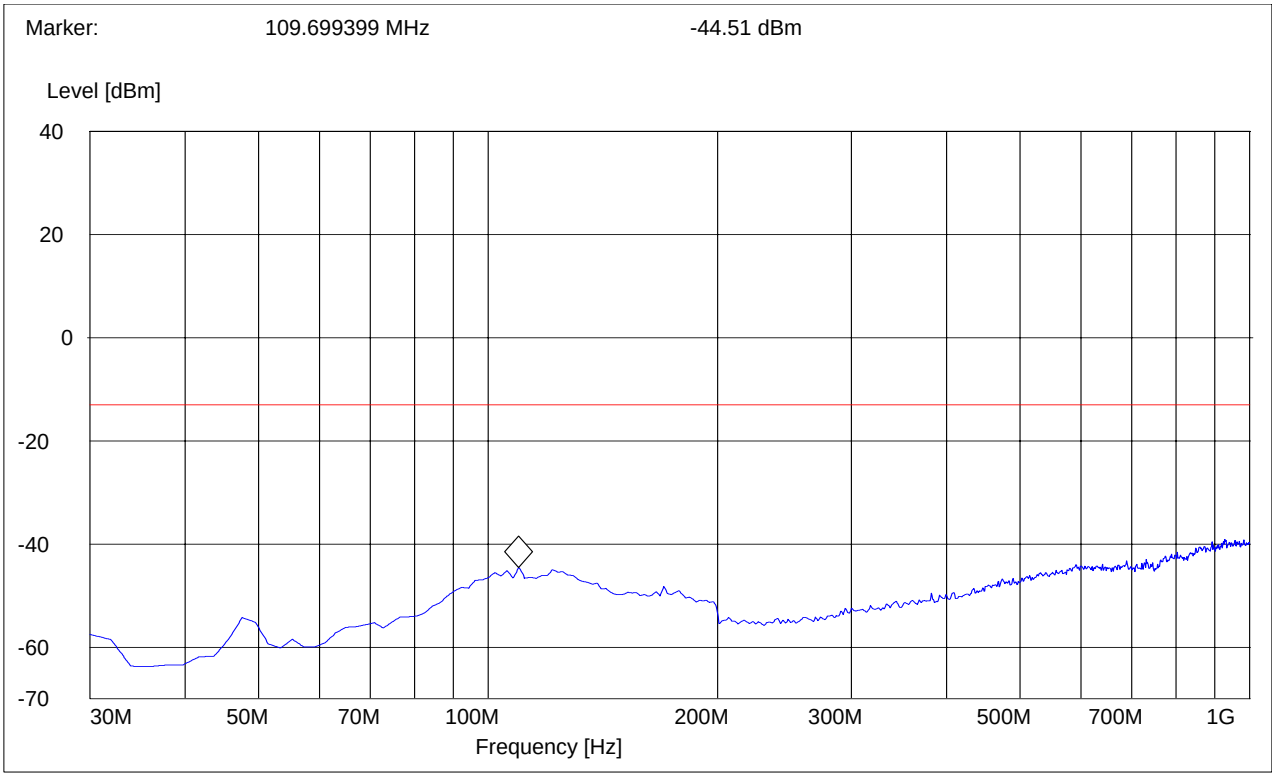
Harmonic	Tx ch-512 Freq.(MHz)	Level (dBm)	Tx ch-661 Freq. (MHz)	Level (dBm)	Tx ch-810 Freq. (MHz)	Level (dBm)
2	**3700.4**	-28.44	**3760**	-34.68	**3819.6**	-36.12
3	**5550.6**	-42.64	**5640**	-38.56	**5729.4**	-44.79
4	**7400.8**	-39.48	**7520**	-39.47	**7639.2**	-37.02
5	**9251**	-35.05	**9400**	-32.51	**9549**	-27.11
6	**11101.2**	-31.80	**11280**	-34.55	**11458.8**	-38.58
7	**12951.4**	-34.94	**13160**	-33.35	**13368.6**	-36.66
8	**14801.6**	NF	**15040**	NF	**15278.4**	NF
9	**16651.8**	NF	**16920**	NF	**17188.2**	NF
10	**18502**	NF	**18800**	NF	**19098**	NF
NF = NOISE FLOOR						

RADIATED SPURIOUS EMISSIONS(PCS 1900)
30MHz - 1GHz
Spurious emission limit –13dBm
Antenna: vertical

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

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

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

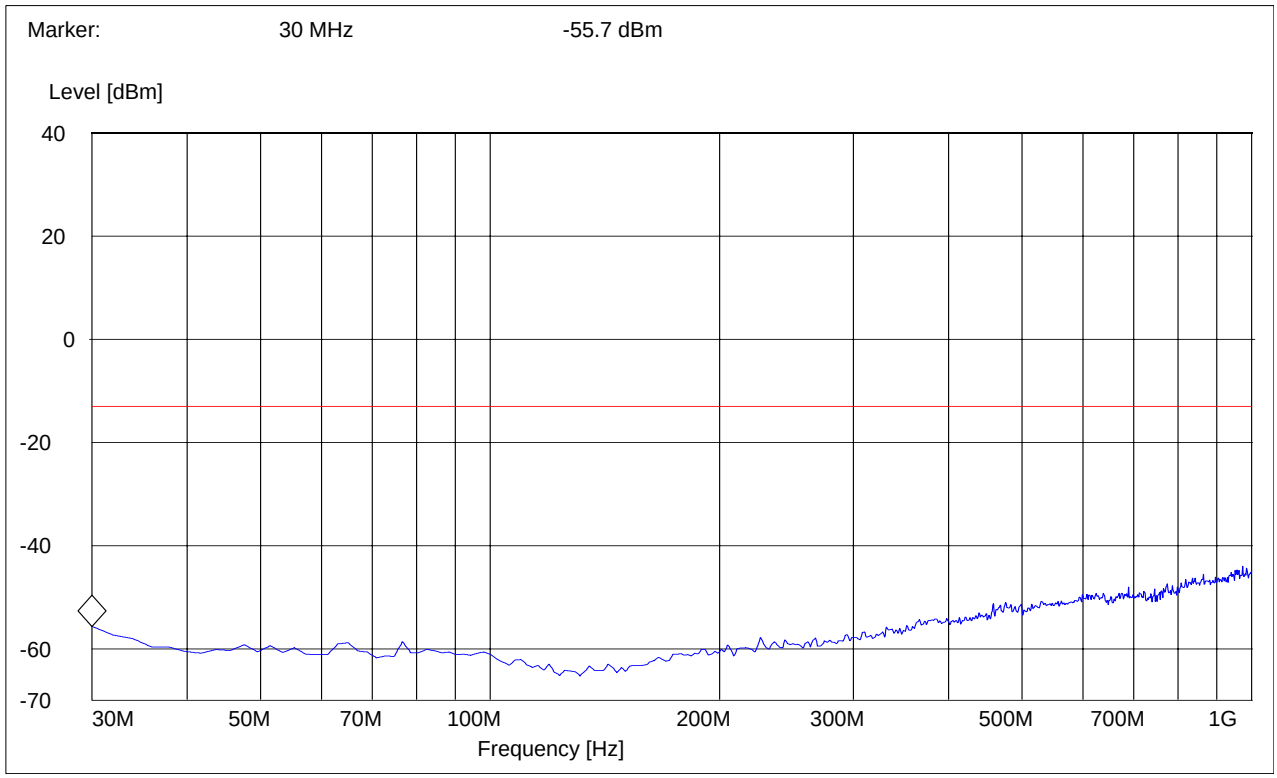


RADIATED SPURIOUS EMISSIONS(PCS 1900)
30MHz - 1GHz
Spurious emission limit –13dBm
Antenna: horizontal

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

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

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

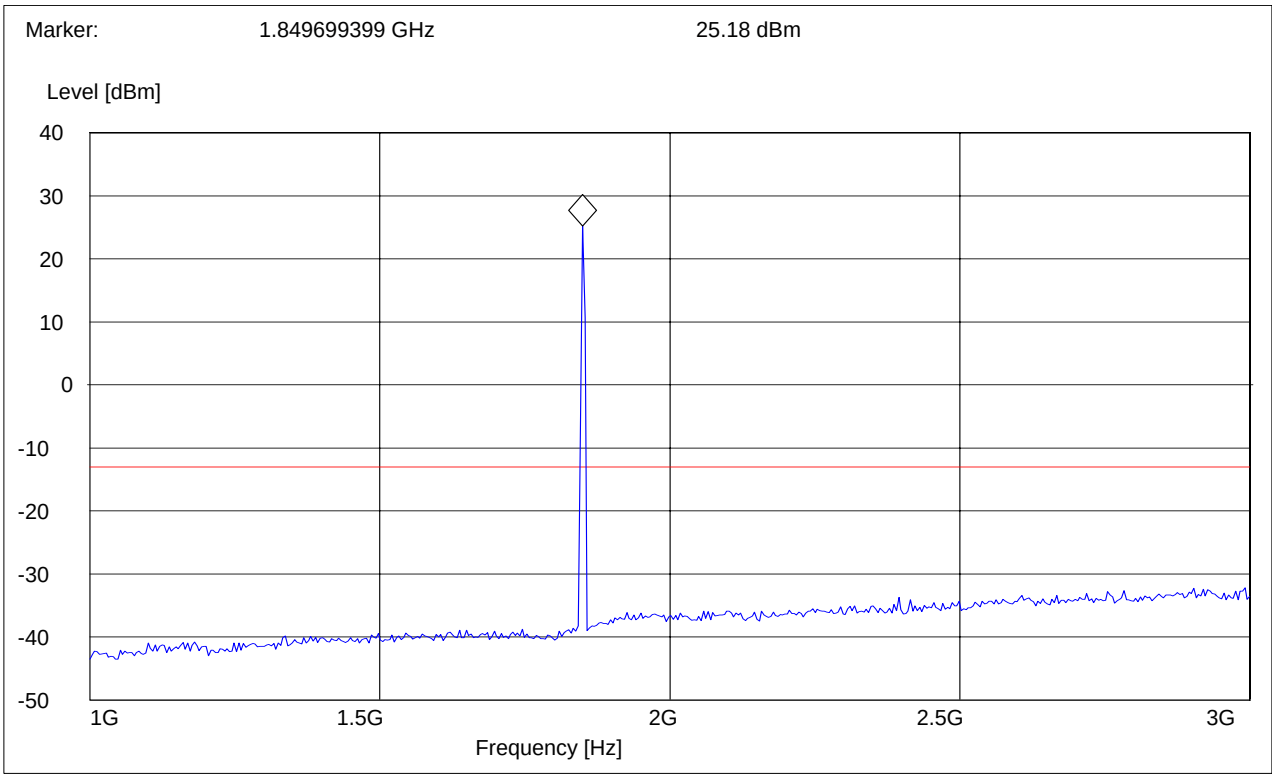


RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1850.2MHz: 1GHz – 3GHz
Spurious emission limit –13dBm

SWEEP TABLE: "FCC Spuri 1-3G"

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

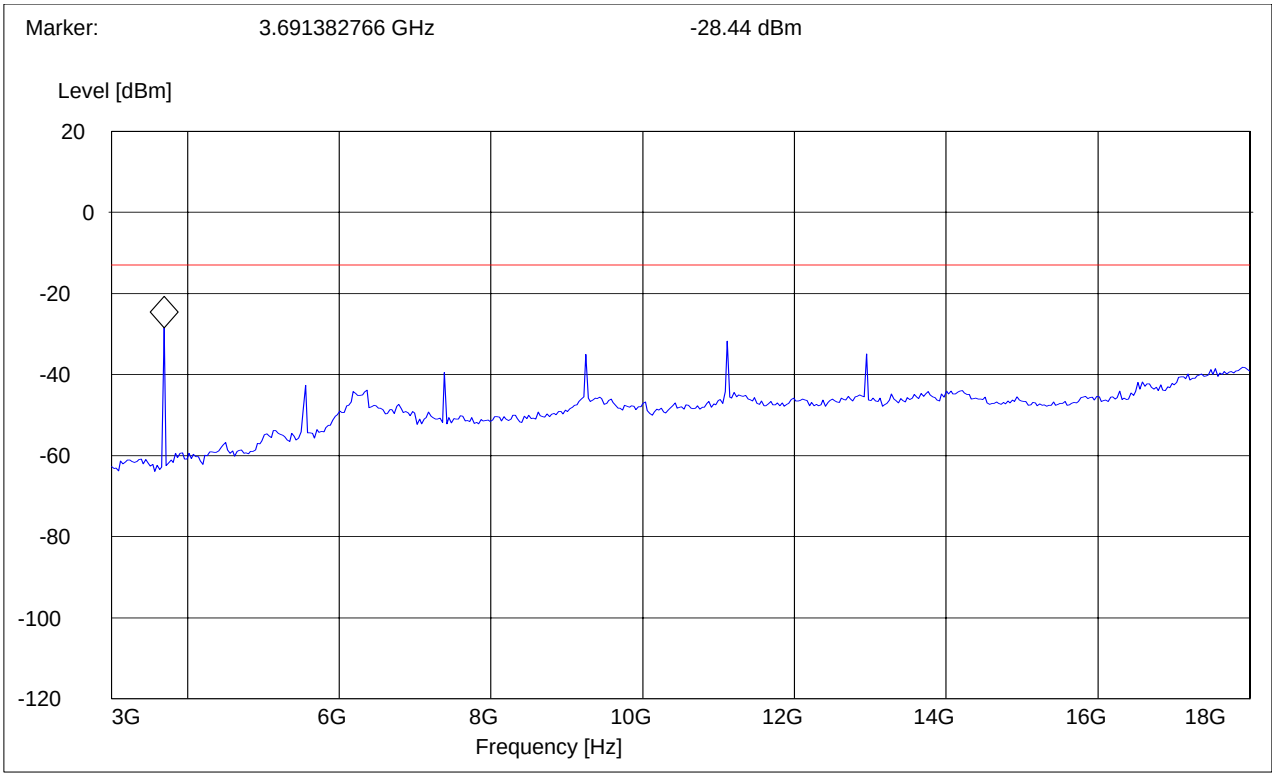
Note: The peak above the limit line is the carrier freq. at ch-512.



RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1850.2MHz: 3GHz – 18GHz
Spurious emission limit –13dBm

SWEEP TABLE: "FCC Spuri 3-18G"

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

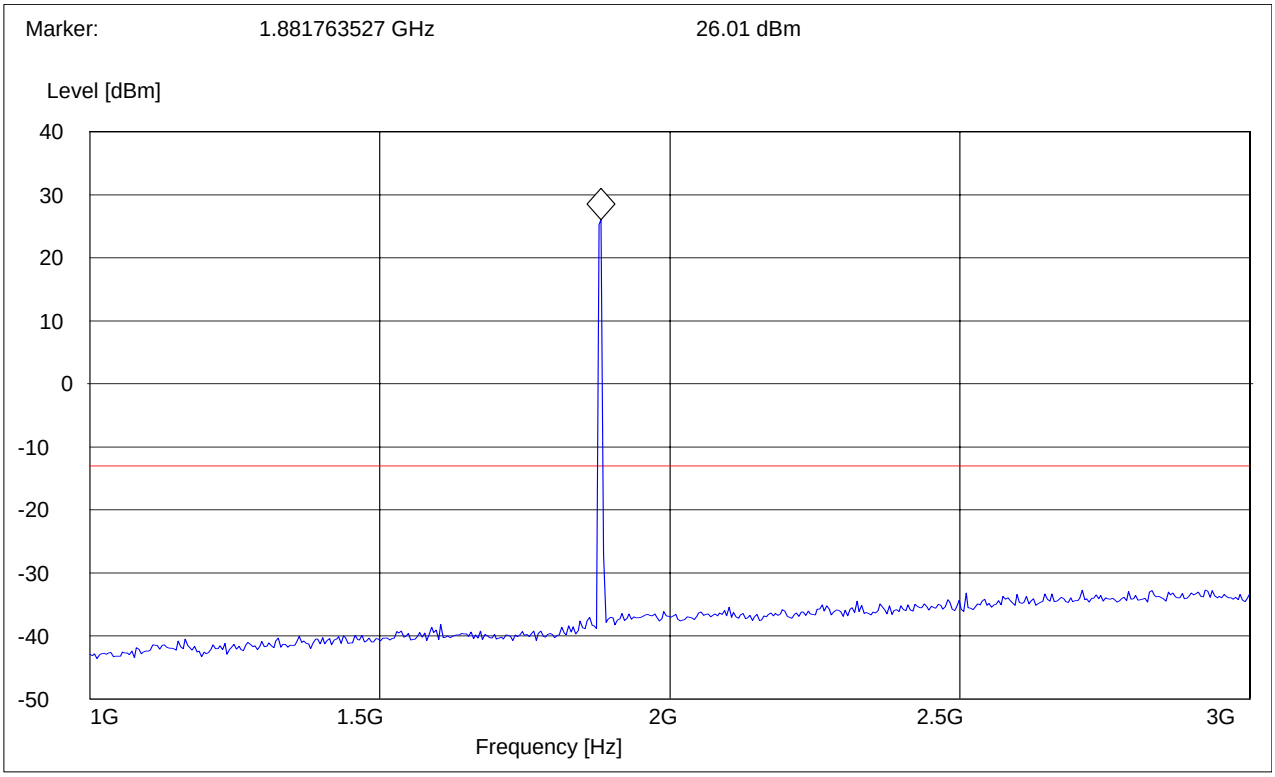


RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1880.0MHz: 1GHz – 3GHz
Spurious emission limit –13dBm

SWEEP TABLE: "FCC Spuri 1-3G"

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

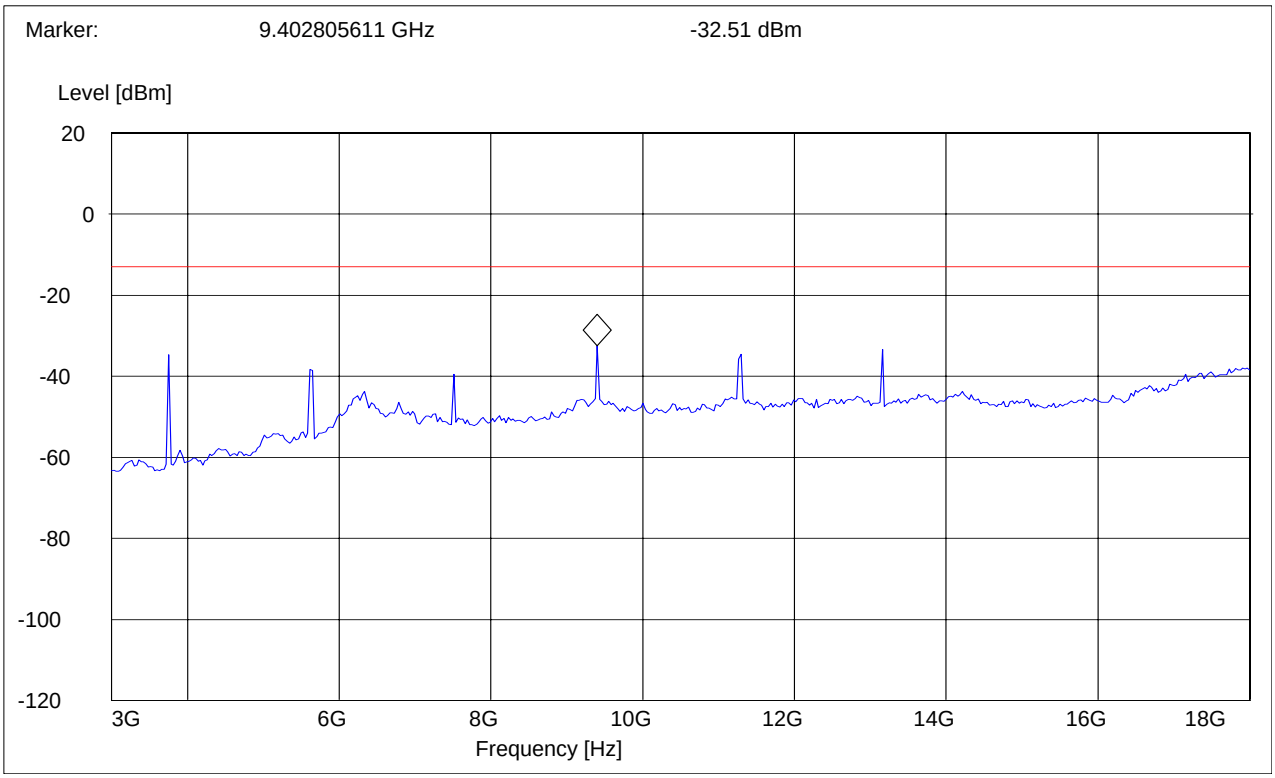
Note: The peak above the limit line is the carrier freq. at ch-661.



RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1880.0MHz: 3GHz – 18GHz
Spurious emission limit –13dBm

SWEEP TABLE: "FCC Spuri 3-18G"

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



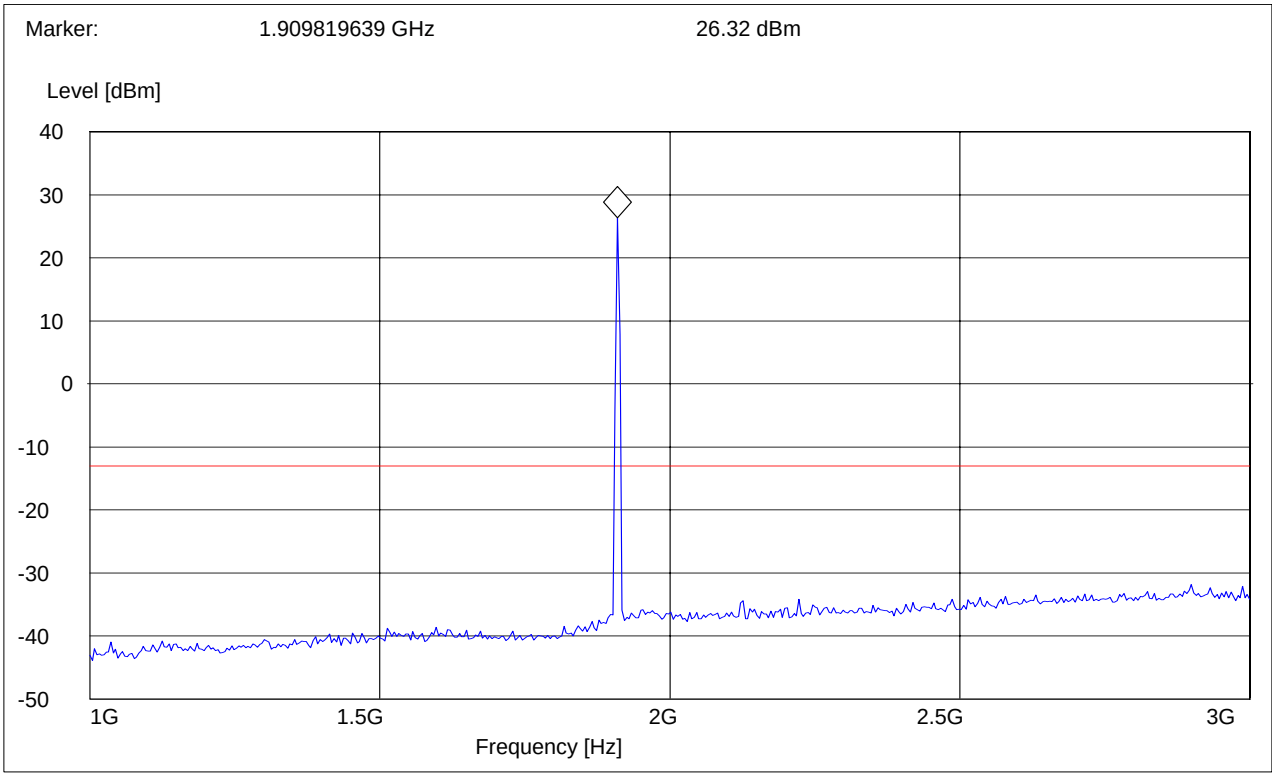
RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1909.8MHz: 1GHz – 3GHz
Spurious emission limit –13dBm

SWEEP TABLE: "FCC Spuri 1-3G"

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

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

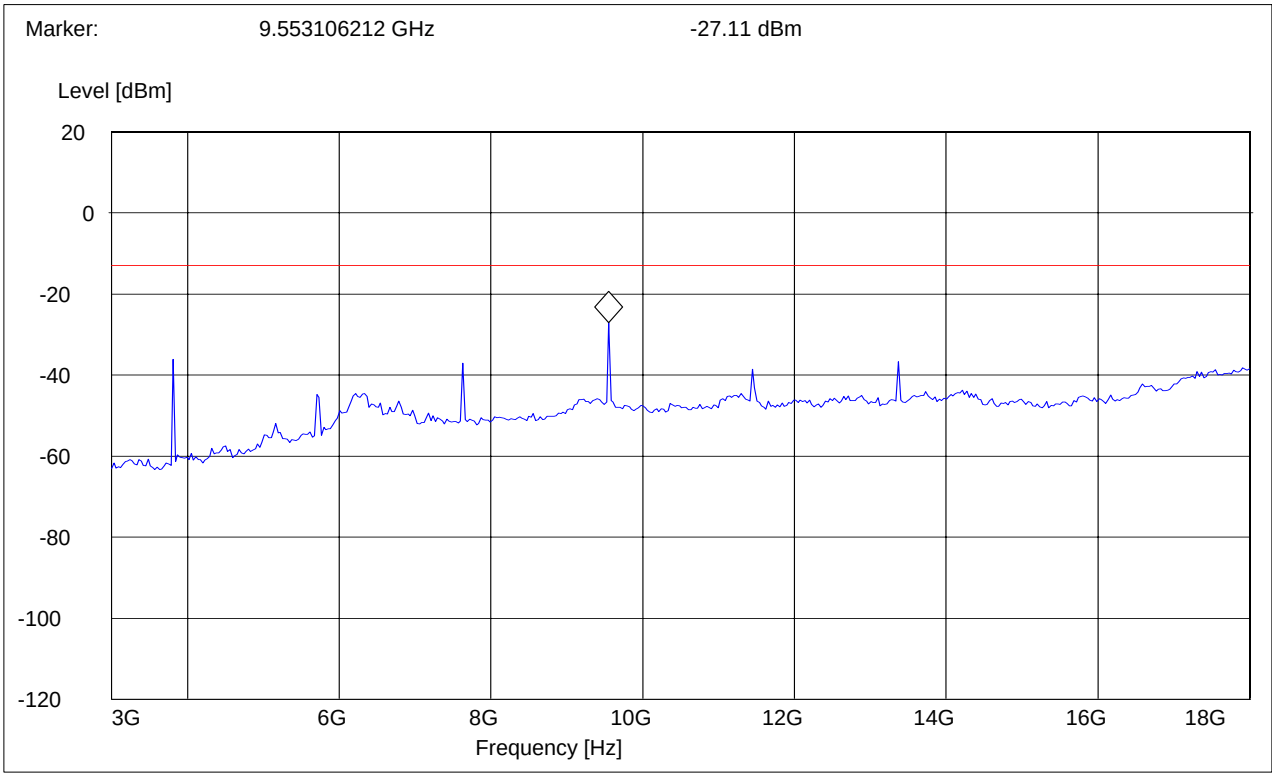
Note: The peak above the limit line is the carrier freq. at ch-810.



RADIATED SPURIOUS EMISSIONS(PCS 1900)
Tx @ 1909.8MHz: 3GHz – 18GHz
Spurious emission limit –13dBm

SWEEP TABLE: "FCC Spuri 3-18G"

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

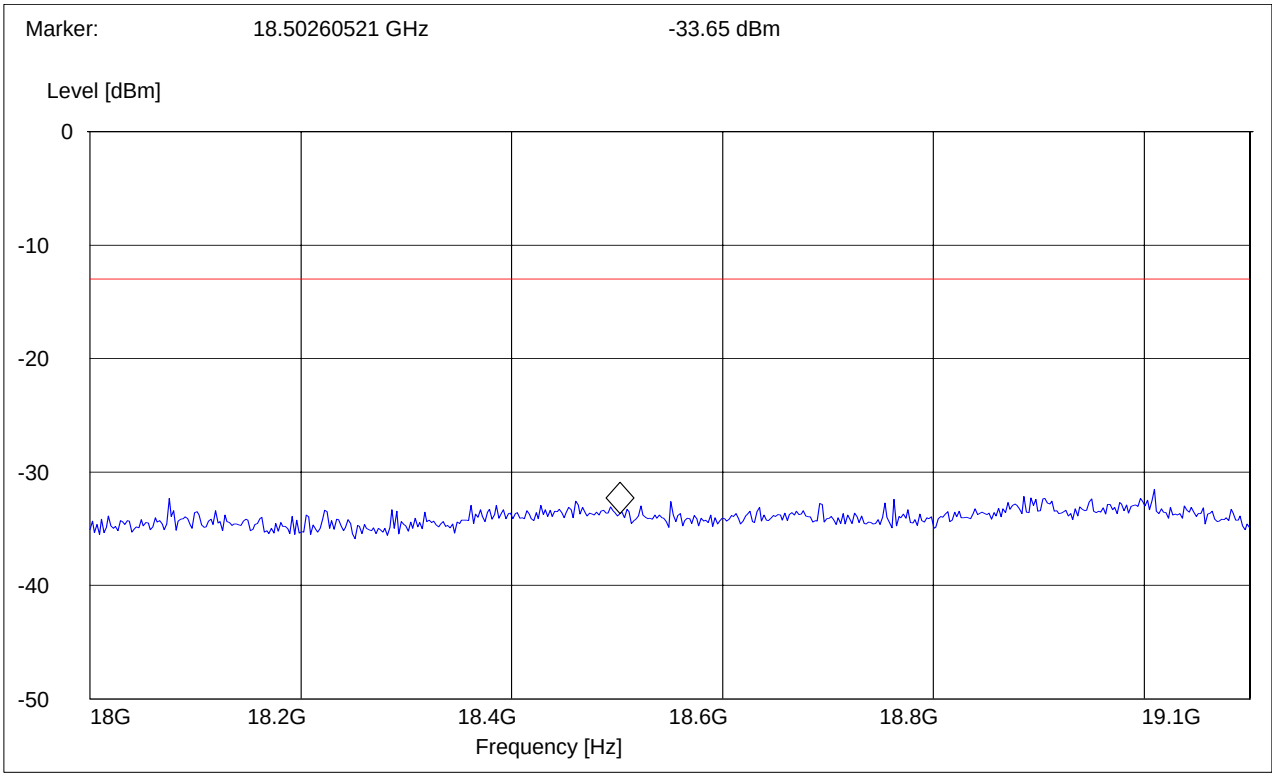


RADIATED SPURIOUS EMISSIONS(PCS 1900)
18GHz – 19.1GHz
Spurious emission limit –13dBm

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

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

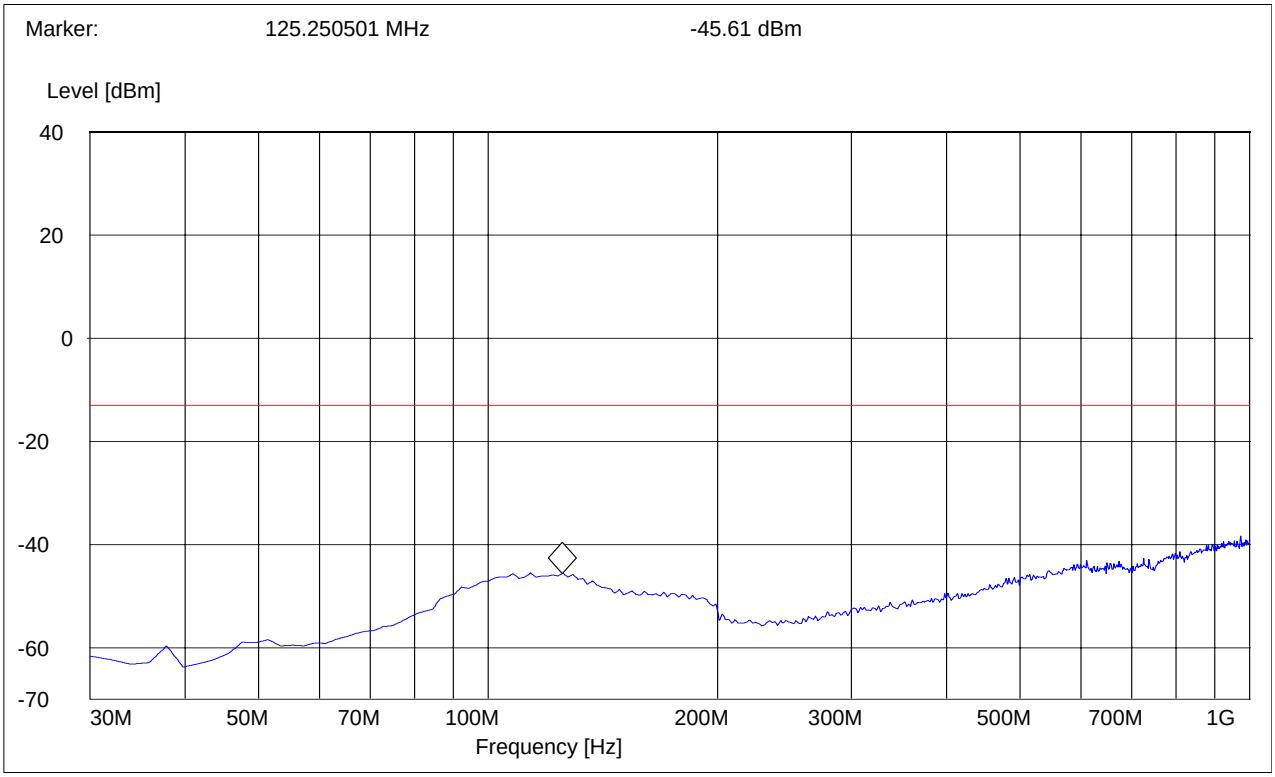
Note: This plot is valid for low, mid & high channels (worst-case plot)



RADIATED SPURIOUS EMISSIONS (IDLE MODE)
EUT in Idle Mode: 30MHz – 1GHz
Spurious emission limit –13dBm
Antenna: vertical

SWEEP TABLE: "FCC 22 Spur 30M-1G"

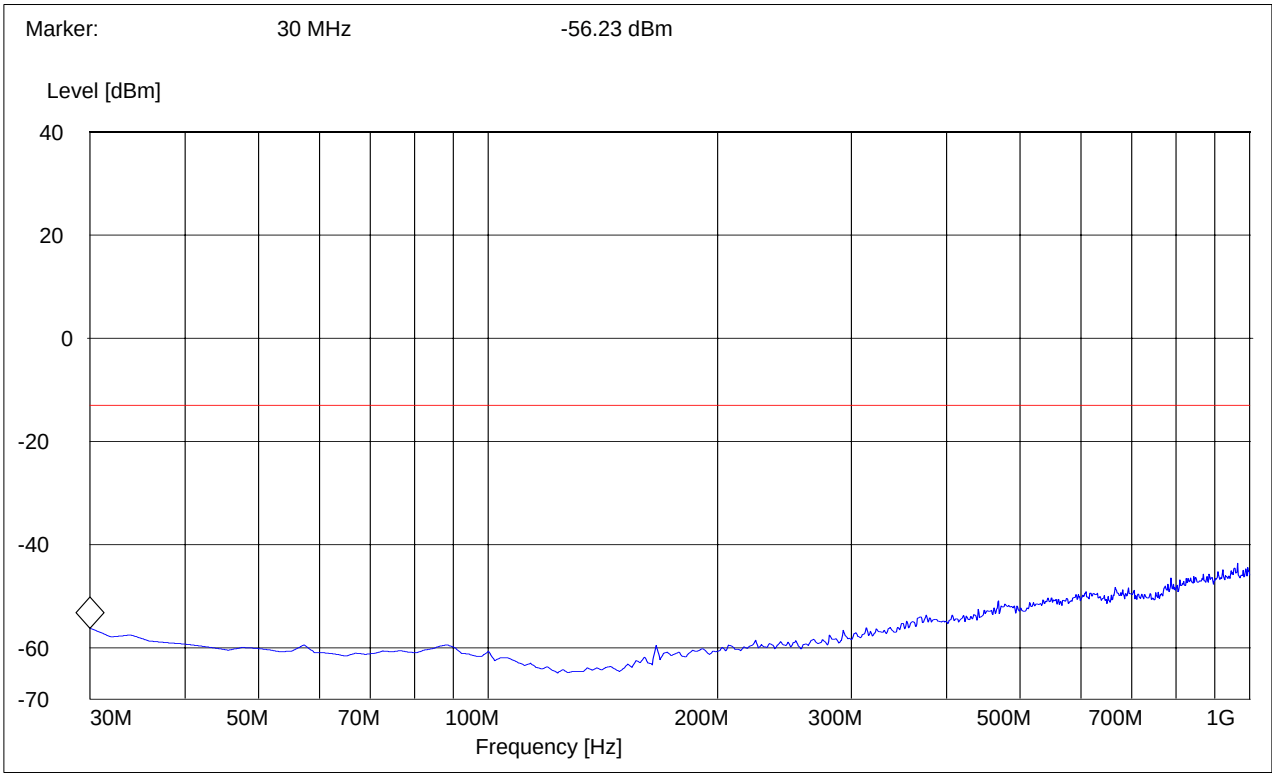
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	1 MHz	1 MHz



RADIATED SPURIOUS EMISSIONS (IDLE MODE)
EUT in Idle Mode: 30MHz – 1GHz
Spurious emission limit –13dBm
Antenna: horizontal

SWEEP TABLE: "FCC 22 Spur 30M-1G"

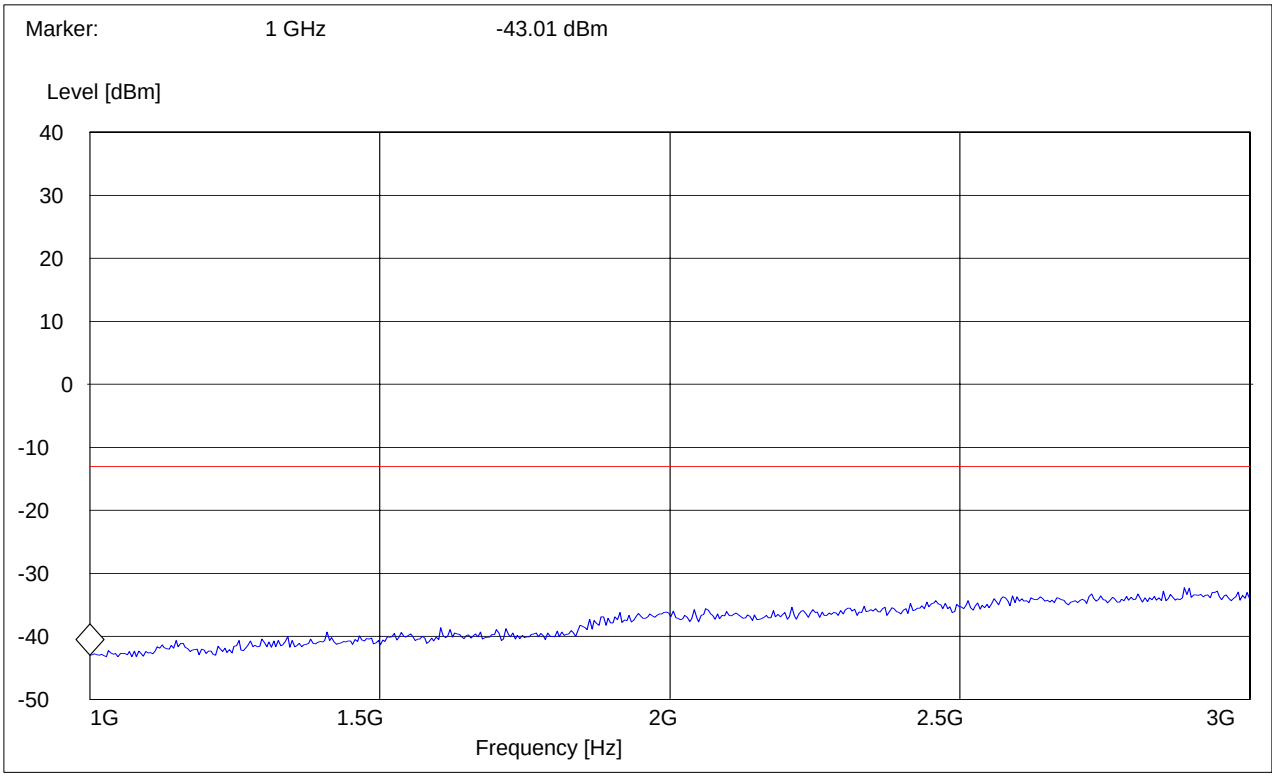
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	1 MHz	1 MHz



RADIATED SPURIOUS EMISSIONS (IDLE MODE)
EUT in Idle Mode: 1GHz – 3GHz
Spurious emission limit –13dBm

SWEEP TABLE: "FCC Spuri 1-3G"

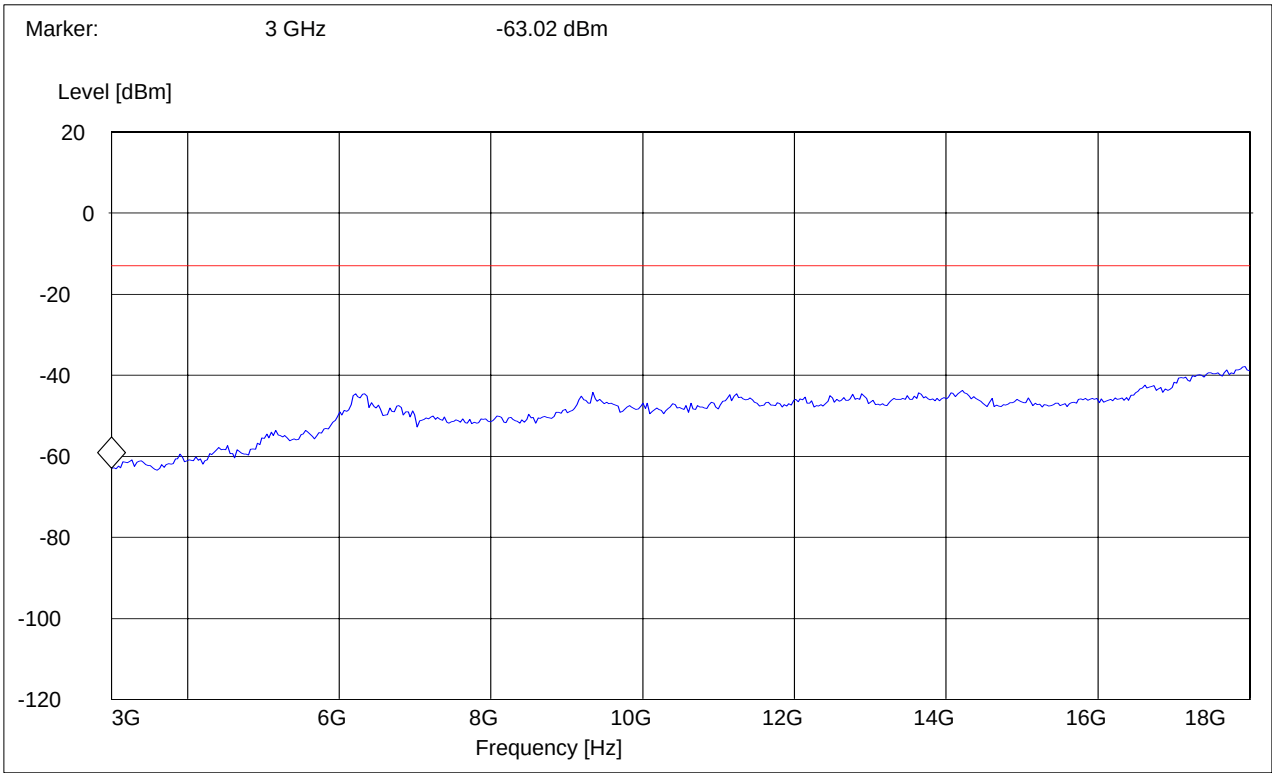
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz



RADIATED SPURIOUS EMISSIONS (IDLE MODE)
EUT in Idle Mode: 3GHz – 18GHz
Spurious emission limit –13dBm

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

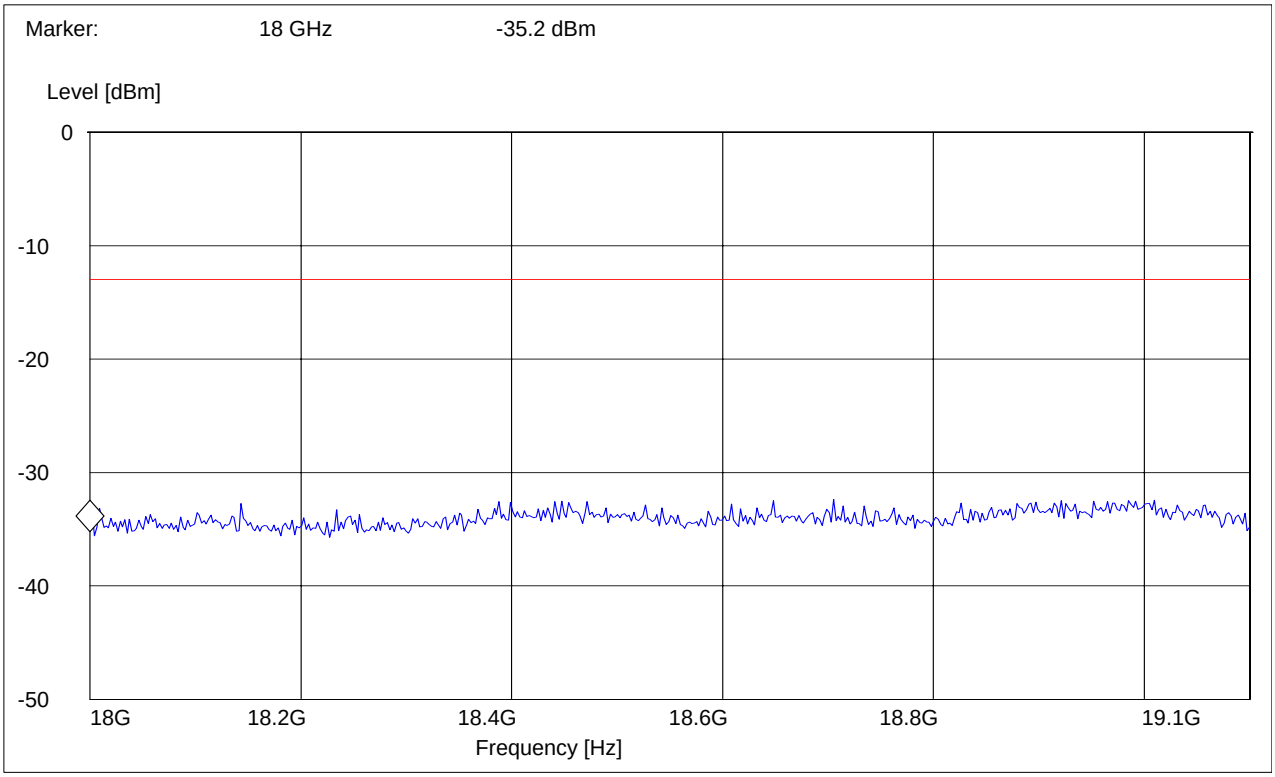
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	1 MHz



RADIATED SPURIOUS EMISSIONS (IDLE MODE)
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. Time	RBW	VBW
18GHz	19.1GHz	Max Peak	Coupled	1 MHz	1 MHz



5.3 RECEIVER RADIATED EMISSIONS § 2.1053 / RSS-133

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 3GHz and 26.5GHz very short cable connections to the antenna was used to minimize the noise level.**

2. **Receiver radiated emissions were done on both 850/1900 bands, but only worst-case plots are submitted in the test reports.**

Limits **SUBCLAUSE § RSS-133**

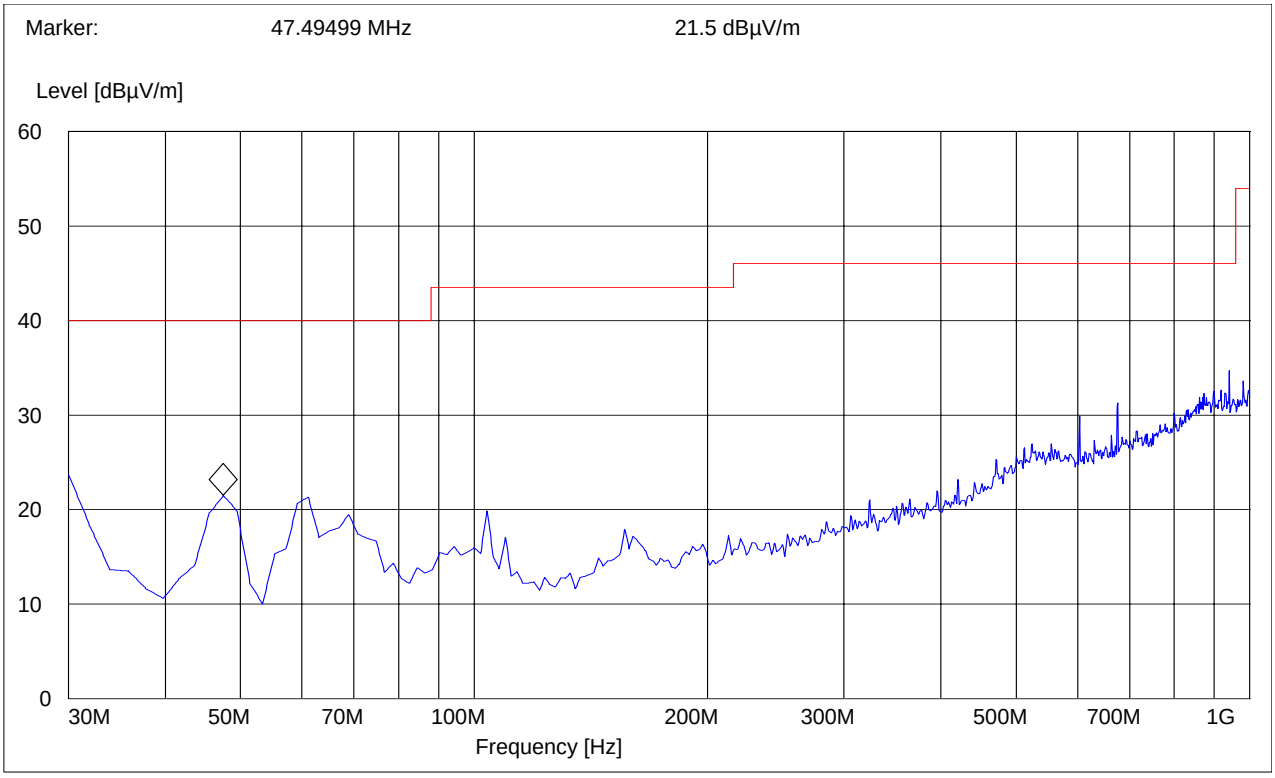
Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

5.3.1 Receiver Spurious on EUT

RECEIVER RADIATED EMISSIONS
EUT in Idle Mode: 30MHz – 1GHz
Antenna: vertical

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

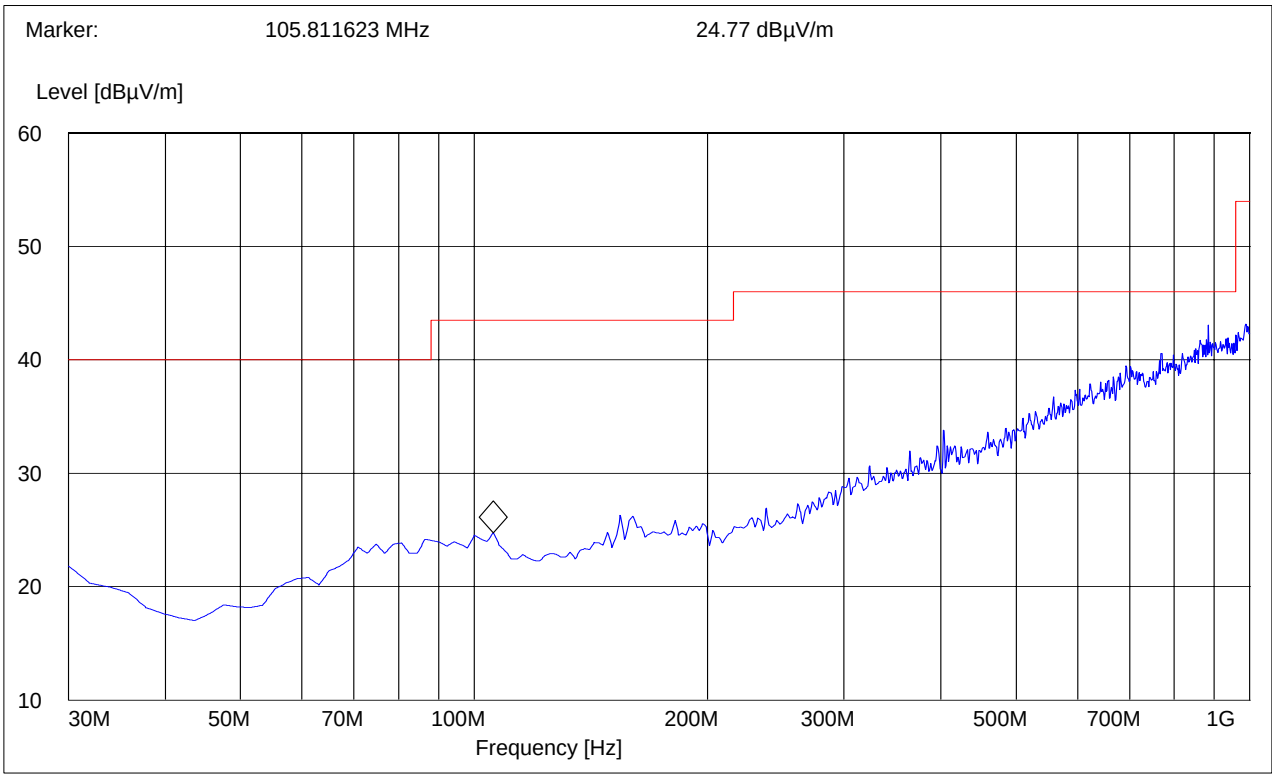
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz



RECEIVER RADIATED EMISSIONS
EUT in Idle Mode: 30MHz – 1GHz
Antenna: horizontal

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

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

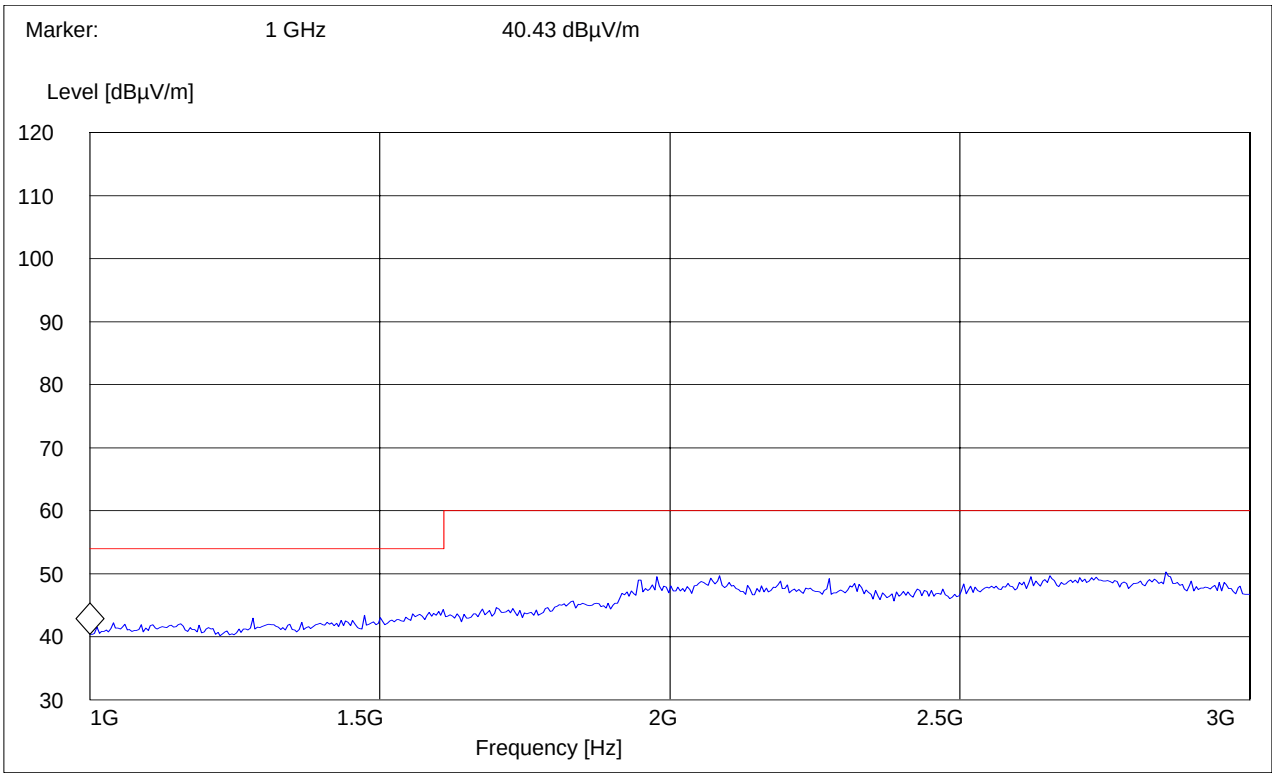


RECEIVER RADIATED EMISSIONS
EUT in Idle Mode: 1GHz – 3GHz

Note: marked peak is downlink from the base station

SWEEP TABLE: "FCC Spuri 1-3G"

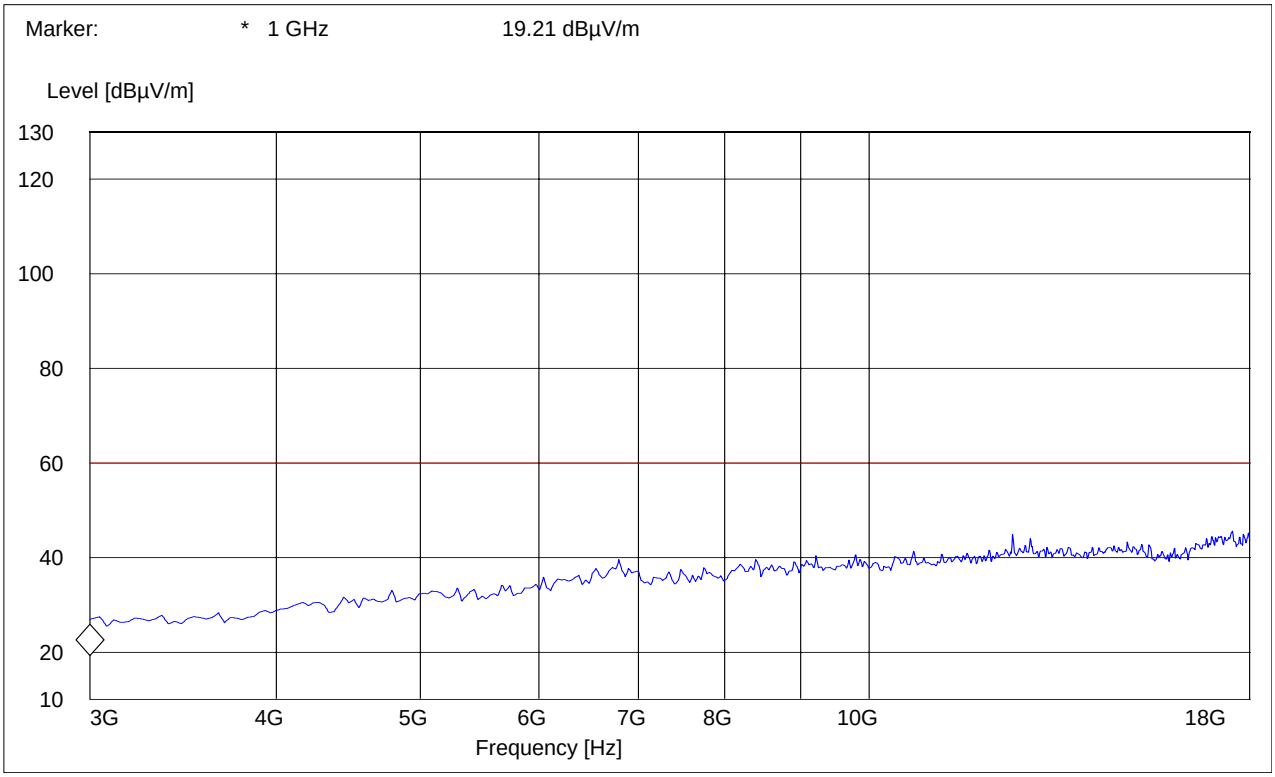
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz



RECEIVER RADIATED EMISSIONS
EUT in Idle Mode: 3GHz – 18GHz

SWEEP TABLE: "FCC spuri 3-18G"

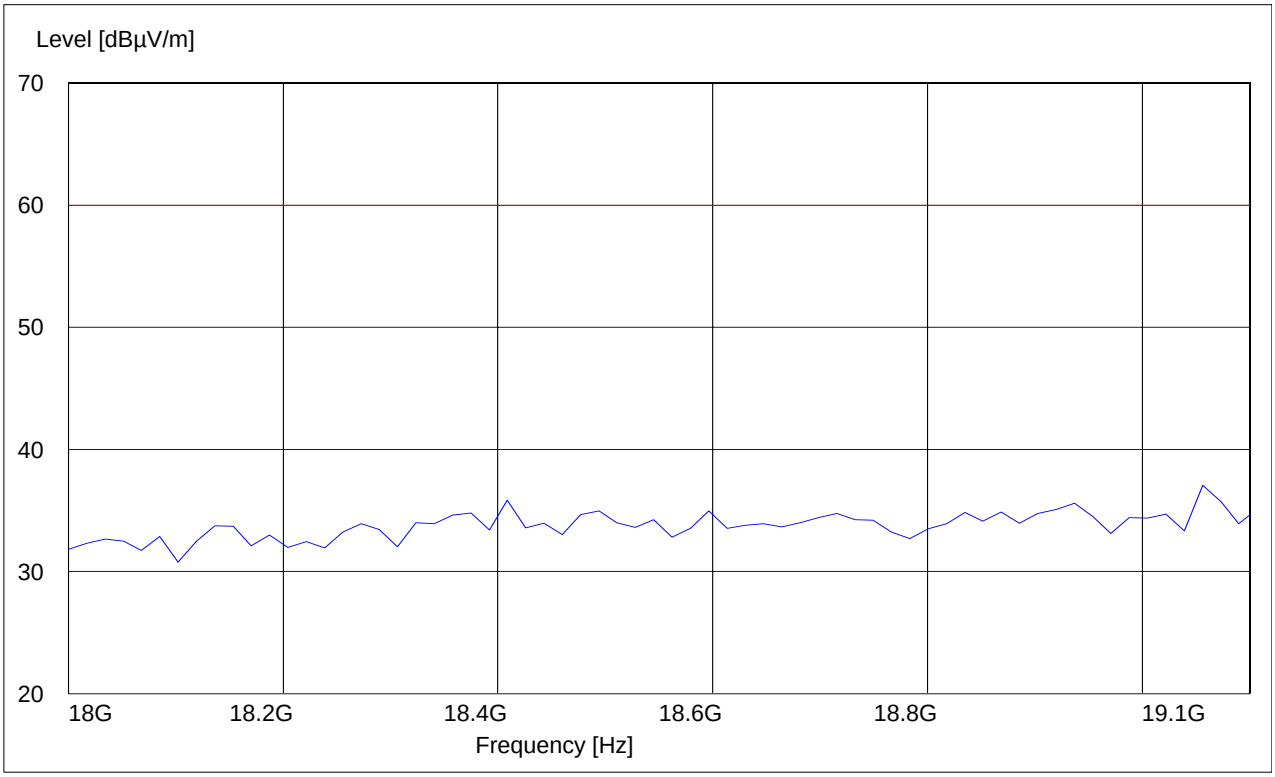
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	1 MHz



RECEIVER RADIATED EMISSIONS
EUT in Idle Mode: 18GHz – 19.1GHz

SWEEP TABLE: "FCC spuri 18-19.1G"

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

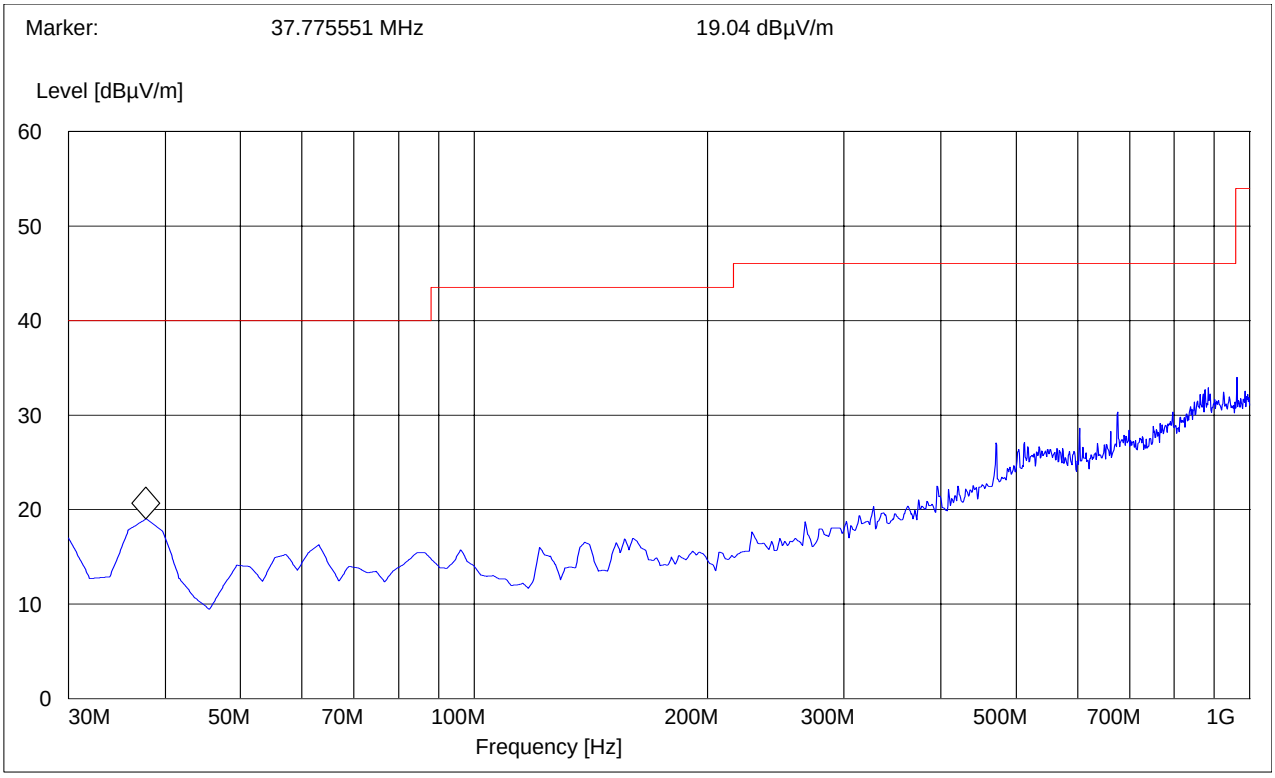


5.3.2 Receiver Spurious Spot Check on MTCBA-E

RECEIVER RADIATED EMISSIONS
EUT in Idle Mode: 30MHz – 1GHz
Antenna: vertical

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

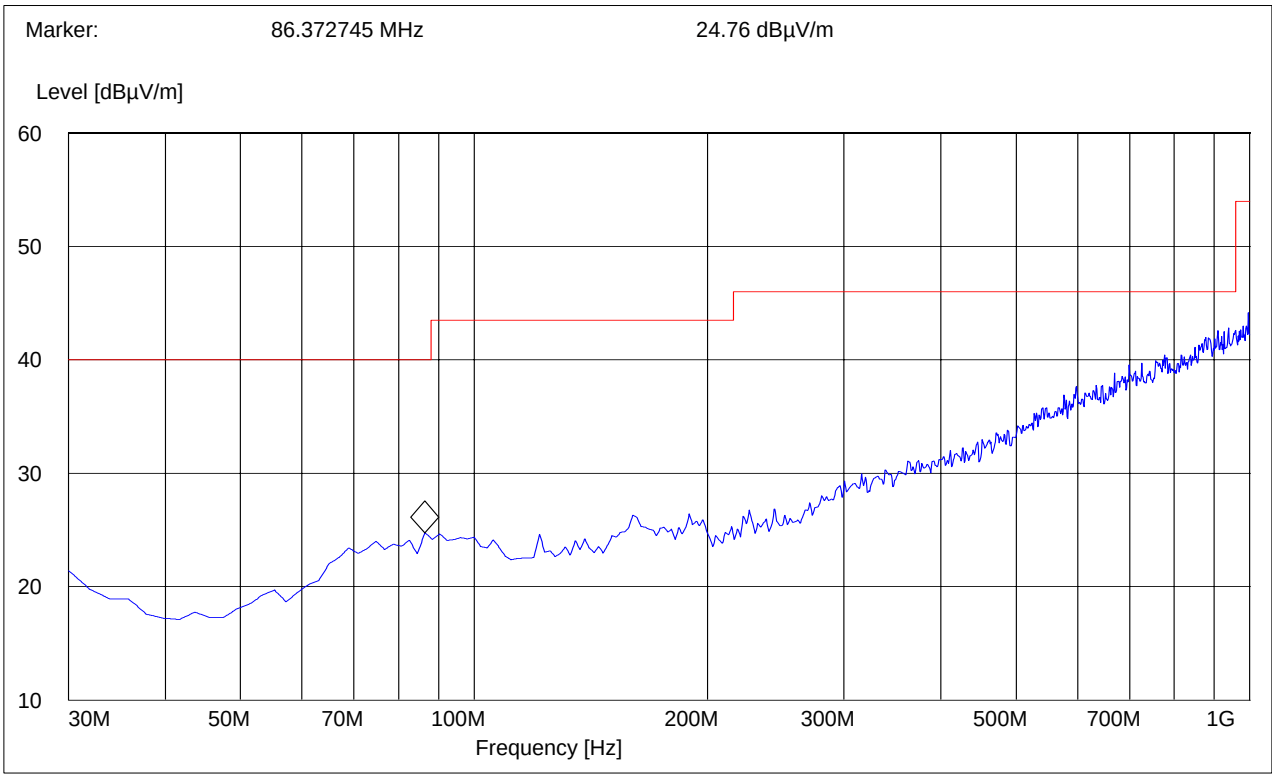
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz



RECEIVER RADIATED EMISSIONS
EUT in Idle Mode: 30MHz – 1GHz
Antenna: horizontal

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

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

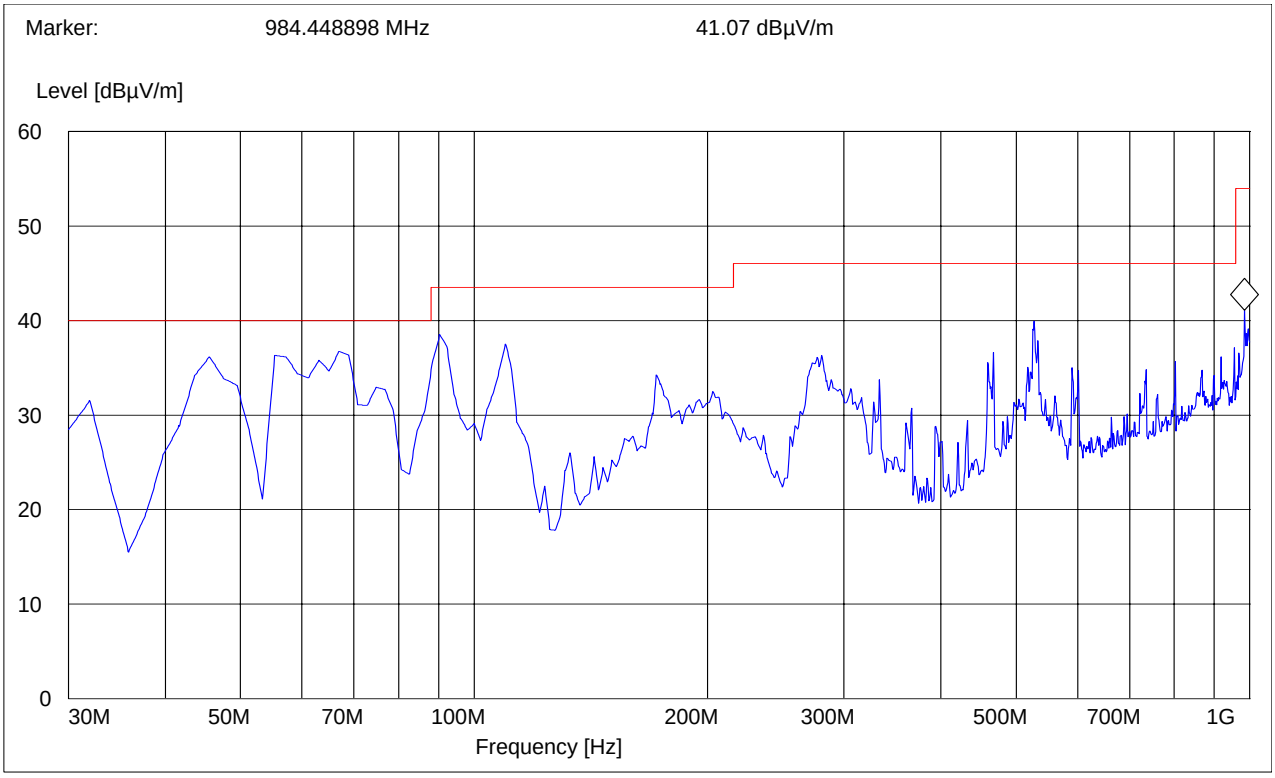


5.3.3 Receiver Spurious Spot Check on MTCBA-E-U

RECEIVER RADIATED EMISSIONS
EUT in Idle Mode: 30MHz – 1GHz
Antenna: vertical

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

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

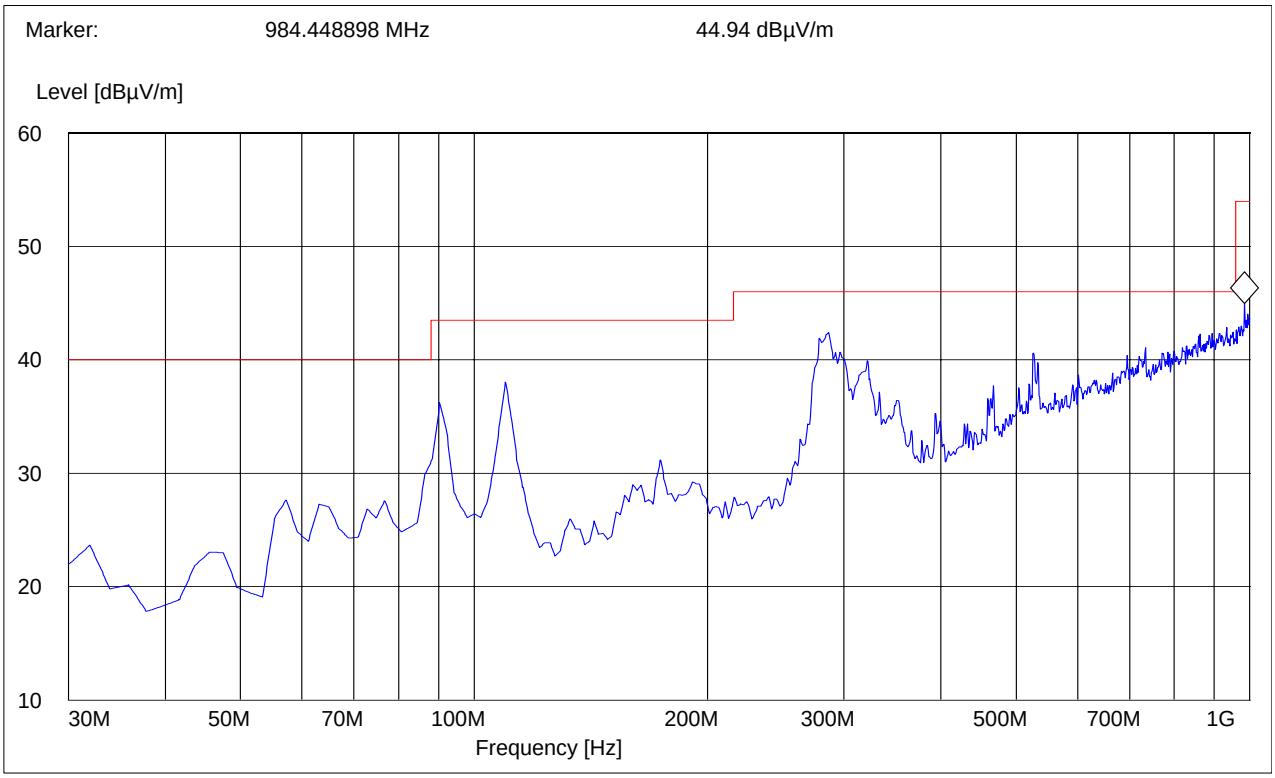


***note: all above emissions seen is from host laptop not MTCBA-E-U.**

RECEIVER RADIATED EMISSIONS
EUT in Idle Mode: 30MHz – 1GHz
Antenna: horizontal

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

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



***note: all above emissions seen is from host laptop not MTCBA-E-U.**

5.4 AC POWERLINE CONDUCTED EMISSIONS § 15.107/207

Measured with AC/DC power adapter
Technical specification: 15.107 / 15.207 (Revised as of August 20, 2002)
Limit

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50
* Decreases with logarithm of the frequency		

ANALYZER SETTINGS: RBW = 10KHz VBW = 10KHz

5.4.1 Results EUT (AC/DC adapter)

LISN

411 Dixon Landing Road, CA 95035

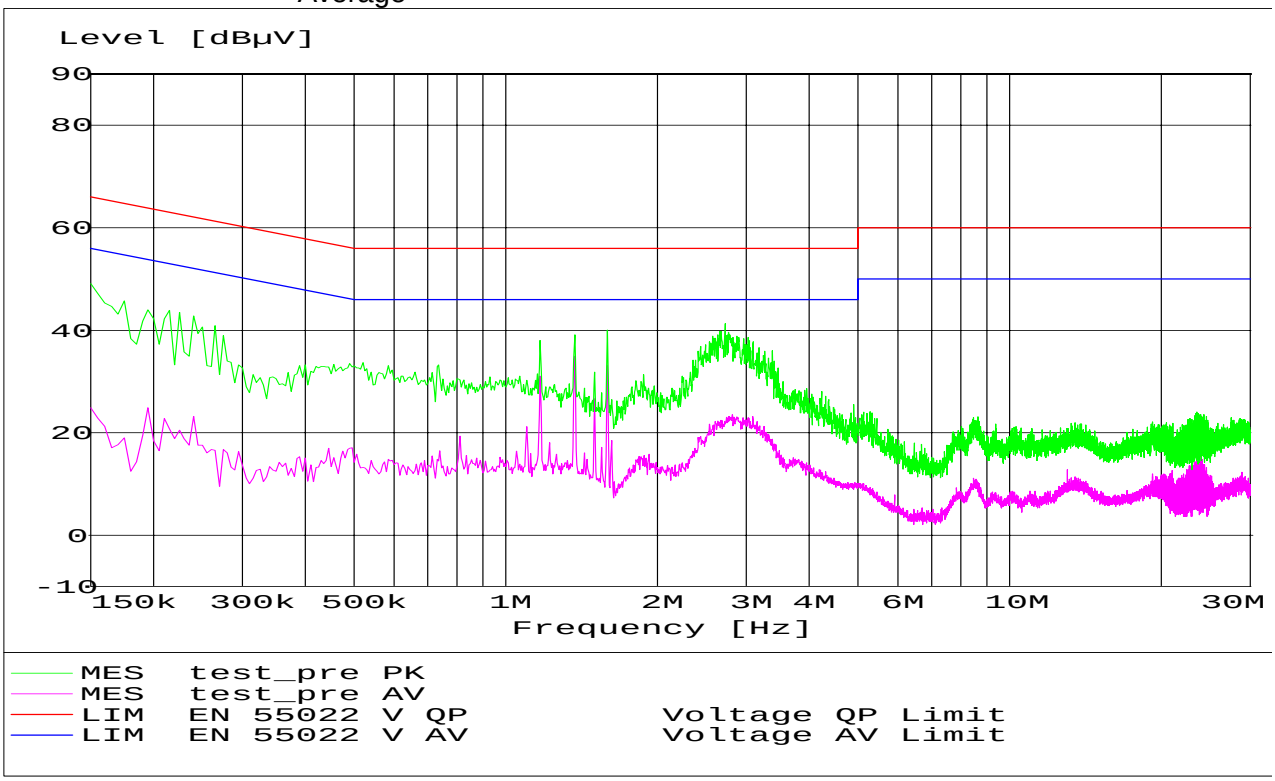
EUT / Description:	SocketModem
Manufacturer:	MULITECH
Test mode:	TX 1900 --> RS-232 CDN between laptop and modem
Test Engineer:	Mark
Phase:	L+N
Comment:	110V

Start of Test: 6/7/2005 / 4:07:59PM

SCAN TABLE: "EN 55022 Voltage"

Short Description: EN 55022 Voltage

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	5.0 kHz	MaxPeak Average	10.0 ms	9 kHz	None



5.4.2 Results MTCBA-E (AC/DC adapter)

LISN

411 Dixon Landing Road, CA 95035

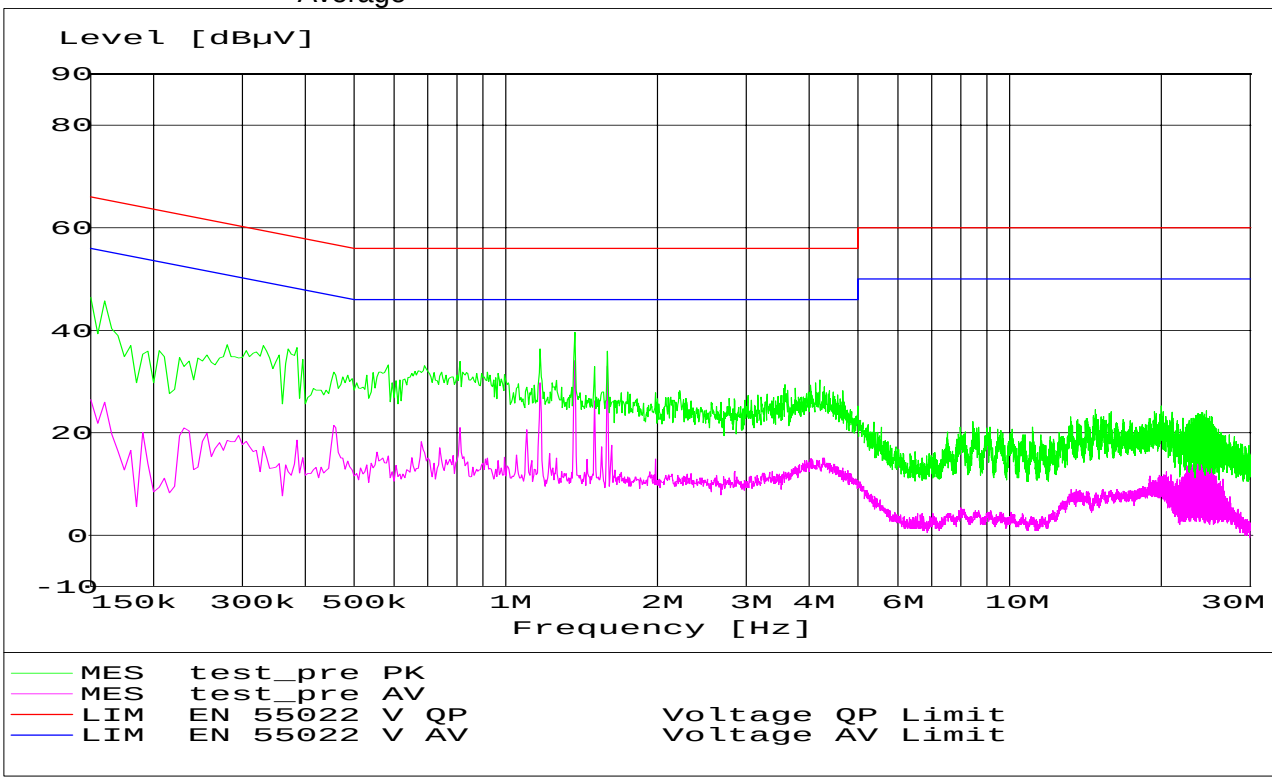
EUT / Description:	MTCBA-E (serial port)
Manufacturer:	MULITECH
Test mode:	TX 1800 --> RS-232 CDN between laptop and modem
Test Engineer:	Mark
Phase:	L+N
Comment:	110V

Start of Test: 6/7/2005 / 3:52:46PM

SCAN TABLE: "EN 55022 Voltage"

Short Description: EN 55022 Voltage

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



5.4.3 Results MTCBA-E –U (via laptop)

LISN

411 Dixon Landing Road, CA 95035

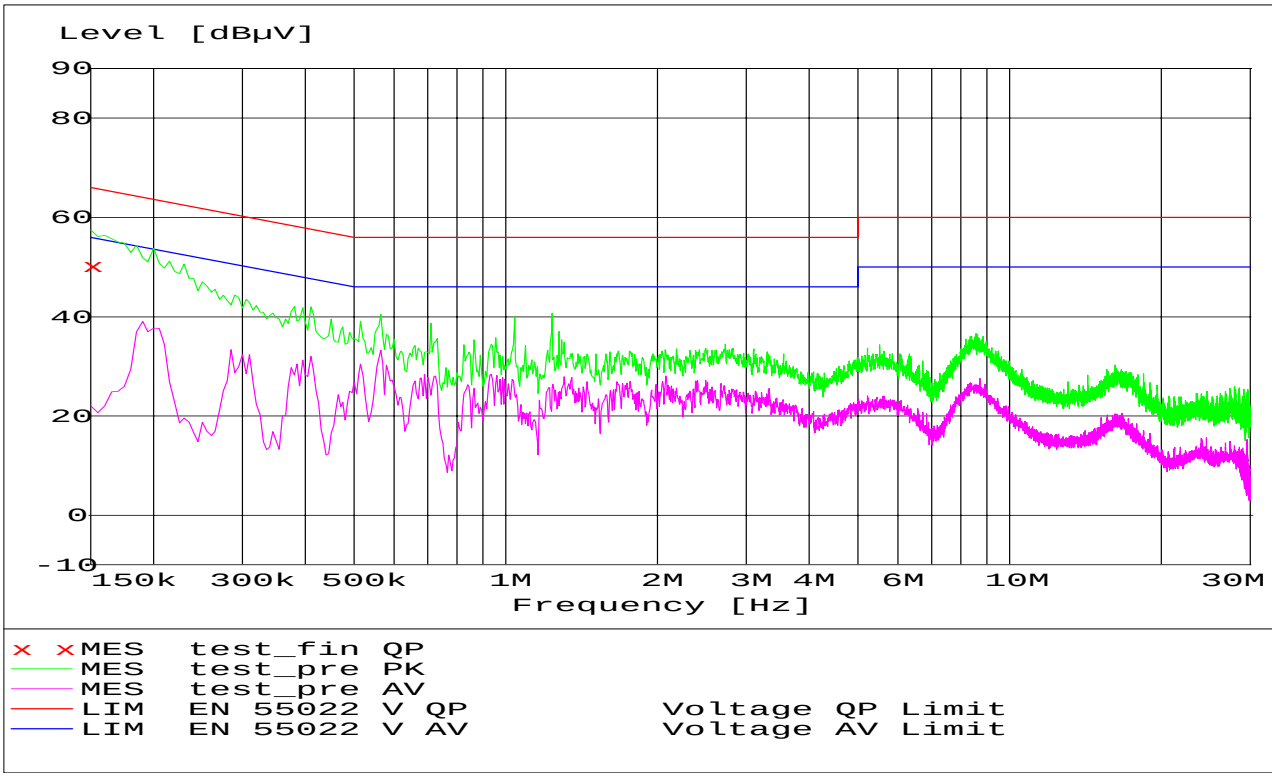
EUT / Description:	MTCBA-E-U (USB)
Manufacturer:	MULITECH
Test mode:	TX
Test Engineer:	Neelesh
Phase:	L+N
Comment:	110V

Start of Test: 6/6/2005 / 10:51:23AM

SCAN TABLE: "EN 55022 Voltage"

Short Description: EN 55022 Voltage

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "test_fin QP"

6/6/2005 10:54AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.150000	50.30	0.0	66	15.7	L1	GND

6 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

7 References

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PART 2--FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS October 1**,** 2001.

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PART 24 PERSONAL COMMUNICATIONS SERVICES October 1, 1998.

ANSI / TIA-603-B-2003 Land Mobile FM or PM Communications Equipment Measurement and Performance Standard November 7, 2002.