

CETECOM Inc.



CETECOM Inc.

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Issued test report consists of 55 Pages

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<p>FCC LISTED, REG. NO.: 101450 & RECOGNIZED BY INDUSTRY CANADA IC – 3925</p>

Test report no.: 301FCC24/2002
FCC Part 24 / RSS 133
(GoBook)

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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: Mark Sechrist****1.2 Testing laboratory****CETECOM Inc.**

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1.3 Details of applicant

Name : **Itronix Corporation**
Street : **804 South Stevens St.**
City : **Spokane, WA 99204**
Country : **U.S.A.**
Contact : **Mr. Richard Sargent**
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Tele-fax : **(509) 742-1672**
e-mail : **Sargent@itronix.com**

1.4 Application details

Date of receipt of application : 6/23/02
Date of receipt test item : 01/08/01 and 6/23/02
Date of test : 11/08/01 – 11/09/01, 2/05/02, 6/24/02

1.5 Test item

Manufacturer : Itronix Corporation
Model No : IX250 (GoBook)
Description : Ruggedized laptop computer
with built in SierraWireless Aircard 750
Serial No. : ZZGE2073ZZ3030

Additional information

Frequency : GSM 900/1800/1900
Type of modulation : GMSK
Number of channels : 299 (in PCS 1900)
Antenna : Whip, monopole
Power supply : 5.0 volt DC
Output power : 1.8 Watt
Extreme vol. Limits : 4.5 VDC – 5.5 VDC
Extreme temp. Tolerance : -10 to +50 celsius

1.6 Test standards

FCC Part 24 / RSS133 r1

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.

Technical responsibility for area of testing :

06/28/02**EMC & Radio****Lothar Schmidt**

Date**Section****Name****Signature**

2.2 Test report

TEST REPORT

**Test report no.: 301FCC24/2002
(GoBook)**

TEST REPORT REFERENCE**LIST OF MEASUREMENTS**

PARAMETER TO BE MEASURED	PARAGRAPH	PAGE
POWER OUTPUT	SUBCLAUSE § 24.232	7
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POWER OUTPUT**SUBCLAUSE § 24.232****Summary:**

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMD-55) to ensure max. power transmission and proper modulation.

This paragraph contains both average, peak output powers and EIRP measurements for the EUT.

In all cases, the peak output power is within the required mask (this mask is specified in the JTC standards, TIA PN3389 Vol. 1 Chap 7, and is no FCC requirement).

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 FSEM 30 (peak and average)

This measurements were done at 3 frequencies, 1850.2 MHz, 1880.0 MHz and 1909.8 MHz (bottom, middle and top of operational frequency range)

Limits:

Power Step	Nominal Peak Output Power (dBm)	Tolerance (dB)
0	+30	± 2

Power Measurements:**Conducted:**

Frequency (MHz)	Power Step	Peak Output Power (dBm)	Average Output Power (dBm)
1850.2	0	28.57	25.1
1880.0	0	28.14	24.8
1909.8	0	28.56	24.8
Measurement uncertainty		±0.5 dB	

ANALYZER SETTINGS: RBW = 3MHz VBW = 3MHz

EIRP Measurements

Description: This is the test for the maximum radiated power from the EUT.

Rule Part 24.232(b) specifies that "Mobile/portable stations are limited to 2 watts e.i.r.p. peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

Method of Measurement:

1. In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference centre of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power (P_{in}) is applied to the input of the dipole, and the power received (P_r) at the chamber's probe antenna is recorded.
2. A "reference path loss" is established as $P_{in} + 2.1 - P_r$.
3. The EUT is substituted for the dipole at the reference centre of the chamber. The EUT is put into CW test mode and a scan is performed to obtain the radiation pattern.
4. From the radiation pattern, the co-ordinates where the maximum antenna gain occurs is identified.
5. The EUT is then put into pulse mode at its maximum power level (Power Step 0).
6. "Gated mode" power measurements are performed with the receiving antenna placed at the coordinates determined in Step 3 to determine the output power as defined in FCC Rule 24.232 (b) and (c). The "reference path loss" from Step 1 is added to this result.
7. This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.1 dBi) and known input power (P_{in}).
8. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.1\text{dBi}$.

Limits:

Power Step	Burst Average EIRP (dBm)
0	<33

Power Measurements:

Plots are shown on next pages.

Radiated:

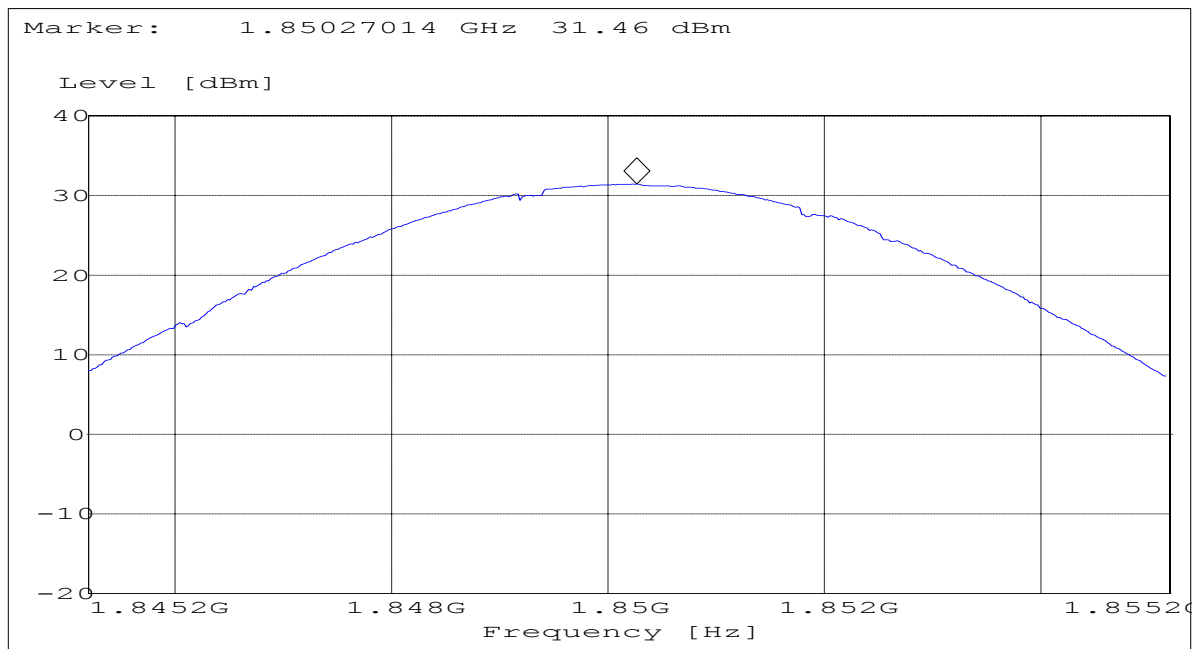
Frequency (MHz)	Power Step	BURST AVERAGE (dBm)		MODULATION AVERAGE (dBm)	
		EIRP	ERP	EIRP	ERP
1850.2	0	31.46	29.36	22.22	20.12
1880.0	0	32.60	30.50	23.36	21.26
1909.8	0	31.86	29.76	22.62	20.52
Measurement uncertainty		±0.5 dB			

ANALYZER SETTINGS: RBW = 3MHz VBW = 3MHz

EIRP CHANNEL 512:

SWEEP TABLE: "EIRP 1900 CH512"

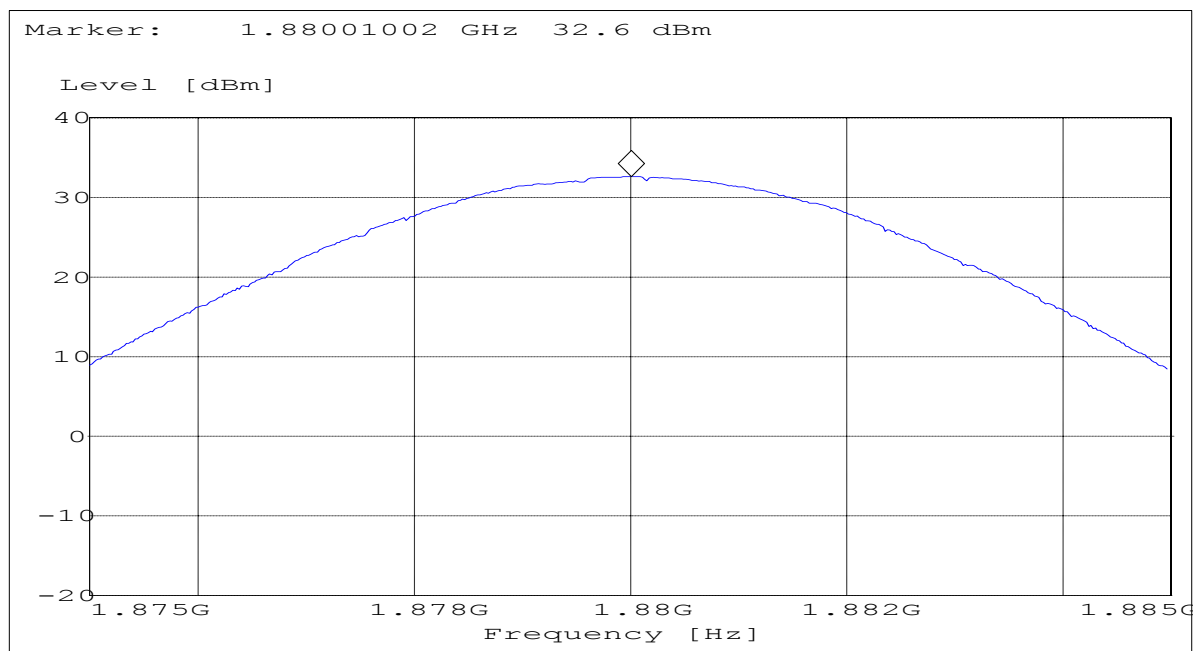
Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
1.8452 GHz	1.8552 GHz	Max Peak	Coupled	3 MHz



EIRP CHANNEL 661:

SWEEP TABLE: "EIRP 1900 CH661"

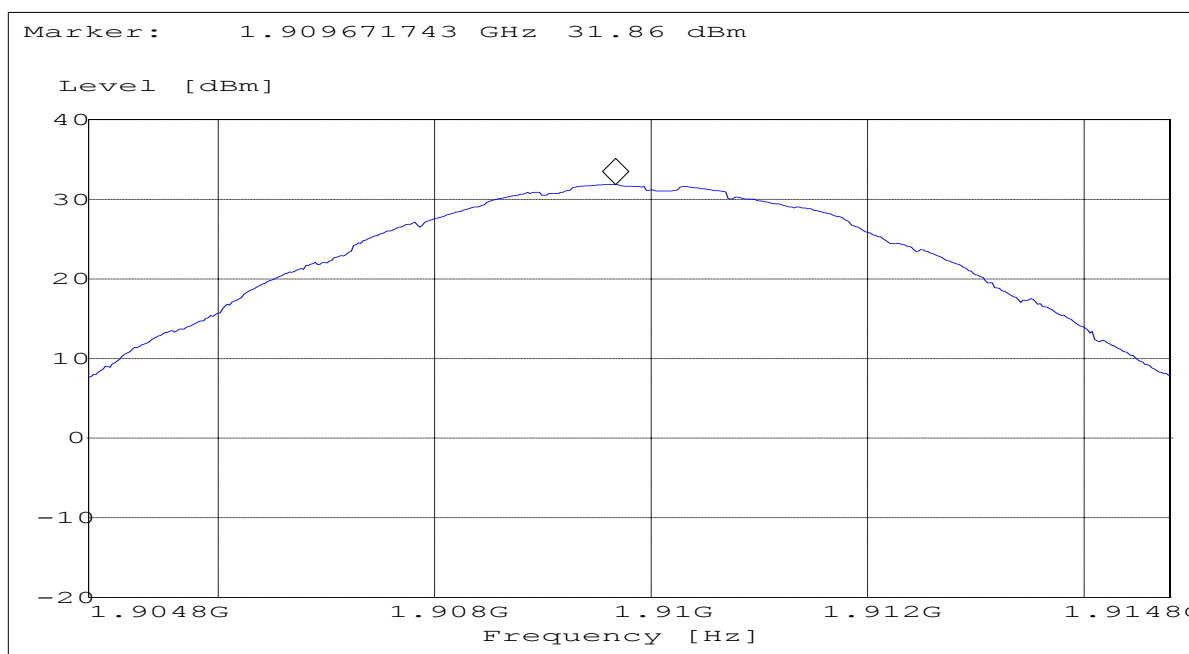
Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
1.875 GHz	1.885 GHz	Max Peak	Coupled	3 MHz



EIRP CHANNEL 810:

SWEEP TABLE: "EIRP 1900 CH810"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
1.9048 GHz	1.9148 GHz	Max Peak	Coupled	3 MHz



OCCUPIED BANDWIDTH**§2.989****Occupied Bandwidth Results**

Similar to conducted emissions, occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the USPCS frequency band. Table 8.2 below lists the measured 99% power and -26dBC occupied bandwidths. Spectrum analyzer plots are included on the following pages.

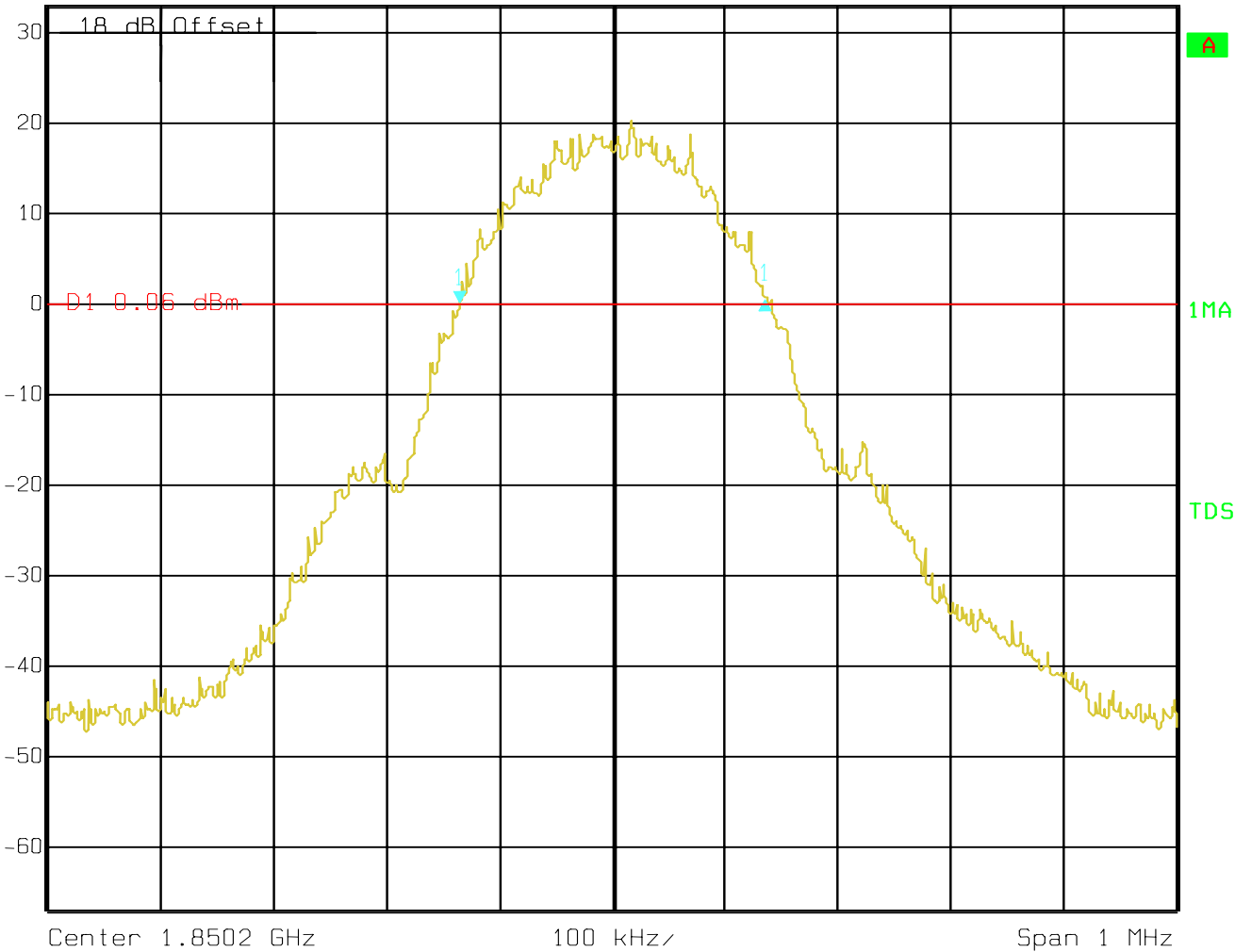
4

Frequency	99% Occupied Bandwidth	-26 dBc Bandwidth
1850.2 MHz	270.54 kHz	318.64 kHz
1880.0 MHz	280.56 kHz	314.63 kHz
1909.2 MHz	280.56 kHz	312.63 kHz

Channel 512
99% Occupied Bandwidth



Ref Lvl	Delta 1 [T1]	RBW	3 kHz	RF Att	30 dB
33 dBm	0.37 dB	VBW	3 kHz		
	270.54108216 kHz	SWT	280 ms	Unit	dBm

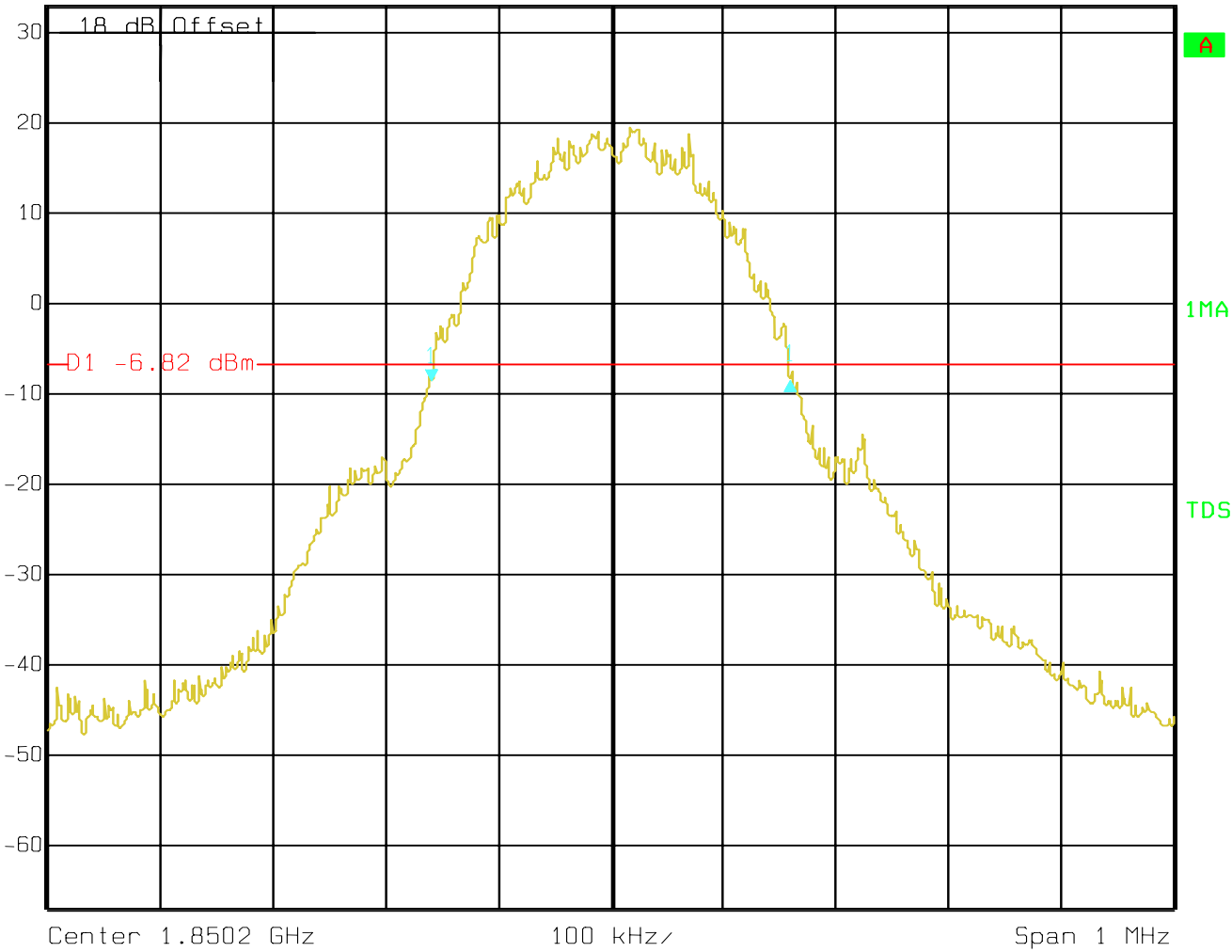


Date: 8.NOV.01 19:15:10

Channel 512
-26 dBc Bandwidth



Ref Lvl	Delta 1 [T1]	RBW	3 kHz	RF Att	30 dB
33 dBm	0.38 dB	VBW	3 kHz		
	318.63727455 kHz	SWT	280 ms	Unit	dBm

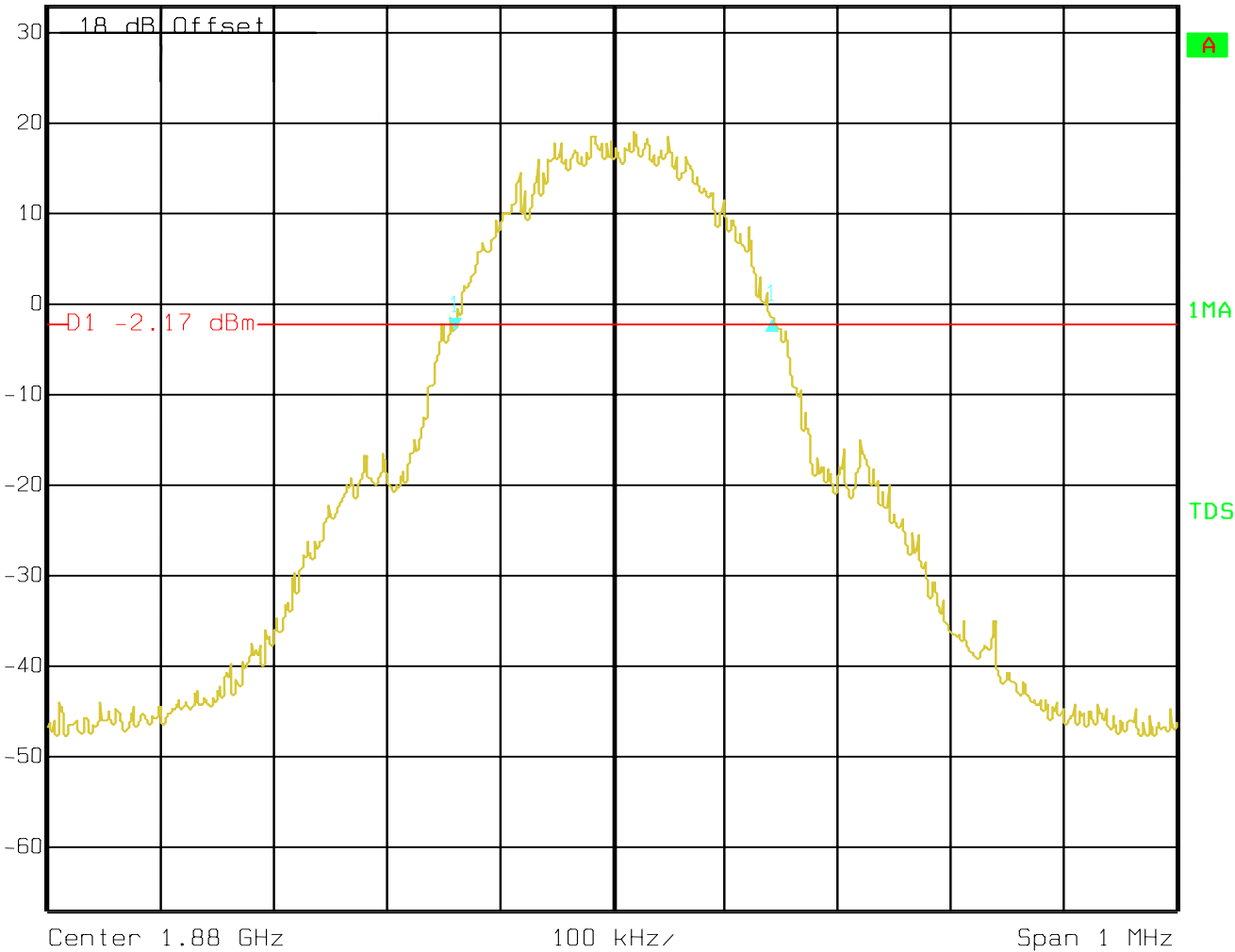


Date: 8.NOV.01 19:12:59

Channel 661
99% Occupied Bandwidth



Ref Lvl	Delta 1 [T1]	RBW	3 kHz	RF Att	30 dB
33 dBm	1.23 dB	VBW	3 kHz		
	280.56112224 kHz	SWT	280 ms	Unit	dBm

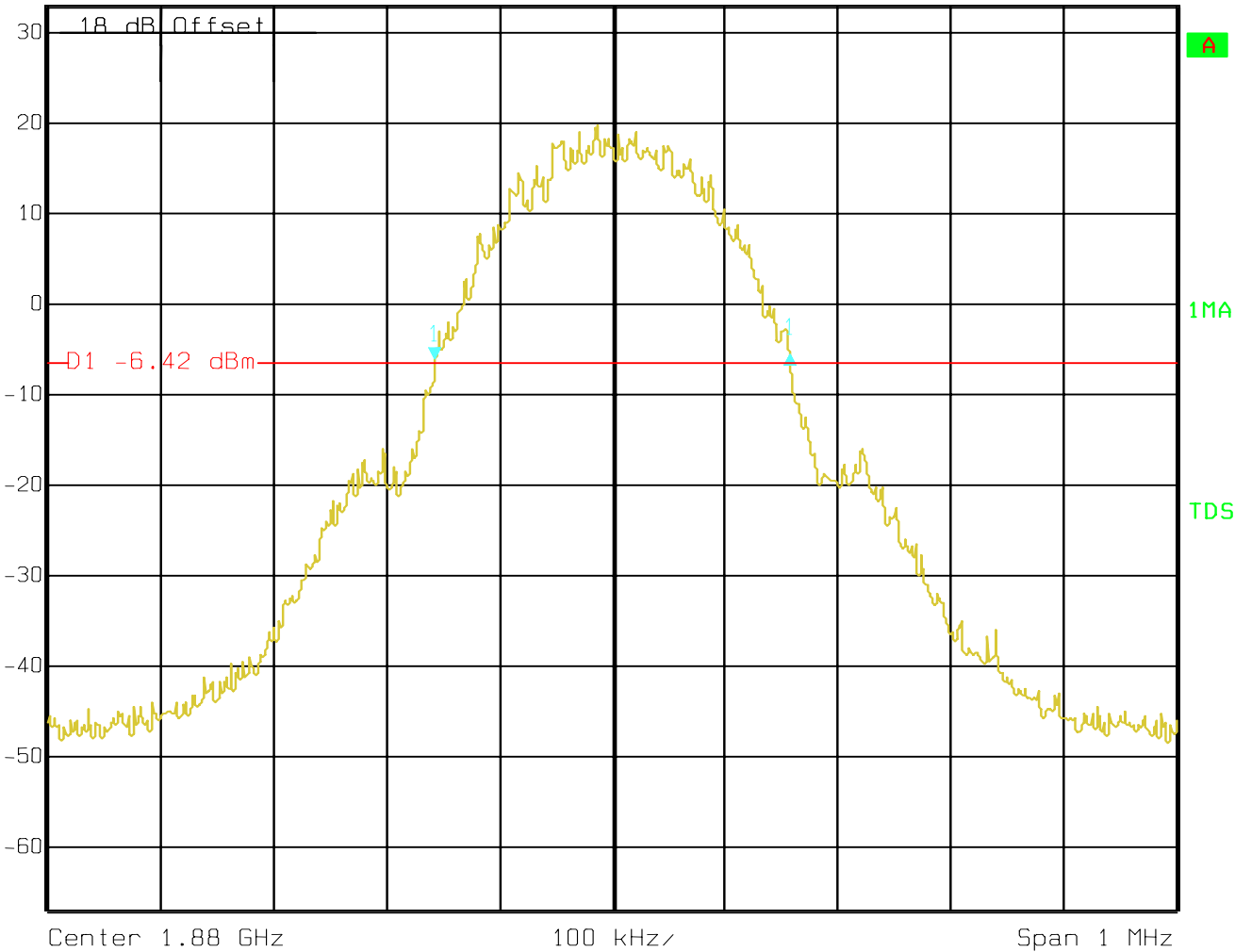


Date: 8.NOV.01 19:20:25

Channel 661
-26 dBc Bandwidth



Ref Lvl	Delta 1 [T1]	RBW	3 kHz	RF Att	30 dB
33 dBm	0.65 dB	VBW	3 kHz		
	314.62925852 kHz	SWT	280 ms	Unit	dBm

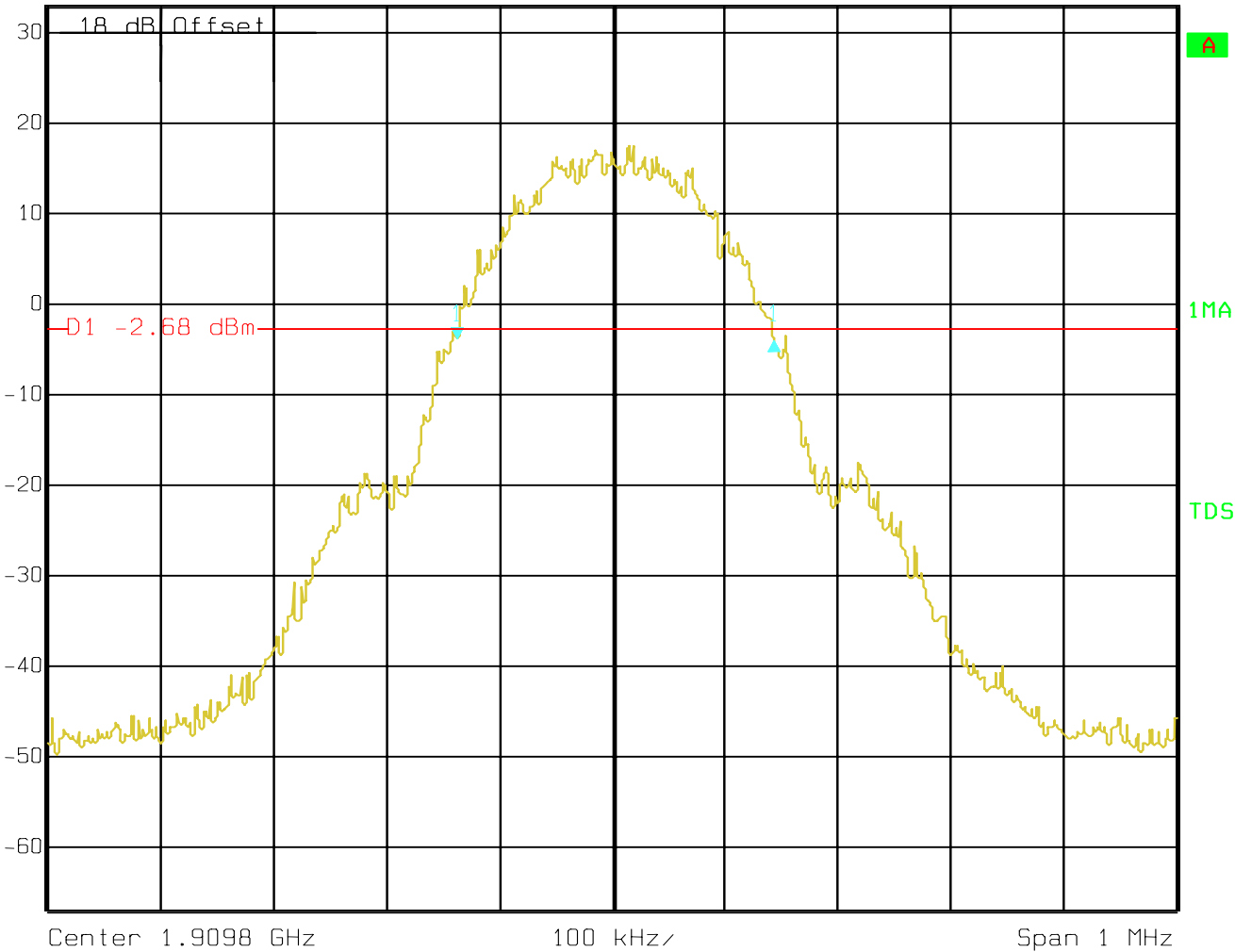


Date: 8.NOV.01 19:18:05

Channel 810
99% Occupied Bandwidth



Ref Lvl	Delta 1 [T1]	RBW	3 kHz	RF Att	30 dB
33 dBm	0.15 dB	VBW	3 kHz		
	280.56112224 kHz	SWT	280 ms	Unit	dBm

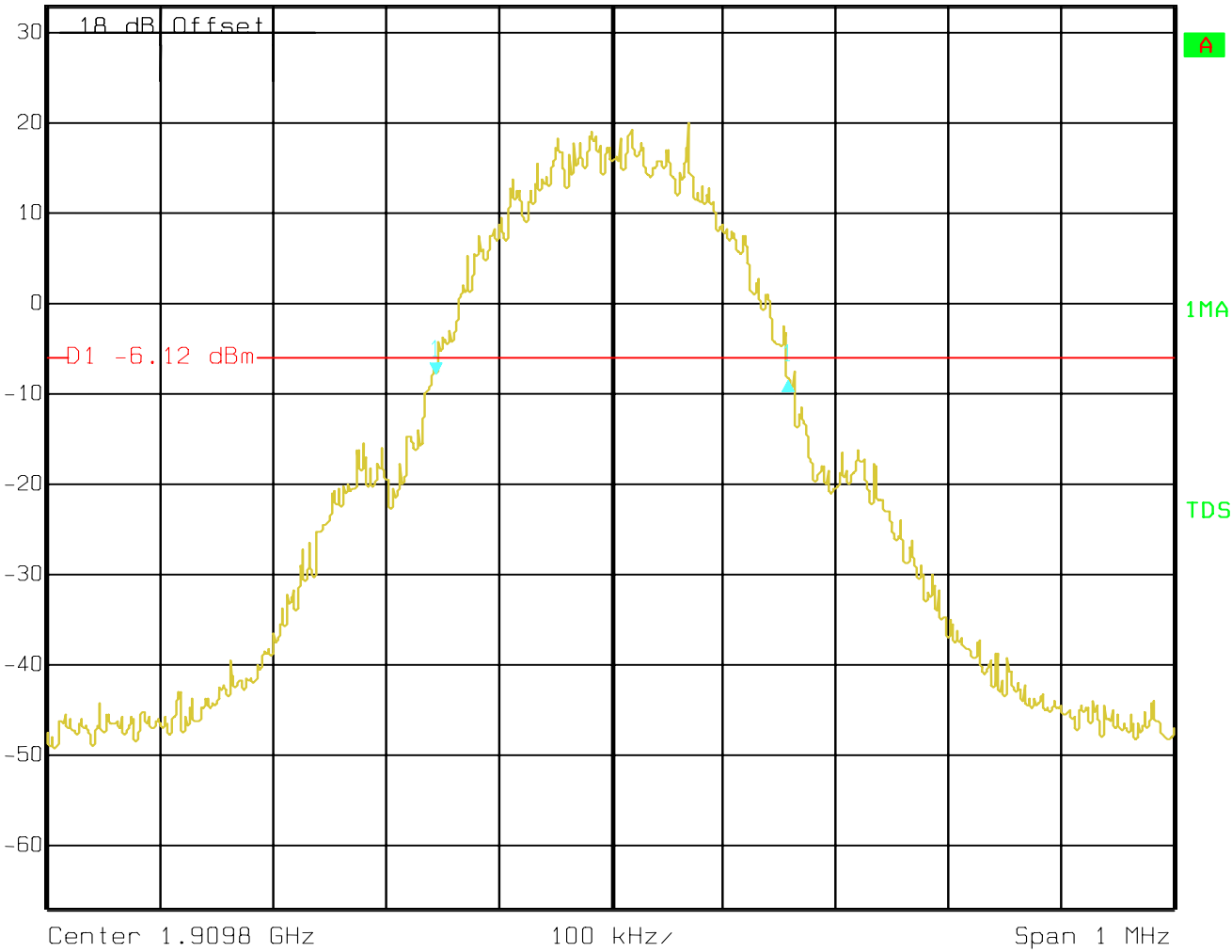


Date: 8.NOV.01 19:27:08

Channel 810
-26 dBc Bandwidth



Ref Lvl	Delta 1 [T1]	RBW	3 kHz	RF Att	30 dB
33 dBm	-0.37 dB	VBW	3 kHz		
	312.62525050 kHz	SWT	280 ms	Unit	dBm



Date: 8.NOV.01 19:24:35

FREQUENCY STABILITY SUBCLAUSE § 24.235**Method of Measurement:**

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the DUT in “call mode”. This is accomplished with the use of an R&S CMU 200 Universal Radio Communication Tester.

1. Measure the carrier frequency at room temperature.
2. Subject the DUT to a 45 minute soak at -30 C.
3. With the DUT, powered via 5.0 Volts, connected to the R&S CMU 200 and in a simulated call on channel 661 (center channel), measure the carrier frequency. These measurements should be made within 2 minutes of powering up the DUT, to prevent significant self-warming.
4. Repeat the above measurements at 10 C increments from -30 C to +50 C. Allow at least 45 minutes at each temperature, un-powered, before making measurements. At all temperature levels hold the temperature to +/- 0.5 C during the measurement procedure.
5. Re-measure carrier frequency at room temperature with nominal 5.0 Volts. Vary supply voltage from minimum 3.1 Volts to 3.5 Volts, in 0.2 Volt increments re-measuring the carrier frequency at each voltage. Then vary the supply voltage from 4.5V to the maximum 5.5V, in 0.2V increments re-measuring the carrier frequency at each voltage

Measurement Limit:

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment..." Section 2.1055(d)(2) applies. This requires that the manufacturer specify the voltage limits for frequency stability testing. This transceiver is specified to operate with an input voltage of between 3.15 VDC and 3.45 VDC, with a nominal voltage of 3.3 VDC and between 4.5 VDC and 5.5 VDC, with a nominal voltage of 5.0 VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of + 5 % and -5 % for the nominal voltage of 3.3 VDC and a tolerance of +10% and -10% for 5 VDC. For the purposes of measuring frequency stability these voltage limits are to be used.

AFC Frequency Error vs. Temperature

<u>Temperature</u> (deg C)	<u>Voltage</u> (volts)	<u>channel</u>	<u>Frequency Error</u> (Hz)	<u>Frequency Error</u> (ppm)
50	5	661	-24.47	-0.0136
40	5	661	-6.72	0.0037
30	5	661	-10.59	-0.0059
20	5	661	-16.21	-0.0090
10	5	661	-16.08	-0.0089
0	5	661	-24.99	-0.0139
-10	5	661	-39.45	-0.0219
-20	5	661	-47.14	-0.0262
-30	5	661	-76.7	-0.0426

AFC Frequency Error vs. Voltage

<u>Temperature</u> (deg C)	<u>Voltage</u> (volts)	<u>Channel</u>	<u>Frequency Error</u> (Hz)	<u>Frequency Error</u> (ppm)
25	5.5	661	-19.44	-0.0108
25	5.3	661	-14.21	-0.0079
25	5.1	661	-11.69	-0.0065
25	5	661	-16.21	-0.0090
25	4.9	661	-15.37	-0.0085
25	4.7	661	-11.11	-0.0062
25	4.5	661	-28.02	-0.0156
25	3.5	661	-1.87	-0.0010
25	3.3	661	-3.55	-0.0020
25	3.1	661	-4.58	-0.0025

EMISSIONS LIMITS**§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. 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 USPCS 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 waveguide 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 ERP 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, center, and lower carrier frequencies of the USPCS band (1850.2 MHz, 1879.8 MHz and 1909.8 MHz). 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 USPCS band into any of the other blocks. 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.

NOTE: The spurious 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 18 GHz and 19.1 GHz very short cable connections to the antenna was used to minimize the noise level.

RESULTS OF RADIATED TESTS FOR FCC-24:

Harmonics	Tx ch-512 Freq. (MHz)	Level (dBm)	Tx ch-661 Freq. (MHz)	Level (dBm)	Tx ch-810 Freq. (MHz)	Level (dBm)
2	3700.4	-44.13	3760	-42.26	3819.6	-42.93
3	5550.6	-35.65	5640	-36.03	5729.4	-35.35
4	7400.8	-31.21	7520	-30.43	7639.2	-31.63
5	9251	-37.73	9400	-37.71	9549	-36.83
6	11101.2	-37.37	11280	-38.20	11458.8	-35.66
7	12951.4	-34.11	13160	-34.75	13368.6	-34.08
8	14801.6	-33.22	15040	-32.57	15278.4	-31.76
9	16651.8	-27.82	16920	-28.10	17188.2	-25.39
10	18502	-26.17	18800	-29.65	19098	-29.79

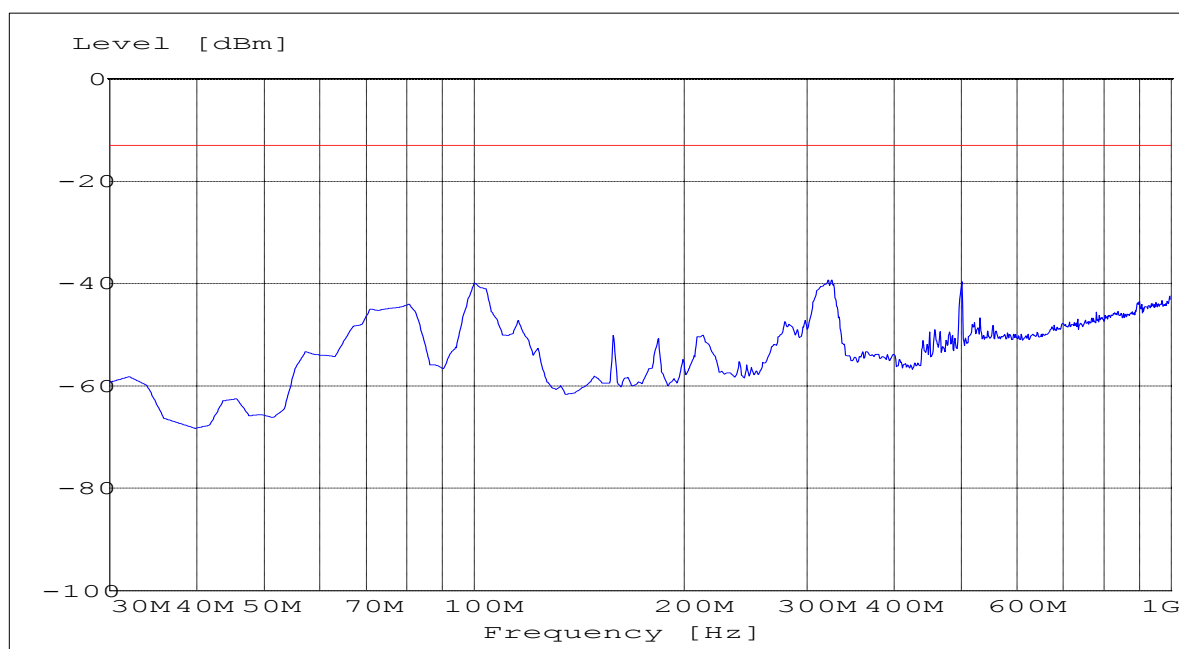
RADIATED SPURIOUS EMISSIONS

Channel 512 : 30MHz - 1GHz

Spurious emission limit -13dBm

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

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



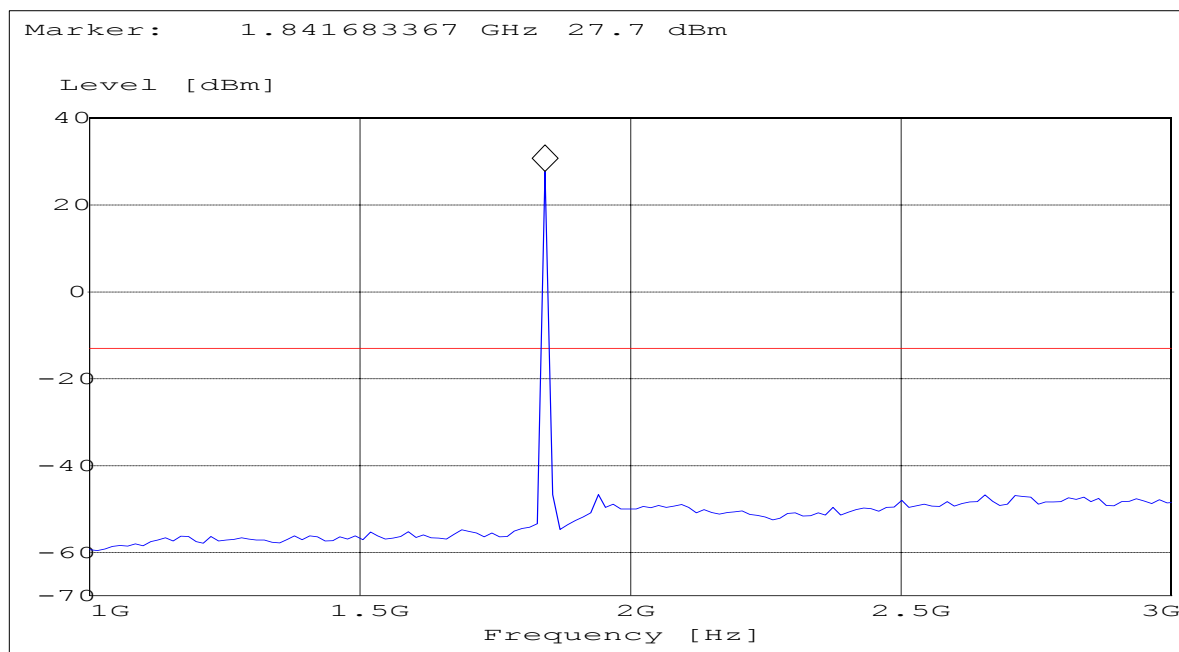
RADIATED SPURIOUS EMISSIONS**Channel 512 : 1GHz – 3GHz**

Spurious emission limit –13dBm

NOTE: peak above the limit line is the Carrier frequency. Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots under EIRP.

SWEEP TABLE: "FCC Spuri 1-3G"

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

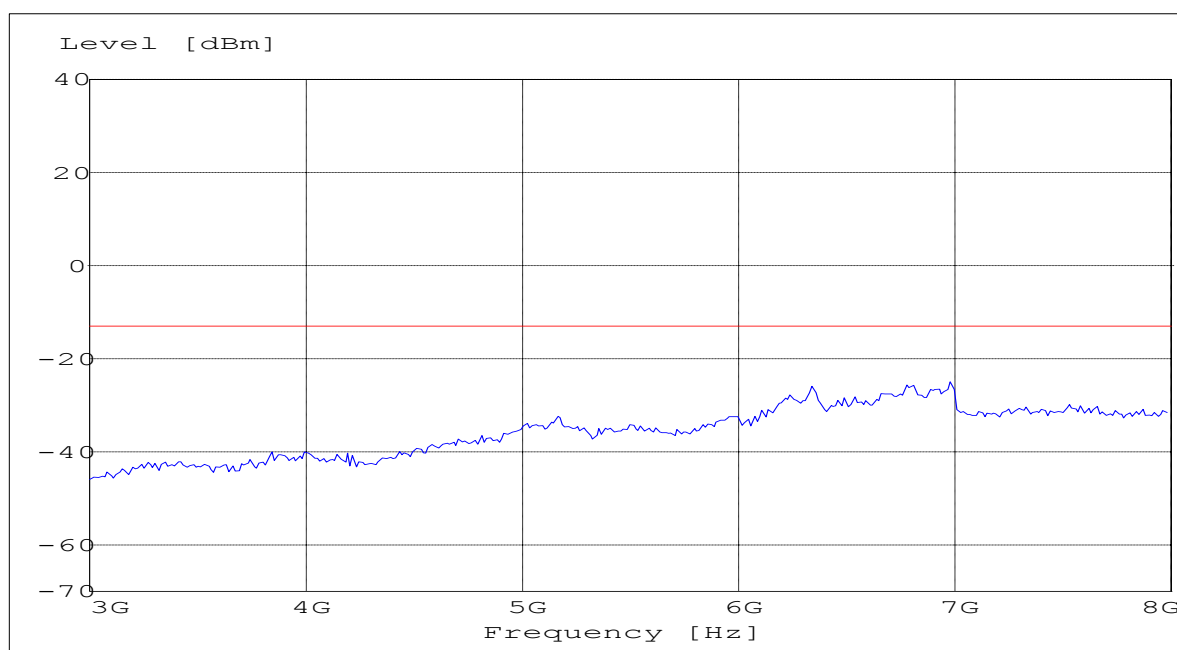


RADIATED SPURIOUS EMISSIONS**Channel 512 : 3GHz – 8GHz**

Spurious emission limit –13dBm

SWEEP TABLE: "FCC Spuri 3-8G"

<i>Start</i>	<i>Stop</i>	<i>Detector</i>	<i>Meas.</i>	<i>RBW/VBW</i>
<i>Frequency</i>	<i>Frequency</i>		<i>Time</i>	
3GHz	8GHz	Max Peak	Coupled	1 MHz

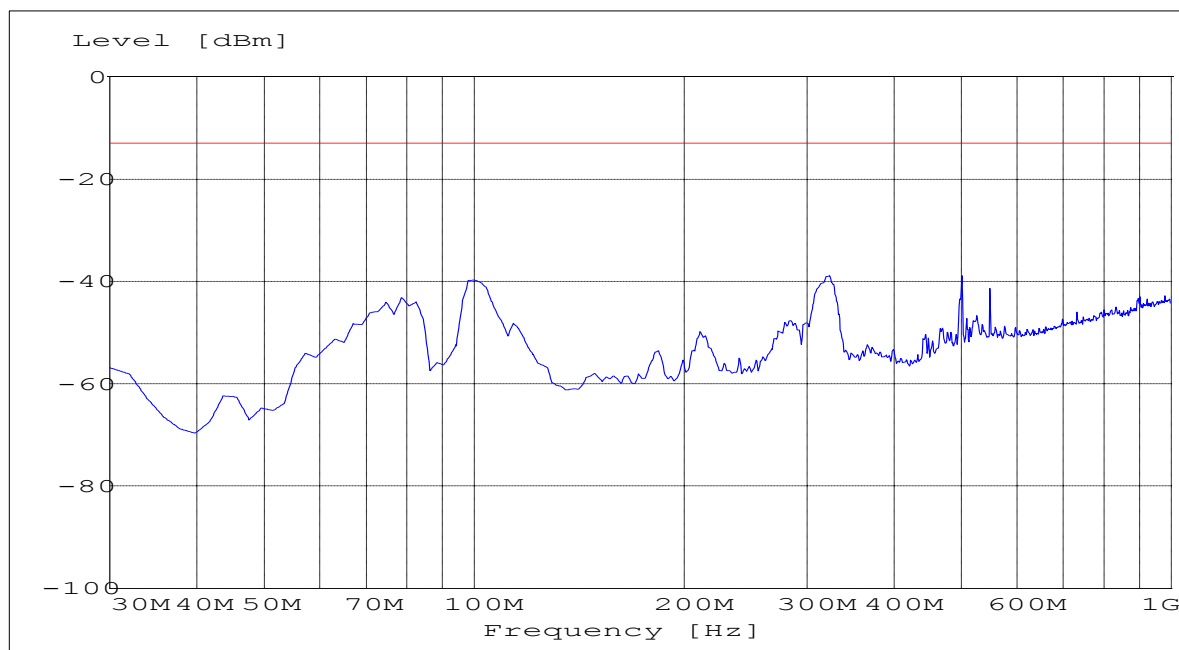
**RADIATED SPURIOUS EMISSIONS**

Channel 661: 30MHz –1GHz

Spurious emission limit –13dBm

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

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



RADIATED SPURIOUS EMISSIONS

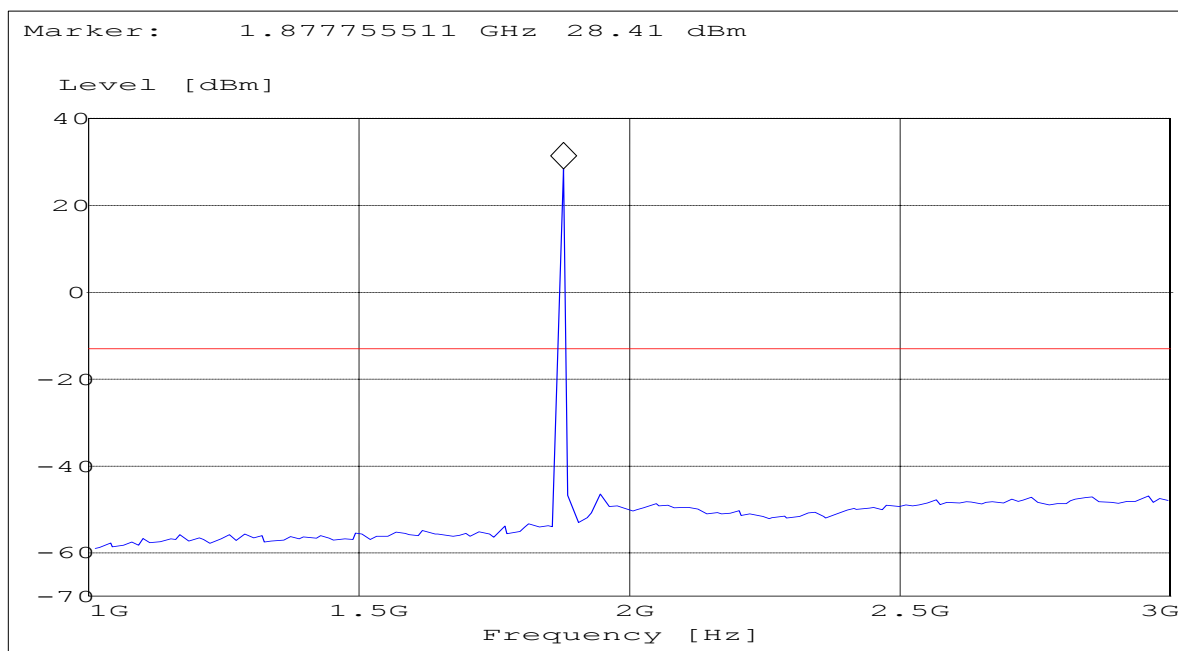
Channel 661: 1GHz – 3GHz

Spurious emission limit –13dBm

NOTE: peak above the limit line is the Carrier frequency. Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots under EIRP.

SWEEP TABLE: "FCC Spuri 1-3G"

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



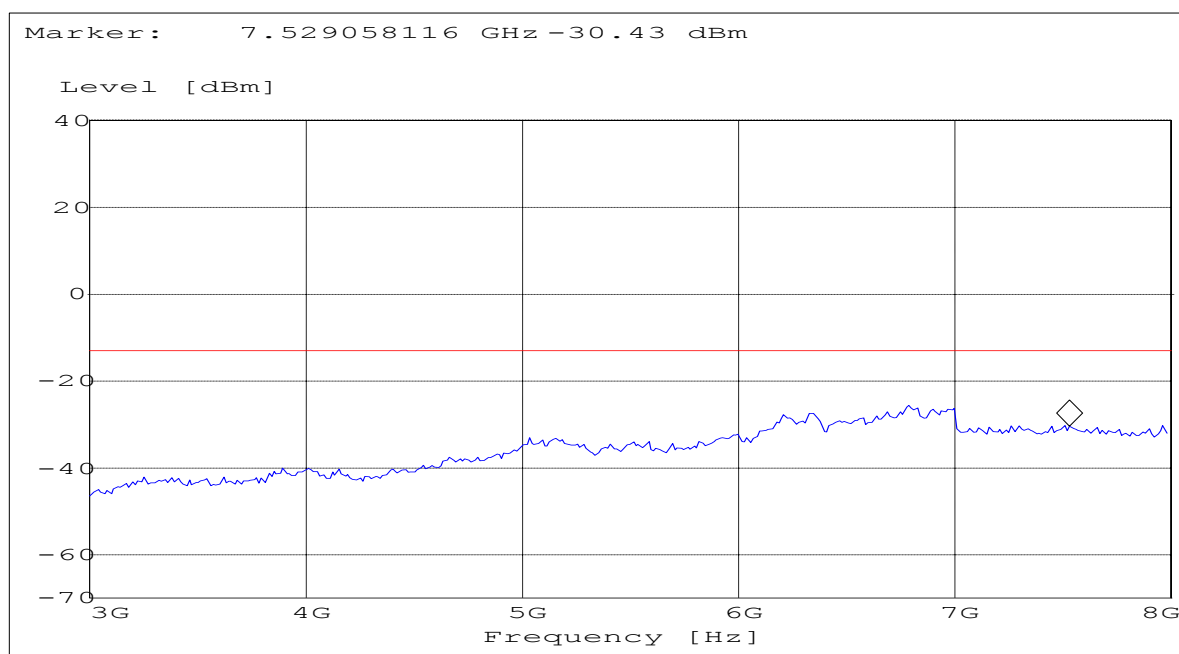
RADIATED SPURIOUS EMISSIONS

Channel 661: 3GHz – 8GHz

Spurious emission limit –13dBm

SWEEP TABLE: "FCC Spuri 3-8G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
3GHz	8GHz	Max Peak	Coupled	1 MHz



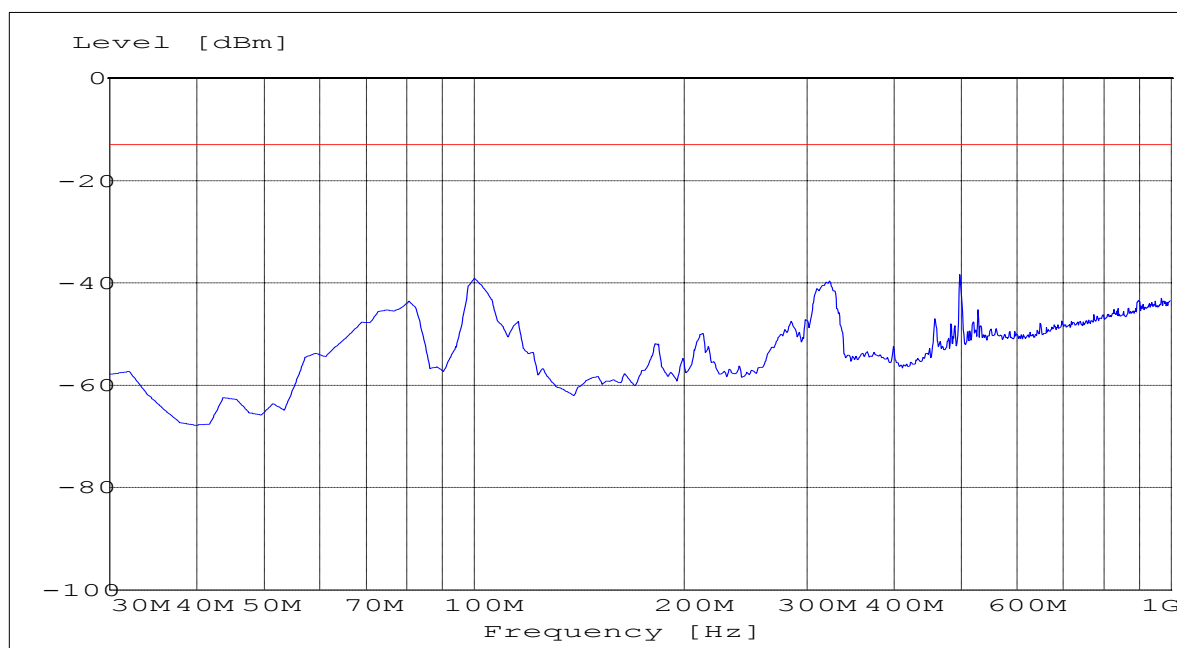
RADIATED SPURIOUS EMISSIONS

Channel 810: 30MHz –1GHz

Spurious emission limit –13dBm

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

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



RADIATED SPURIOUS EMISSIONS

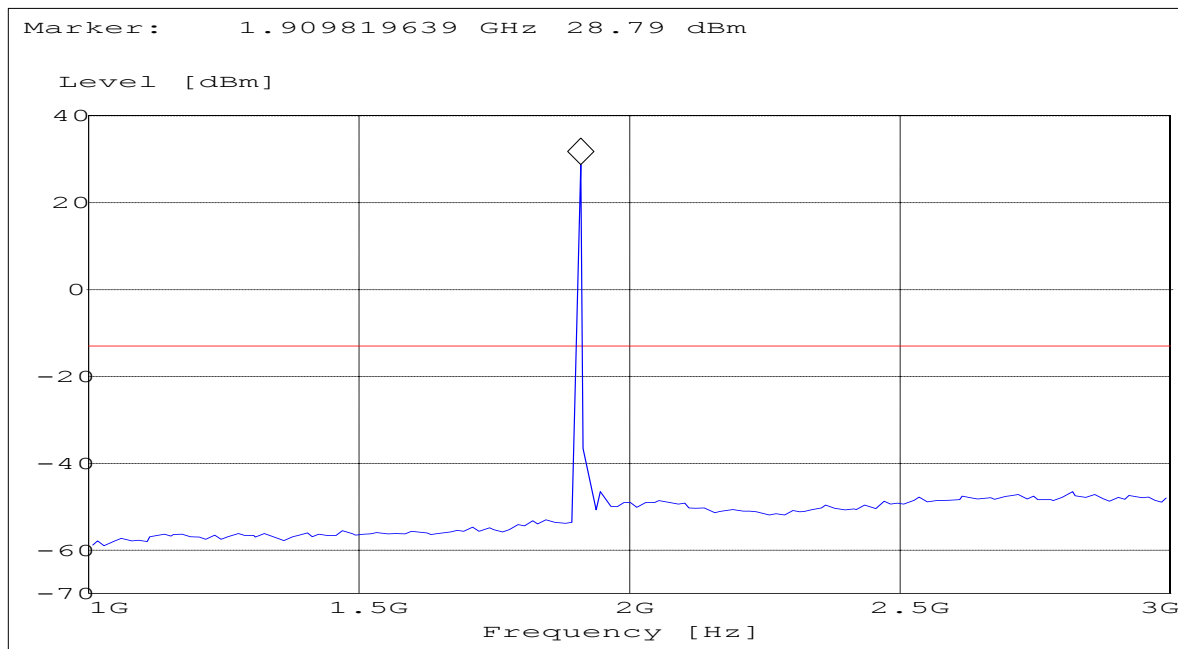
Channel 810: 1GHz – 3GHz

Spurious emission limit –13dBm

NOTE: peak above the limit line is the Carrier frequency. Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots under EIRP.

SWEEP TABLE: "FCC Spuri 1-3G"

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



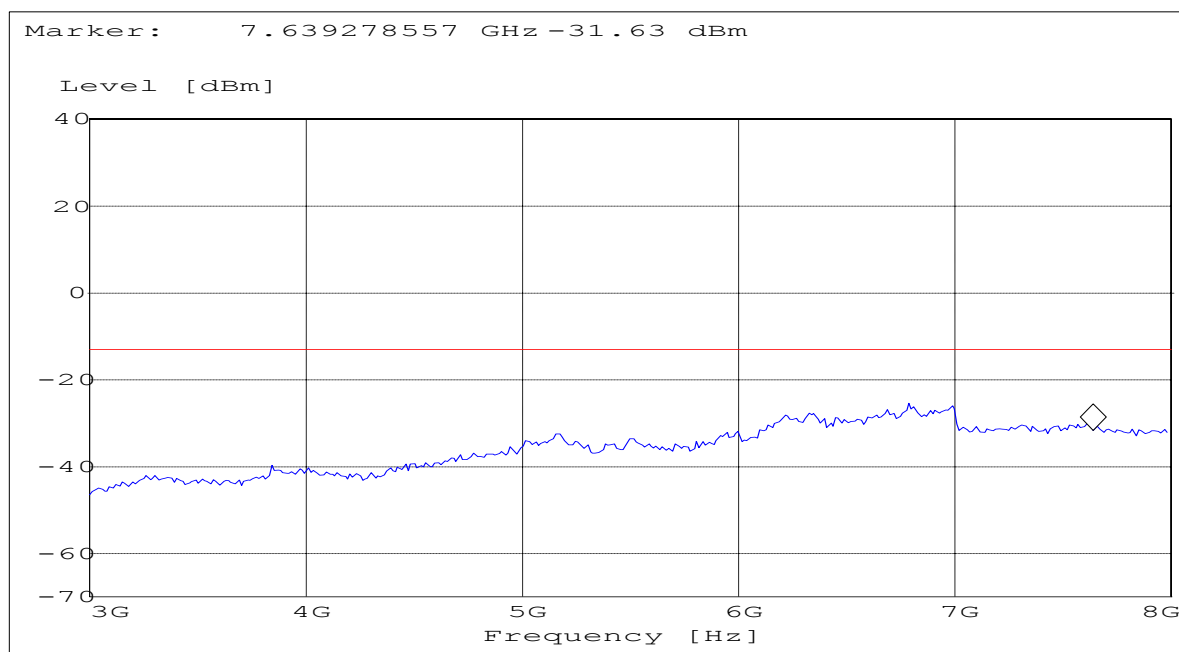
RADIATED SPURIOUS EMISSIONS

Channel 810: 3GHz – 8GHz

Spurious emission limit –13dBm

SWEEP TABLE: "FCC Spuri 3-8G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
3GHz	8GHz	Max Peak	Coupled	1 MHz



RADIATED SPURIOUS EMISSIONS

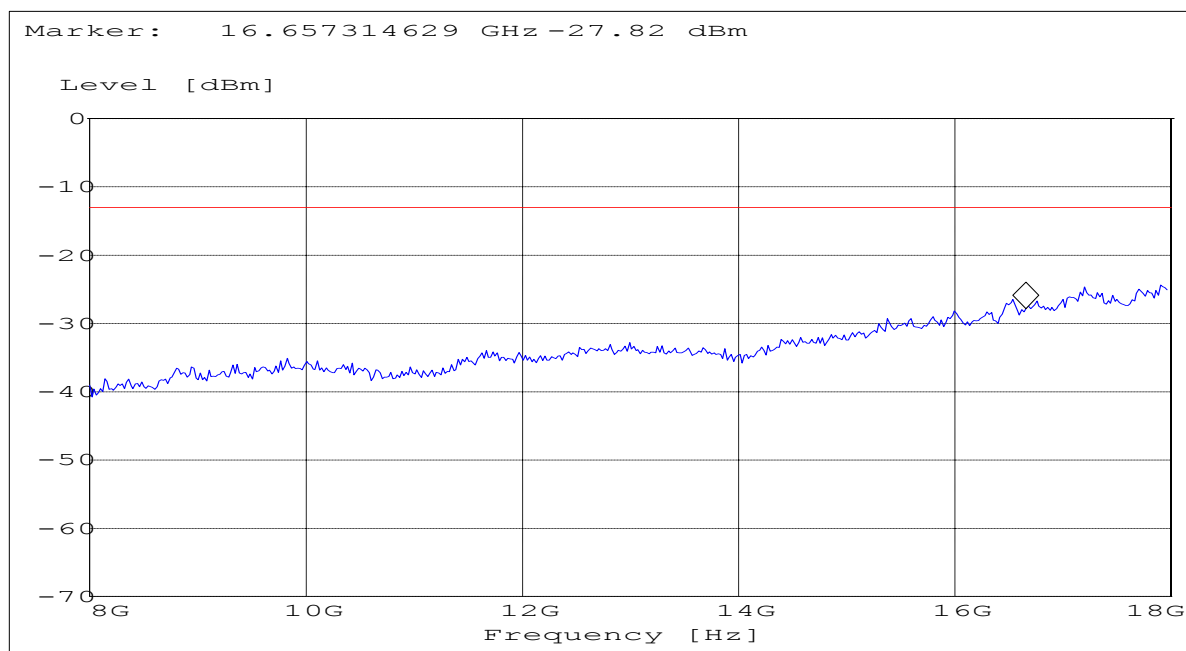
8GHz – 18GHz

Spurious emission limit –13dBm

(NOTE: This plot is valid for all three channels)

SWEEP TABLE: "FCC 24 spuri 8-18G"

<i>Start</i>	<i>Stop</i>	<i>Detector</i>	<i>Meas.</i>	<i>RBW/VBW</i>
<i>Frequency</i>	<i>Frequency</i>		<i>Time</i>	
8GHz	18GHz	Max Peak	Coupled	1 MHz



RADIATED SPURIOUS EMISSIONS

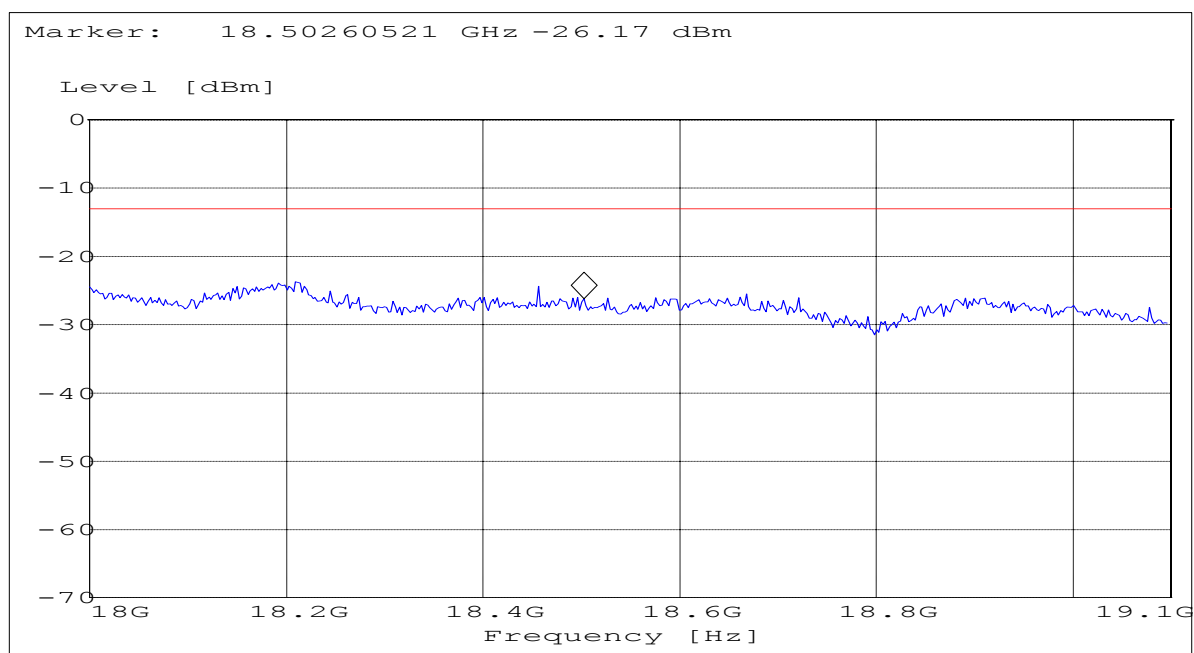
18GHz – 19.1GHz

Spurious emission limit –13dBm

(NOTE: This plot is valid for all three channels)

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

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



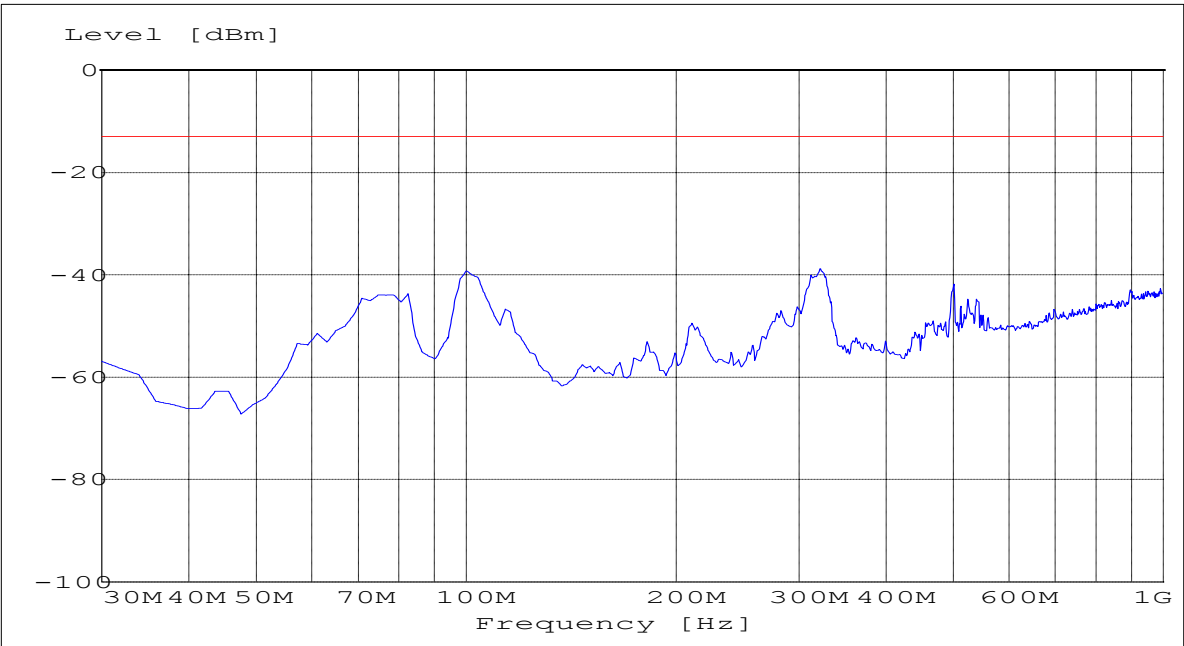
RADIATED SPURIOUS EMISSIONS

EUT in Idle Mode: 30MHz – 1GHz

Spurious emission limit –13dBm

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

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

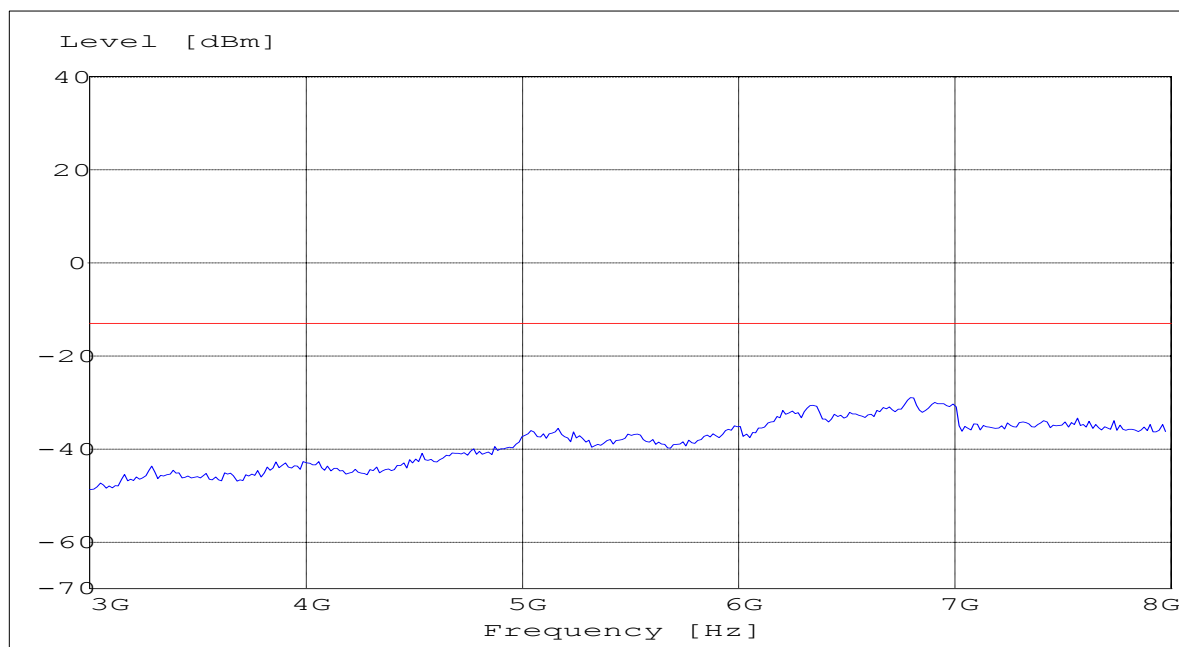


RADIATED SPURIOUS EMISSIONS**EUT in Idle Mode: 1GHz – 8GHz**

Spurious emission limit –13dBm

SWEEP TABLE: "FCC Spuri 1-8G"

<i>Start</i>	<i>Stop</i>	<i>Detector</i>	<i>Meas.</i>	<i>RBW/VBW</i>
<i>Frequency</i>	<i>Frequency</i>		<i>Time</i>	
1GHz	8GHz	Max Peak	Coupled	1 MHz



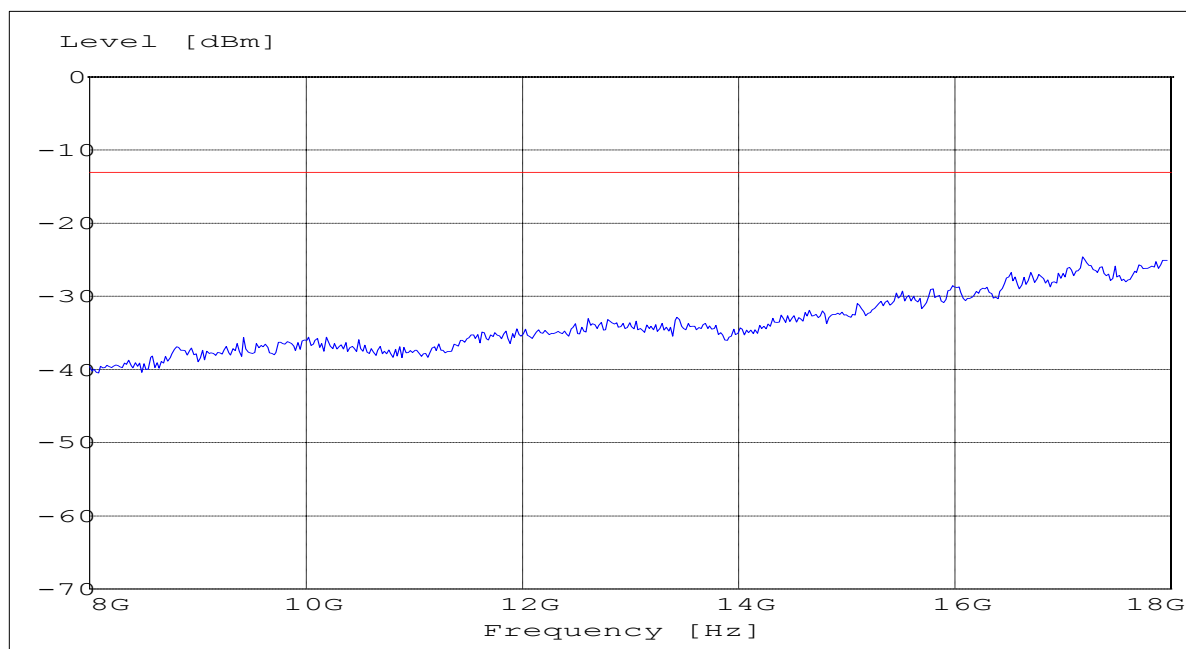
RADIATED SPURIOUS EMISSIONS

EUT in Idle Mode: 8GHz – 18GHz

Spurious emission limit –13dBm

SWEEP TABLE: "FCC 24 spuri 8-18G"

Start	Stop	Detector	Meas.	RBW/VBW
Frequency	Frequency		Time	
8GHz	18GHz	Max Peak	Coupled	1 MHz

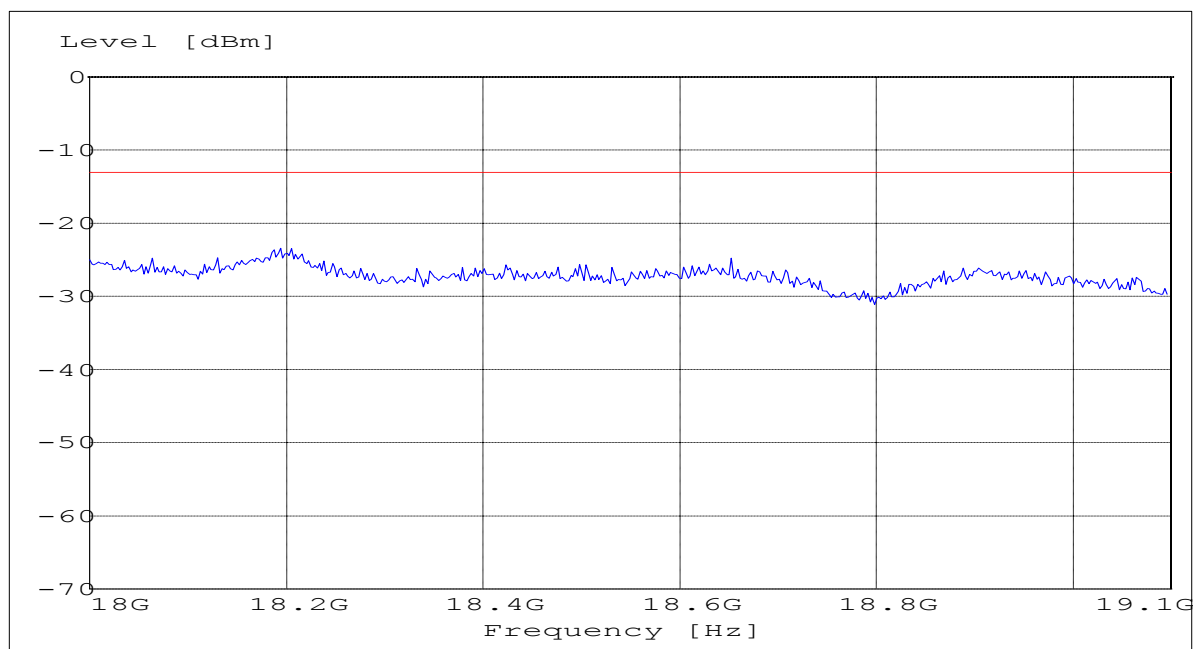


RADIATED SPURIOUS EMISSIONS**EUT in Idle Mode: 18GHz – 19.1GHz**

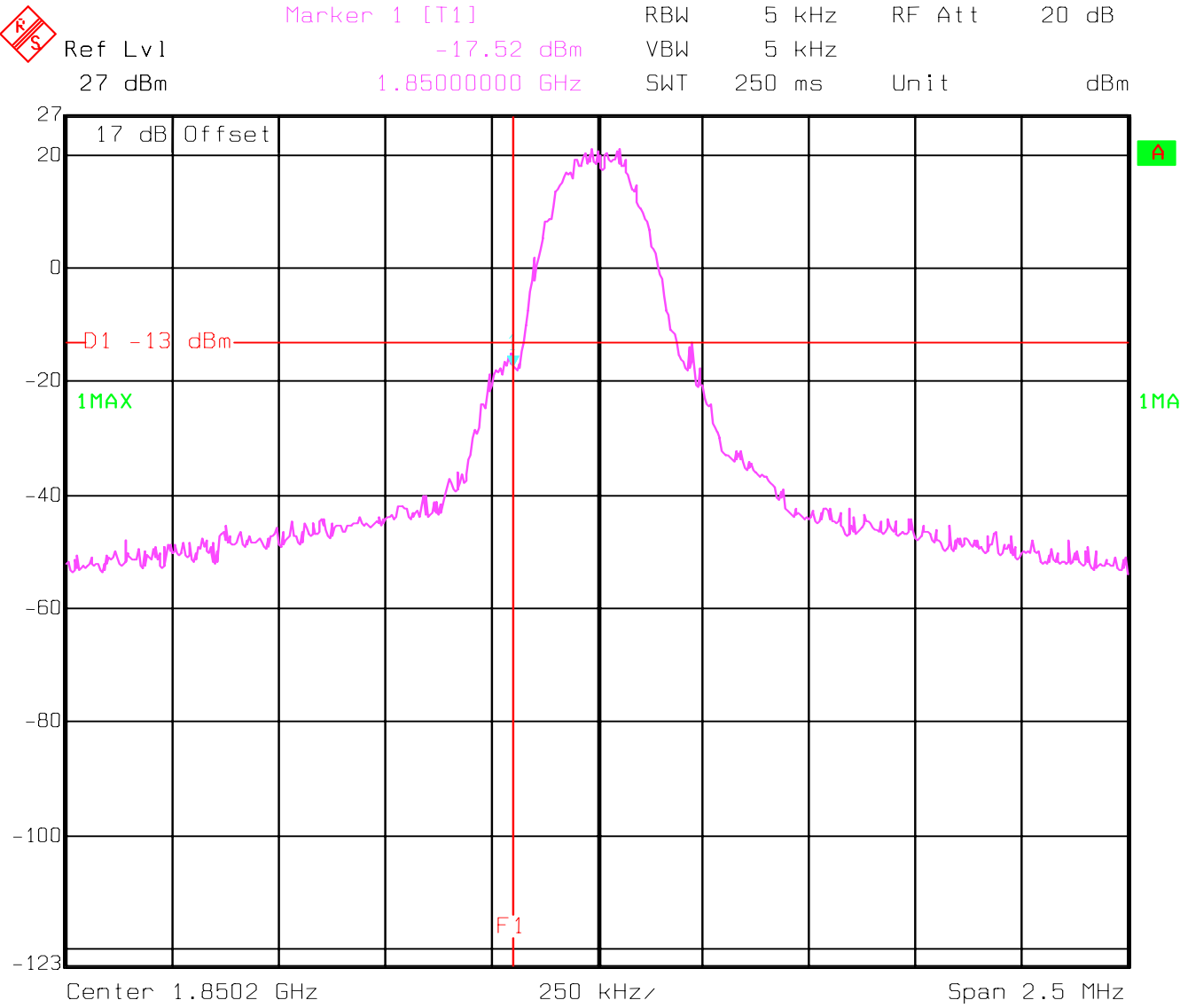
Spurious emission limit –13dBm

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

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



Lower Band Edge:
(Conducted)

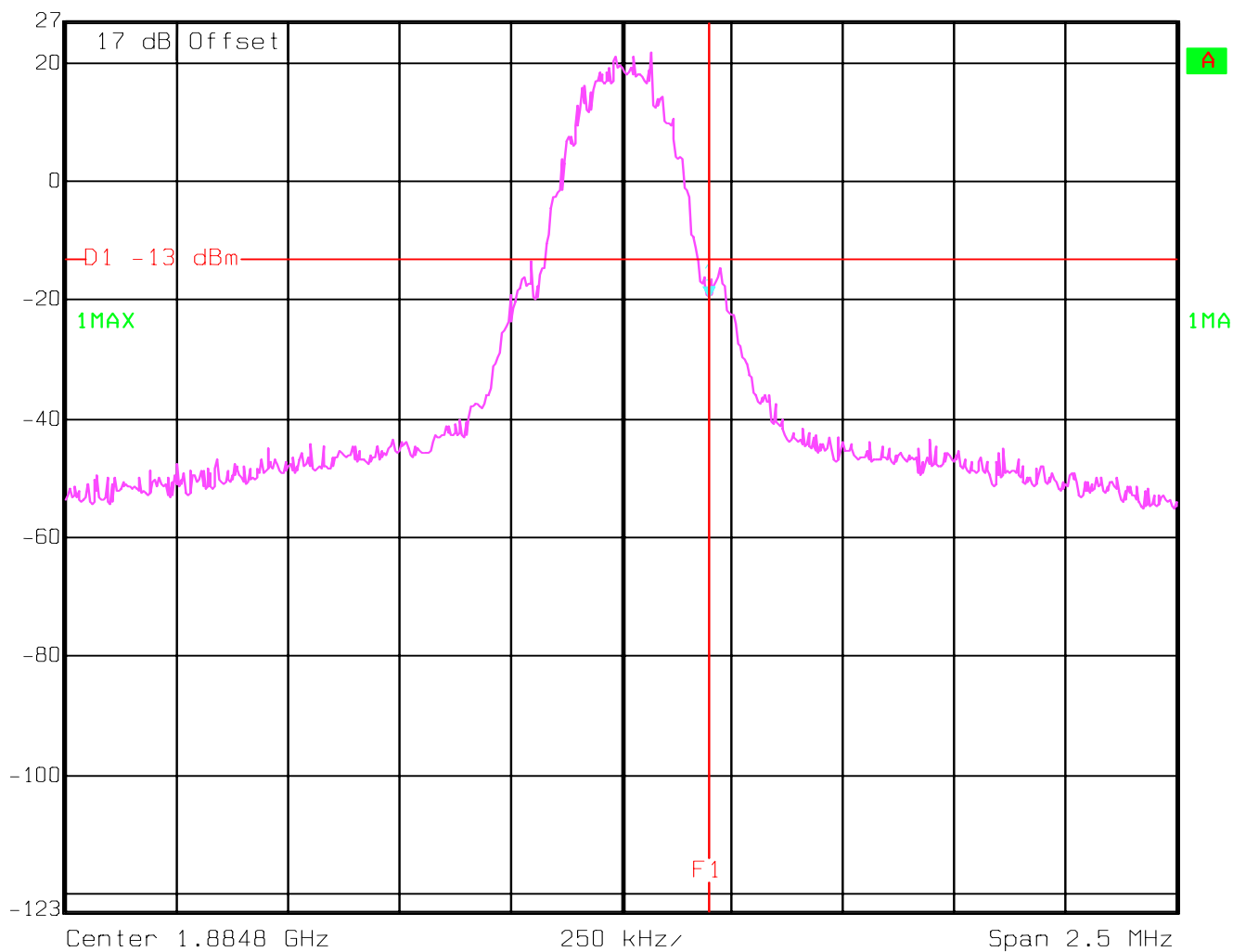


Date: 05.FEB.2002 17:26:51

Mid-Band Edge: (Conducted)

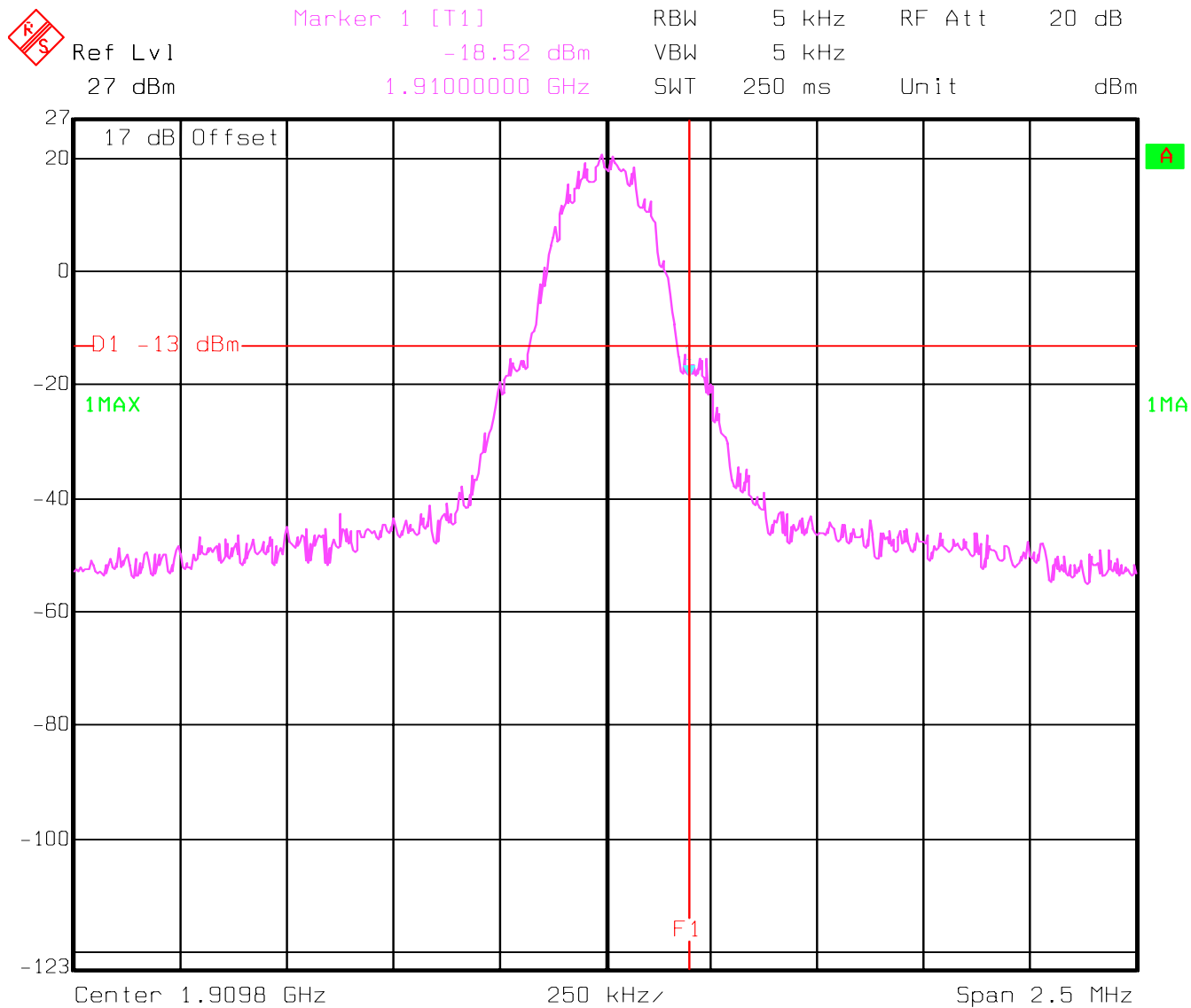


Ref Lvl 27 dBm
 Marker 1 [T1] -19.79 dBm
 1.8850000 GHz
 RBW 5 kHz
 VBW 5 kHz
 SWT 250 ms
 RF Att 20 dB
 Unit dBm



Date: 05.FEB.2002 17:28:42

Higher Band Edge: (Conducted)



Date: 05.FEB.2002 17:30:14

RECEIVER RADIATED EMISSIONS**SUBCLAUSE § 15.209**

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 18GHz and 19.1GHz very short cable connections to the antenna was used to minimize the noise level.

Limits**SUBCLAUSE § 15.209**

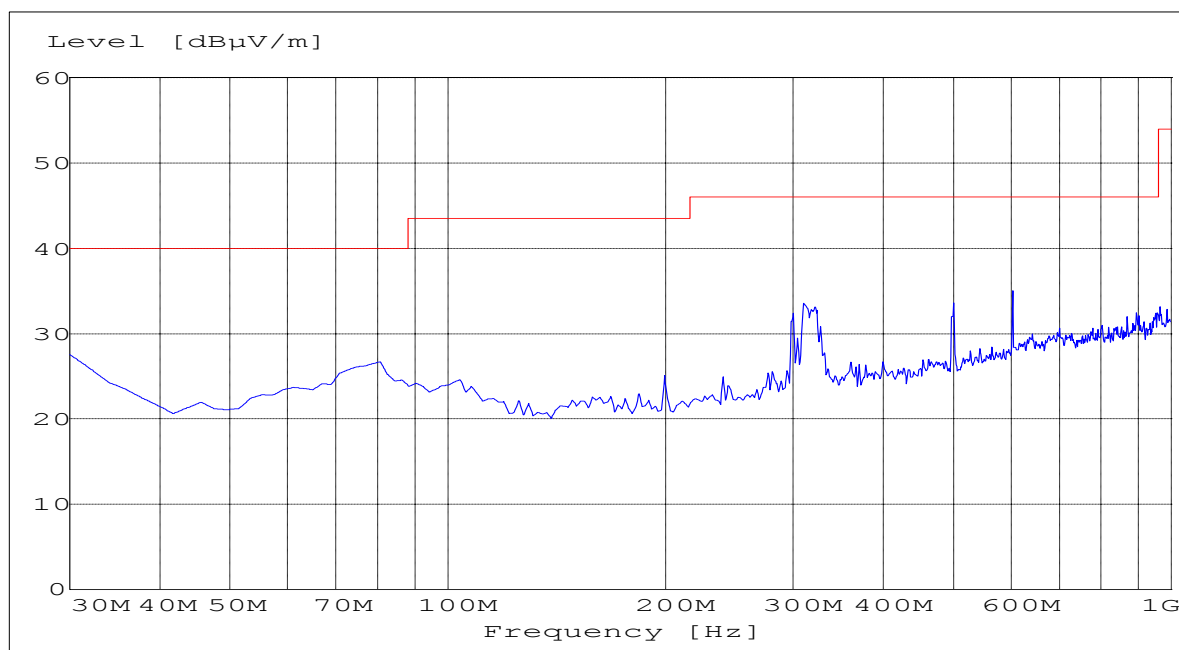
Frequency (MHz)	Field strength (μV/m)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

RECEIVER RADIATED EMISSIONS

EUT in Idle Mode: 30MHz – 1GHz

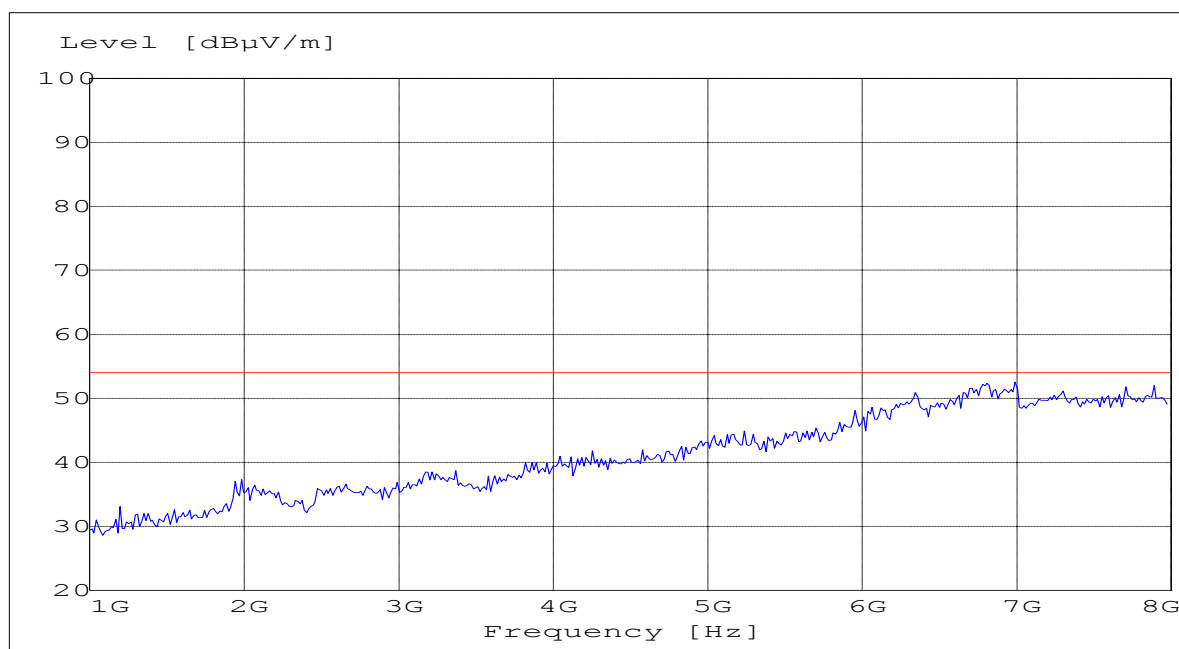
SWEEP TABLE: "FCC 24 Spur 30M-1G"

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



RECEIVER RADIATED EMISSIONS
EUT in Idle Mode: 1GHz – 8GHz***SWEEP TABLE: "FCC Spuri 1-8G"***

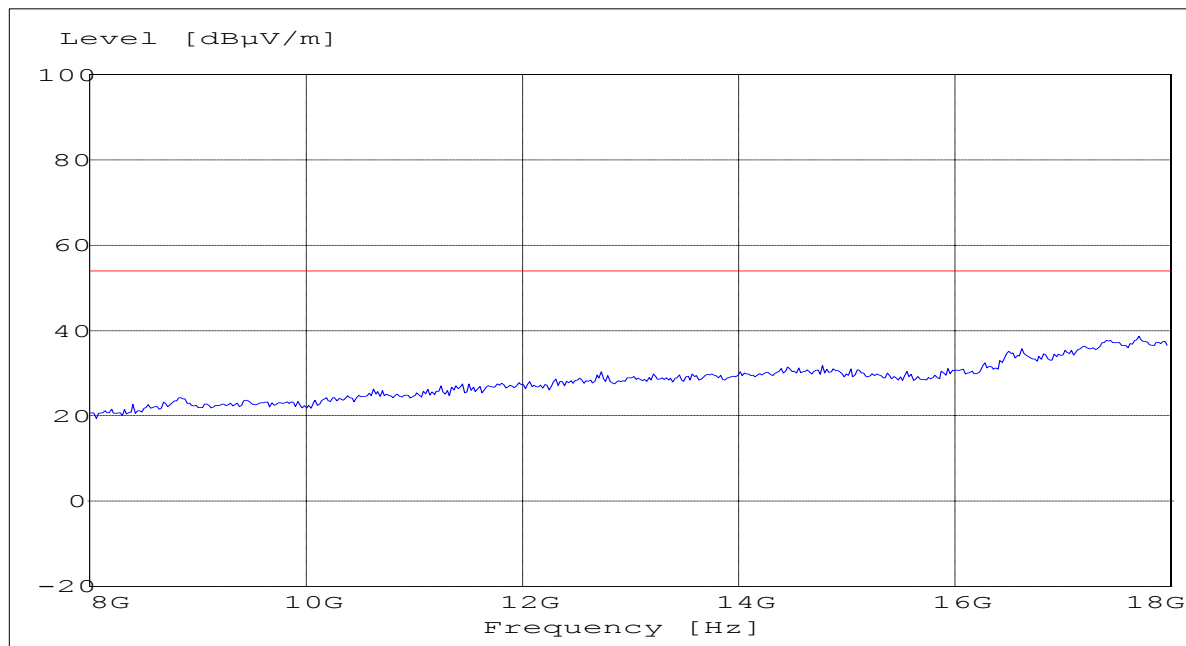
<i>Start</i>	<i>Stop</i>	<i>Detector</i>	<i>Meas.</i>	<i>RBW/VBW</i>
<i>Frequency</i>	<i>Frequency</i>		<i>Time</i>	
1GHz	8GHz	Max Peak	Coupled	1 MHz



RECEIVER RADIATED EMISSIONS
EUT in Idle Mode: 8GHz – 18GHz

SWEEP TABLE: "FCC 24 spuri 8-18G"

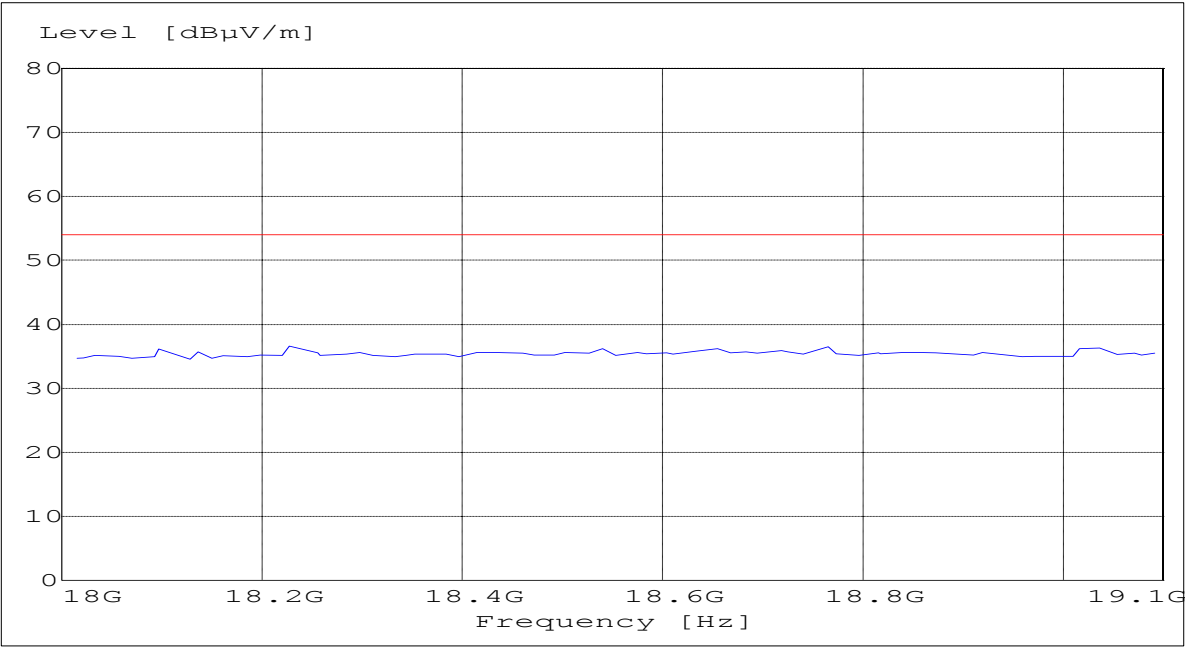
<i>Start</i>	<i>Stop</i>	<i>Detector</i>	<i>Meas.</i>	<i>RBW/VBW</i>
<i>Frequency</i>	<i>Frequency</i>		<i>Time</i>	
8GHz	18GHz	Max Peak	Coupled	1 MHz



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

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

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



CONDUCTED SPURIOUS EMISSIONS**Measurement Procedure:**

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency.

For the equipment under test, this equates to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz.

2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

USPCS Transmitter**Channel Frequency**

512 1850.2 MHz

661 1880.0 MHz

810 1909.8 MHz

Measurement Limit:

Sec. 24.238 Emission Limits.

(a) On any frequency outside frequency band of 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. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

(NF=noise-floor)

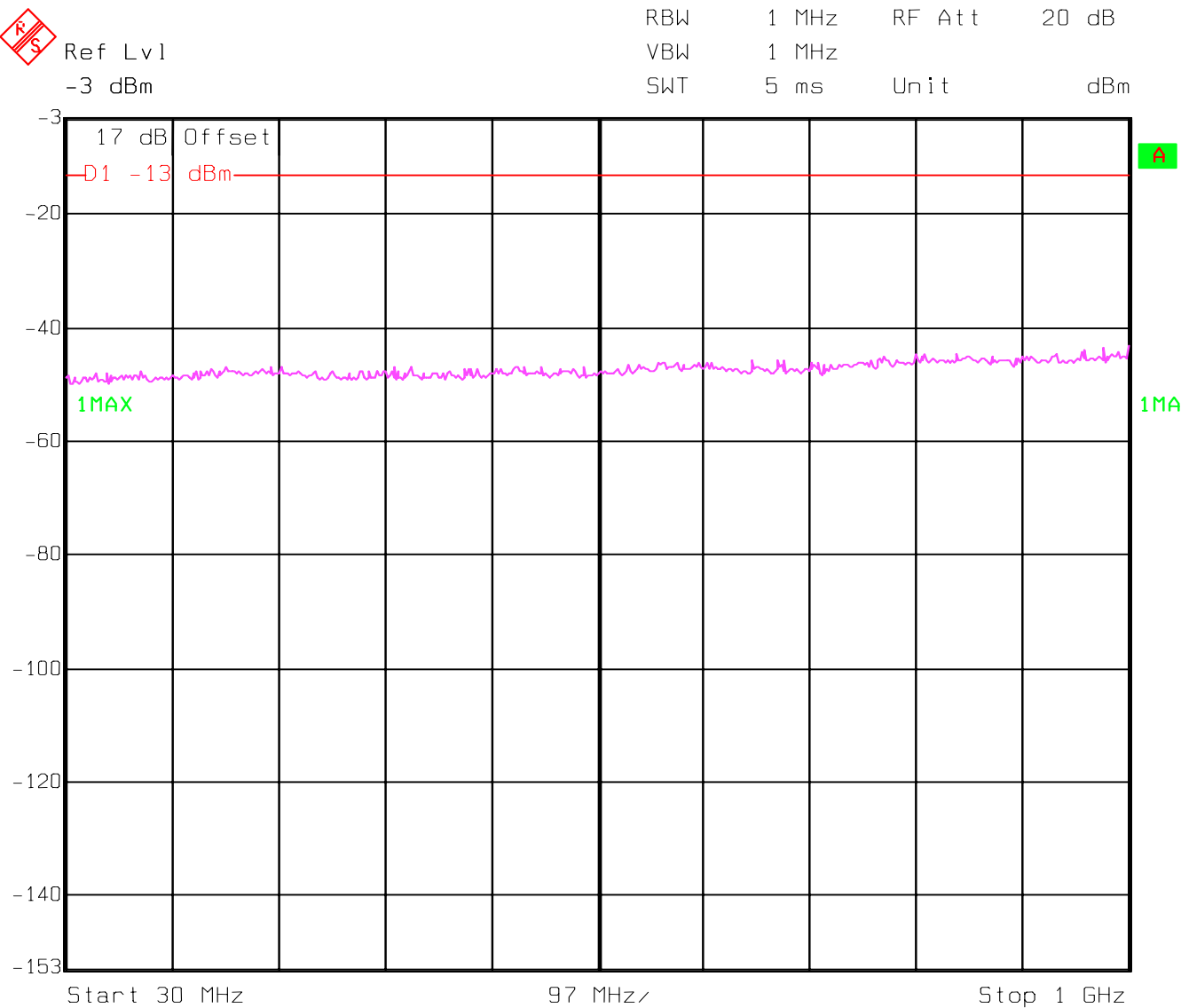
Harmonics	Tx ch-512 Freq. (MHz)	Level (dBm)	Tx ch-661 Freq. (MHz)	Level (dBm)	Tx ch-810 Freq. (MHz)	Level (dBm)
2	3700.4	nf	3760	nf	3819.6	nf
3	5550.6	nf	5640	nf	5729.4	nf
4	7400.8	nf	7520	nf	7639.2	nf
5	9251	nf	9400	nf	9549	nf
6	11101.2	nf	11280	nf	11458.8	nf
7	12951.4	nf	13160	nf	13368.6	nf
8	14801.6	nf	15040	nf	15278.4	nf
9	16651.8	nf	16920	nf	17188.2	nf
10	18502	nf	18800	nf	19098	nf

CONDUCTED SPURIOUS EMISSIONS

30MHz – 1GHz

Spurious emission limit –13dBm

(NOTE: This plot is valid for all three channels)



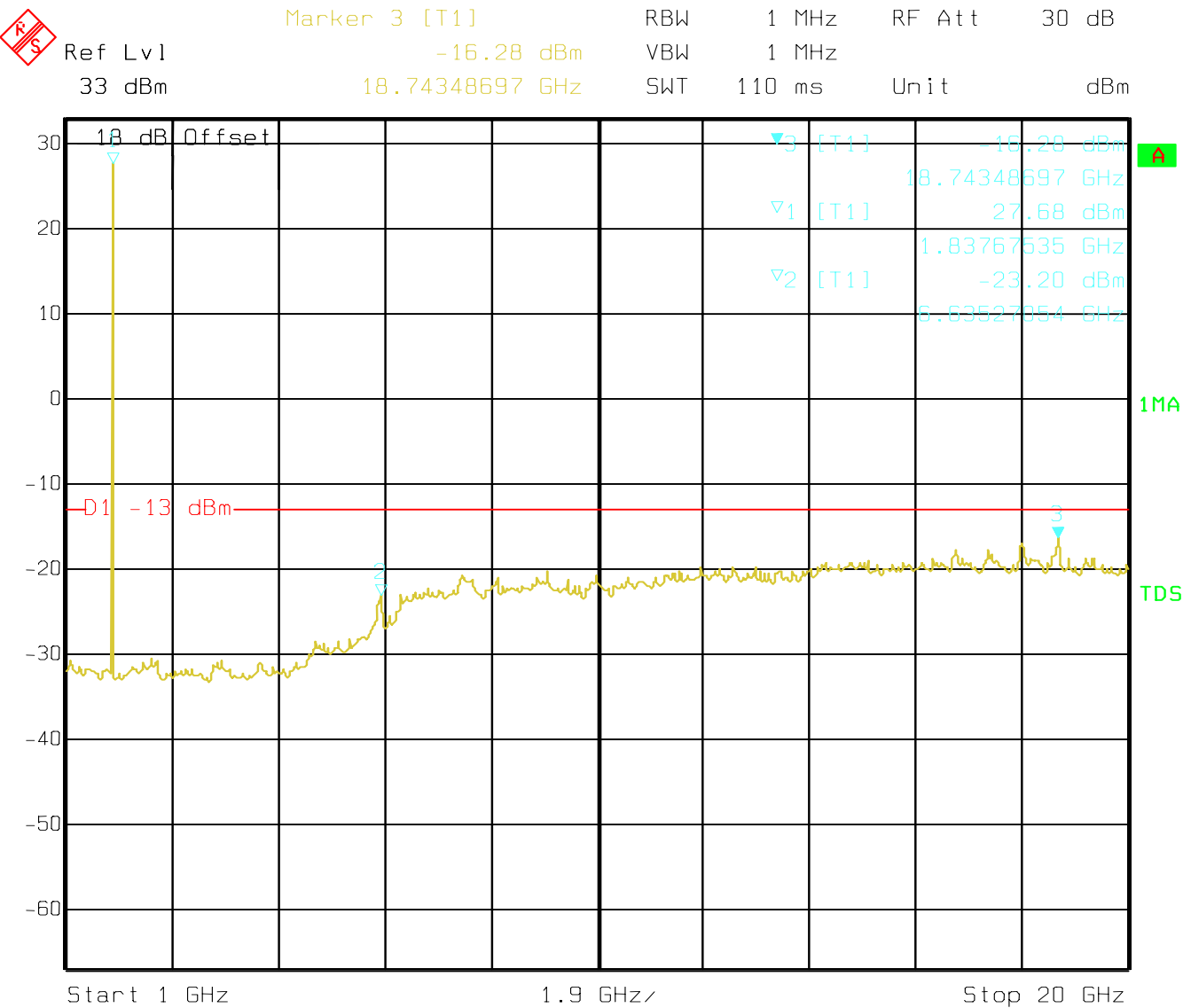
Date: 05.FEB.2002 16:47:36

CONDUCTED SPURIOUS EMISSIONS

Channel 512:1GHz – 20GHz

Spurious emission limit –13dBm

NOTE: peak above the limit line is the carrier frequency.



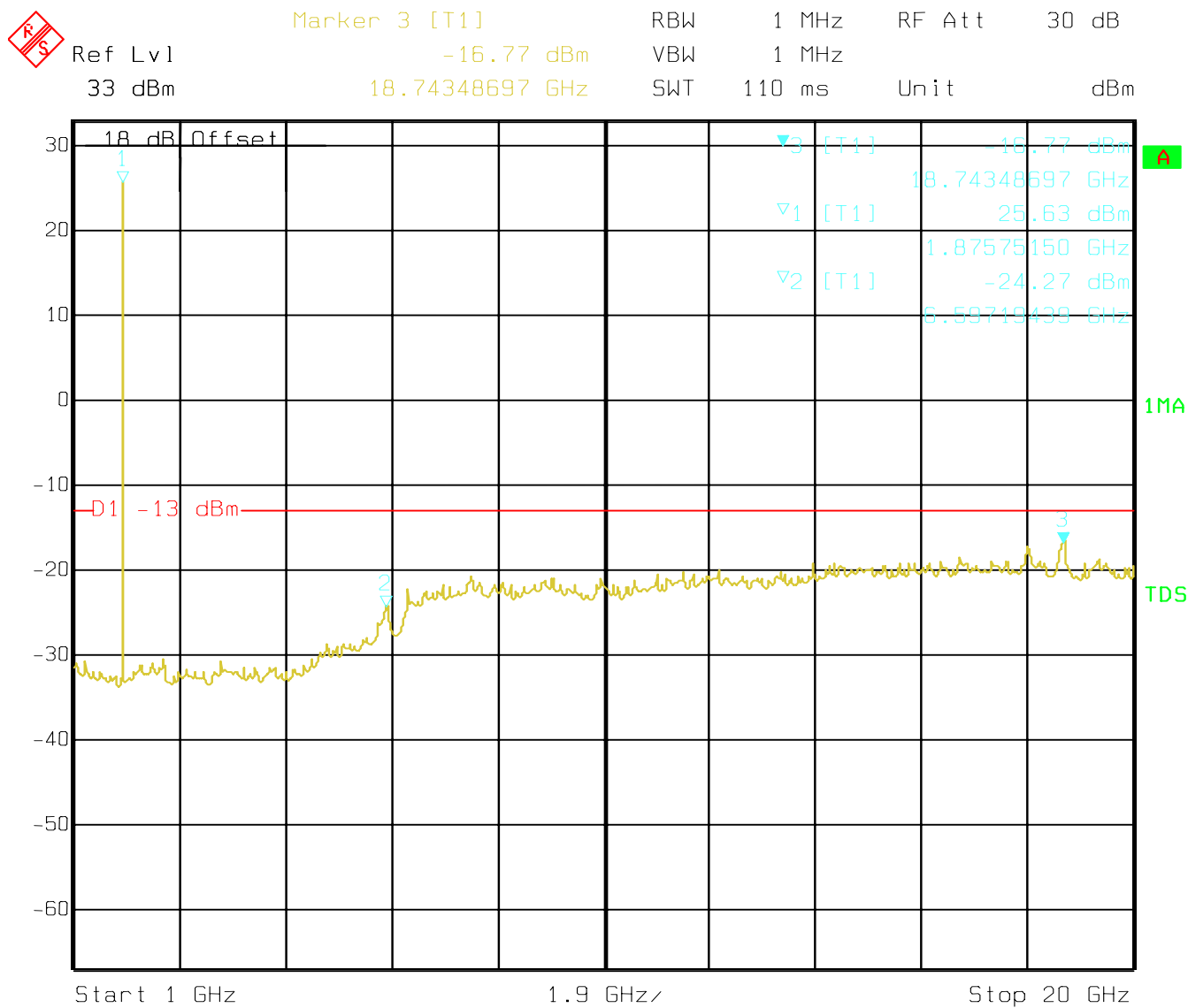
Date: 8.NOV.01 18:49:45

CONDUCTED SPURIOUS EMISSIONS

Channel 661:1GHz – 20GHz

Spurious emission limit –13dBm

NOTE: peak above the limit line is the carrier frequency.



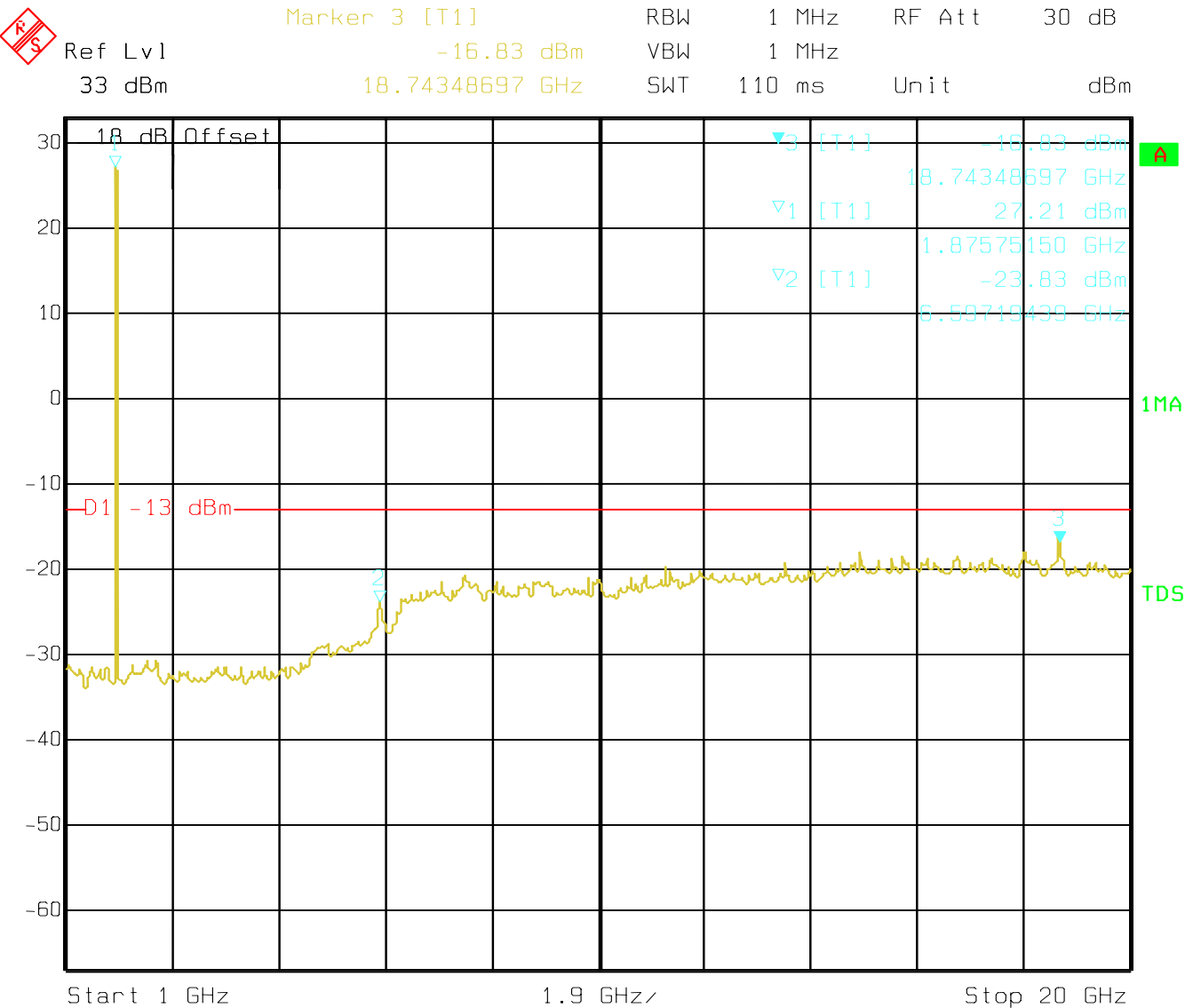
Date: 8.NOV.01 18:53:22

CONDUCTED SPURIOUS EMISSIONS

Channel 810:1GHz – 20GHz

Spurious emission limit –13dBm

NOTE: peak above the limit line is the carrier frequency.



Date: 8.NOV.01 19:00:38

CONDUCTED SPURIOUS EMISSIONS

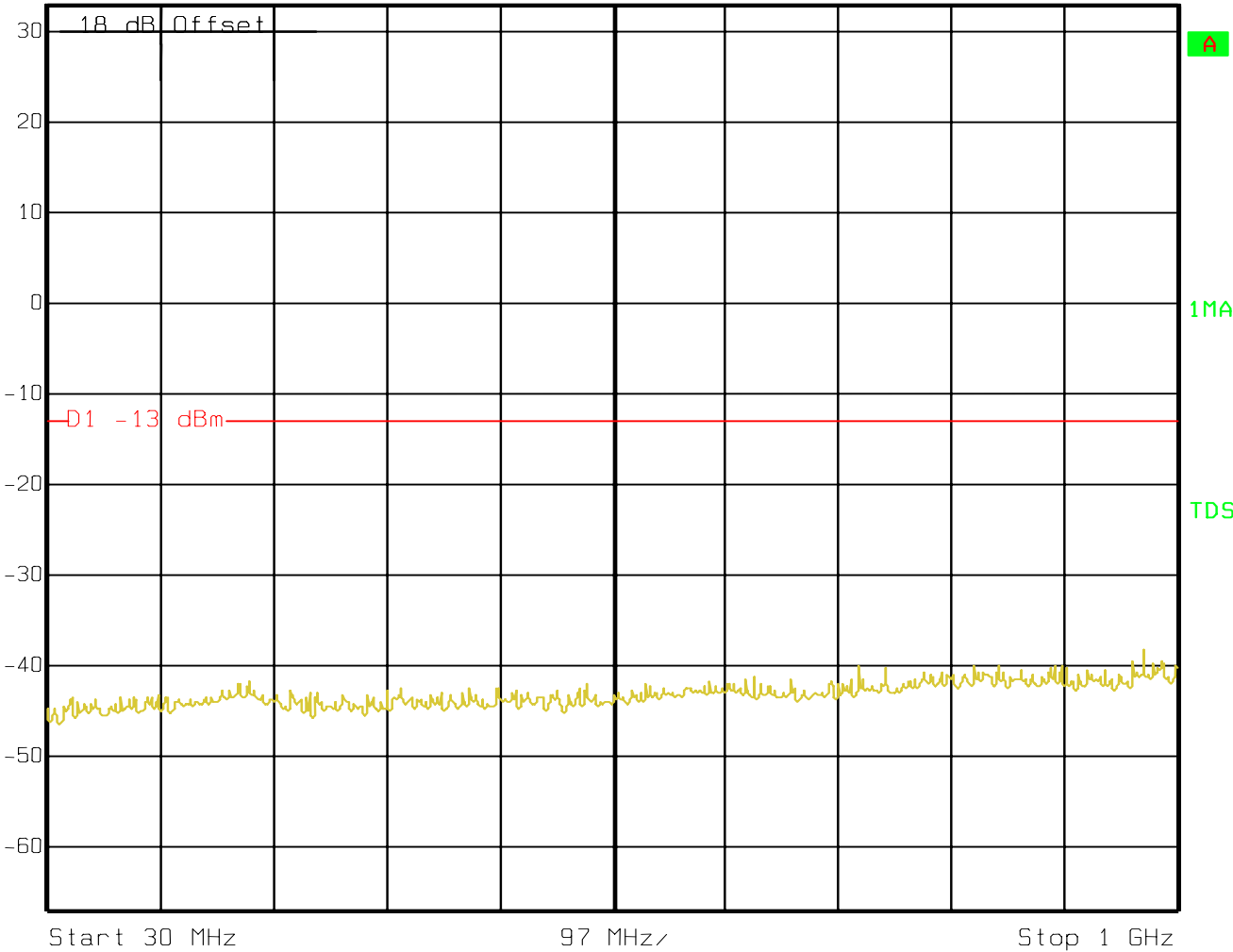
EUT in Idle Mode: 30MHz – 1GHz

Spurious emission limit –13dBm



Ref Lvl
33 dBm

RBW 100 kHz RF Att 30 dB
VBW 100 kHz
SWT 245 ms Unit dBm



Date: 8.NOV.01 19:02:17

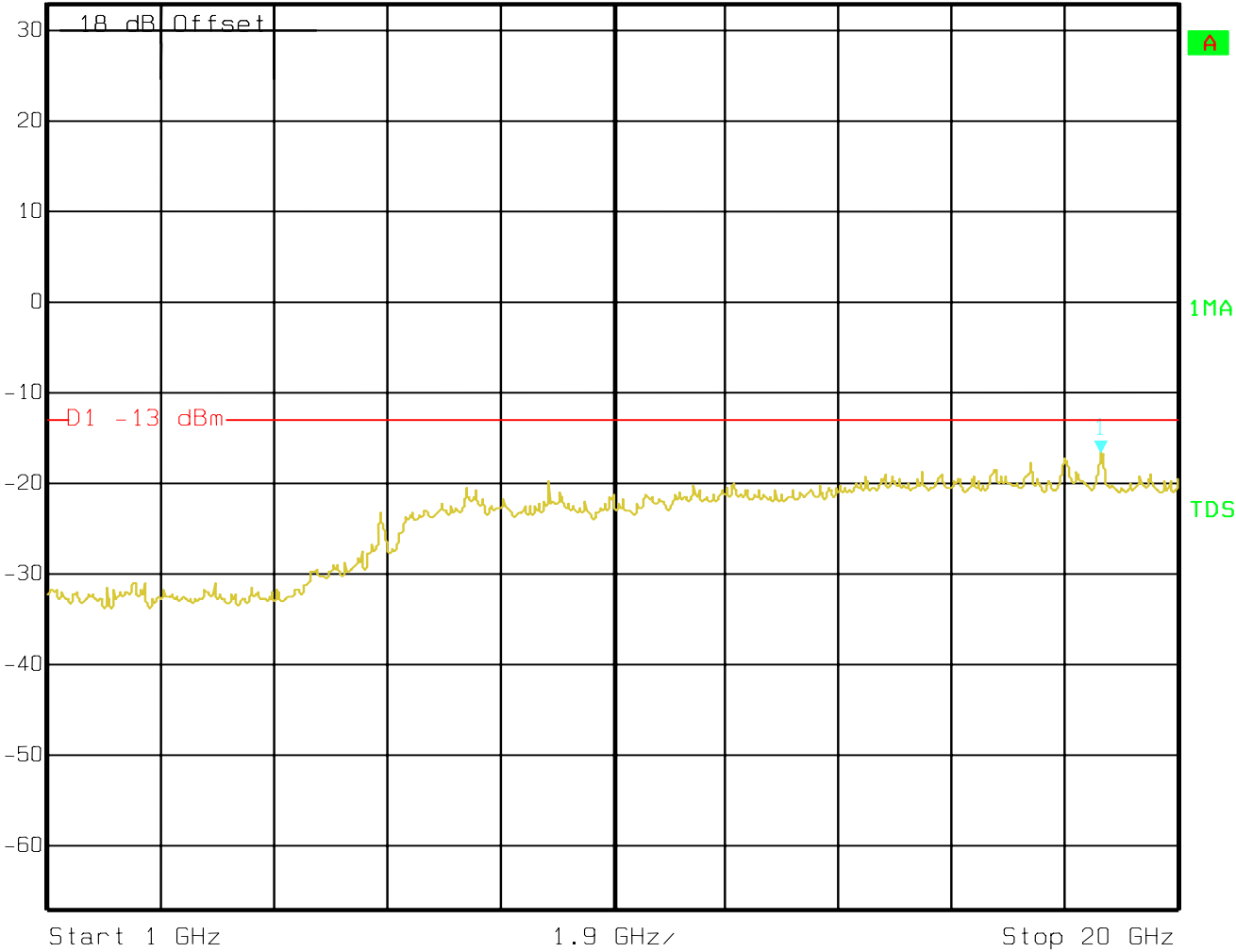
CONDUCTED SPURIOUS EMISSIONS

EUT in Idle Mode: 1GHz – 20GHz

Spurious emission limit –13dBm



Ref Lvl 33 dBm
Marker 1 [T1] -16.70 dBm
18.70541082 GHz
RBW 1 MHz
VBW 1 MHz
SWT 110 ms
RF Att 30 dB
Unit dBm



Date: 8.NOV.01 19:03:51

Conducted emissions

§ 15.107/207

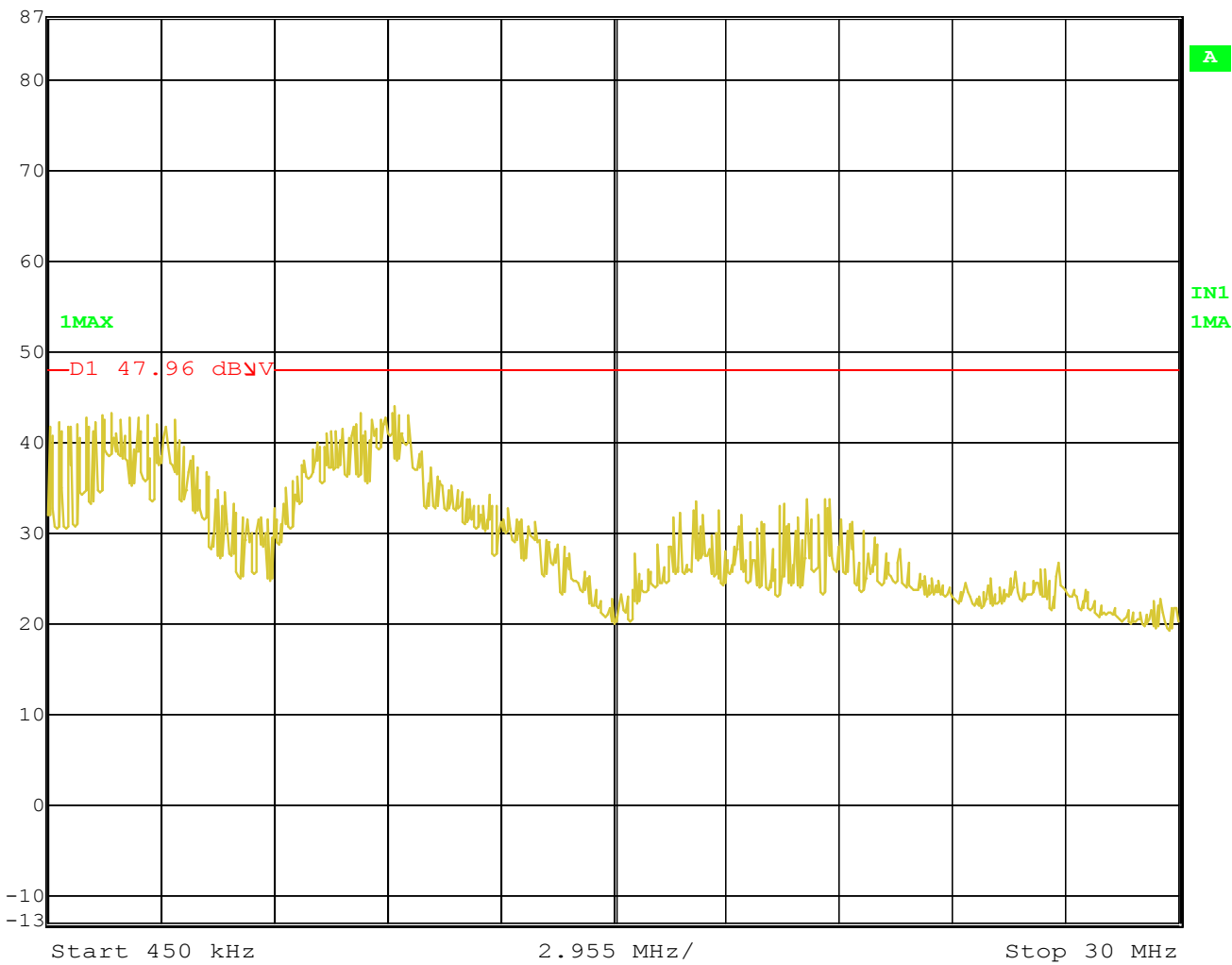
Measured with AC/DC power adapter plugged in LISN

Phase: Line



Ref Lvl
87 dB μ V

RBW 10 kHz RF Att 10 dB
VBW 10 kHz
SWT 10 s Unit dB μ V



Date: 24.JUN.2002 18:42:27

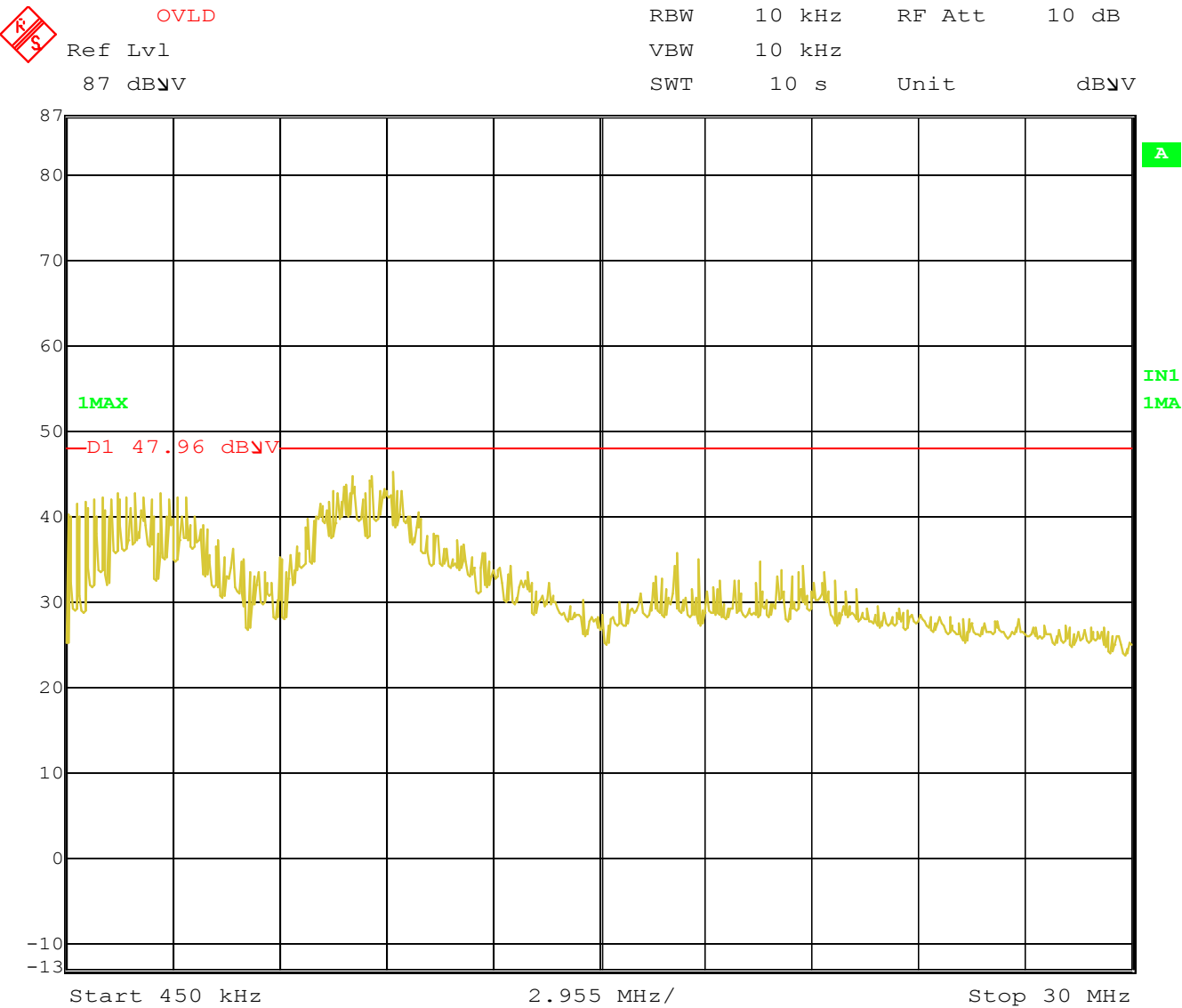
Technical specification: 15.107 / 15.207 (Revised as of October 1, 1991)

Limit

0.45 to 30 MHz	250 μ V / 47.96dB μ V
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ANALYZER SETTINGS: RBW = 10KHz VBW = 10KHz

Phase: Neutral



Date: 24.JUN.2002 18:43:29

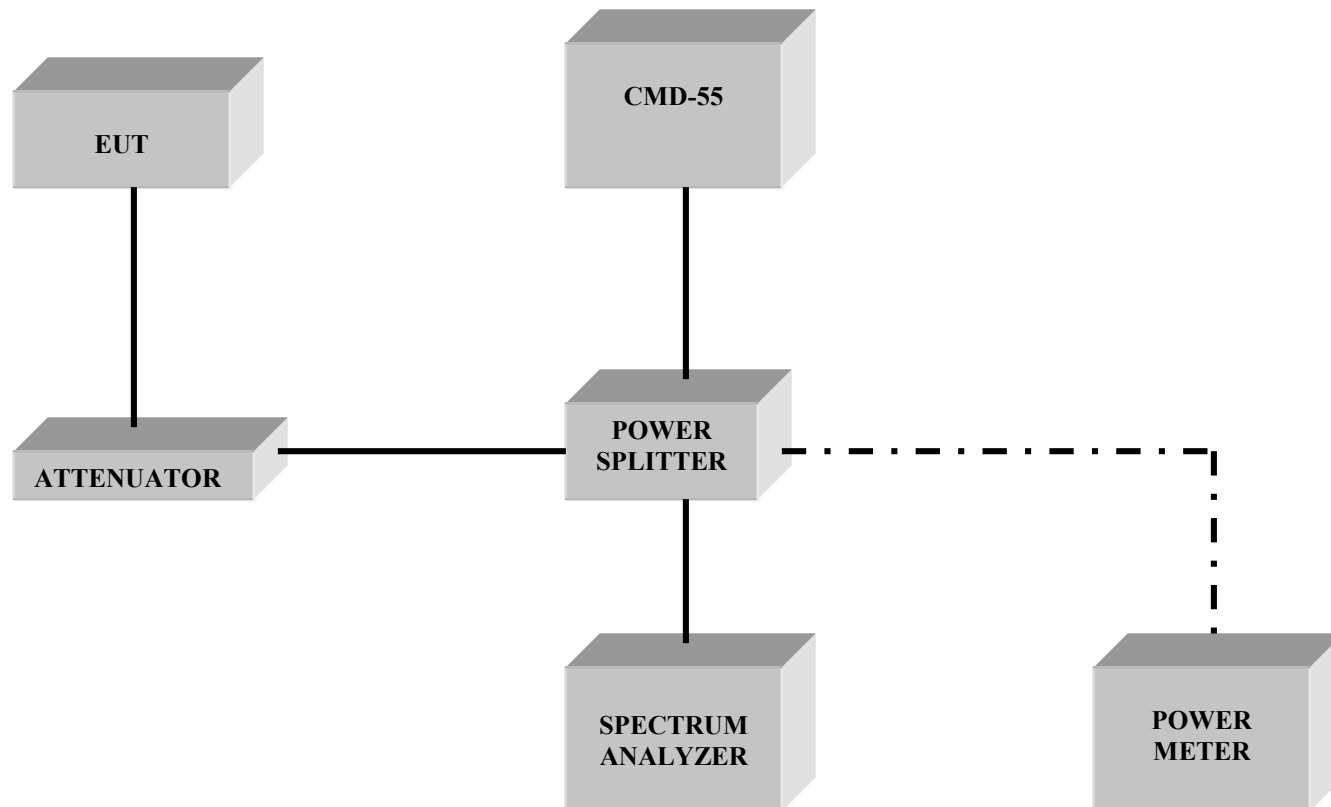
Technical specification : 15.107 / 15.207 (Revised as of October 1, 1991)

Limit

0.45 to 30 MHz	250 μV / 47.96 dBμV
ANALYZER SETTINGS: RBW = 10KHz VBW = 10KHz	

[illegible]

BLOCK DIAGRAM – Conducted Measurements



BLOCK DIAGRAM – Radiated Measurements

