FCC TEST REPORT No. 13/114	2013
for 47 CFR Part 15	15 February

Model name:	Tnet 210
Product description	Wireless RF mesh module
FCC ID	NTAT210
Applicant	Telematics Wireless Ltd., Israel
Manufacturer	Telematics Wireless Ltd., Israel

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Approved by
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Chief TC of PE TC "OMEGA"

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1 EQUIPMENT UNDER TEST

1.1 Basic description

Equipment Category	
Model name	Tnet 210
Destination	a compact RF Receiver/Transmitter unit for the Water Meter
Configuration	stand-alone device
ID number	97555

1.2 Technical characteristics declared by manufacturer

Table 1.2.1 – FHSS Narrow Channel Parameters	
Parameter	**Value**
Frequency Band	902 – 928 MHz
Modulation	Frequency Shift Keying (2GFSK)
Receiver Sensitivity	-105 dBm@110 kbps (BER < 0.1%)
Channel Separation	400 kHz
Data Rates	110 kbps
Frequency deviation	± 50 kHz
Channel Bandwidth @ 20dBc	<250 kHz
Frequency stability (including initial stability, temperature and aging)	<12 ppm
Peak Output power (without Antenna)	Up to +27dBm
Number of hopping channels	51 channels, from 904.8 MHz to 924.8 MHz at 0.4 MHz steps
Harmonics	< - 54 dBm
Max Occupancy time on any channel	400 ms per 20 seconds

Table 1.2.2 – FHSS Wide Channel Parameters	
Parameter	**Value**
Frequency Band	902 – 928 MHz
Modulation	Frequency Shift Keying (2GFSK)
Receiver Sensitivity	-105 dBm@110 kbps (BER < 0.1%)
Channel Separation	800 kHz
Data Rates	220 kbps
Frequency deviation	±110 kHz
Channel Bandwidth @ 20dBc	≥250 kHz
Frequency stability (including initial stability, temperature and aging)	<12 ppm
Peak Output power (without Antenna)	Up to +24 dBm
Number of hopping channels	26 channels, from 904.8 MHz to 924.8 MHz at 0.8 MHz steps
Harmonics	< - 54 dBm
Max Occupancy time on any channel	400 ms per 10 seconds

Antenna

Antenna type	External
Antenna gain	3 дБі

Supply

Power source	Battery
Supply voltage	2.7 – 4 VDC

1.3 Photos

Figure 1.3.1 External photo

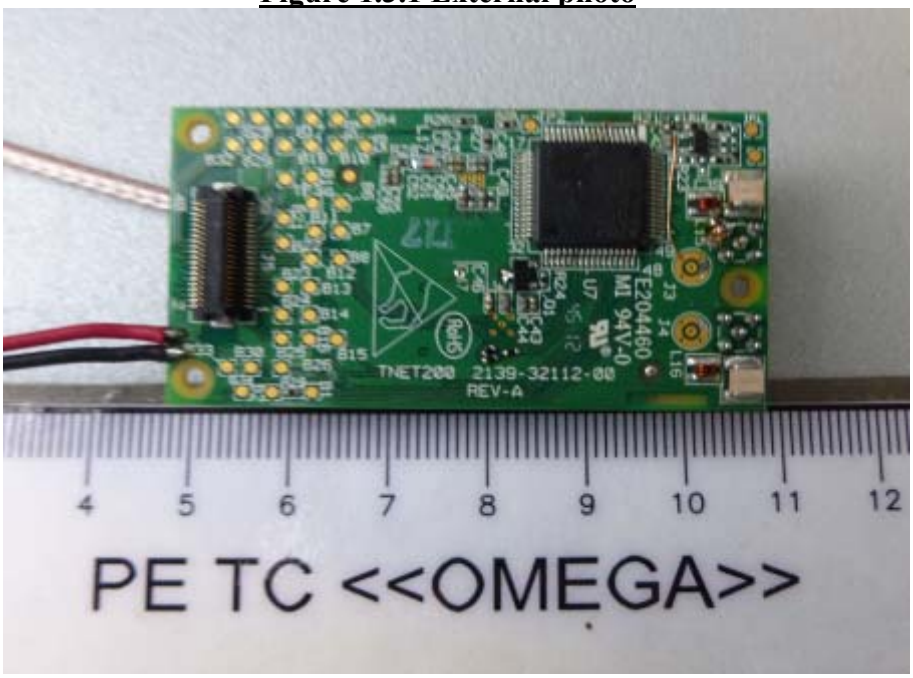
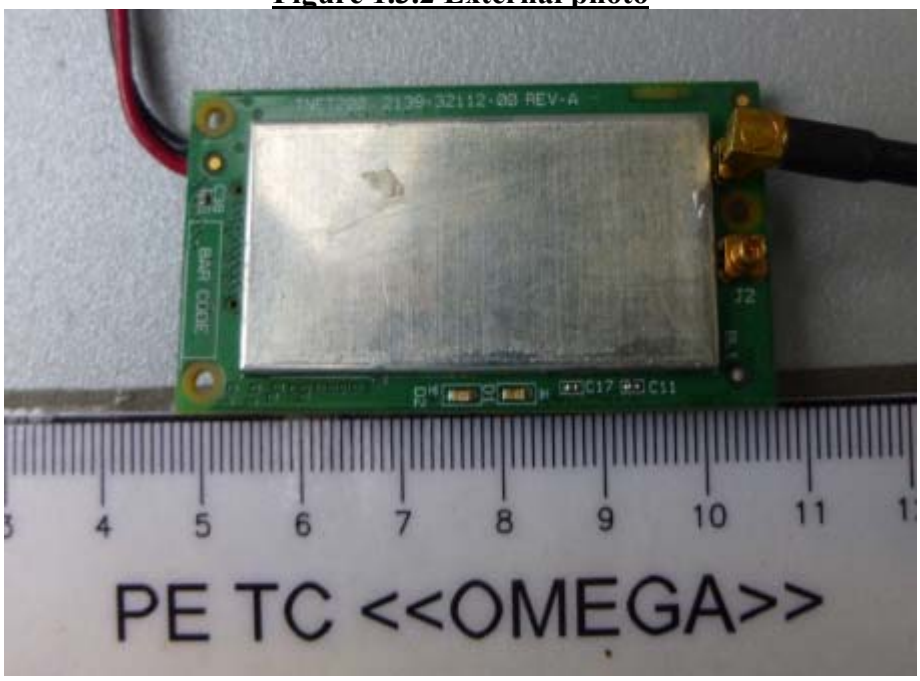


Figure 1.3.2 External photo

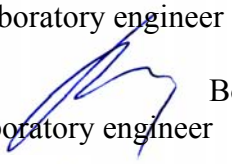


2 GENERAL INFORMATION ABOUT TESTS

2.1 Test program and results of the tests

Number of test	FCC rule	Description of test	Result (Pass, Fail, N/A)
1	15.247(a)1	20 dB bandwidth	Pass
2	15.247(a)1	Frequency separation	Pass
3	15.247(a)1	Number of hopping frequencies	Pass
4	15.247(a)1	Average time of occupancy	Pass
5	15.247(b)3	Peak Output Power	Pass
6	15.247(d)	Emissions at band edges	Pass
7	15.247(d)	Spurious Emissions	Pass
8	15.109 Class B	Radiated Emission	Pass

Tested by:
tests No. 1 - 6: Laboratory engineer



Boris Trifonov

tests No. 7, 8: Laboratory engineer

Vladimir Osaulko

Checked by:
Leading engineer

Fjodor Shubin

2.2 Test manner

2.3 Test conditions and test modes

Normal temperature and humidity:
- temperature: from +15 ºC to +35 ºC;
- relative humidity: from 20 % to 75 %

Normal power source:
- Unom = 3.6V

The frequencies for the testing

Channel	Frequency, MHz
Low	904.8
Mid	914.4
High	924.8

2.4 Test equipment used

№	Name	Model	Inventory or serial No.
1.	EMI Test receiver/spectrum analyzer	R&S ESU-26	100260
2.	Spectrum analyzer	R&S FSV40	105763
3.	Antenna (30 – 1000) MHz	Schwarzbeck UBAA 9114	9111-214
4.	Antenna (1000 - 10000) MHz	HP11966 model 3115	9903-5701
5.	Loop antenna	APA-CP	101142
6.	Digital multimeter	FLUKE 189	89750179
7.	Preamplifier (0.1-18) GHz	Agilent 87405c	MY47010400
8.	Psychrometer	ВИТ-2	B931
9.	Shielded Semi-Anechoic Chamber	"DON"	1

All listed above test equipment is calibrated and certified in accordance with established procedure. The equipment has certificates currently in force.

Ancillary equipment

№	Name	Model
1.	Test load	TNET 200 DEBUG ADAPTER
2.	Notebook	IBM ThinkPad

2.5 Measurement uncertainty

Parameter	Maximum uncertainty
Radiated emission	± 5.2 dB
Conducted emission	± 2.7 dB
Frequency	$\pm 1 \times 10^{-5}$
Temperature	± 1 °C
Humidity	± 2 %
Voltage supply DC	± 2 %

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k = 2.
Measurement uncertainty complies with the requirements of the normative documents and is guaranteed by the test procedures and test equipment.

2.6 Photo of test site

Figure 2.6.1

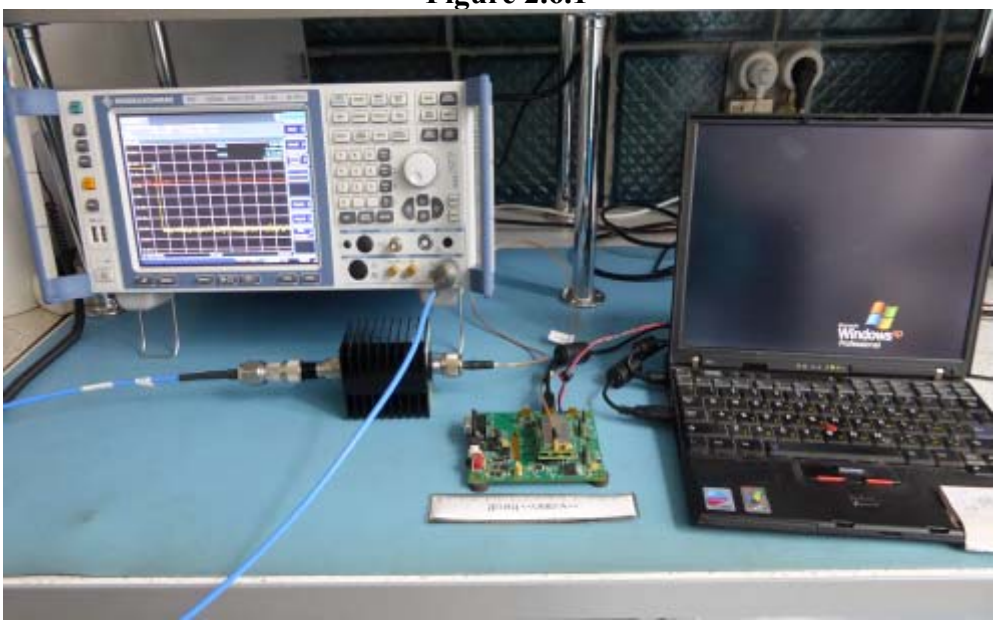


Figure 2.6.2

Figure 2.6.3

3 REPORT OF MEASUREMENTS AND EXAMINATIONS

3.1 "20 dB" bandwidth

3.1.1 Test requirements 15.247 (a) 1

(a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the (2400 - 2483.5) MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

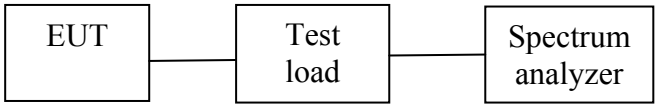
(i) For frequency hopping systems operating in the (902 - 928) MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

3.1.2 Test procedure (Public Notice DA 00-705)

1) The transmitter output was connected to the spectrum analyzer over the air.
2) The transmitter was set up to the normal operational mode with maximum output power rating.
3) Spectrum Analyzer was set to the central frequency of hopping channel investigated with the following settings: RBW = 3 kHz; VBW = 10 kHz; Video Detector = Max Peak; Trace mode = MAX HOLD, Span = 1 MHz.
4) 20 dB bandwidth was measured as a bandwidth of signal at points with power -20 dB below the reference point with maximum power of the spectrum.

3.1.3 Test setup layout

Figure 3.1.1 Test setup



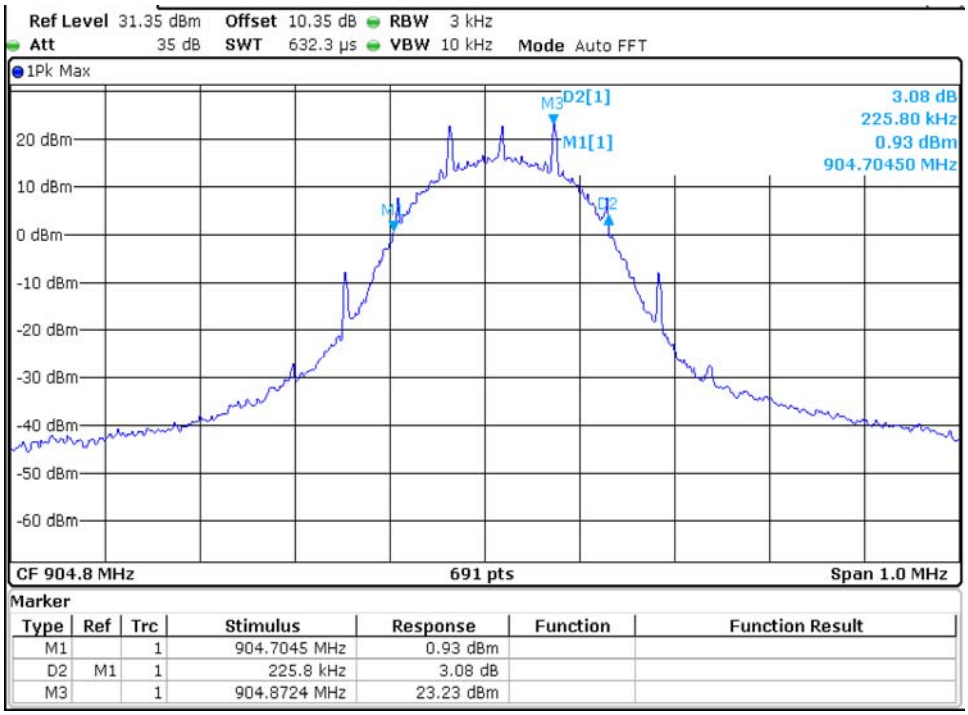
3.1.4 Test result

Temperature: +18 °C Relative humidity: 40 %

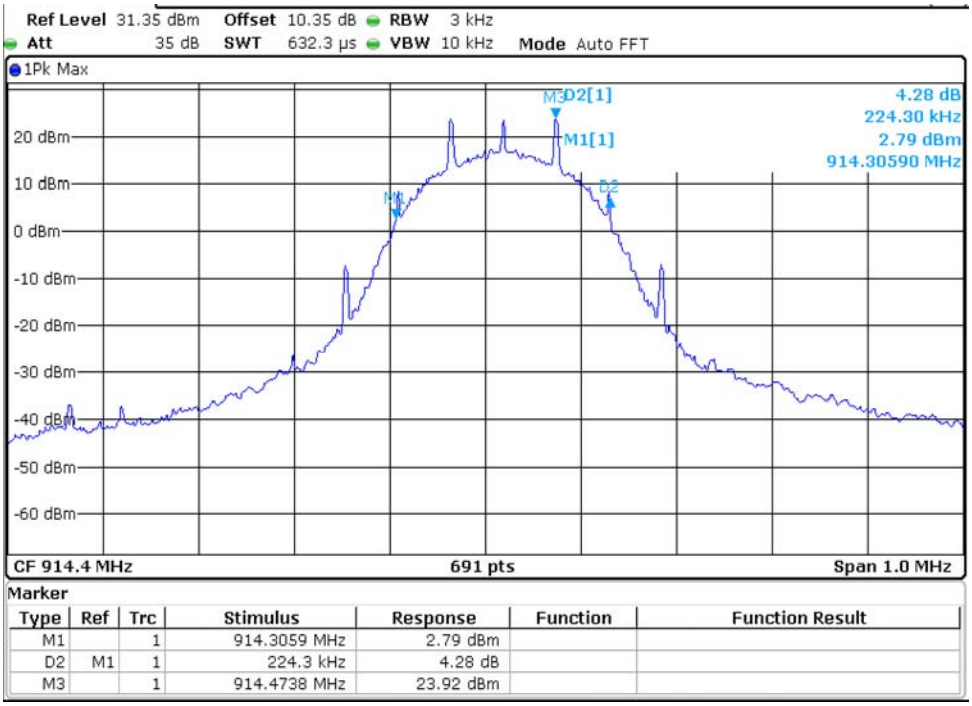
Table 3.1. "20 dB" bandwidth

Frequency, MHz	Measurement result, kHz	Limit, kHz	Result (Pass, Fail, N/A)
FHSS Narrow Channel Mode			
904.8	225.8	250	Pass
914.4	224.3	250	Pass
924.8	224.3	250	Pass
FHSS Wide Channel Mode			
904.8	448.6	500	Pass
914.4	446.5	500	Pass
924.8	447.2	500	Pass

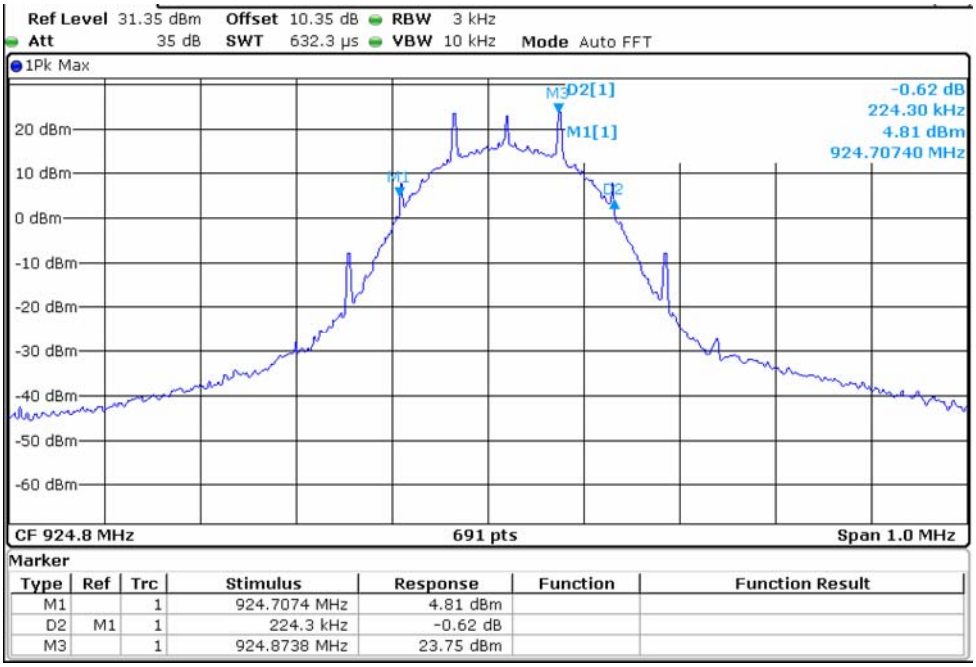
Plot 3.1.1 The 20 dB bandwidth test result at low frequency (step 400 kHz)



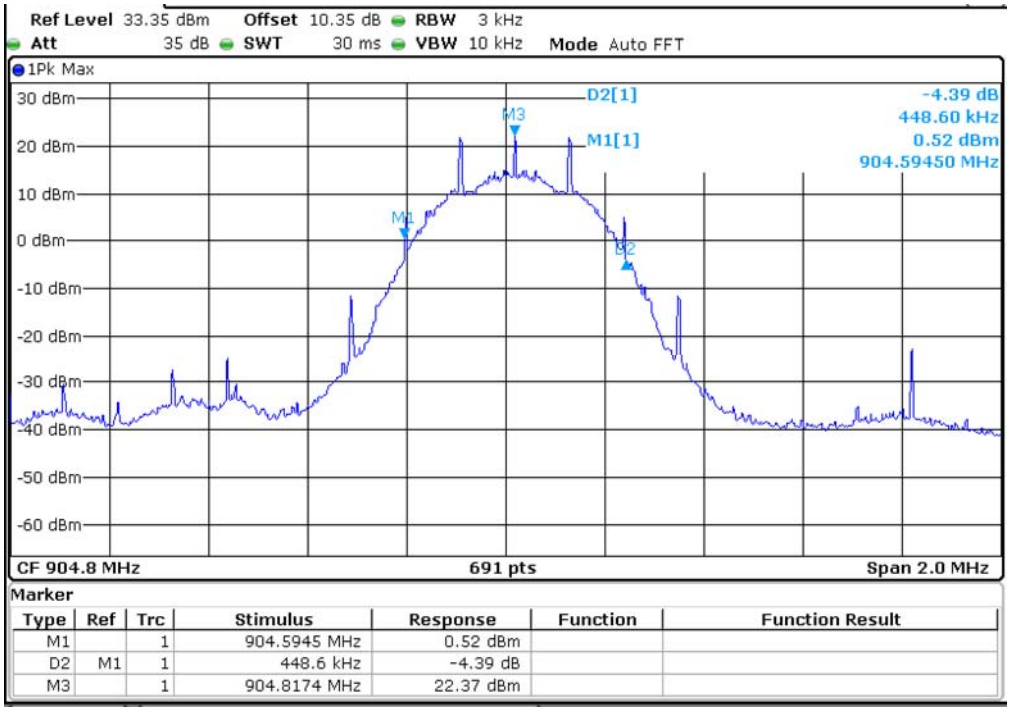
Plot 3.1.2 The 20 dB bandwidth test result at mid frequency (step 400 kHz)



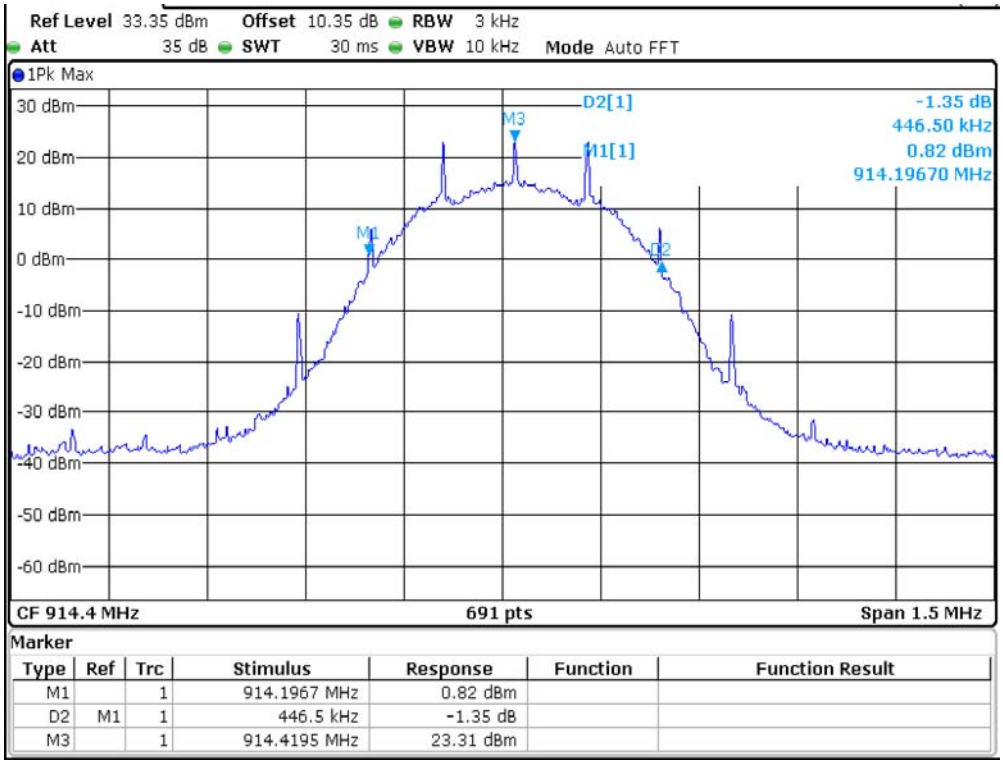
Plot 3.1.3 The 20 dB bandwidth test result at high frequency (step 400 kHz)



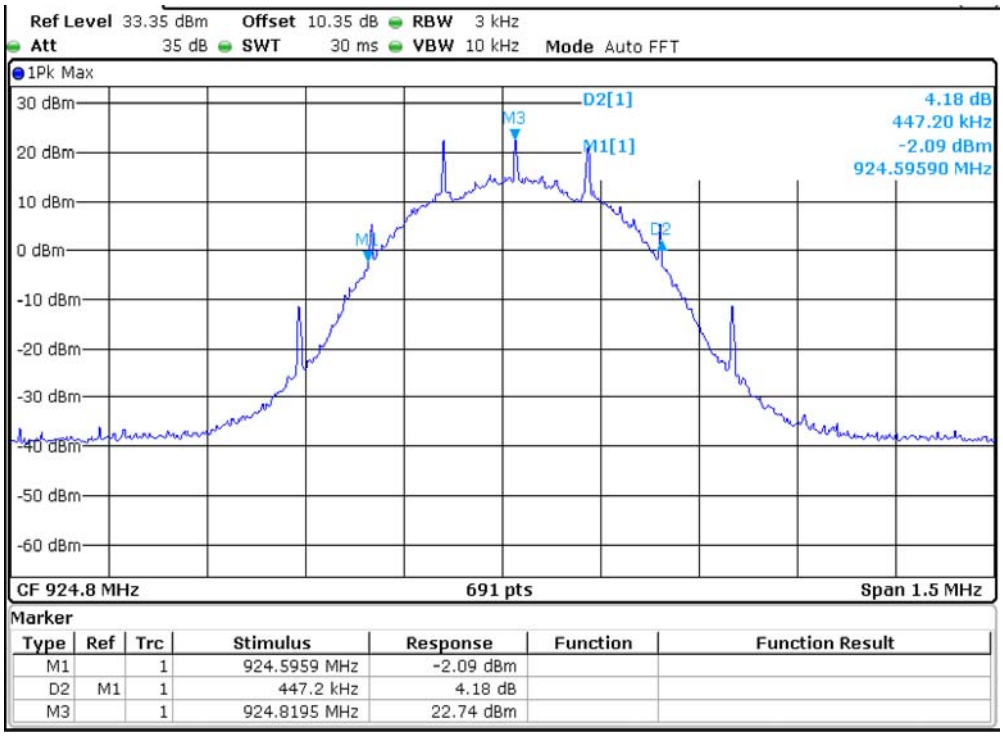
Plot 3.1.4 The 20 dB bandwidth test result at low frequency (step 800 kHz)



Plot 3.1.5 The 20 dB bandwidth test result at mid frequency (step 800 kHz)



Plot 3.1.6 The 20 dB bandwidth test result at high frequency (step 800 kHz)



3.2 Frequency Separation

3.2.1 Test requirements 15.247 (a) 1

(a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the (2400 - 2483.5) MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

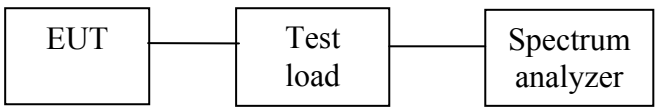
(i) For frequency hopping systems operating in the (902 - 928) MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

3.2.2 Test procedure (Public Notice DA 00-705)

1) The transmitter was connected to the spectrum analyzer over the air.
2) Transmitter was set to the normal operational mode with the maximum power rating.
3) Spectrum Analyzer was set to the central frequency of the hopping channel investigated with the following settings: RBW = 10 kHz; VBW = 30 kHz; Video Detector = Positive Peak; Trace Mode = MAX HOLD; Span = 1 MHz.
4) Frequency separation was measured as a difference between frequencies of two adjacent maximums belonging to the adjacent hopping channels.

3.2.3 Test setup layout

Figure 3.2.1 Test setup



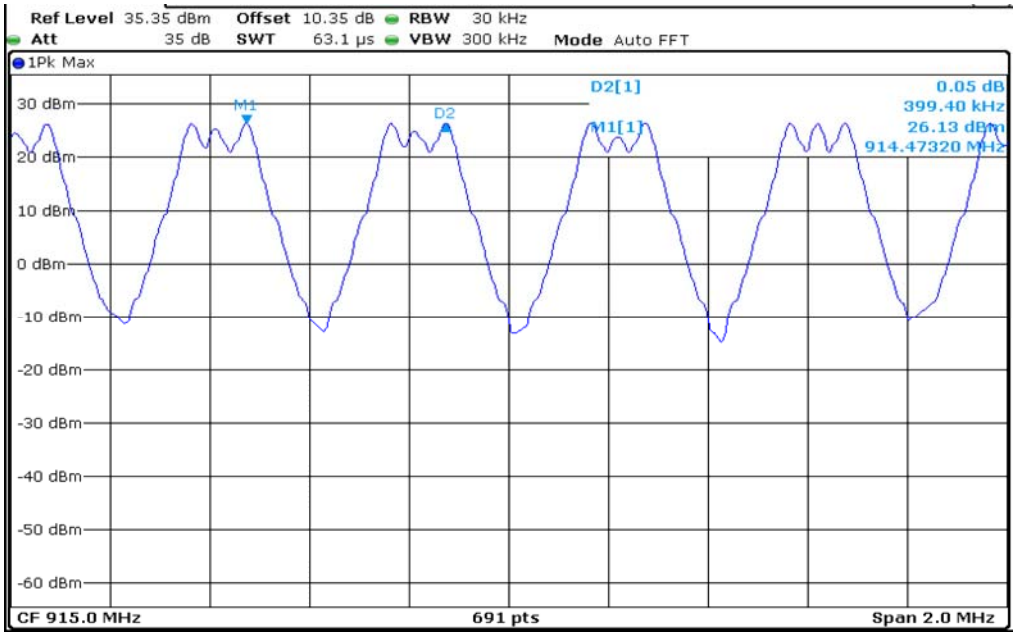
3.2.4 Test result

Temperature: +18 °C Relative humidity: 40 %

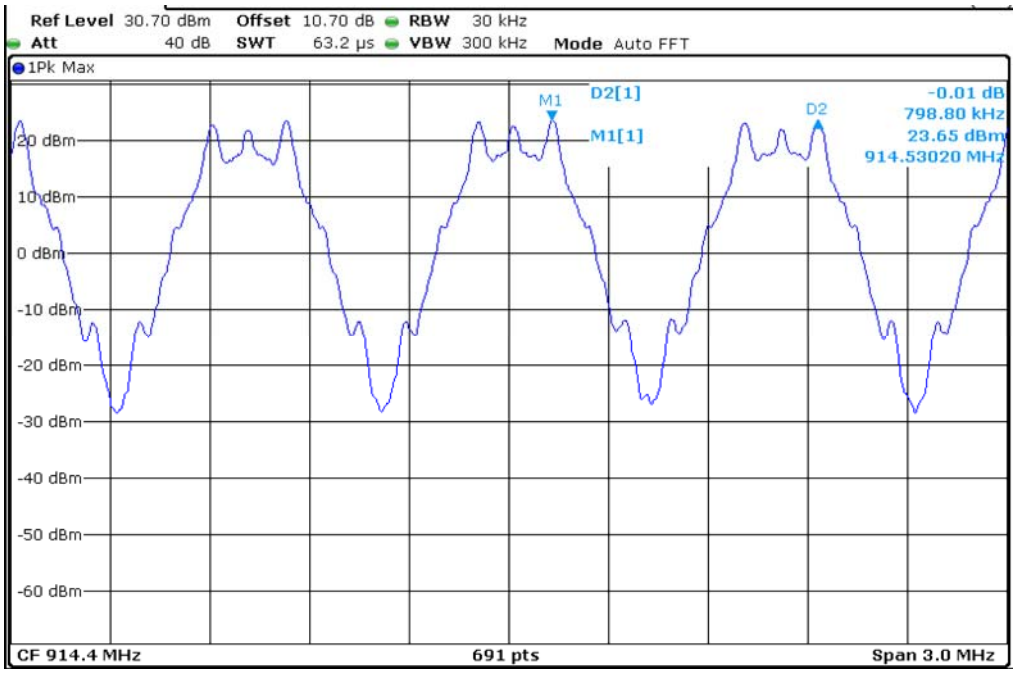
Table 3.2.1 Carrier frequency separation

Measurement result, kHz	Limit, kHz	Result (Pass, Fail, N/A)
FHSS Narrow Channel Mode		
399.40	225.8	Pass
FHSS Wide Channel Mode		
798.80	448.6	Pass

Plot 3.2.1 Carrier frequency separation (step 400 kHz)



Plot 3.2.2 Carrier frequency separation (step 800 kHz)



3.3 Number of hopping frequencies

3.3.1 Test requirements 15.247(a)1

(a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the (2400 - 2483.5) MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

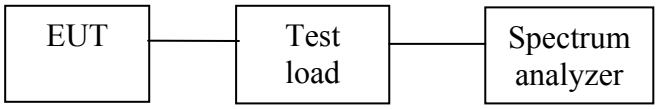
(i) For frequency hopping systems operating in the (902 - 928) MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

3.3.2 Test procedure (Public Notice DA 00-705)

1) The transmitter output was connected to the spectrum analyzer over the air.
2) The transmitter was set to the normal operational mode with the maximum power rating.
3) Spectrum analyzer was set to the central frequency of the EUT operating band with the following settings: RBW = 10 kHz, VBW = 100 kHz, Video Detector = Positive Peak, Trace mode = MAX HOLD; Span = 100 MHz.

3.3.3 Test setup layout

Figure 3.3.1 Test setup



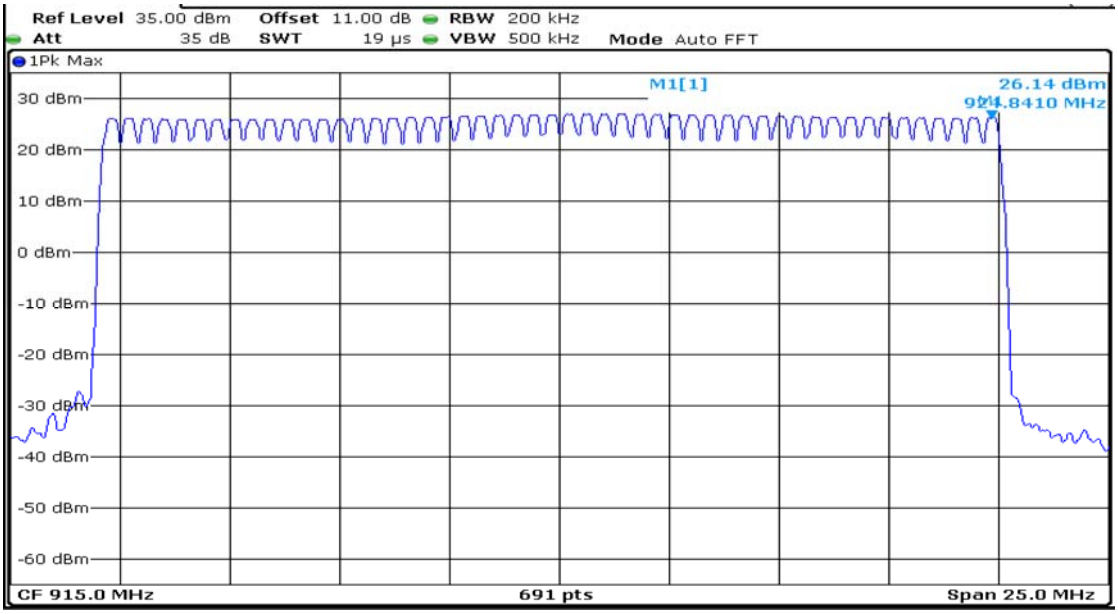
3.3.4 Test result

Temperature: +18 °C Relative humidity: 40 %

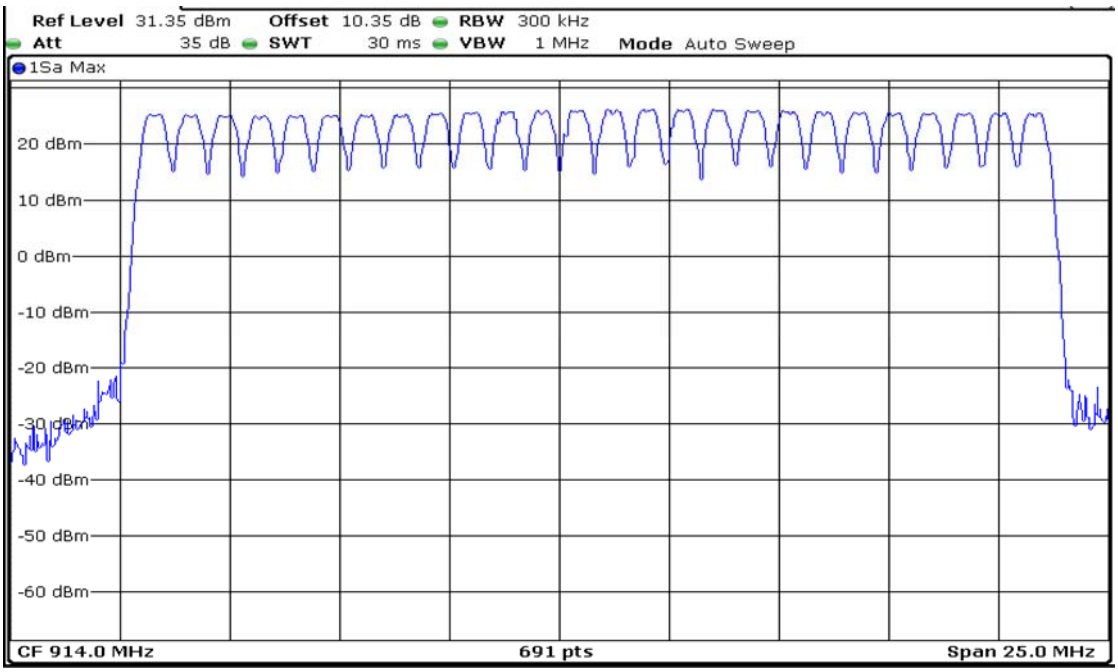
Table 3.3.1 Number of hopping frequencies

Result	Limit	Result (Pass, Fail, N/A)
FHSS Narrow Channel Mode		
51	50	Pass
FHSS Wide Channel Mode		
26	25	Pass

Plot 3.3.1 Number of hopping frequencies (step 400 kHz)



Plot 3.3.2 Number of hopping frequencies (step 800 kHz)



3.4 Average time of occupancy

3.4.1 Test requirements 15.247 (a)1

(a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the (2400 - 2483.5) MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

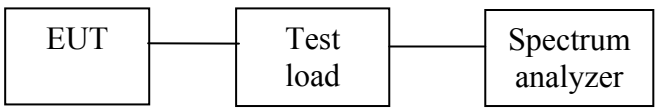
(i) For frequency hopping systems operating in the (902 - 928) MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

3.4.2 Test procedure (Public Notice DA 00-705)

1) The transmitter output was connected to the spectrum analyzer over the air.
2) The transmitter was set to the normal operational mode with the maximum power rating.
3) Spectrum analyzer was set to the hopping frequency investigated in zero span mode to measure the time channel is occupied with the following settings: RBW = 1 MHz, VBW = 10 MHz, Video Detector = Positive Peak, Trace mode = Clear write, Span = Zero Span, Sweep Time = 20 or 10 s; Sweep Mode = Single; Trigger = Video.

3.4.3 Test setup layout

Figure 3.4.1 Test setup



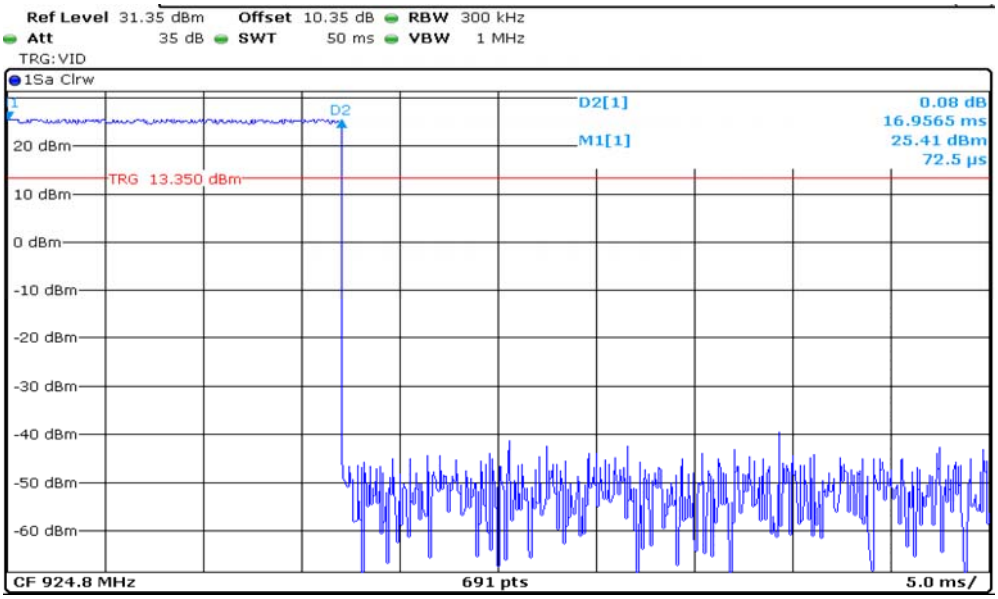
3.4.5 Test result

Temperature: +18 °C Relative humidity: 40 %

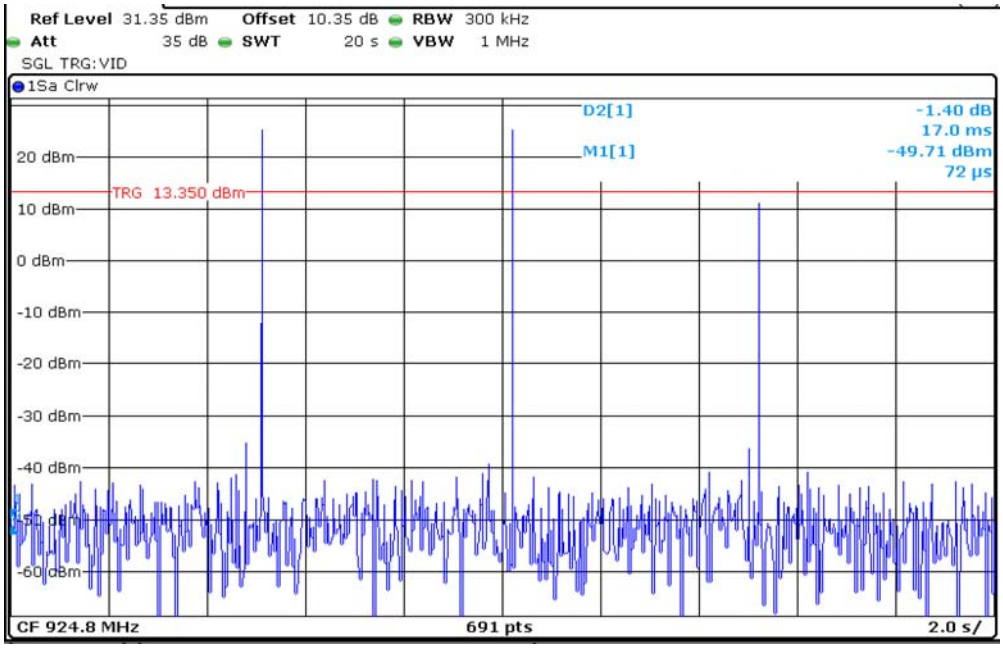
Table 3.4.1 Average time of occupancy

Single transmission duration, ms	Number of hopping frequencies	Investigated time	Result, s	Limit, s	Result (Pass, Fail, N/A)
FHSS Narrow Channel Mode					
16.957	3	20 s	0.0509	0.4	Pass
FHSS Wide Channel Mode					
8.5507	4	10 s	0.0342	0.4	Pass

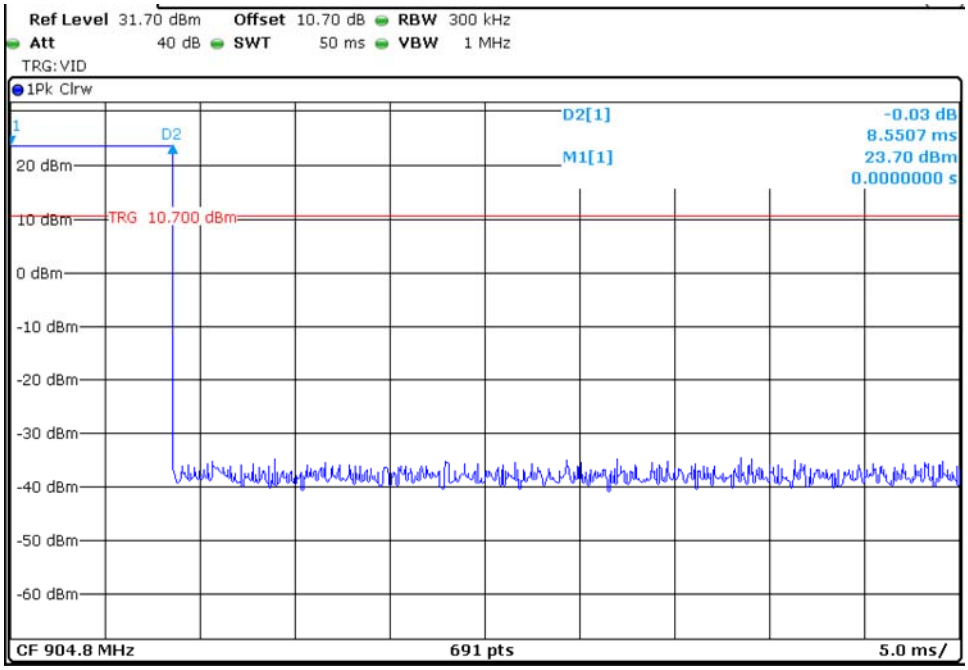
Plot 3.4.1 Average time of occupancy (step 400 kHz)



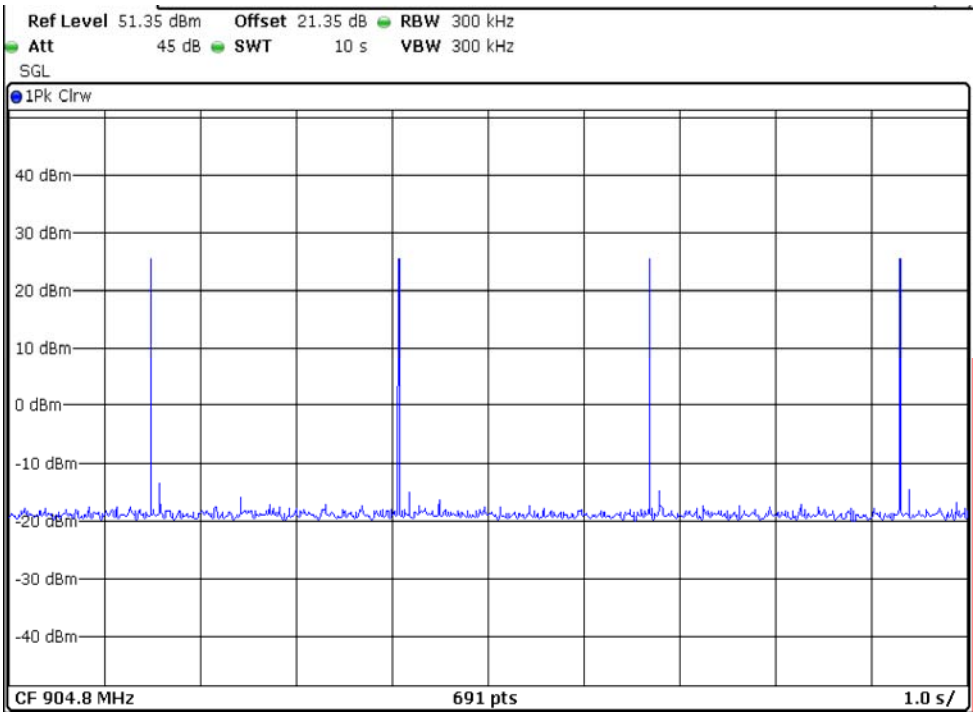
Plot 3.4.2 Average time of occupancy (step 400 kHz)



Plot 3.4.3 Average time of occupancy (step 800 kHz)



Plot 3.4.4 Average time of occupancy (step 800 kHz)



3.5 Peak Output power

3.5.1 Test requirements 15.247 (b) 3

b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:

3) For systems using digital modulation in the (902 - 928) MHz, (2400 - 2483.5) MHz, and (5725 - 5850) MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

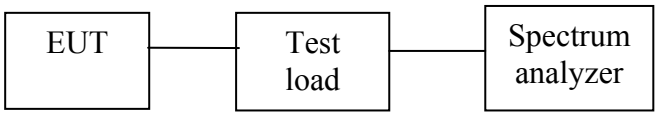
(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b) (1), (b) (2), and (b) (3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.5.2 Test procedure

11) The transmitter output was connected to the spectrum analyzer through the test load.
2) The transmitter was set to the normal operational mode with the maximum power rating.
3) Spectrum analyzer was set to the hopping frequency investigated in Time Domain Power Measurement mode with the following settings: RBW = Channel Separation; VBW > RBW; Video Detector = RMS; Trigger = Video; Span = Zero Span; Sweep Time = Adjusted to observe the whole burst.
4) The power was measured as average power during the burst in Time Domain Power Measurement mode.

3.5.3 Test setup layout

Figure 3.5.1



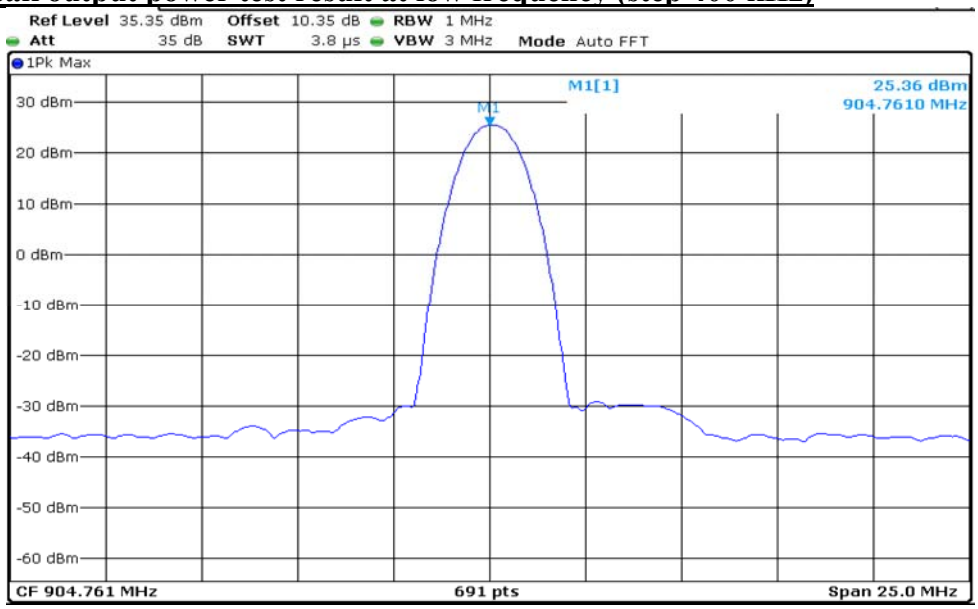
3.2.4 Test result

Temperature: +18 °C Relative humidity: 40 %

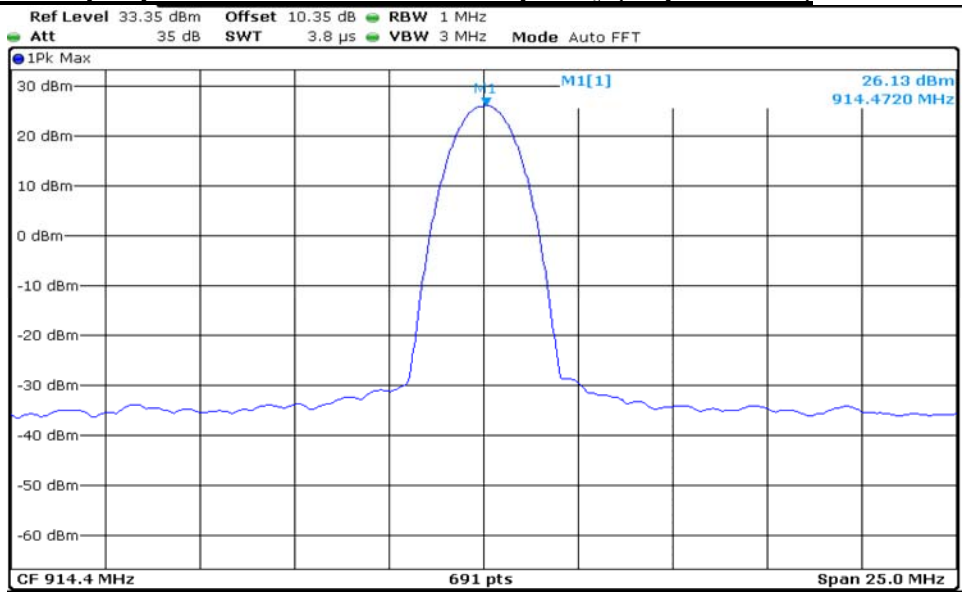
Table 3.2.2 Peak output power test result

Frequency	Peak output power, dBm	Limit, dBm	Margin, dB	Result (Pass, Fail, N/A)
FHSS Narrow Channel Mode				
904.8	25.36	30	- 4.64	Pass
914.4	26.13	30	- 3.87	Pass
924.8	25.57	30	- 4.43	Pass
FHSS Wide Channel Mode				
904.8	23.80	30	- 6.20	Pass
914.4	23.94	30	- 6.06	Pass
924.8	23.01	30	- 6.99	Pass

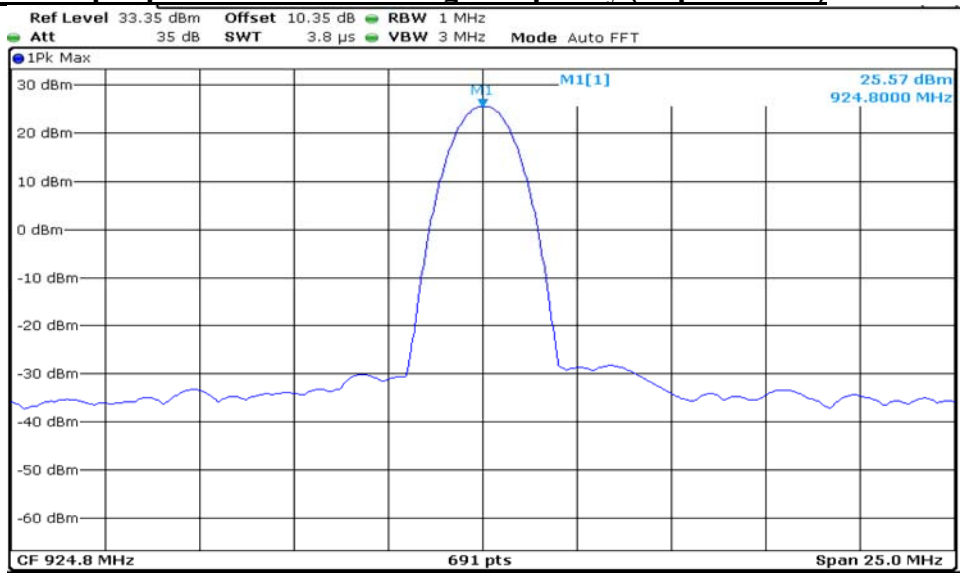
Plot 3.2.1 Peak output power test result at low frequency (step 400 kHz)



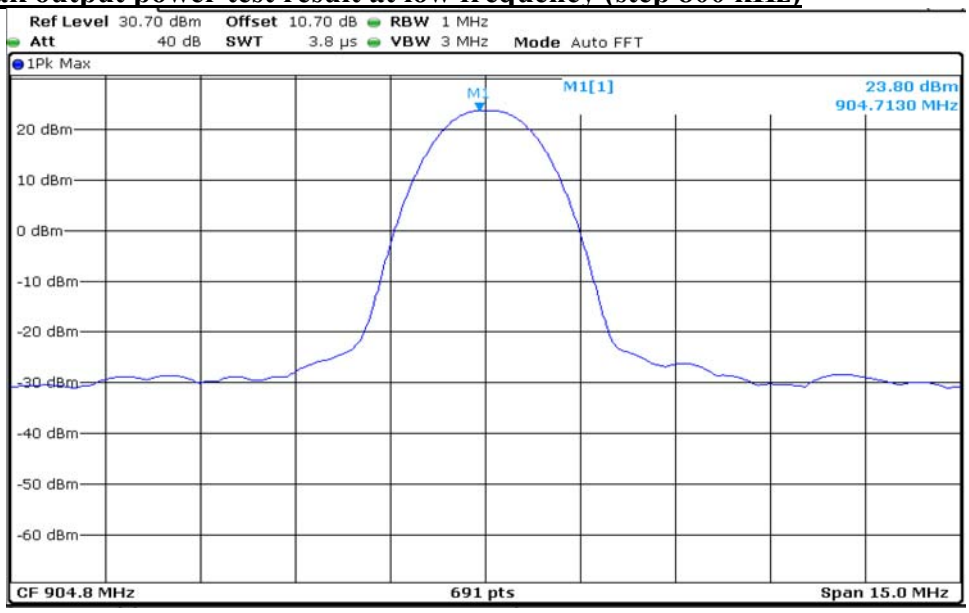
Plot 3.2.2 Peak output power test result at mid frequency (step 400 kHz)



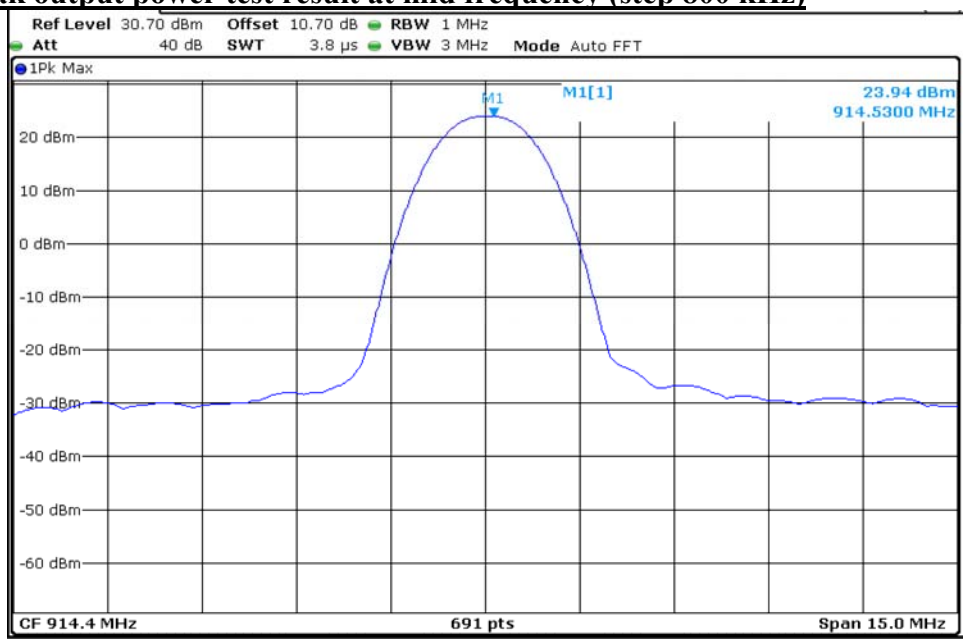
Plot 3.2.3 Peak output power test result at high frequency (step 400 kHz)



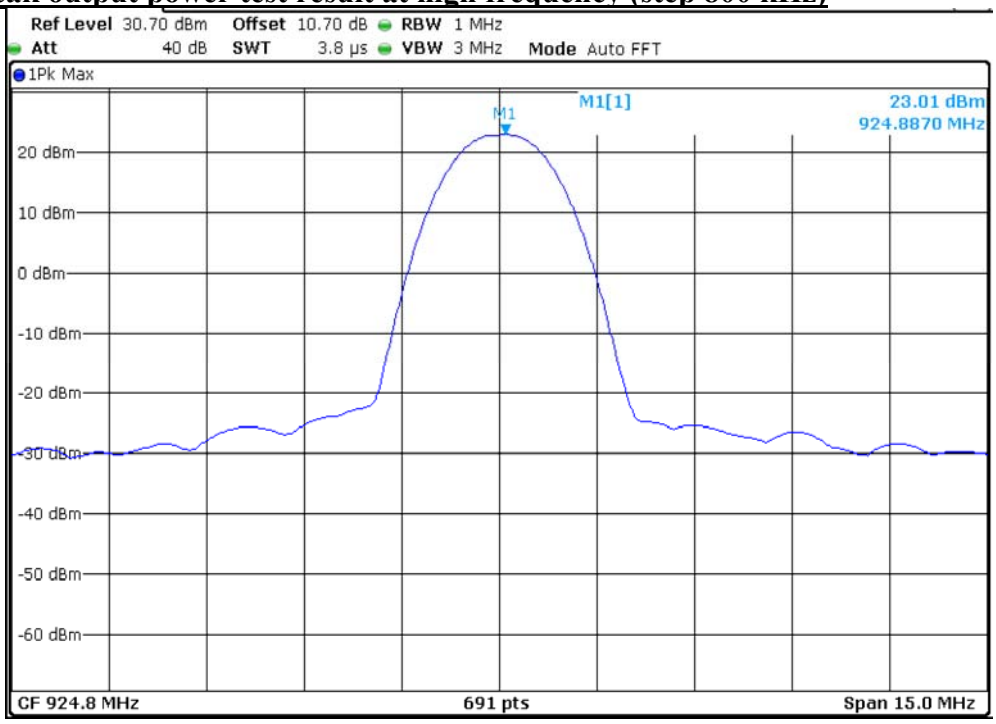
Plot 3.2.4 Peak output power test result at low frequency (step 800 kHz)



Plot 3.2.5 Peak output power test result at mid frequency (step 800 kHz)



Plot 3.2.6 Peak output power test result at high frequency (step 800 kHz)



3.8 Band edge radiated emissions

3.8.1 Test requirements 15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which 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)).

Table 3.8.1 Limit band edge radiated emissions

Assigned frequency, MHz	Attenuation below carrier*, dBc	Field strength at 3 m within restricted bands, dB(μV/m)	
		Peak	Average
902.0 – 928.0	20.0	74.0	54.0

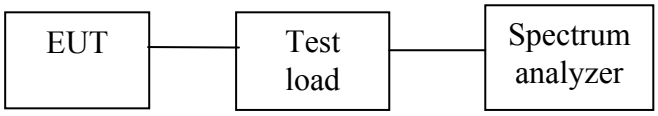
* - Band edge emission limit is provided in terms of attenuation below the peak of modulated carrier measured with the same resolution bandwidth.

3.8.2 Test procedure (Public Notice DA 00-705)

The EUT was set up as shown in Figure 3.8.1, energized normally modulated at the maximum data rate with its hopping function disabled and its proper operation was checked.
The EUT was adjusted to produce maximum available to end user RF output power at the lowest carrier frequency.
The spectrum analyzer span was set to capture the carrier frequency and associated modulation products.
The resolution bandwidth was set wider than 1 % of the frequency span.
The spectrum analyzer was set in max hold mode and allowed trace to stabilize. The highest emission level within the authorized band was measured.
The maximum band edge emission and modulation product outside of the band were measured as provided in Table 3.8.2 and the associated plots and referenced to the highest emission level measured within the authorized band.
The above procedure was repeated with the EUT adjusted to produce maximum RF output power at the highest carrier frequency.
The above procedure was repeated with the frequency hopping function enabled.

3.5.3 Test setup layout

Figure 3.5.1



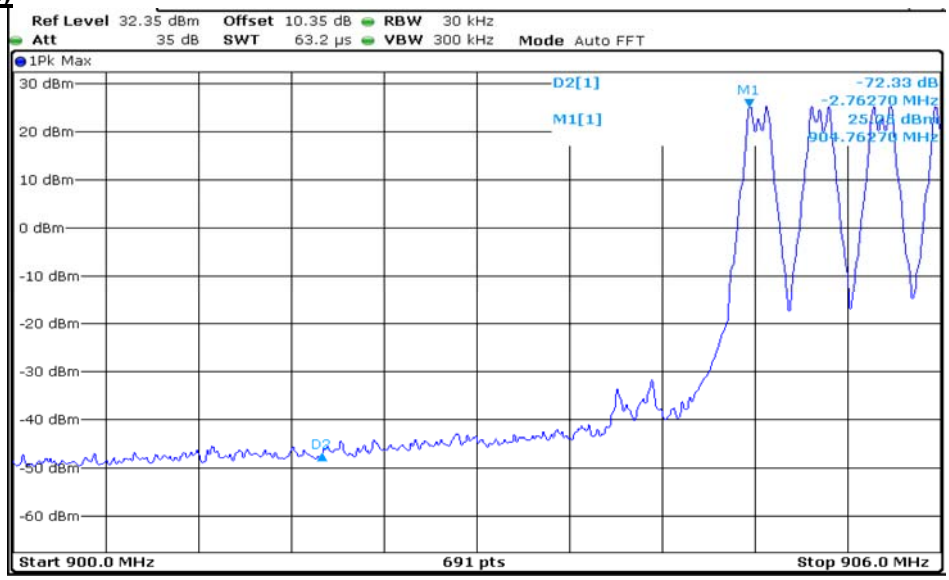
3.8.3 Test result

Temperature: +18 °C Relative humidity: 40 %

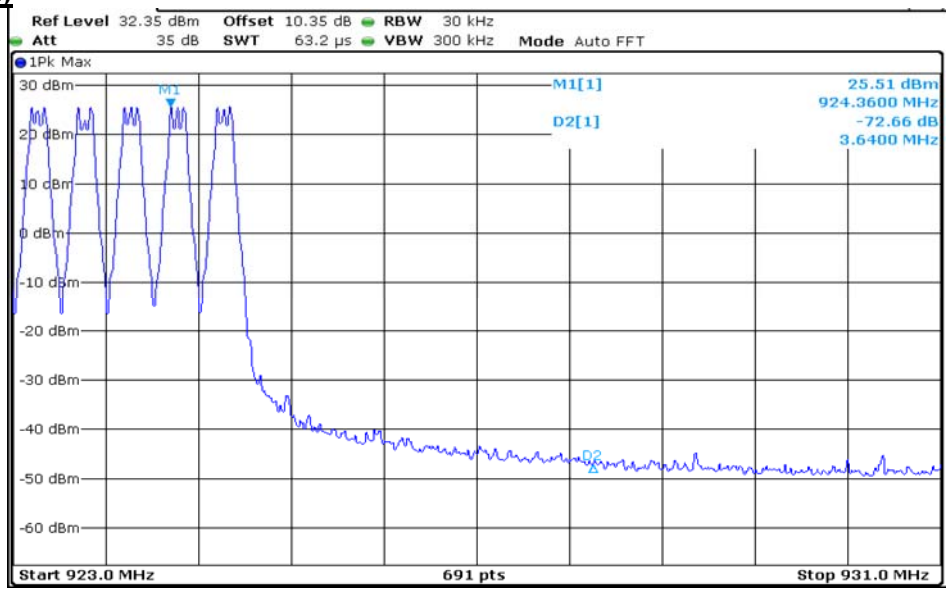
Table 3.8.2 Band edge emission test results

Frequency, MHz	Measurement result, dBc	Limit, dBc	Margin, dB
FHSS Narrow Channel Mode			
902.0	72.33	20.0	- 52.33
928.0	72.66	20.0	- 52.66
FHSS Wide Channel Mode			
902.0	59.19	20.0	- 39.19
928.0	58.16	20.0	- 38.16

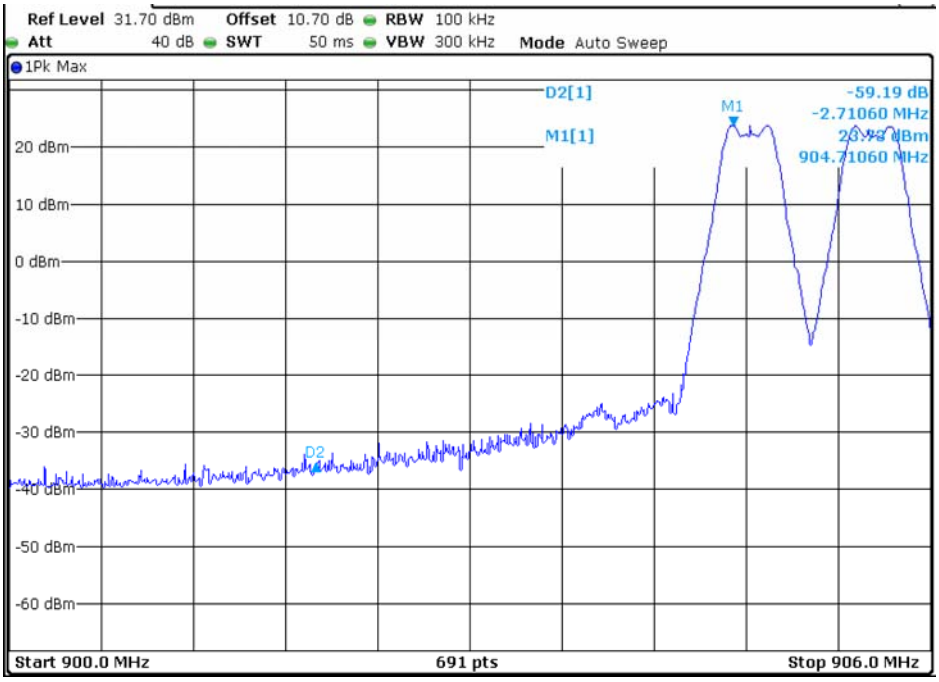
Plot 3.8.1 The highest emission level within the assigned band at low carrier frequency (step 400 kHz)



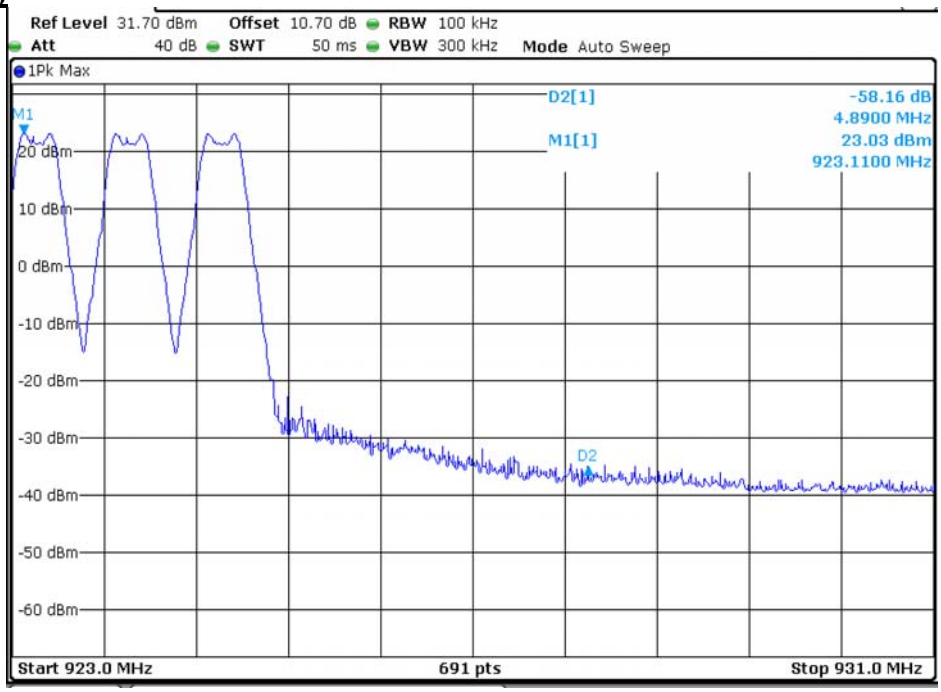
Plot 3.8.1 The highest emission level within the assigned band at high carrier frequency (step 400 kHz)



Plot 3.8.1 The highest emission level within the assigned band at low carrier frequency (step 800 kHz)



Plot 3.8.1 The highest emission level within the assigned band at low carrier frequency (step 800 kHz)



3.9 Spurious Emissions (radiated)

3.9.1 Test requirements 15.247 (d)

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least **20 dB** below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b) (3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209 (a) is not required. In addition, radiated emissions which 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)).

Table 3.9.1 Radiated spurious emissions limits

<table>
<tr><th rowspan="2">Frequency, MHz</th><th colspan="3">Field strength at 3 m within restricted bands, dB(μV/m)***</th><th rowspan="2">Attenuation of field strength of spurious versus carrier outside restricted bands, dBc***</th></tr>
<tr><th>Peak</th><th>Quasi Peak</th><th>Average</th></tr>
<tr><td>0.009 – 0.090</td><td>148.5 – 128.5</td><td>NA</td><td>128.5 – 108.5**</td><td rowspan="11">20.0</td></tr>
<tr><td>0.090 – 0.110</td><td>NA</td><td>108.5 – 106.8**</td><td>NA</td></tr>
<tr><td>0.110 – 0.490</td><td>126.8 – 113.8</td><td>NA</td><td>106.8 – 93.8**</td></tr>
<tr><td>0.490 – 1.705</td><td rowspan="7">NA</td><td>73.8 – 63.0**</td><td rowspan="7">NA</td></tr>
<tr><td>1.705 – 30.0*</td><td>69.5</td></tr>
<tr><td>30 – 88</td><td>40.0</td></tr>
<tr><td>88 – 216</td><td>43.5</td></tr>
<tr><td>216 – 960</td><td>46.0</td></tr>
<tr><td>960 - 1000</td><td>54.0</td></tr>
<tr><td>1000 – 10thharmonic</td><td>74.0</td><td>NA</td><td>54.0</td></tr>
</table>

* - The limit for 3 m test distance was calculated using inverse square distance extrapolation factor as follows:

$$Lim_{s2} = Lim_{s1} + 40\log(S_1/S_2),$$

where S_1 and S_2 – standard defined and test distance respectively in meters.

** - The limit decreases linearly with the logarithm of frequency.

*** - The field strength limits applied from lower radio frequency generated in the device, without going below 9 kHz up to the tenth harmonic of the highest fundamental frequency.

Table 3.9.2 Restricted bands

MHz	MHz	MHz	MHz	MHz	GHz
0.09 - 0.11	8.37625 - 8.38675	73 - 74.6	399.9 - 410	2690 - 2900	10.6 - 12.7
0.495 - 0.505	8.41425 - 8.41475	74.8 - 75.2	608 - 614	3260 - 3267	13.25 - 13.4
2.1735 - 2.1905	12.29 - 12.293	108 - 121.94	960 - 1240	3332 - 3339	14.47 - 14.5
4.125 - 4.128	12.51975 - 12.52025	123 - 138	1300 - 1427	3345.8 - 3358	15.35 - 16.2
4.17725 - 4.17775	12.57675 - 12.57725	149.9 - 150.05	1435 - 1626.5	3600 - 4400	17.7 - 21.4
4.20725 - 4.20775	13.36 - 13.41	156.52475 - 156.52525	1645.5 - 1646.5	4500 - 5150	22.01 - 23.12
6.215 - 6.218	16.42 - 16.423	156.7 - 156.9	1660 - 1710	5350 – 5460	23.6 - 24
6.26775 - 6.26825	16.69475 - 16.69525	162.0125 - 167.17	1718.8 - 1722.2	7250 - 7750	31.2 - 31.8
6.31175 - 6.31225	16.80425 - 16.80475	167.72 - 173.2	2200 - 2300	8025 – 8500	36.43 - 36.5
8.291 - 8.294	25.5 - 25.67	240 - 285	2310 - 2390	9000 - 9200	Above 38.6
8.362 - 8.366	37.5 - 38.25	322 - 335.4	2483.5 - 2500	9300 - 9500	

3.9.2 Test procedure (Public Notice DA 00-705; ANSI C63.4)

The transmitter was set to the normal operational mode with the maximum power rating.

Measurements of spurious emissions outside restricted bands.

Measurement were made in the anechoic chamber with metal floor (in the band of 9 kHz - 1000 MHz) and in fully anechoic chamber (1000 MHz - 10000 MHz) at distance of 3 m. The turntable was rotated, test antenna height (in the band 30 MHz-1000 MHz) was altered in the range of 1-4m (in the chamber with metal floor), test antenna polarization was changed from horizontal to vertical to find maximum reading. In the frequency range of 9 kHz to 30 MHz measurements were made with loop antenna placed at the height of 1 m.

1) Reference power was measured on the center frequency of the signal at distance of 3 m using biconical antenna by the test receiver with the following settings: RBW = 100 kHz, VBW = 300 kHz, Video Detector = Positive Peak.

Spurious emissions were measured:
2) In the band of 9 kHz - 30 MHz with active loop antenna and with the following test receiver settings: RBW =100 kHz; VBW=300 kHz; Video Detector = Positive Peak.
3) In the band of 30 MHz - 1000 MHz with biconical antenna and with the following test receiver settings: RBW = 100 kHz; VBW = 300 kHz; Video Detector = Positive Peak.
4) In the band of 1000 MHz - 10000 MHz with horn antenna and with the following test receiver settings: RBW = 100 kHz; VBW = 300 kHz; Video Detector = Positive Peak.
5) The worst test results (the lowest margins) were recorded and shown in the associated plots.

Measurements of spurious emissions within restricted bands below 1 GHz.

Measurement were made in the anechoic chamber with metal ground floor at distance of 3 m. The turntable was rotated, test antenna height (above 30 MHz) was altered in the range of 1-4m, test antenna polarization was changed from horizontal to vertical to find maximum reading.

Spurious emissions were measured:
1) In the band of 9 kHz - 150 kHz with active loop antenna and with the following settings of test receiver: RBW = 1 kHz; VBW = 3 kHz; Video Detector = Positive Peak - during prequalification measurement, Quasi-Peak - during final measurement.
2) In the band of 150 kHz - 30 MHz with active loop antenna and with the following settings of test receiver: RBW = 10 kHz; VBW = 30 kHz, Video Detector = Positive Peak - during prequalification measurement, Quasi-Peak - during final measurement.
3) In the band of 30 MHz - 1000 MHz with biconical antenna and with the following settings of test receiver: RBW = 120 kHz, VBW = 300 kHz, Video Detector = Positive Peak - during prequalification measurement, Quasi-Peak - during final measurement.
4) The worst test results (the lowest margins) were recorded and shown in the associated plots.

Measurements of spurious emissions within restricted bands above 1 GHz.

Measurements were made in the anechoic chamber at distance of 3 m. The turntable was rotated; test antenna polarization was changed from horizontal to vertical to find maximum reading.
Spurious emissions were measured:
1) In the band of 1000 MHz - 10000 MHz with horn antenna and with the following settings of test receiver: RBW = 1 MHz, VBW = 3 MHz, Video Detector = Positive Peak - during prequalification measurement, Average - during final measurement.
2) The worst test results (the lowest margins) were recorded and shown in the associated plots.

Figure 3.9.1 Test setup layout (below 30 MHz)

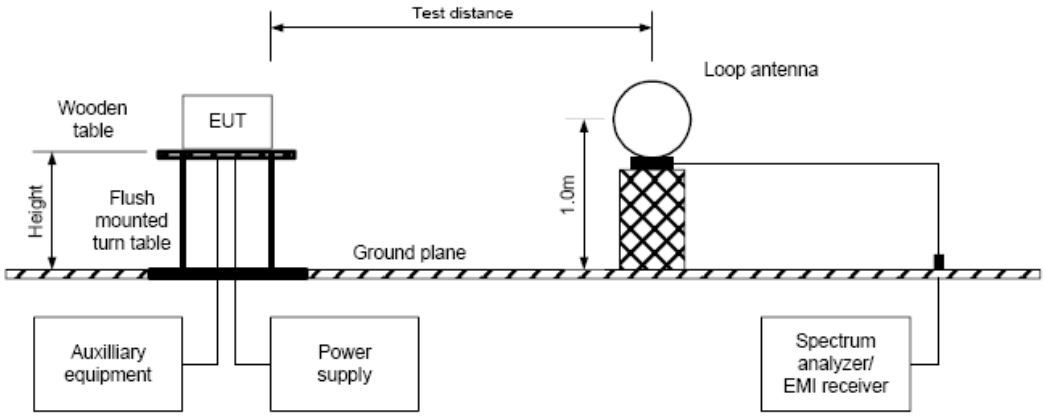
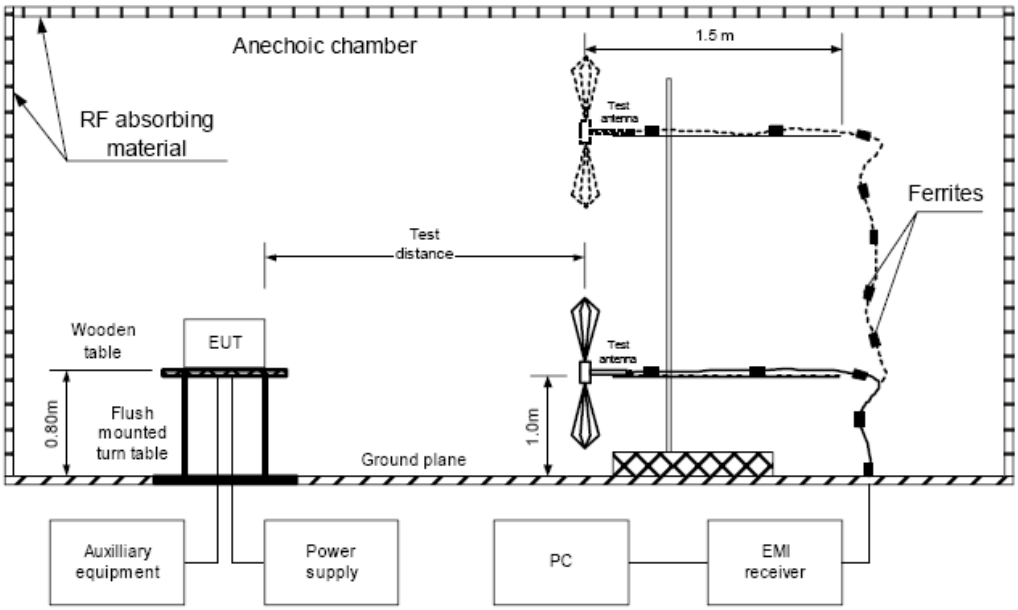


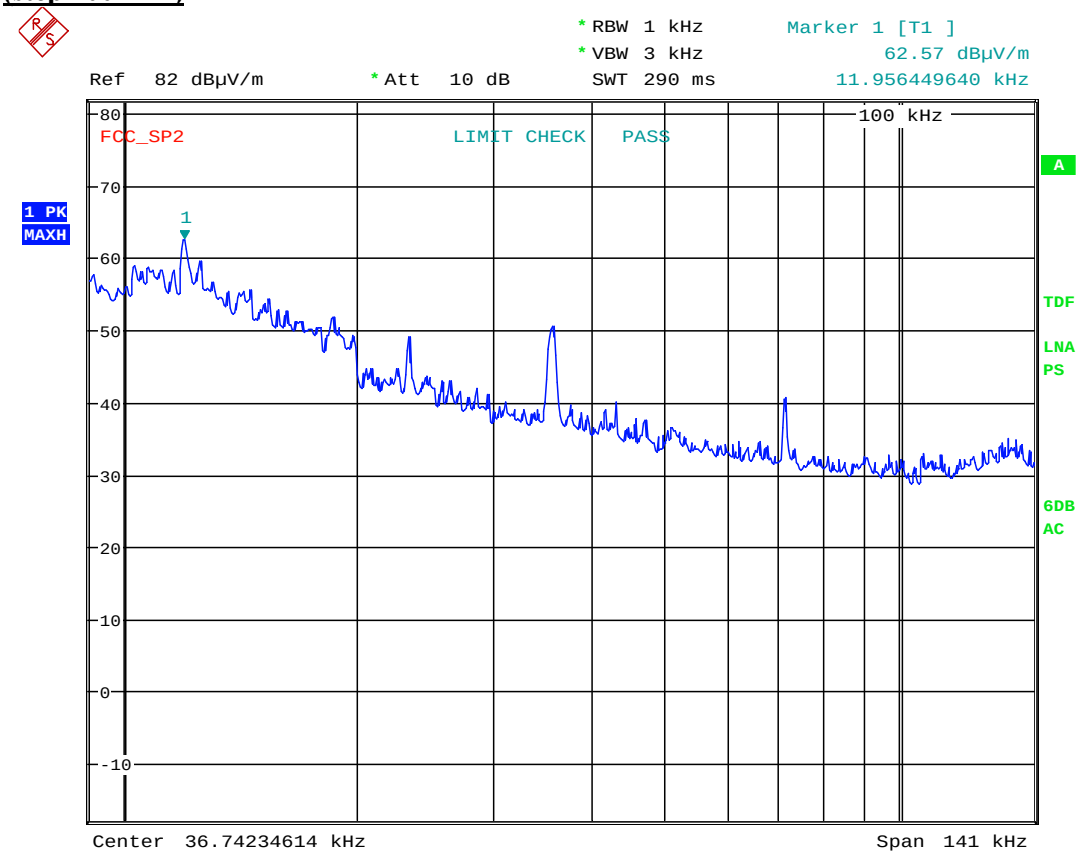
Figure 3.9.2 Test setup layout (above 30 MHz and below 10 GHz)



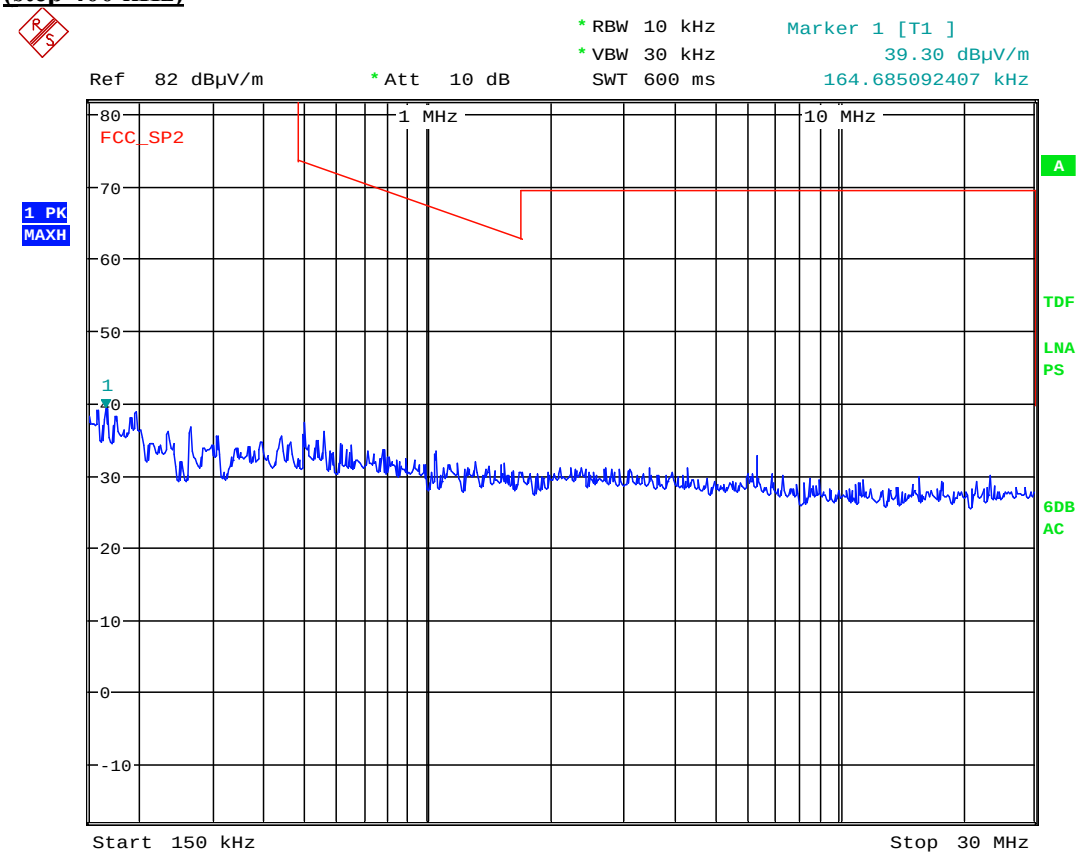
3.9.3 Test result 9 kHz - 10000 kHz

Temperature: +18 ^{o}C Relative humidity: 45 %

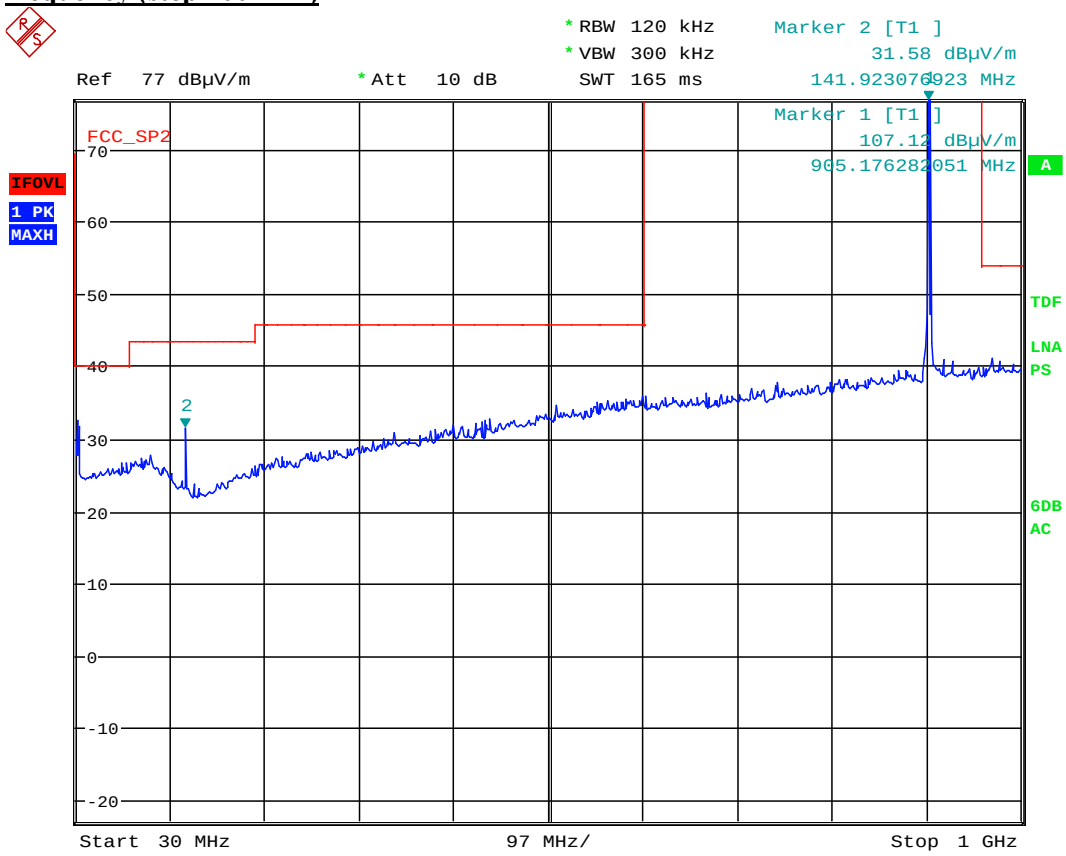
Plot 3.9.1 Radiated emission measurements from 9 kHz to 150 kHz at the 904.8 MHz carrier frequency (step 400 kHz)



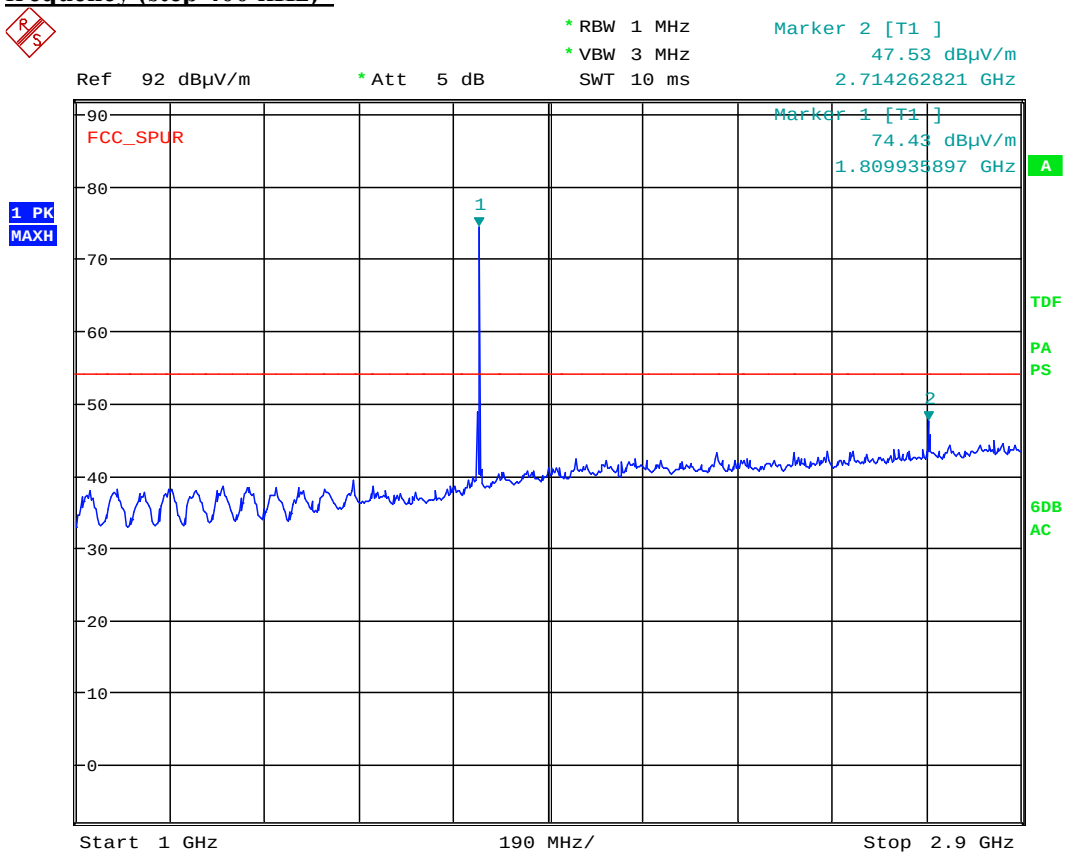
Plot 3.9.2 Radiated emission measurements from 150 kHz to 30 MHz at the 904.8 MHz carrier frequency (step 400 kHz)



Plot 3.9.3 Radiated emission measurements from 30 MHz to 1000 MHz at the 904.8 MHz carrier frequency (step 400 kHz)

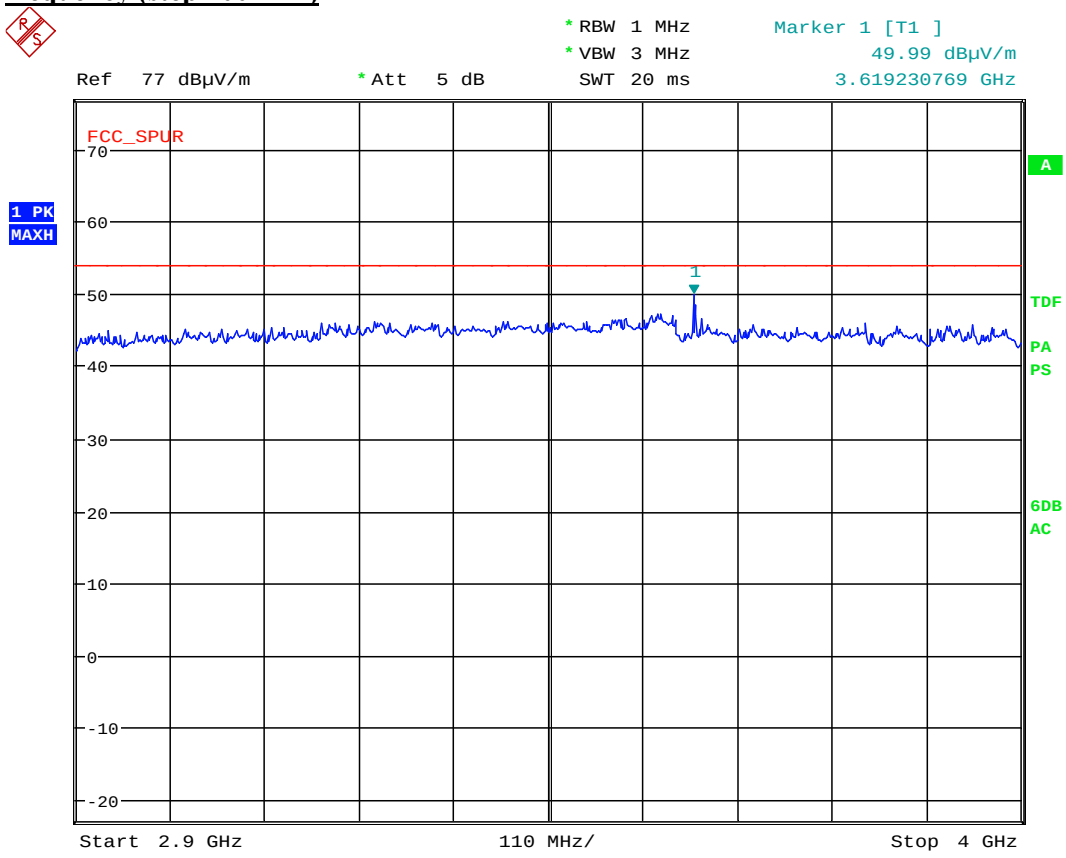


Plot 3.9.4 Radiated emission measurements from 1000 MHz to 2900 MHz at the 904.8 MHz carrier frequency (step 400 kHz)*

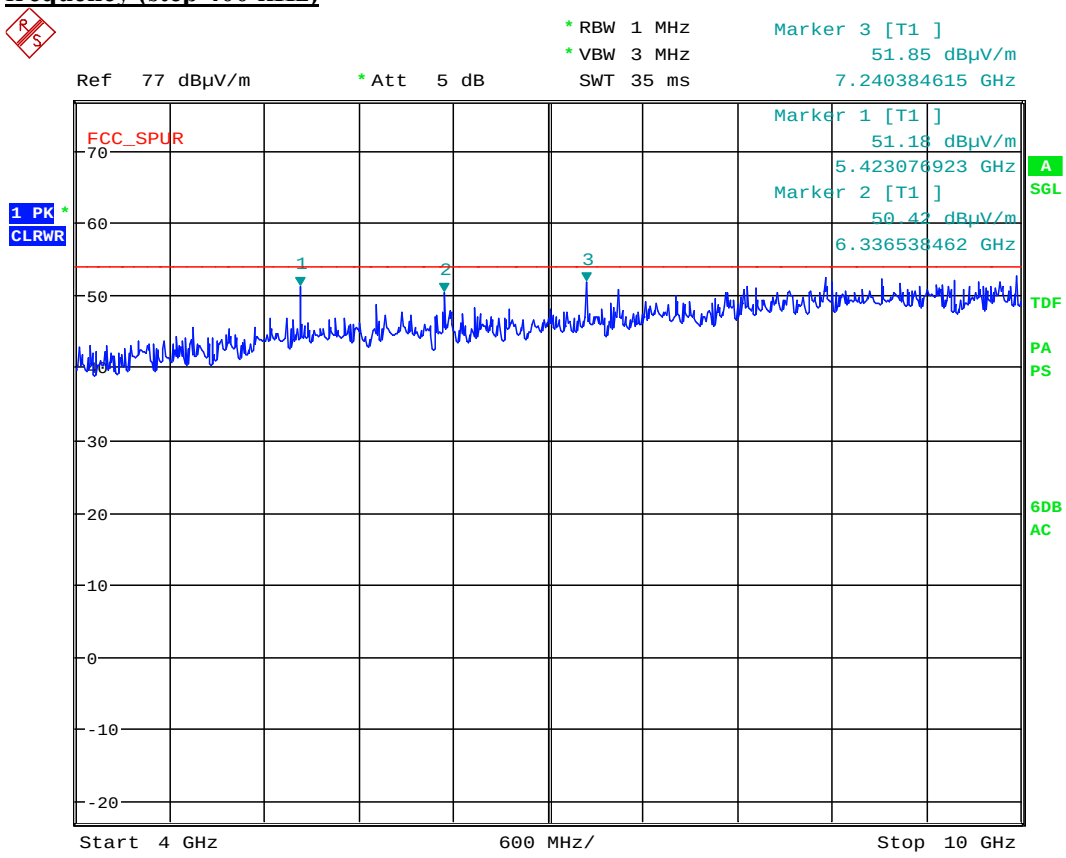


*** - limit for restricted bands does not apply to the second harmonic (904.8 MHz)**

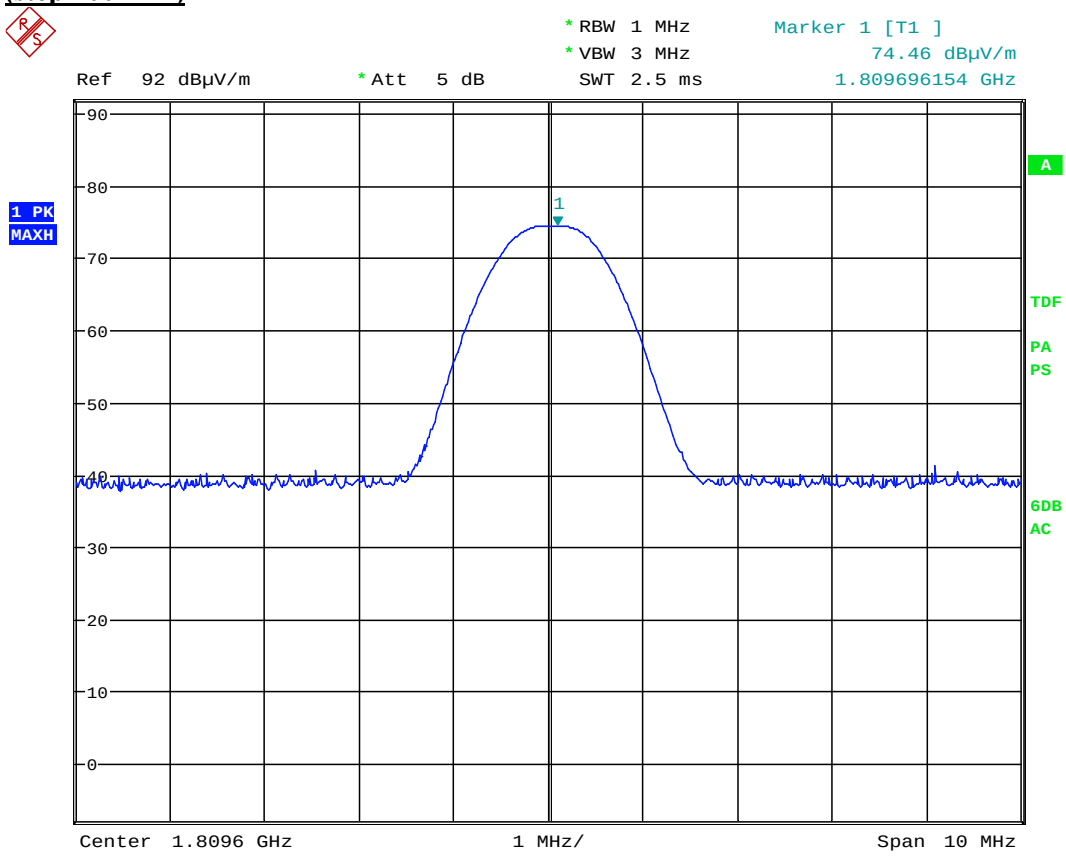
Plot 3.9.5 Radiated emission measurements from 2900 MHz to 4000 MHz at the 904.8 MHz carrier frequency (step 400 kHz)



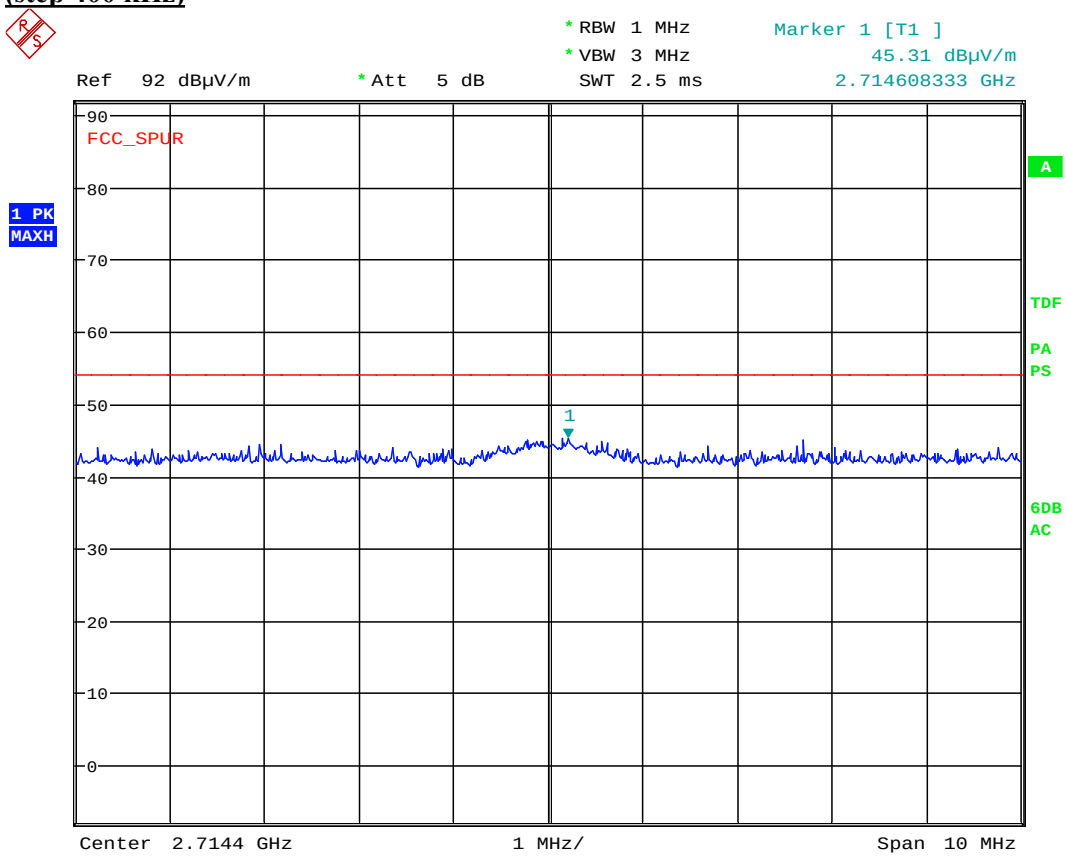
Plot 3.9.6 Radiated emission measurements from 4000 MHz to 10000 MHz at the 904.8 MHz carrier frequency (step 400 kHz)



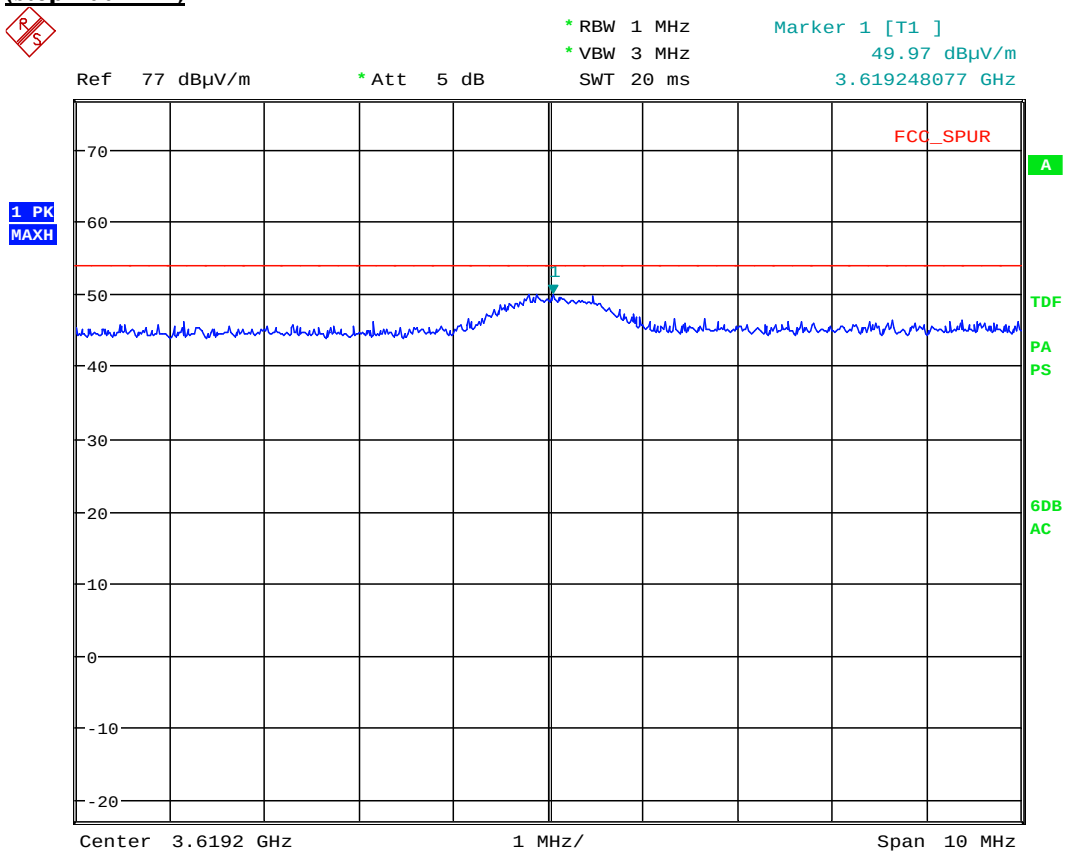
Plot 3.9.7 Radiated emission measurements at the second harmonic of 904.8 MHz carrier frequency (step 400 kHz)



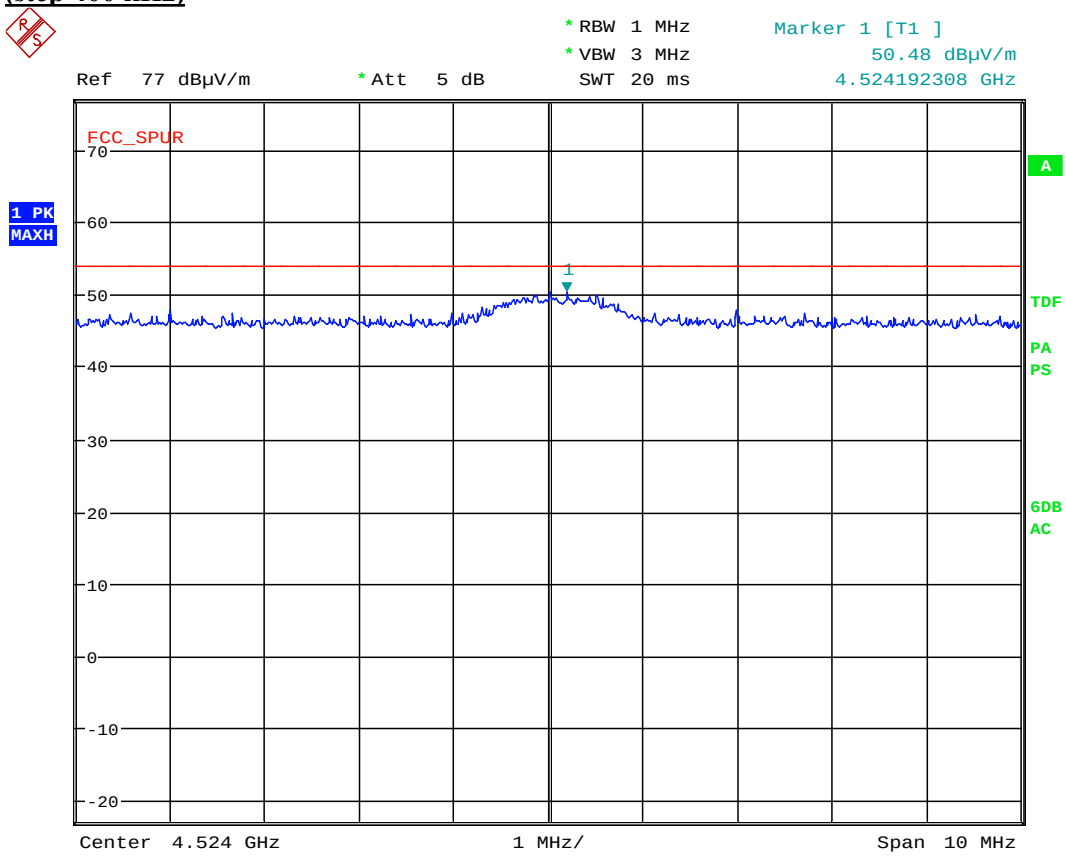
Plot 3.9.8 Radiated emission measurements at the third harmonic of 904.8 MHz carrier frequency (step 400 kHz)



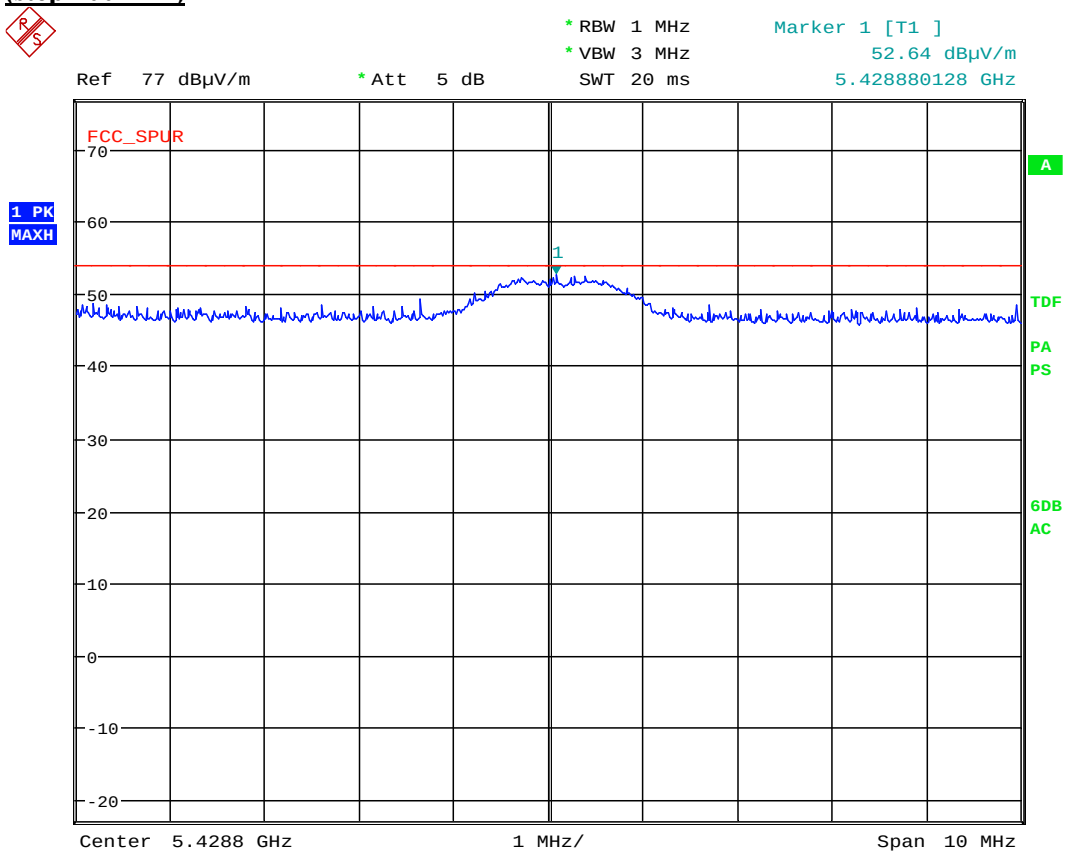
Plot 3.9.9 Radiated emission measurements at the forth harmonic of 904.8 MHz carrier frequency (step 400 kHz)



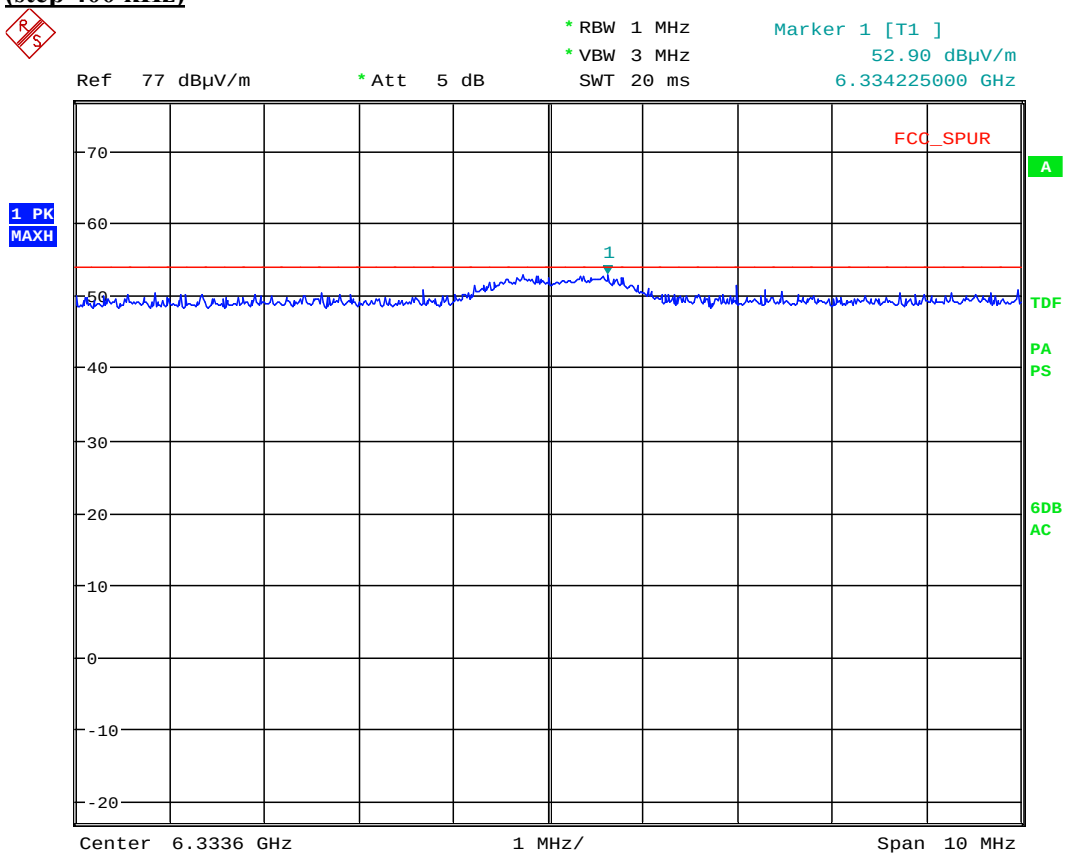
Plot 3.9.10 Radiated emission measurements at the fifth harmonic of 904.8 MHz carrier frequency (step 400 kHz)



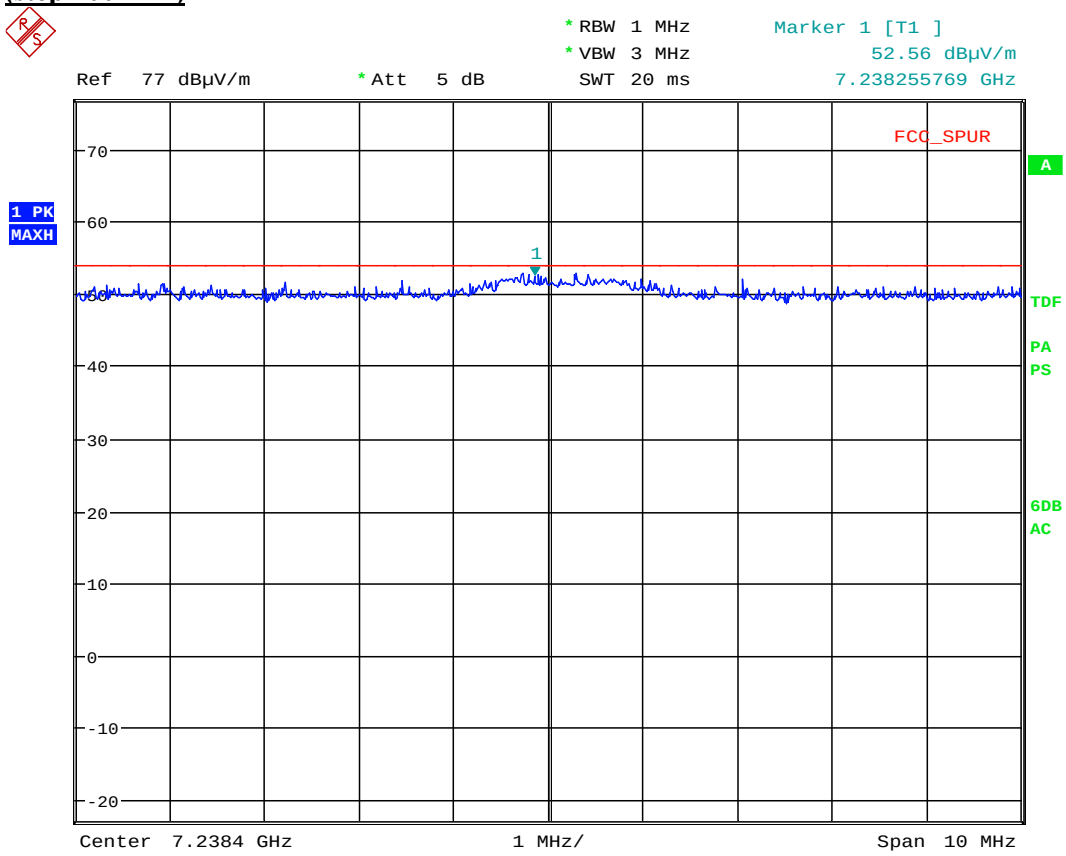
Plot 3.9.11 Radiated emission measurements at the sixth harmonic of 904.8 MHz carrier frequency (step 400 kHz)



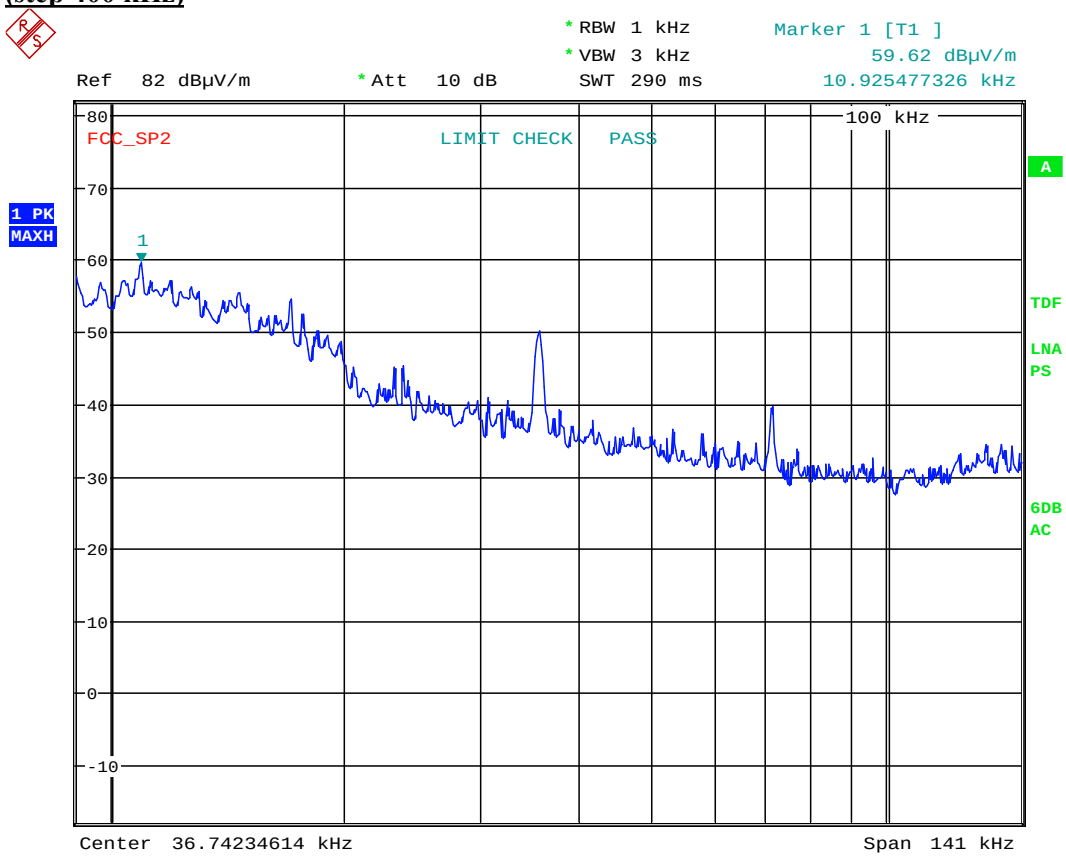
Plot 3.9.12 Radiated emission measurements at the seventh harmonic of 904.8 MHz carrier frequency (step 400 kHz)



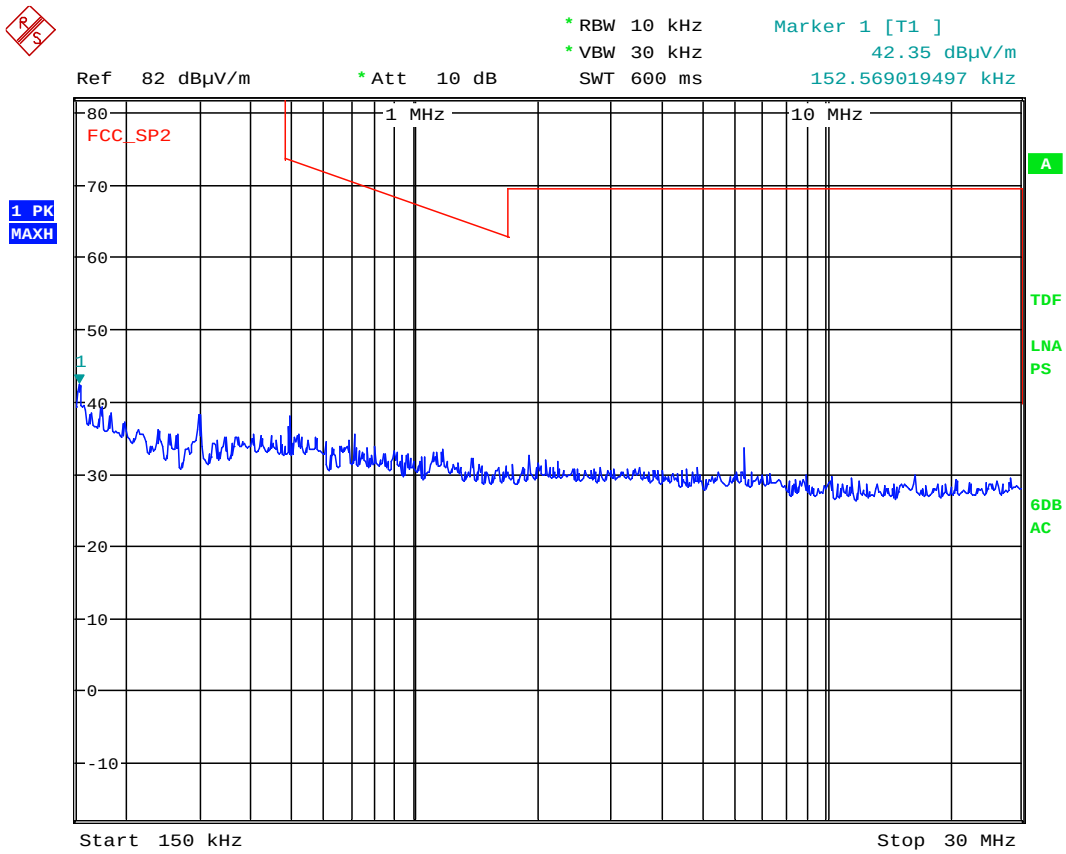
Plot 3.9.13 Radiated emission measurements at the eighth harmonic of 904.8 MHz carrier frequency (step 400 kHz)



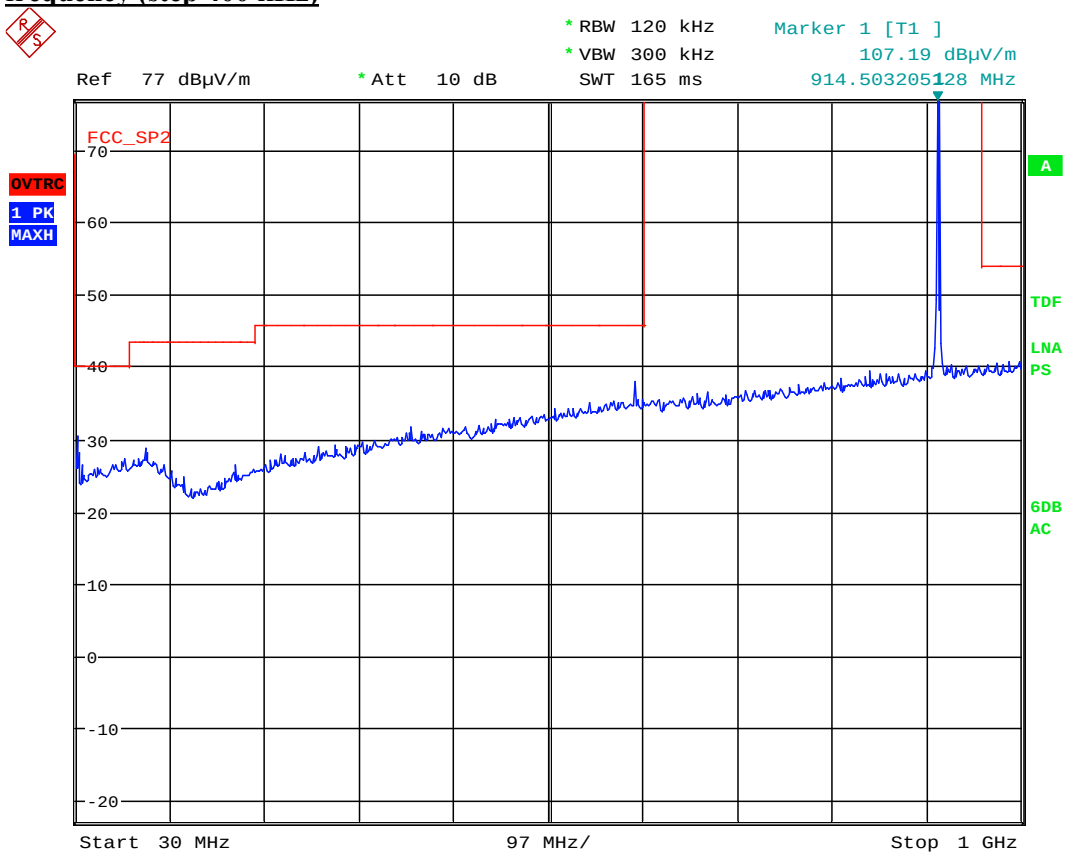
Plot 3.9.14 Radiated emission measurements from 9 kHz to 150 kHz at the 914.4 MHz carrier frequency (step 400 kHz)



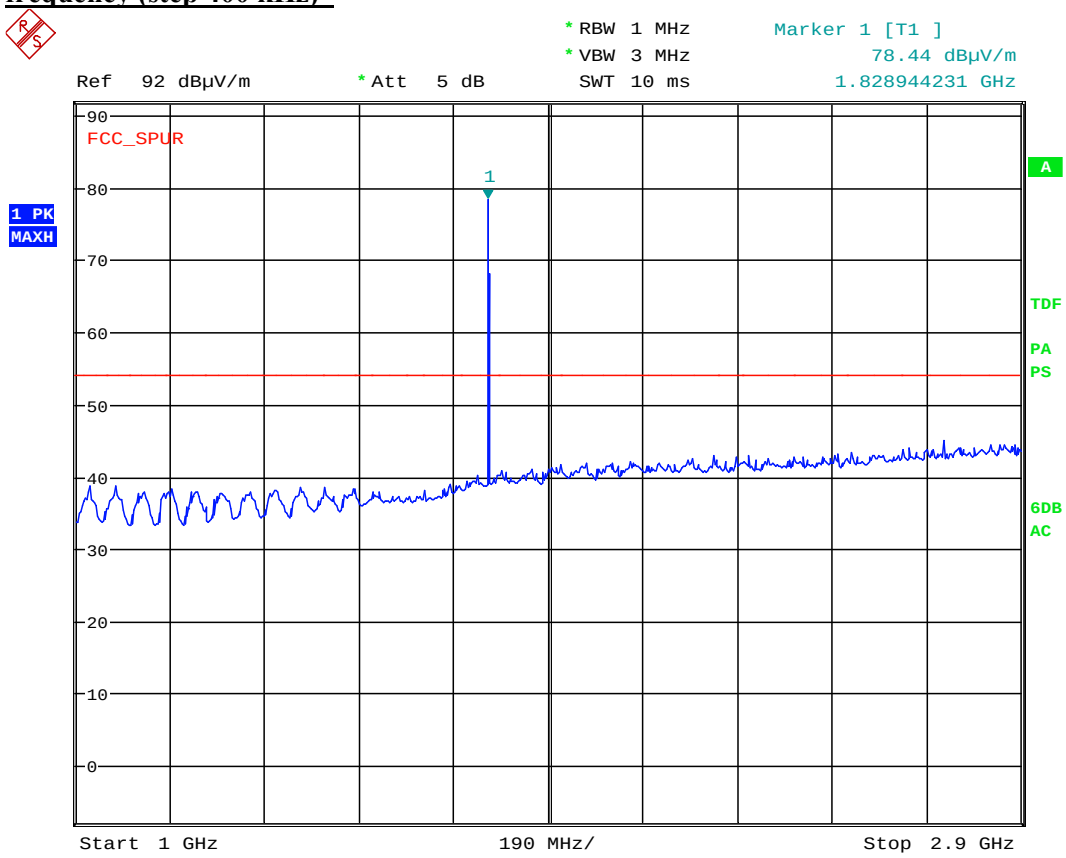
Plot 3.9.15 Radiated emission measurements from 150 kHz to 30 MHz at the 914.4 MHz carrier frequency (step 400 kHz)



Plot 3.9.16 Radiated emission measurements from 30 MHz to 1000 MHz at the 914.4 MHz carrier frequency (step 400 kHz)

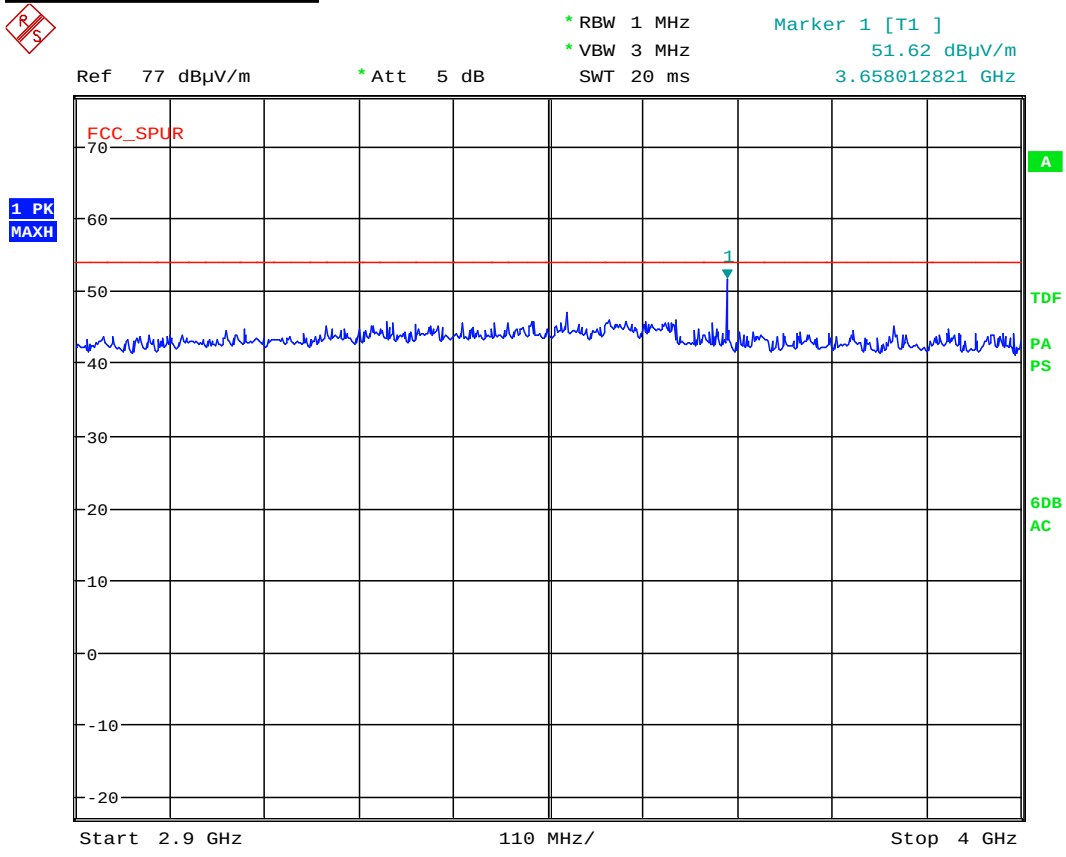


Plot 3.9.17 Radiated emission measurements from 1000 MHz to 2900 MHz at the 914.4 MHz carrier frequency (step 400 kHz)*

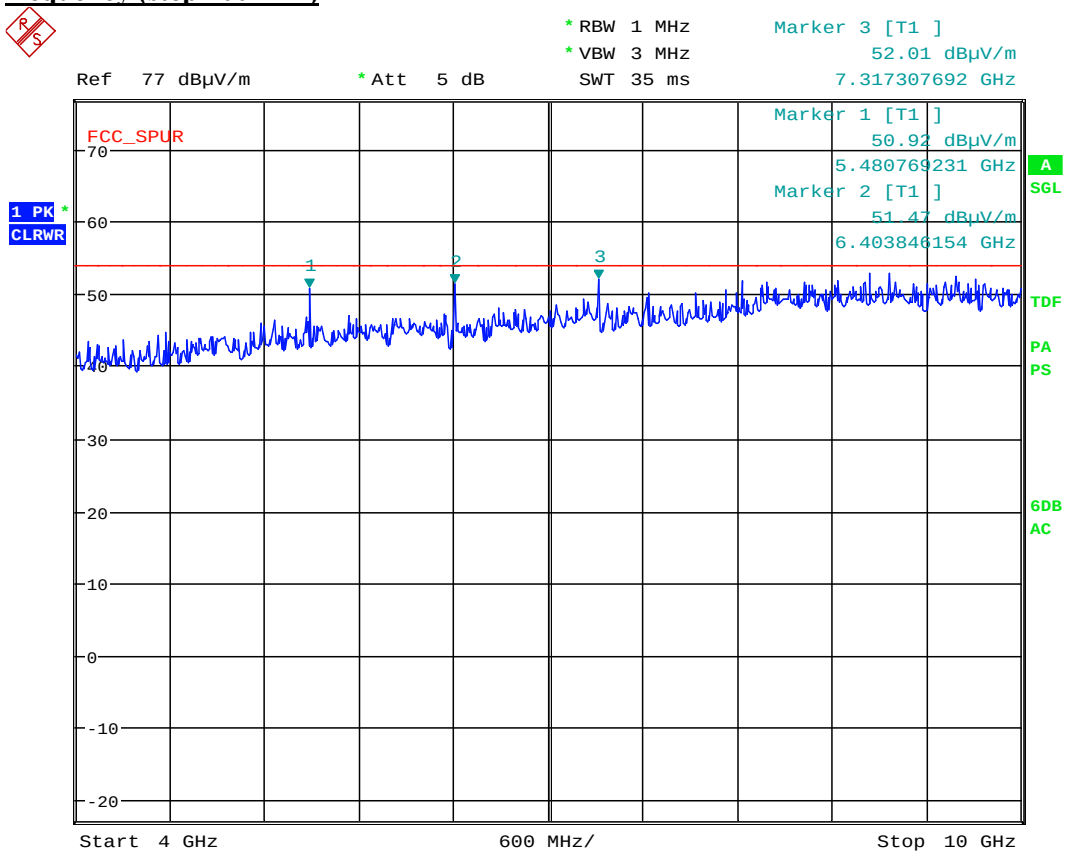


*** - limit for restricted bands does not apply to the second harmonic (914.4 MHz)**

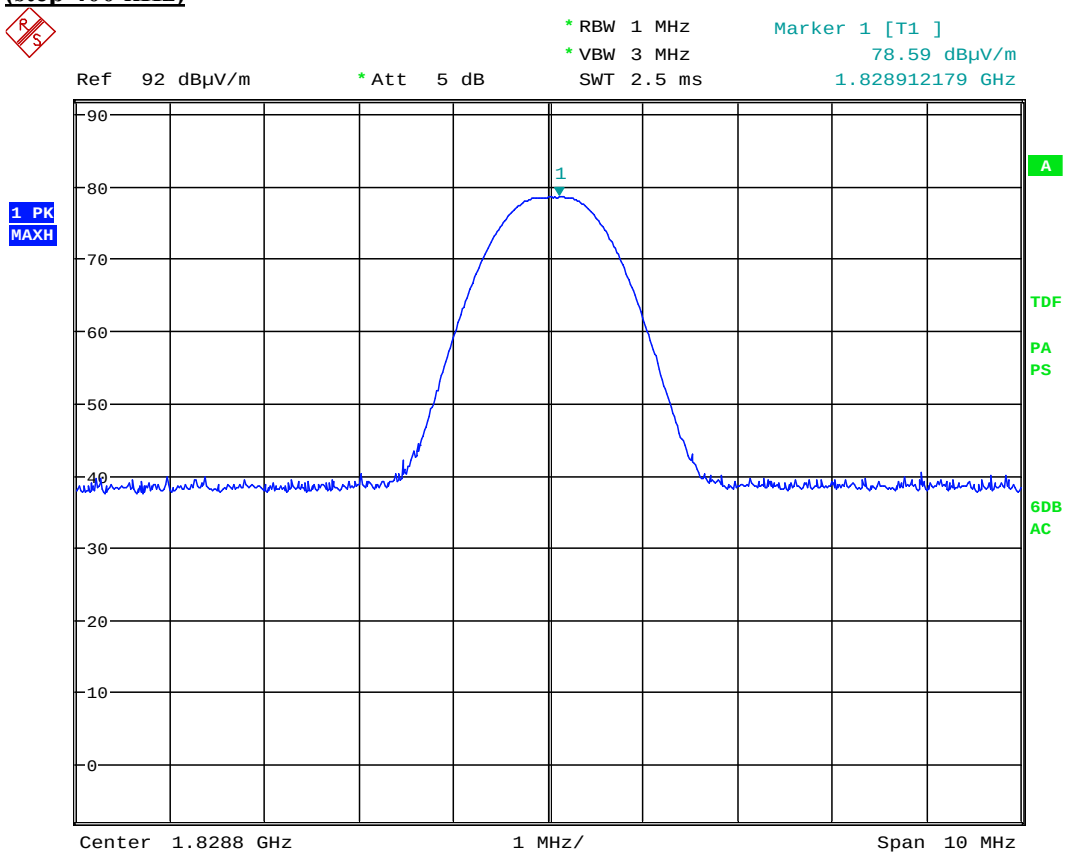
Plot 3.9.18 Radiated emission measurements from 2900 MHz to 4000 MHz at the 914.4 MHz carrier frequency (step 400 kHz)



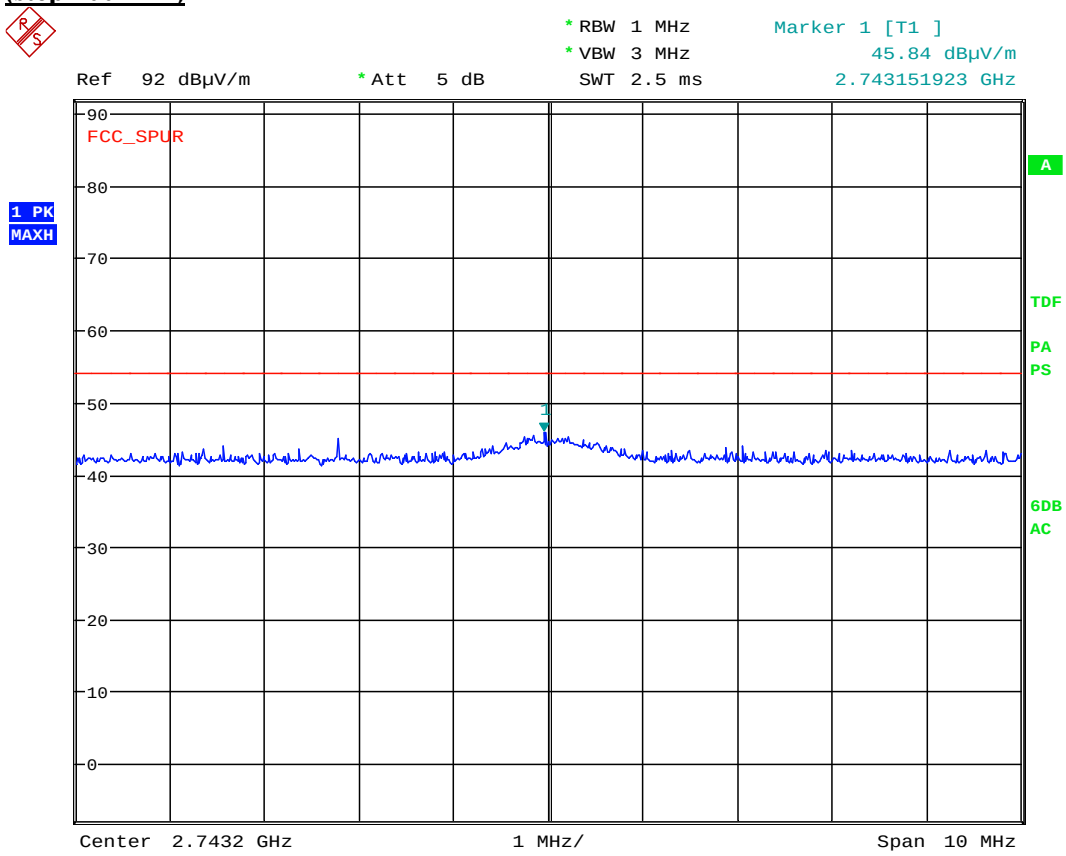
Plot 3.9.19 Radiated emission measurements from 4000 MHz to 10000 MHz at the 914.4 MHz carrier frequency (step 400 kHz)



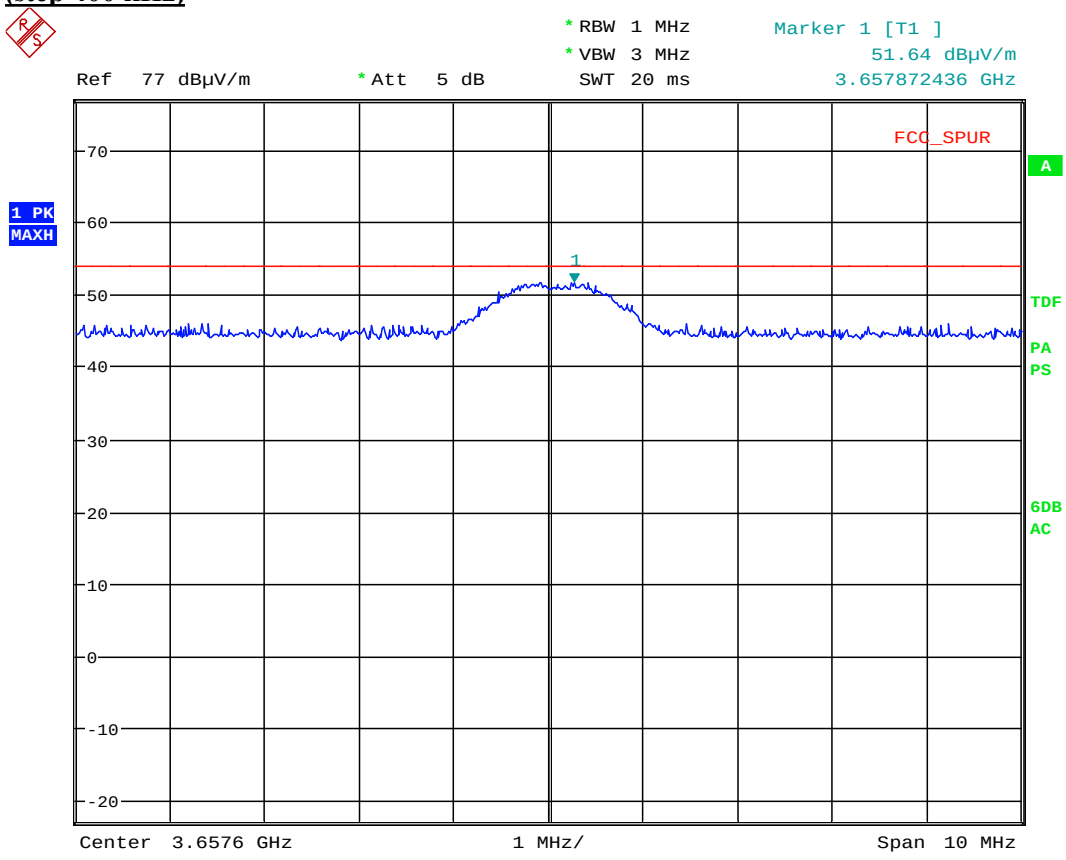
Plot 3.9.20 Radiated emission measurements at the second harmonic of 914.4 MHz carrier frequency (step 400 kHz)



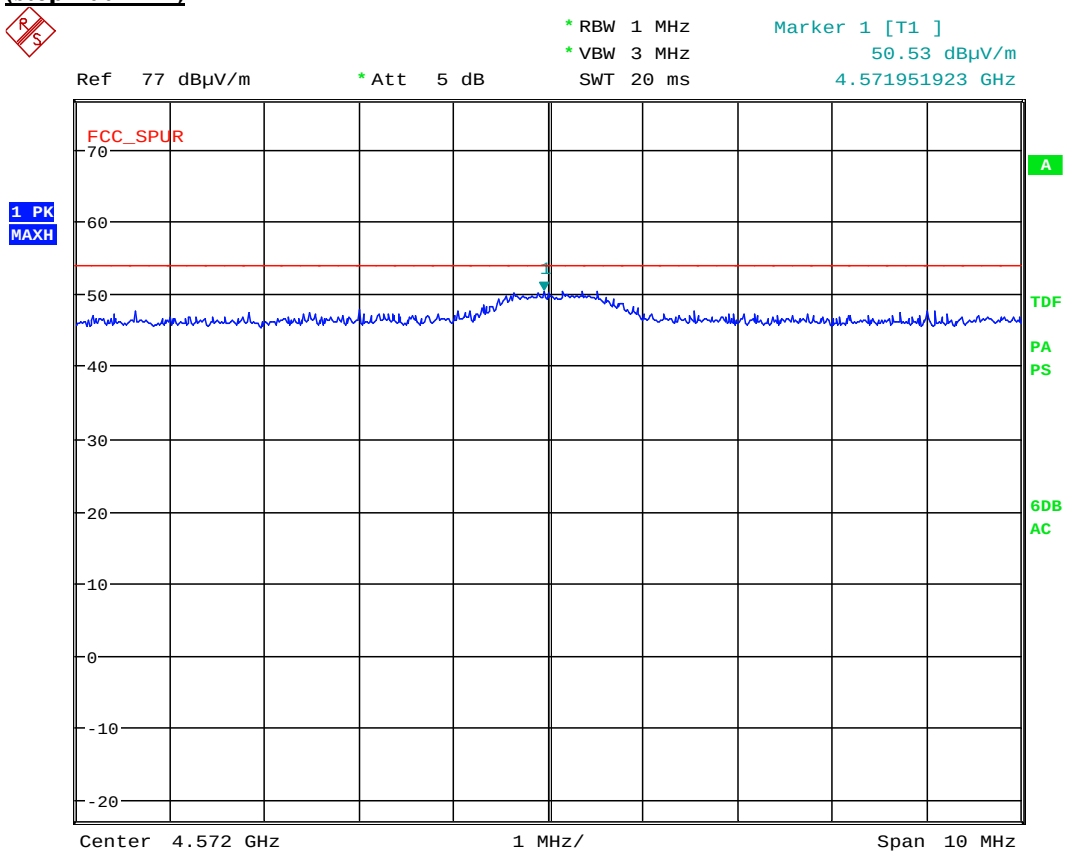
Plot 3.9.21 Radiated emission measurements at the third harmonic of 914.4 MHz carrier frequency (step 400 kHz)



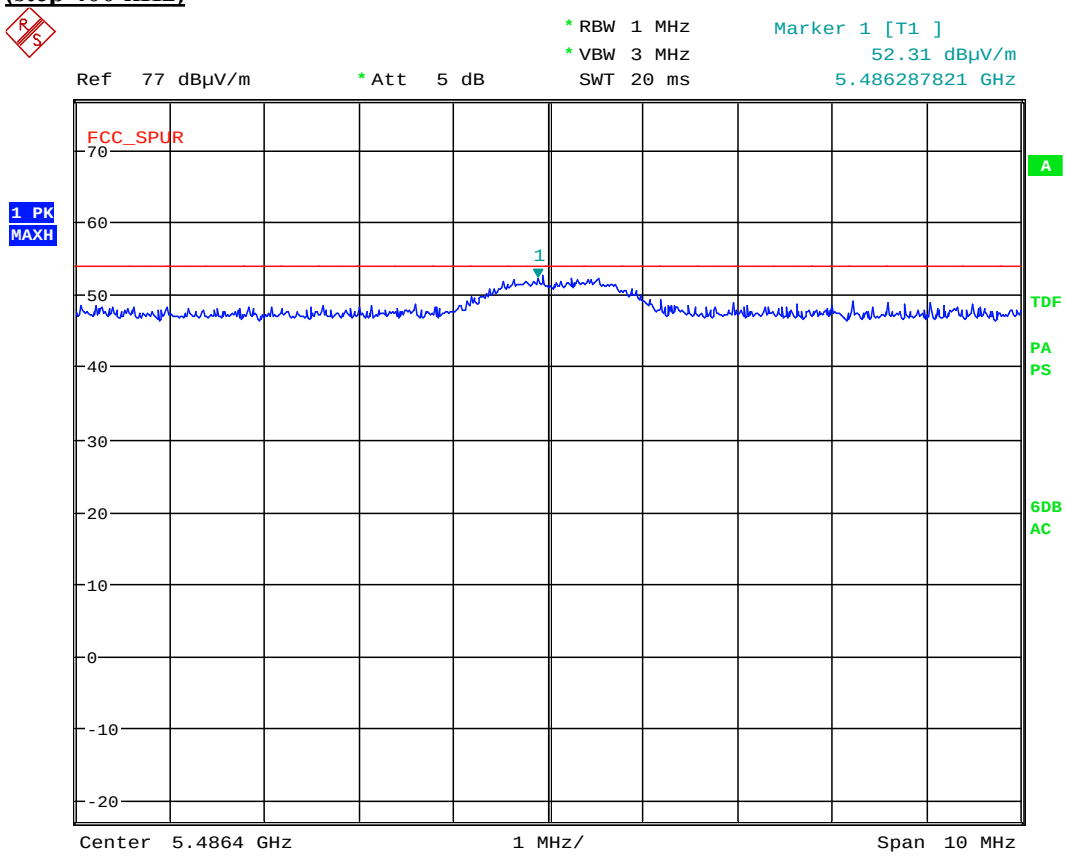
Plot 3.9.22 Radiated emission measurements at the forth harmonic of 914.4 MHz carrier frequency (step 400 kHz)



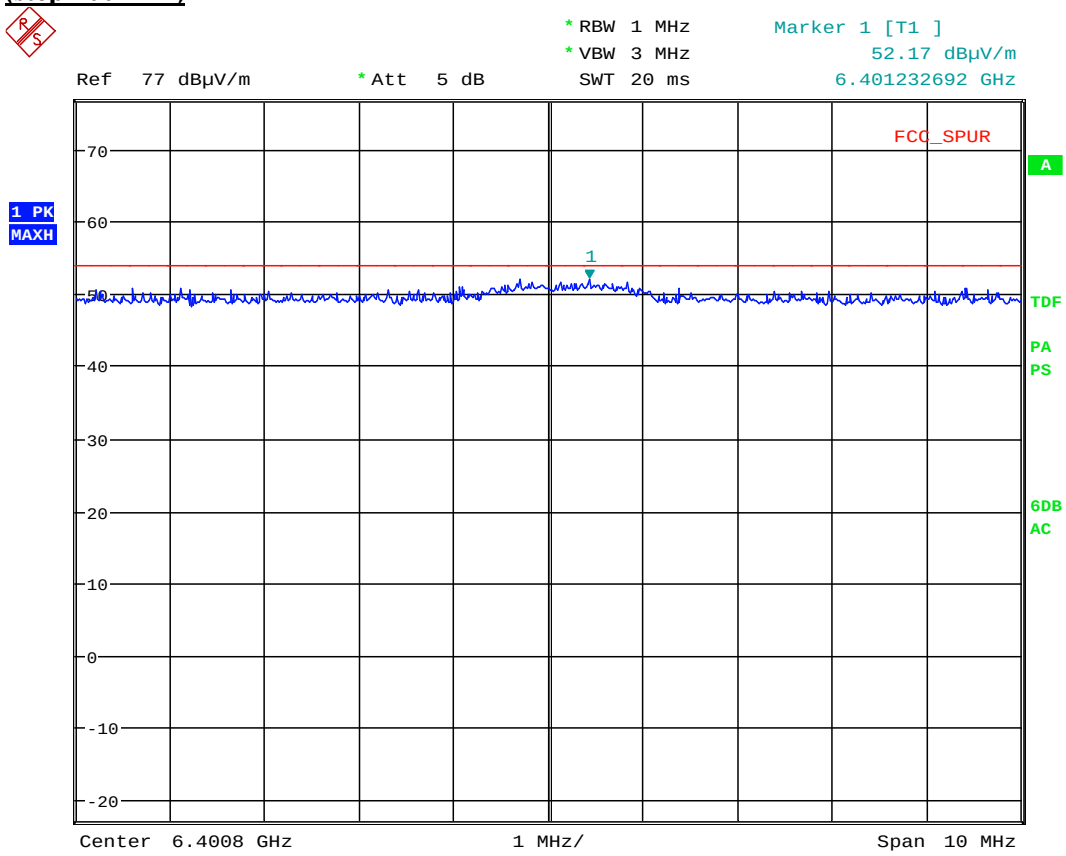
Plot 3.9.23 Radiated emission measurements at the fifth harmonic of 914.4 MHz carrier frequency (step 400 kHz)



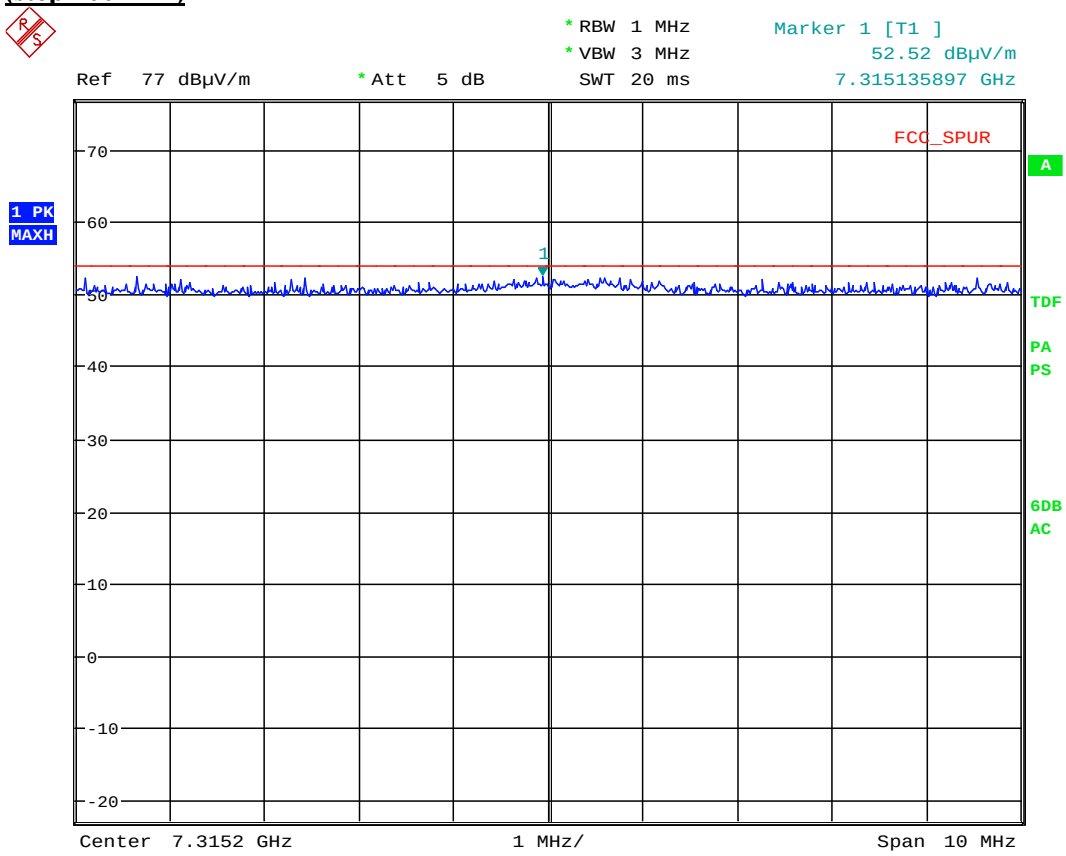
Plot 3.9.24 Radiated emission measurements at the sixth harmonic of 914.4 MHz carrier frequency (step 400 kHz)



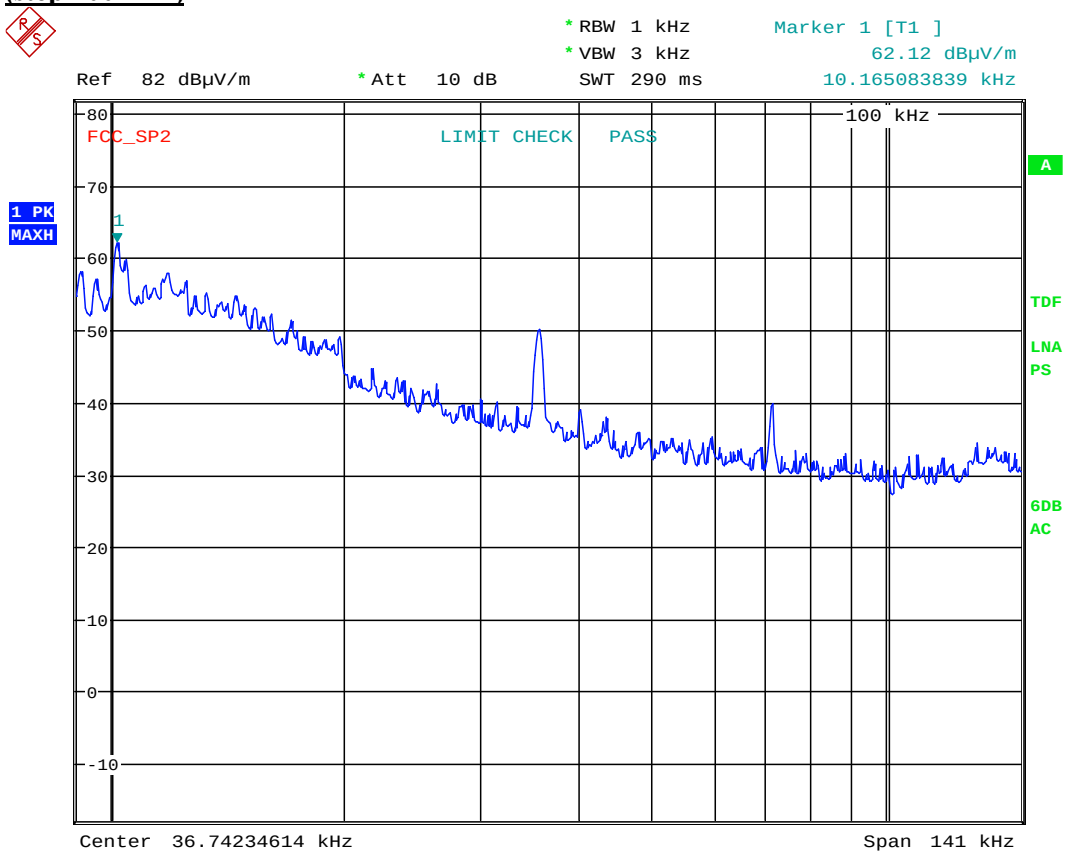
Plot 3.9.25 Radiated emission measurements at the seventh harmonic of 914.4 MHz carrier frequency (step 400 kHz)



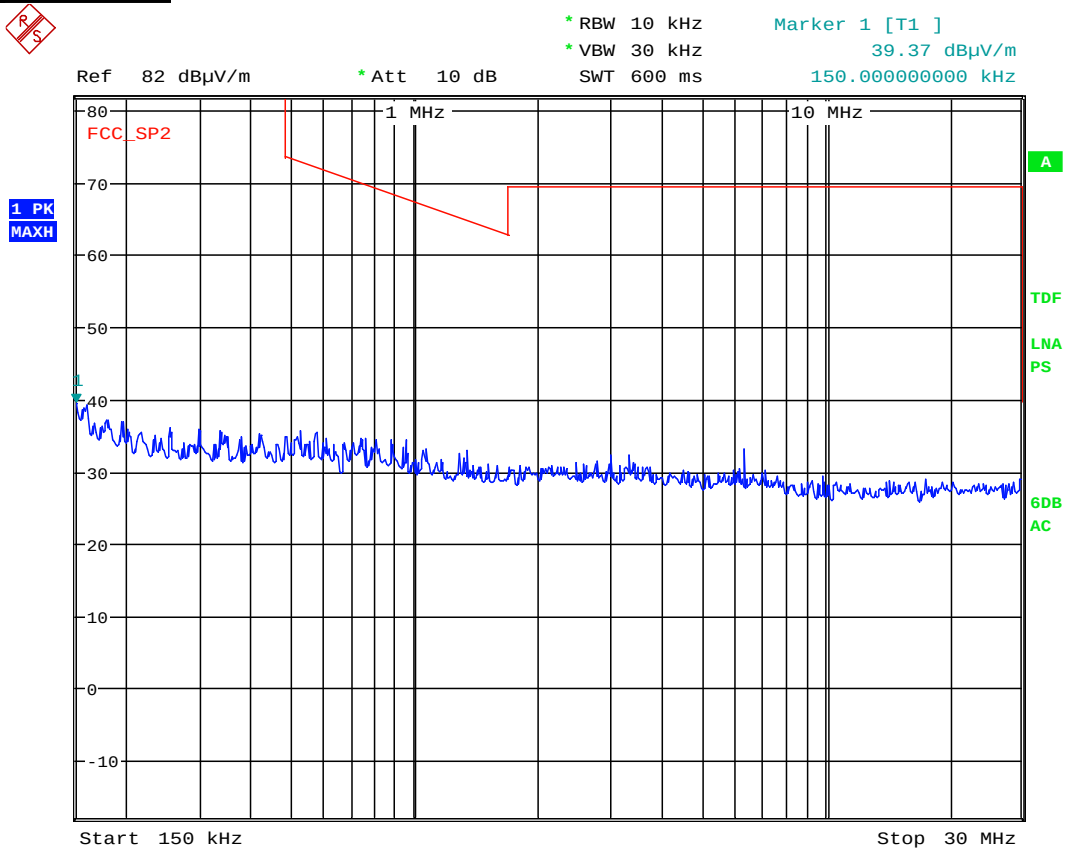
Plot 3.9.26 Radiated emission measurements at the eighth harmonic of 914.4 MHz carrier frequency (step 400 kHz)



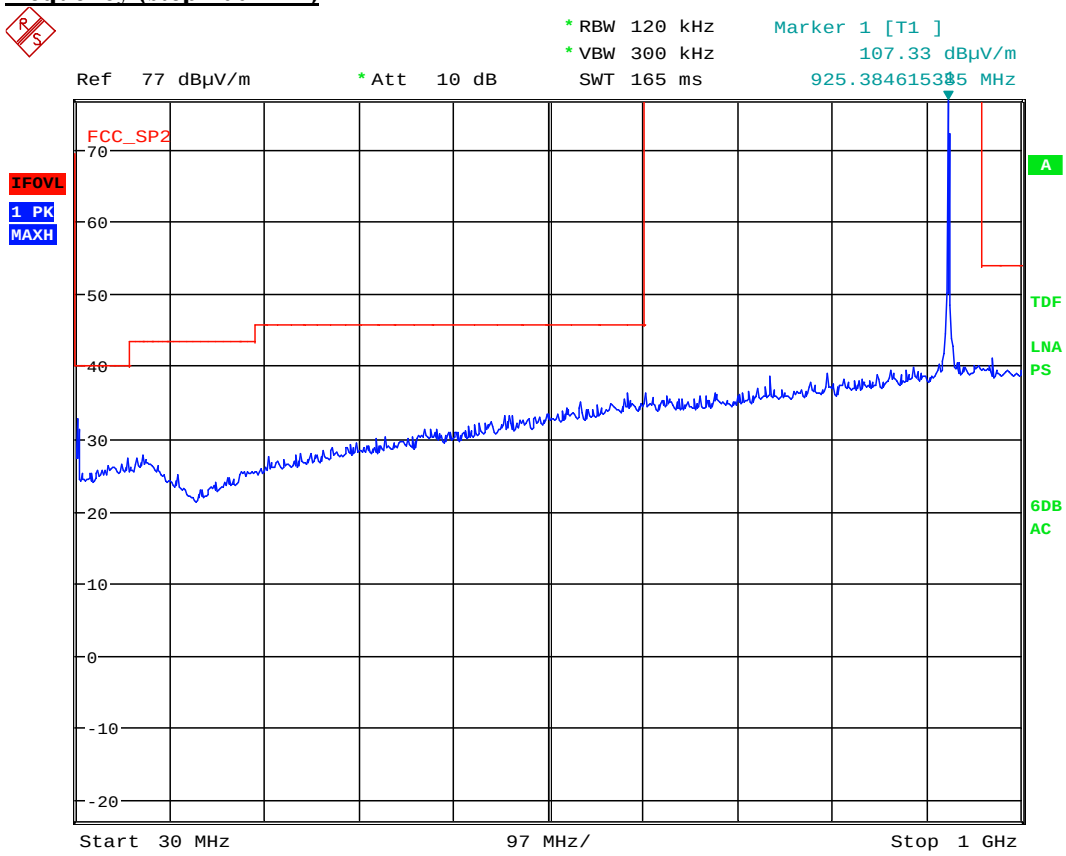
Plot 3.9.27 Radiated emission measurements from 9 kHz to 150 kHz at the 924.8 MHz carrier frequency (step 400 kHz)



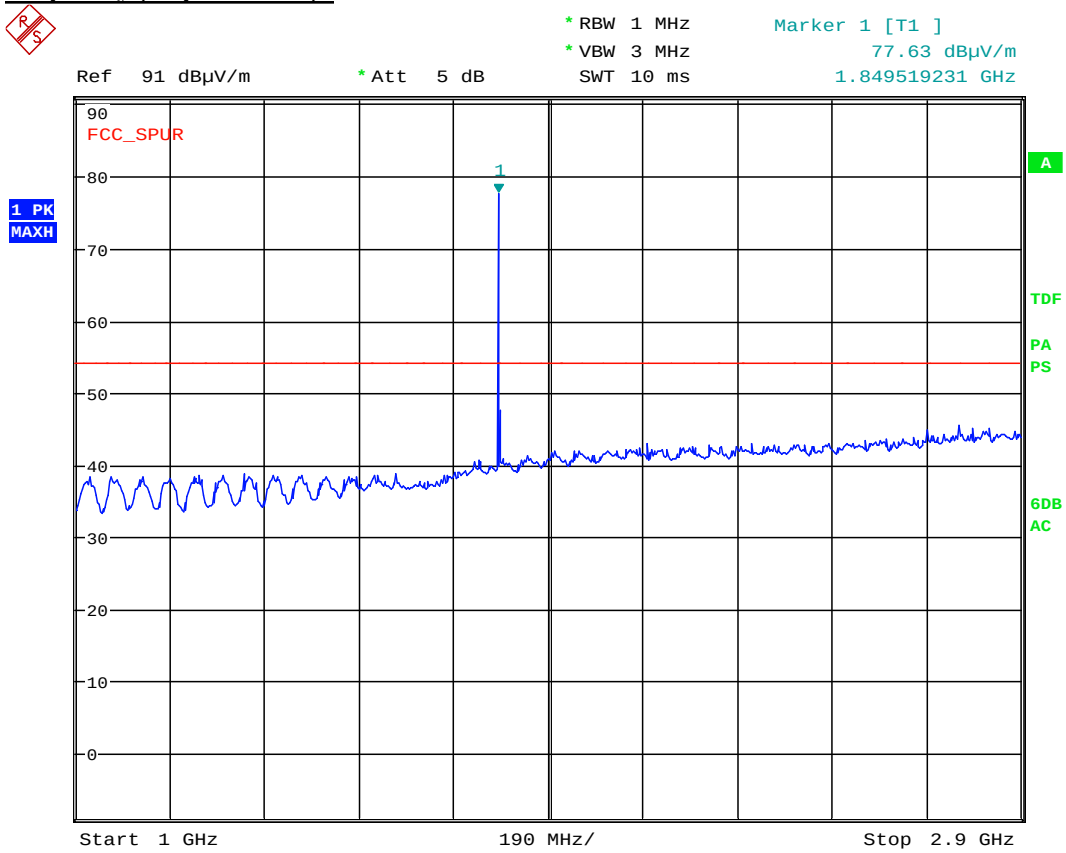
Plot 3.9.28 Radiated emission measurements from 150 kHz to 30 MHz at the 924.8 MHz carrier frequency (step 400 kHz)



Plot 3.9.29 Radiated emission measurements from 30 MHz to 1000 MHz at the 924.8 MHz carrier frequency (step 400 kHz)

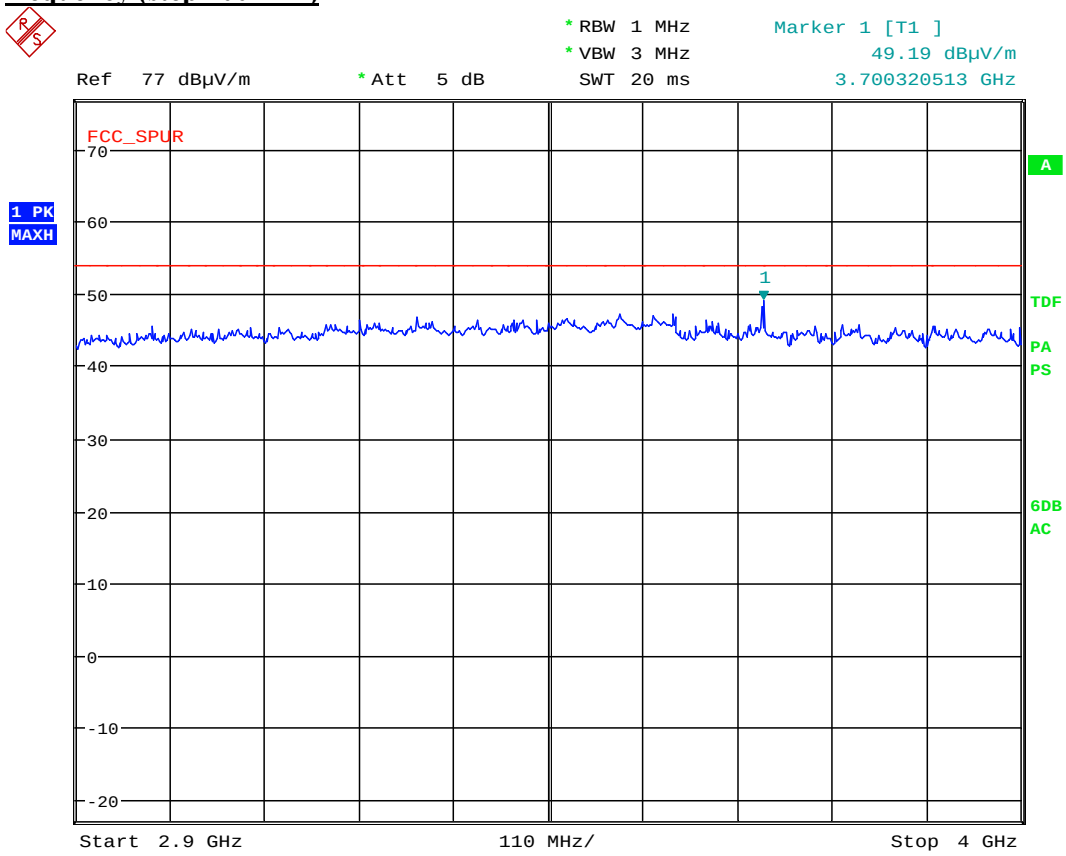


Plot 3.9.30 Radiated emission measurements from 1000 MHz to 2900 MHz at the 924.8 MHz carrier frequency (step 400 kHz)*

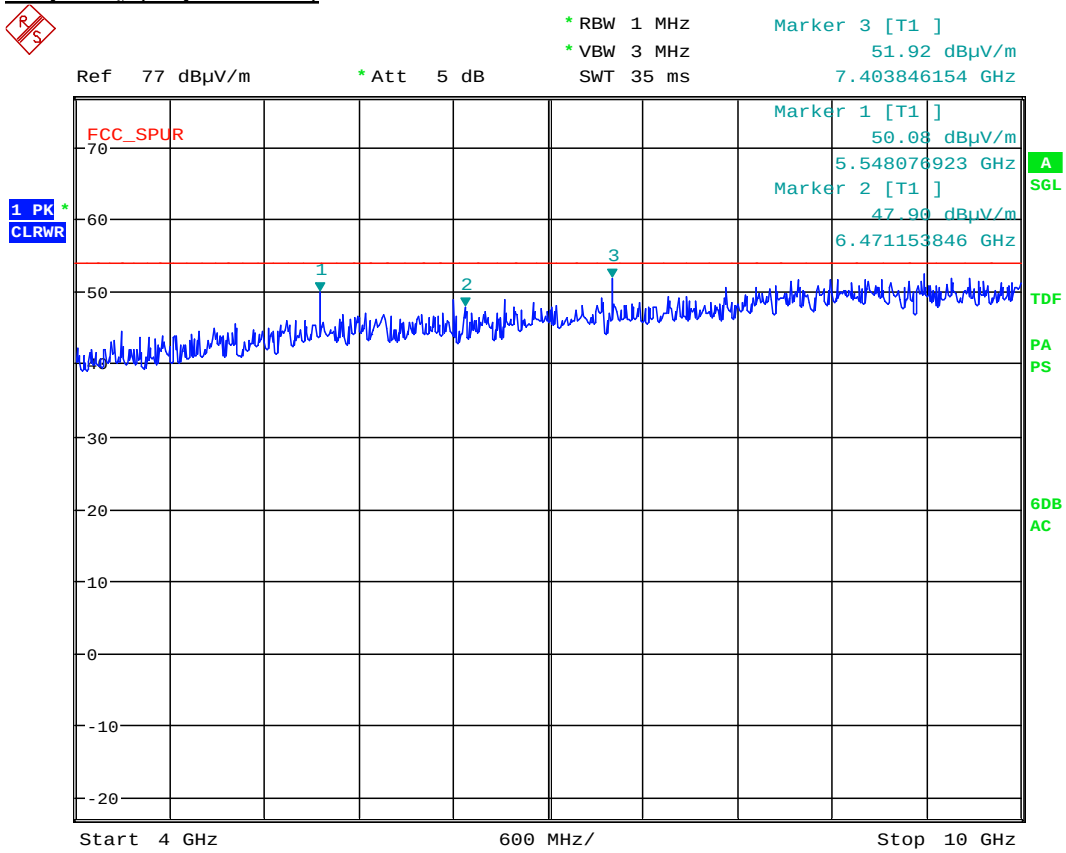


*** - limit for restricted bands does not apply to the second harmonic (924.8 MHz)**

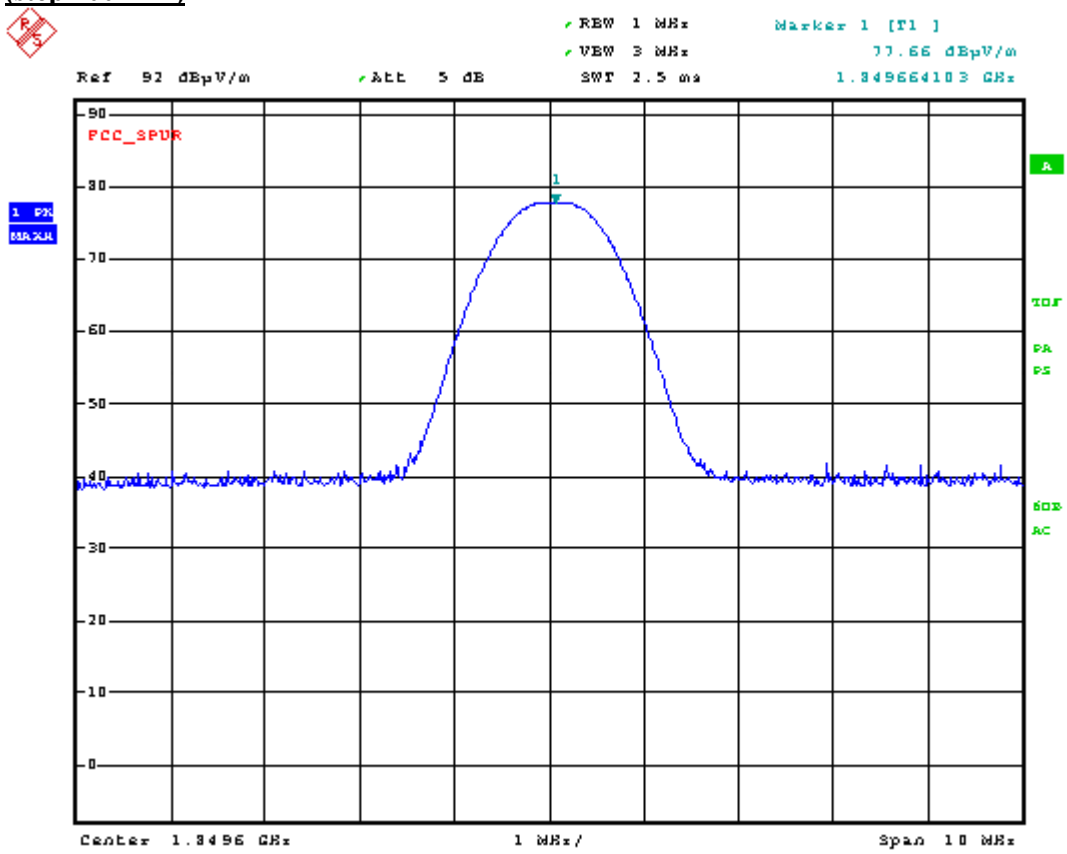
Plot 3.9.31 Radiated emission measurements from 2900 MHz to 4000 MHz at the 924.8 MHz carrier frequency (step 400 kHz)



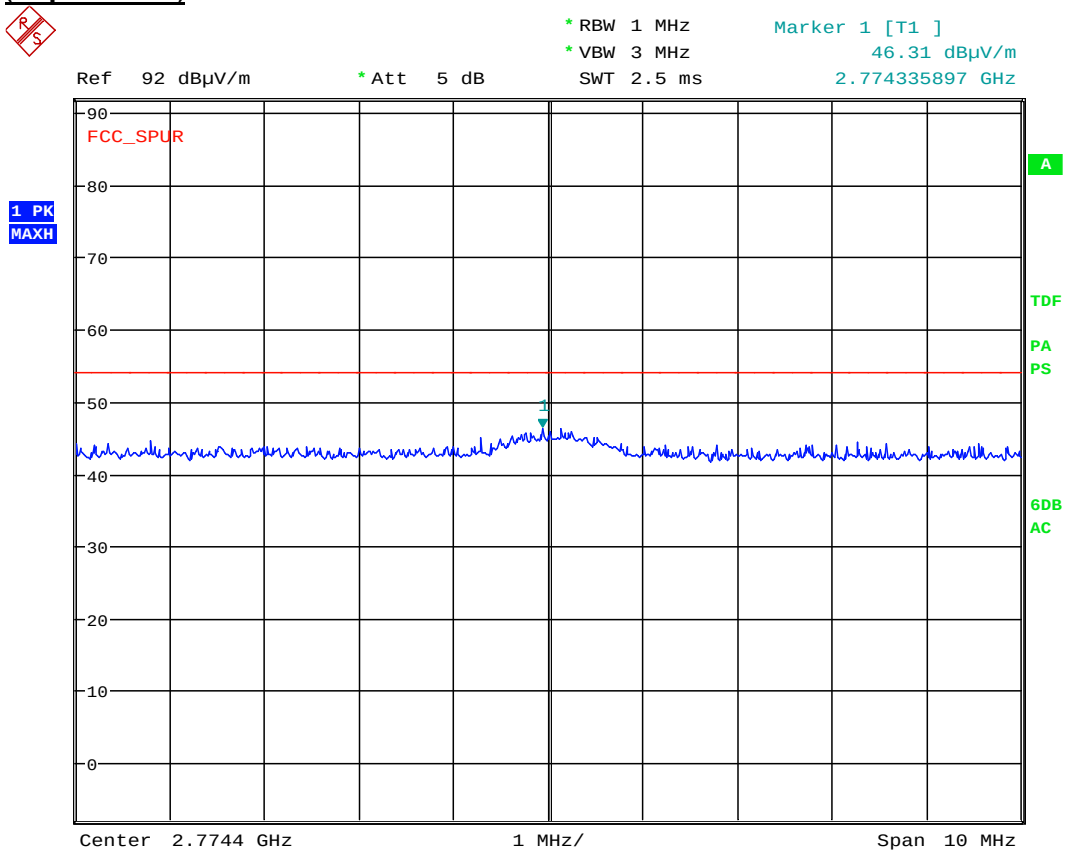
Plot 3.9.32 Radiated emission measurements from 4000 MHz to 10000 MHz at the 924.8 MHz carrier frequency (step 400 kHz)



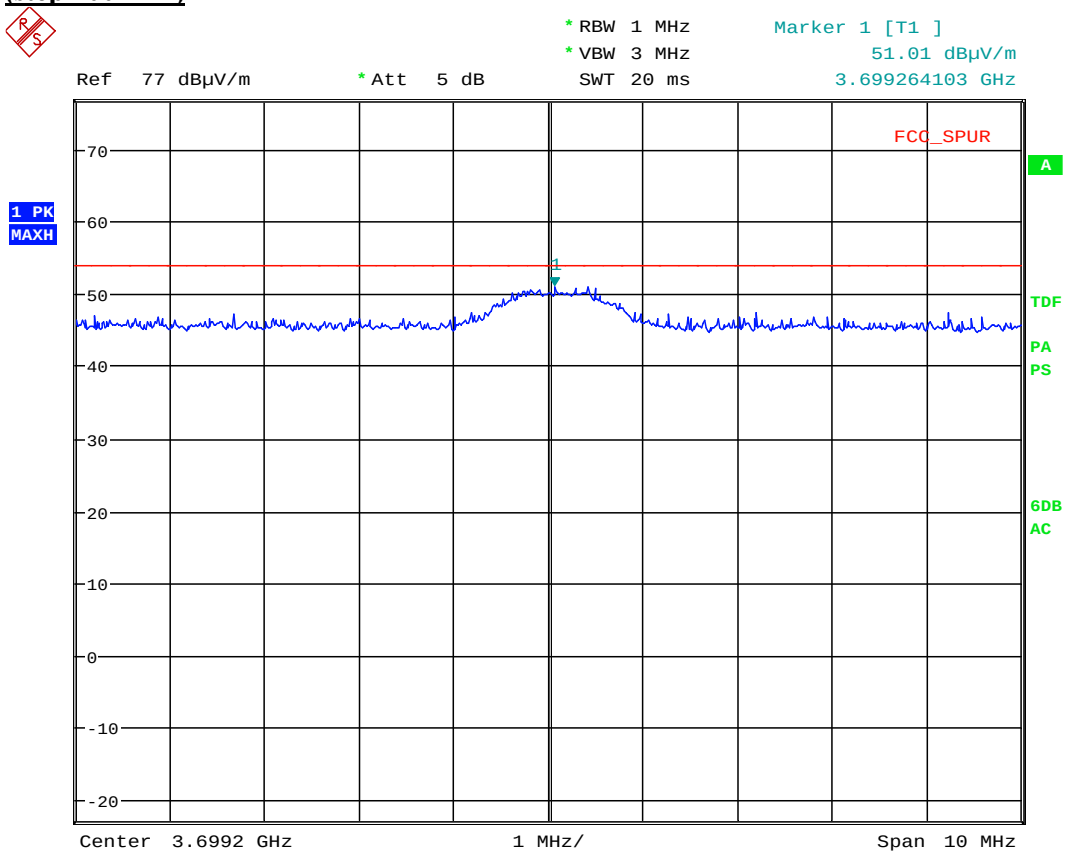
Plot 3.9.33 Radiated emission measurements at the second harmonic of 924.8 MHz carrier frequency (step 400 kHz)



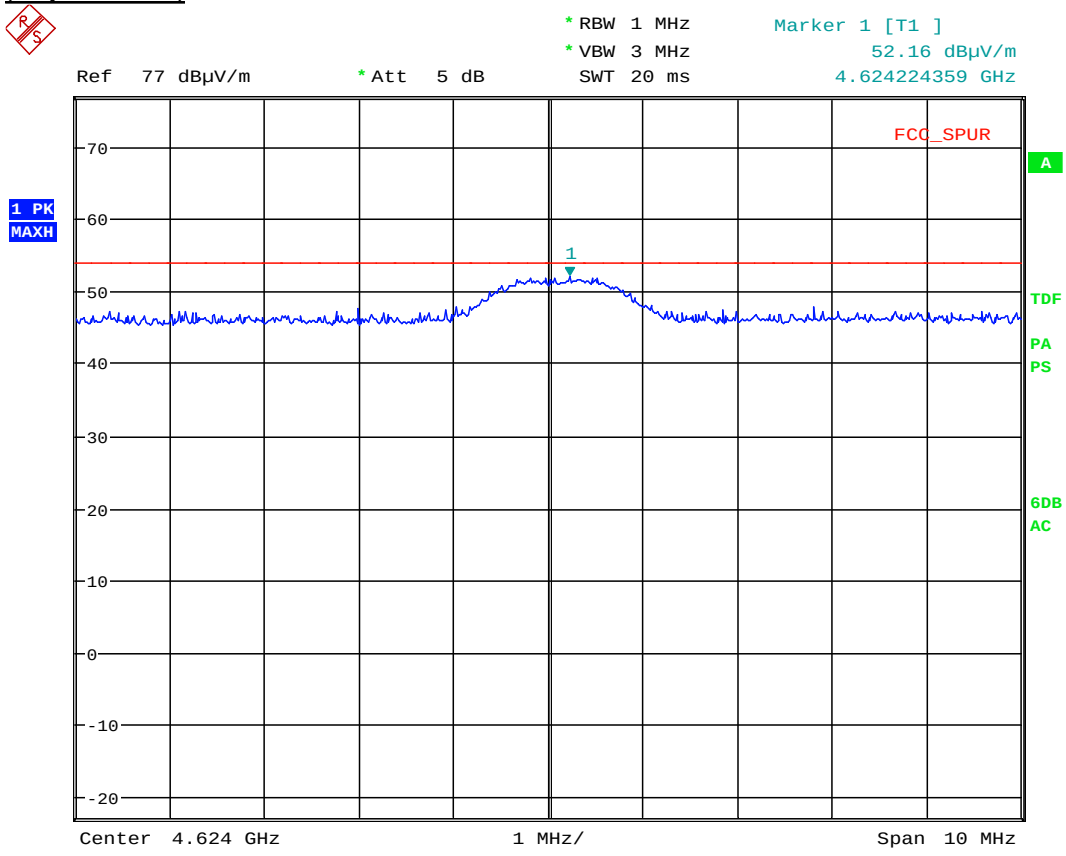
Plot 3.9.34 Radiated emission measurements at the third harmonic of 924.8 MHz carrier frequency (step 400 kHz)



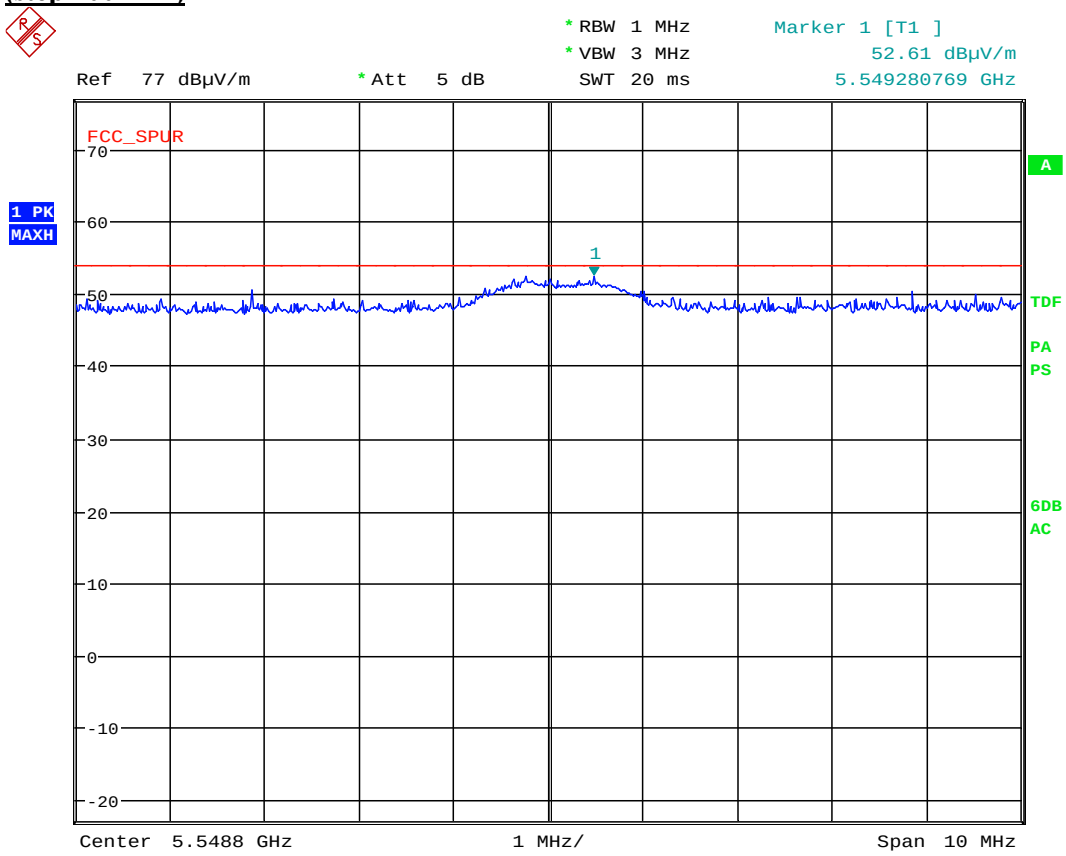
Plot 3.9.35 Radiated emission measurements at the forth harmonic of 924.8 MHz carrier frequency (step 400 kHz)



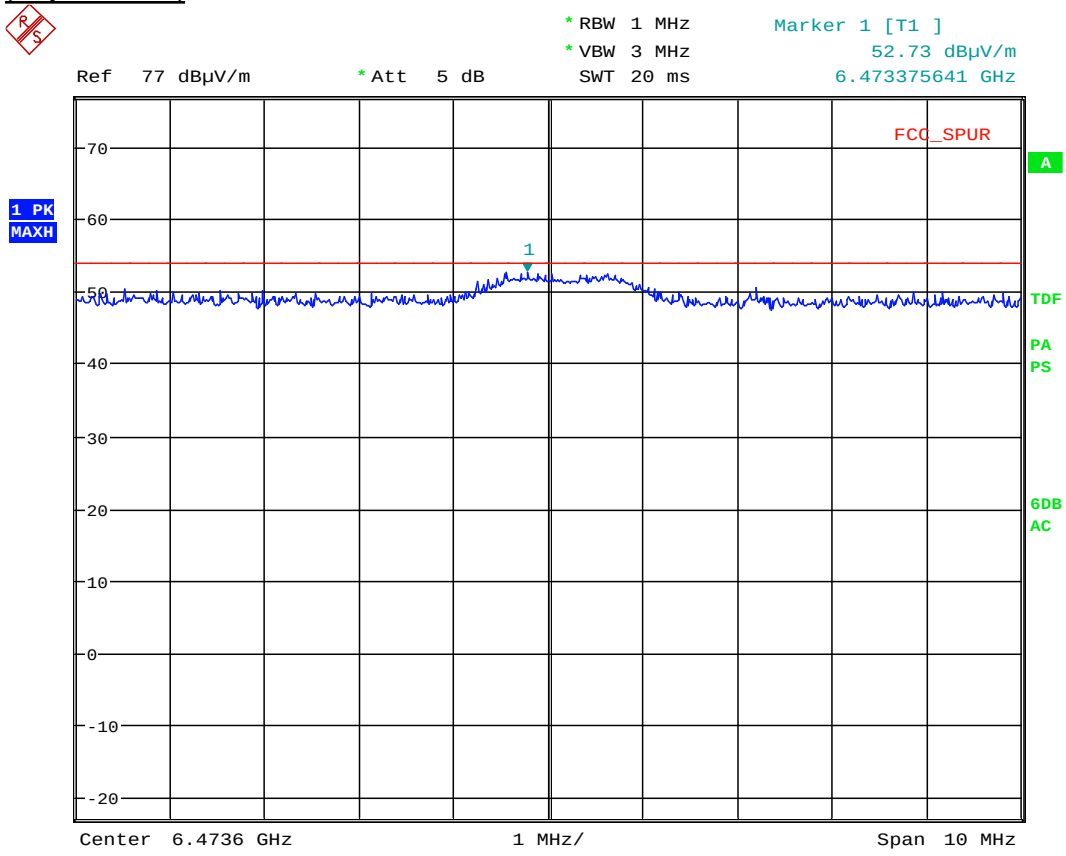
Plot 3.9.36 Radiated emission measurements at the fifth harmonic of 924.8 MHz carrier frequency (step 400 kHz)



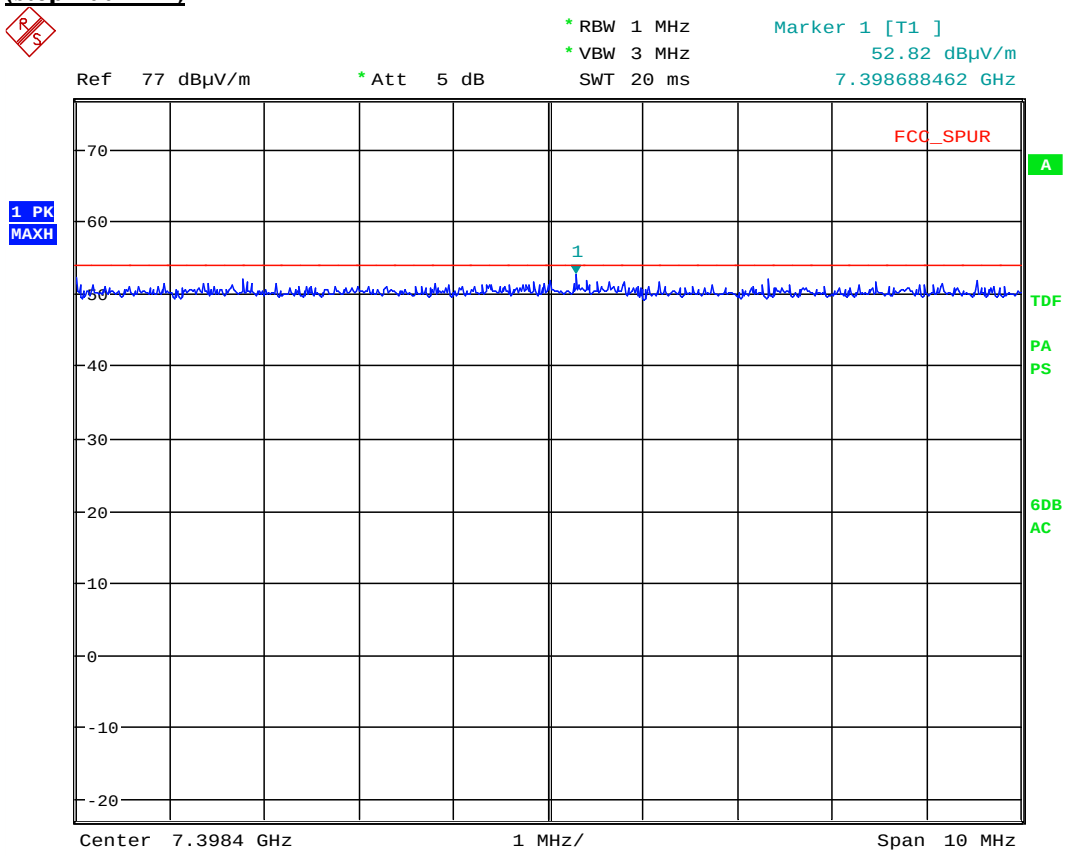
Plot 3.9.37 Radiated emission measurements at the sixth harmonic of 924.8 MHz carrier frequency (step 400 kHz)



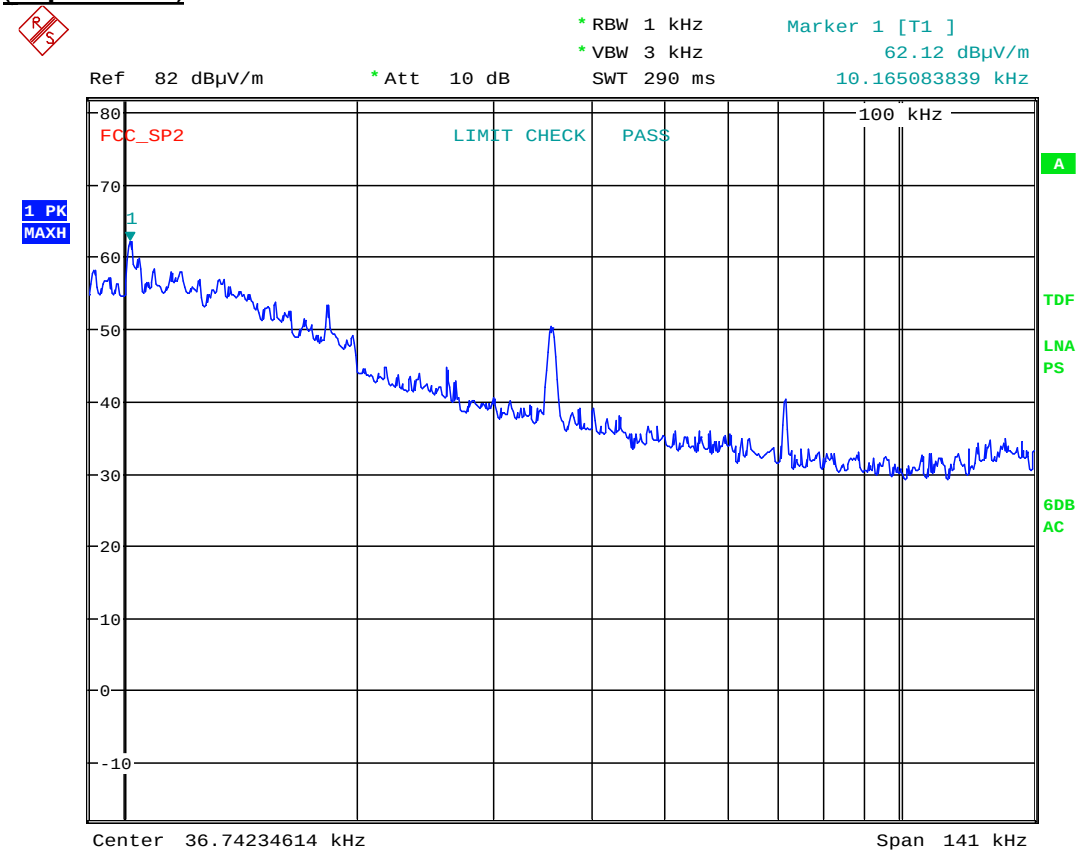
Plot 3.9.38 Radiated emission measurements at the seventh harmonic of 924.8 MHz carrier frequency (step 400 kHz)



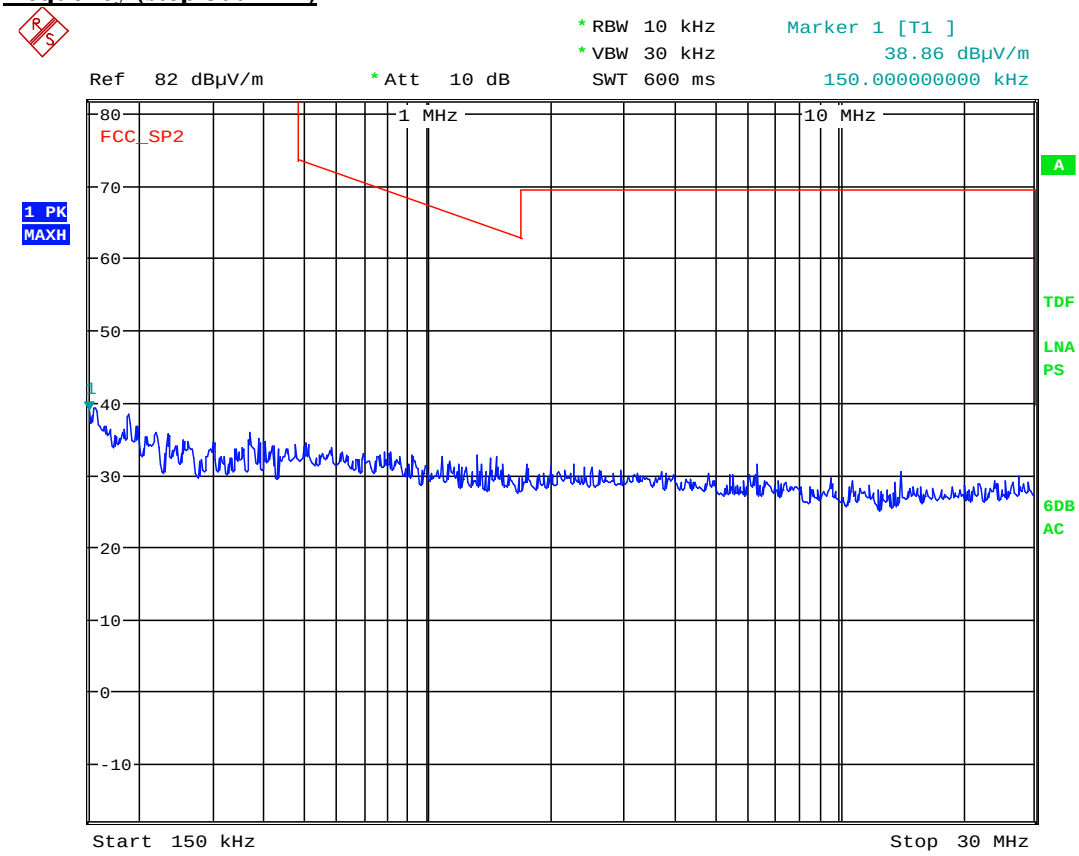
Plot 3.9.39 Radiated emission measurements at the eighth harmonic of 924.8 MHz carrier frequency (step 400 kHz)



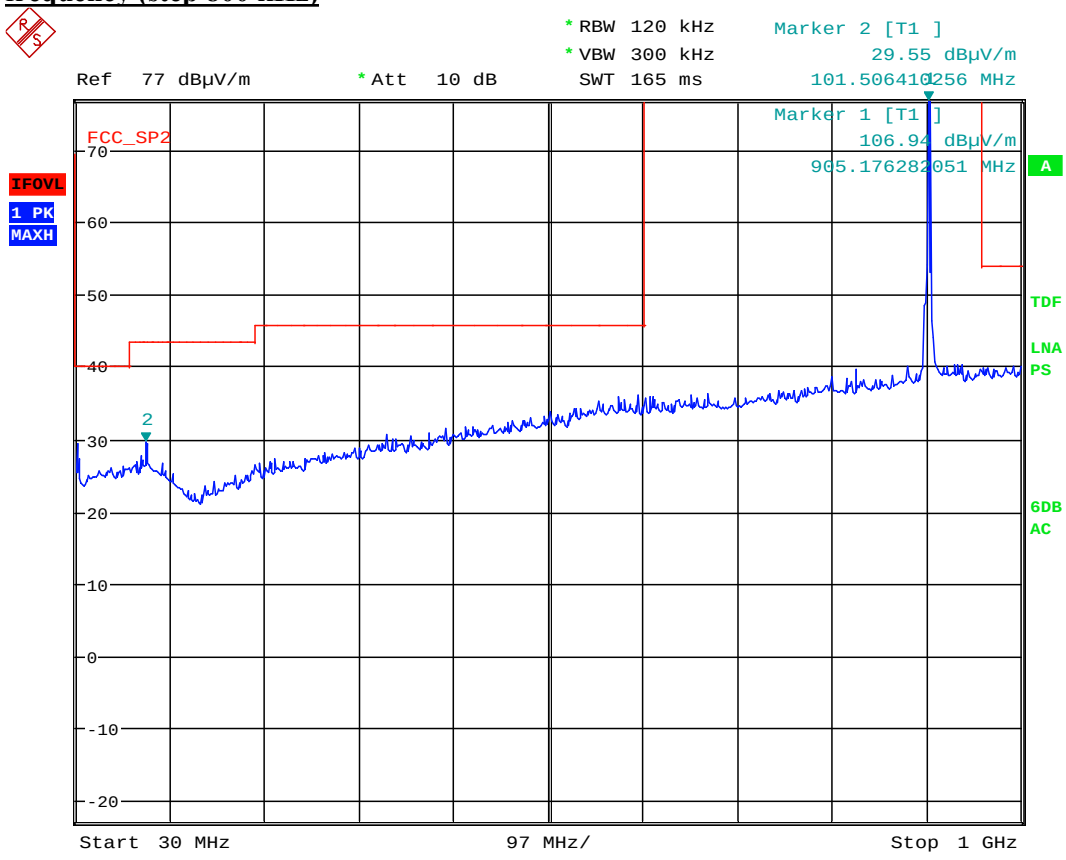
Plot 3.9.40 Radiated emission measurements from 9 kHz to 150 kHz at the 904.8 MHz carrier frequency (step 800 kHz)



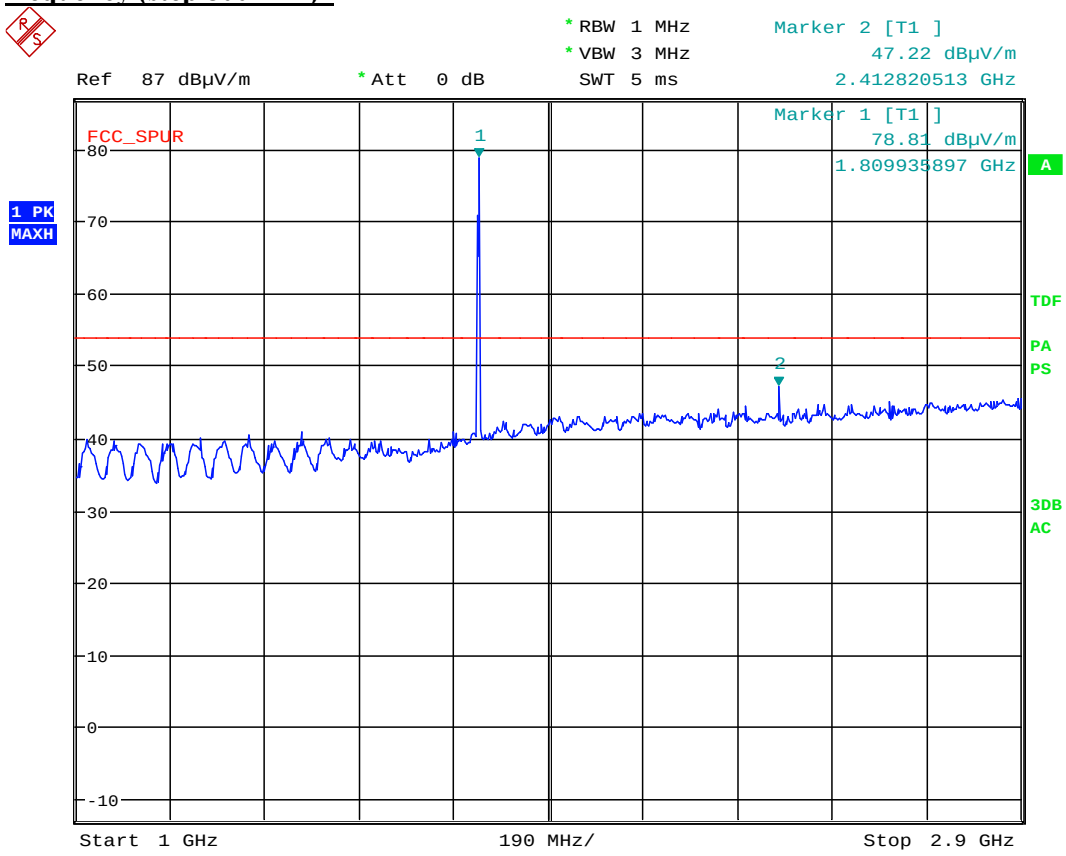
Plot 3.9.41 Radiated emission measurements from 150 kHz to 30 MHz at the 904.8 MHz carrier frequency (step 800 kHz)



Plot 3.9.42 Radiated emission measurements from 30 MHz to 1000 MHz at the 904.8 MHz carrier frequency (step 800 kHz)

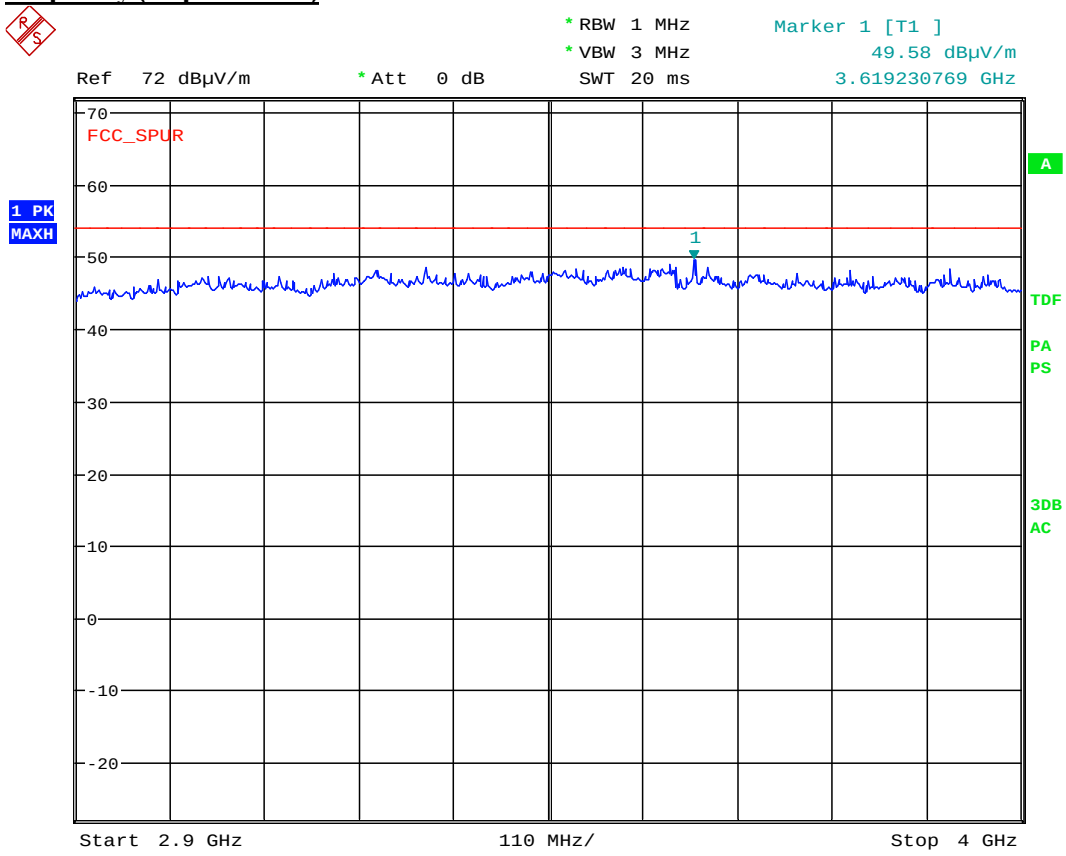


Plot 3.9.43 Radiated emission measurements from 1000 MHz to 2900 MHz at the 904.8 MHz carrier frequency (step 800 kHz)*

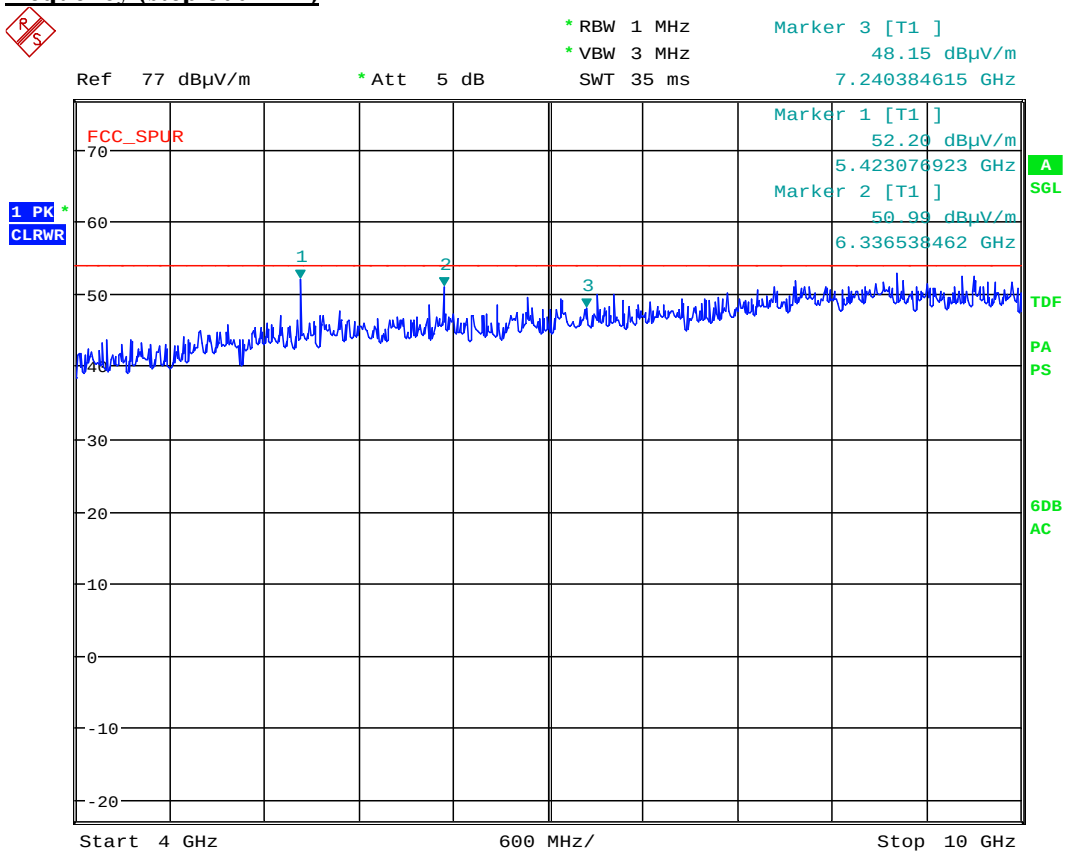


*** - limit for restricted bands does not apply to the second harmonic (904.8 MHz)**

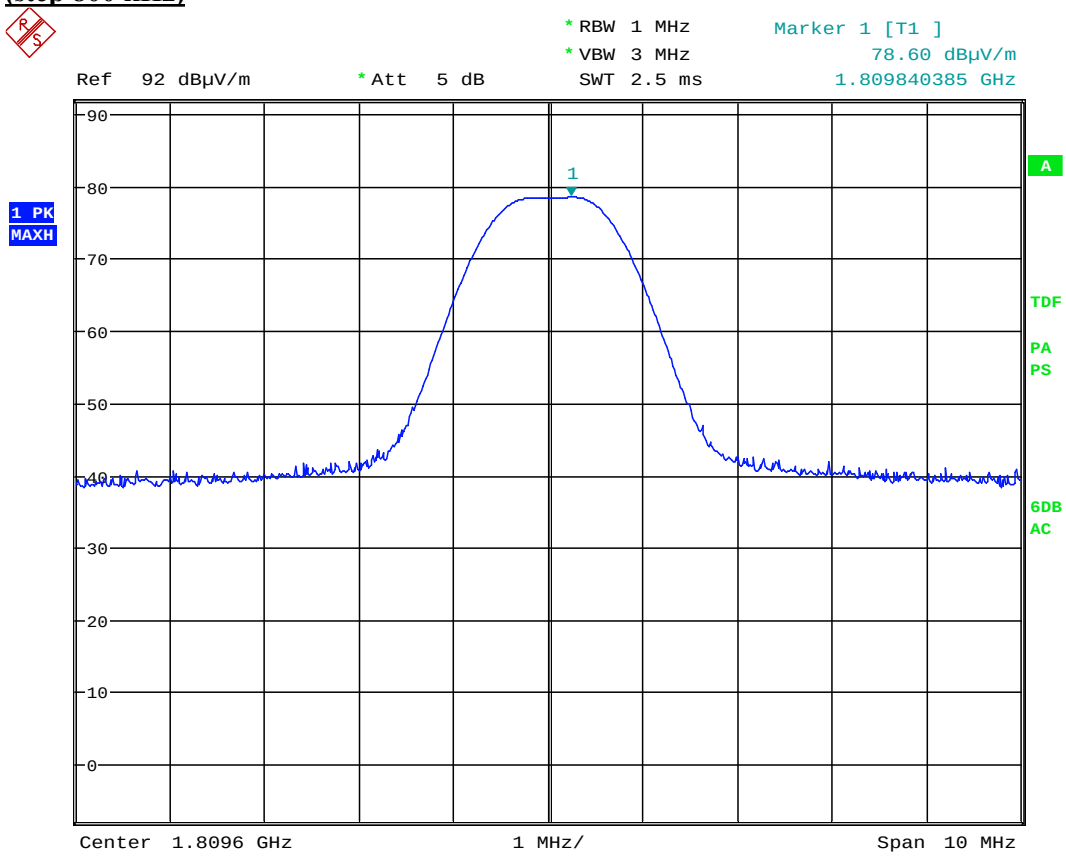
Plot 3.9.44 Radiated emission measurements from 2900 MHz to 4000 MHz at the 904.8 MHz carrier frequency (step 800 kHz)



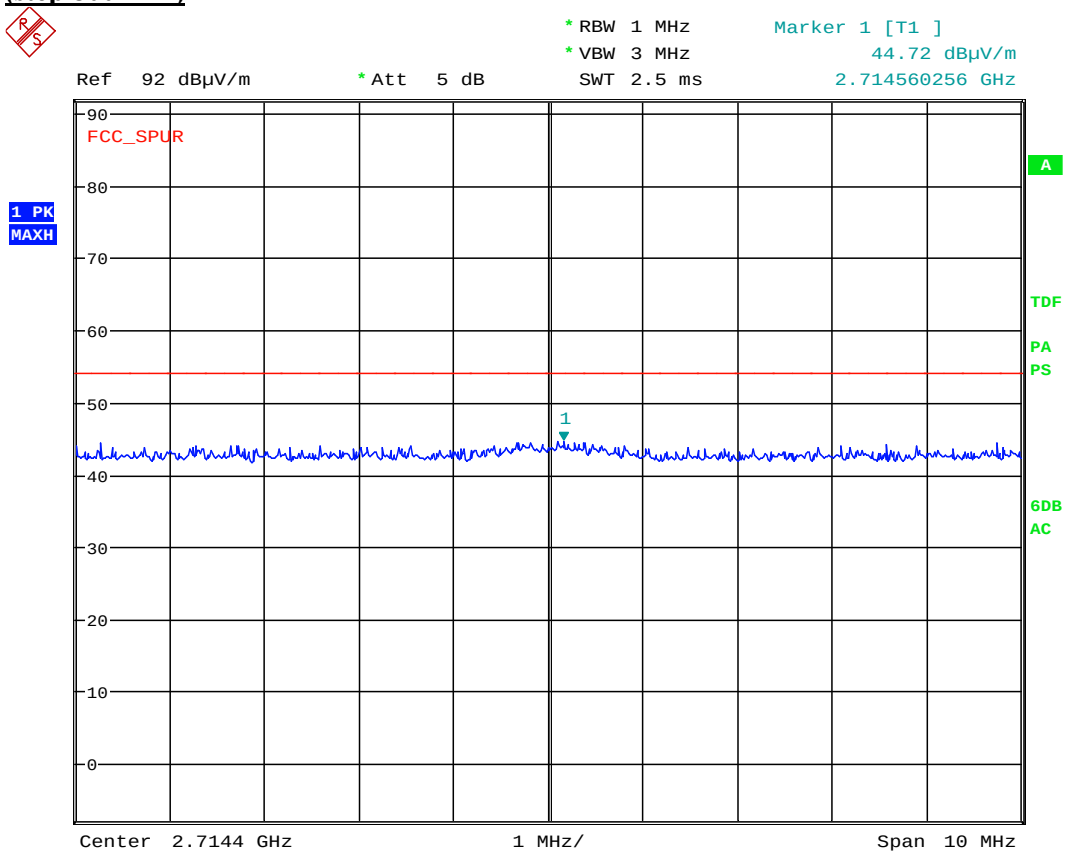
Plot 3.9.45 Radiated emission measurements from 4000 MHz to 10000 MHz at the 904.8 MHz carrier frequency (step 800 kHz)



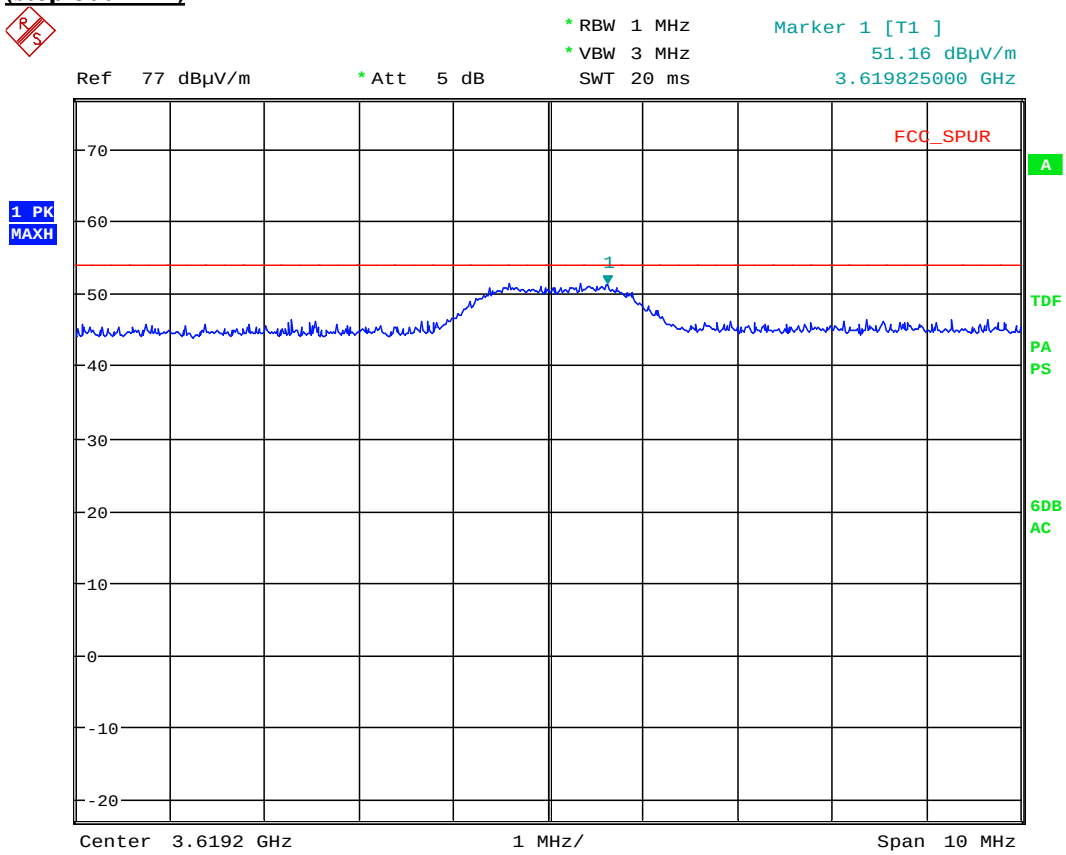
Plot 3.9.46 Radiated emission measurements at the second harmonic of 904.8 MHz carrier frequency (step 800 kHz)



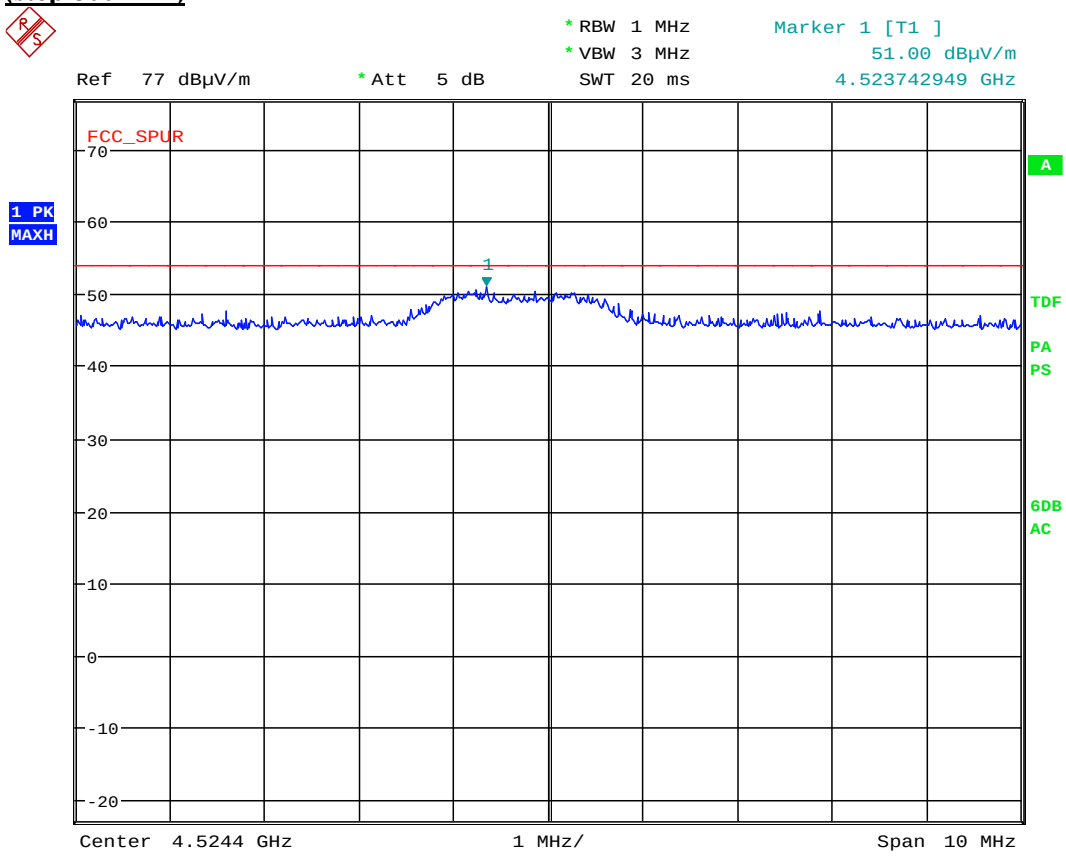
Plot 3.9.47 Radiated emission measurements at the third harmonic of 904.8 MHz carrier frequency (step 800 kHz)



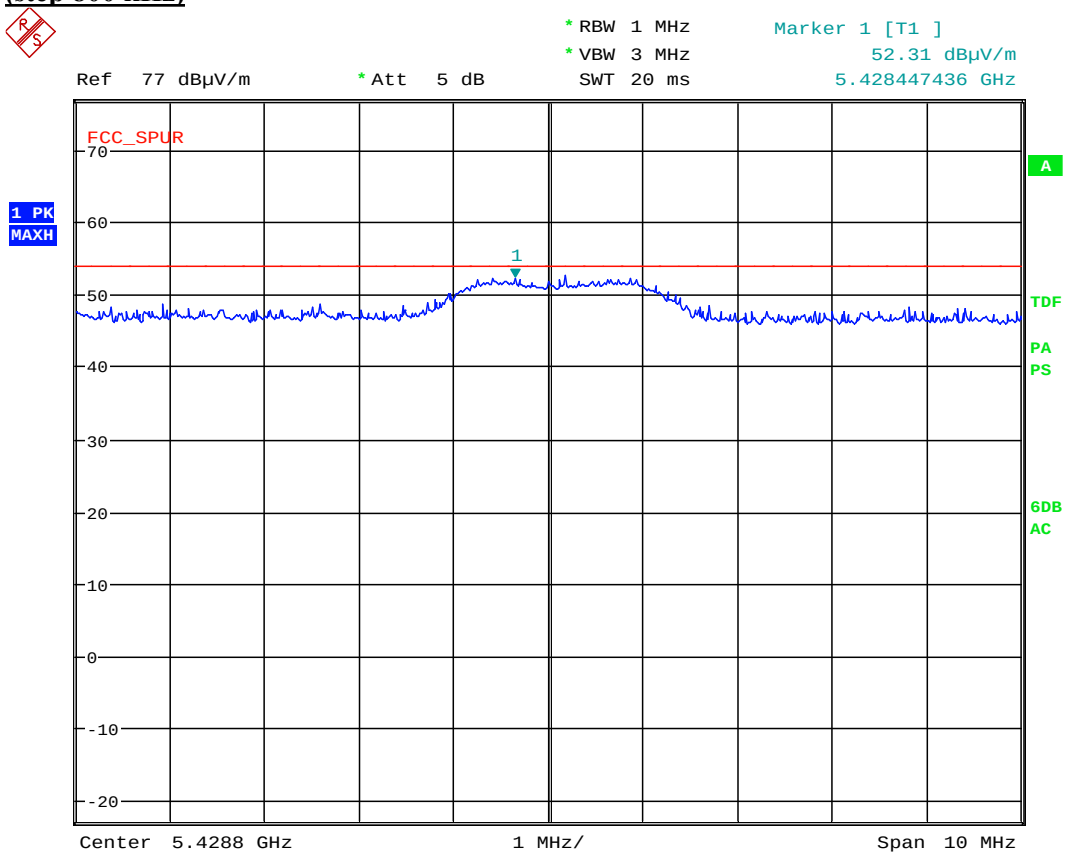
Plot 3.9.48 Radiated emission measurements at the forth harmonic of 904.8 MHz carrier frequency (step 800 kHz)



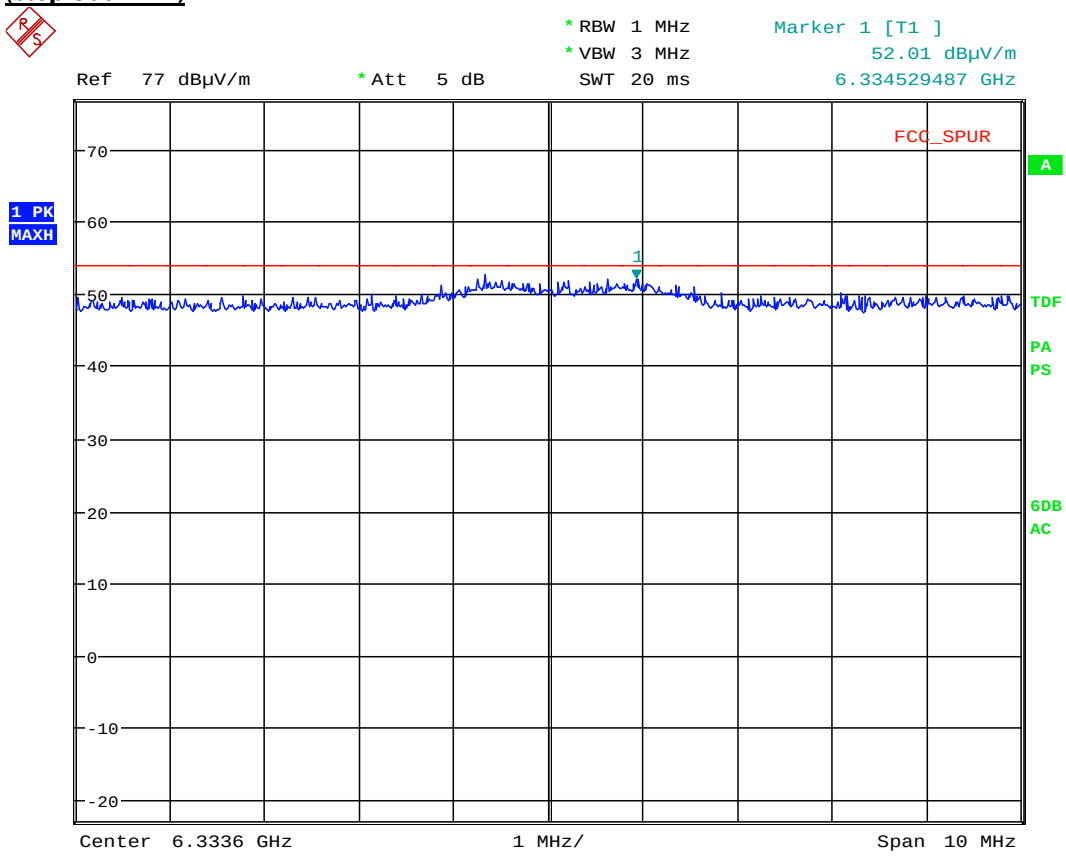
Plot 3.9.49 Radiated emission measurements at the fifth harmonic of 904.8 MHz carrier frequency (step 800 kHz)



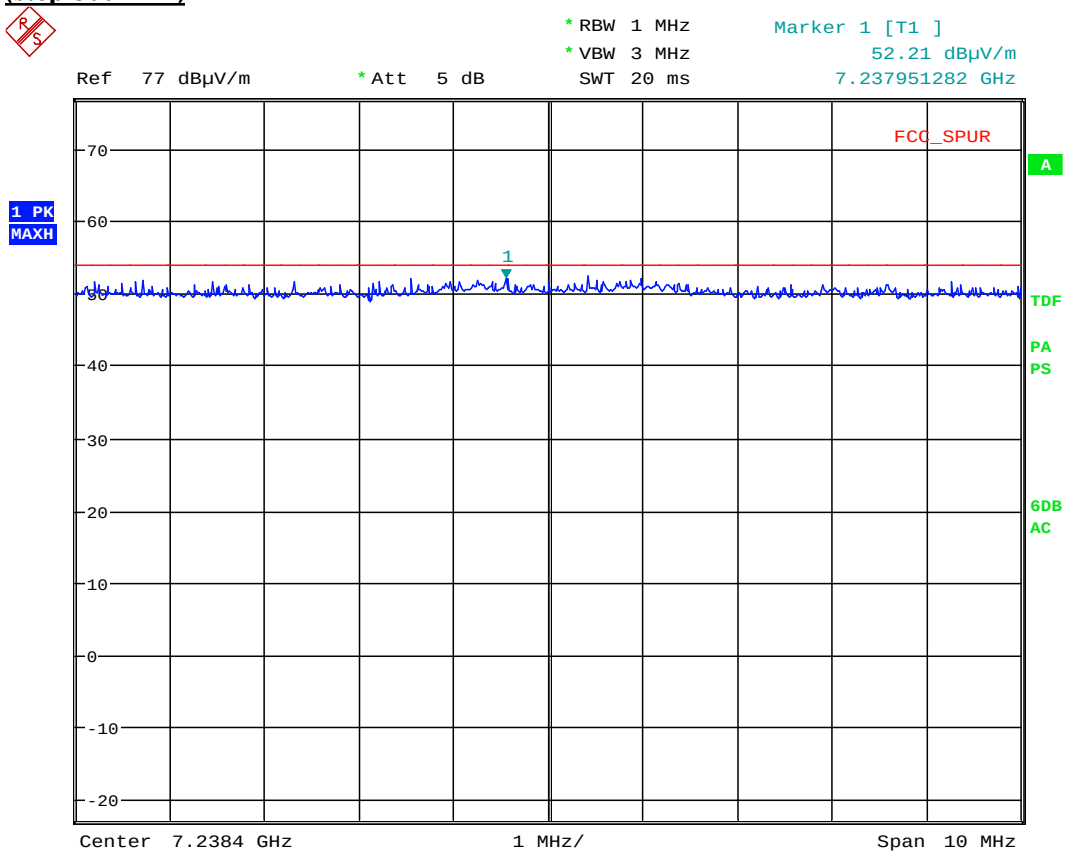
Plot 3.9.50 Radiated emission measurements at the sixth harmonic of 904.8 MHz carrier frequency (step 800 kHz)



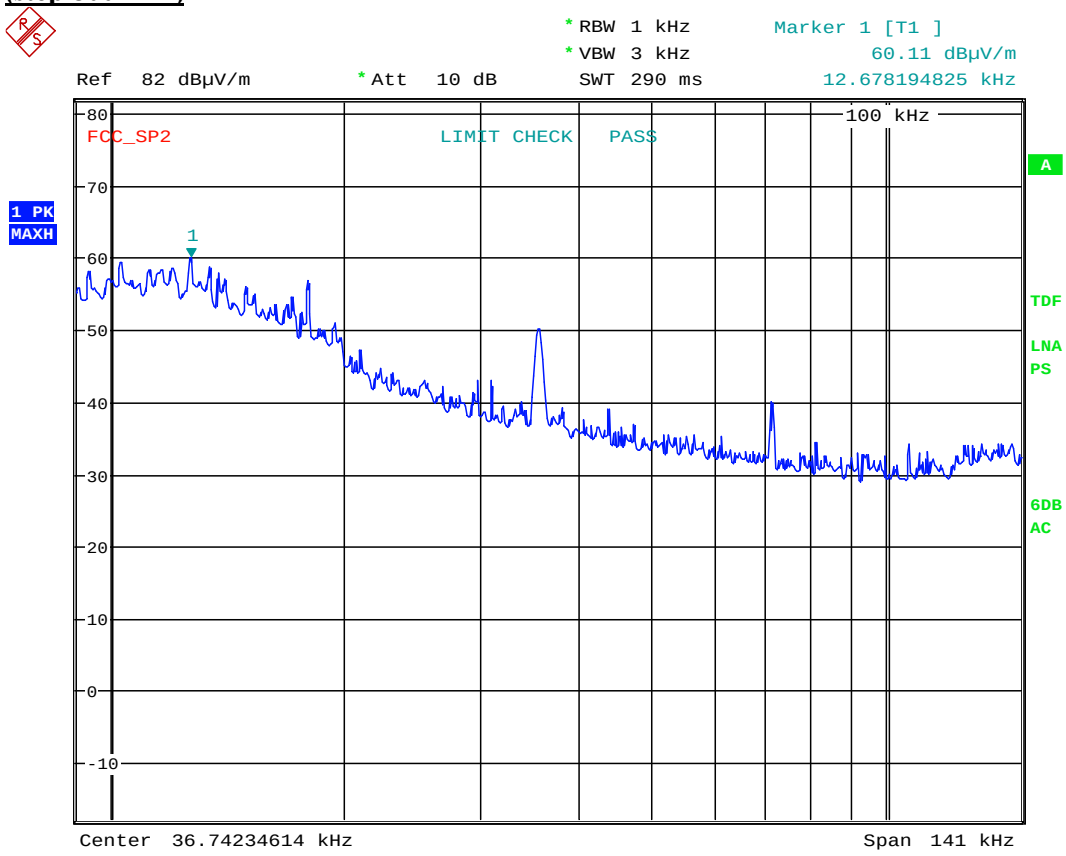
Plot 3.9.51 Radiated emission measurements at the seventh harmonic of 904.8 MHz carrier frequency (step 800 kHz)



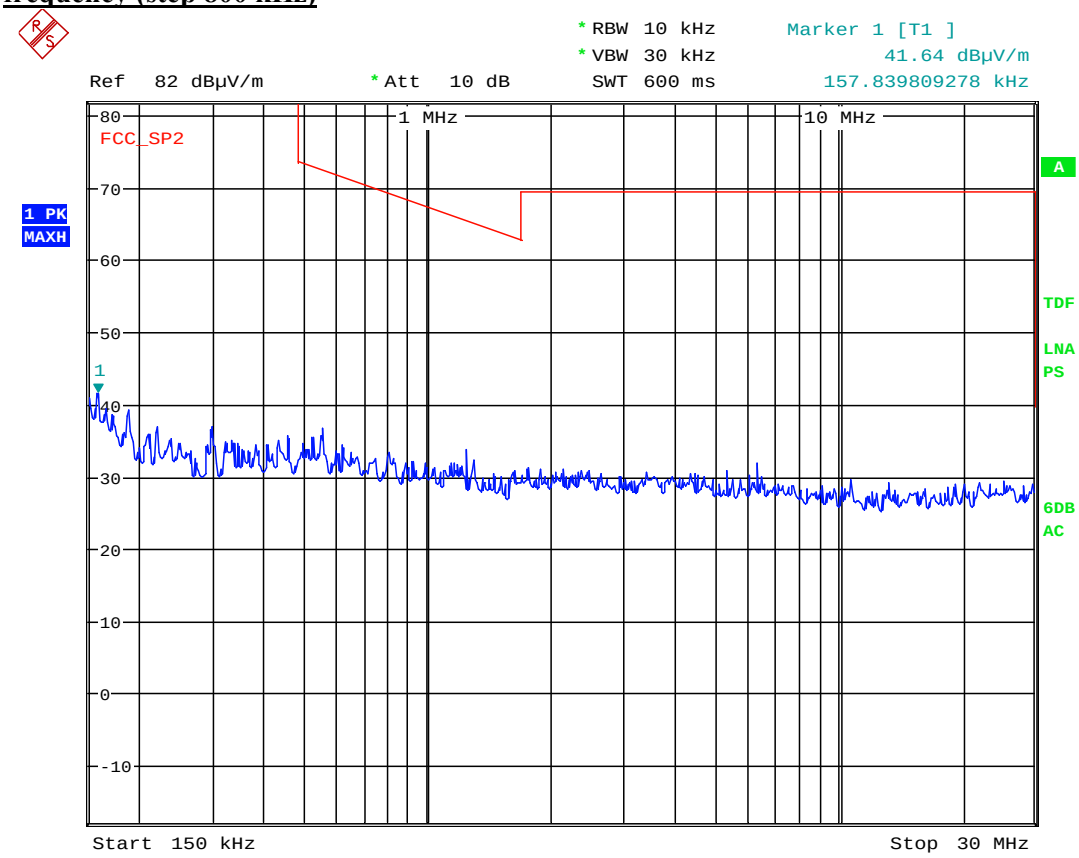
Plot 3.9.52 Radiated emission measurements at the eighth harmonic of 904.8 MHz carrier frequency (step 800 kHz)



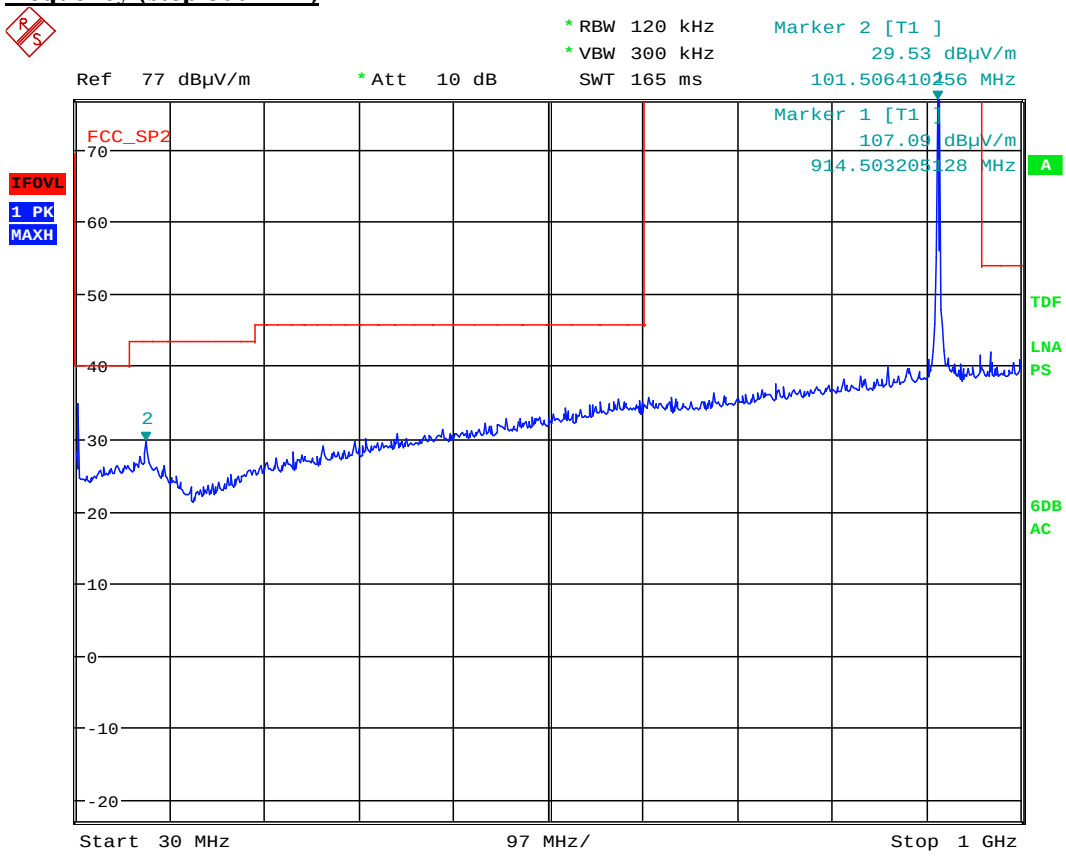
Plot 3.9.53 Radiated emission measurements from 9 kHz to 150 kHz at the 914.4 MHz carrier frequency (step 800 kHz)



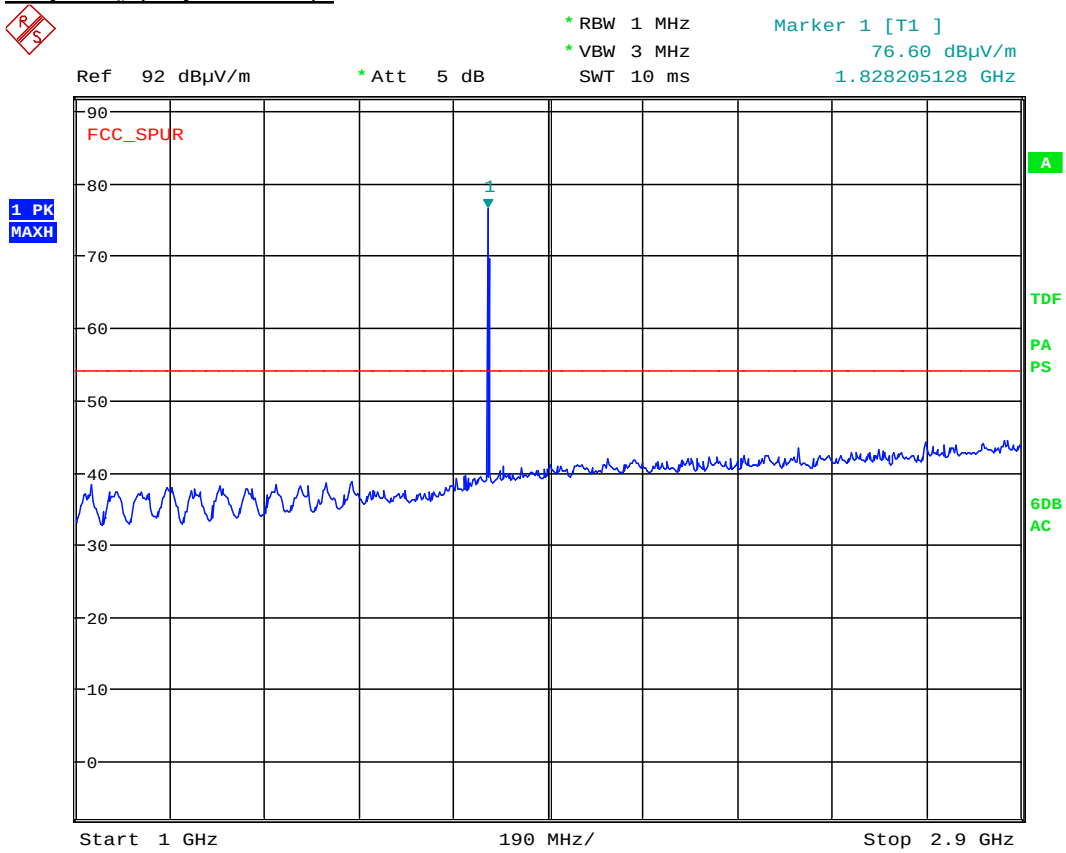
Plot 3.9.54 Radiated emission measurements from 150 kHz to 30 MHz at the 914.4 MHz carrier frequency (step 800 kHz)



Plot 3.9.55 Radiated emission measurements from 30 MHz to 1000 MHz at the 914.4 MHz carrier frequency (step 800 kHz)

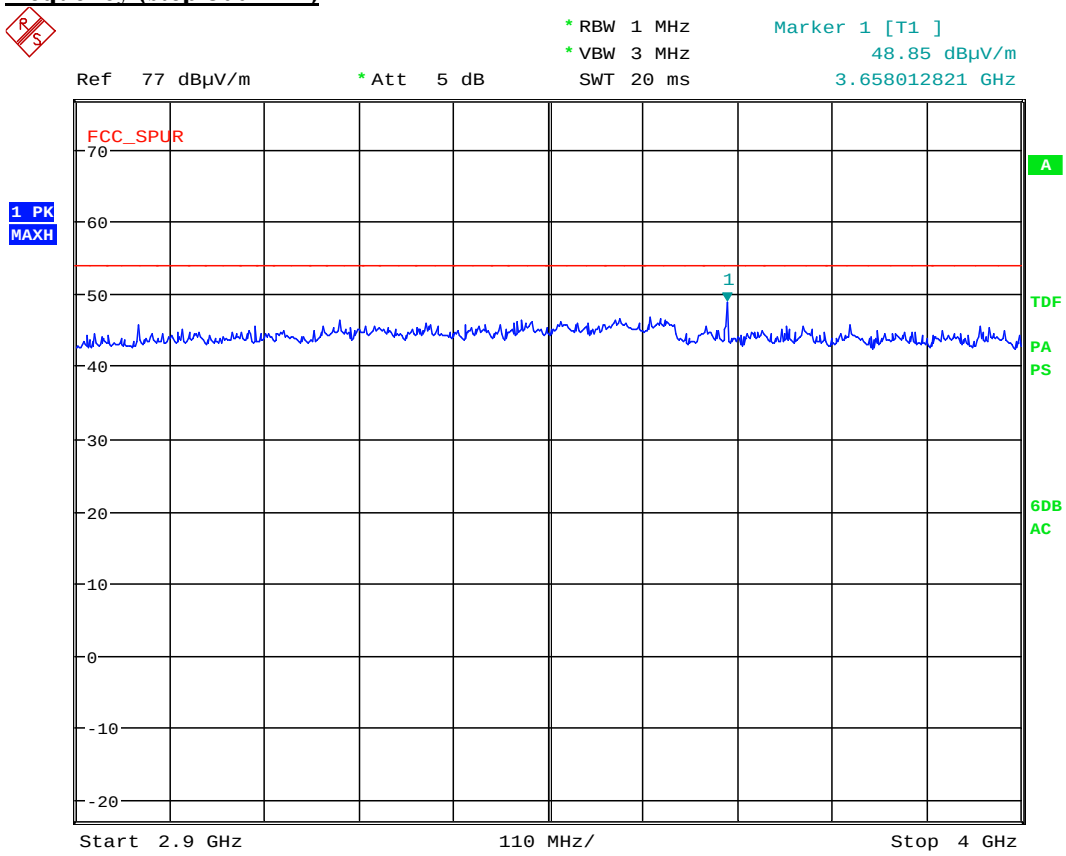


Plot 3.9.56 Radiated emission measurements from 1000 MHz to 2900 MHz at the 914.4 MHz carrier frequency (step 800 kHz)*

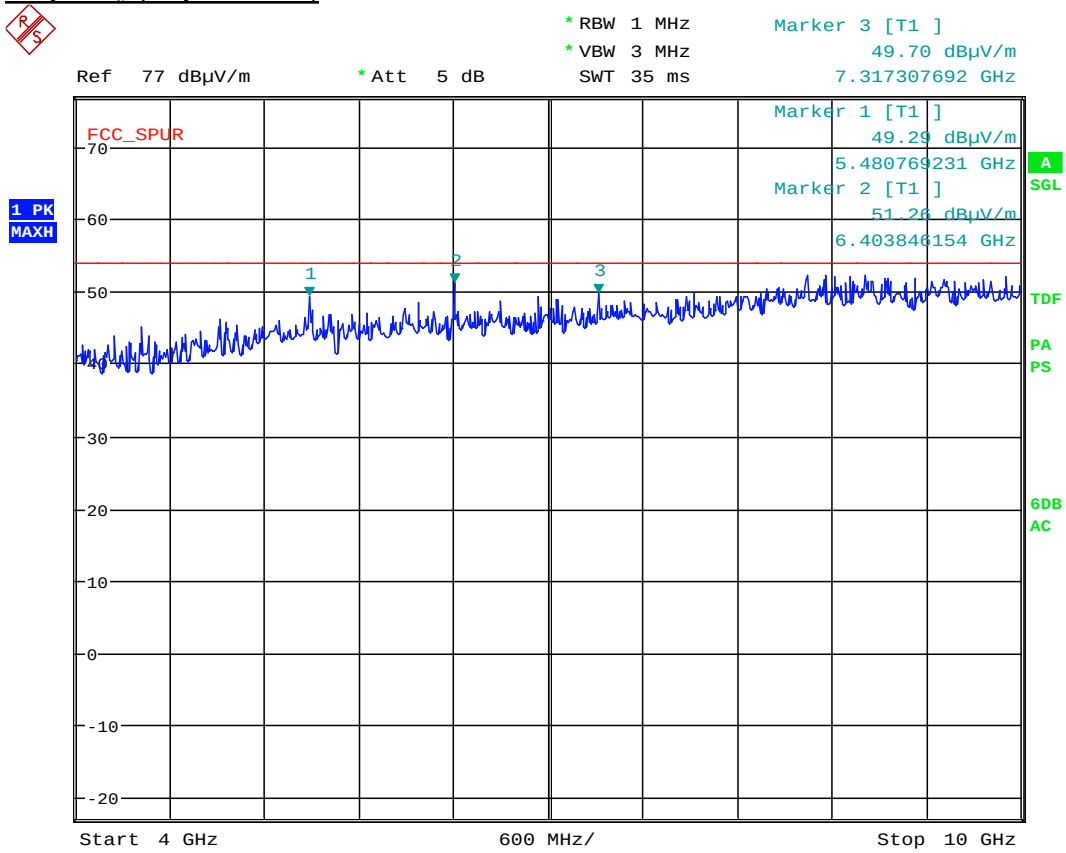


*** - limit for restricted bands does not apply to the second harmonic (914.4 MHz)**

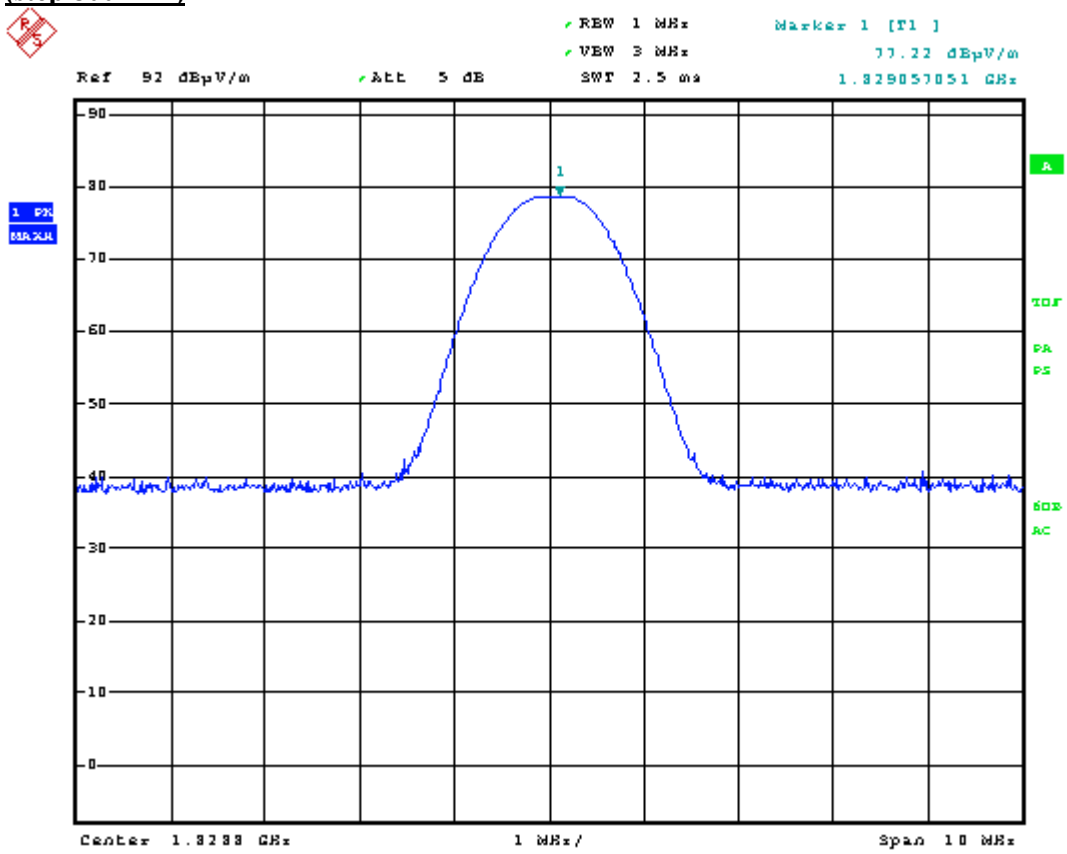
Plot 3.9.57 Radiated emission measurements from 2900 MHz to 4000 MHz at the 914.4 MHz carrier frequency (step 800 kHz)



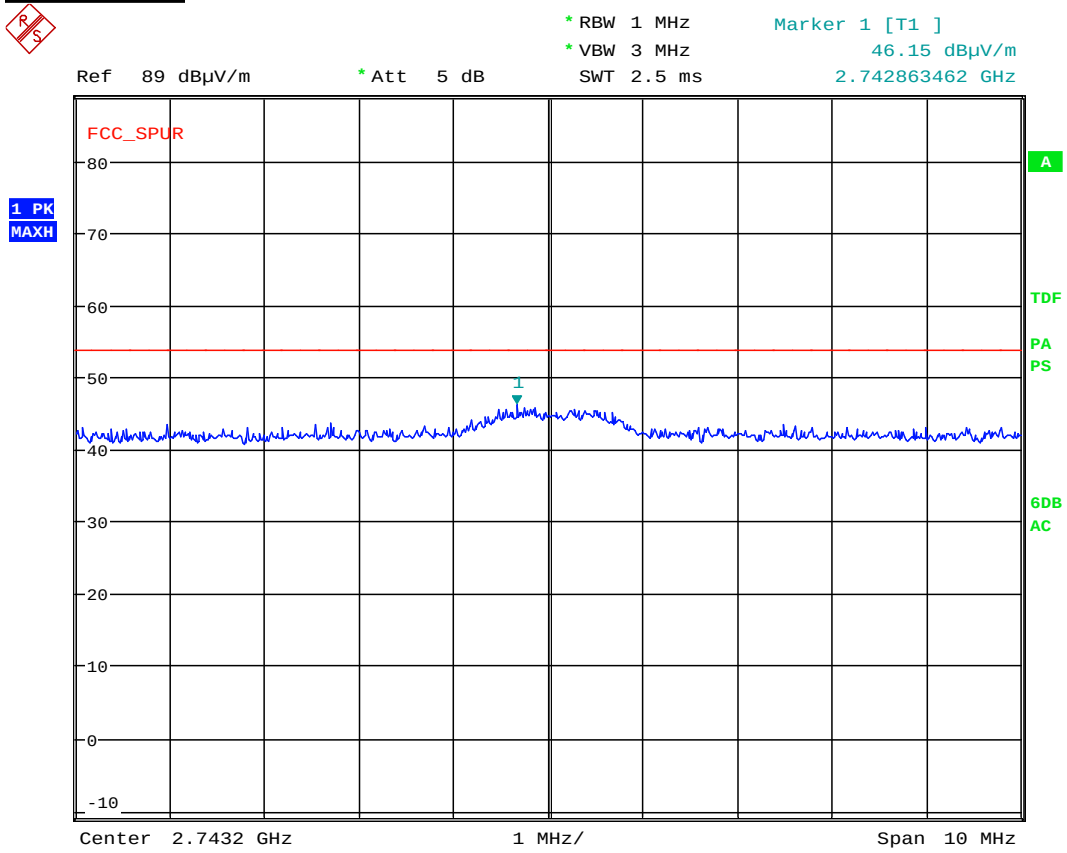
Plot 3.9.58 Radiated emission measurements from 4000 MHz to 10000 MHz at the 914.4 MHz carrier frequency (step 800 kHz)



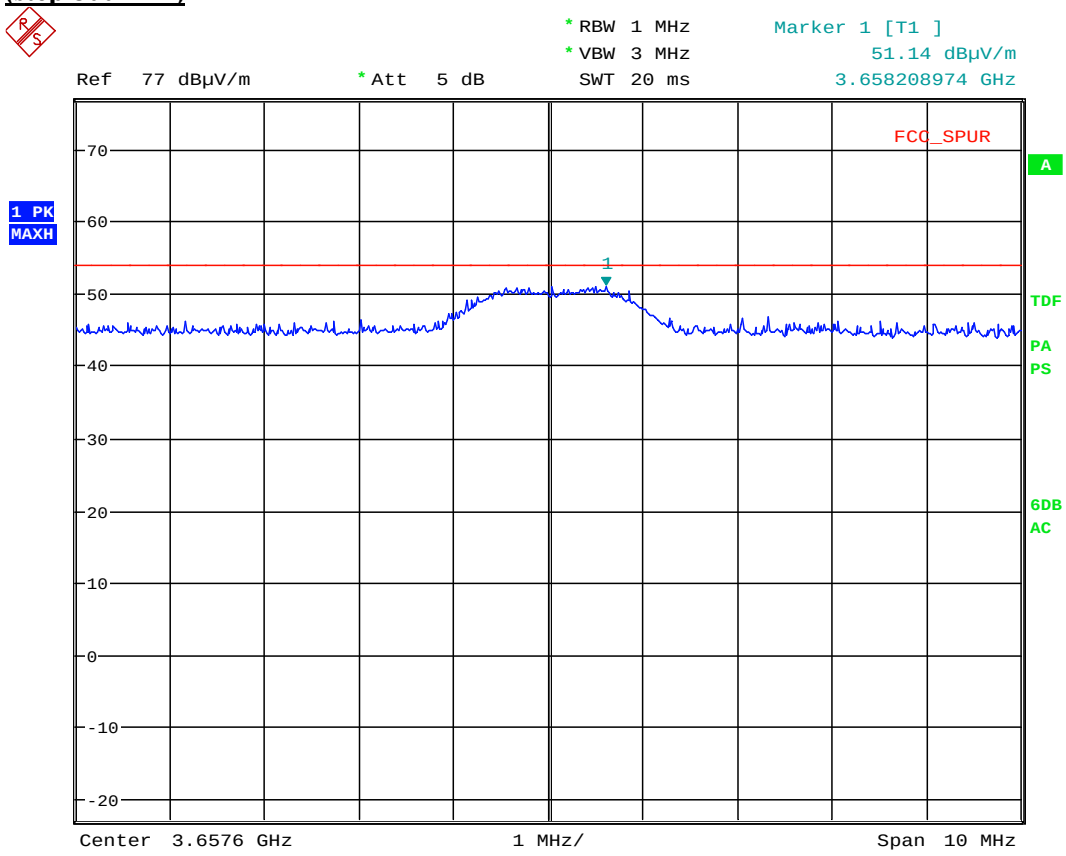
Plot 3.9.59 Radiated emission measurements at the second harmonic of 914.4 MHz carrier frequency (step 800 kHz)



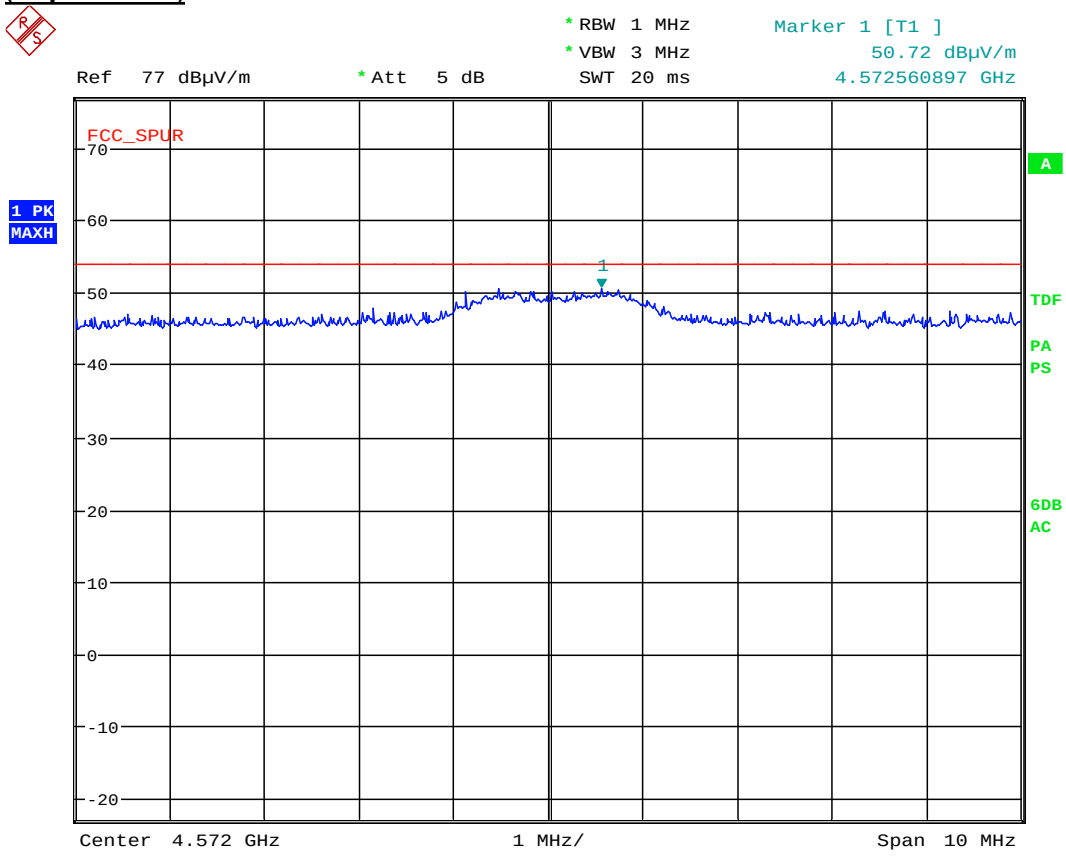
Plot 3.9.60 Radiated emission measurements at the third harmonic of 914.4 MHz carrier frequency (step 800 kHz)



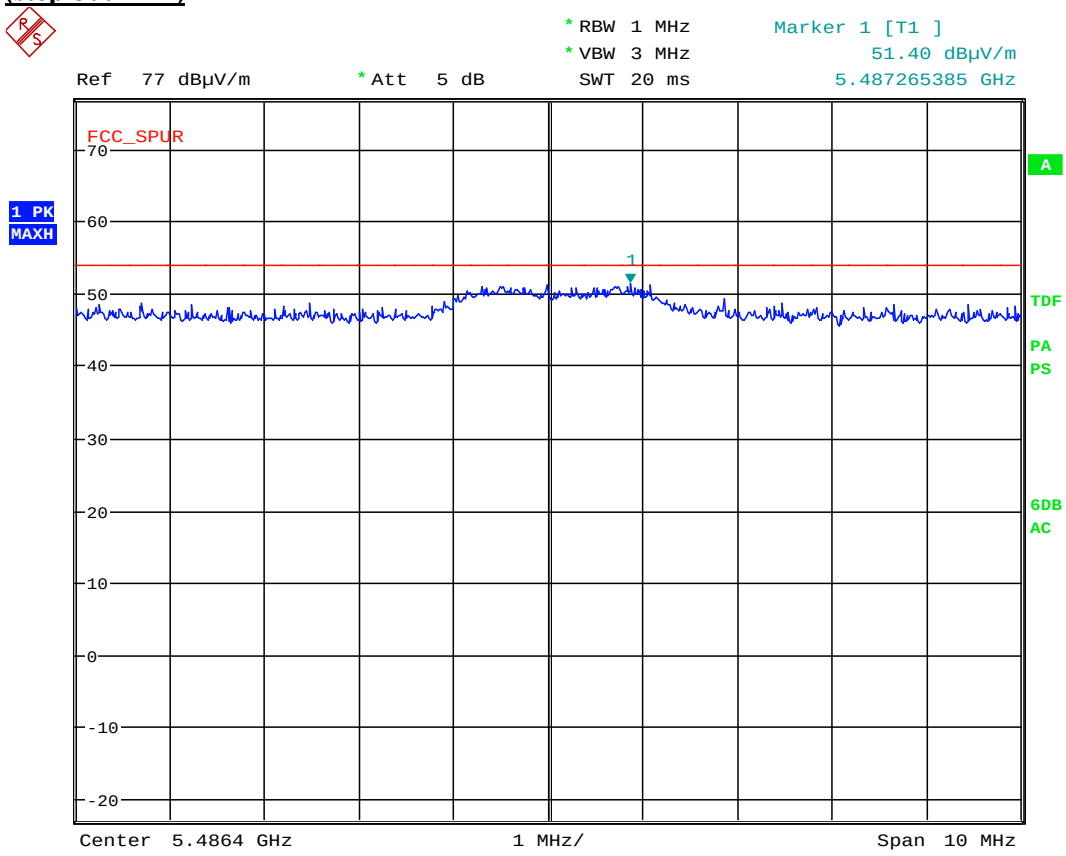
Plot 3.9.61 Radiated emission measurements at the forth harmonic of 914.4 MHz carrier frequency (step 800 kHz)



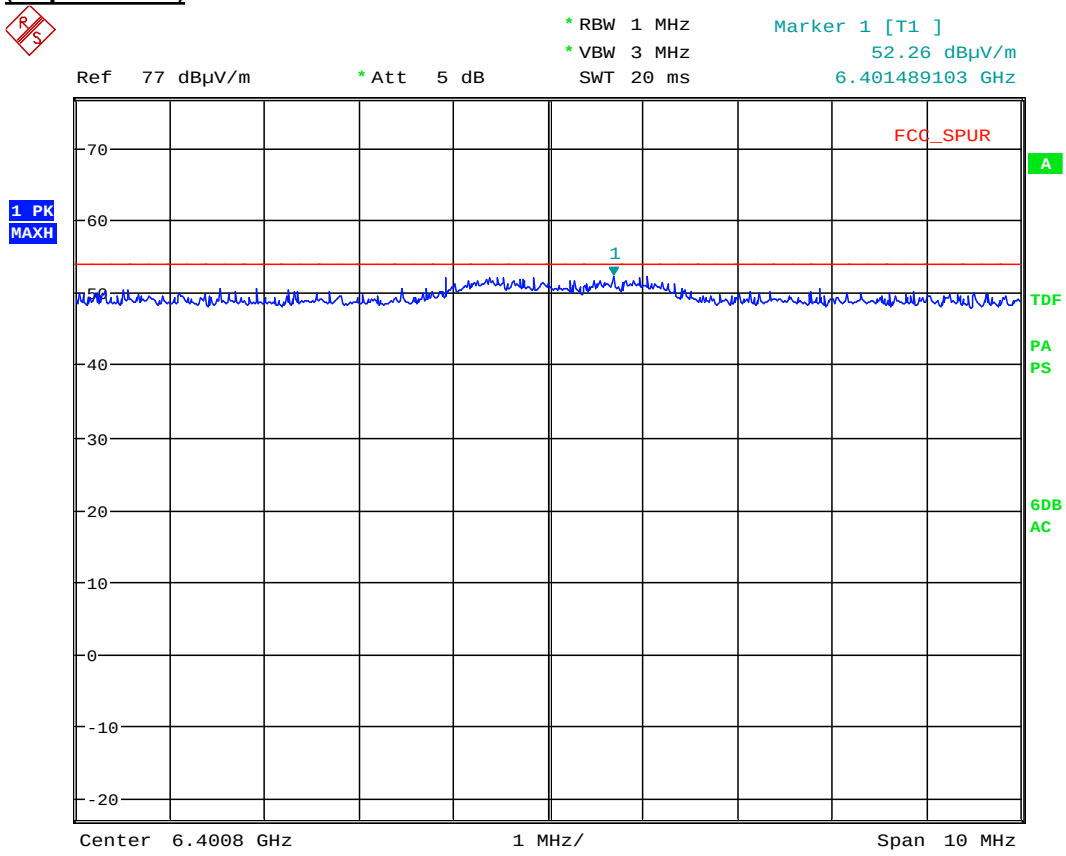
Plot 3.9.62 Radiated emission measurements at the fifth harmonic of 914.4 MHz carrier frequency (step 800 kHz)



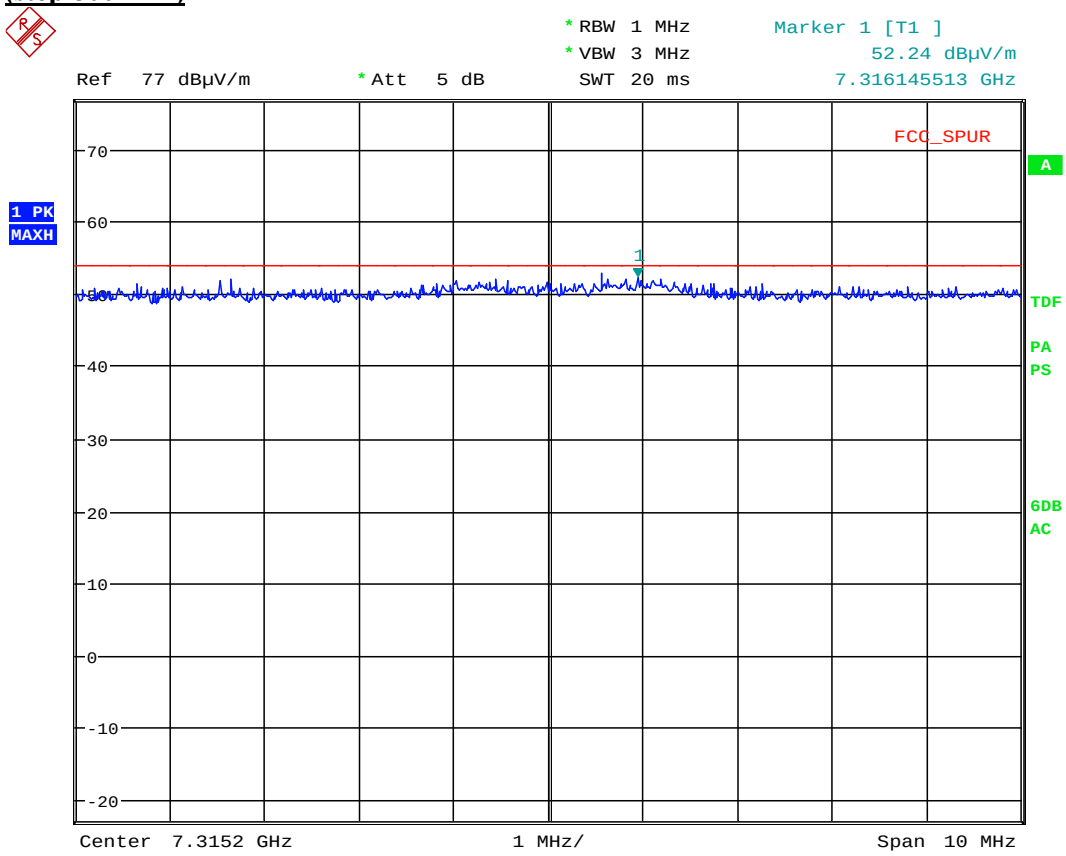
Plot 3.9.63 Radiated emission measurements at the sixth harmonic of 914.4 MHz carrier frequency (step 800 kHz)



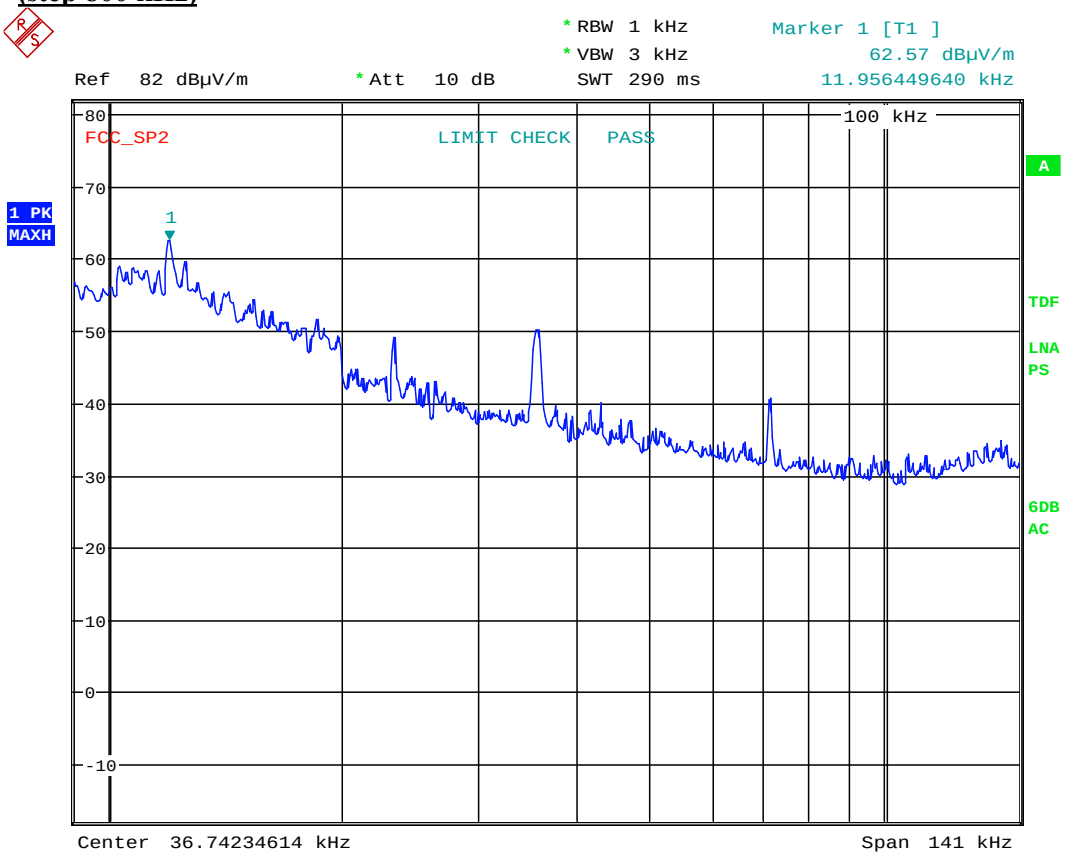
Plot 3.9.64 Radiated emission measurements at the seventh harmonic of 914.4 MHz carrier frequency (step 800 kHz)



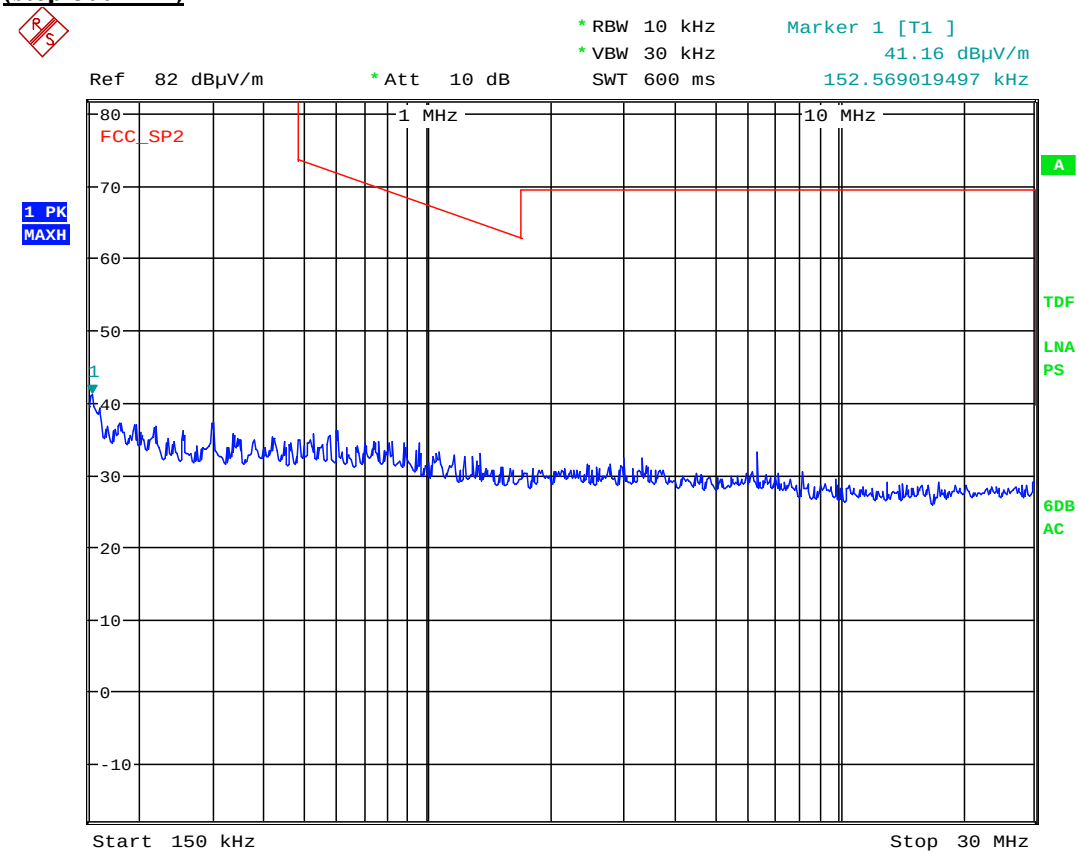
Plot 3.9.65 Radiated emission measurements at the eighth harmonic of 914.4 MHz carrier frequency (step 800 kHz)



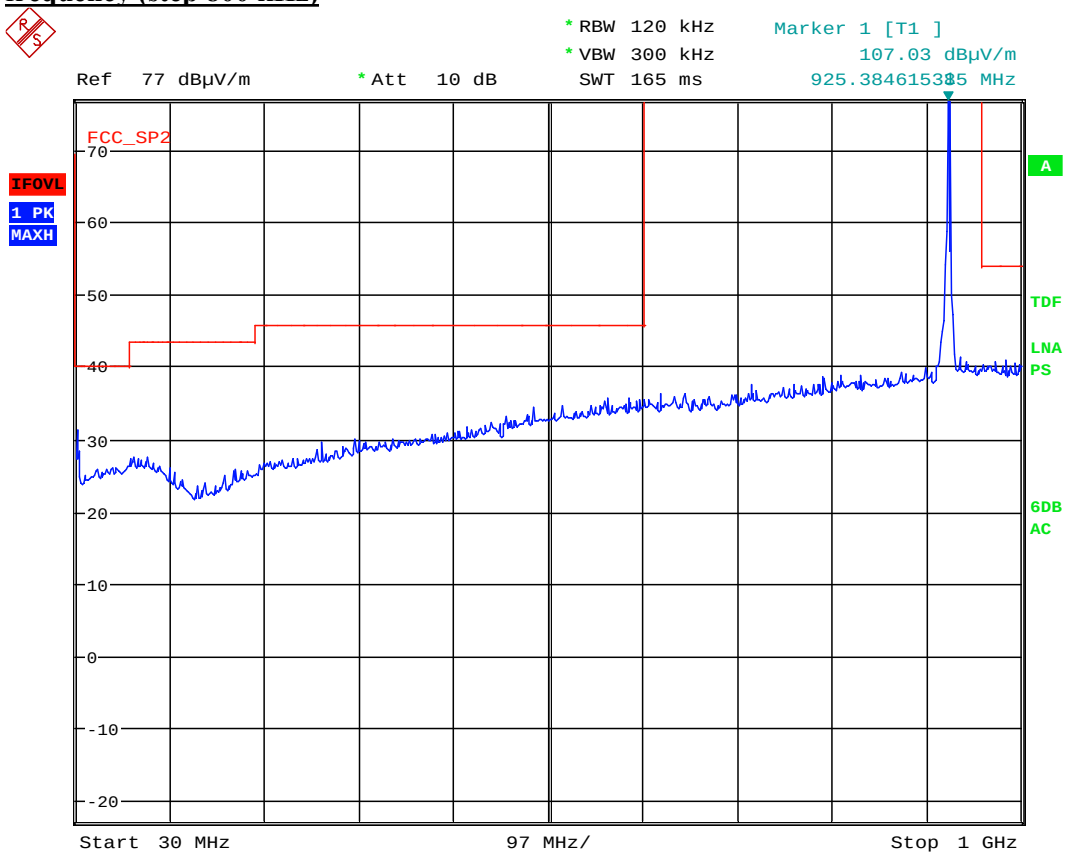
Plot 3.9.66 Radiated emission measurements from 9 kHz to 150 kHz at the 924.8 MHz carrier frequency (step 800 kHz)



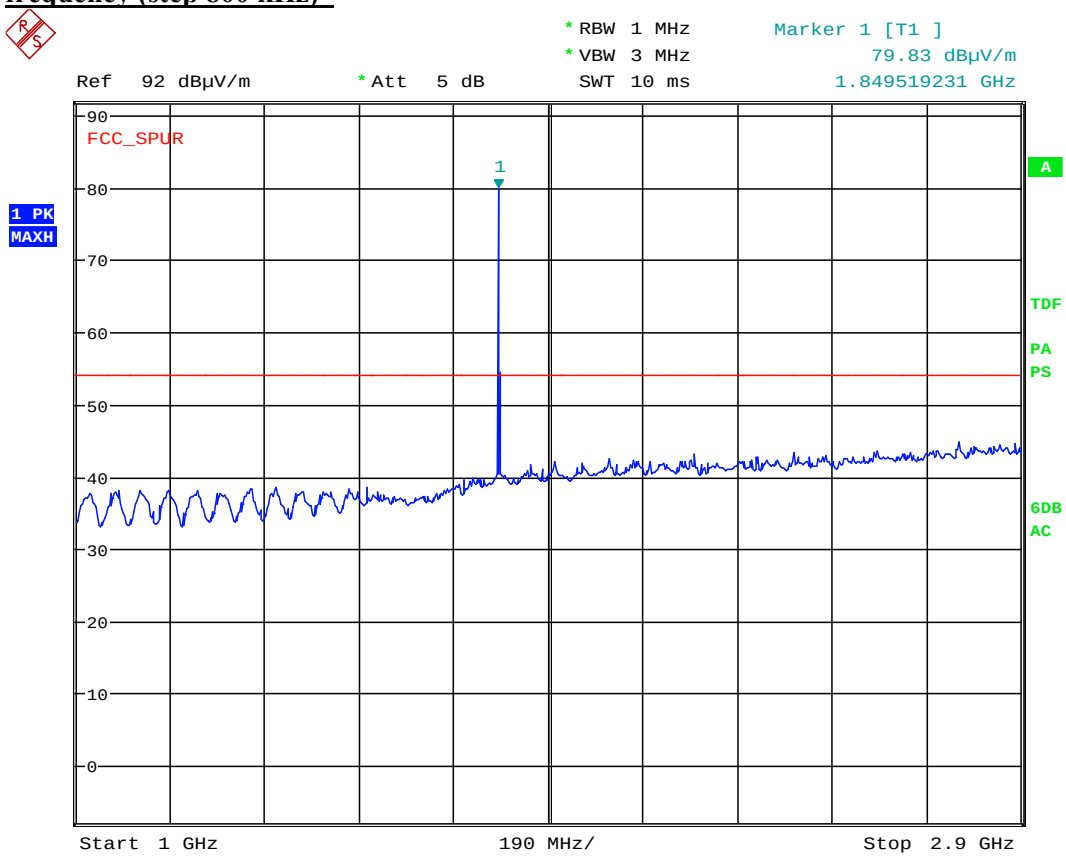
Plot 3.9.67 Radiated emission measurements from 150 kHz to 30 MHz at the 924.8 MHz carrier frequency (step 800 kHz)



Plot 3.9.68 Radiated emission measurements from 30 MHz to 1000 MHz at the 924.8 MHz carrier frequency (step 800 kHz)

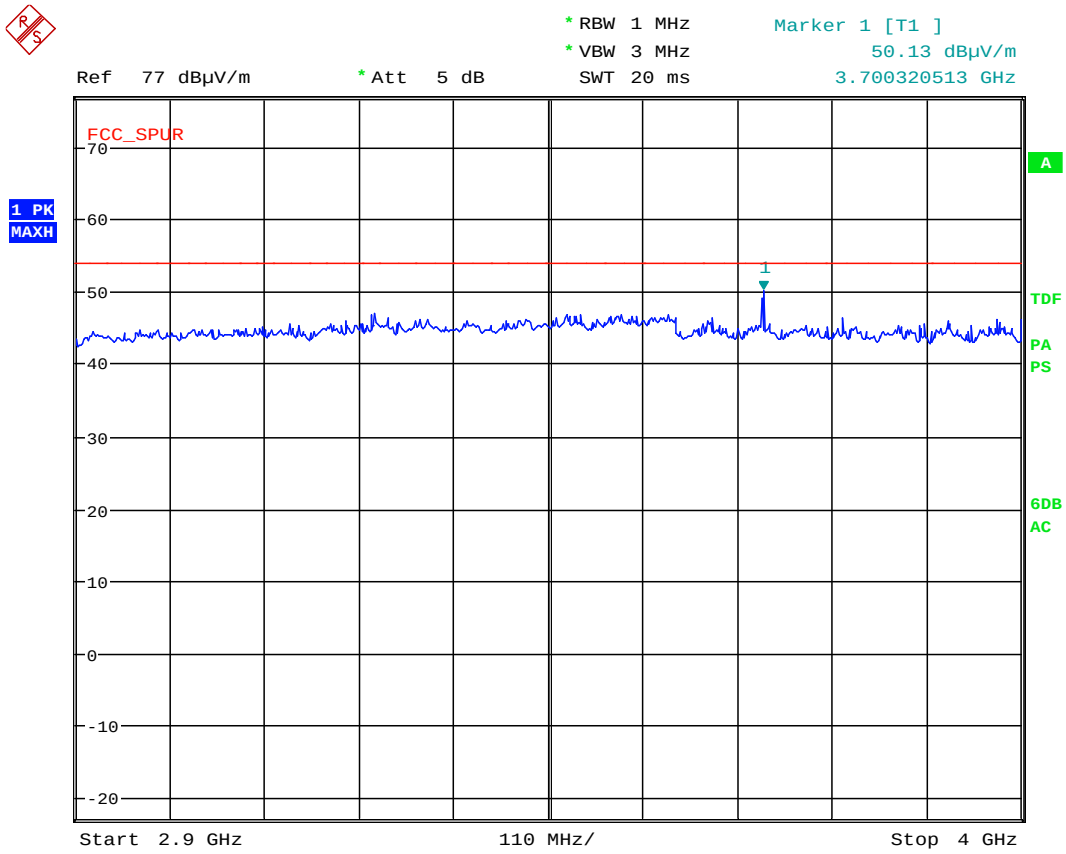


Plot 3.9.69 Radiated emission measurements from 1000 MHz to 2900 MHz at the 924.8 MHz carrier frequency (step 800 kHz)*

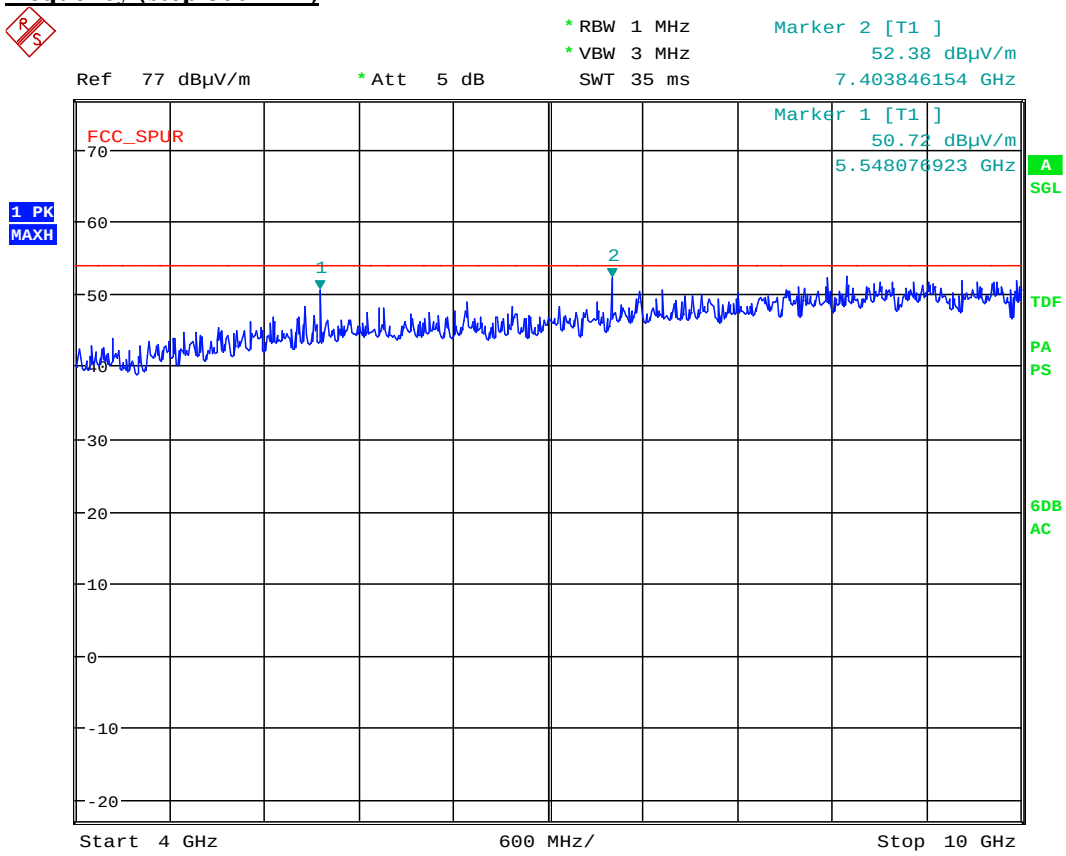


*** - limit for restricted bands does not apply to the second harmonic (924.8 MHz)**

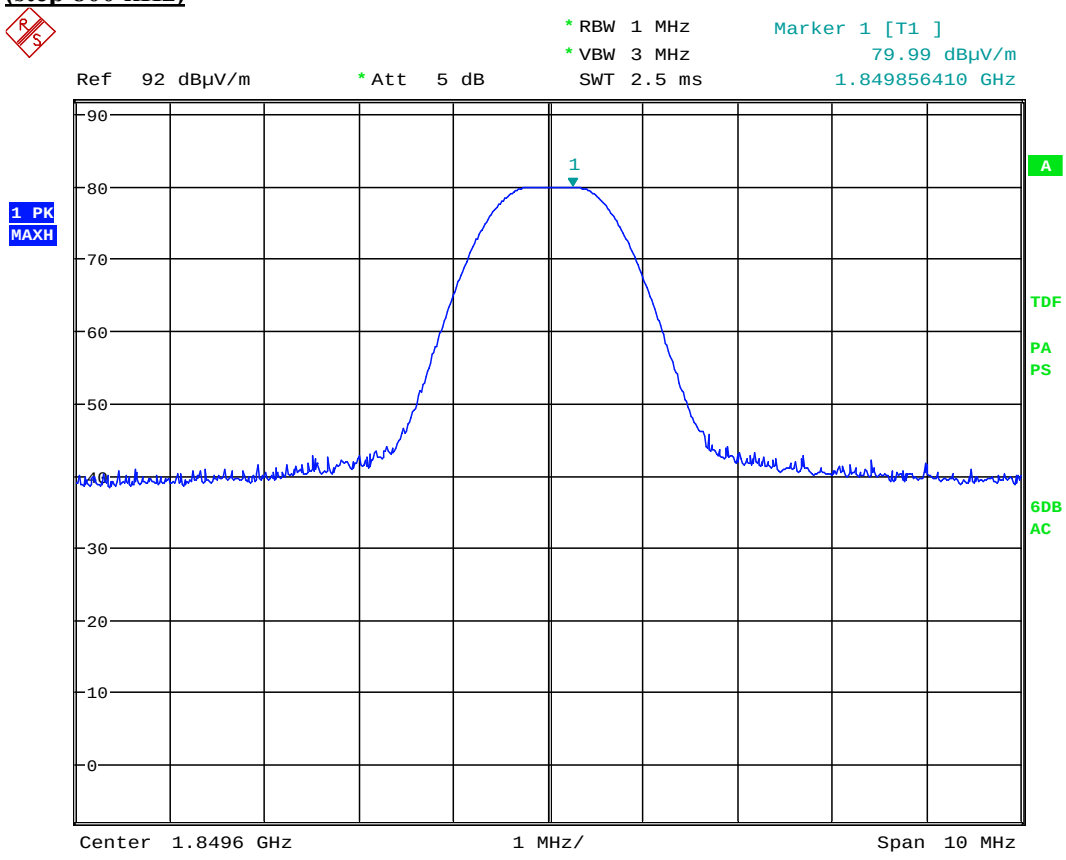
Plot 3.9.70 Radiated emission measurements from 2900 MHz to 4000 MHz at the 924.8 MHz carrier frequency (step 800 kHz)



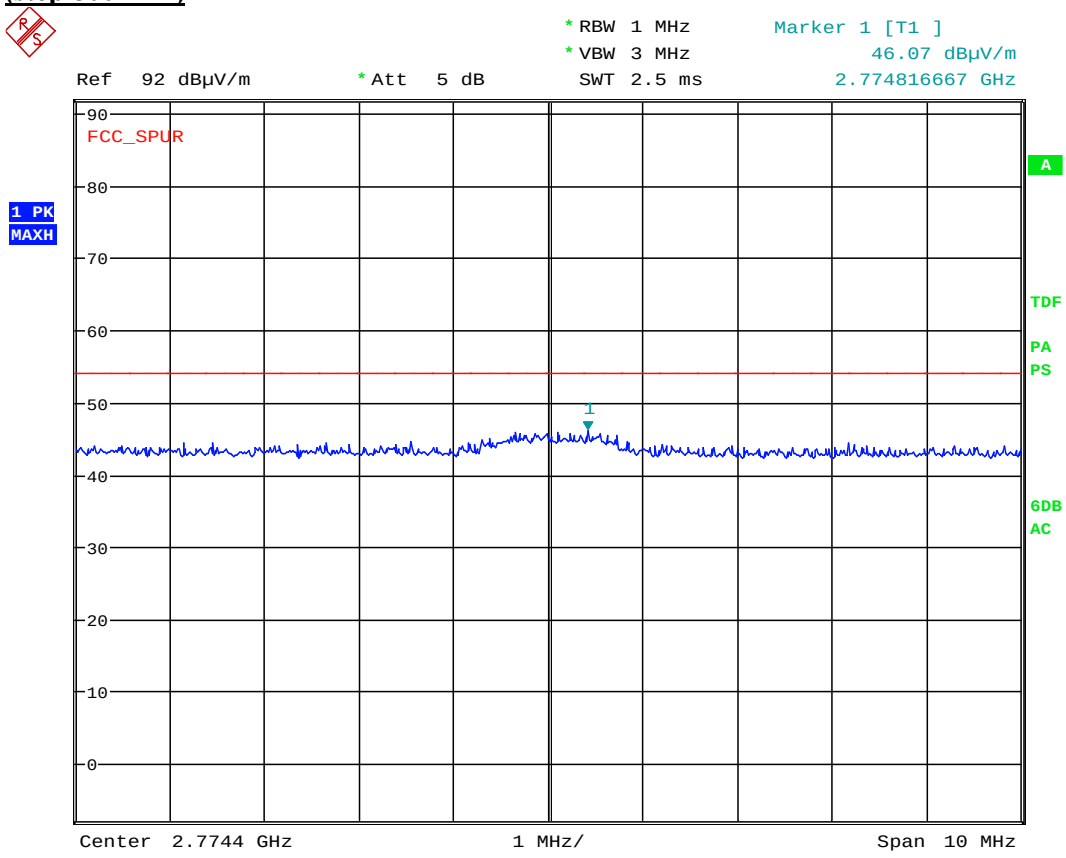
Plot 3.9.71 Radiated emission measurements from 4000 MHz to 10000 MHz at the 924.8 MHz carrier frequency (step 800 kHz)



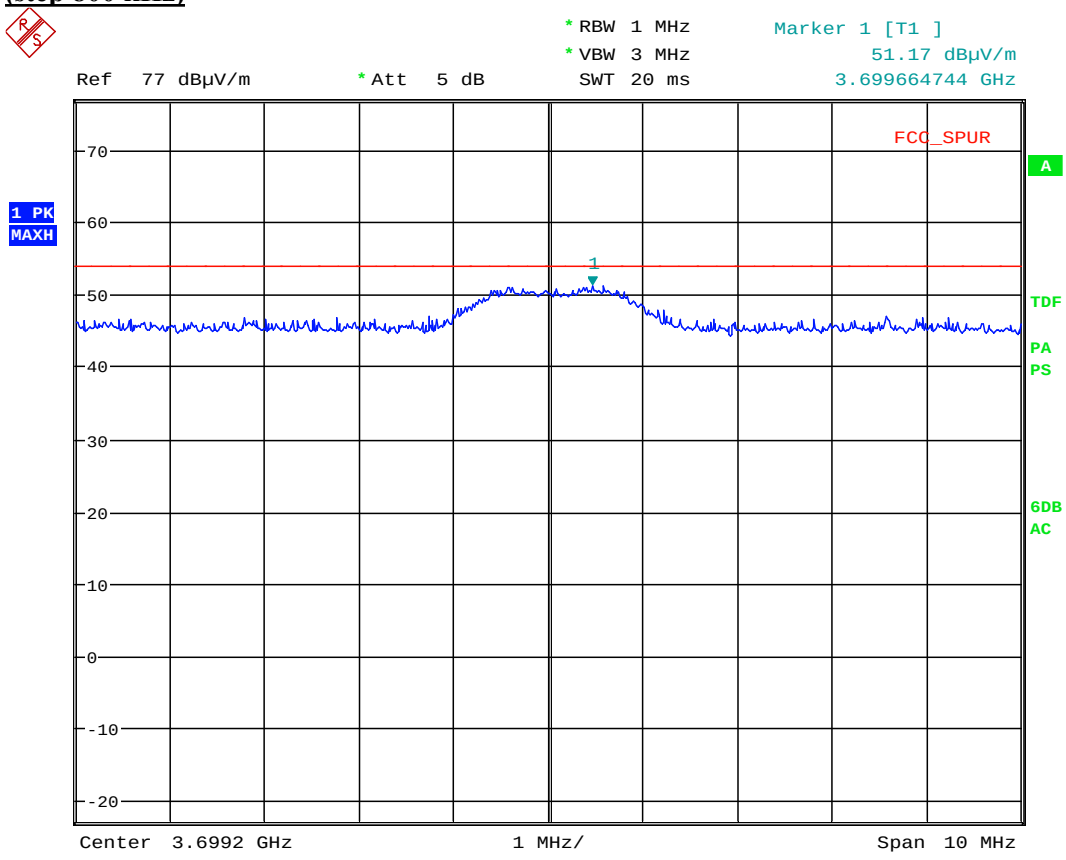
Plot 3.9.72 Radiated emission measurements at the second harmonic of 924.8 MHz carrier frequency (step 800 kHz)



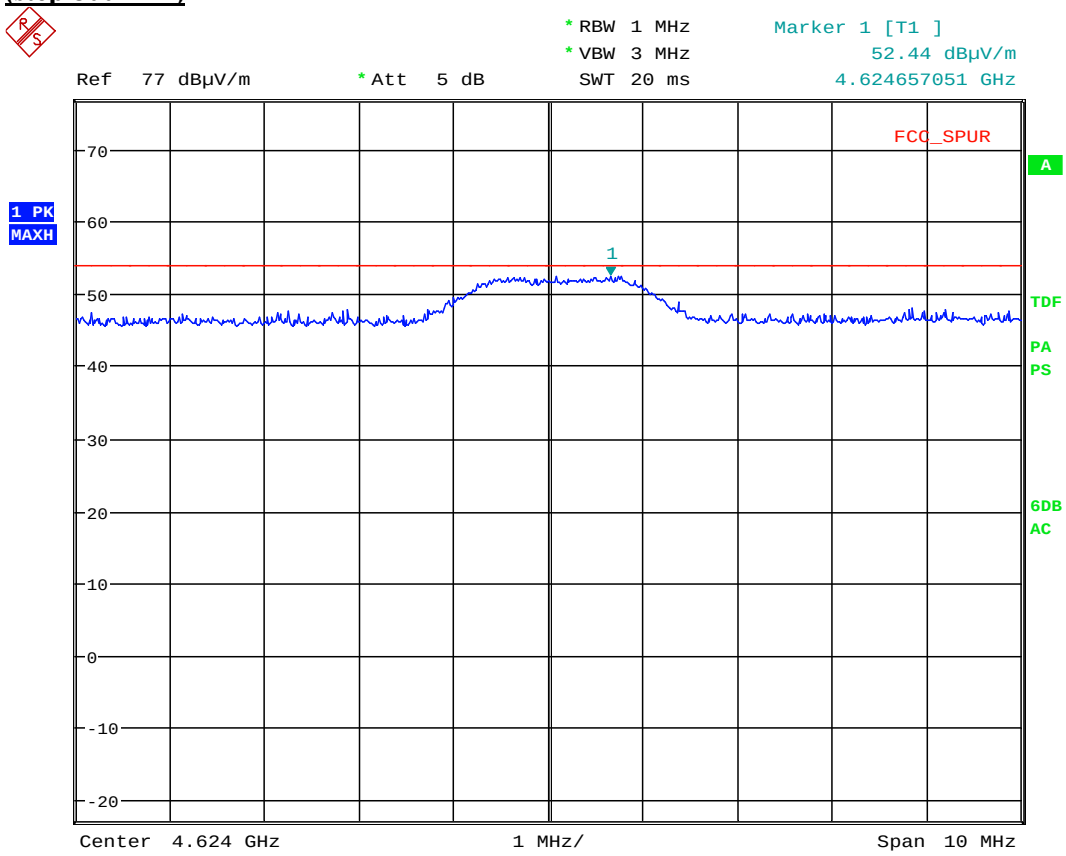
Plot 3.9.73 Radiated emission measurements at the third harmonic of 924.8 MHz carrier frequency (step 800 kHz)



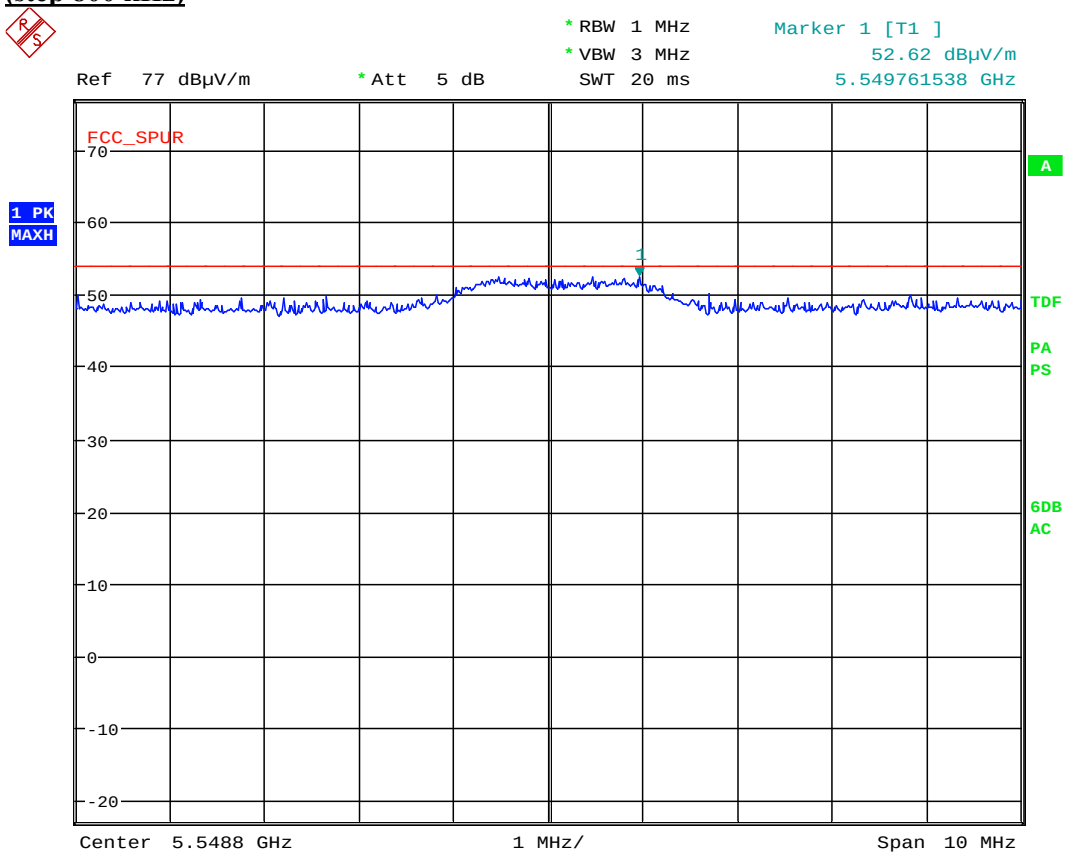
Plot 3.9.74 Radiated emission measurements at the forth harmonic of 924.8 MHz carrier frequency (step 800 kHz)



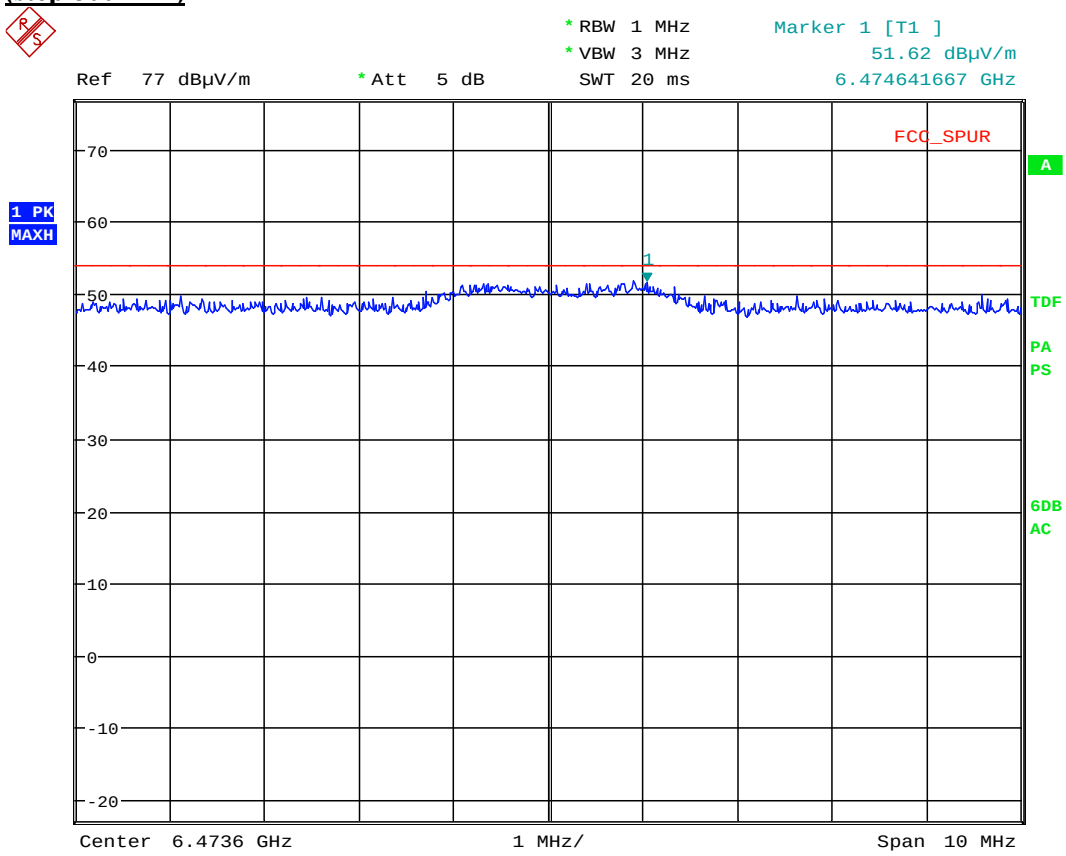
Plot 3.9.75 Radiated emission measurements at the fifth harmonic of 924.8 MHz carrier frequency (step 800 kHz)



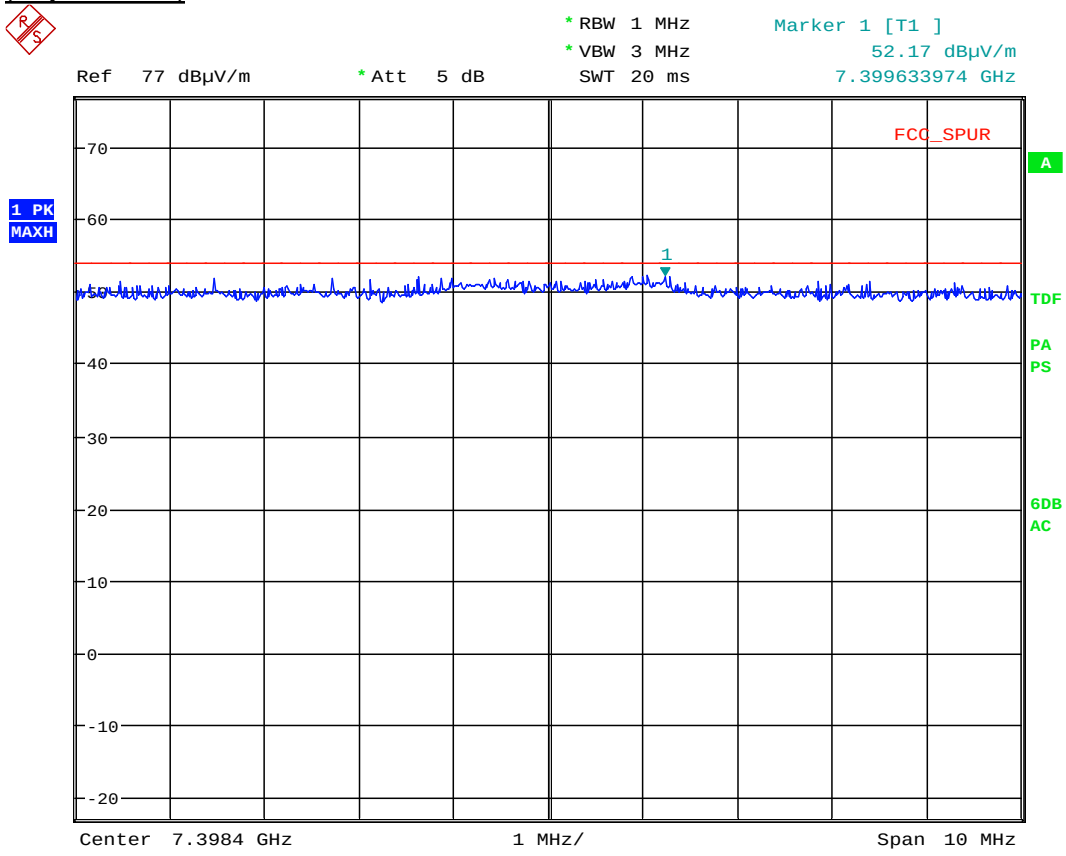
Plot 3.9.76 Radiated emission measurements at the sixth harmonic of 924.8 MHz carrier frequency (step 800 kHz)



Plot 3.9.77 Radiated emission measurements at the seventh harmonic of 924.8 MHz carrier frequency (step 800 kHz)



Plot 3.9.78 Radiated emission measurements at the eighth harmonic of 924.8 MHz carrier frequency (step 800 kHz)



3.10 Radiated Emission

3.10.1 Test requirements 15.109 Class B

Frequency of emission (MHz)	Field strength (microvolts/meter)	Field Strength (dBμV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

3.10.2 Test procedure (ANSI C63.4, Sections 11.6 and 12.1.4)

The test was performed to measure radiated emissions from the equipment under test enclosure. The measurement was made in the anechoic chamber at measurement distance of 3m in two bands: (30-1000) MHz, (1000-10000) MHz.

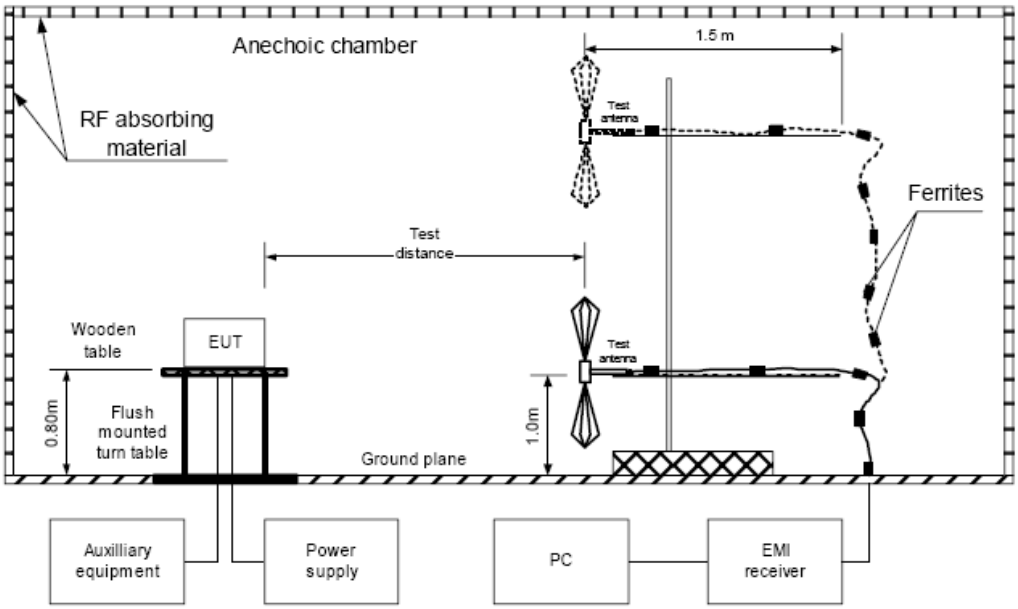
1) The equipment under test was set to stand-by mode.

2) In the band of (30-1000) MHz the measurement was made in anechoic chamber with metal floor. The turntable was rotated, the antenna height was altered in the range of 1m - 4m, the polarization of biconical antenna was changed from horizontal to vertical in a process of seeking for the maximum result. Settings of the test receiver: RBW = 120 kHz; Video Detector = Positive Peak during prequalification measurement, Quasi-Peak - during final measurement.

3) In the band of (1000-10000) MHz the measurement was made in fully anechoic chamber. The height of test antenna was fixed while the turntable was rotated and the polarization of horn test antenna was changed from horizontal to vertical in a process of seeking for the maximum result. Settings of the test receiver: RBW = 1000 kHz; Video Detector = Positive Peak during prequalification measurement, Average - during final measurement.

4) The worst test results (the lowest margins) were recorded and shown in the associated plots.

Figure 3.10.1 Test setup layout (above 30 MHz and below 10 GHz)



3.10.3 Test result

Temperature: +18 °C Relative humidity: 45 %

EUT OPERATING MODE: Receive / Stand-by

Table 3.10.2 Radiated emission test result (904.8 MHz, step 400 kHz)

Frequency, MHz	Turntable position, degrees	Antenna height, m	Antenna polarization	Peak detector emission, dBμV/m	Quasi-Peak Detector Emission, dBμV/m	Average detector emission, dBμV/m	Limit, dBμV/m	Result (Pass, Fail, N/A)
41.931192	0	1.0	H	20.9	15.4	-	40.0	Pass
42.777831	10	1.0	H	20.1	15.4	-	40.0	Pass
66.672872	0	2.0	H	21.1	16.6	-	40.0	Pass
104.540368	0	1.0	V	26.6	23.0	-	43.5	Pass
122.302178	10	1.0	H	19.0	13.8	-	43.5	Pass
213.837319	90	3.0	V	20.2	15.1	-	43.5	Pass
348.267791	180	3.0	H	25.9	19.5	-	46.0	Pass
492.649671	10	4.0	V	27.9	22.6	-	46.0	Pass
682.413257	90	2.0	V	30.8	25.6	-	46.0	Pass
946.217097	0	1.0	V	34.9	29.8	-	46.0	Pass
1115.101616	10	3.0	H	37.4	-	23.9	54.0	Pass
1304.561656	30	2.5	V	38.4	-	24.3	54.0	Pass
1985.076055	0	1.5	V	40.7	-	27.8	54.0	Pass
2485.676370	20	3.5	V	43.3	-	30.1	54.0	Pass
3128.112789	0	2.0	H	44.0	-	31.2	54.0	Pass
3916.966315	0	2.5	H	47.8	-	33.6	54.0	Pass
4983.821844	180	2.5	H	48.5	-	35.5	54.0	Pass
6284.467498	0	1.0	V	50.4	-	36.8	54.0	Pass
7721.264772	0	3.5	H	53.1	-	39.4	54.0	Pass
9863.644872	0	3.0	V	55.5	-	41.9	54.0	Pass

Table 3.10.3 Radiated emission test result (914.4 MHz, step 400 kHz)

Frequency, MHz	Turntable position, degrees	Antenna height, m	Antenna polarization	Peak detector emission, dBμV/m	Quasi-Peak Detector Emission, dBμV/m	Average detector emission, dBμV/m	Limit, dBμV/m	Result (Pass, Fail, N/A)
40.978252	0	4.0	V	20.6	15.5	-	40.0	Pass
56.085908	0	3.0	V	20.2	15.3	-	40.0	Pass
60.512298	10	4.0	V	20.4	14.8	-	40.0	Pass
102.676400	0	1.0	V	22.3	16.4	-	43.5	Pass
104.540368	10	1.0	V	27.1	23.9	-	43.5	Pass
123.037828	180	3.0	V	18.9	13.7	-	43.5	Pass
206.692571	300	3.0	H	20.2	14.7	-	43.5	Pass
338.317969	0	2.0	V	24.4	19.3	-	46.0	Pass
489.704091	180	1.0	H	27.3	22.5	-	46.0	Pass
687.204504	20	1.0	V	30.7	25.7	-	46.0	Pass
955.721961	60	1.0	H	35.6	29.9	-	46.0	Pass
1155.955816	10	3.5	V	37.2	-	23.2	54.0	Pass
1549.265807	0	4.0	H	37.9	-	25.0	54.0	Pass

Frequency, MHz	Turntable position, degrees	Antenna height, m	Antenna polarization	Peak detector emission, dBμV/m	Quasi-Peak Detector Emission, dBμV/m	Average detector emission, dBμV/m	Limit, dBμV/m	Result (Pass, Fail, N/A)
1941.902614	0	3.0	H	41.2	-	28.1	54.0	Pass
2485.676370	0	1.5	H	42.7	-	30.1	54.0	Pass
3066.202648	70	1.0	H	44.7	-	31.4	54.0	Pass
3968.193524	0	1.0	H	46.9	-	34.3	54.0	Pass
4993.794472	90	2.0	H	49.0	-	36.2	54.0	Pass
6147.786542	0	1.0	V	50.4	-	37.2	54.0	Pass
7728.986037	270	1.0	H	53.0	-	39.4	54.0	Pass
9716.867159	40	1.0	H	55.0	-	41.9	54.0	Pass

Table 3.10.4 Radiated emission test result (924.8 MHz, step 400 kHz)

Frequency, MHz	Turntable position, degrees	Antenna height, m	Antenna polarization	Peak detector emission, dBμV/m	Quasi-Peak Detector Emission, dBμV/m	Average detector emission, dBμV/m	Limit, dBμV/m	Result (Pass, Fail, N/A)
40.449245	0	2.0	H	21.0	15.5	-	40.0	Pass
45.603662	30	1.0	V	20.8	15.7	-	40.0	Pass
61.981418	30	3.0	V	19.7	14.5	-	40.0	Pass
102.779076	0	2.0	V	24.1	20.1	-	43.5	Pass
125.899046	20	3.0	V	18.5	13.3	-	43.5	Pass
201.995217	10	2.0	V	19.6	14.5	-	43.5	Pass
346.531664	0	1.0	V	25.3	19.5	-	46.0	Pass
493.142320	0	2.0	V	27.7	22.7	-	46.0	Pass
687.891709	300	2.0	V	31.2	25.7	-	46.0	Pass
959.550587	0	3.0	V	35.7	30.0	-	46.0	Pass
1242.209405	0	2.0	H	37.1	-	24.1	54.0	Pass
1408.927271	40	1.0	H	38.1	-	24.5	54.0	Pass
1953.583197	0	2.5	H	40.9	-	27.5	54.0	Pass
2453.587647	10	2.5	H	42.3	-	29.8	54.0	Pass
3063.139508	0	1.5	H	44.4	-	31.8	54.0	Pass
3964.229294	0	1.5	H	46.6	-	34.0	54.0	Pass
4993.794472	90	3.0	H	48.6	-	36.2	54.0	Pass
6135.509388	0	4.0	V	49.8	-	36.8	54.0	Pass
7553.334896	180	2.5	H	52.8	-	39.2	54.0	Pass
9853.791081	50	1.5	V	55.0	-	42.0	54.0	Pass

Table 3.10.5 Radiated emission test result (904.8 MHz, step 800 kHz)

Frequency, MHz	Turntable position, degrees	Antenna height, m	Antenna polarization	Peak detector emission, dBμV/m	Quasi-Peak Detector Emission, dBμV/m	Average detector emission, dBμV/m	Limit, dBμV/m	Result (Pass, Fail, N/A)
40.046969	90	1.0	V	21.5	15.6	-	40.0	Pass
57.966665	20	2.0	V	20.5	15.2	-	40.0	Pass
64.316495	70	2.0	H	19.0	13.5	-	40.0	Pass
101.452254	0	1.0	V	25.8	21.0	-	43.5	Pass
137.611692	10	1.0	V	17.4	12.3	-	43.5	Pass
206.073731	0	1.0	H	19.9	14.7	-	43.5	Pass
343.771844	0	1.0	H	24.9	19.4	-	46.0	Pass

Frequency, MHz	Turntable position, degrees	Antenna height, m	Antenna polarization	Peak detector emission, dBμV/m	Quasi-Peak Detector Emission, dBμV/m	Average detector emission, dBμV/m	Limit, dBμV/m	Result (Pass, Fail, N/A)
488.237912	350	4.0	V	27.4	22.5	-	46.0	Pass
638.849180	190	3.0	H	31.1	25.3	-	46.0	Pass
953.813381	0	3.0	V	34.9	29.9	-	46.0	Pass
1178.117770	110	4.0	H	37.0	-	24.1	54.0	Pass
1397.706406	30	4.0	H	38.1	-	24.4	54.0	Pass
1989.048193	0	1.5	V	40.8	-	28.1	54.0	Pass
2485.676370	270	3.0	V	42.9	-	30.1	54.0	Pass
3060.079429	0	2.0	H	44.0	-	31.3	54.0	Pass
3897.440101	210	2.50	V	46.7	-	33.6	54.0	Pass
4993.794472	180	1.50	H	49.4	-	36.2	54.0	Pass
6135.509388	0	3.0	V	50.5	-	36.8	54.0	Pass
7775.476042	180	2.0	V	52.9	-	39.4	54.0	Pass
9992.644448	90	3.0	V	55.3	-	42.3	54.0	Pass

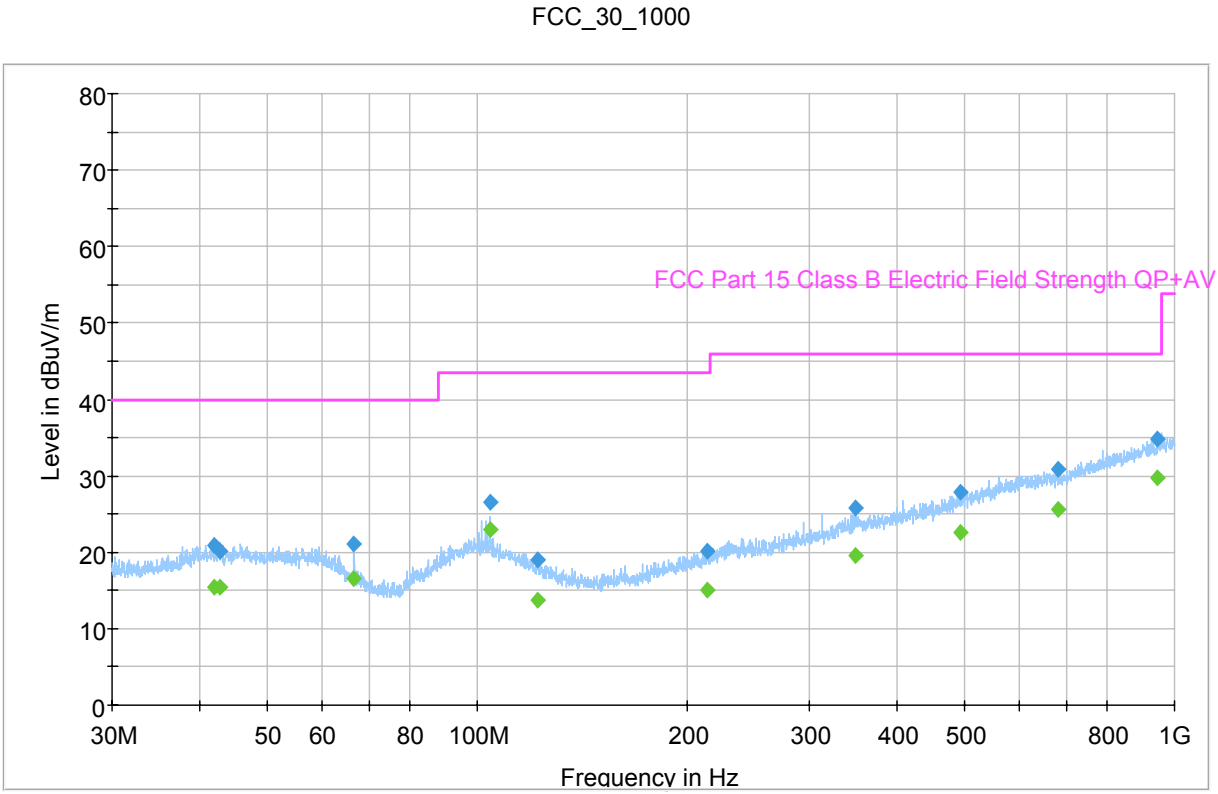
Table 3.10.6 Radiated emission test result (914.4 MHz, step 800 kHz)

Frequency, MHz	Turntable position, degrees	Antenna height, m	Antenna polarization	Peak detector emission, dBμV/m	Quasi-Peak Detector Emission, dBμV/m	Average detector emission, dBμV/m	Limit, dBμV/m	Result (Pass, Fail, N/A)
41.101310	200	4.0	V	21.2	15.6	-	40.0	Pass
56.592705	50	3.0	H	21.0	15.3	-	40.0	Pass
60.754710	0	2.0	V	19.8	14.8	-	40.0	Pass
102.779076	0	1.0	V	24.7	21.4	-	43.5	Pass
124.398031	10	3.0	V	19.3	13.5	-	43.5	Pass
205.867863	340	1.0	V	19.2	14.6	-	43.5	Pass
345.494145	180	1.0	V	24.7	19.5	-	46.0	Pass
490.683989	0	4.0	V	27.9	22.6	-	46.0	Pass
690.647406	180	2.0	H	30.5	25.7	-	46.0	Pass
930.275265	20	4.0	H	34.5	29.6	-	46.0	Pass
1257.198177	0	3.5	V	37.0	-	23.8	54.0	Pass
1526.211683	40	3.5	V	38.1	-	24.9	54.0	Pass
1975.180382	60	4.0	H	40.6	-	28.1	54.0	Pass
2488.162046	0	2.0	V	43.1	-	30.2	54.0	Pass
3124.987802	70	1.0	H	44.6	-	31.3	54.0	Pass
3936.590356	0	2.5	H	46.3	-	34.0	54.0	Pass
5008.790841	180	3.0	V	48.7	-	36.2	54.0	Pass
6086.645457	0	1.0	H	49.7	-	36.9	54.0	Pass
7344.877743	120	3.5	H	52.6	-	39.1	54.0	Pass
9834.113021	180	4.0	V	55.5	-	42.0	54.0	Pass

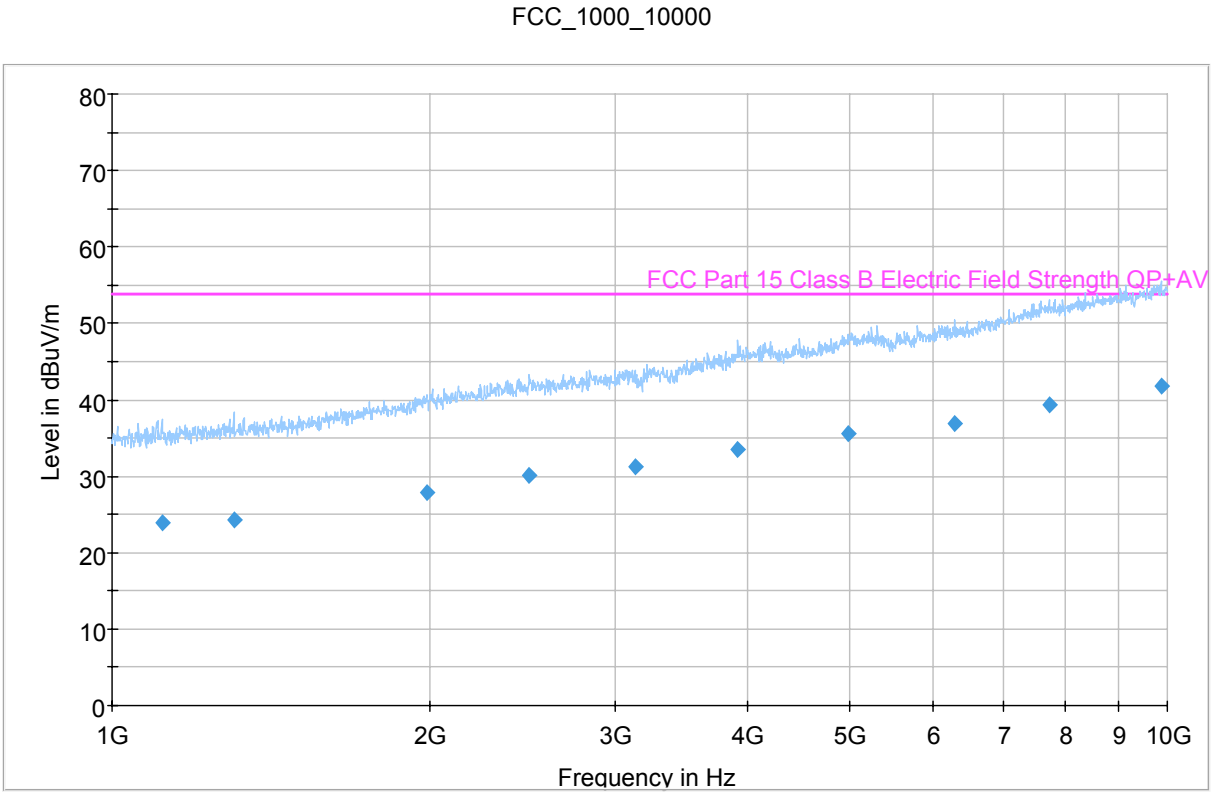
Table 3.10.7 Radiated emission test result (924.8 MHz, step 800 kHz)

Frequency, MHz	Turntable position, degrees	Antenna height, m	Antenna polarization	Peak detector emission, dBμV/m	Quasi-Peak Detector Emission, dBμV/m	Average detector emission, dBμV/m	Limit, dBμV/m	Result (Pass, Fail, N/A)
40.489694	30	4.0	V	20.4	15.6	-	40.0	Pass
55.806318	20	3.0	V	20.6	15.3	-	40.0	Pass
60.694016	0	1.0	H	20.0	14.8	-	40.0	Pass
102.779076	0	1.0	V	26.4	22.5	-	43.5	Pass
122.914913	10	2.0	H	18.8	13.7	-	43.5	Pass
214.908647	350	4.0	H	20.2	15.3	-	43.5	Pass
348.964675	190	1.0	H	24.4	19.6	-	46.0	Pass
486.776123	10	4.0	V	27.7	22.5	-	46.0	Pass
699.679891	150	3.0	V	31.2	25.8	-	46.0	Pass
952.860520	0	2.0	H	35.9	29.9	-	46.0	Pass
1165.235894	0	2.5	V	37.4	-	23.9	54.0	Pass
1583.709933	50	4.0	V	38.3	-	25.4	54.0	Pass
1934.154383	0	3.0	V	40.8	-	27.5	54.0	Pass
2493.140858	0	1.5	H	43.1	-	29.7	54.0	Pass
3109.409628	0	3.0	V	44.4	-	31.1	54.0	Pass
3870.266822	0	3.0	V	46.6	-	33.9	54.0	Pass
4998.788266	160	1.0	V	49.3	-	35.7	54.0	Pass
6160.088263	30	1.5	V	50.3	-	37.1	54.0	Pass
7545.789107	230	4.0	V	53.5	-	39.3	54.0	Pass
9982.661786	90	2.0	H	55.4	-	42.3	54.0	Pass

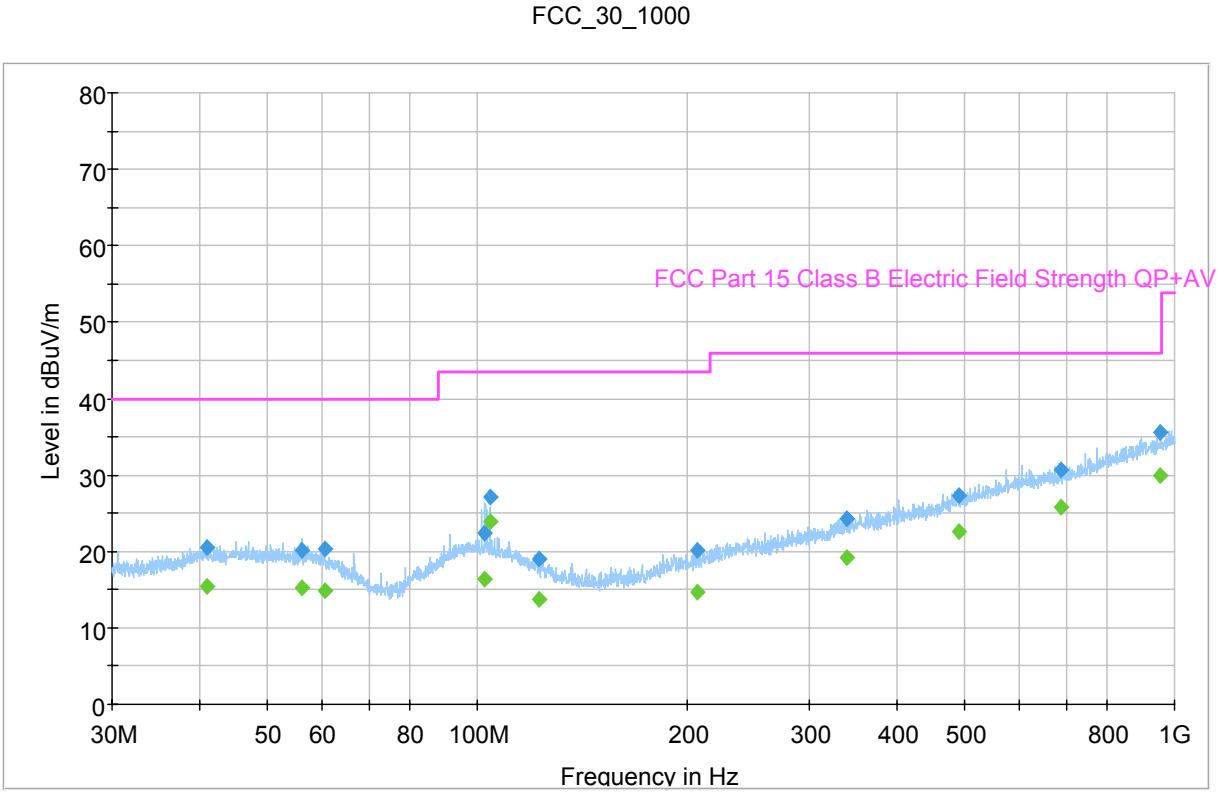
Plot 3.10.1 Radiated emission measurements in (30 – 1000) MHz range, vertical and horizontal polarization (904.8 MHz, step 400 kHz)



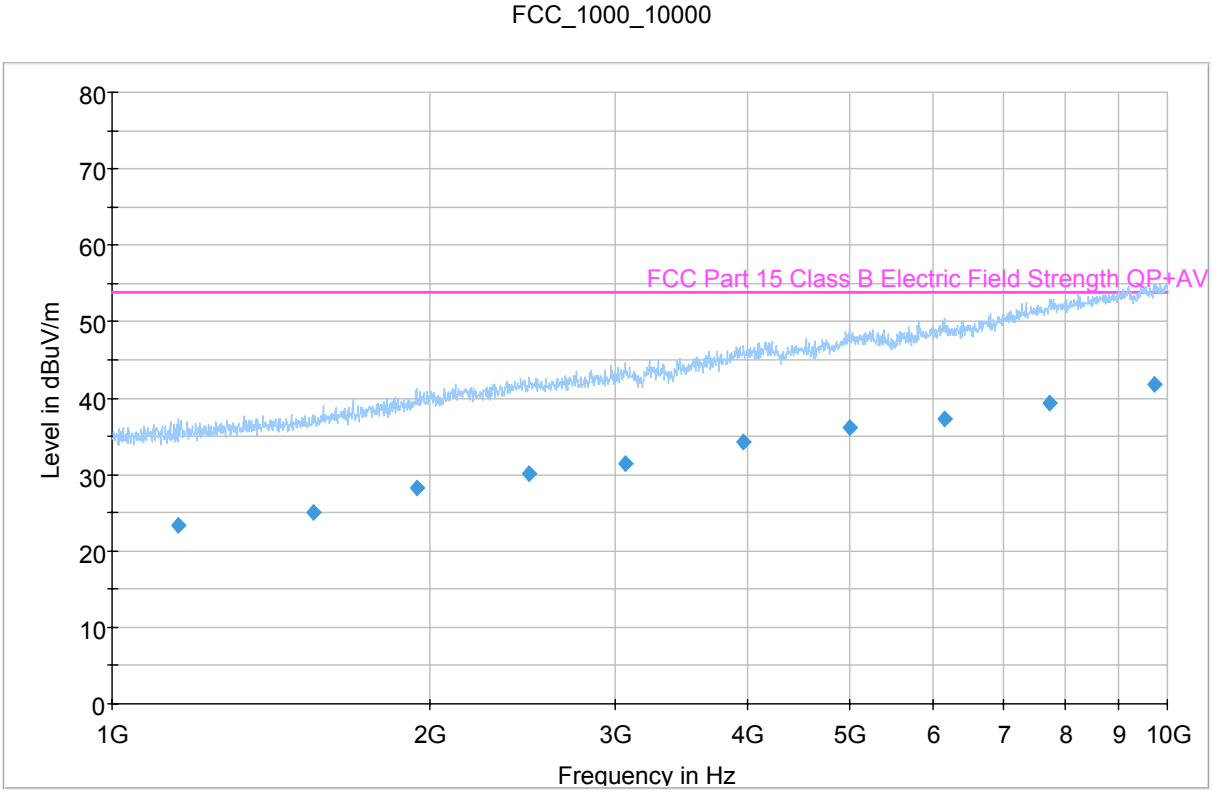
Plot 3.10.2 Radiated emission measurements in (1000 – 10000) MHz range, vertical and horizontal polarization (904.8 MHz, step 400 kHz)



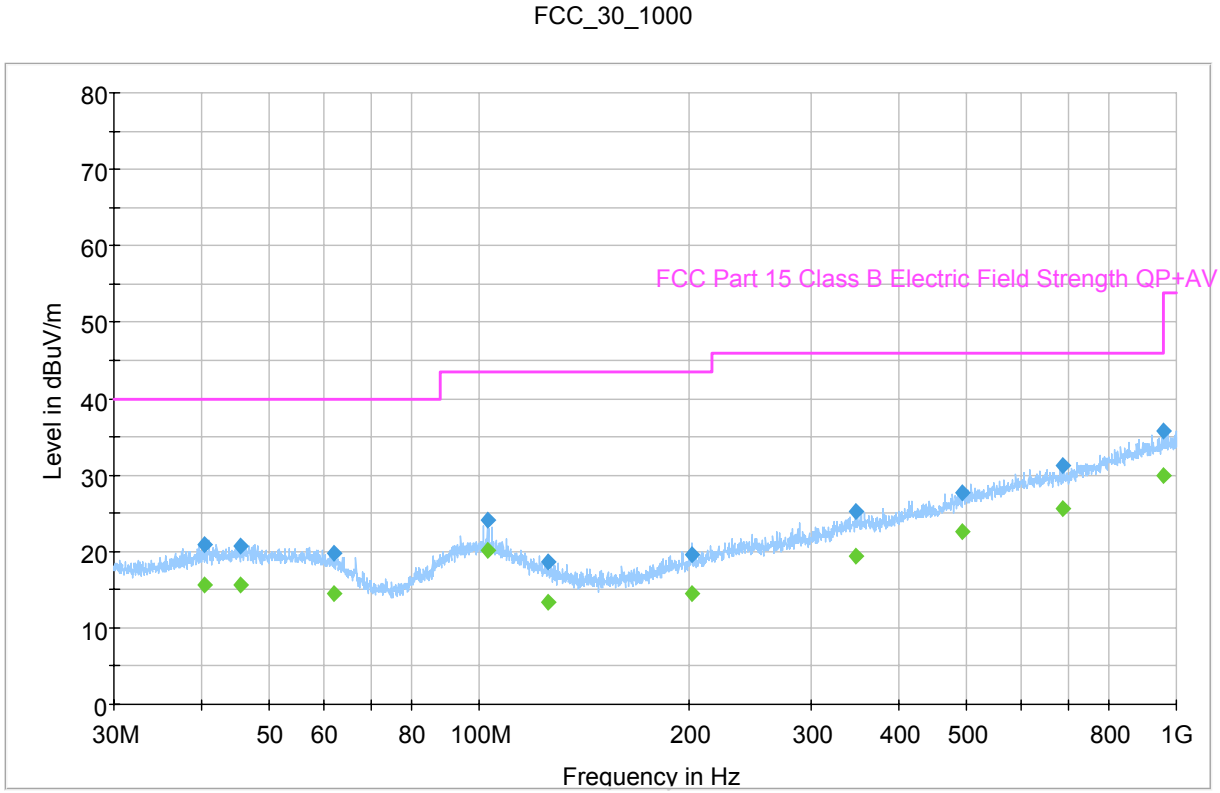
Plot 3.10.3 Radiated emission measurements in (30 – 1000) MHz range, vertical and horizontal polarization (914.4 MHz, step 400 kHz)



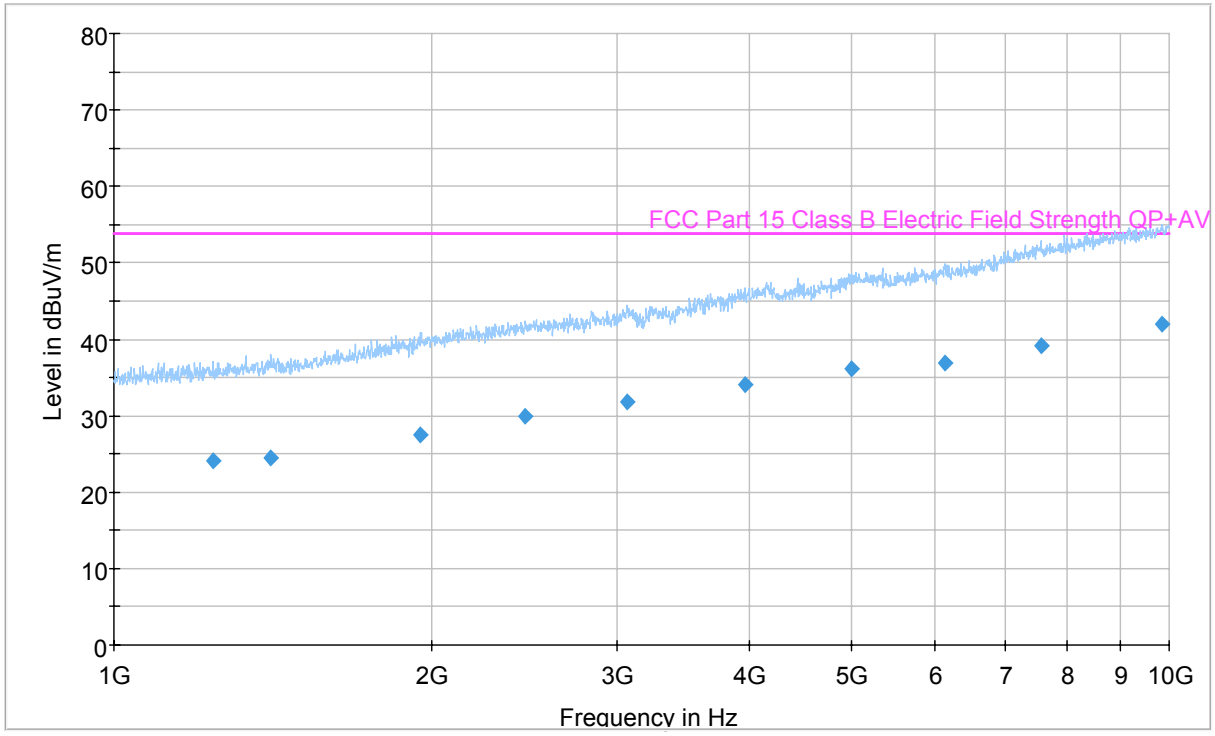
Plot 3.10.4 Radiated emission measurements in (1000 – 10000) MHz range, vertical and horizontal polarization (914.4 MHz, step 400 kHz)



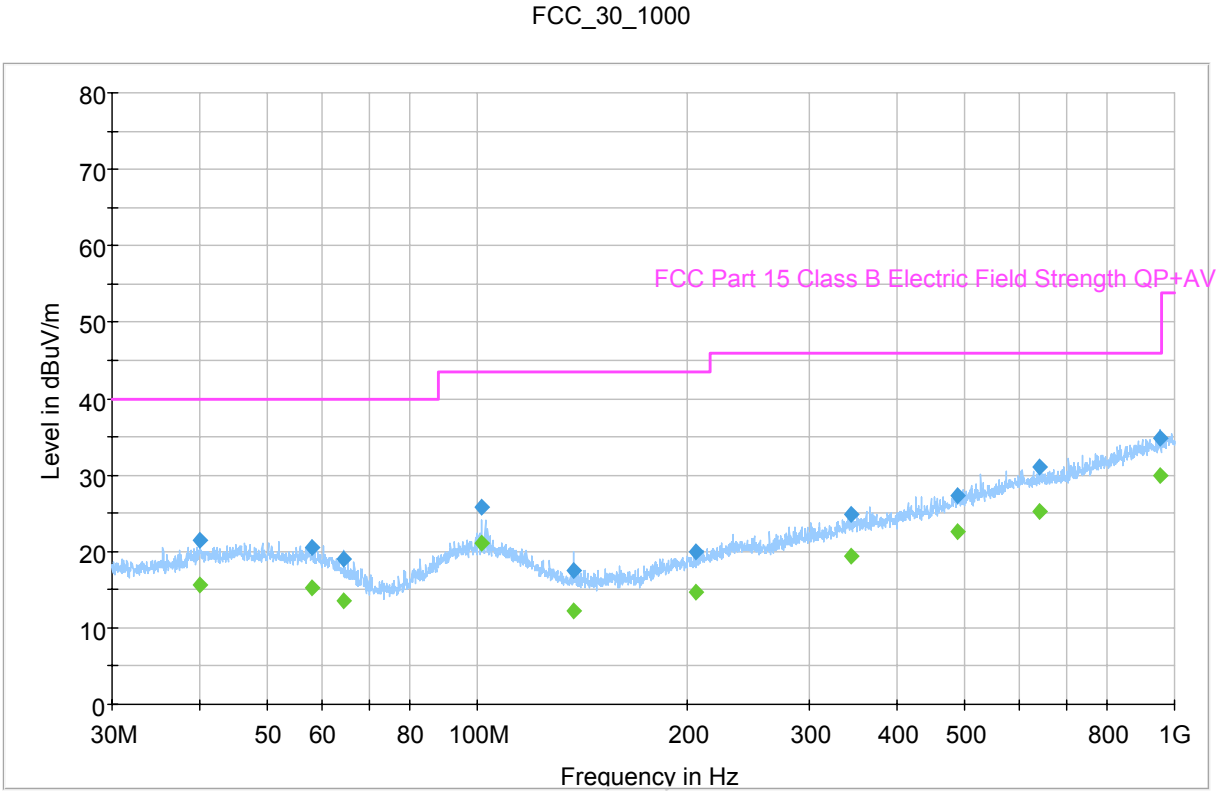
Plot 3.10.5 Radiated emission measurements in (30 – 1000) MHz range, vertical and horizontal polarization (924.8 MHz, step 400 kHz)



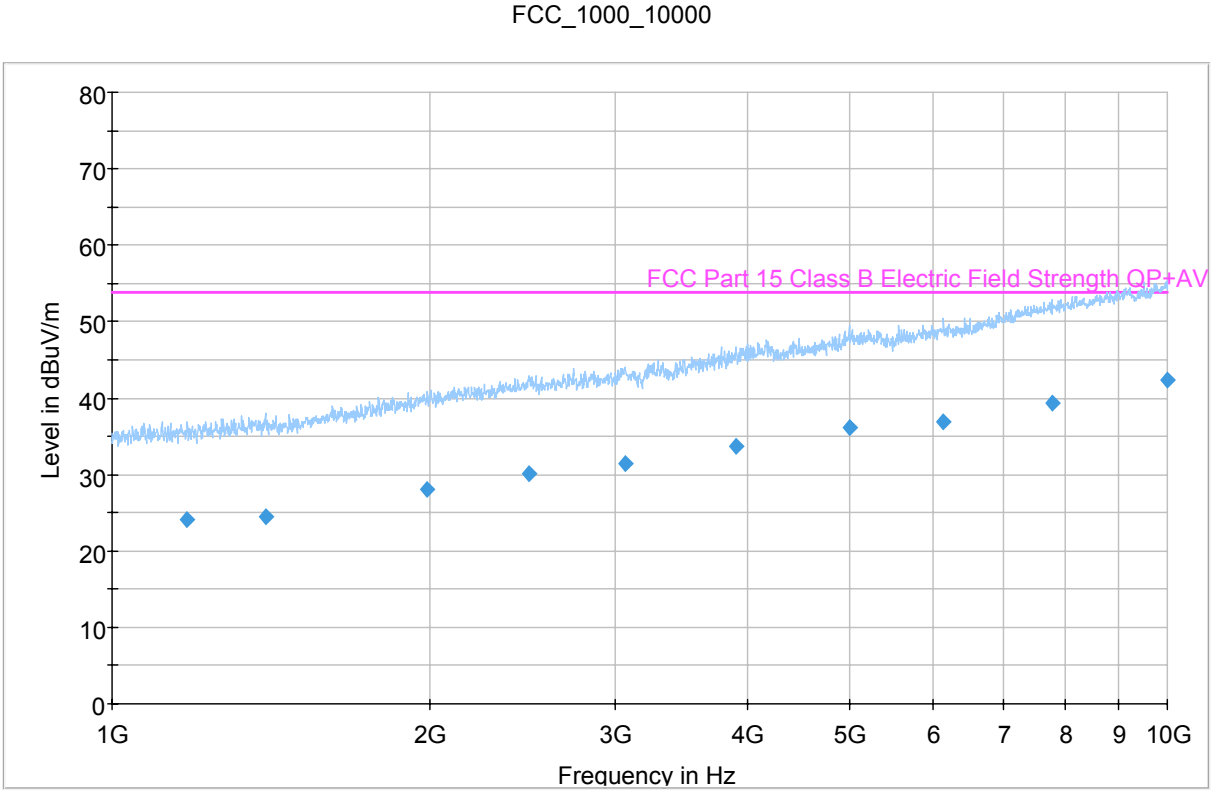
Plot 3.10.6 Radiated emission measurements in (1000 – 10000) MHz range, vertical and horizontal polarization (924.8 MHz, step 400 kHz)



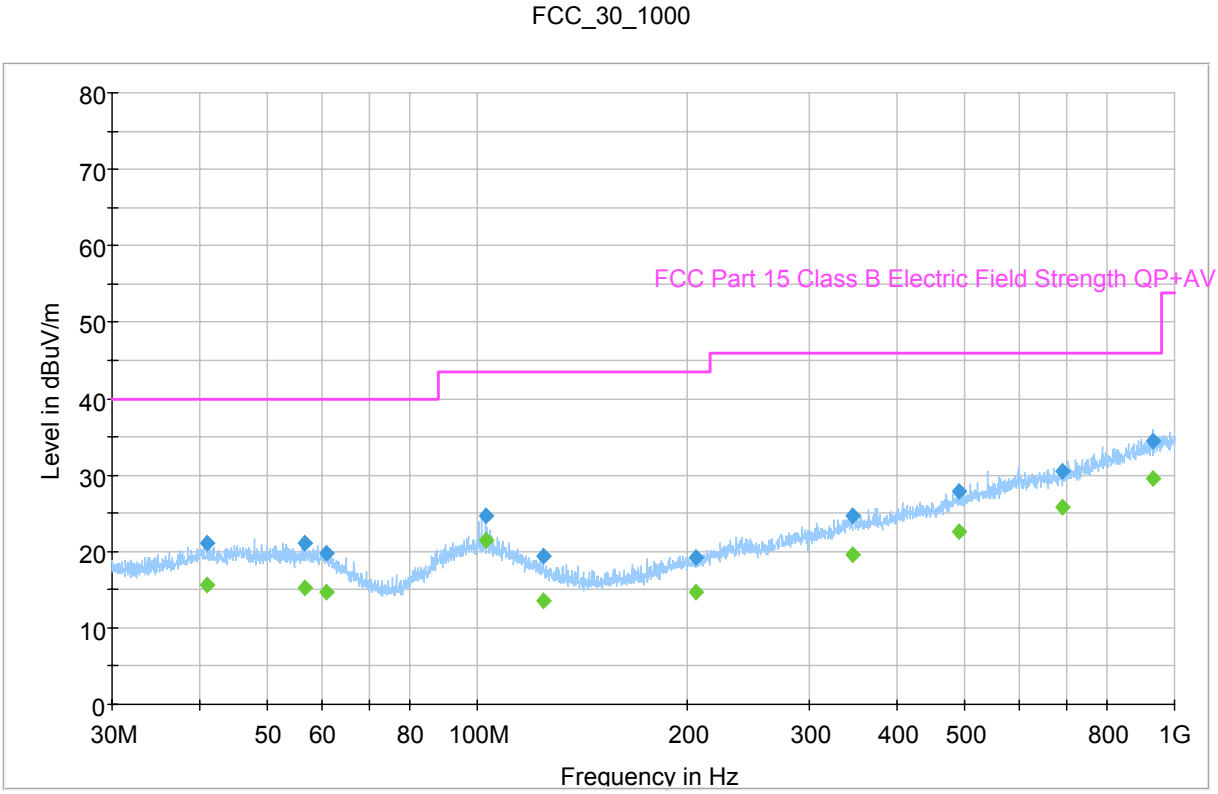
Plot 3.10.7 Radiated emission measurements in (30 – 1000) MHz range, vertical and horizontal polarization (904.8 MHz, step 800 kHz)



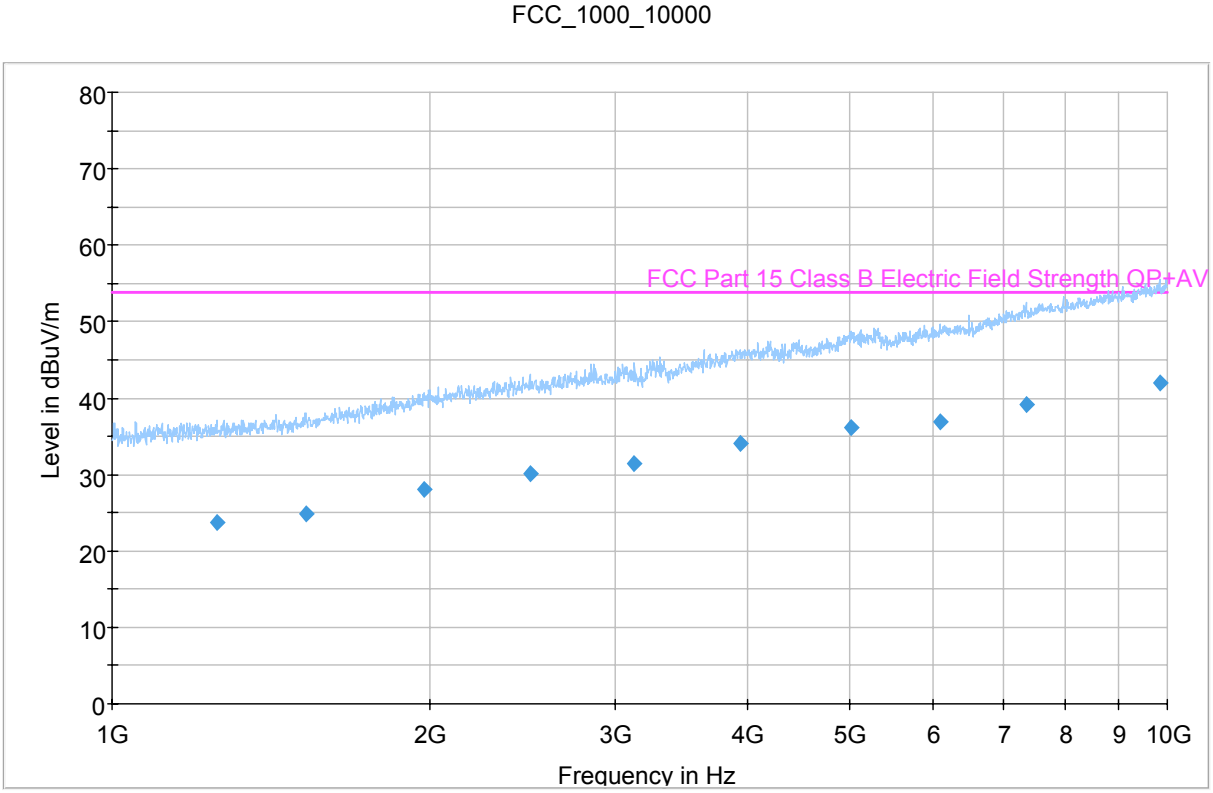
Plot 3.10.8 Radiated emission measurements in (1000 – 10000) MHz range, vertical and horizontal polarization (904.8 MHz, step 800 kHz)



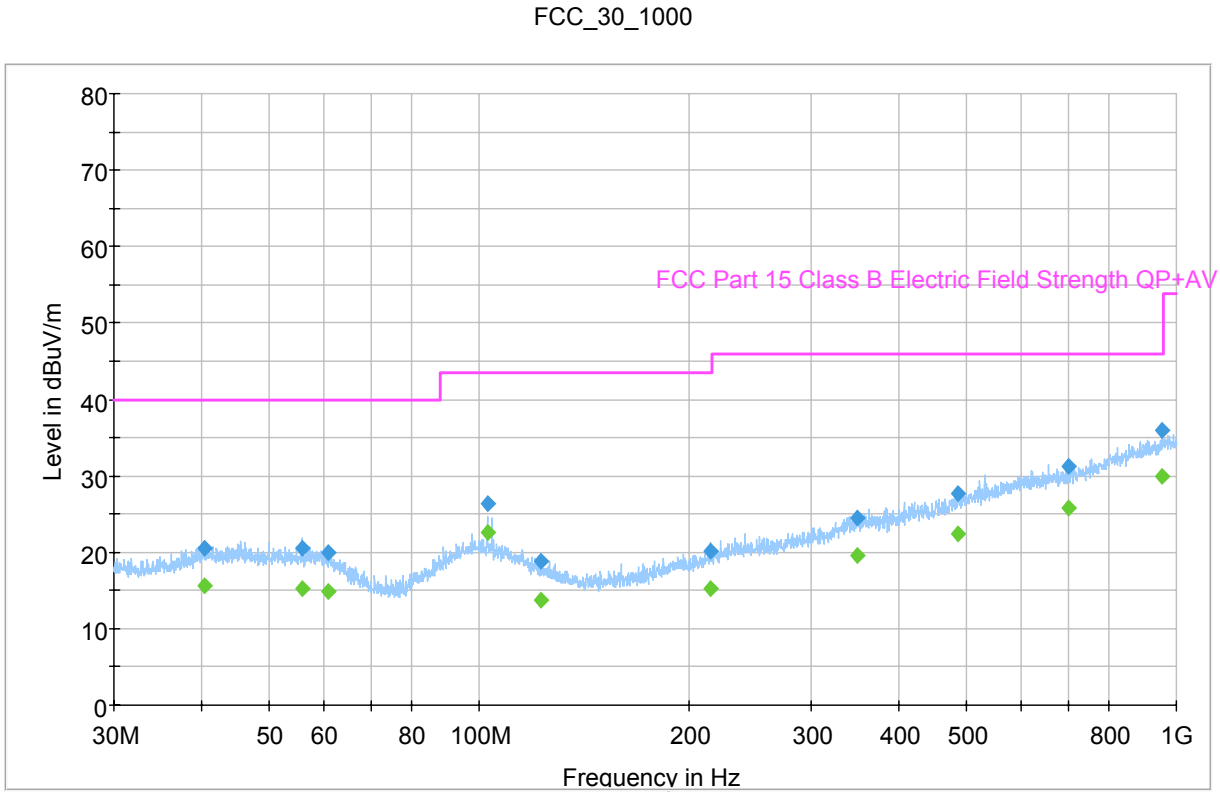
Plot 3.10.9 Radiated emission measurements in (30 – 1000) MHz range, vertical and horizontal polarization (914.4 MHz, step 800 kHz)



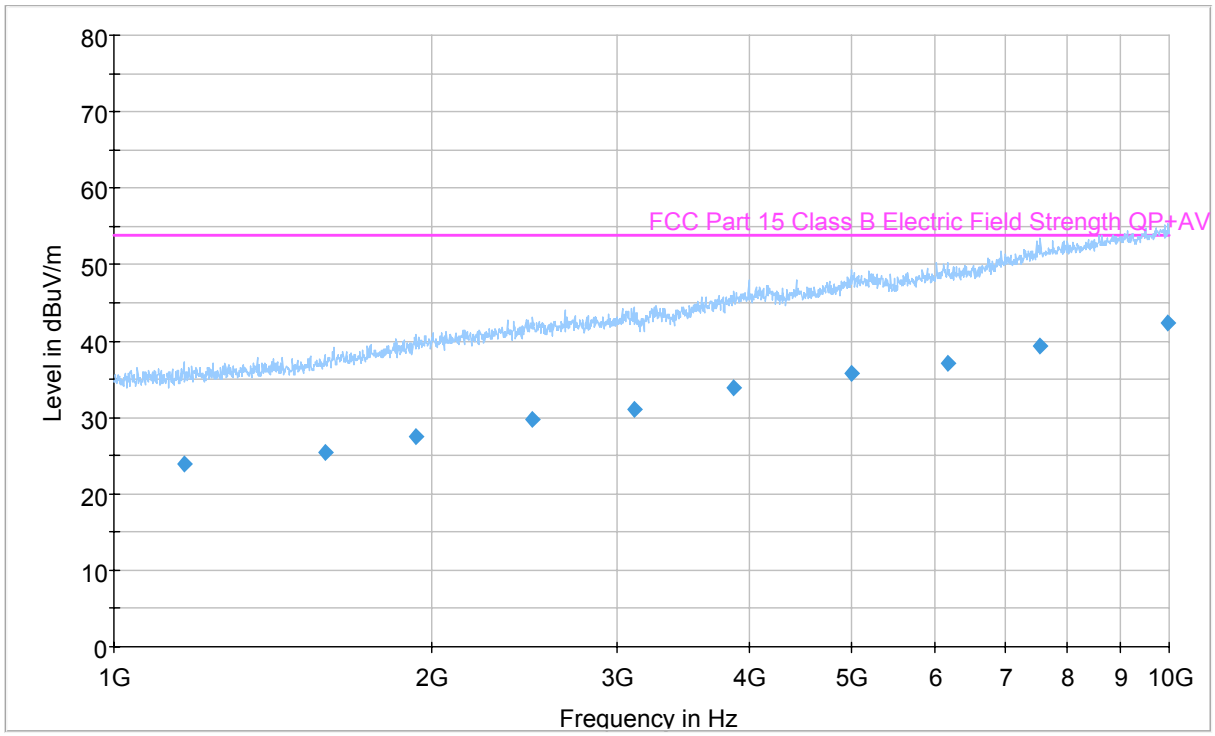
Plot 3.10.10 Radiated emission measurements in (1000 – 10000) MHz range, vertical and horizontal polarization (914.4 MHz, step 800 kHz)



Plot 3.10.11 Radiated emission measurements in (30 – 1000) MHz range, vertical and horizontal polarization (924.8 MHz, step 800 kHz)



Plot 3.10.12 Radiated emission measurements in (1000 – 10000) MHz range, vertical and horizontal polarization (924.8 MHz, step 800 kHz)



April 29, 2013

Tnet 210 Compliance to a Single Modular Approval

Tnet 210 complies to the FCC part 15.212 as defined at sections (a)(1)(i) to (a)(1)(viii)

a(1)(i) – Radio elements are located under the shield.

a(1)(ii) – The modular transmitter is integrated device with buffered data inputs.

a(1)(iii) – The modular transmitter's maximal transmission power is limited to a defined power supply voltage, the transceiver has own power supply regulation.

a(1)(iv) – The antenna employ a “unique” antenna coupler, all connections between the module and the antenna, including the cable are unique. (Reverse polarity)

a(1)(v) – The modular transmitter is tested in a stand-alone configuration.

a(1)(vi) – The modular transmitter is equipped with a permanently affixed label with its own FCC identification number.

The outside of the device into which the module is installed display a label referring to the enclosed module. Here is the drawing of the outside label.

a(1)(vii) – The modular transmitter operating requirements is defined at Tnet210 specifications.

a(1)(vii) – The calculation of RF exposure is in separate document (RF exposure Tnet).