Center for Quality Engineering

Test Report No.: D0XD0001

FCC ID: VBNFRIE-01

Order No.: D0XD **Pages:** 71 **Munich,** Oct 20, 2010

Client:	Nokia Siemens Networks Oy
Equipment Under Test:	Flexi Multiradio BTS RF module 1.7/2.1GHz Flexi WCDMA BTS RF module 1.7/2.1GHz Radio Access Technology: UTRA
Manufacturer:	Nokia Siemens Networks Oy
Task:	Conformance test according to the test specifications mentioned below
Test Specification(s):	FCC 47 CFR Part 2 and 27
Result:	The EUT complies with the requirements of the specification.

The results relate only to the items tested as described in this test report.

approved by:	**Date**	**Signature**
Neuhäusler Lab Manager Technical Services	Oct 21, 2010	
Bauer Lab Manager EMC	Oct 21, 2010	

This document was signed electronically.

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1 Summary

The measurements described in this report were conducted pursuant to 47 CFR § 2.947. All applicable paragraphs of the 47 CFR parts 2 and 27 of the most current version of the rules were considered.

The following tests were performed according to the FCC rules in order to verify the compliance of the EUT with the FCC requirements:

Test No.	Measurement	FCC Rule	Page Number of this Report	Result
1	RF Power Output	§ 2.1046, § 27.50	12	compliant
2	Modulation Characteristics	§ 2.1047, § 2.201	15	compliant
3	Occupied Bandwidth	§ 2.1049	16	compliant
4	Spurious Emissions at Antenna Terminals	§ 2.1051, § 2.1057, § 27.53	17	compliant
5	Field Strength of Spurious Radiation	§ 2.1053, § 2.1057, § 27.53	23	compliant
6	Frequency Stability	§ 2.1055, § 27.54	25	compliant

Table 1-1: Results – Summary

In accordance with the FCC Rule §15.3 (z) the equipment was tested with the limits that are valid for an *unintentional radiator*.

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2 References

2.1 Specifications

No	Standard	Title	Date
[1]	FCC 47 CFR Part 2 and 27	Code of Federal Regulations, Title 47: Telecommunication Part 2: Frequency Allocations and Radio Treaty Matters; General Rules and Regulations Part 27: Miscelleanous Wireless Communications Services[1]	2009-10

1) Updated by: Federal Register / Vol. 75, No. 141 / Friday, July 23, 2010 / Rules and Regulations / 43088

2.2 Glossary of Terms

°C	Degree Celsius
16QAM	16 Quadrature Amplitude Modulation
3GPP	3rd Generation Partnership Project
AC	Alternating Current
ANT	Antenna
BS	Base Station
chk	checked against a calibrated reference
cnn	calibration not necessary
DAR	Deutscher Akkreditierungsrat (German Accreditation Council)
DATech	Deutsche Akkreditierungsstelle Technik e.V.
dB	Decibel
dBc	Decibel per Carrier
dBm	Decibel per Milliwatt
DC	Direct Current
DCH	Dedicated Channel
DL	Downlink
DPCH	Dedicated Physical Channel
EUT	Equipment Under Test
FDD	Frequency Division Duplex
ind	for indication only
kbps	Kilobits per second
max	Maximum
min	Minimum
n/a	Not Applicable
n/p	Not Performed
P	Power
Pmax	Maximum Output Power
Prat	Rated Output Power
QPSK	Quadrature Phase Shift Keying
RBW	Resolution Bandwidth
Ref	Reference
RF	Radio Frequency
RMS	Root Mean Square
RX	Receive Path
SW	Software
T	Temperature
TM	Test Model
TRX	Transceiver
TX	Transmit Path
UARFCN	UTRA Absolute Radio Frequency Channel Number
UL	Uplink

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UMTS	Universal Mobile Telecommunications System
UTRA	UMTS Terrestrial Radio Access
UTRAN	UMTS Terrestrial Radio Access Network
Uu	UMTS Air Interface
V	Volt
W	Watt
w/	with
w/o	without

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3 General Information

3.1 Identification of Client

Nokia Siemens Networks Oy
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Kaapelitie 4,
FI-90651, Oulu, Finland
Jari Virta

3.2 Test Laboratory

Nokia Siemens Networks Oy
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FI-90651, Oulu, Finland
Jari Virta

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3.3 Time Schedule

Test No.:	**1, 2, 3, 4,6**	**5**
Start of Test:	Sep 15, 2010	Aug 26, 2010
End of Test:	Oct 07, 2010	Aug 27, 2010

3.4 Participants

Name	**Function**
Rami Salomäki	Testing, Setup of EUT
Hannu Eskola	Testing, Setup of EUT
Sami Riuttanen	Testing, Setup of EUT
Jari Veijola	Testing, Setup of EUT
Stephane Nakpane	Editor

4 Equipment Under Test

The tested equipment is representative for serial production.

4.1 Description of EUT

The BTS performs the radio function of the Base Station System (BSS), and is connected to the Radio Network Controller (RNC) via the Iub interface, and to Mobile Stations (MS) via the Air interface (Antenna). The RNC is further connected to Serving GPRS Support Node (SGSN) or it can be connected to the Mobile Switching Centre (MSC) via IWU (Inter Working Unit).

4.2 Configuration of EUT

The used different EUT configurations are shown by the following tables.

Module Type	Flexi Multiradio BTS RF module 1.7/2.1GHz Flexi WCDMA BTS RF module 1.7/2.1GHz	
Radio Access Technology	UTRA	
Frequency Bands	**Uplink**	**Downlink**
Block A:	1710 – 1720 MHz	2110 – 2120 MHz
Block B:	1720 – 1730 MHz	2120 – 2130 MHz
Block C:	1730 – 1735 MHz	2130 – 2135 MHz
Block D:	1735 – 1740 MHz	2135 – 2140 MHz
Block E:	1740 – 1745 MHz	2140 – 2145 MHz
Block F:	1745 – 1755 MHz	2145 – 2155 MHz
	Single Carrier	**Multi Carrier**
Rated Output Power (Prat)	60 W (Config. A and C)	2x30 W (Config. B)
	RX	**TX**
Number of Antenna Ports	6 (RX1 to RX6)	6 (TX1 to TX6)
MiMo	Yes	Yes

Table 4-1: Overview of EUT Configuration

The tests were performed with one EUT at the antenna ports TX1 and/or TX2.

The used different EUT configurations are shown by the following table.

Module Name	**Serial-No.**	**Module Type**	**Config.**
FRIE	L9103100256	RF module	A, B, C
FRIE	L9103100255	RF module	A, B, C
Other Modules	**Module Type**		**Config.**
FSME	System module		A, B, C
FSME	System module		C
FTLB	Transmission module		A, B

Table 4-2: Configuration of EUT

For a functional description of the modules, please refer to the appropriate related parts and exhibit sections of this certification application.

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4.3 Operating Conditions

If not stated otherwise, the following standard setup procedure for the EUT was used:

Setup for testing single carrier:
The transmitter was set up according to 3GPP TS 25.141 Test Model 1, 5 and 6 for all tests.

Test model 1:
64 DPCHs at 30 ksps (SF=128) distributed randomly across the code space, at random power levels and random timing offsets, were defined to simulate a realistic operating scenario which may have high PAR (Peak-to-Average Ratio).

Test model 5:
TX1: 30 DPCHs at 30 ksps (SF=128) together with 8 HS-PDSCHs at 240 ksps (SF=16). Each DPCH is modulated by QPSK and each HS-PDCH is modulated by 16QAM modulation.
TX2: 8 HS-PDSCHs at 240 ksps (SF=16) modulated by 16QAM.

Test model 6:
30 DPCHs at 30 ksps (SF=128) together with 8 HS-PDSCHs at 240 ksps (SF=16). Each DPCH is modulated by QPSK and each HS-PDCH is modulated by 64QAM modulation.

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Setup for testing multi carrier:
The transmitter was set up according to 3GPP TS 25.141 Test Model 1, 5 and 6 for all tests.

Test model 1:
32 DPCHs at 30 ksps (SF=128) distributed randomly across the code space, at random power levels and random timing offsets, were defined to simulate a realistic operating scenario which may have high PAR (Peak-to-Average Ratio).

Test model 5:
TX1: 14 DPCHs at 30 ksps (SF=128) together with 4 HS-PDSCHs at 240 ksps (SF=16). Each DPCH is modulated by QPSK and each HS-PDCH is modulated by 16QAM modulation.
TX2: 4 HS-PDSCHs at 240 ksps (SF=16) modulated by 16QAM.

Test model 6:
30 DPCHs at 30 ksps (SF=128) together with 8 HS-PDSCHs at 240 ksps (SF=16). Each DPCH is modulated by QPSK and each HS-PDCH is modulated by 64QAM modulation.

The Flexi Multiradio BTS was supplied with 48 V DC.

During the measurements, one carrier channel was tested at a time. The carrier was set to the maximum power level to ensure the maximum emission amplitudes during all measurements.

During the tests, the Flexi Multiradio BTS is transmitting a pseudo random bit pattern on the data channels. This ensures that the measurements of the emission characteristics of the transmitter are pursuant to § 2.1049.

4.4 Compliance Criteria

The EUT must fulfil the requirements (described in the specifications mentioned in chapter 2.1, Specifications) for the selected test cases.

5 General Description of Tests

5.1 Tested Carrier Frequencies

The measurements were performed on 3 carrier frequencies, according to the following table:

Frequency [MHz]		Remark
Single carrier	Multi carrrier	
2112.4	2112.4 and 2117.4	lowest possible carrier frequency
2132.6	2132.6 and 2137.6	frequency at the middle of the band
2152.6	2152.6 and 2147.6	highest possible carrier frequency

Table 5-1: Carrier Frequencies

5.2 Modulation Characteristics

The EUT supports QPSK, 16QAM and 64QAM modulation. The modulation characteristic is defined in standard 3GPP TS 25.213.

5.3 Test Configuration

If not stated otherwise, the following measurement configuration was used to perform all measurements (see figure below).

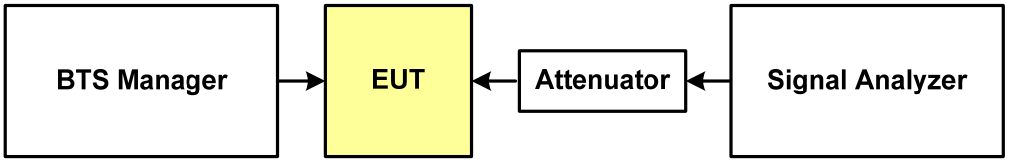

Figure 5-1: Test Configuration

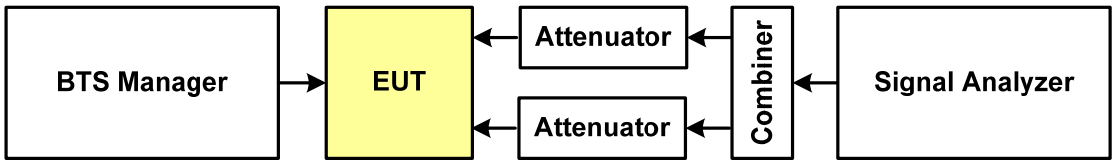

Figure 5-2: Test Configuration combined output

The RF output of the transceiver (cell) under test is connected to a signal analyzer via a high power attenuator to protect the input of the signal analyzer from high RF power levels. A description of the analyzer settings is given in each of the sections describing the measurements. The other transceivers are terminated.

A complete list of the measurement equipment is included on page 28 of this measurement report.

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5.4 Calibration of the Test Equipment

All relevant test equipment has a valid calibration from an external calibration laboratory. Additionally the signal analyzer has a built-in self-calibration procedure. This calibration procedure was activated prior to the measurements so that the analyzer is deemed accurate. High quality cables were used to connect the measurement equipment to the EUT. The actual loss of the attenuator and the cables was measured with a high precision network/signal analyzer and taken into account for all measurements.

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6 Test Results

6.1 Test No. 1: RF power output (§ 2.1046, § 27.50)

6.1.1 Purpose

The RF power output measurements were performed pursuant to § 2.1046 in order to determine the base station maximum RF power output.

6.1.2 Limits

According to § 27.50, base stations are limited to 1640 watts/MHz peak E.I.R.P (when transmitting with an emission bandwidth greater than 1 MHz).

6.1.3 EUT Operating Condition

The standard setup procedure as described in section 4.3 of this report was used.

6.1.4 Test Configuration

The test configuration used is described in section 5.3 of this report.

6.1.5 Test Procedure and Results

CDMA Per ANSI/J-STD-014,
TDMA Per ANSI/J-STD-010

Detachable Antenna:
The peak power at antenna terminals is measured using an in-line peak power meter or a signal analyzer.

Using a signal analyzer the RF power is measured with a frequency sweep across the carrier (see screenshots). The carrier power is calculated from the signal analyzer by integration over the result. The base station maximum output power is the sum of the measured carrier power and the external attenuation (cable loss of the test set up).

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The following table shows the measured output powers at the antenna connector. Screenshots of the measurements are included on pages 29 of this report.

Config A:

Carrier Frequency	RF Power Output		Result
[MHz]	[dBm]	[W]	
QPSK-Modulation TX1			
2112.4	47.80	60.26	compliant
2132.6	47.91	61.80	compliant
2152.6	47.88	61.38	compliant
16QAM-Modulation TX1			
2112.4	47.85	60.95	compliant
2132.6	48.04	63.68	compliant
2152.6	48.00	63.10	compliant
16QAM-Modulation TX2			
2112.4	46.18	41.50	compliant
2132.6	46.14	41.11	compliant
2152.6	46.20	41.69	compliant
16QAM-Modulation TX1 + TX2 Calculated Total			
2112.4	50.11	102.45	compliant
2132.6	50.20	104.79	compliant
2152.6	50.20	104.79	compliant
64QAM-Modulation TX1			
2112.4	48.07	64.12	compliant
2132.6	48.09	64.42	compliant
2152.6	48.05	63.83	compliant
Measurement Uncertainty:		±0.3dB	

Table 6-1: Results – RF Power Output – Single carrier

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Config B:

Carrier Frequency		RF Power Output						Result
First	Last	First carrier		Last carrier		Calculated Total		
[MHz]		[dBm]	[W]	[dBm]	[W]	[dBm]	[W]	
QPSK-Modulation TX1								
2112.4	2117.4	45.10	32.36	45.21	33.19	48.17	65.55	compliant
2132.6	2137.6	45.00	31.62	45.01	31.70	48.02	63.32	compliant
2152.6	2147.6	45.15	32.73	45.18	32.96	48.17	65.69	compliant
16QAM-Modulation TX1								
2112.4	2117.4	45.06	32.06	45.16	32.81	48.12	64.87	compliant
2132.6	2137.6	45.10	32.36	45.09	32.28	48.11	64.64	compliant
2152.6	2147.6	45.15	32.73	45.17	32.89	48.17	65.62	compliant
16QAM-Modulation TX2								
2112.4	2117.4	43.46	22.18	43.61	22.96	46.55	45.14	compliant
2132.6	2137.6	43.26	21.18	43.43	22.03	46.36	43.21	compliant
2152.6	2147.6	43.49	22.34	43.45	22.13	46.48	44.47	compliant
16QAM-Modulation TX1 + TX2 Calculated Total								
2112.4	2117.4	47.34	54.24	47.46	55.77	50.41	110.01	compliant
2132.6	2137.6	47.29	53.54	47.35	54.31	50.33	107.85	compliant
2152.6	2147.6	47.41	55.07	47.41	55.02	50.42	110.09	compliant
64QAM-Modulation TX1								
2112.4	2117.4	45.11	32.43	45.23	33.34	48.18	65.77	compliant
2132.6	2137.6	45.07	32.14	45.09	32.28	48.09	64.42	compliant
2152.6	2147.6	45.12	32.51	45.16	32.81	48.15	65.32	compliant
Measurement Uncertainty:					±0.3dB			

Table 6-2: Results – RF Power Output – Multi carrier

The base station maximum RF power output was found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.

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6.2 Test No. 2: Modulation Characteristics (§ 2.1047, § 2.201)

The occupied bandwidth was measured to be 5.0 MHz, which represents the 99% power bandwidth (see the following section and screenshots on pages 37). Therefore, the modulation characteristic of the base stations transceiver is **5M00F9W**.

No further testing is required under this section of the FCC rules. No measurements other than the occupied bandwidth are required.

The modulation characteristics were found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.

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6.3 Test No. 3: Occupied Bandwidth (§ 2.1049)

6.3.1 Purpose

The measurements are performed to determine the occupied bandwidth of the EUT pursuant to § 2.1049.

6.3.2 Limits

According to § 2.1049 the 99% occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to 0.5% of the emitted power.

6.3.3 EUT Operating Condition

The standard setup procedure as described in section 4.3 of this report was used.

6.3.4 Test Configuration

The test configuration used is described in section 5.3 of this report.

6.3.5 Test Procedure and Results

The 99% occupied bandwidth of the carrier emission is measured using a signal analyzer with Resolution Bandwidth set to set to 30kHz (less than 1% of bandwidth) (see screenshots on pages 37 for details). The following table summarizes the results:

Config A:

Carrier Frequency [MHz]	Occupied Bandwidth [MHz]	Result
QPSK-Modulation TX1		
2112.4	4.1506	compliant
2132.6	4.1506	compliant
2152.6	4.1667	compliant
16QAM-Modulation TX1		
2112.4	4.1346	compliant
2132.6	4.1506	compliant
2152.6	4.1667	compliant
16QAM-Modulation TX2		
2112.4	4.1506	compliant
2132.6	4.1506	compliant
2152.6	4.1667	compliant
64QAM-Modulation TX1		
2112.4	4.1667	compliant
2132.6	4.1506	compliant
2152.6	4.1667	compliant
Measurement Uncertainty:		±38kHz

Table 6-3: Results – Occupied Bandwidth – Single carrier

The occupied bandwidth was found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.

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6.4 Test No. 4: Spurious Emissions at Antenna Terminals (§ 2.1051, § 2.1057, § 27.53)

6.4.1 Purpose

The measurements of the spurious emissions at the equipment output terminals were performed pursuant to § 2.1051 in order to verify that all emissions are below the limits given by § 27.53.

6.4.2 Limits

Compliance with § 27.53 requires that any emission be attenuated below the transmitter power by at least 43 + 10 $\log_{10}$ P (P = transmitter power in Watts).

The compliance limit was calculated in the following way:

Maximum transmitter output power [W]:	P
Maximum transmitter output power [dBm]:	30 + 10 $\log_{10}$ P (conversion from W to dBm)
Attenuation required by FCC:	43 + 10 $\log_{10}$ P

Compliance limit = Maximum transmitter output power - Required attenuation
= 30 + 10 $\log_{10}$ P - (43 + 10 $\log_{10}$ P) = -13 dBm

6.4.3 EUT Operating Condition

The standard setup procedure as described in section 4.3 of this report was used.

6.4.4 Test Configuration

The test configuration used is described in section 5.3 of this report.

6.4.5 Test Procedure and Results

Signal analyzer settings:
The tests were carried out in accordance with § 27.53. For all frequency ranges except two (the one immediately below and the one immediately above the carrier frequency block) a 1 MHz resolution bandwidth was used for the measurements.
In the 1 MHz frequency bands immediately outside and adjacent to the carrier frequency block a resolution bandwidth is lowered to 1% of the 26 dB occupied bandwidth of the transmitted carrier and at minimum to 30kHz.
Note: Lower and upper band edge measurement with single carrier when TX1 + TX2 were summed, resolution bandwidth was reduced to 30kHz.
30kHz is <1% of the emission BW (4.2MHz between the 26dB points). To compensate the reduced measurement bandwidth, the limit was adjusted with 1.5dB to -14.5dBm.

According to § 2.1057, all emission including the fundamental frequency of the transceiver and all frequencies up to the 10th harmonic were investigated.

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The following tables summarize the worst case detected emission levels (see screenshots on pages 40 for details). The external attenuation (cable loss of the set up) is already added in the results. It can be seen separately as the 'Offset' value in the screenshots.

Config A:

Carrier Frequency: 2112.4 MHz			
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Result**
QPSK-Modulation TX1			
	2110.0	-13.76	compliant
16QAM-Modulation TX1			
	2110.0	-14.36	compliant
16QAM-Modulation TX2			
	2110.0	-16.29	compliant
16QAM-Modulation TX1 + TX2			
	2110.0	-18.22	compliant
64QAM-Modulation TX1			
	2110.0	-14.40	compliant
Measurement Uncertainty:			9kHz<f ≤10MHz: ±1.7dB 10MHz<f ≤3.6GHz: ±1.6dB 3.6GHz<f ≤8GHz: ±2.2dB 8GHz<f ≤22GHz: ±2.6dB

Table 6-4: Results - Spurious Emissions – Single Carrier (Lower Band Edge)

Config A:

Carrier Frequency: 2152.6 MHz			
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Result**
QPSK-Modulation TX1			
	2155.0	-14.03	compliant
16QAM-Modulation TX1			
	2155.0	-14.12	compliant
16QAM-Modulation TX2			
	2155.0	-16.47	compliant
16QAM-Modulation TX1 + TX2			
	2155.0	-18.51	compliant
64QAM-Modulation TX1			
	2155.0	-14.24	compliant
Measurement Uncertainty:			9kHz<f ≤10MHz: ±1.7dB 10MHz<f ≤3.6GHz: ±1.6dB 3.6GHz<f ≤8GHz: ±2.2dB 8GHz<f ≤22GHz: ±2.6dB

Table 6-5: Results - Spurious Emissions – Single Carrier (Upper Band Edge)

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Config A:

Carrier Frequency: 2132.6 MHz			
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Result**
QPSK-Modulation TX1			
30 - 3000	881.97	-28.87	compliant
3000 - 22000	4248.40	-28.40	compliant
16QAM-Modulation TX1			
30 - 3000	881.97	-29.29	compliant
3000 - 22000	4248.40	-29.29	compliant
16QAM-Modulation TX2			
30 - 3000	881.97	-29.13	compliant
3000 - 22000	4248.40	-30.92	compliant
16QAM-Modulation TX1 + TX2			
30 - 3000	881.97	-24.55	compliant
3000 - 22000	4248.40	-24.99	compliant
64QAM-Modulation TX1			
30 - 3000	881.97	-29.19	compliant
3000 - 22000	4248.40	-28.56	compliant
Measurement Uncertainty:			9kHz<f ≤10MHz: ±1.7dB 10MHz<f ≤3.6GHz: ±1.6dB 3.6GHz<f ≤8GHz: ±2.2dB 8GHz<f ≤22GHz: ±2.6dB

Table 6-6: Results - Spurious Emissions – Single Carrier

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Config B:

First Carrier Frequency: 2112.4 MHz – Second Carrier Frequeny: 2117.4 MHz			
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Result**
QPSK-Modulation TX1			
	2110.0	-16.21	compliant
16QAM-Modulation TX1			
	2110.0	-16.59	compliant
16QAM-Modulation TX2			
	2110.0	-19.27	compliant
16QAM-Modulation TX1 + TX2			
	2110.0	-16.84	compliant
64QAM-Modulation TX1			
	2110.0	-16.53	compliant
Measurement Uncertainty:			9kHz<f ≤10MHz: ±1.7dB 10MHz<f ≤3.6GHz: ±1.6dB 3.6GHz<f ≤8GHz: ±2.2dB 8GHz<f ≤22GHz: ±2.6dB

Table 6-7: Results - Spurious Emissions – Multi Carrier (Lower Band Edge)

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Config B:

First Carrier Frequency: 2152.6 MHz – Second Carrier Frequeny: 2147.6 MHz			
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Result**
QPSK-Modulation TX1			
	2155.0	-16.10	compliant
16QAM-Modulation TX1			
	2155.0	-16.38	compliant
16QAM-Modulation TX2			
	2155.0	-19.29	compliant
16QAM-Modulation TX1 + TX2			
	2155.0	-15.59	compliant
64QAM-Modulation TX1			
	2155.0	-16.35	compliant
Measurement Uncertainty:			9kHz<f ≤10MHz: ±1.7dB 10MHz<f ≤3.6GHz: ±1.6dB 3.6GHz<f ≤8GHz: ±2.2dB 8GHz<f ≤22GHz: ±2.6dB

Table 6-8: Results - Spurious Emissions – Multi Carrier (Upper Band Edge)

Config B:

First Carrier Frequency: 2132.6 MHz – Second Carrier Frequeny: 2137.6 MHz			
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Result**
QPSK-Modulation TX1			
30 - 3000	881.97	-27.22	compliant
3000 - 22000	4248.40	-30.67	compliant
16QAM-Modulation TX1			
30 - 3000	886.73	-28.57	compliant
3000 - 22000	4248.40	-32.35	compliant
16QAM-Modulation TX2			
30 - 3000	886.73	-29.03	compliant
3000 - 22000	4248.40	-34.83	compliant
16QAM-Modulation TX1 + TX2			
30 - 3000	886.73	-31.91	compliant
3000 - 22000	4248.40	-28.04	compliant
64QAM-Modulation TX1			
30 - 3000	886.73	-27.95	compliant
3000 - 22000	4248.40	-31.19	compliant
Measurement Uncertainty:			9kHz<f ≤10MHz: ±1.7dB 10MHz<f ≤3.6GHz: ±1.6dB 3.6GHz<f ≤8GHz: ±2.2dB 8GHz<f ≤22GHz: ±2.6dB

Table 6-9: Results - Spurious Emissions – Multi Carrier

Config B:

First Carrier Frequency: 2112.4 MHz – Second Carrier Frequeny: 2117.4 MHz			
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Result**
QPSK-Modulation TX1			
	2107.3	-31.10	compliant
16QAM-Modulation TX1			
	2107.4	-30.87	compliant
16QAM-Modulation TX2			
	2107.3	-32.48	compliant
16QAM-Modulation TX1 + TX2			
	2107.4	-28.17	compliant
64QAM-Modulation TX1			
	2107.3	-30.58	compliant
Measurement Uncertainty:			9kHz<f ≤10MHz: ±1.7dB 10MHz<f ≤3.6GHz: ±1.6dB 3.6GHz<f ≤8GHz: ±2.2dB 8GHz<f ≤22GHz: ±2.6dB

Table 6-10: Results - Spurious Emissions – Multi Carrier 3rd order IM (Lower Band Edge)

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Config B:

First Carrier Frequency: 2152.6 MHz – Second Carrier Frequeny: 2147.6 MHz			
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Result**
QPSK-Modulation TX1			
	2157.6	-32.16	compliant
16QAM-Modulation TX1			
	2157.6	-32.02	compliant
16QAM-Modulation TX2			
	2159.0	-32.14	compliant
16QAM-Modulation TX1 + TX2			
	2157.7	-28.53	compliant
64QAM-Modulation TX1			
	2157.8	-32.30	compliant
Measurement Uncertainty:			9kHz<f ≤10MHz: ±1.7dB 10MHz<f ≤3.6GHz: ±1.6dB 3.6GHz<f ≤8GHz: ±2.2dB 8GHz<f ≤22GHz: ±2.6dB

Table 6-11: Results - Spurious Emissions – Multi Carrier 3rd order IM (Upper Band Edge)

Config B:

First Carrier Frequency: 2132.6 MHz – Second Carrier Frequeny: 2137.6 MHz			
Frequency Range [MHz]	**Emission Frequency [MHz]**	**Maximum Emission Level [dBm]**	**Result**
QPSK-Modulation TX1			
	2127.45	-35.10	compliant
16QAM-Modulation TX1			
	2127.55	-38.02	compliant
16QAM-Modulation TX2			
	2127.40	-40.39	compliant
16QAM-Modulation TX1 + TX2			
	2127.34	-34.33	compliant
64QAM-Modulation TX1			
	2127.29	-37.63	compliant
Measurement Uncertainty:			9kHz<f ≤10MHz: ±1.7dB 10MHz<f ≤3.6GHz: ±1.6dB 3.6GHz<f ≤8GHz: ±2.2dB 8GHz<f ≤22GHz: ±2.6dB

Table 6-12: Results - Spurious Emissions – Multi Carrier 3rd order IM (Inband)

The measured conducted emission levels were found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.

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6.5 Test No. 5: Field Strength of Spurious Radiation (§ 2.1053, § 2.1057, § 27.53)

6.5.1 Purpose

The measurement of spurious radiated emissions was performed pursuant to § 2.1053 and § 2.1057 to verify that the field strength of any spurious emissions radiated directly from the cabinet, control circuits, power leads or intermediate circuit elements are attenuated below the transmitter power P by at least 43 + 10 $\log_{10}$ (P in Watts) dB as is required by § 27.53 (Emission limits).

6.5.2 Limits

Compliance with § 27.53 requires that all spurious emissions be attenuated below the transmitter power by at least 43 + 10 $\log_{10}$ P (P = rated maximum transmitter output power in Watts).

The compliance limit was calculated as per the following table:

Rated maximum transmitter output power:	60.0 W (= 47.78 dBm)
Required attenuation:	43 + 10 $\log_{10}$ 60.0 = **60.78 dB**

According to § 2.1057, all emissions to the 10th harmonic were investigated.

6.5.3 EUT Operating Condition

The standard setup procedure as described in section 4.3 of this report was used.

6.5.4 Test Configuration

The measurements were performed in an anechoic chamber. The radiated test site complies with the site attenuation requirements listed in ANSI C63.4 2003 and is listed with the FCC.

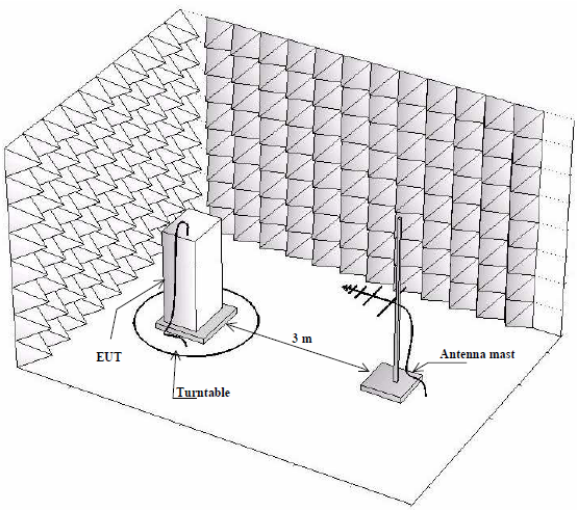

Figure 6-1: Test Configuration

Photographs of the EUT in the anechoic chamber are shown on page 69 of this measurement report.

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6.5.5 Test Procedure

TIA/EIA-603-C-2004, Section 2.2.12
The test was performed in a semi-anechoic shielded room. The EUT was placed on a non-conductive 0.8 m high table standing on the turntable. During the test in the frequency range 30 – 22000 MHz the distance from the EUT to the measuring antenna was 3 m. In order to find the maximum levels of the disturbance radiation the angle of the turntable, the height of the measuring antenna were varied during the tests. The test was performed with the measuring antenna being both in horizontal and vertical polarizations.

Vertical and horizontal polarizations in the frequency range 30 – 22000 MHz was first measured by using the peak detector. During the peak detector scan the turntable was rotated from 0° to 360° with 30° step with the antenna heights 1.0 m and 2.5 m.

The limit of -13 dBm has been calculated to correspond 84.4 dB (µV/m).
Spurious emissions closer than 20 dB to the limit was measured with average detector.

The antenna substitution method was used to determine the equivalent radiated power at spurious frequencies. The EUT was replaced with a reference substitution antenna with a known gain referenced to an isotropic radiator $G_{Antenna[dBi]}$. This antenna was fed with a signal at the spurious frequency $P_{Gen[dBm]}$. The level of the signal was adjusted to repeat the previously measured level. The resulting
EIRP is the signal level fed to the reference antenna corrected for gain referenced to an isotropic.
The formula below was used to calculate the EIRP of the EUT.

$$P_{EIRP[dbm]} = P_{Gen[dBm]} - L_{Cable[dB]} + G_{Antenna[dBi]}$$

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6.5.6 Test Results & Limits

Worst case detected emission levels are reported in the following table (refer to spectral plots included on pages 69 for details). The antenna factor and cable loss is according to the manufacturer's specification.

Config C:

Frequency	Maximum Emission Level	Result
[MHz]	[dBm]	
All	More than 20dB below limit -13 dBm	compliant
Measurement Uncertainty:		±5.4dB

Table 6-13: Results – Field Strength of Spurious Radiation – Single carrier

The measured emission levels were found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.

6.6 Test No. 6: Frequency Stability (§ 2.1055, § 27.54)

6.6.1 Purpose

Frequency stability measurements were performed to verify that the frequency deviation of the emission stays within the licensee's frequency block under extreme temperature conditions (-30°C to +50 °C) according to § 2.1055.

6.6.2 Limits

According to § 27.54, the frequency of the fundamental emission is required to stay within the authorized frequency block, independent of the ambient temperature.

6.6.3 EUT Operating Condition

The standard setup procedure as described in section 4.3 of this report was used.

6.6.4 Test Configuration

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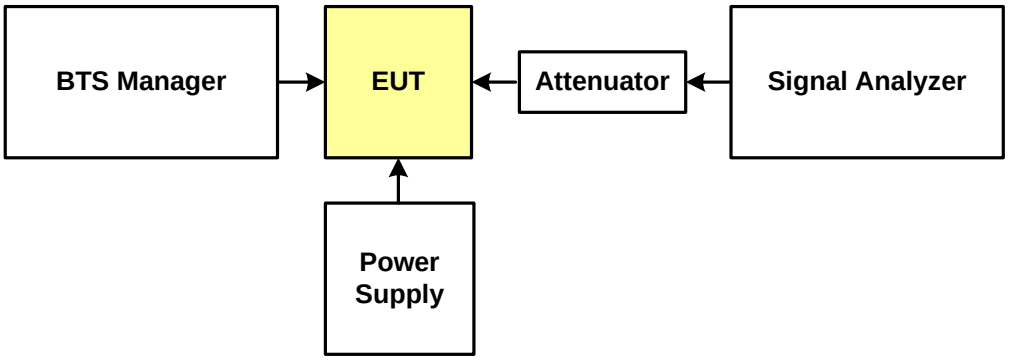

Figure 6-2: Test Configuration for frequency stability with voltage variation

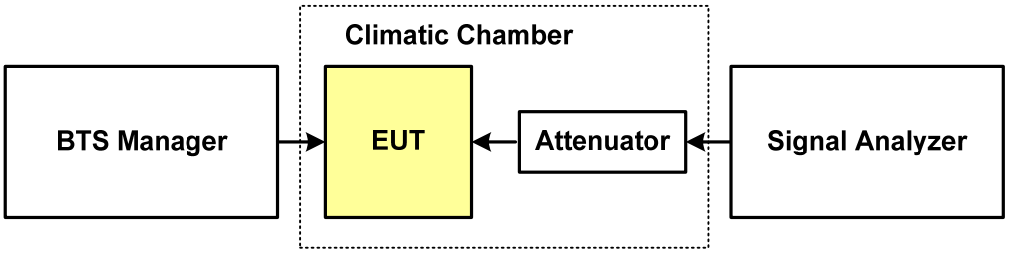

Figure 6-3: Test Configuration for frequency stability with temperature variation

A complete list of the measurement equipment is included on page 28 of this measurement report.

6.6.5 Test Procedure and Results

Frequency Stability with Temperature Variation: The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees celsius to +50 degrees celsius. The E.U.T. is allowed to stabilize at each temperature and the frequency error is measured.

Config A:

Carrier Frequency: 2132.6 MHz						
Supply Voltage (DC)	**Ambient Temperature**	**Frequency Deviation**		**Manufacturer's Specification**		**Result**
[V]	**[°C]**	**[Hz]**	**[ppm]**	**[Hz]**	**[ppm]**	
QPSK-Modulation TX1						
-48.0	-30	-2.27	-0.0011	106	0.05	compliant
-48.0	-20	-28.13	-0.0132	106	0.05	compliant
-48.0	-10	-10.01	-0.0047	106	0.05	compliant
-48.0	0	-7.57	-0.0035	106	0.05	compliant
-48.0	+10	-4.08	-0.0019	106	0.05	compliant
-48.0	+30	13.23	0.0062	106	0.05	compliant
-48.0	+40	25.92	0.0122	106	0.05	compliant
-48.0	+50	37.27	0.0175	106	0.05	compliant
16QAM Modulation TX1						
-48.0	-30	-12.76	-0.0060	106	0.05	compliant
-48.0	-20	-37.90	-0.0178	106	0.05	compliant
-48.0	-10	-18.95	-0.0089	106	0.05	compliant
-48.0	0	-10.05	-0.0047	106	0.05	compliant
-48.0	+10	-4.94	-0.0023	106	0.05	compliant
-48.0	+30	4.36	0.0020	106	0.05	compliant
-48.0	+40	17.54	0.0082	106	0.05	compliant
-48.0	+50	27.27	0.0128	106	0.05	compliant
16QAM Modulation TX2						
-48.0	-30	-2.62	-0.0012	106	0.05	compliant
-48.0	-20	-31.06	-0.0146	106	0.05	compliant
-48.0	-10	-11.39	-0.0053	106	0.05	compliant
-48.0	0	-10.32	-0.0048	106	0.05	compliant
-48.0	+10	-3.84	-0.0018	106	0.05	compliant
-48.0	+30	12.12	0.0057	106	0.05	compliant
-48.0	+40	25.63	0.0120	106	0.05	compliant
-48.0	+50	39.04	0.0183	106	0.05	compliant

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Supply Voltage (DC)	Ambient Temperature	Frequency Deviation		Manufacturer's Specification		Result
[V]	[°C]	[Hz]	[ppm]	[Hz]	[ppm]	
64QAM Modulation TX1						
-48.0	-30	-2.54	-0.0012	106	0.05	compliant
-48.0	-20	-27.73	-0.0130	106	0.05	compliant
-48.0	-10	-9.85	-0.0046	106	0.05	compliant
-48.0	0	-8.87	-0.0042	106	0.05	compliant
-48.0	+10	-3.38	-0.0016	106	0.05	compliant
-48.0	+30	13.93	0.0065	106	0.05	compliant
-48.0	+40	26.84	0.0126	106	0.05	compliant
-48.0	+50	38.84	0.0182	106	0.05	compliant
Measurement Uncertainty:					±5.0 Hz	

Table 6-14: Results – Frequency stability with temp. variation – Single carrier (Middle)

Frequency Stability with Voltage Variation:

The E.U.T. is placed in a climatic chamber and allowed to stabilize at +20 degrees celsius for at least 15 minutes. With the voltage input to the E.U.T. set to 85% S.T.V., the frequency error is measure. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Config A:

Carrier Frequency: 2132.6 MHz						
Supply Voltage (DC)	Ambient Temperature	Frequency Deviation [ppm]		Manufacturer's Specification		Result
[V]	[°C]	[Hz]	[ppm]	[Hz]	[ppm]	
QPSK Modulation TX1						
-40.8	+20	4.39	0.0021	106	0.05	compliant
-48.0	+20	3.70	0.0017	106	0.05	compliant
-55.2	+20	4.45	0.0021	106	0.05	compliant
16QAM Modulation TX1						
-40.8	+20	3.24	0.0015	106	0.05	compliant
-48.0	+20	4.17	0.0020	106	0.05	compliant
-55.2	+20	2.77	0.0013	106	0.05	compliant
16QAM Modulation TX2						
-40.8	+20	4.66	0.0022	106	0.05	compliant
-48.0	+20	4.15	0.0019	106	0.05	compliant
-55.2	+20	4.08	0.0019	106	0.05	compliant
64QAM Modulation TX1						
-40.8	+20	4.11	0.0019	106	0.05	compliant
-48.0	+20	5.49	0.0026	106	0.05	compliant
-55.2	+20	4.44	0.0021	106	0.05	compliant
Measurement Uncertainty:					±5.0 Hz	

Table 6-15: Results – Frequency stability with voltage variation – Single carrier (Middle)

The measured frequency stability was found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.

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7 Test Data and Screenshots

7.1 Part List of the RF Measurement Test Equipment

No.	Test Equipment	Type (Manufacturer)	Serial Number	Calibration date	Calibration due	Test No.
1	Network Analyzer	Hewlett-Packard: HP8753E	US38431868	06/2010	06/2011	1, 2, 3, 4, 6
2	Network Analyzer	Hewlett-Packard: HP8753ES	US39172107	06/2010	06/2011	1, 2, 3, 4, 6
3	Calibration kit	Hewlett-Packard: HP85032B	2919A04843	06/2010	06/2011	1, 2, 3, 4, 6
4	Signal Generator	Rohde & Schwarz: SMP 04	845401/001	07/2010	07/2012	1, 2, 3, 4, 6
5	DC power	Sörensen: SGI 80/188	0525A00546	cnn	cnn	1, 2, 3, 4, 6
6	Signal Analyzer	Rohde & Schwarz: FSQ 26	100364	01/2010	01/2011	1, 2, 3, 4, 6
7	Frequency Standard	Datum 8040	0041005473	03/2010	03/2011	6
8	Temperature/humidity meter	VAISALA: HMI 31	P3730008	03/2010	03/2011	1, 2, 3, 4, 5, 6
9	Enviromental chamber	Weiss technick	DU22/500/80	06/2010	06/2011	6
10	Attenuator	Spinner: 527736	86962	cnn	cnn	4
11	Attenuator	Spinner: 531251	27034	cnn	cnn	4
12	Attenuator	Weinschel: 1433	MG798	cnn	cnn	4
13	Attenuator	Spinner: 531212	22589A	cnn	cnn	4
14	Attenuator	Spinner: 531212	22589B	cnn	cnn	4
15	Attenuator	Narda: 769-30	08275	cnn	cnn	1, 2, 3, 4, 6
16	Attenuator	Weinschel: 67-20-33	BM0633	cnn	cnn	4
17	Attenuator	Weinschel: 66-20-34	BM6886	cnn	cnn	4
18	High pass filter	Reactel: 9HSX-3/20-S11	0531	cnn	cnn	4
19	Combiner	Weinschel: 1870A	6275	cnn	cnn	4
20	Semianechoic chamber	S&M 9m × 5m × 6m (Room 0039)	B83317-C6019-T232	08/2008	08/2011	5
21	EMI Test Receiver	R&S ESIB 26	100335	07/2010	07/2011	5
22	Horn Antenna	Emco 3115	00075697	06/2010	06/2011	5
23	Bilog Antenna	Chase CBL6112B	2694	07/2010	07/2011	5
24	Log periodic Antenna	R&S HL025	356749/012	07/2010	07/2011	
25	Signal Generator	R&S SMR 20	832428/030	07/2010	07/2011	5
26	Amplifier	Miteq AFSX4	791117	cnn	cnn	5
27	Antenna Mast	Deisel HD240	2401323194	cnn	cnn	5
28	Mast Controller	Deisel HD100	1001331	cnn	cnn	5
29	Amplifier	HP 83017A	3123A00444	cnn	cnn	5

Table 7-1: Part List of the RF Measurement Test Equipment

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7.2 Spectral Plots

7.2.1 Test No. 1: RF Power Output

The value ‘CH PWR’ is the carrier power measured by the signal analyzer. ‘REF PWR’ (and also ‘Offset’) is the external attenuation (cable loss of the test set up). The sum of both values is base station maximum output power given on page 12. The external attenuation is frequency dependant. Thus the various ‘Offset’ values in the screenshots may differ.

Config A:

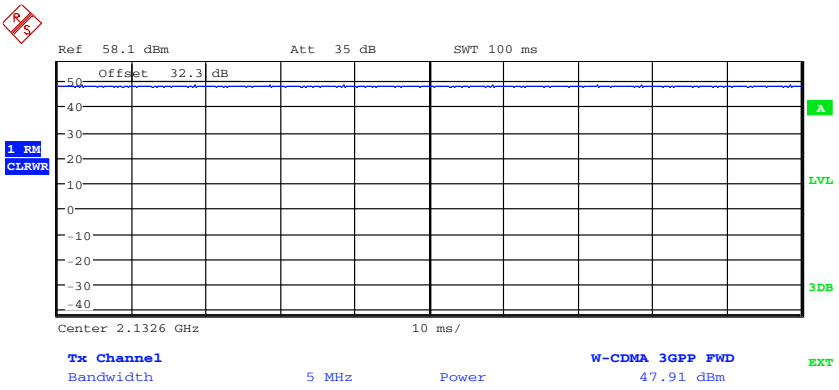

Figure 7-1: RF Power Output TX1
Single Carrier – QPSK (2132.6 MHz)

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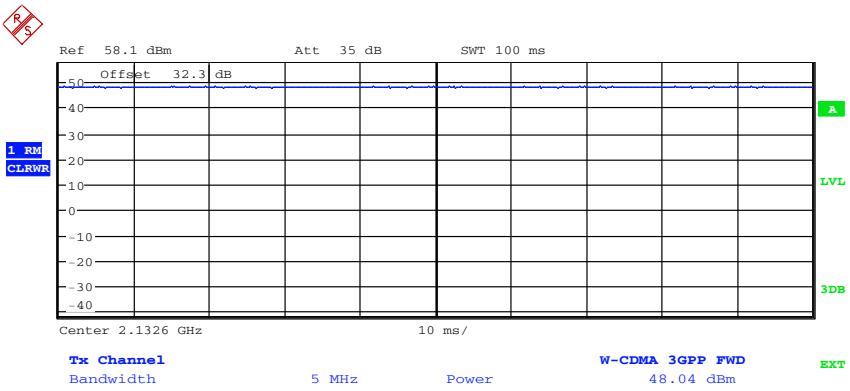

Figure 7-2: RF Power Output TX1

Single Carrier – 16QAM (2132.6 MHz)

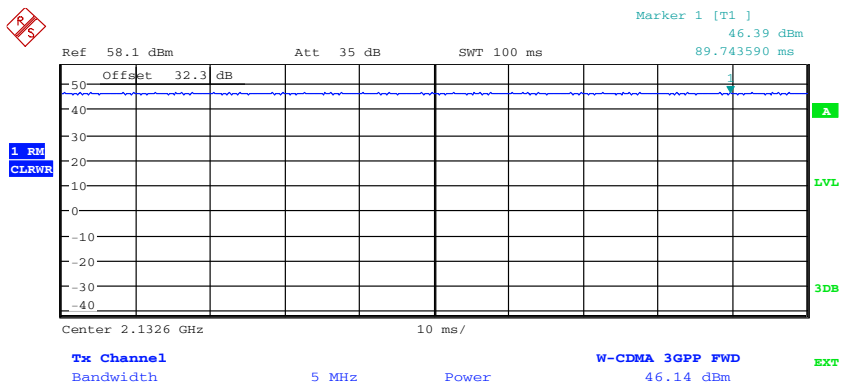

Figure 7-3: RF Power Output TX2

Single Carrier TX2 – 16QAM (2132.6 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory

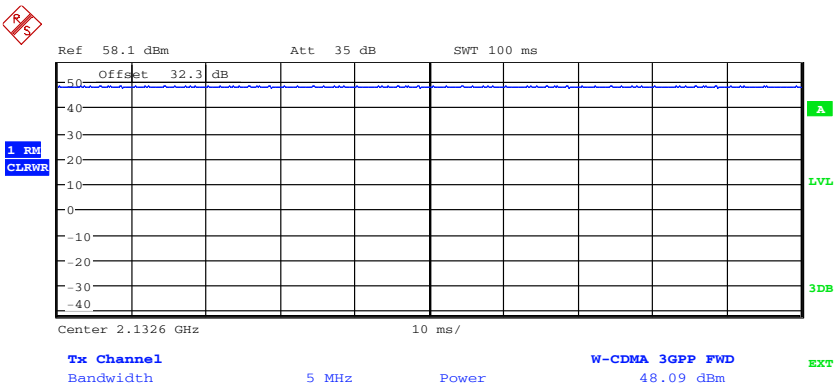

Figure 7-4: RF Power Output TX1
Single Carrier – 64QAM (2132.6 MHz)

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Config B:

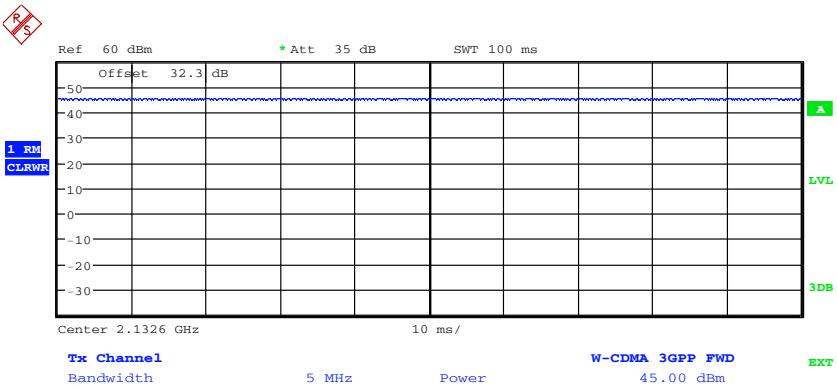

Figure 7-5: RF Power Output TX1
Multi Carrier – QPSK (2132.6 MHz)

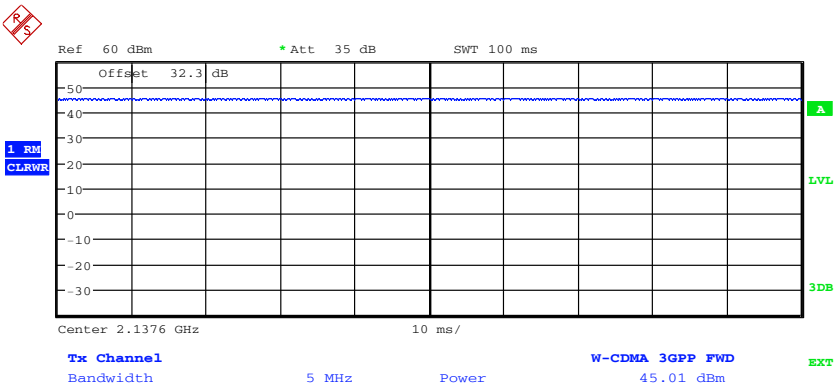

Figure 7-6: RF Power Output TX1
Multi Carrier – QPSK (2137.6 MHz)

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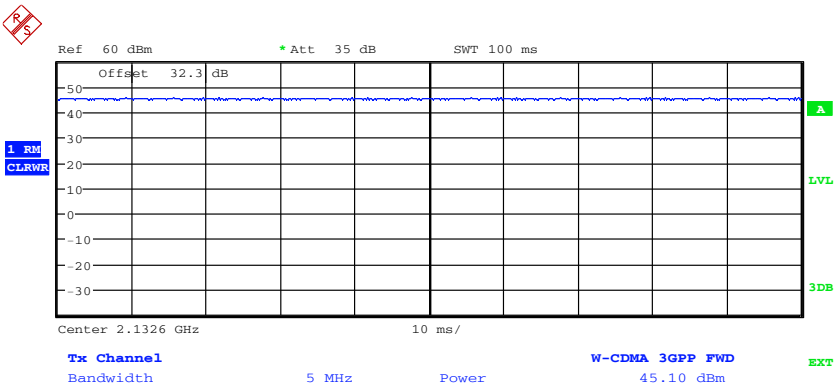

Figure 7-7: RF Power Output TX1
Multi Carrier – 16QAM (2132.6 MHz)

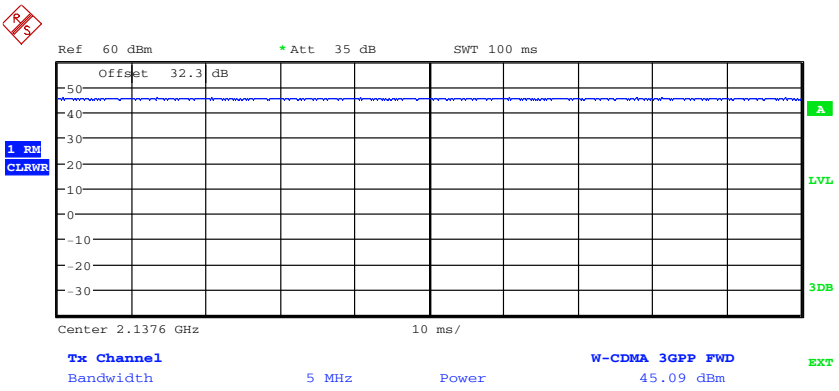

Figure 7-8: RF Power Output TX1
Multi Carrier TX1 – 16QAM (2137.6 MHz)

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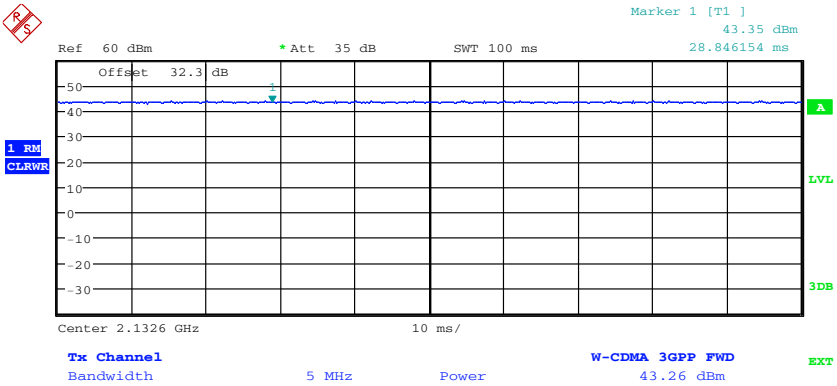
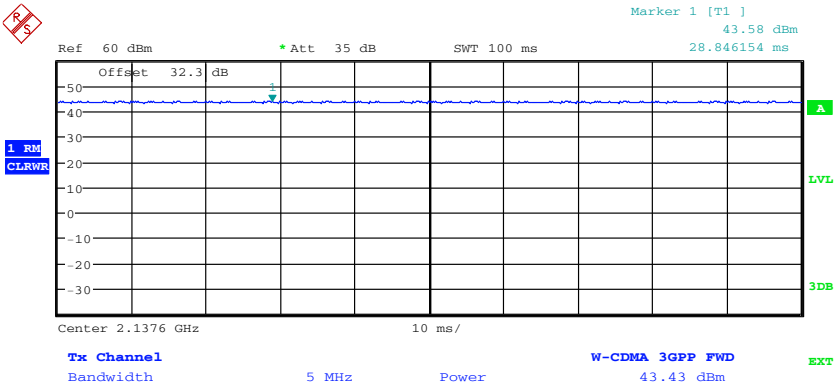


Date: 20.SEP.2010 15:36:51

Figure 7-9: RF Power Output TX2
Multi Carrier – 16QAM (2132.6 MHz)



Date: 20.SEP.2010 15:37:30

Figure 7-10: RF Power Output TX2
Multi Carrier – 16QAM (2137.6 MHz)

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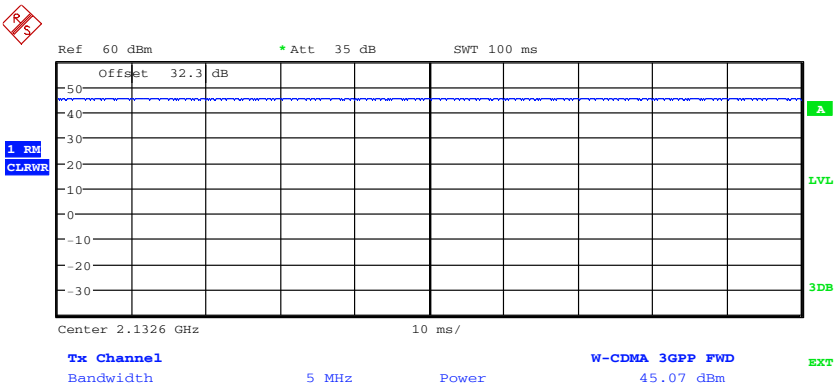

Figure 7-11: RF Power Output TX1
Multi Carrier – 64QAM (2132.6 MHz)

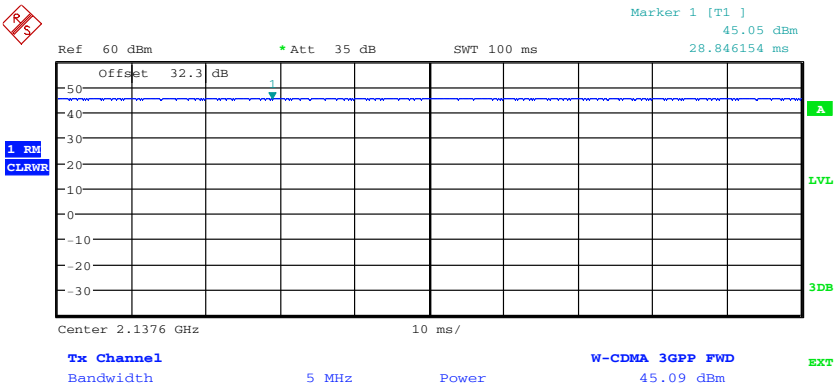

Figure 7-12: RF Power Output TX1
Multi Carrier – 64QAM (2137.6 MHz)

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7.2.2 Test No. 2: Modulation Characteristics

No additional measurements are required for the modulation characteristics. Please refer to test no. 3, occupied bandwidth on pages 37.

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7.2.3 Test No. 3: Occupied Bandwidth

The value ‘OPB’ is the measured occupied bandwidth.

Config A:

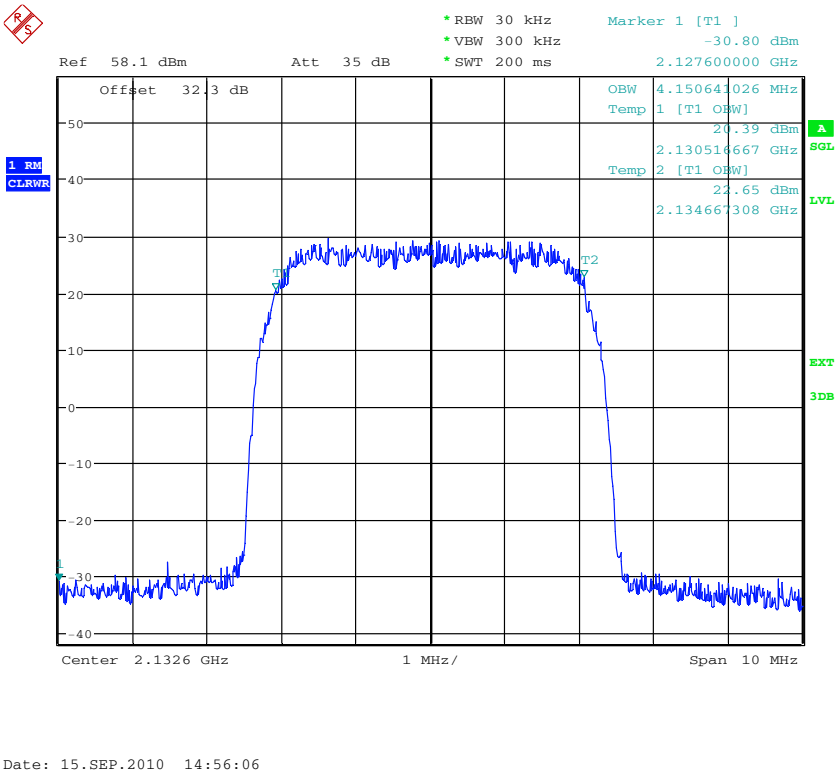

Figure 7-13: Occupied Bandwidth TX1 – QPSK (2132.6 MHz)

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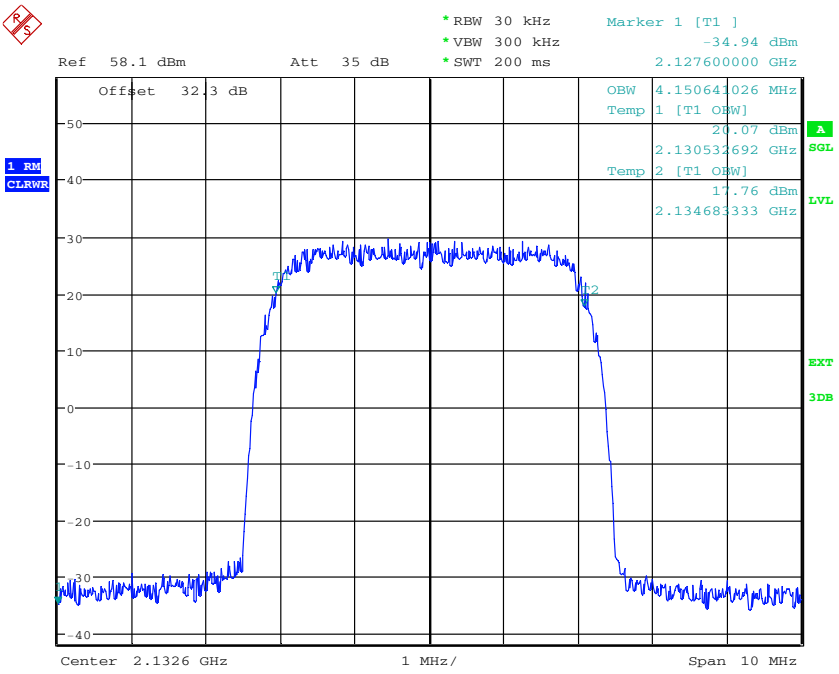

Figure 7-14: Occupied Bandwidth TX1 – 16QAM (2132.6 MHz)

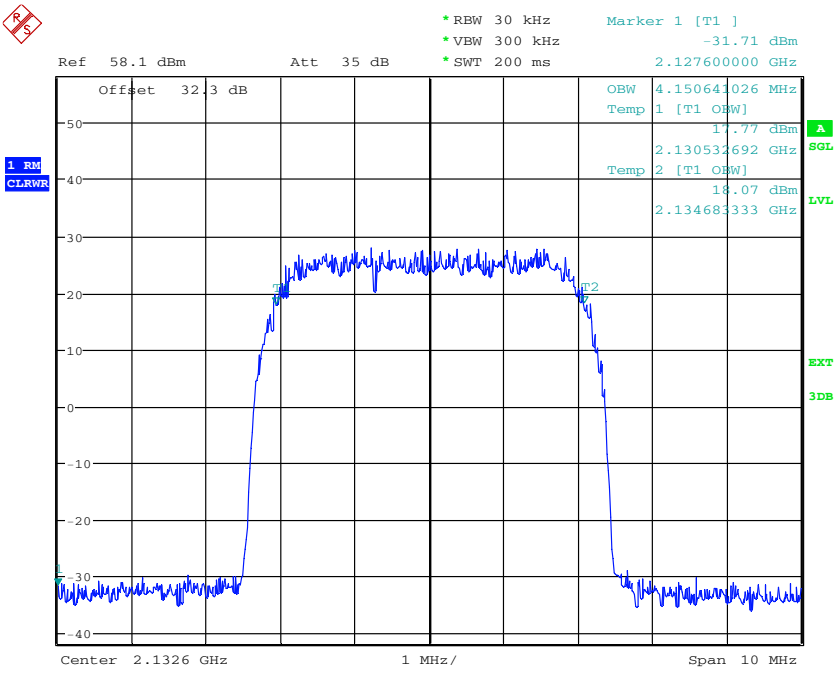

Figure 7-15: Occupied Bandwidth TX2 – 16QAM (2132.6 MHz)

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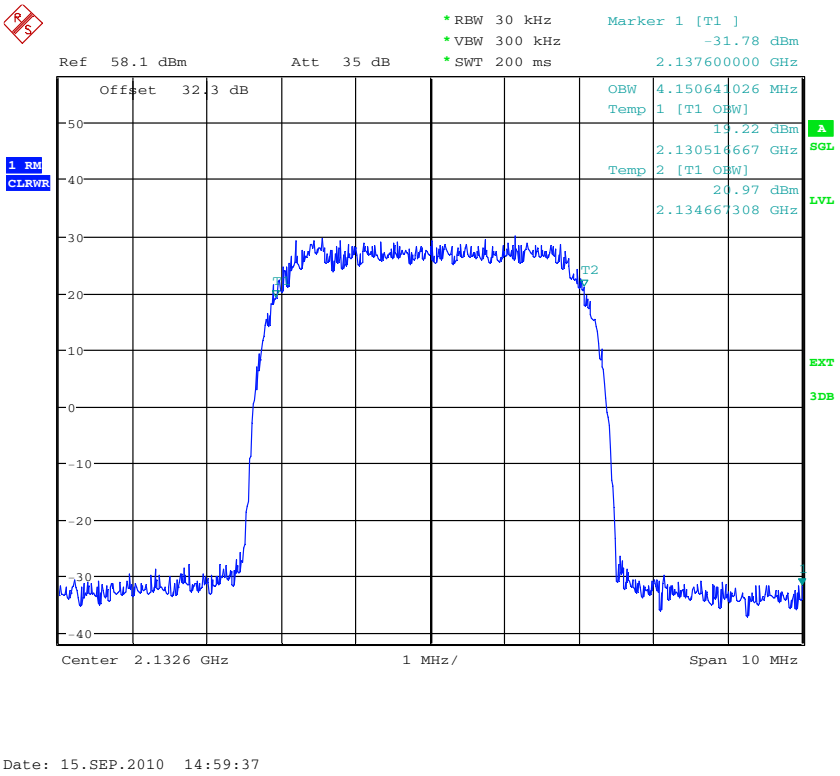

Figure 7-16: Occupied Bandwidth TX1 – 64QAM (2132.6 MHz)

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7.2.4 Test No. 4: Spurious Emissions at the Antenna Terminals

The external attenuation (cable loss of the setup) can be seen as the 'Offset' value in the screenshots. The external attenuation is frequency dependant. Thus the various 'Offset' values in the screenshots may differ.

Config A:

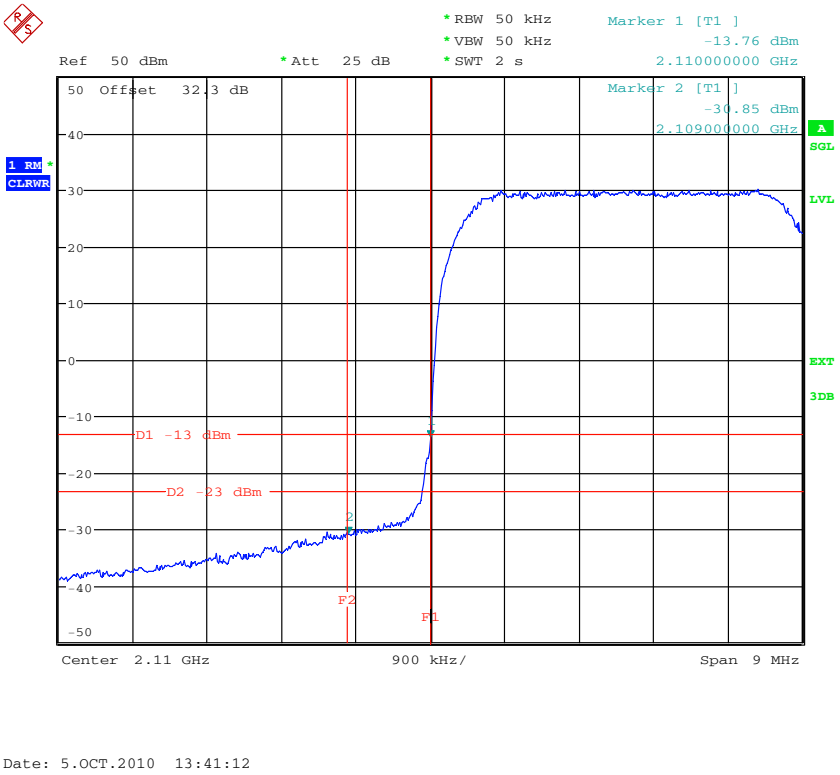


Figure 7-17: Spurious Emissions (Lower Band Edge) TX1 Single Carrier – QPSK (2112.4 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory

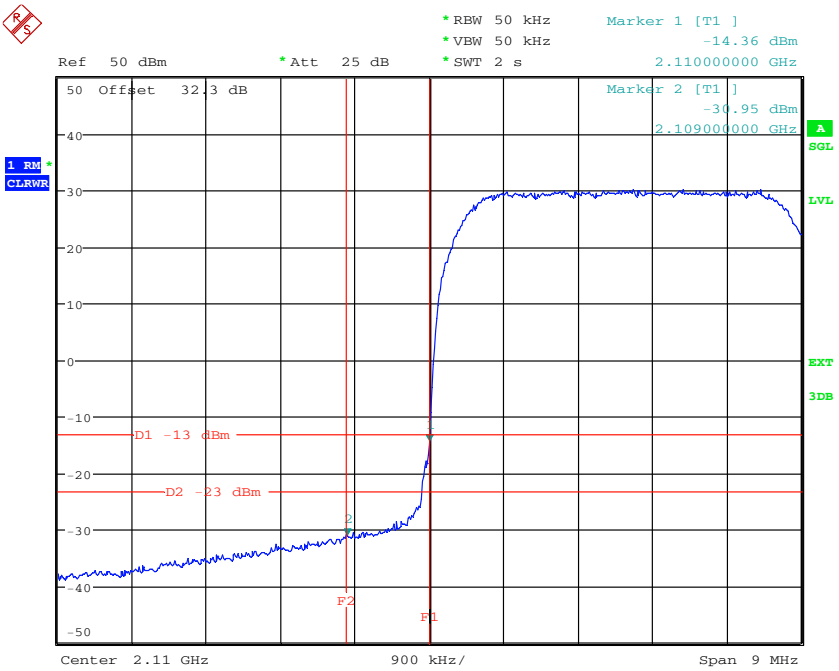


Figure 7-18: Spurious Emissions (Lower Band Edge) TX1
Single Carrier – 16QAM (2112.4 MHz)

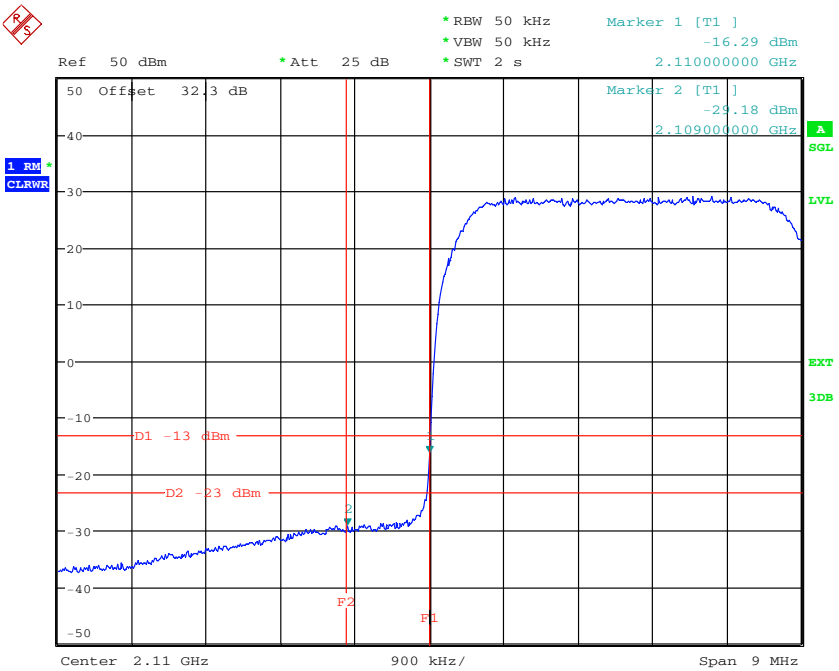
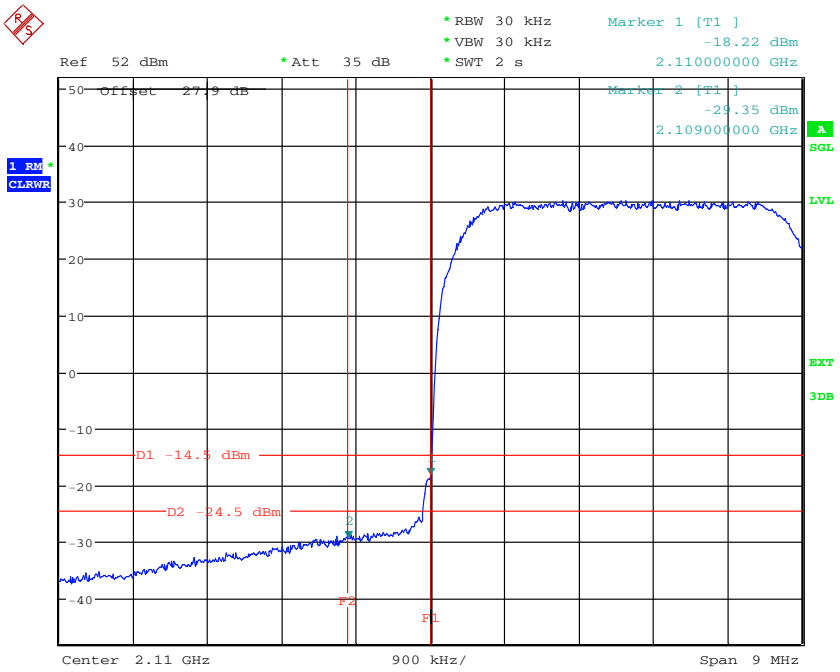


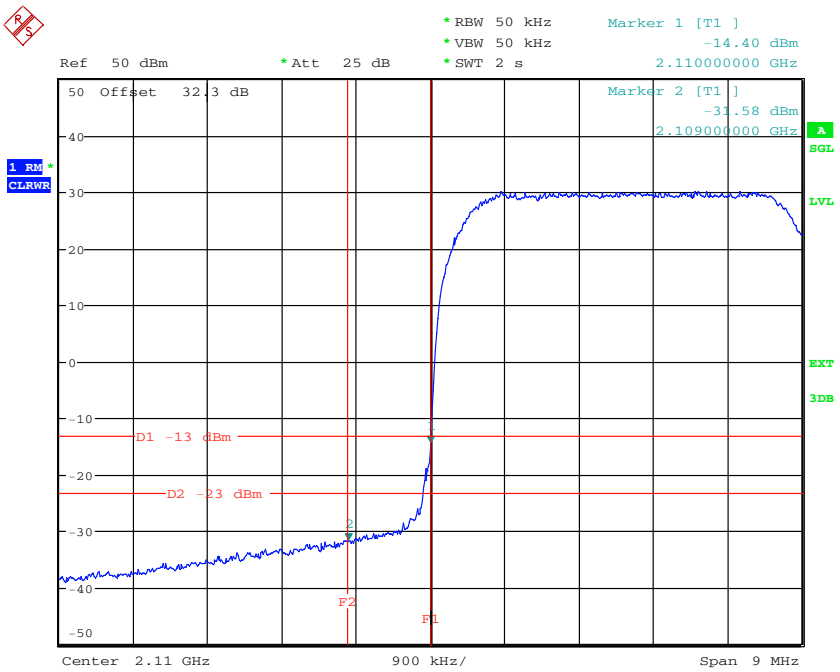
Figure 7-19: Spurious Emissions (Lower Band Edge) TX2
Single Carrier – 16QAM (2112.4 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory



Date: 7.OCT.2010 12:03:59

Figure 7-20: Spurious Emissions (Lower Band Edge) TX1 + TX2
Single Carrier – 16QAM (2112.4 MHz)



Date: 5.OCT.2010 13:50:23

Figure 7-21: Spurious Emissions (Lower Band Edge) TX1
Single Carrier – 64QAM (2112.4 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory

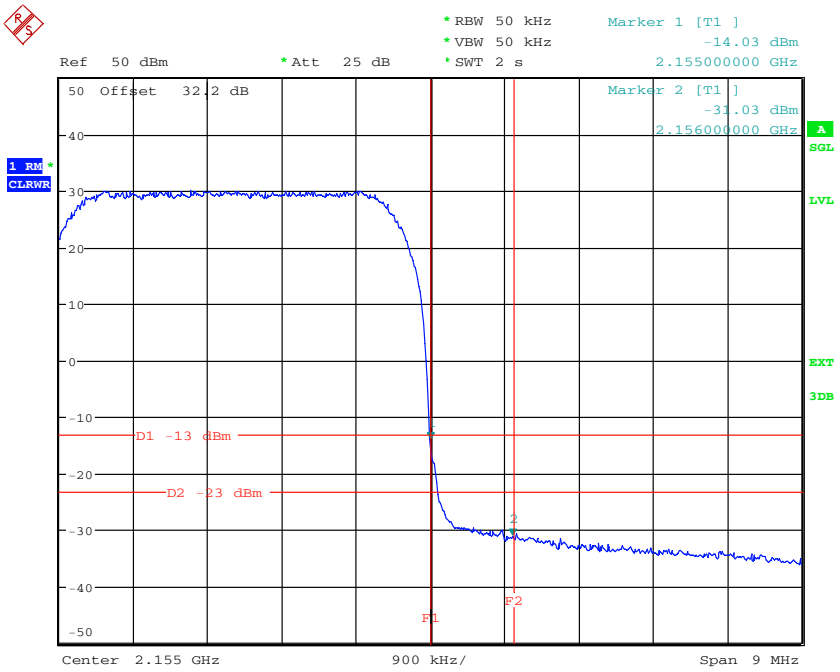


Figure 7-22: Spurious Emissions (Upper Band Edge) TX1 Single Carrier – QPSK (2152.6 MHz)

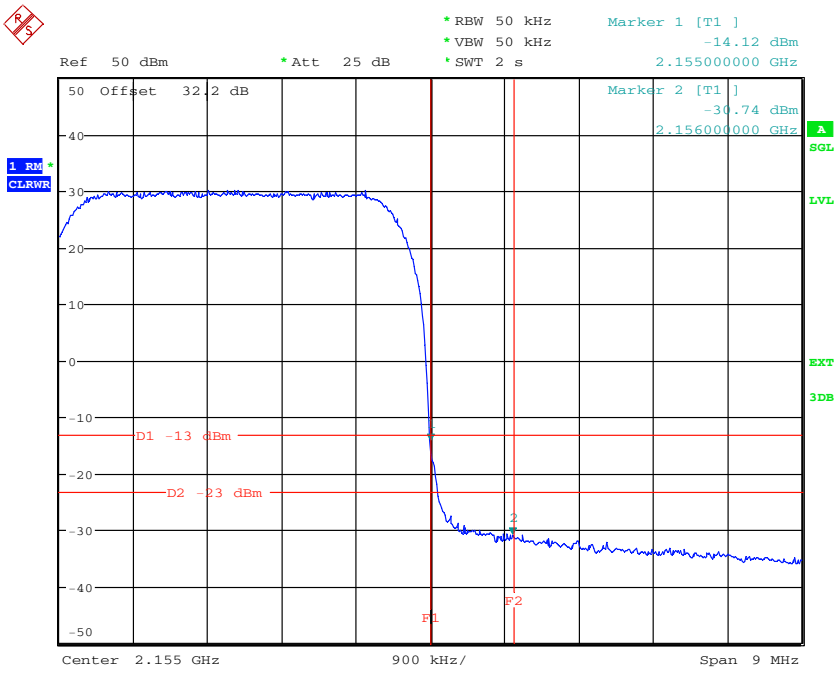
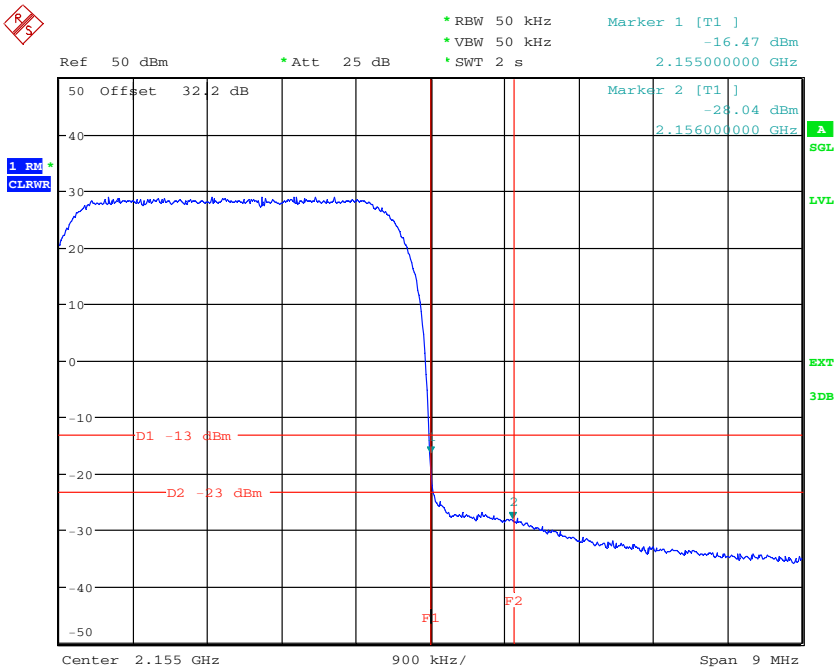


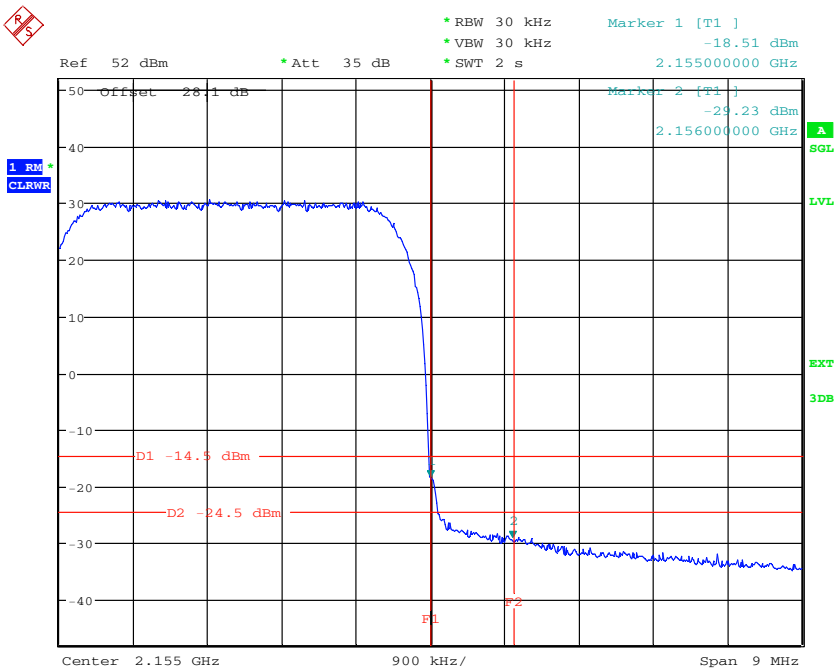
Figure 7-23: Spurious Emissions (Upper Band Edge) TX1 Single Carrier – 16QAM (2152.6 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory



Date: 5.OCT.2010 13:56:39

Figure 7-24: Spurious Emissions (Upper Band Edge) TX2
Single Carrier – 16QAM (2152.6 MHz)



Date: 7.OCT.2010 12:12:03

Figure 7-25: Spurious Emissions (Upper Band Edge) TX1 + TX2
Single Carrier – 16QAM (2152.6 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory

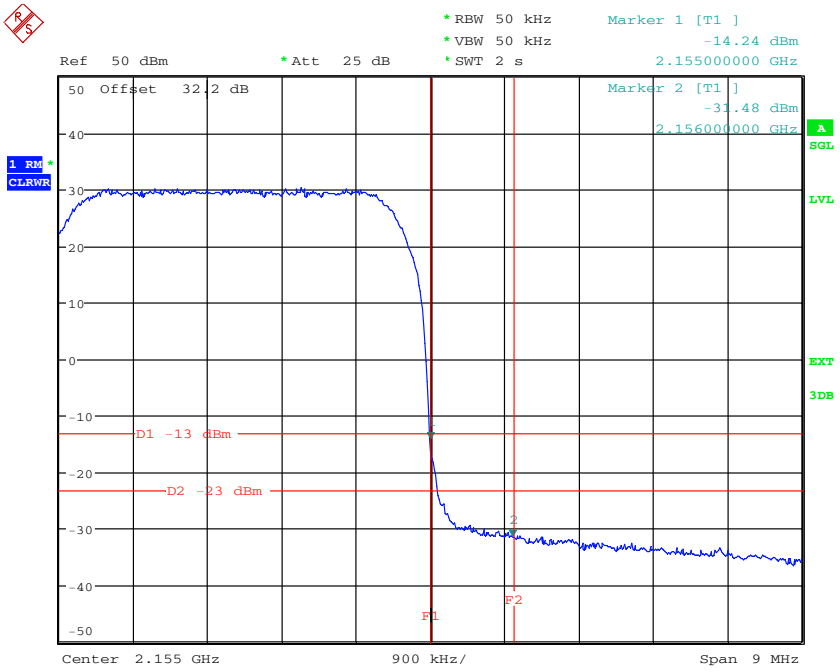


Figure 7-26: Spurious Emissions (Upper Band Edge) TX1 Single Carrier – 64QAM (2152.6 MHz)

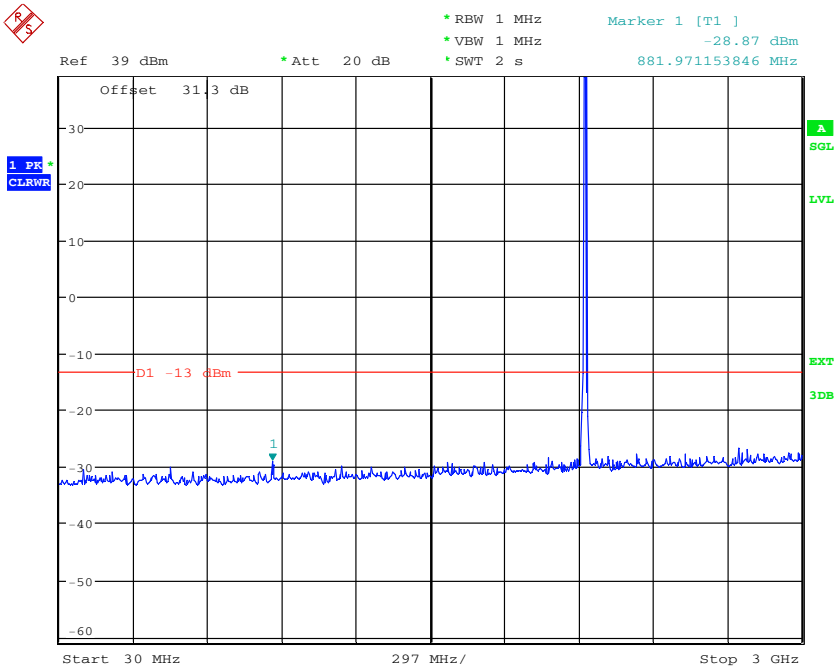


Figure 7-27: Spurious Emissions (30MHz – 3GHz) TX1 Single Carrier – QPSK (2132.6 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory

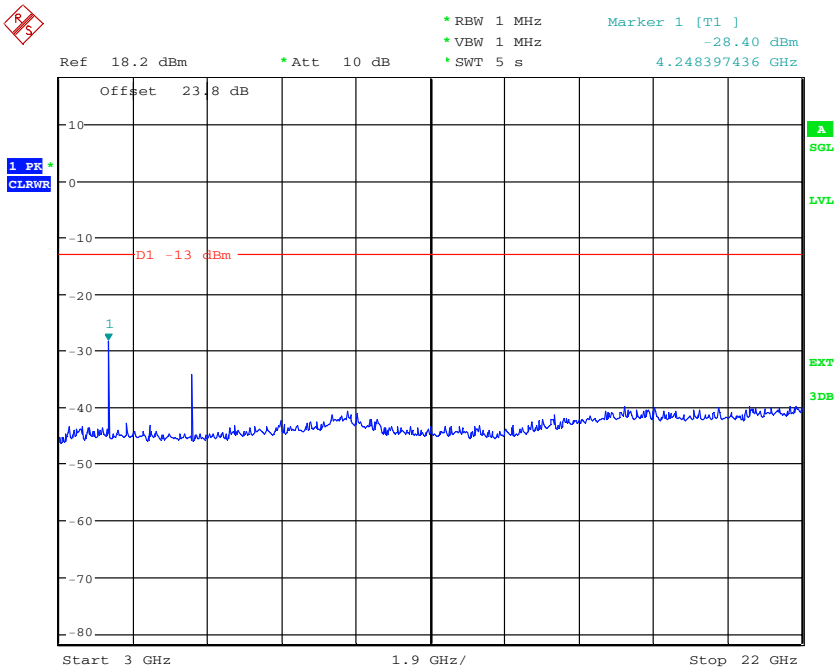


Figure 7-28: Spurious Emissions (3GHz – 22GHz) TX1
Single Carrier – QPSK (2132.6 MHz)

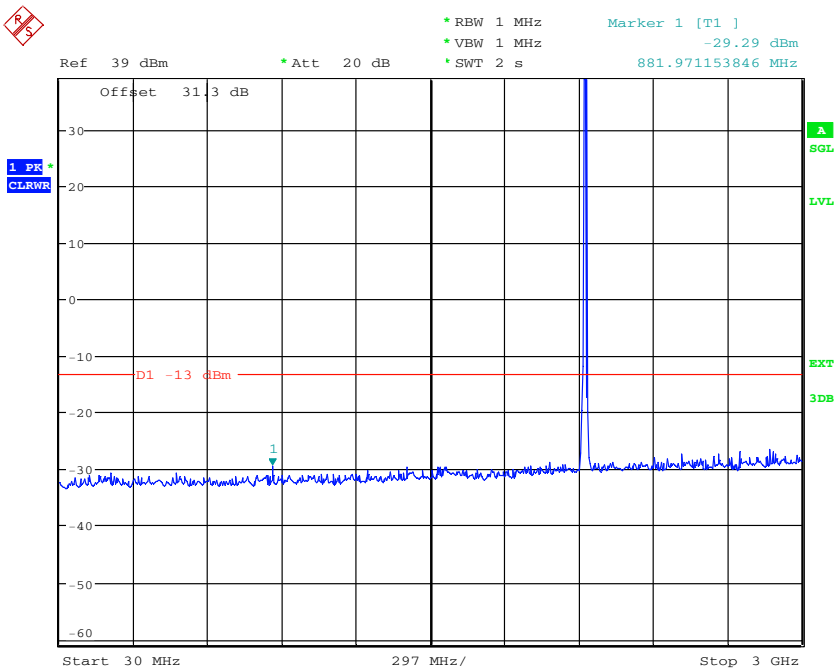
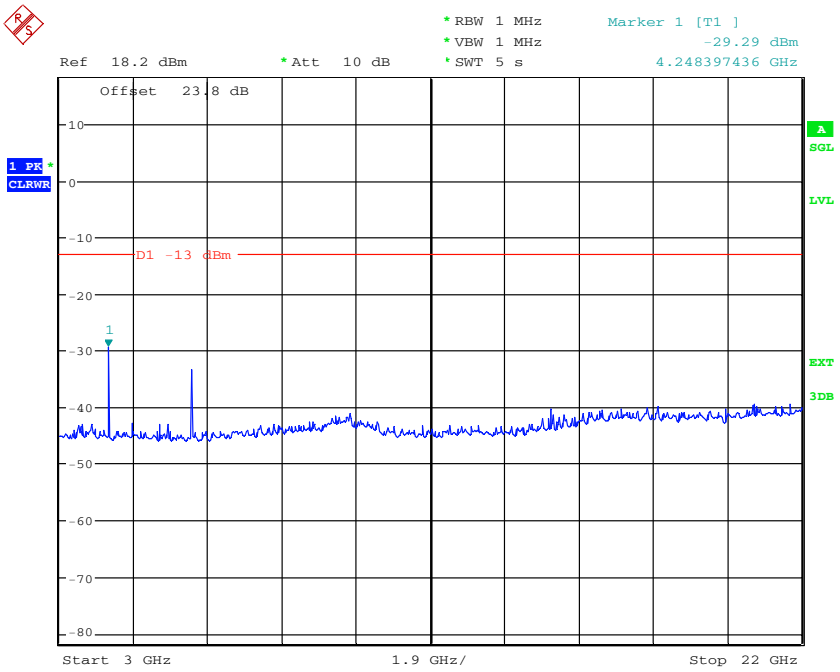


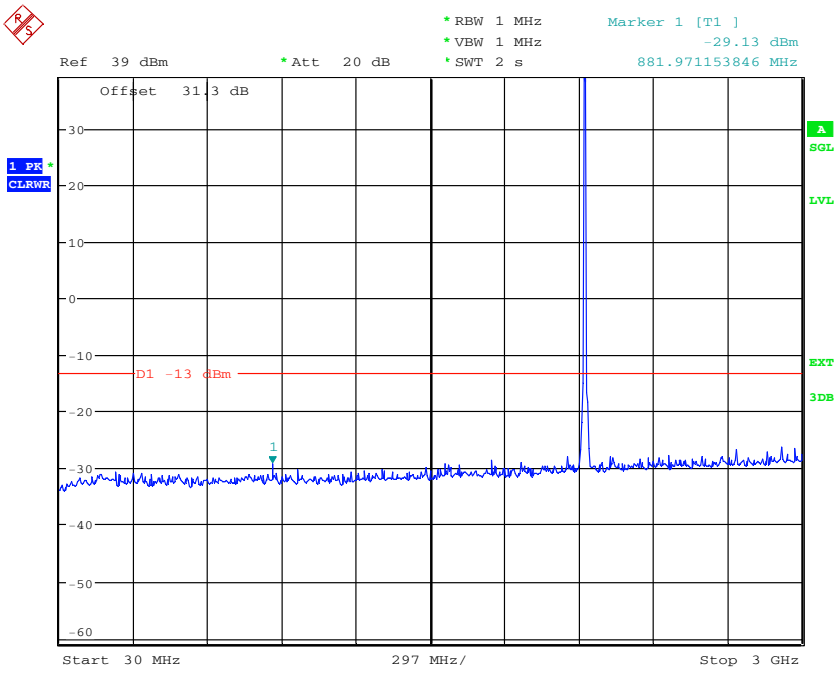
Figure 7-29: Spurious Emissions (30MHz – 3GHz) TX1
Single Carrier – 16QAM (2132.6 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory



Date: 20.SEP.2010 13:26:42

Figure 7-30: Spurious Emissions (3GHz – 22GHz) TX1
Single Carrier – 16QAM (2132.6 MHz)



Date: 20.SEP.2010 12:59:40

Figure 7-31: Spurious Emissions (30MHz – 3GHz) TX2
Single Carrier – 16QAM (2132.6 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory

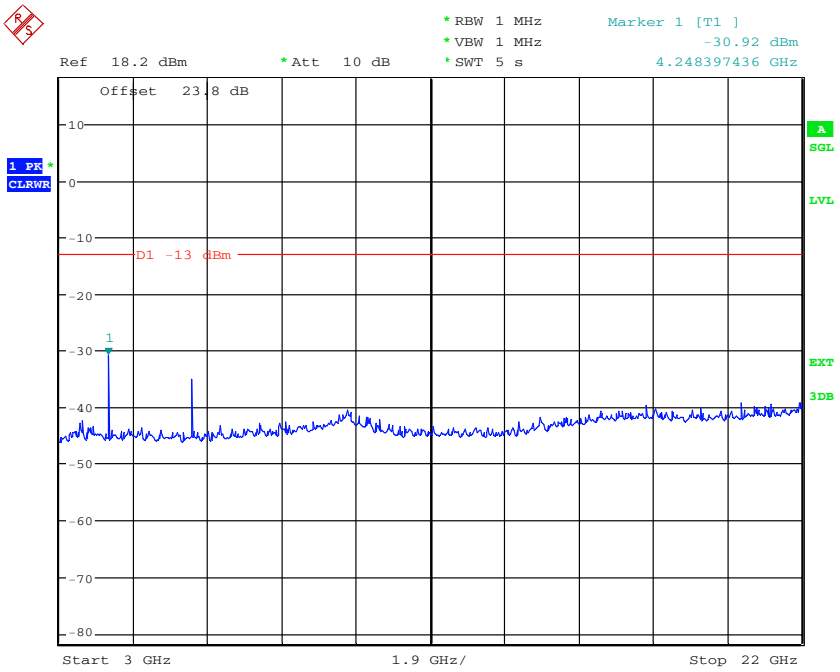


Figure 7-32: Spurious Emissions (3GHz – 22GHz) TX2
Single Carrier – 16QAM (2132.6 MHz)

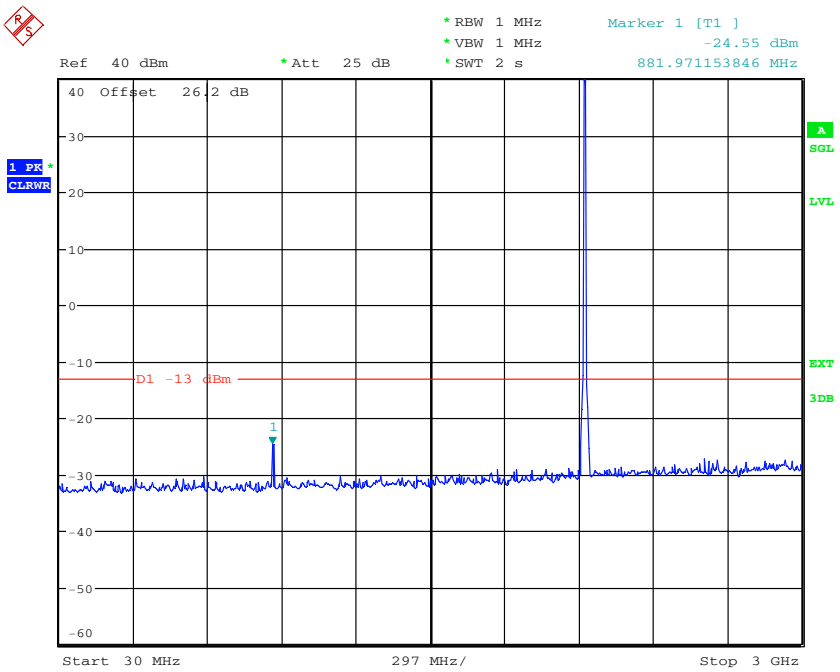
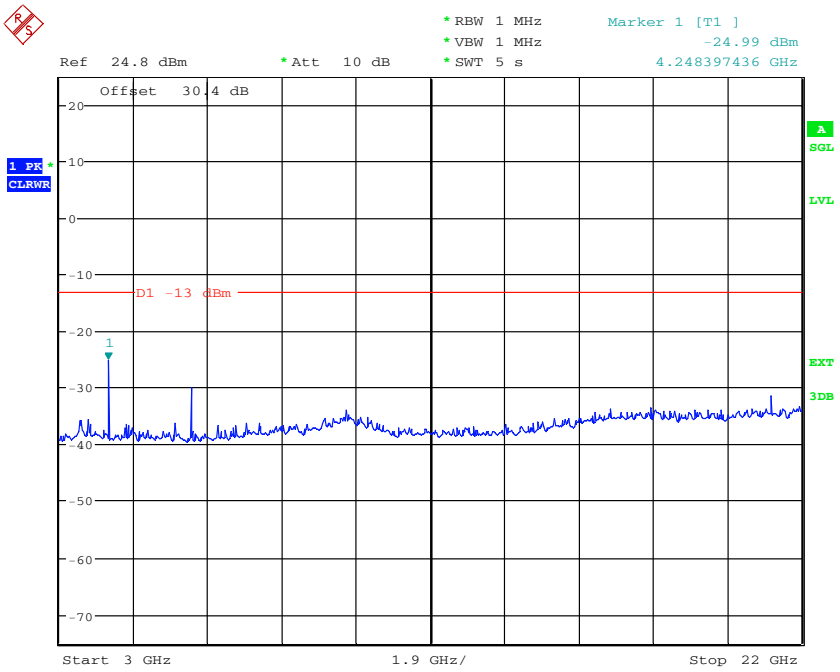


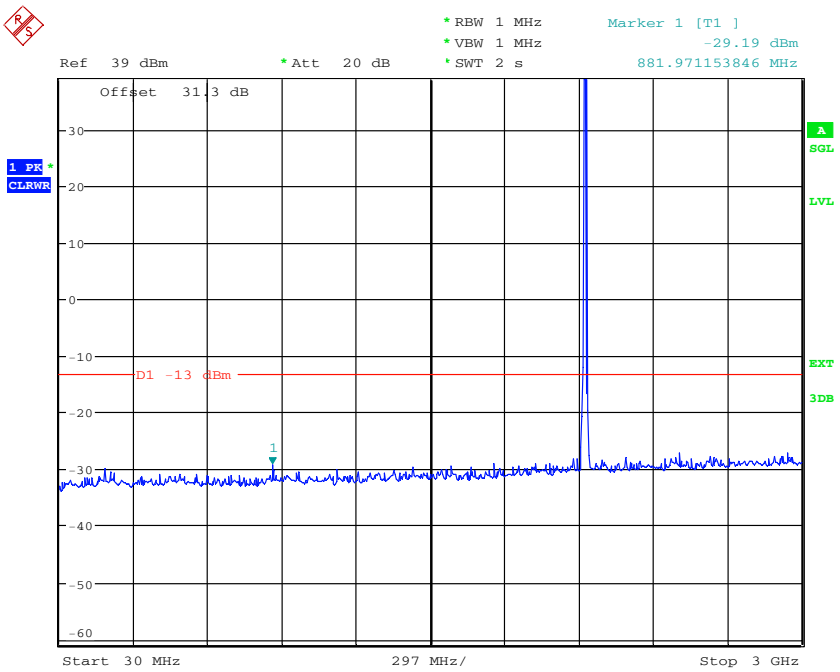
Figure 7-33: Spurious Emissions (30MHz – 3GHz) TX1 + TX2
Single Carrier – 16QAM (2132.6 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory



Date: 21.SEP.2010 15:34:19

Figure 7-34: Spurious Emissions (3GHz – 22GHz) TX1 + TX2
Single Carrier– 16QAM (2132.6 MHz)



Date: 20.SEP.2010 12:56:28

Figure 7-35: Spurious Emissions (30MHz – 3GHz) TX1
Single Carrier – 64QAM (2132.6 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory

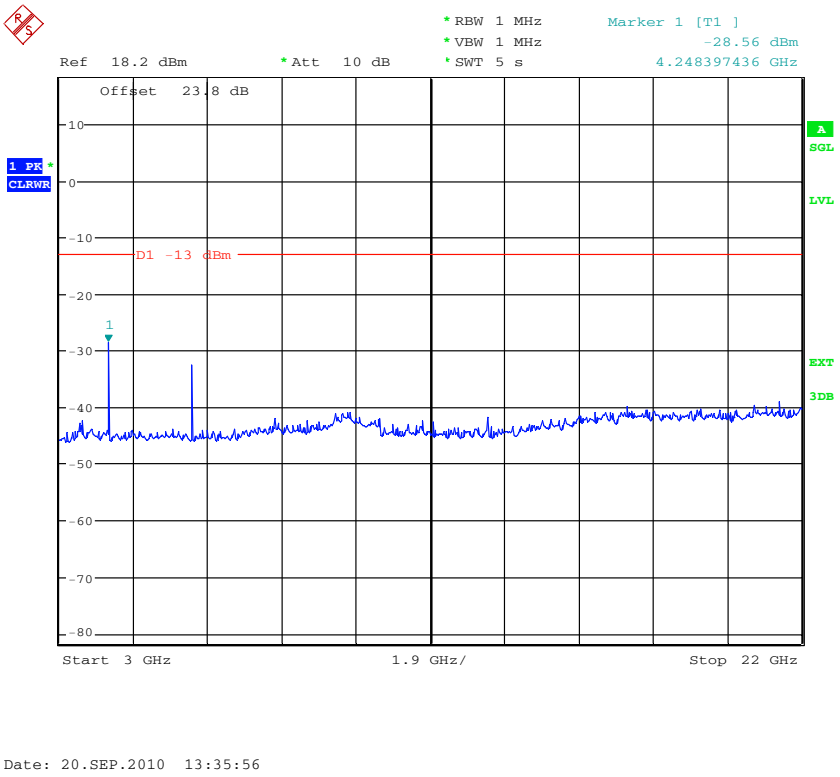


Figure 7-36: Spurious Emissions (3GHz – 22GHz) TX1
Single Carrier – 64QAM (2132.6 MHz)

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Config B:

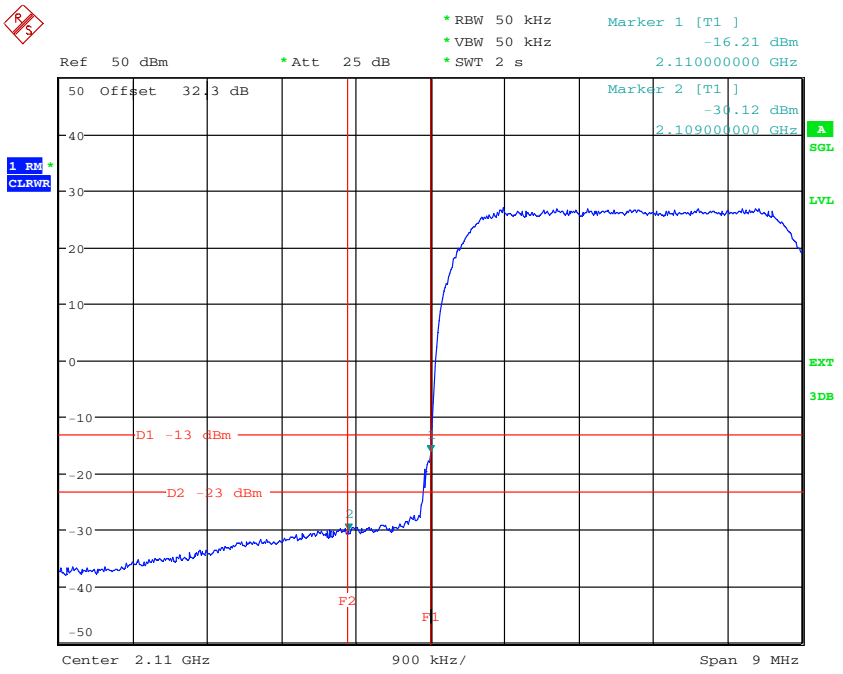

Figure 7-37: Spurious Emissions (Lower Band Edge) TX1 Multi Carrier – QPSK (2112.4 – 2117.4 MHz)

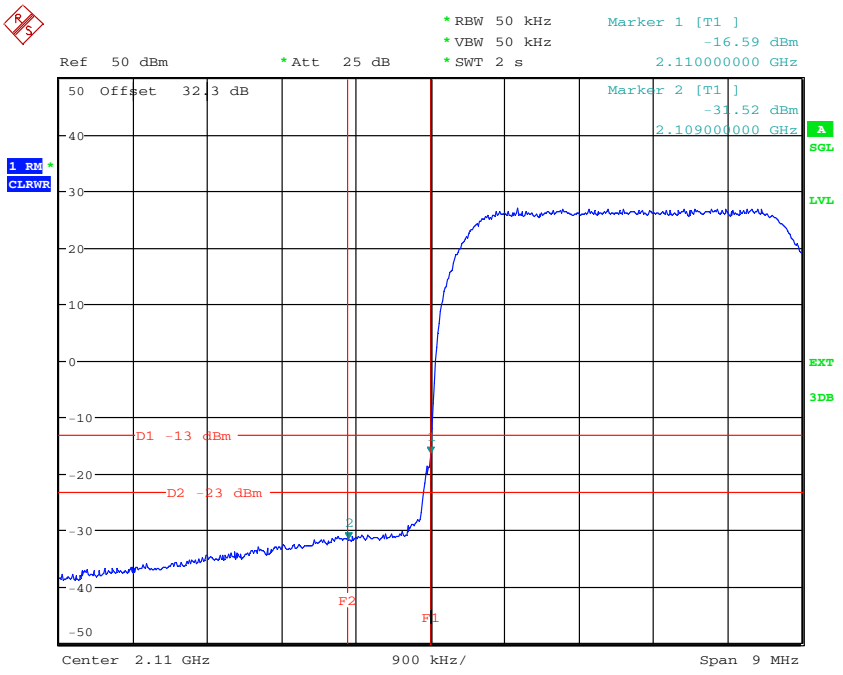

Figure 7-38: Spurious Emissions (Lower Band Edge) TX1 Multi Carrier – 16QAM (2112.4 – 2117.4 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory

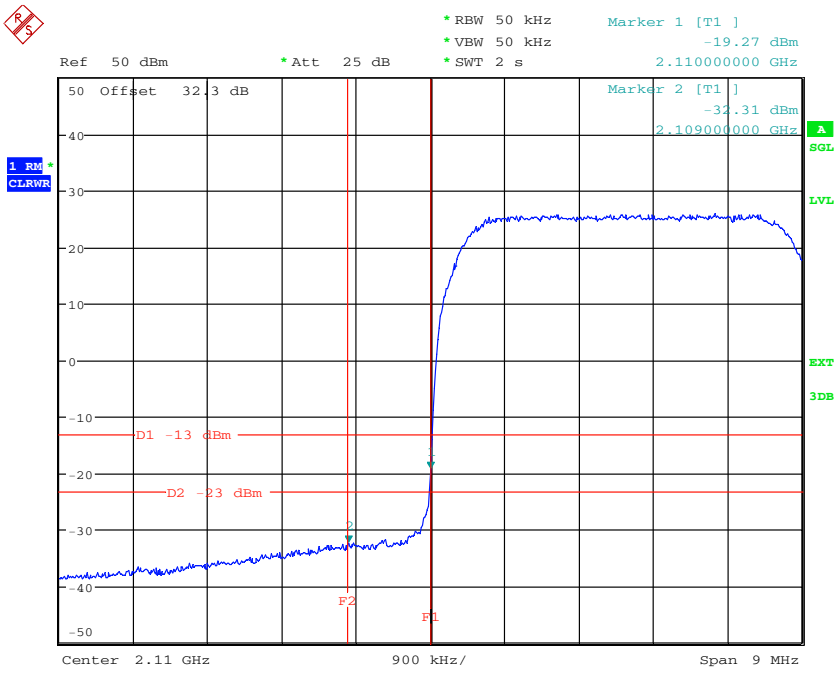

Figure 7-39: Spurious Emissions (Lower Band Edge) TX2 Multi Carrier – 16QAM (2112.4 – 2117.4 MHz)

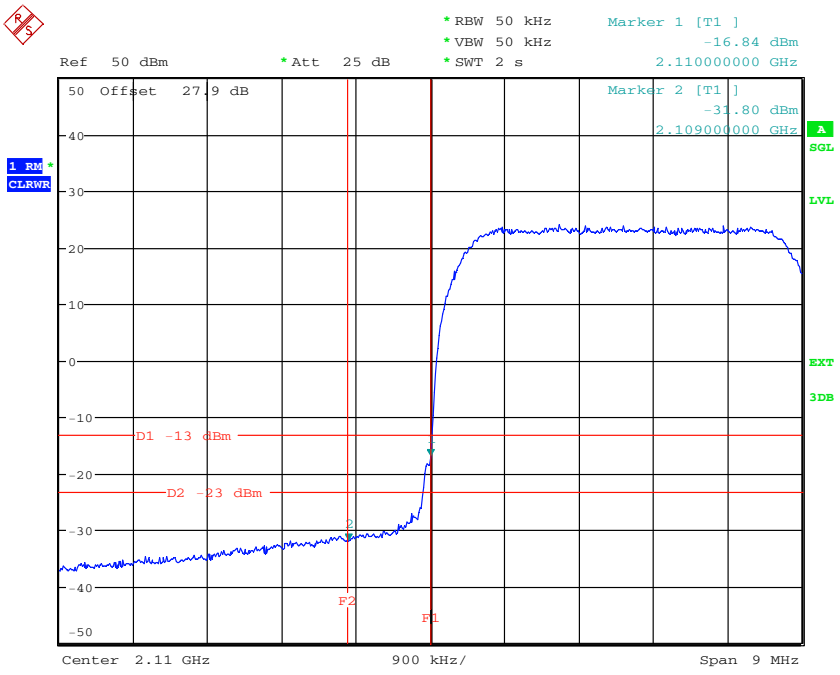

Figure 7-40: Spurious Emissions (Lower Band Edge) TX1 +TX2 Multi Carrier – 16QAM (2112.4 – 2117.4 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory

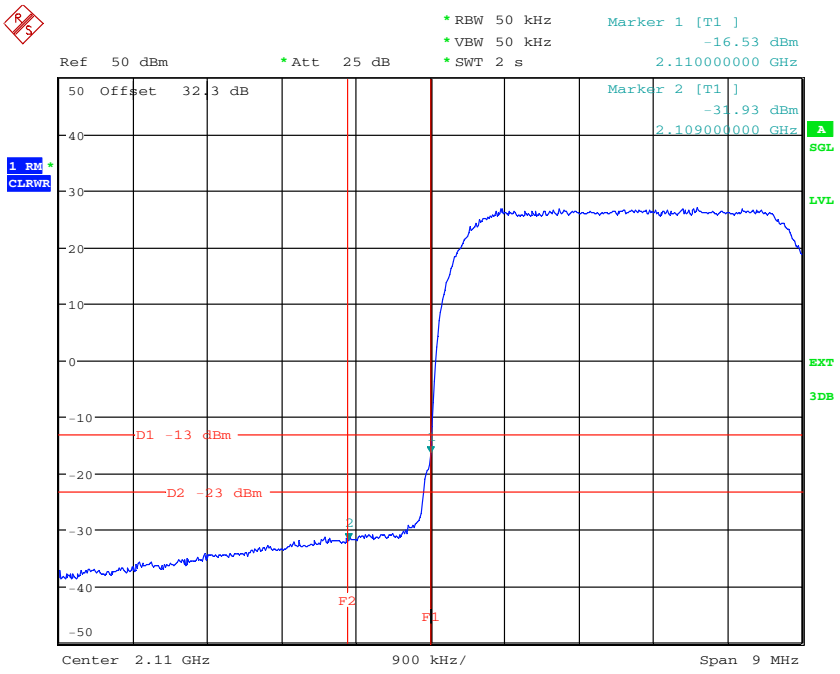

Figure 7-41: Spurious Emissions (Lower Band Edge) TX1 Multi Carrier – 64QAM (2112.4 – 2117.4 MHz)

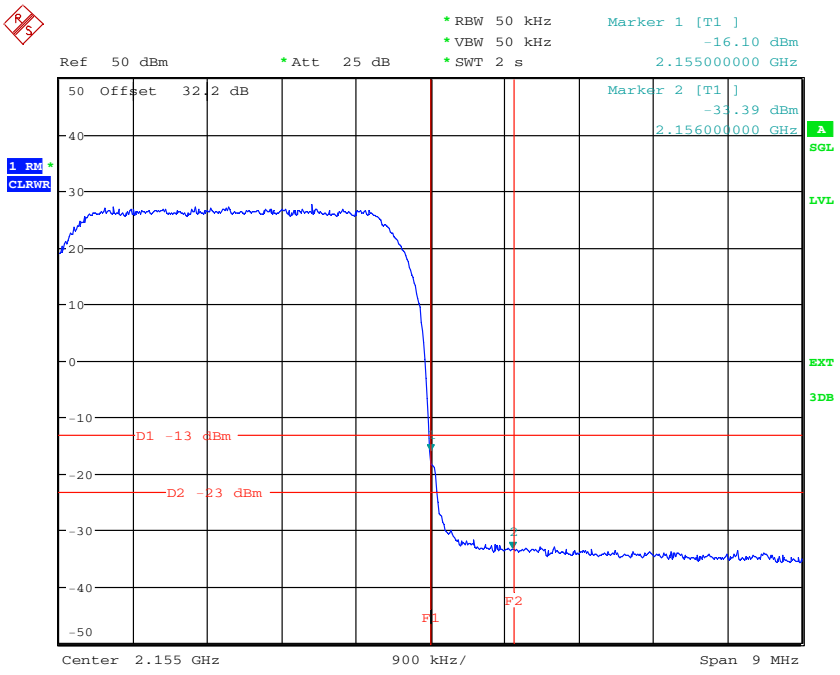

Figure 7-42: Spurious Emissions (Upper Band Edge) TX1 Multi Carrier – QPSK (2152.6 – 2147.6 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory

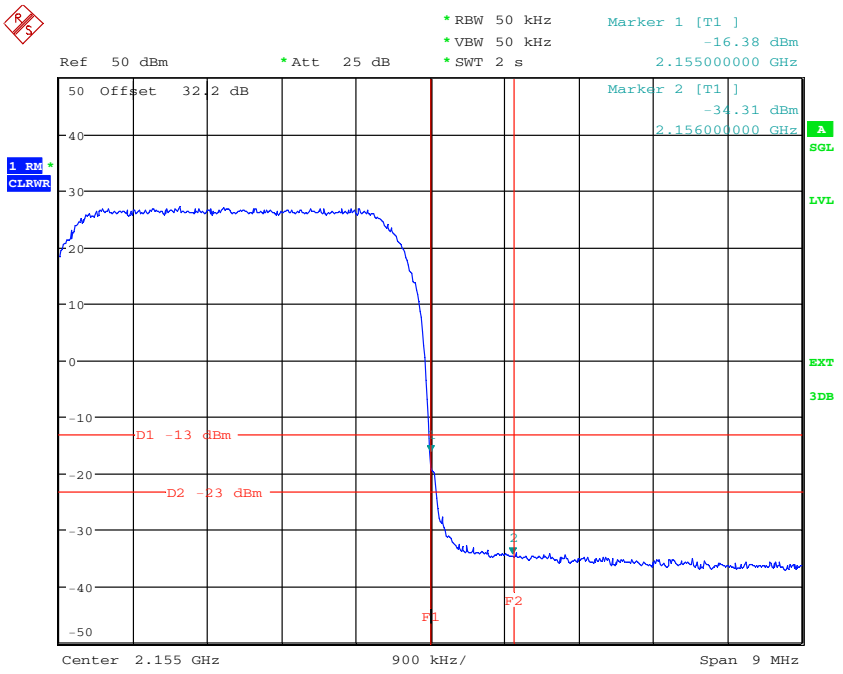

Figure 7-43: Spurious Emissions (Upper Band Edge) TX1
Multi Carrier – 16QAM (2152.6 – 2147.6 MHz)

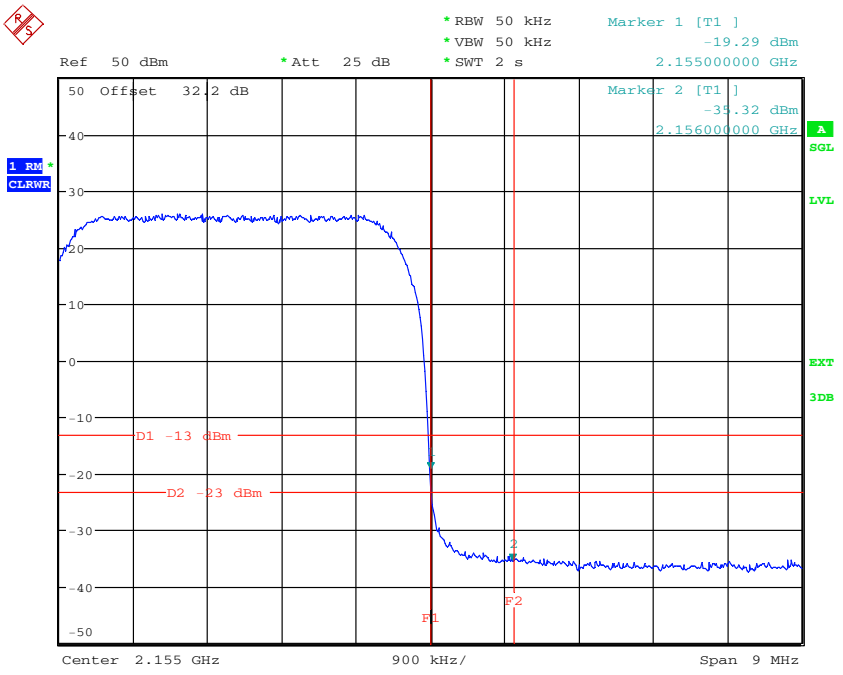

Figure 7-44: Spurious Emissions (Upper Band Edge) TX2
Multi Carrier – 16QAM (2152.6 – 2147.6 MHz)

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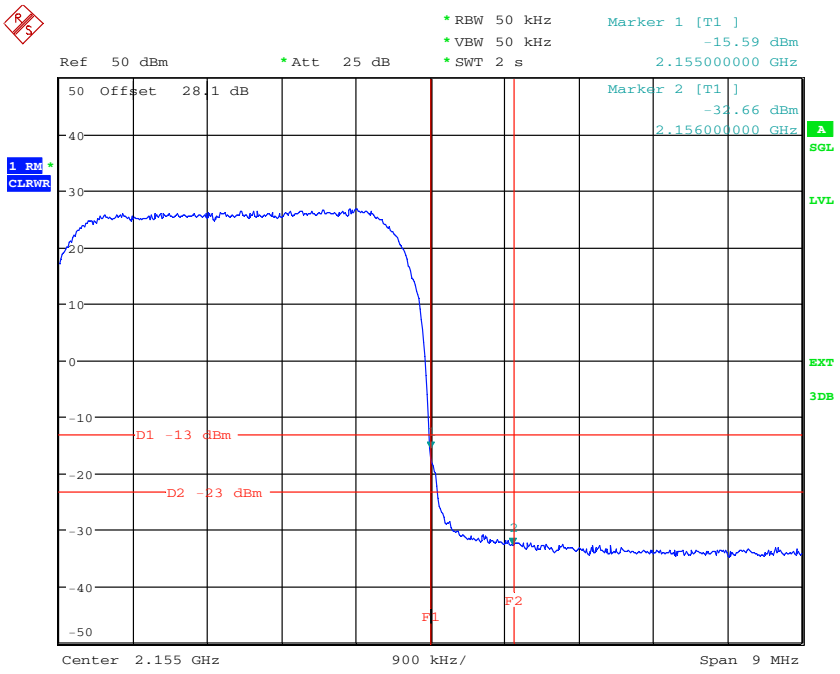

Figure 7-45: Spurious Emissions (Upper Band Edge) TX1 +TX2 Multi Carrier – 16QAM (2152.6 – 2147.6 MHz)

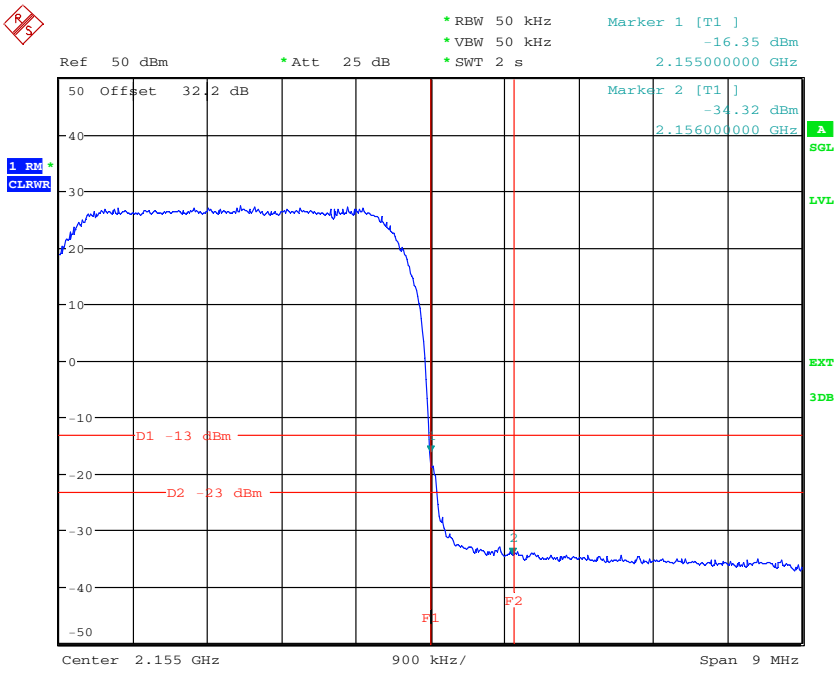

Figure 7-46: Spurious Emissions (Upper Band Edge) TX1 Multi Carrier – 64QAM (2152.6 – 2147.6 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory

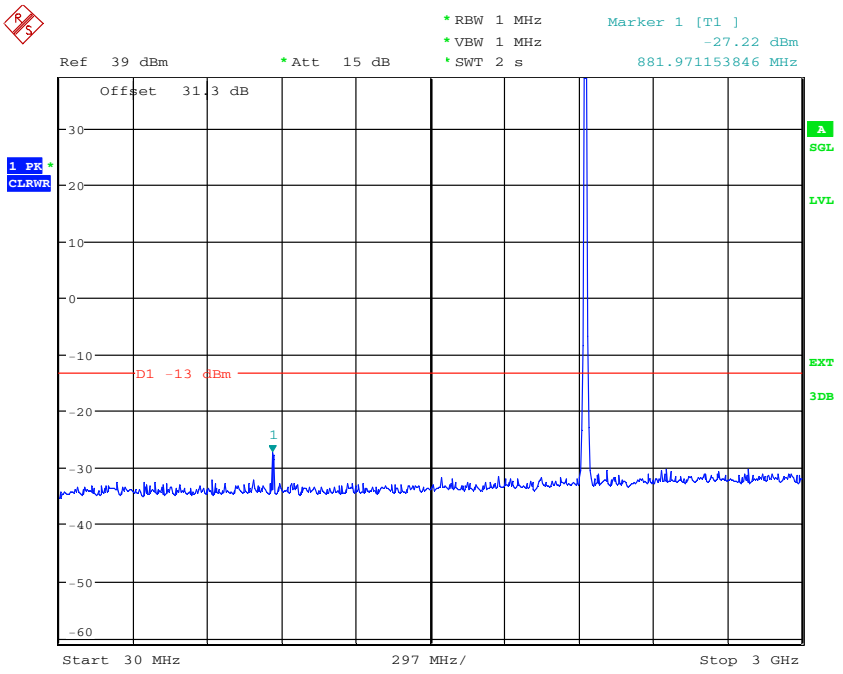

Figure 7-47: Spurious Emissions (30MHz – 3GHz) TX1
Multi Carrier – QPSK (2132.6 – 2137.6 MHz)

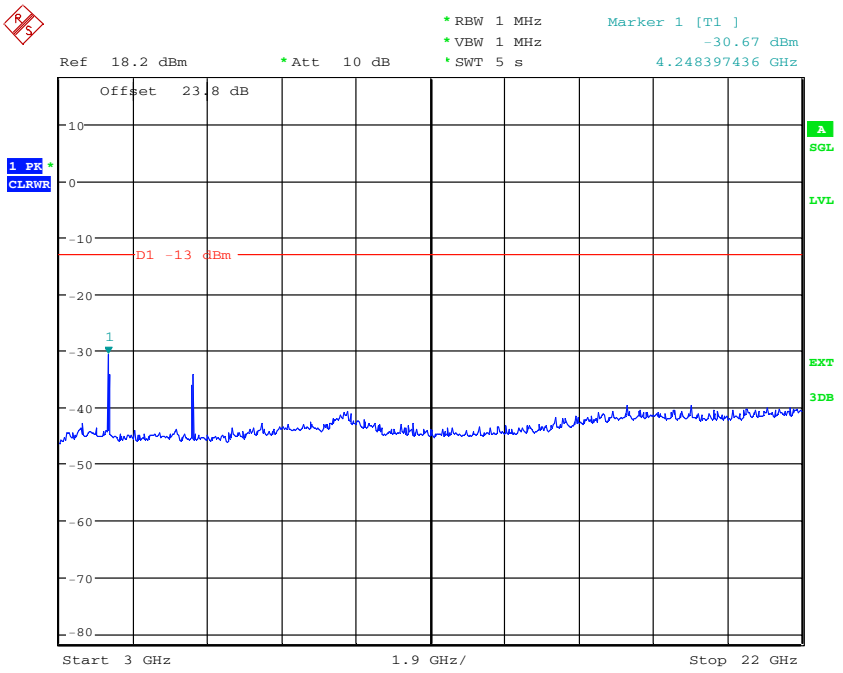

Figure 7-48: Spurious Emissions (3GHz – 22GHz) TX1
Multi Carrier – QPSK (2132.6 – 2137.6 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory

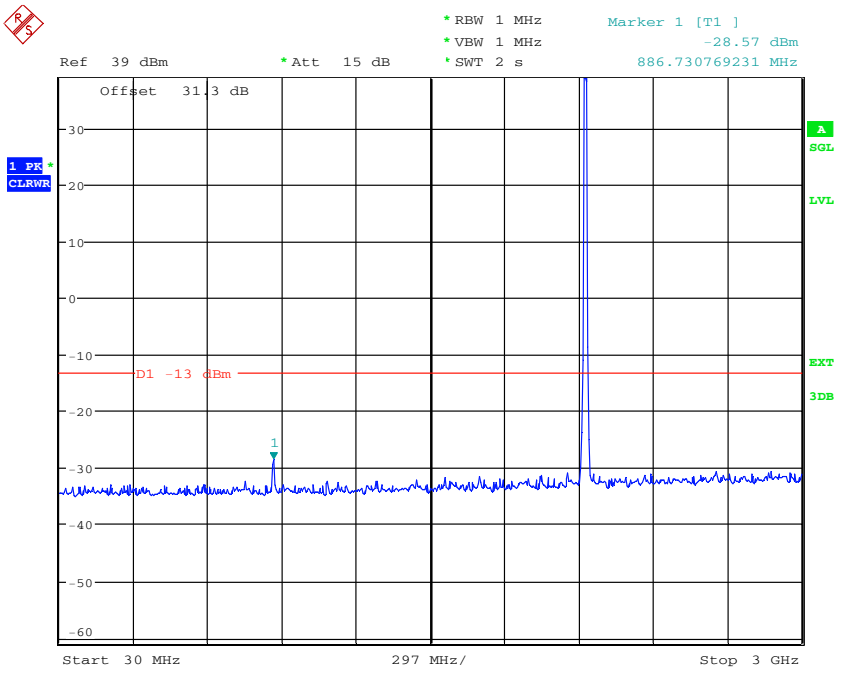

Figure 7-49: Spurious Emissions (30MHz – 3GHz) TX1 Multi Carrier – 16QAM (2132.6 – 2137.6 MHz)

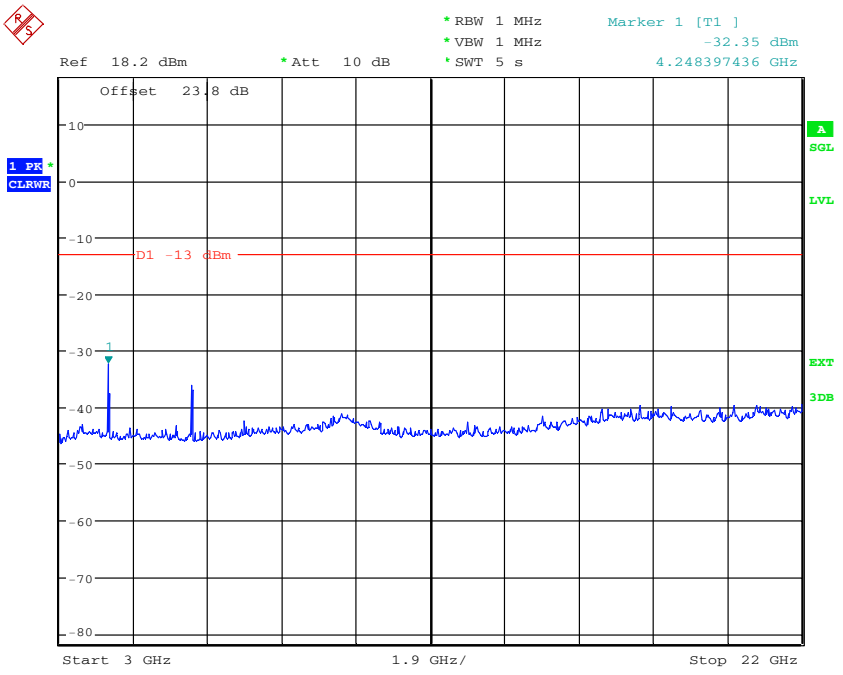

Figure 7-50: Spurious Emissions (3GHz – 22GHz) TX1 Multi Carrier – 16QAM (2132.6 – 2137.6 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory

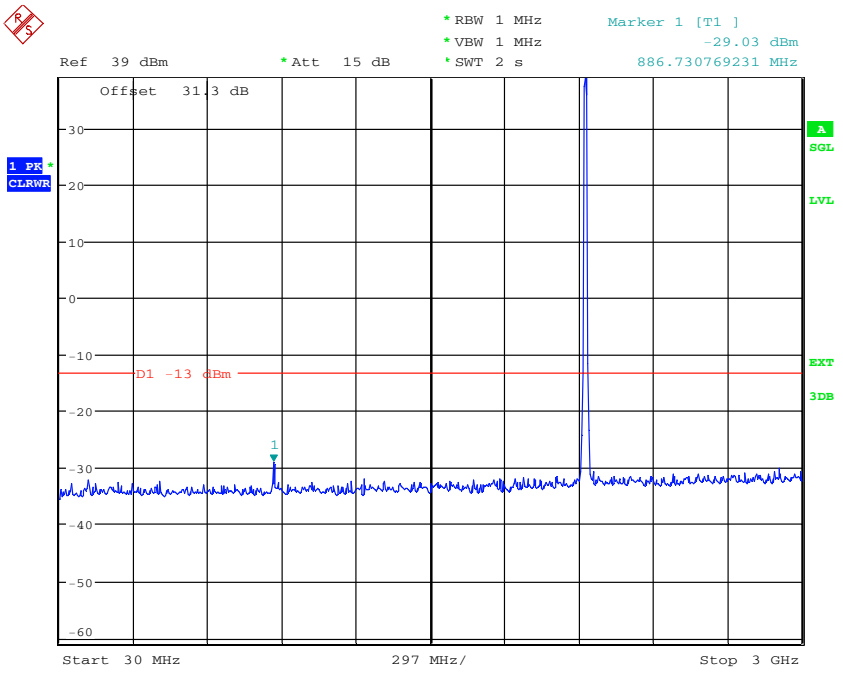

Figure 7-51: Spurious Emissions (30MHz – 3GHz) TX2 Multi Carrier – 16QAM (2132.6 – 2137.6 MHz)

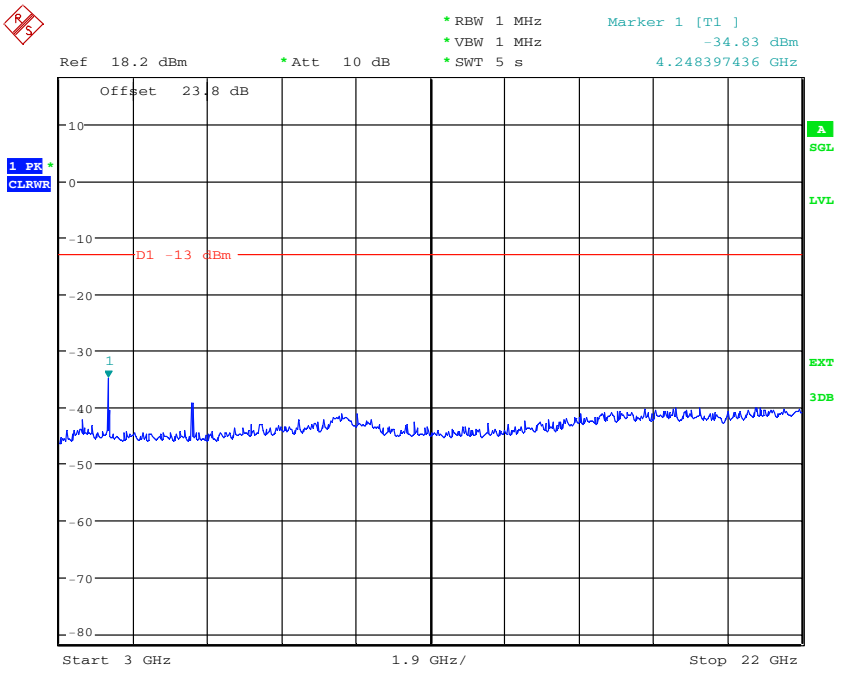

Figure 7-52: Spurious Emissions (3GHz – 22GHz) TX2 Multi Carrier – 16QAM (2132.6 – 2137.6 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory

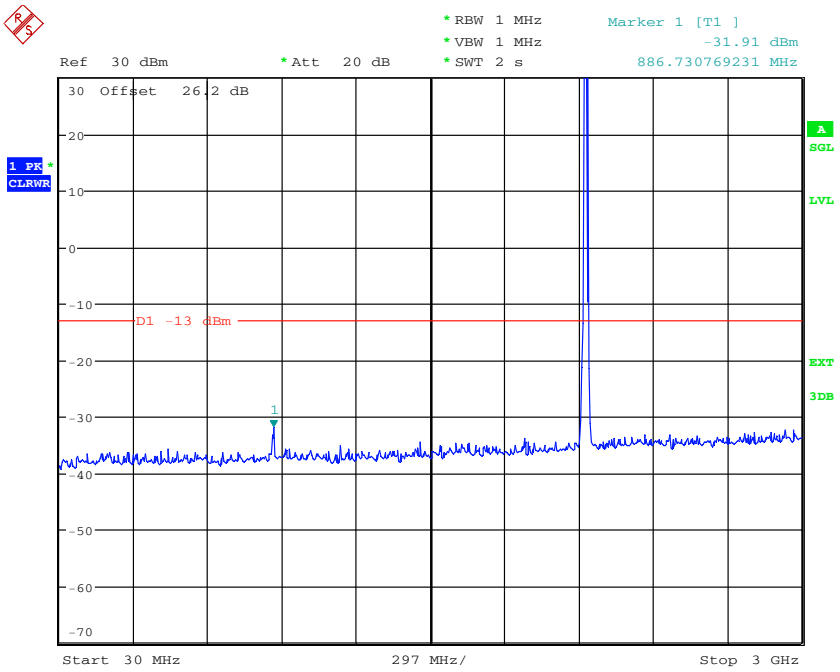

Figure 7-53: Spurious Emissions (30MHz – 3GHz) TX1 + TX2 Multi Carrier – 16QAM (2132.6 – 2137.6 MHz)

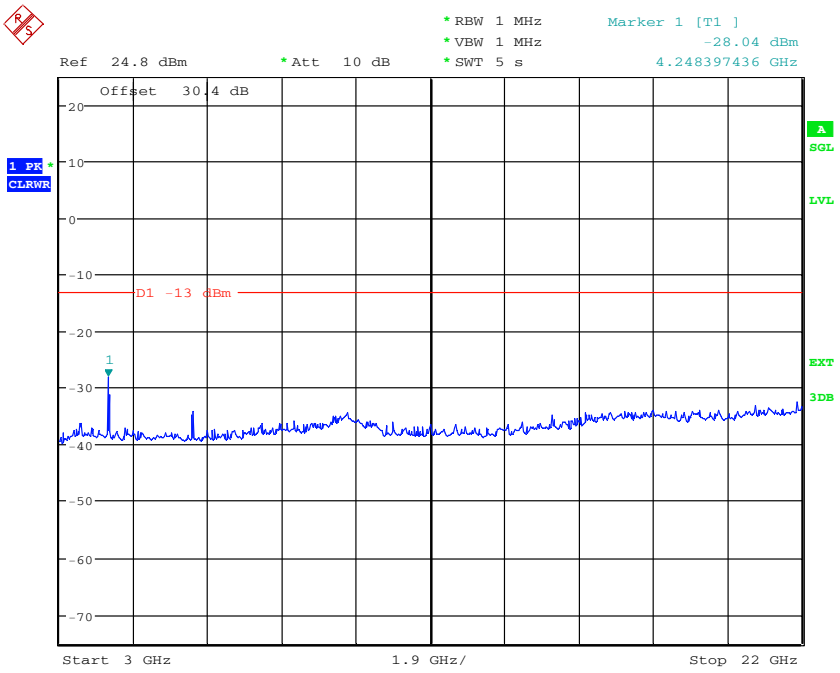

Figure 7-54: Spurious Emissions (3GHz – 22GHz) TX1 + TX2 Multi Carrier – 16QAM (2132.6 – 2137.6 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory

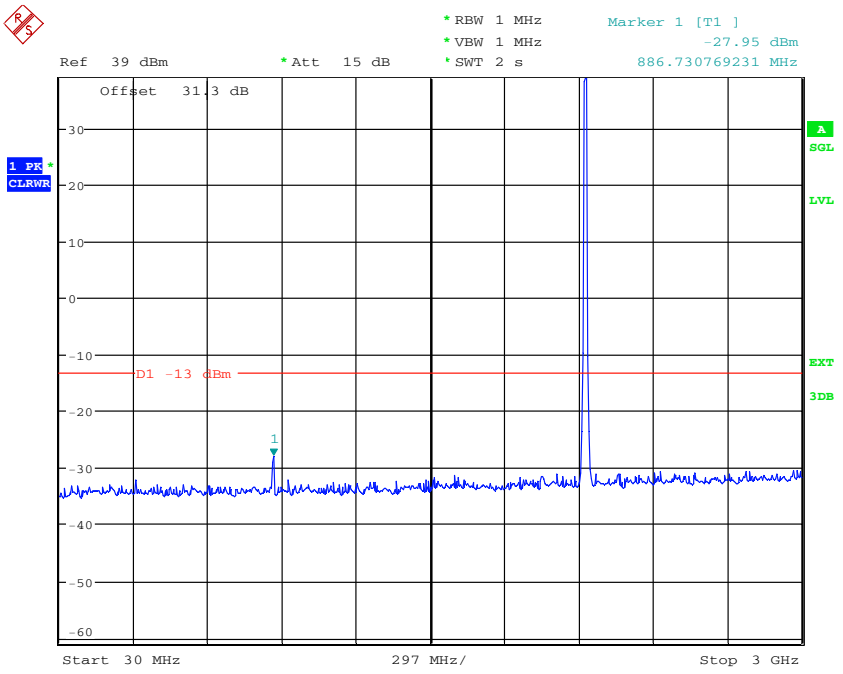

Figure 7-55: Spurious Emissions (30MHz – 3GHz) TX1 Multi Carrier – 64QAM (2132.6 – 2137.6 MHz)

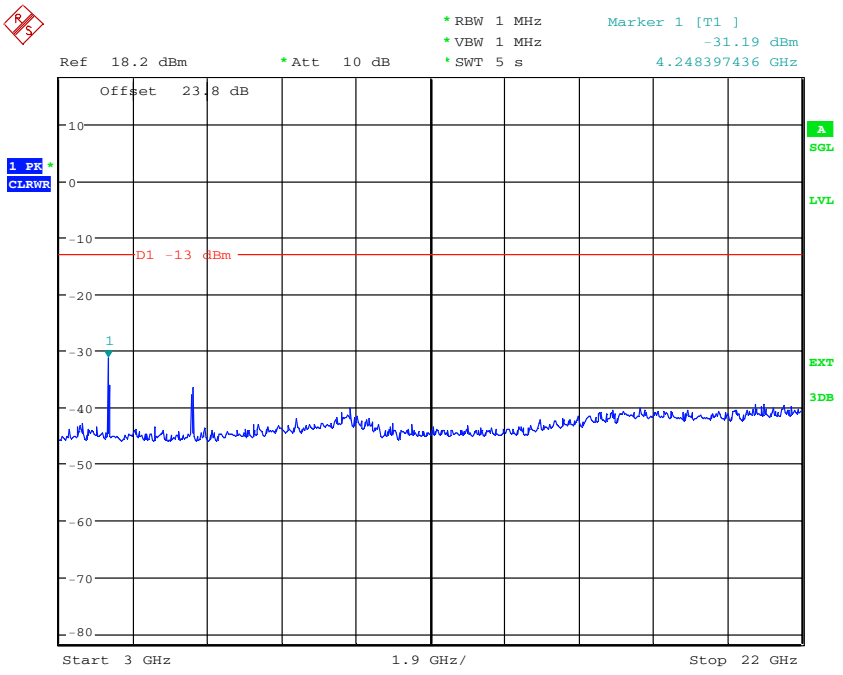

Figure 7-56: Spurious Emissions (3GHz – 22GHz) TX1 Multi Carrier – 64QAM (2132.6 – 2137.6 MHz)

The test report shall not be reproduced except in full without the written approval of the testing laboratory

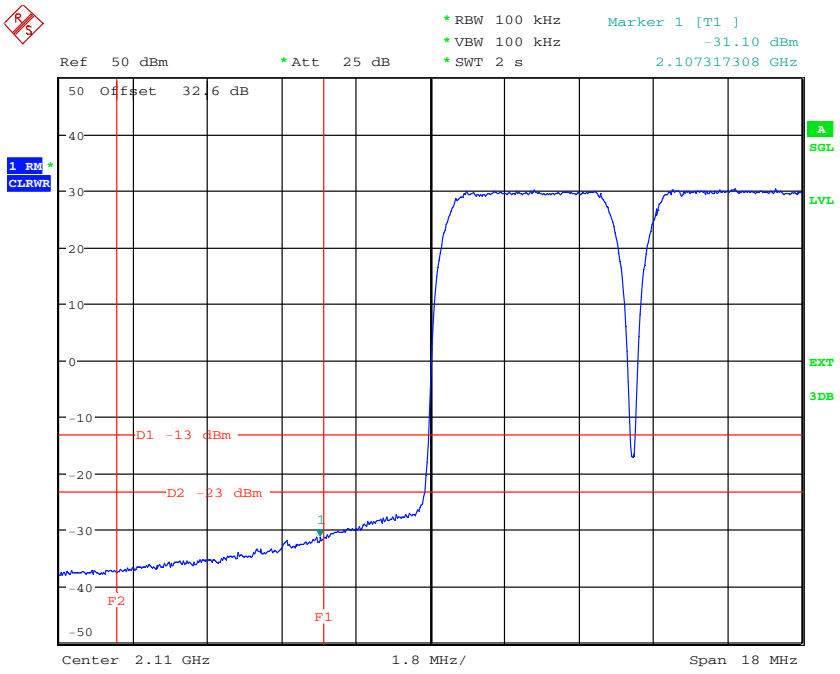

Figure 7-57: Spurious Emissions (3rd Order IM, Lower Band Edge) TX1 Multi Carrier – QPSK (2112.4 – 2117.4 MHz)

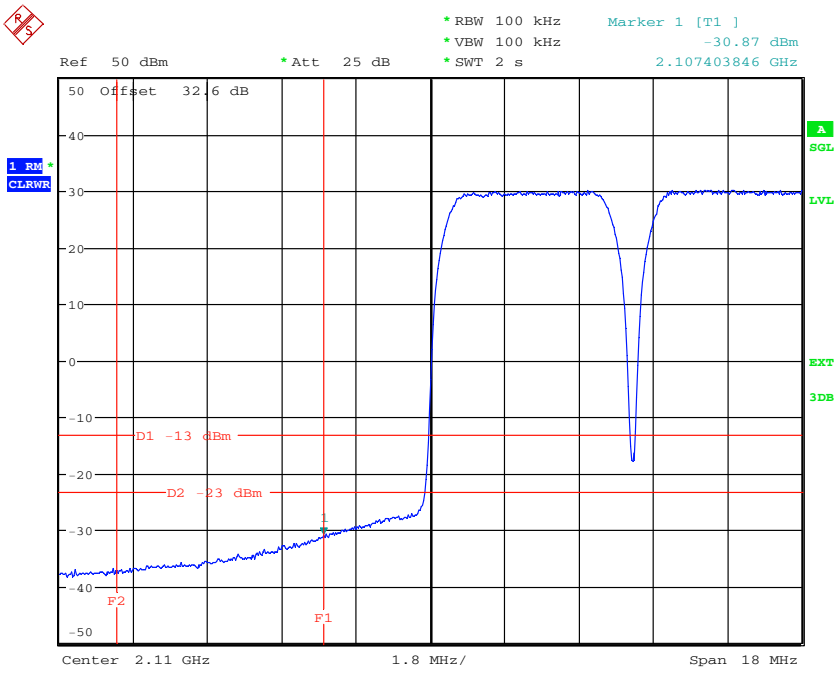

Figure 7-58: Spurious Emissions (3rd Order IM, Lower Band Edge) TX1 Multi Carrier – 16QAM (2112.4 – 2117.4 MHz)

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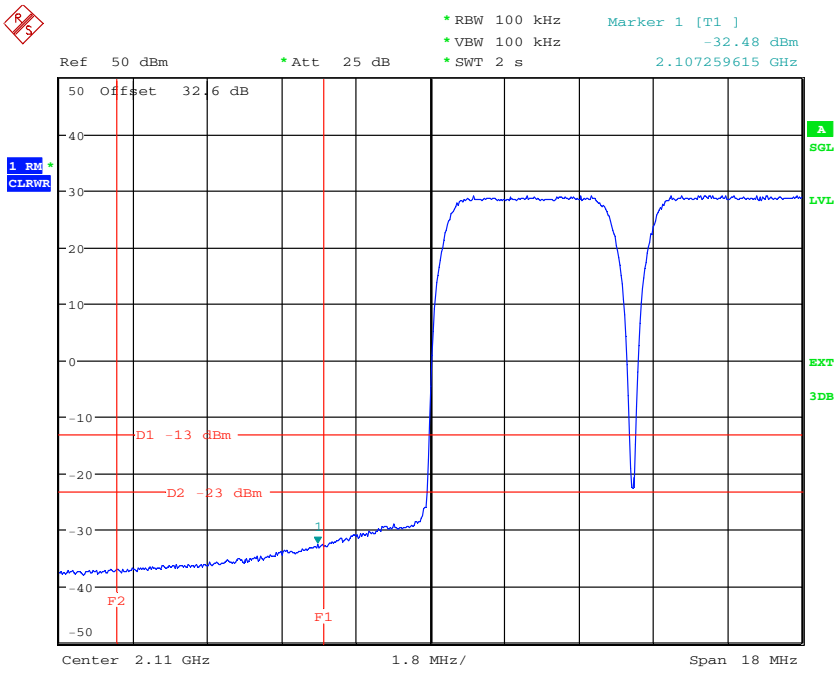

Figure 7-59: Spurious Emissions (3rd Order IM, Lower Band Edge) TX2 Multi Carrier – 16QAM (2112.4 – 2117.4 MHz)

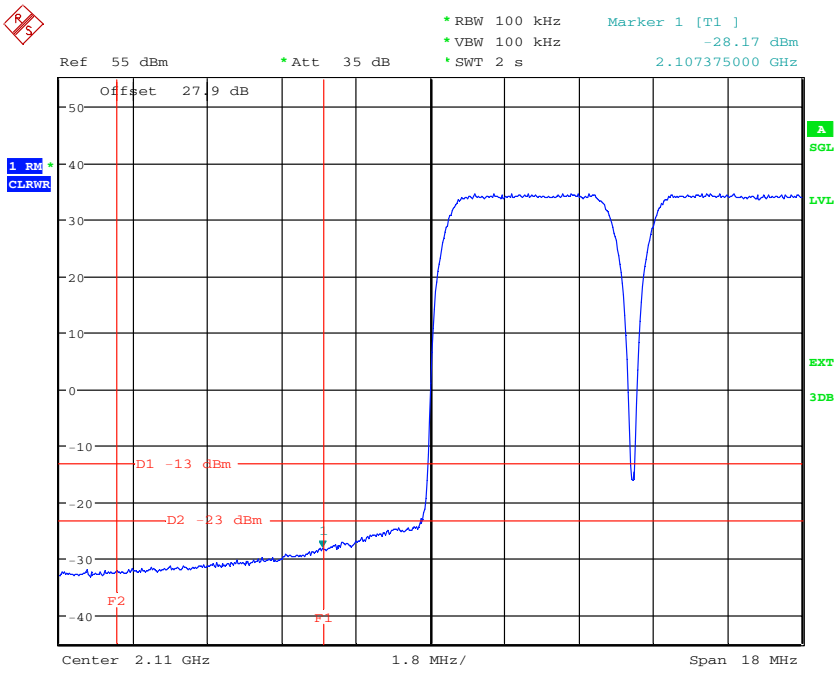

Figure 7-60: Spurious Emissions (3rd Order IM, Lower Band Edge) TX1 + TX2 Multi Carrier – 16QAM (2112.4 – 2117.4 MHz)

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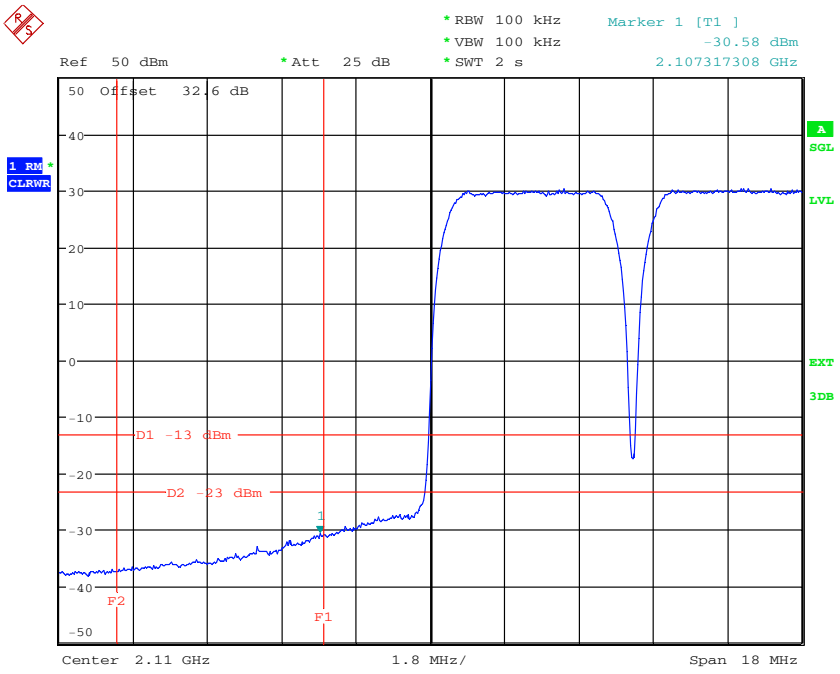

Figure 7-61: Spurious Emissions (3rd Order IM, Lower Band Edge) TX1 Multi Carrier – 64QAM (2112.4 – 2117.4 MHz)

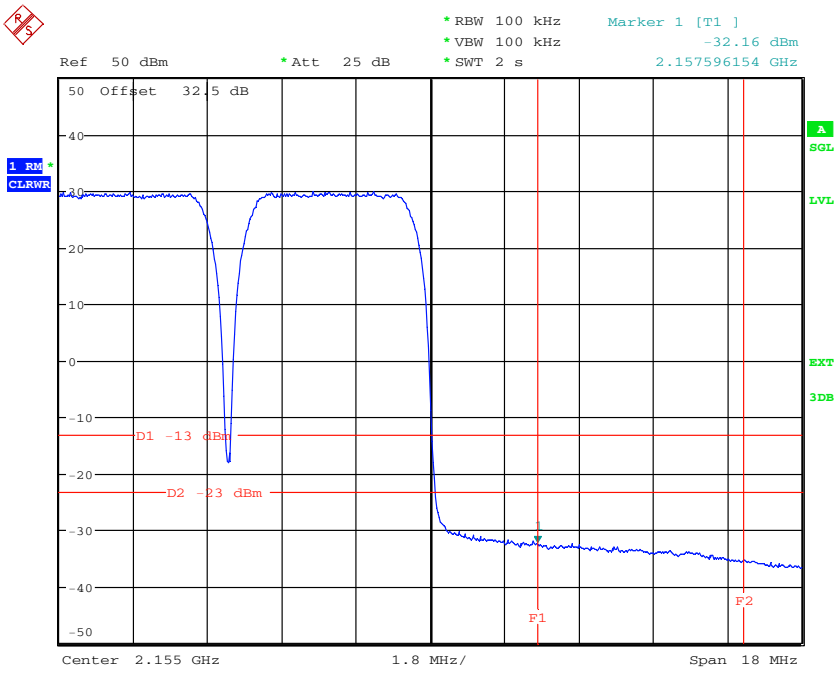

Figure 7-62: Spurious Emissions (3rd Order IM, Upper Band Edge) TX1 Multi Carrier – QPSK (2152.6 – 2147.6 MHz)

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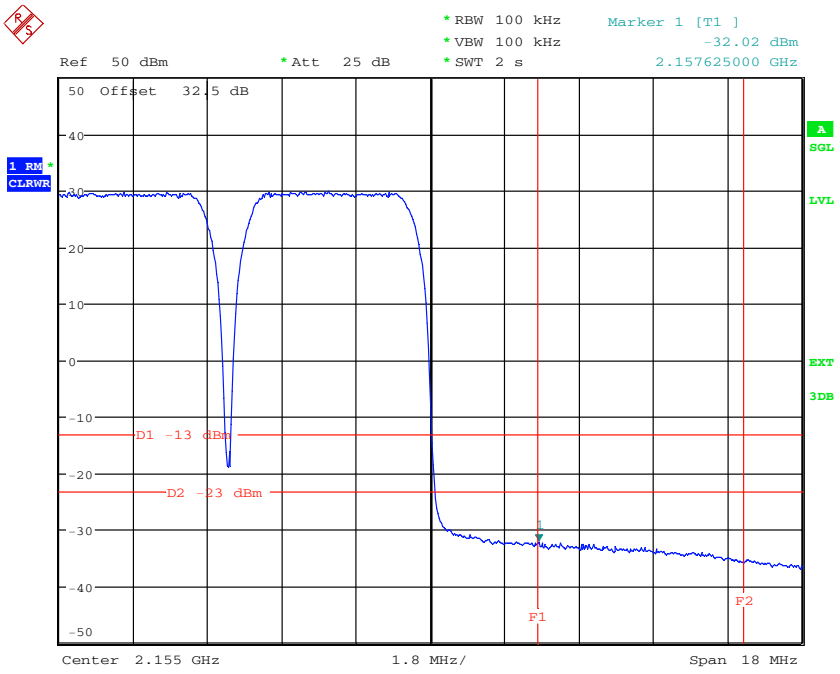

Figure 7-63: Spurious Emissions (3rd Order IM, Upper Band Edge) TX1 Multi Carrier – 16QAM (2152.6 – 2147.6 MHz)

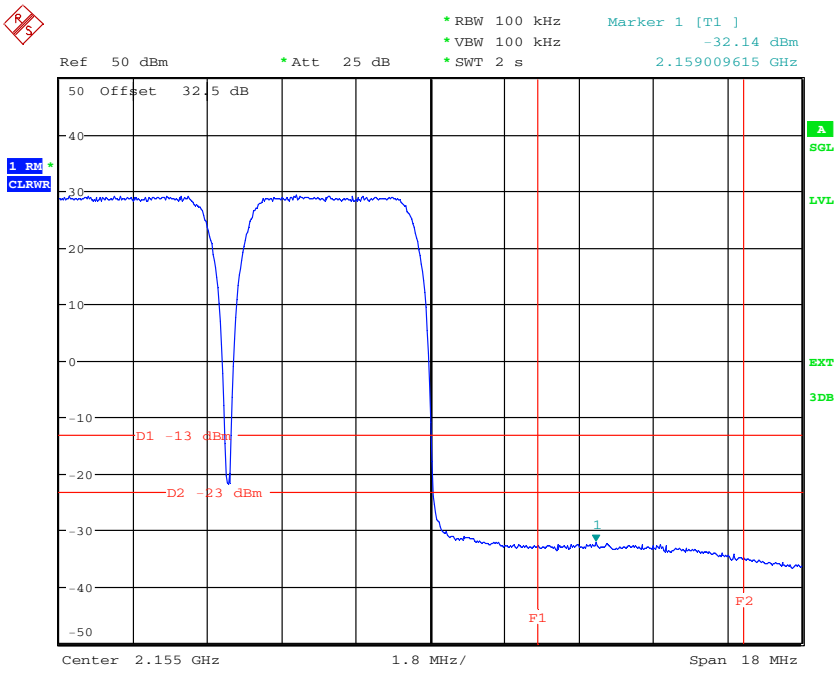

Figure 7-64: Spurious Emissions (3rd Order IM, Upper Band Edge) TX2 Multi Carrier – 16QAM (2152.6 – 2147.6 MHz)

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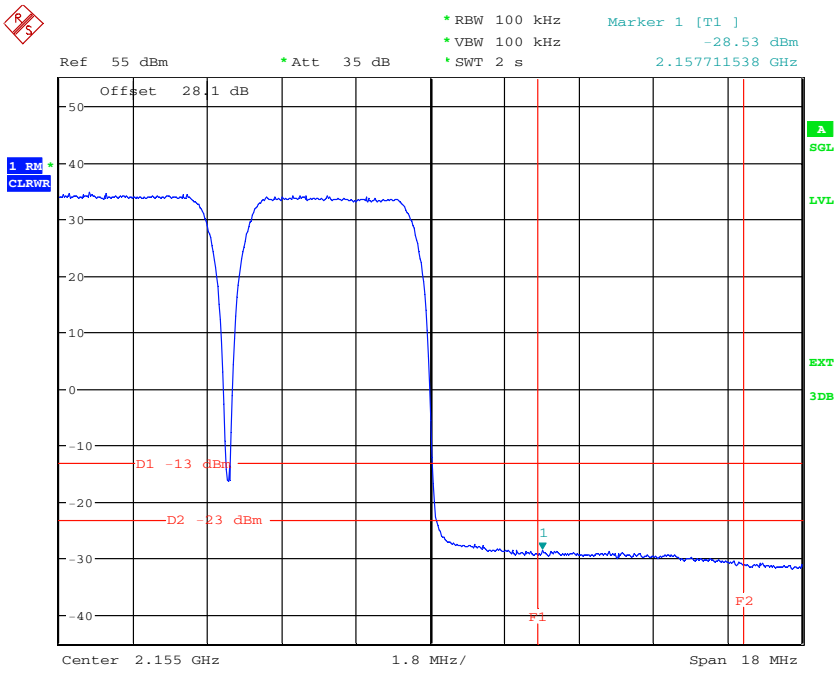

Figure 7-65: Spurious Emissions (3rd Order IM, Upper Band Edge) TX1 + TX2 Multi Carrier – 16QAM (2152.6 – 2147.6 MHz)

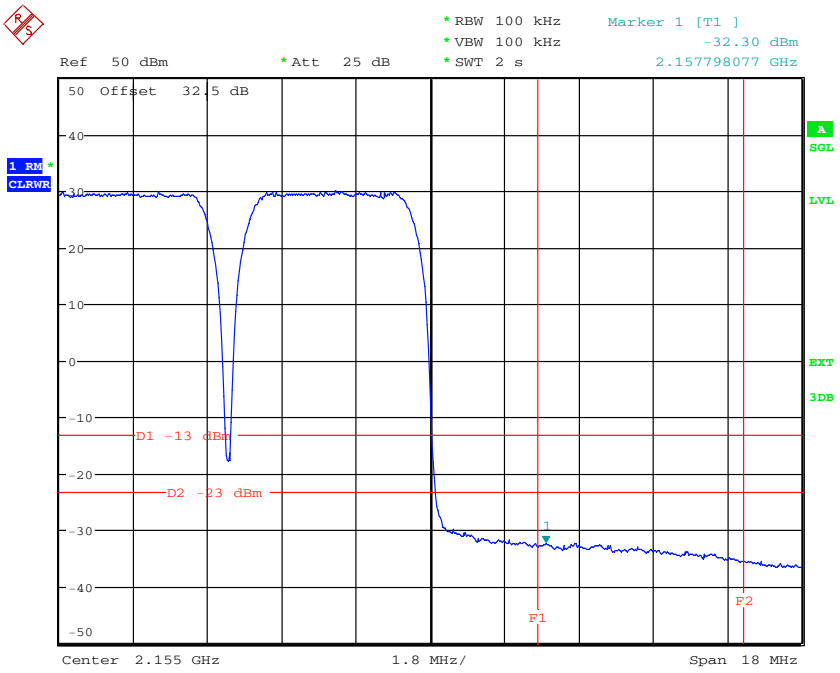

Figure 7-66: Spurious Emissions (3rd Order IM, Upper Band Edge) TX1 Multi Carrier – 64QAM (2152.6 – 2147.6 MHz)

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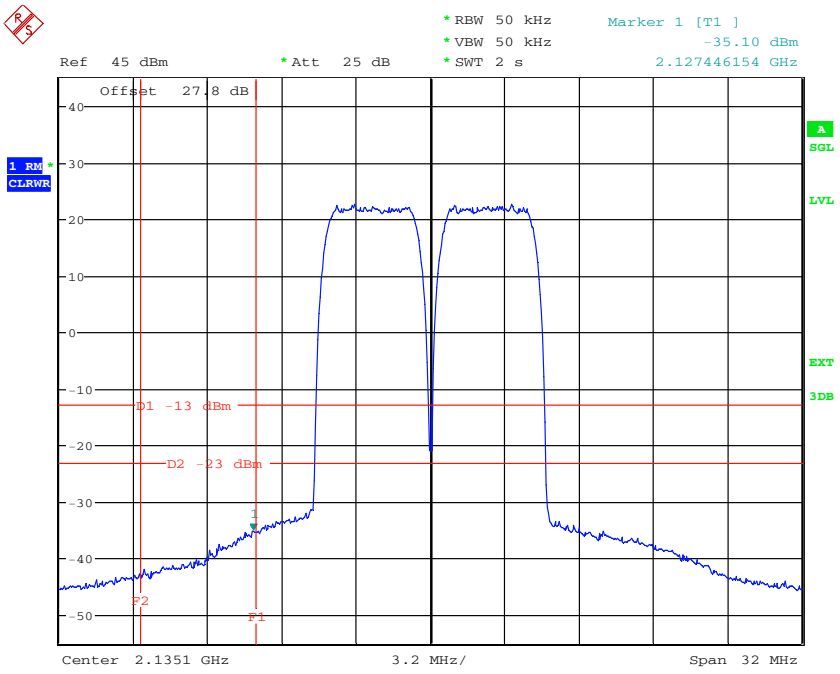

Figure 7-67: Spurious Emissions (3rd Order IM, Middle) TX1 Multi Carrier – QPSK (2132.6 – 2137.6 MHz)

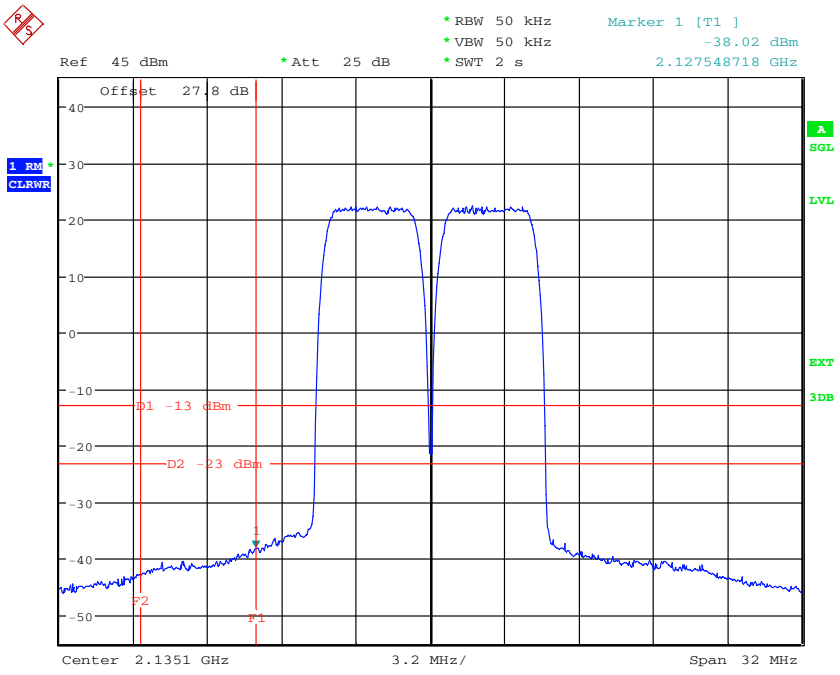

Figure 7-68: Spurious Emissions (3rd Order IM, Middle) TX1 Multi Carrier – 16QAM (2132.6 – 2137.6 MHz)

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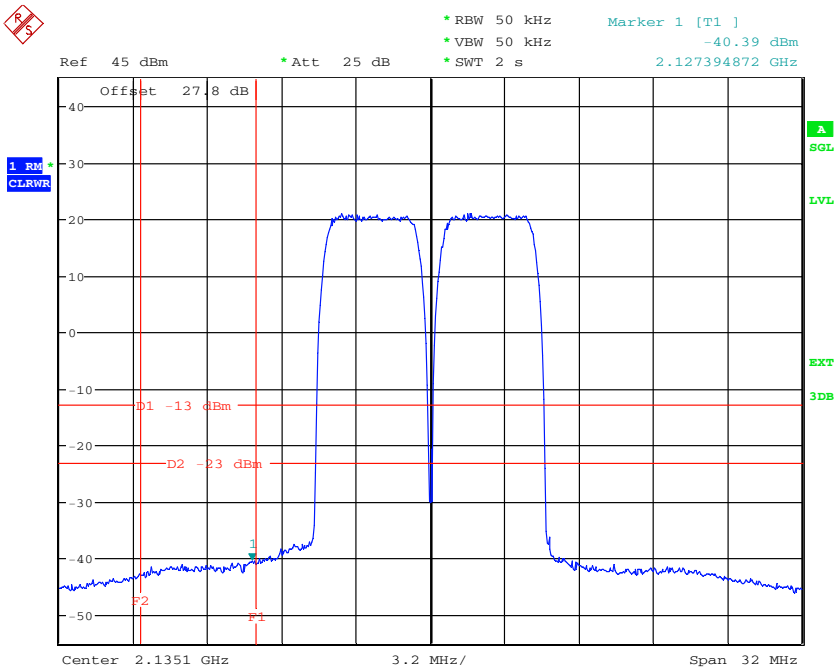

Figure 7-69: Spurious Emissions (3rd Order IM, Middle) TX2 Multi Carrier – 16QAM (2132.6 – 2137.6 MHz)

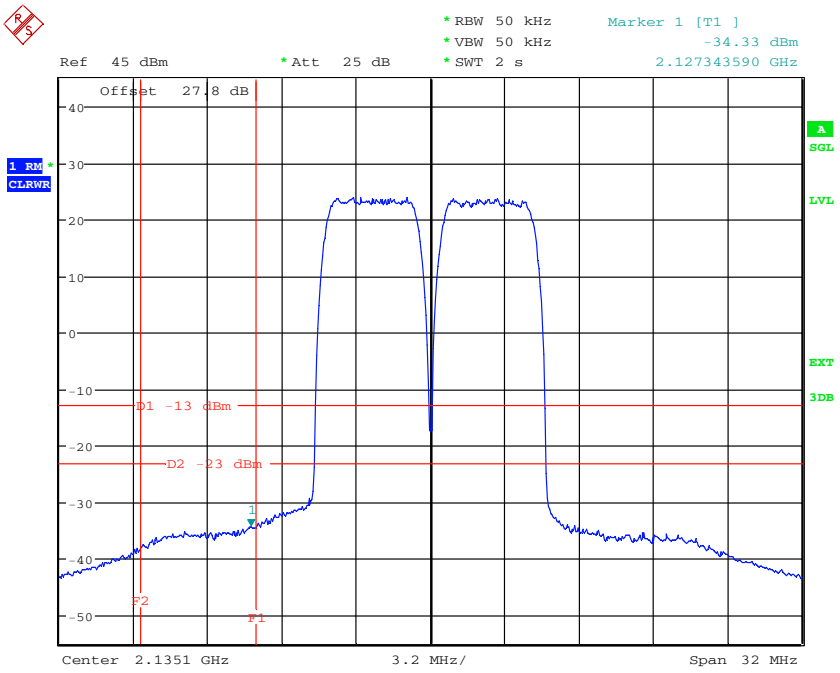

Figure 7-70: Spurious Emissions (3rd Order IM, Middle) TX1 + TX2 Multi Carrier – 16QAM (2132.6 – 2137.6 MHz)

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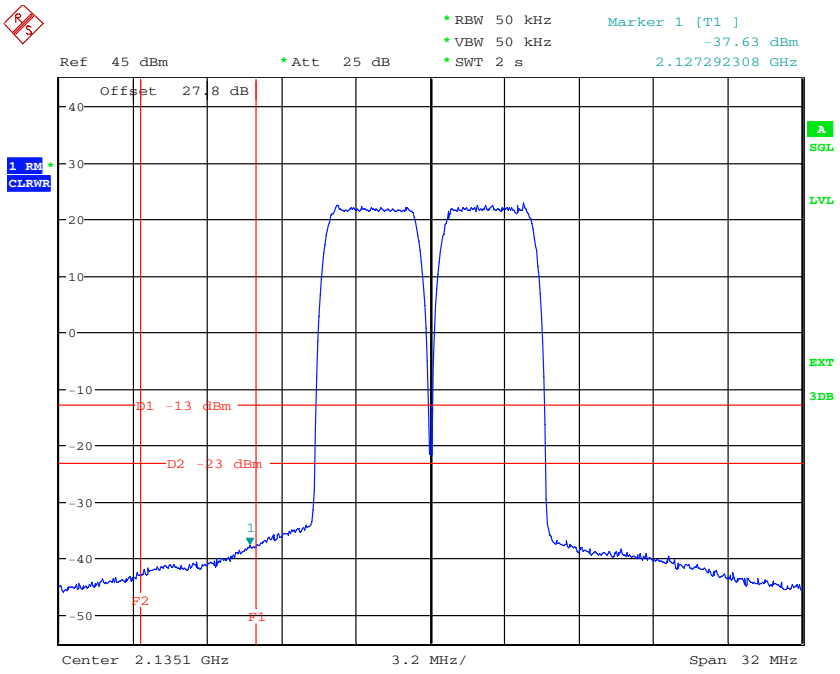

Figure 7-71: Spurious Emissions (3rd Order IM, Middle) TX1 Multi Carrier – 64QAM (2132.6 – 2137.6 MHz)

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7.2.5 Test No. 5: Field Strength of Spurious Radiation

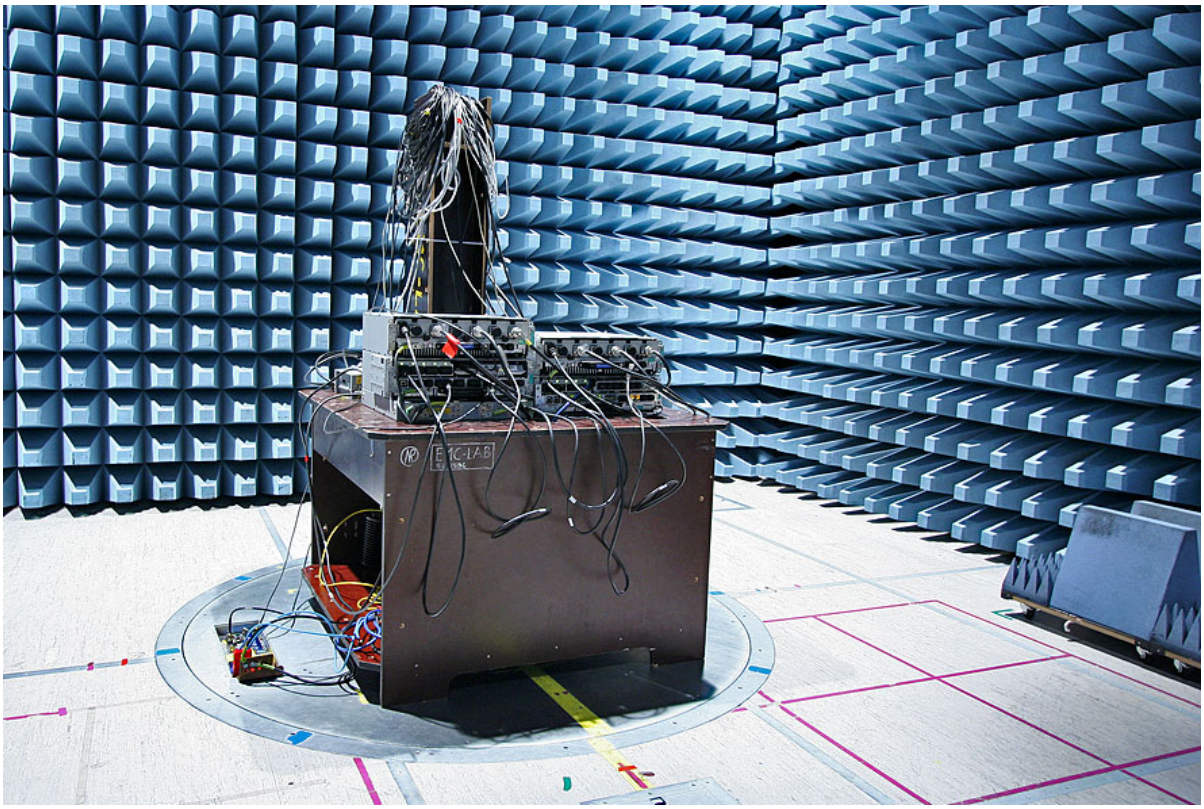

Figure 7-72: Photograph of the anechoic chamber with the EUT

Config C:

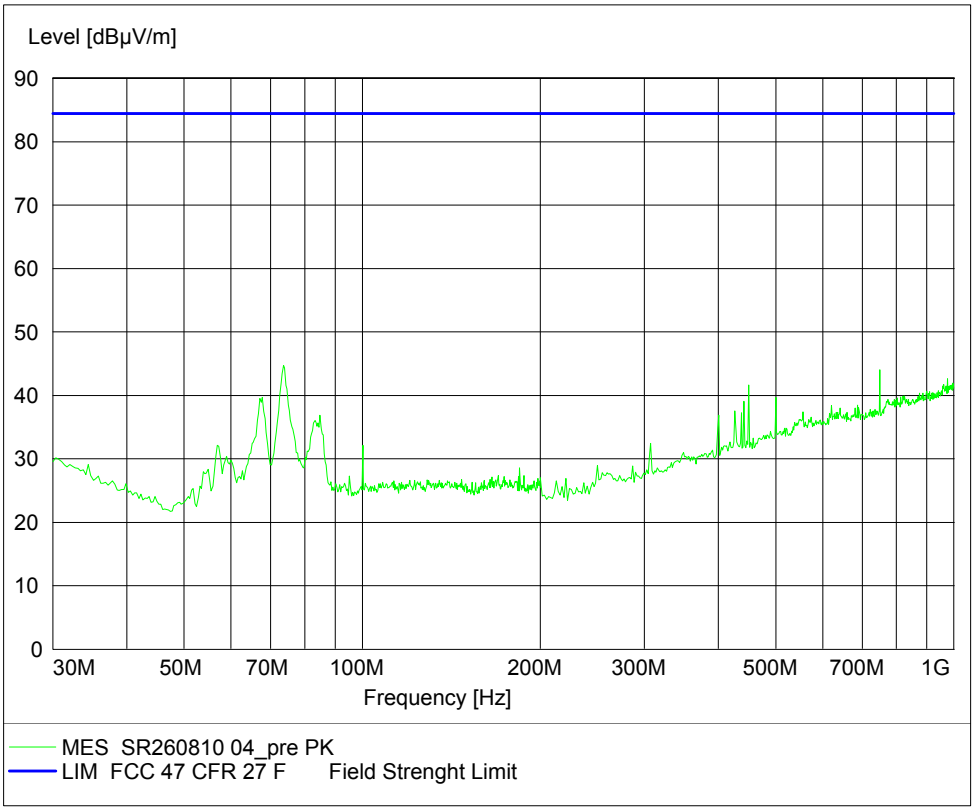

Figure 7-73: Radiated Emission 30 MHz –1GHz

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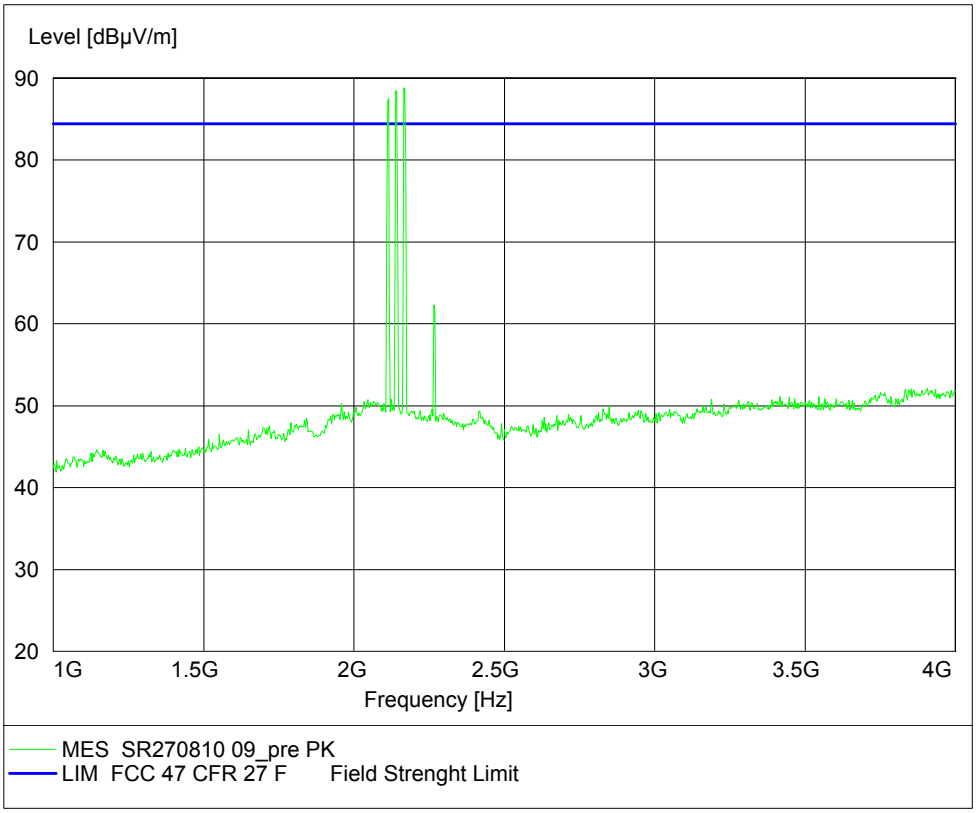
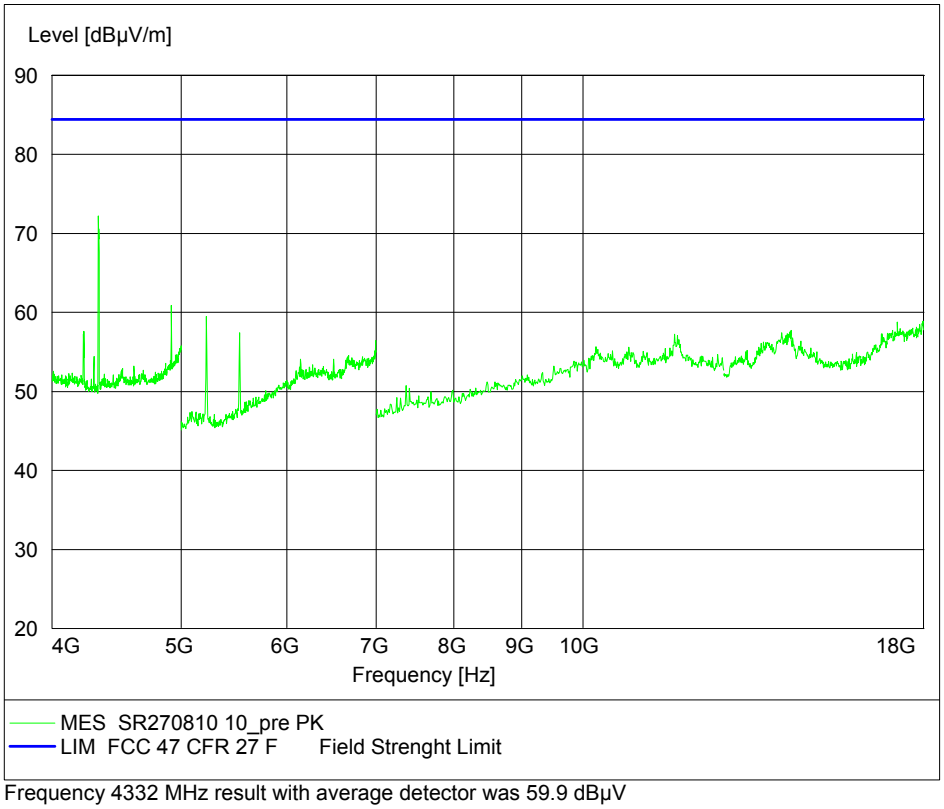


Figure 7-74: Radiated Emission 1 GHz – 4GHz



Frequency 4332 MHz result with average detector was 59.9 dBµV

Figure 7-75: Radiated Emission 4 GHz – 18GHz

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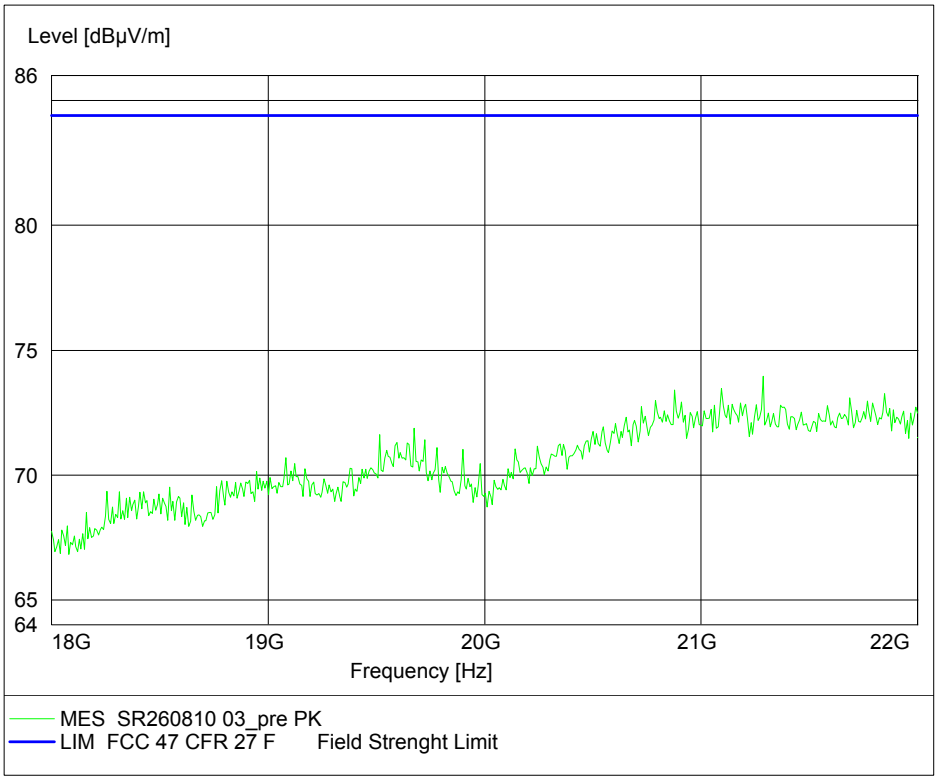

Figure 7-76: Radiated Emission 18 GHz – 22 GHz

Note: The frequencies shown on the plot were used for the spurious emission measurements using the 'dipole substitution method'.

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