Certification Test Report

FCC ID: AZ492FT5862
IC: 109U-92FT5862

FCC Rule Part: 15.247
IC Radio Standards Specification: RSS-210

ACS Report Number: 14-2014.W06.1B

Manufacturer: Motorola Solutions SDNBHD
Model: AAM28UMN9KA1AN

Test Begin Date: **February 24, 2014**
Test End Date: **March 5, 2014**

Report Issue Date: March 27, 2014

FOR THE SCOPE OF ACCREDITATION UNDER CERTIFICATE NUMBER AT-1533

This report must not be used by the client to claim product certification, approval, or endorsement by ACLASS, ANSI, or any agency of the Federal Government.

Project Manager:

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Reviewed by:

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Director, Wireless Certifications
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This report contains 72 pages

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1 GENERAL

1.1 Purpose

The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations and Industry Canada's Radio Standards Specification RSS-210.

1.2 Manufacturer Information

Applicant
Motorola Solutions Co. Ltd.
No. 7, Xixin Avenue,
West District of Hi-tech Zone,
Chengdu , Sichuan, P.R.C. 611731
China

Manufacturer
Motorola Solutions SDN BHD
Plot 2 Bayan Lepas,
Technoplex Industrial Park,
Mukim 12 SWD (CSC)
11900 Bayan Lepas, Penang
Malaysia

1.3 Product Description

The Motorola XPR 5580 8/900M 35W GOB BT/GPS CD, model AAM28UMN9KA1AN is a two way communication mobile radio capable of digital transmission operating in the VHF band of 806 MHz - 941 MHz. The unit also includes a Bluetooth transceiver.

Table1.3-1: Bluetooth Radio Properties

Mode of Operation	Frequency Range (MHz)	Number of Channels	Channel Separation (kHz)	Data Rates Supported (kbps)
GFSK	2402 - 2480	79	1000	1000
π/4-DQPSK	2402 - 2480	79	1000	2000
8DPSK	2402 - 2480	79	1000	3000

Model Number: AAM28UMN9KA1AN

Model Variants: The manufacturer declares the following model variants.

Table 1.3-2: Model Variants

Model Variants	Description	Tested
AAM28UMN9KA1AN	XPR 5580 8/900M 35W GOB BT/GPS Color Display	Yes
AAM28UMC9KA1AN	XPR 5380 8/900M 35W GOB BT/GPS Numeric Display	-----

The models listed above are identical except for the control heads. Per the manufacturer, the color display control head includes an additional LCD which makes it the most complex. Model AAM28UMN9KA1AN was chosen for testing and evaluated to the full requirements. The model AAM28UMC9KA1AN is declared compliant based on similarity.

Test Sample Serial Number(s): 203TQB0003 (RF Conducted), 203TQB0008 (Radiated)

Test Sample Condition: The samples were in good conditions with no observable physical damages.

1.4 Test Methodology and Considerations

The EUT was tested for RF conducted emissions at the antenna port as well as for radiated and power line conducted emissions for the Bluetooth radio for all available modulations.

The RF conducted measurements were performed on the EUT modified with an SMA connector at the Bluetooth antenna port. Where applicable, data is provided for the modulation corresponding to the worst case.

The radiated emissions evaluations were conducted up to the 10th harmonic for all available modulations. The EUT was also evaluated for inter-modulation products for the co-located Bluetooth and 800 MHz / 900 MHz radios transmitting at the same time. All inter-modulation products were found compliant to the limits of 15.209 and RSS-GEN.

Power line conducted emissions measurements were performed for all available modulations and the results are provided for the worst case configuration.

Table 1.4-1: Bluetooth Radio Test configuration

Mode of Operations	Frequency (MHz)	Data Rate (kbps)
GFSK	2402	1000
	2441	1000
	2480	1000
π/4 DQPSK	2402	2000
	2441	2000
	2480	2000
8 DPSK	2402	3000
	2441	3000
	2480	3000

The EUT was also evaluated for unintentional emissions when operating as a computer peripheral device. The results are documented separately in a Declaration of Conformity/Verification test report.

2 TEST FACILITIES

2.1 Location

The radiated and conducted emissions test sites are located at the following address:

Advanced Compliance Solutions, Inc.
3998 FAU Blvd, Suite 310
Boca Raton, Florida 33431
Phone: (561) 961-5585
Fax: (561) 961-5587
www.acstestlab.com

FCC Test Firm Registration #: 475089
Industry Canada Lab Code: 4175C

2.2 Laboratory Accreditations/Recognitions/Certifications

ACS is accredited to ISO/IEC 17025 by ANSI-ASQ National Accreditation Board under their ACLASS program and has been issued certificate number AT-1533 in recognition of this accreditation. Unless otherwise specified, all test methods described within this report are covered under the ISO/IEC 17025 scope of accreditation.

2.3 Radiated & Conducted Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site

The EMC radiated test facility consists of an RF-shielded enclosure. The interior dimensions of the indoor semi-anechoic chamber are approximately 48 feet (14.6 m) long by 36 feet (10.8 m) wide by 24 feet (7.3 m) high and consist of rigid, 1/8 inch (0.32 cm) steel-clad, wood core modular panels with steel framing. In the shielded enclosure, the faces of the panels are galvanized and the chamber is self-supporting. 8-foot RF absorbing cones are installed on 4 walls and the ceiling. The steel-clad ground plane is covered with vinyl floor.

The turntable is driven by pneumatic motor, which is capable of supporting a 2000 lb. load. The turntable is flushed with the chamber floor which it is connected to, around its circumference, with a continuous metallic loaded spring. An EMCO Model 1050 Multi-device Controller controls the turntable position.

A pneumatic motor is used to control antenna polarizations and height relative to the ground. The height information is displayed on the control unit EMCO Model 1050.

The control room is an RF shielded enclosure attached to the semi-anechoic chamber with two bulkhead panels for connecting RF, and control cables. The dimension of the room is 7.3 m x 4.9 m x 3 m high and the entrance doors of both control and conducted rooms are 3 feet (0.91 m) by 7 feet (2.13 m).

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3.1-1 below:

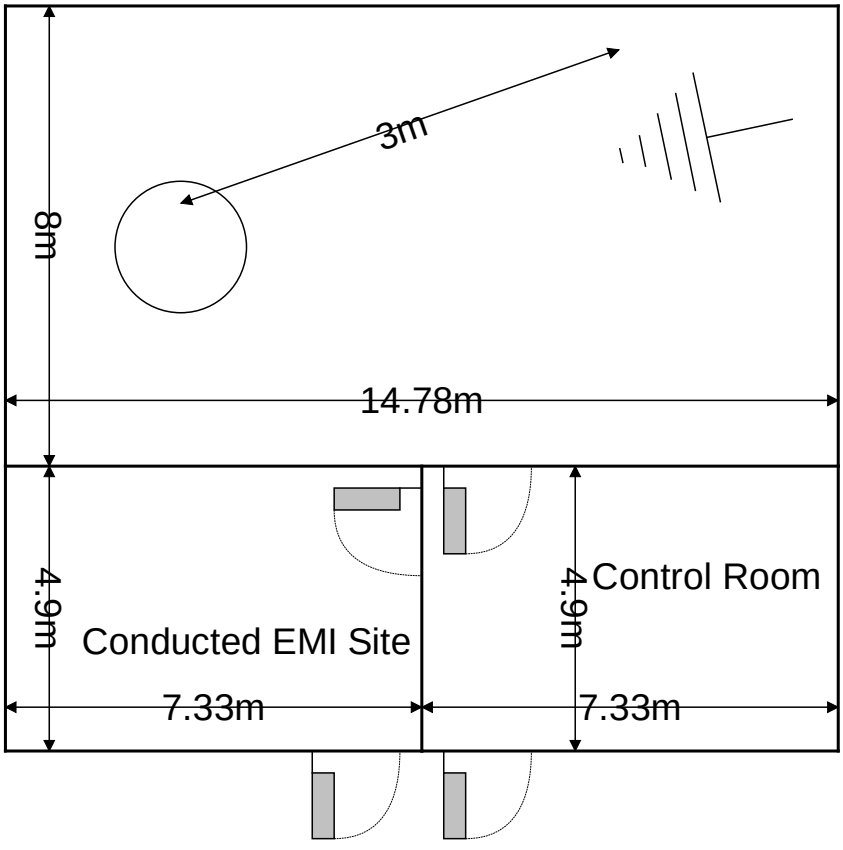


Figure 2.3.1-1: Semi-Anechoic Chamber Test Site

2.3.2 Conducted Emissions Test Site Description

The dimensions of the shielded conducted room are 7.3 x 4.9 x 3 m^3. As per ANSI C63.4 2003 requirements, the data were taken using two LISNs; a Solar Model 8028-50 50 Ω/50 µH and an EMCO Model 3825, which are installed as shown in Photograph 3. For 220 V, 50 Hz, a Polarad LISN (S/N 879341/048) is used in conjunction with a 1 kVA, 50 Hz/220 V EDGAR variable frequency generator, Model 1001B, to filter conducted noise from the generator.

A diagram of the room is shown below in figure 2.3.2-1:

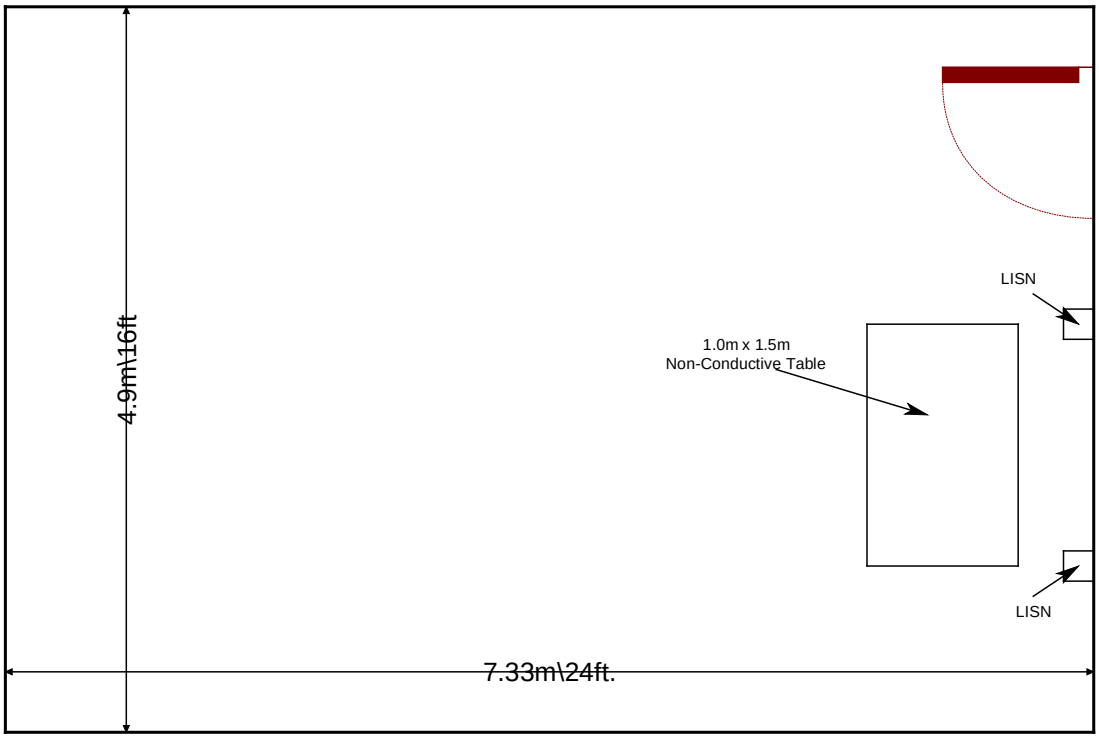


Figure 2.3.2-1: AC Mains Conducted EMI Site

3 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ANSI C63.4-2003: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9KHz to 40GHz
- ANSI C63.10-2009: Standard for Testing Unlicensed Wireless Devices
- US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2014
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2014
- FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems, March 30, 2000
- Industry Canada Radio Standards Specification: RSS-210 - Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Issue 8 December 2010.
- Industry Canada Radio Standards Specification: RSS-GEN – General Requirements and Information for the Certification of Radiocommunication Equipment, Issue 3, December 2010.

4 LIST OF TEST EQUIPMENT

The calibration interval of test equipment is annually or the manufacturer's recommendations. Where the calibration interval deviates from the annual cycle based on the instrument manufacturer's recommendations, it shall be stated below.

Table 4-1: Test Equipment

AssetID	Manufacturer	Model #	Equipment Type	Serial #	Last Calibration Date	Calibration Due Date
523	Agilent	E7405	Spectrum Analyzers	MY45103293	1/8/2013	1/8/2015
2002	EMCO	3108	Antennas	2147	11/22/2013	11/22/2015
2004	EMCO	3146	Antennas	1385	11/22/2013	11/22/2015
2006	EMCO	3115	Antennas	2573	4/24/2013	4/24/2015
2008	COM-Power	AH-826	Antennas	81009	NCR	NCR
2011	Hewlett-Packard	HP 8447D	Amplifiers	2443A03952	12/31/2013	12/31/2014
2022	EMCO	LISN3825/2R	LISN	1095	9/9/2013	9/9/2015
2044	QMI	N/A	Cables	2044	12/31/2013	12/31/2014
2070	Mini Circuits	VHF-8400+	Filter	2070	1/1/2014	1/1/2015
2071	Trilithic, Inc.	4HC1400-1-KK	Filter	9643263	1/1/2014	1/1/2015
2072	Mini Circuits	VHF-3100+	Filter	30737	1/1/2014	1/1/2015
2075	Hewlett Packard	8495B	Attenuators	2626A11012	1/2/2014	1/2/2015
2076	Hewlett Packard	HP5061-5458	Cables	2076	12/31/2013	12/31/2014
2082	Teledyne Storm Products	90-010-048	Cables	2082	5/31/2013	5/31/2014
2086	Merrimac	FAN-6-10K	Attenuators	23148-83-1	12/31/2013	12/31/2014
2089	Agilent Technologies, Inc.	83017A	Amplifiers	3123A00214	12/16/2013	12/16/2014
2095	ETS Lindgren	TILE4! - Version 4.2.A	Software	85242	NCR	NCR
3002	Rohde & Schwarz	ESU40	Receiver	100346	11/5/2013	11/5/2014
3004	Teseq	CFL 9206A	Attenuators	34720	10/21/2013	10/21/2015

NCR=No Calibration Required

5 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item #	Type Device	Manufacturer	Model/Part #	Serial #
1	Microphone	Motorola	RMN5127C	N/A
2	GPS/PTT Antenna	Motorola	HAF4033A	N/A
3	EUT Power Supply	Motorola	AE210-3101	G298010310
4	Laptop	Dell	Latitude D620	CN-0TD761-12961-68G-3106
5	Mouse	Dell	M-UAR DEL7	LZ9440C43W5

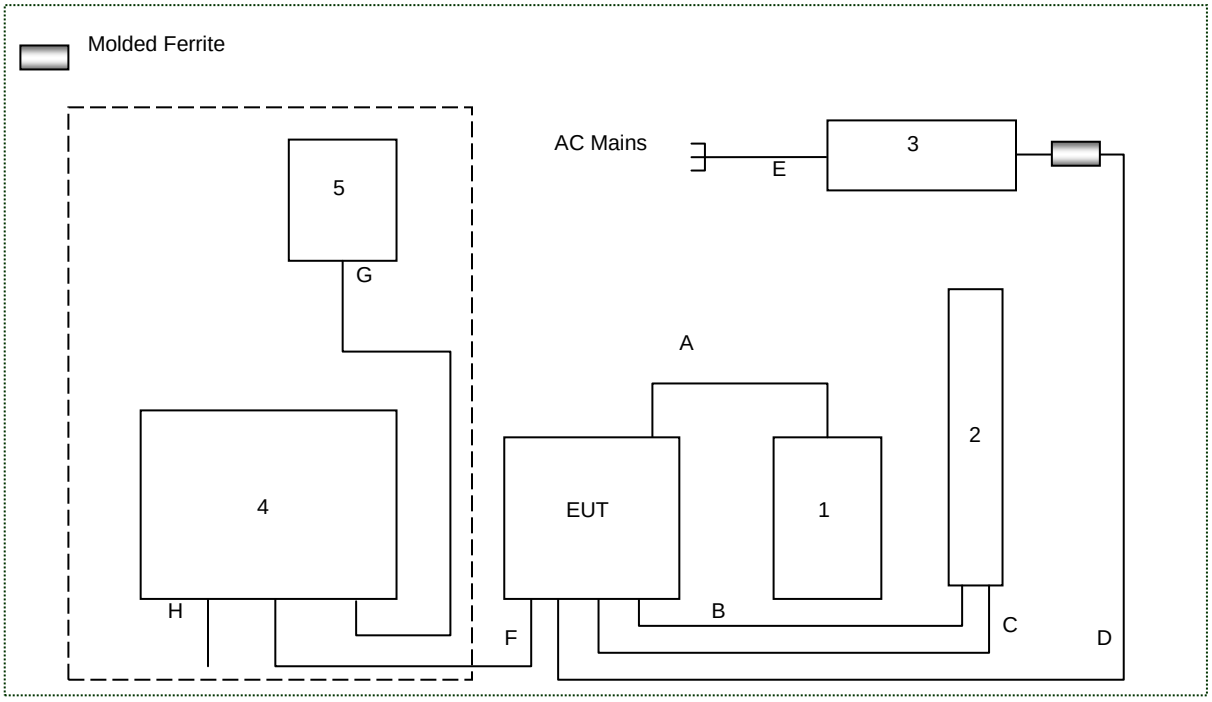
Table 5-2: Cables for Support Equipment (Radiated Emissions)

Cable #	Cable Type	Length	Shield	Termination
A	Microphone cable	3 m	No	EUT to microphone
B	Coaxial	5.05 m	Yes	EUT to Antenna
C	Coaxial	5.16 m	Yes	EUT to Antenna
D	Power Cable	2.8 m	No	EUT to Power Supply
E	Power Cord	1.68 m	No	Power Supply to AC Mains
F	USB Data Cable	10 m	No	EUT to Laptop
G	USB Cable	1.8 m	No	EUT to Mouse
H	Serial Cable	1.84	No	None

Table 5-3: Cables for Support Equipment (Power Line Conducted Emissions)

Cable #	Cable Type	Length	Shield	Termination
A	Microphone cable	3 m	No	EUT to microphone
B	Coaxial	5.05 m	Yes	EUT to Antenna
C	Coaxial	5.16 m	Yes	EUT to Antenna
D	Power Cable	2.8 m	No	EUT to Power Supply
E	Power Cord	1.68 m	No	Power Supply to AC Mains
F	USB Data Cable	2.35 m	No	EUT to Laptop
G	USB Cable	1.8 m	No	EUT to Mouse
H	Serial Cable	1.84	No	None

6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM



Notes:
The laptop was set outside of the test environment for the radiated emissions evaluation.
Cable D includes a molded ferrite as depicted in the block diagram.

7 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

7.1 Antenna Requirement – FCC: Section 15.203

The EUT is configured with an internal 2.5 dBi non-detachable planar inverted-F antenna (PIFA), hence meeting the requirements of FCC Section 15.203.

7.2 Power Line Conducted Emissions – FCC: Section 15.207 IC: RSS-Gen 7.2.4

7.2.1 Measurement Procedure

ANSI C63.4 sections 6 and 7 were the guiding documents for this evaluation. Conducted emissions were performed from 150 kHz to 30 MHz with the spectrum analyzer's resolution bandwidth set to 9 kHz and the video bandwidth set to 30 kHz. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss
Margin = Applicable Limit - Corrected Reading

7.2.2 Measurement Results

Results of the test corresponding to the EUT configuration leading to the worse case emissions are shown below:

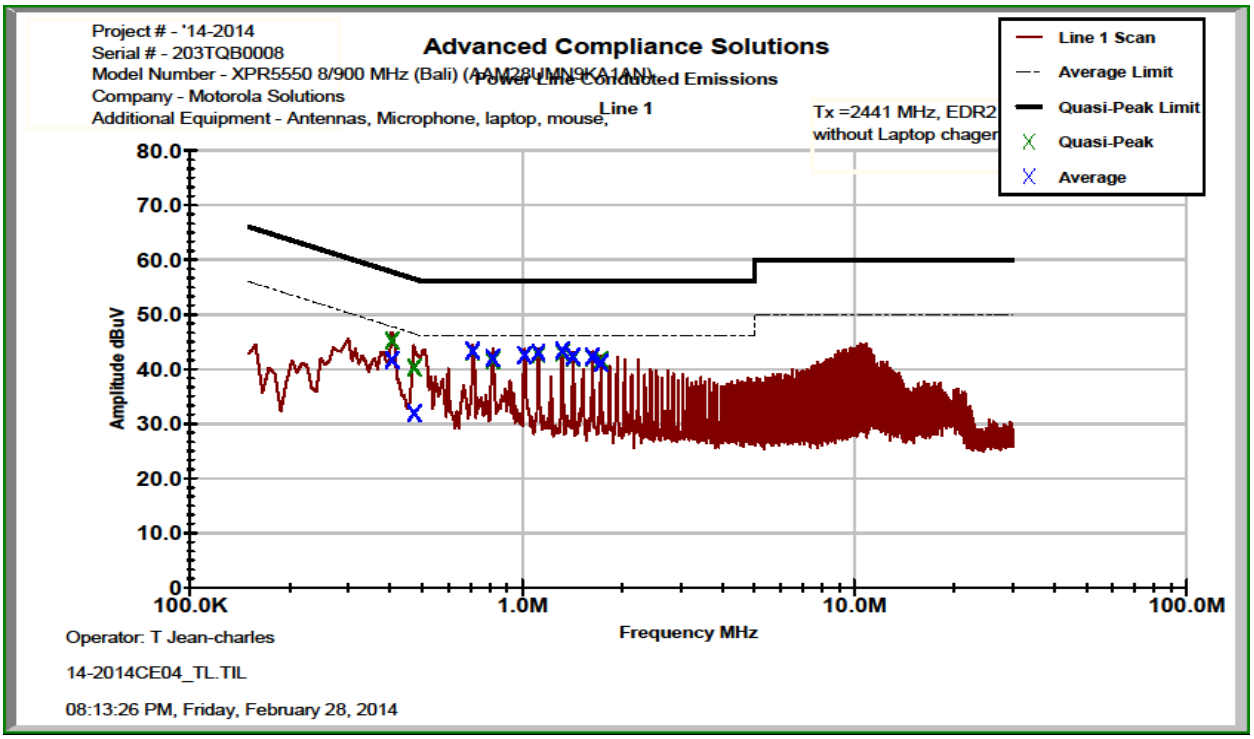


Figure 7.2.2-1: Conducted Emissions Results – Line 1

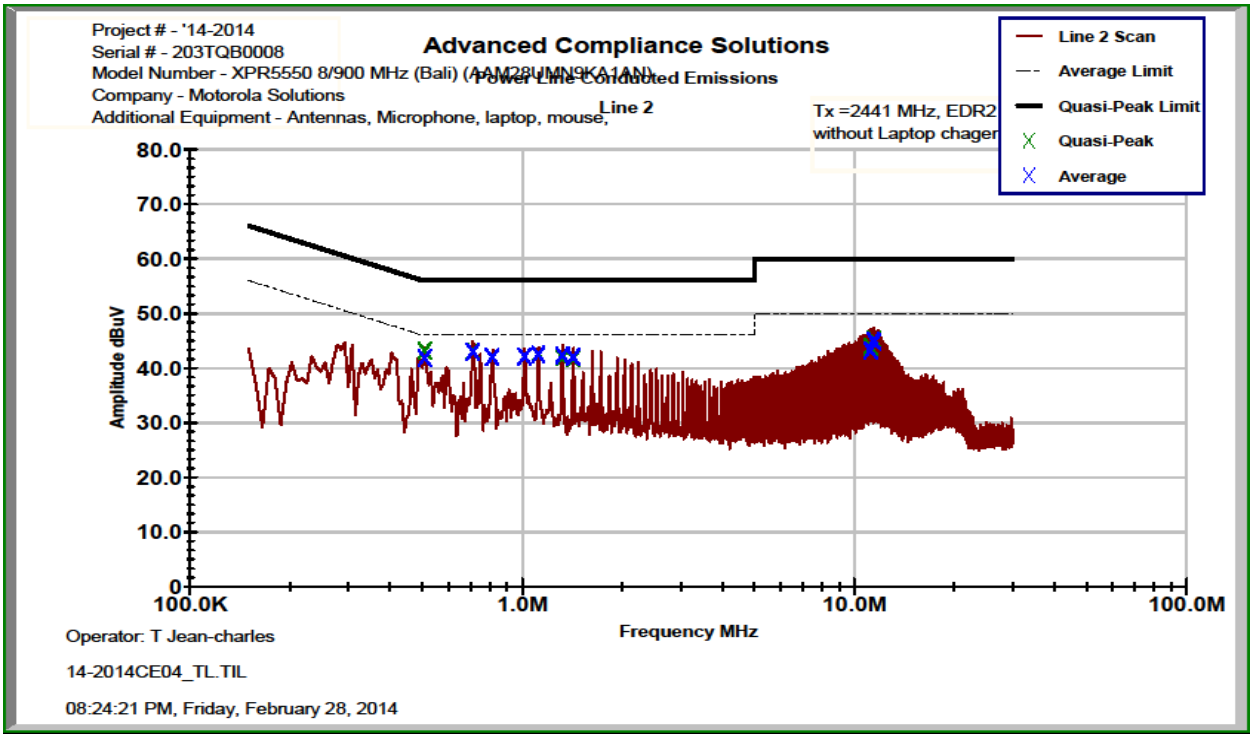


Figure 7.2.2-2: Conducted Emissions Results – Line 2

Table 7.2.2-1: Conducted EMI Results

☒ Line 1 ☒ Line 2 ☐ Line 3
☐ Line 4
☒ To Ground ☐ Floating
☐ Telecom Port ____
☒ dBµV ☐ dBµA

Plot Number: 14-2014CE04
Power Supply Description: 14.1 VDC

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
Line 1									
0.404875	35.112	31.599	10.08	45.19	41.68	57.75	47.75	12.6	6.1
0.472337	30.178	21.814	10.08	40.26	31.89	56.47	46.47	16.2	14.6
0.709487	33.128	33.219	10.09	43.22	43.31	56.00	46.00	12.8	2.7
0.813313	31.489	31.857	10.09	41.58	41.95	56.00	46.00	14.4	4.0
1.01465	32.381	32.443	10.11	42.49	42.55	56.00	46.00	13.5	3.4
1.11748	32.622	32.879	10.11	42.73	42.99	56.00	46.00	13.3	3.0
1.31916	32.877	33.209	10.11	42.99	43.32	56.00	46.00	13.0	2.7
1.42088	31.953	32.123	10.11	42.06	42.23	56.00	46.00	13.9	3.8
1.62278	31.972	32.033	10.11	42.08	42.14	56.00	46.00	13.9	3.9
1.72484	31.441	30.917	10.11	41.55	41.03	56.00	46.00	14.5	5.0
Line 2									
0.50795	33.135	31.751	10.06	43.19	41.81	56.00	46.00	12.8	4.2
0.709388	32.95	32.888	10.07	43.02	42.96	56.00	46.00	13.0	3.0
0.811612	31.911	31.892	10.07	41.98	41.96	56.00	46.00	14.0	4.0
1.0152	32.007	32.012	10.08	42.09	42.09	56.00	46.00	13.9	3.9
1.11607	32.389	32.371	10.08	42.47	42.45	56.00	46.00	13.5	3.6
1.31796	31.828	32.23	10.08	41.91	42.31	56.00	46.00	14.1	3.7
1.42134	31.606	31.89	10.08	41.68	41.97	56.00	46.00	14.3	4.0
11.159	33.317	32.639	10.58	43.89	43.22	60.00	50.00	16.1	6.8
11.3739	34.392	34.383	10.58	44.98	44.97	60.00	50.00	15.0	5.0
11.467	34.494	34.244	10.59	45.08	44.83	60.00	50.00	14.9	5.2

7.3 Peak Output Power - FCC Section 15.247(b)(1) IC: RSS-210 A8.4(2)

7.3.1 Measurement Procedure (Conducted Method)

The RF output port of the EUT was directly connected to the input of the spectrum analyzer. The display values were corrected for cable and external attenuation.

7.3.2 Measurement Results

Results are shown below:

Table 7.3.2-1: RF Output Power (GFSK)

Frequency (MHz)	Power (dBm)
2402	8.61
2441	8.97
2480	9.47

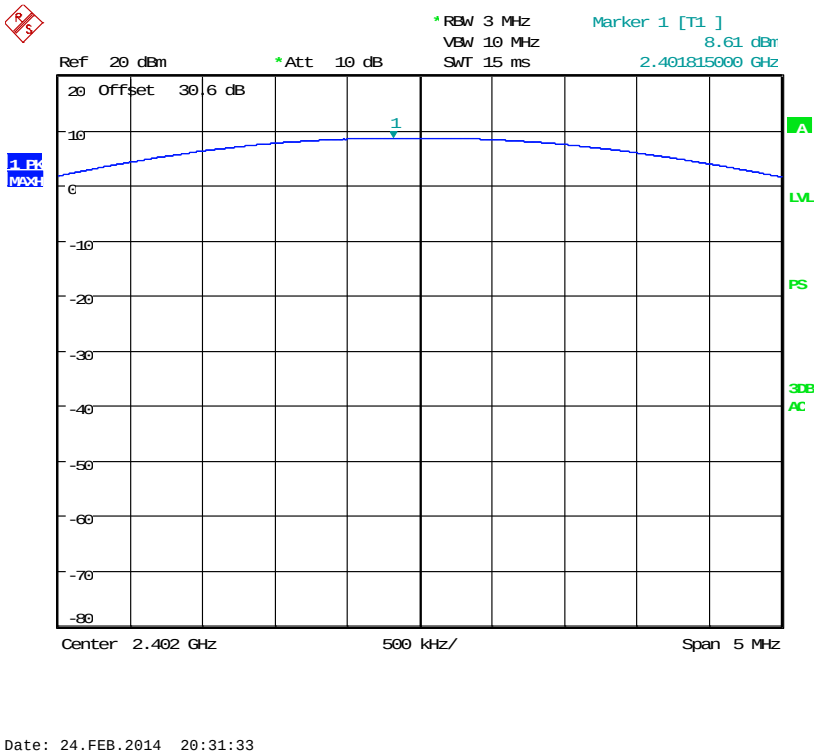


Figure 7.3.2-1: RF Output Power (GFSK) - Low Channel

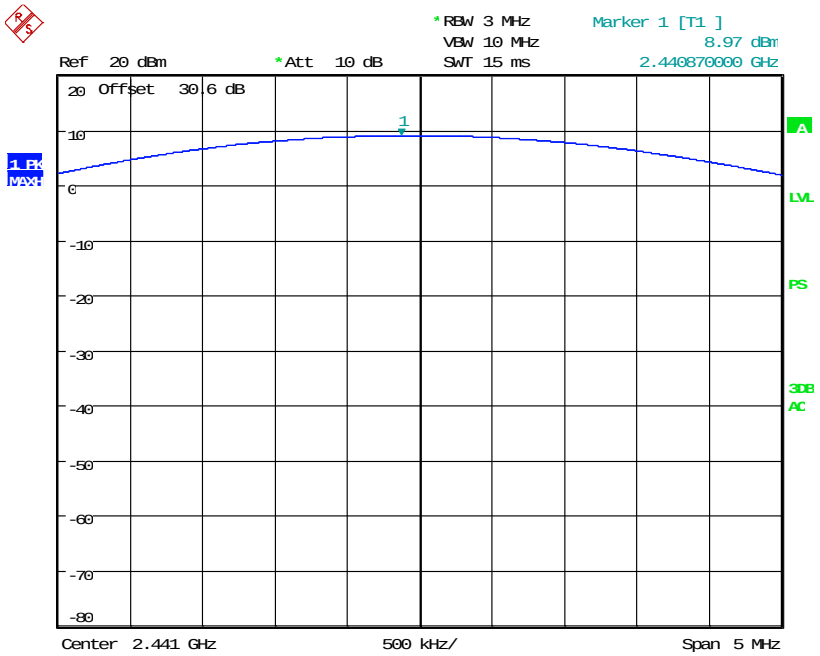


Figure 7.3.2-2: RF Output Power (GFSK) - Middle Channel

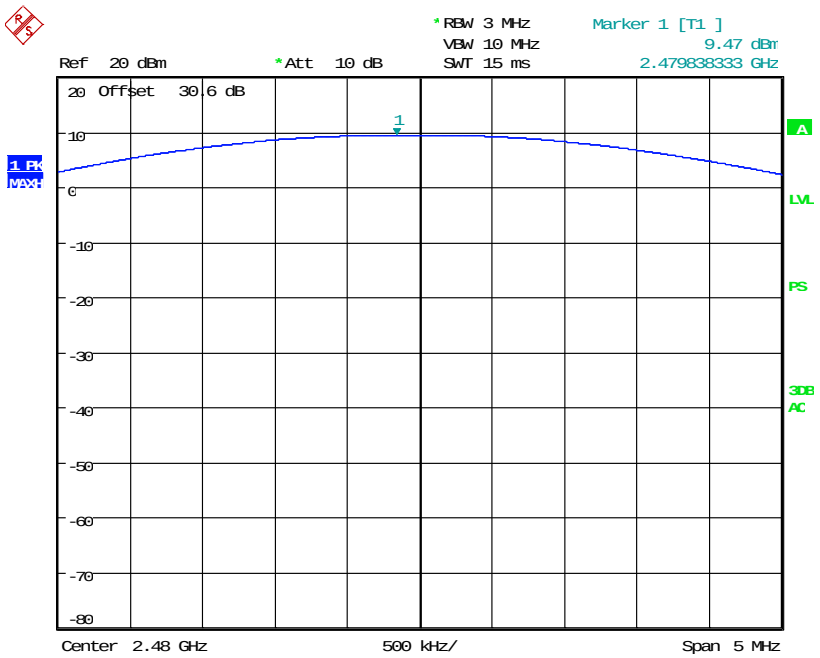


Figure 7.3.2-3: RF Output Power (GFSK) - High Channel

Table 7.3.2-2: RF Output Power (π/4 DQPSK)

Frequency (MHz)	Power (dBm)
2402	8.63
2441	9.02
2480	9.52

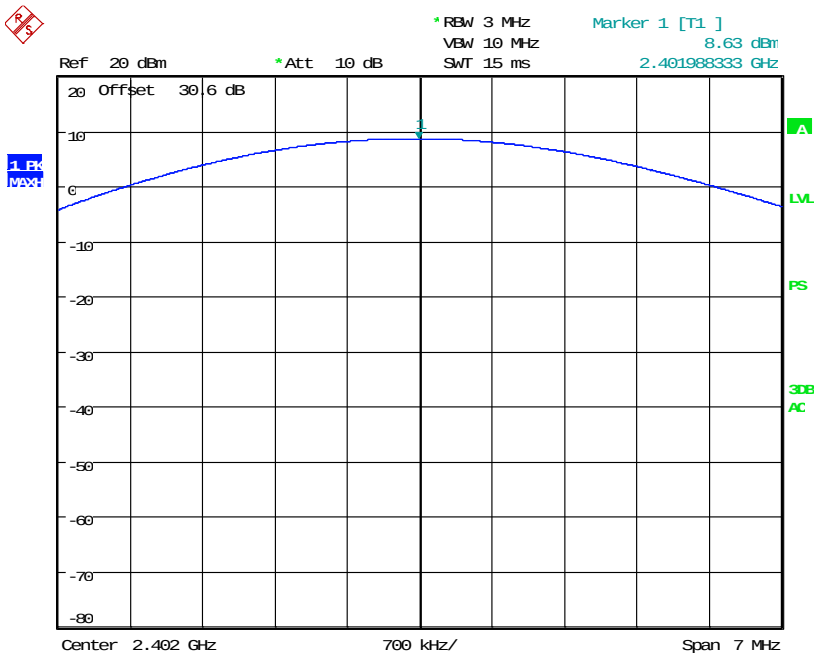


Figure 7.3.2-4: RF Output Power (π/4 DQPSK) - Low Channel

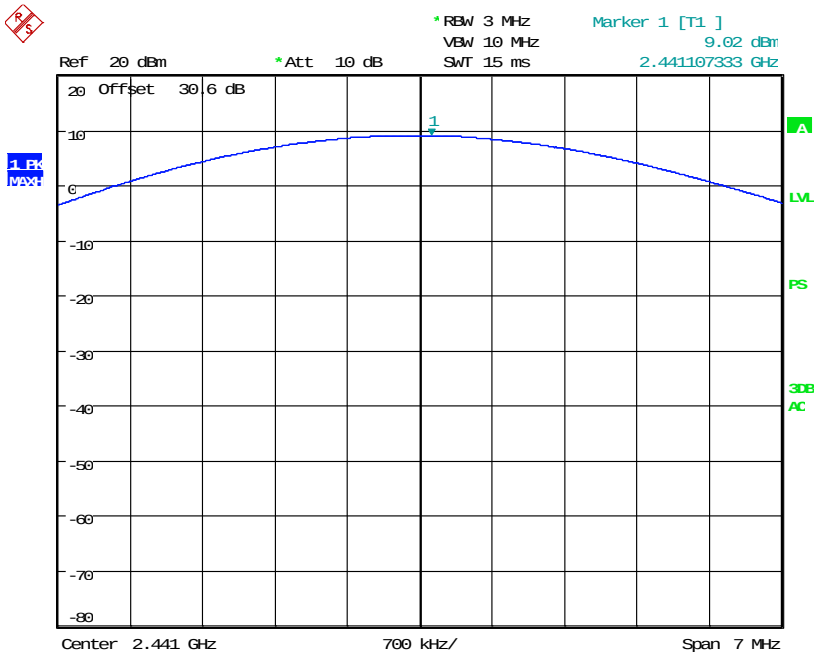


Figure 7.3.2-5: RF Output Power (π/4 DQPSK) - Middle Channel

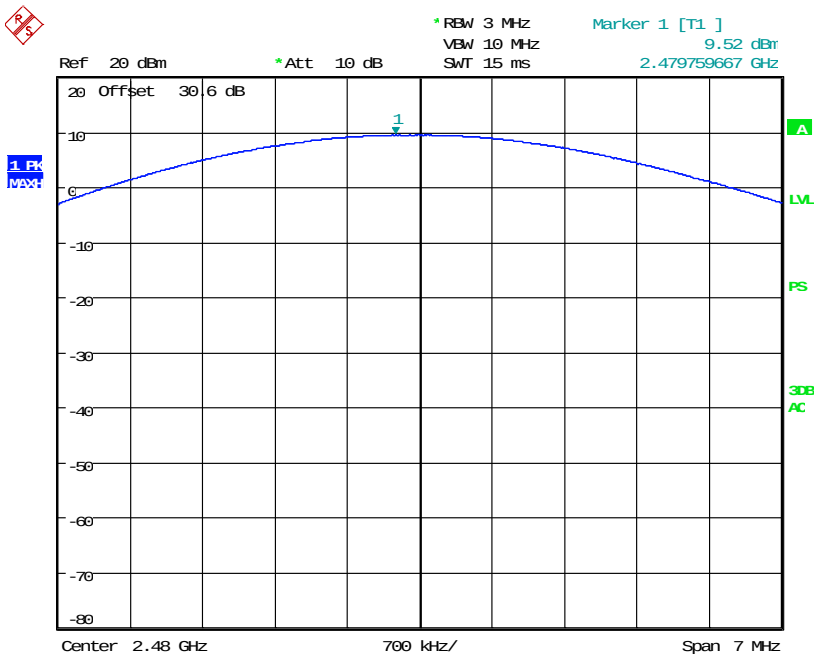


Figure 7.3.2-6: RF Output Power (π/4 DQPSK) - High Channel

Table 7.3.2-3 RF Output Power (8DPSK)

Frequency (MHz)	Power (dBm)
2402	9.22
2441	9.76
2480	10.27

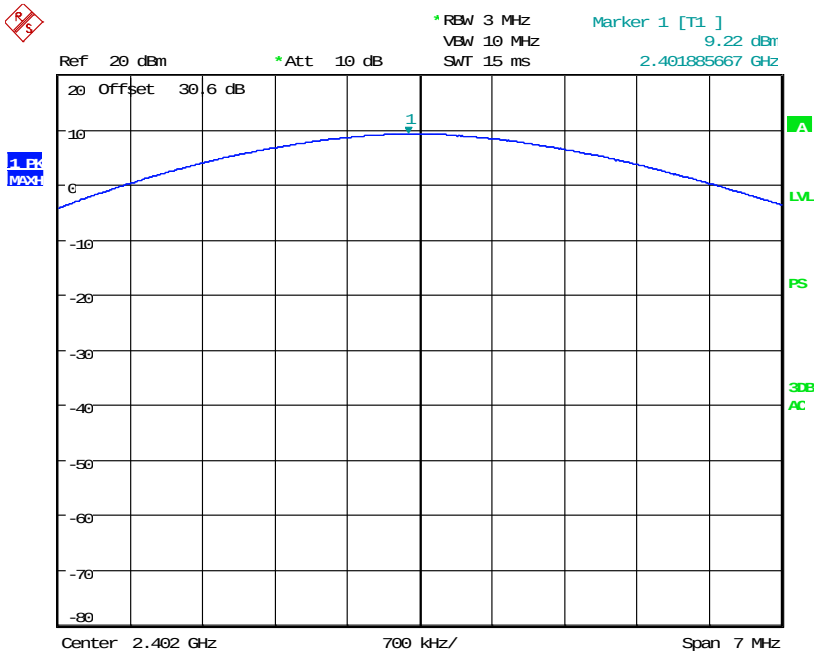


Figure 7.3.2-7: RF Output Power (8DPSK) - Low Channel

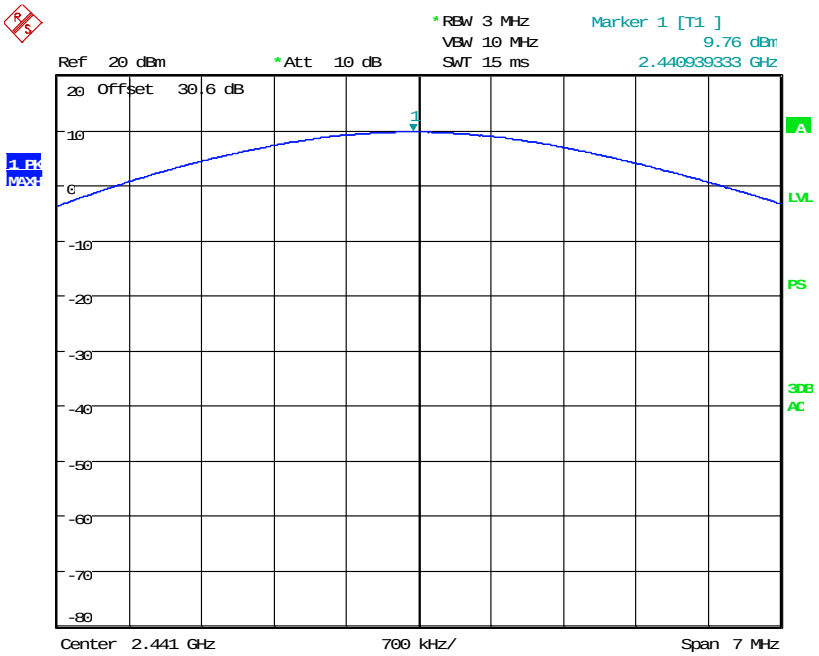


Figure 7.3.2-8: RF Output Power (8DPSK) - Middle Channel

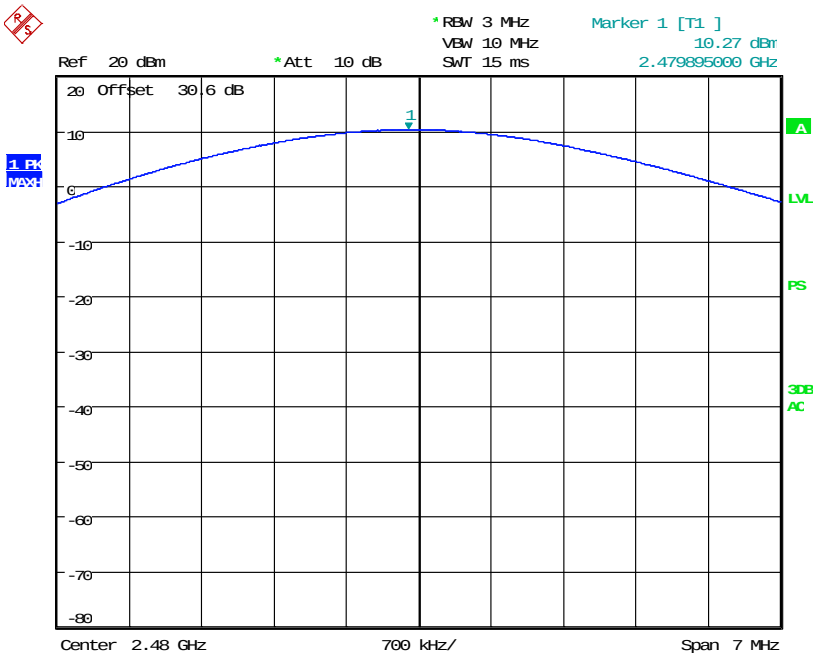


Figure 7.3.2-9: RF Output Power (8DPSK) - High Channel

7.4 Channel Usage Requirements

7.4.1 Carrier Frequency Separation – FCC: Section 15.247(a)(1) IC: RSS-210 A8.1(b)

7.4.1.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer. The span of the spectrum analyzer was set wide enough to capture two adjacent peaks and the RBW and VBW were set to ≥ 1% of the span.

7.4.1.2 Measurement Results

Results are shown:

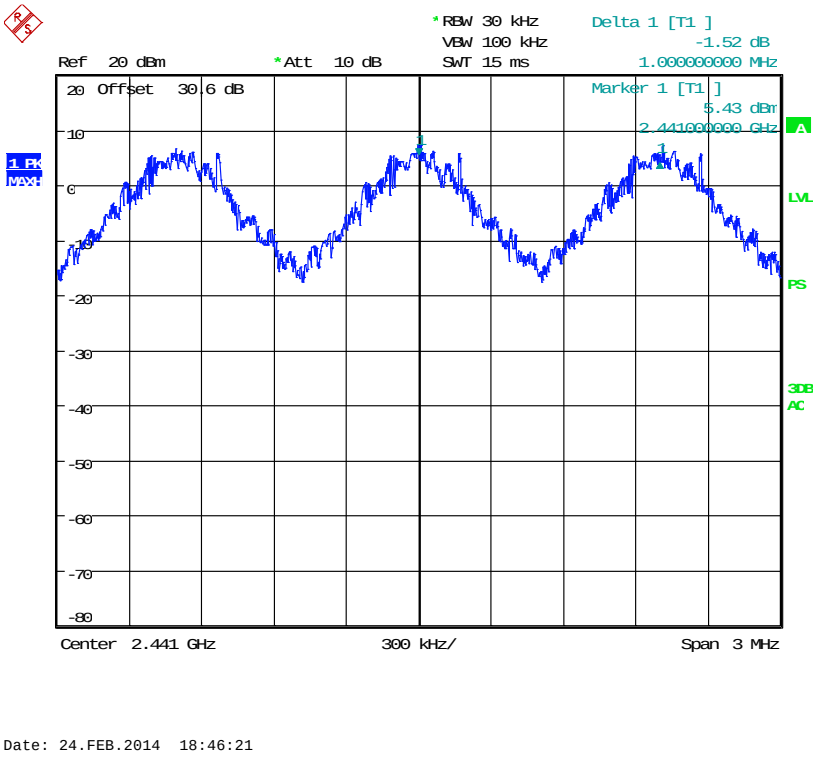


Figure 7.4.1.2-1: Carrier Frequency Separation

7.4.2 Number of Hopping Channels – FCC: Section 15.247(a)(1)(iii) IC: RSS-210 A8.1(d)

7.4.2.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer through suitable attenuation. The span of the spectrum analyzer was set wide enough to capture the number of hopping channels. The peak detector max hold function was enabled for the measurements.

7.4.2.2 Measurement Results

Results are shown below:

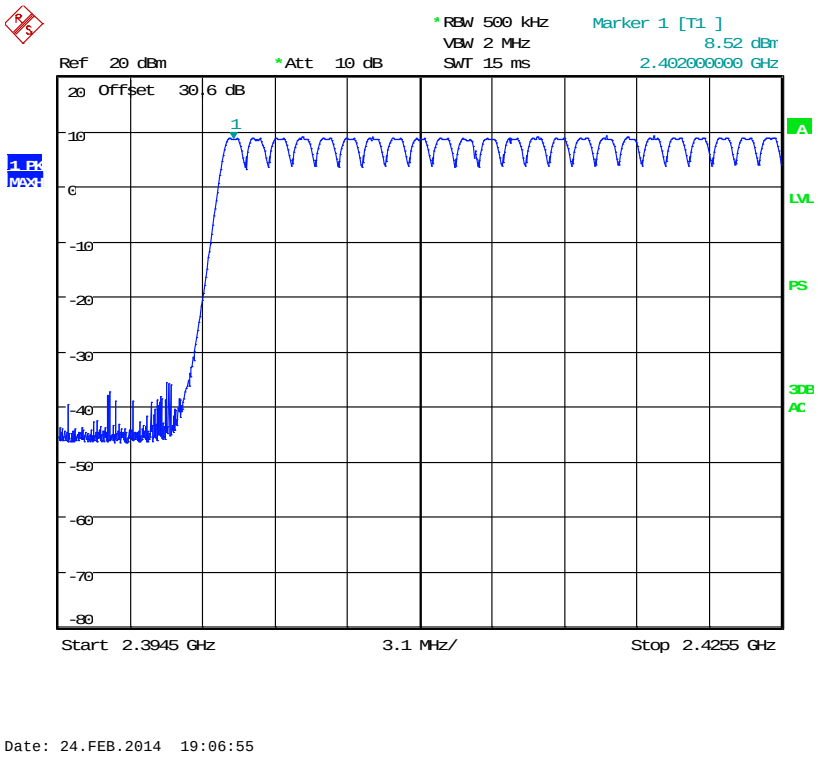


Figure 7.4.2.2-1: Number of Hopping Channels (1 – 24)

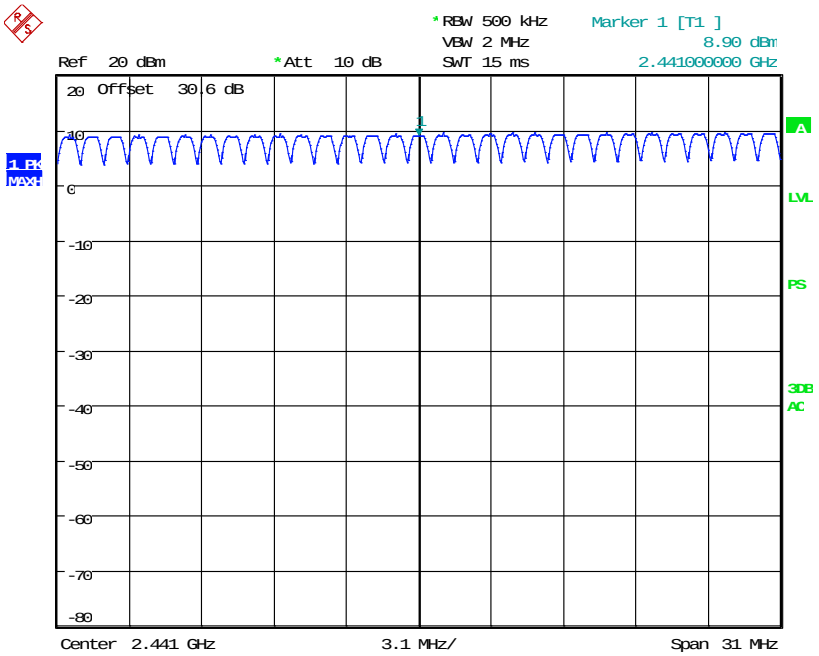


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Figure 7.4.2.2-2: Number of Hopping Channels (25 – 55)

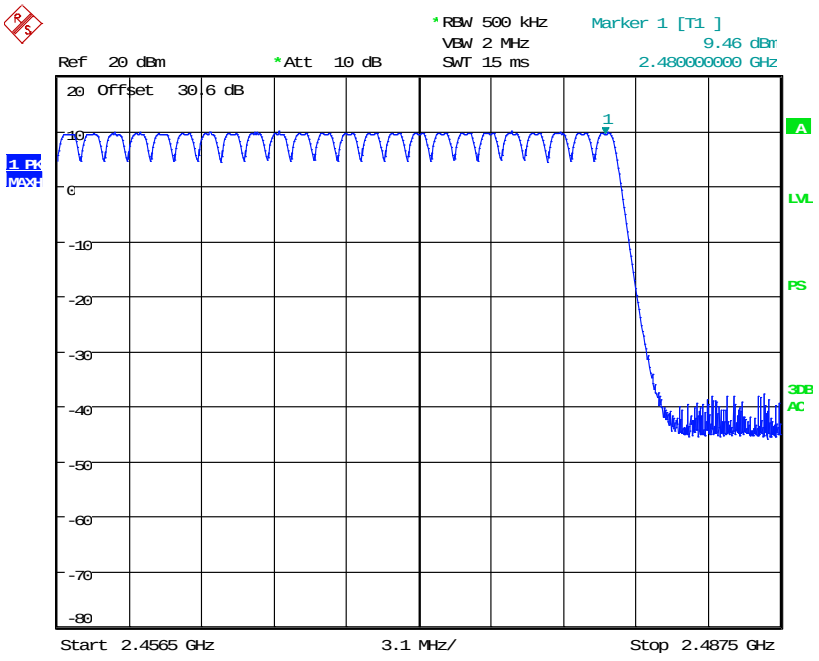

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Figure 7.4.2.2-3: Number of Hopping Channels (56 – 79)

7.4.3 Channel Dwell Time – FCC: Section 15.247(a)(1)(iii) IC: RSS-210 A8.1(d)

7.4.3.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer through suitable attenuation. The span of the spectrum analyzer was set 0 Hz centered on a hopping channel. The RBW was set to 1 MHz and the sweep time adjusted to capture the entire dwell time per channel with peak detector max hold function.

7.4.3.2 Measurement Results

Results are shown below:

Table 7.4.3.2-1 Dwell Time on a 31.6 Second Cycle

Packet Format	Number of Hops Per Sec. (NHPS)	Number of Hops per Channel Per Sec. (NHPCPS)	Number of hops on a 31.6 s Cycle (NHPC)	Measured Dwell Times (ms)	Dwell Times on a 31.6 s Cycle	Limit (ms)	Status
DH1	800	10.13	320	0.4086538	130.77	400	PASS
DH3	400	5.06	160	1.661859	265.90	400	PASS
DH5	266.67	3.38	106.67	2.919872	311.46	400	PASS

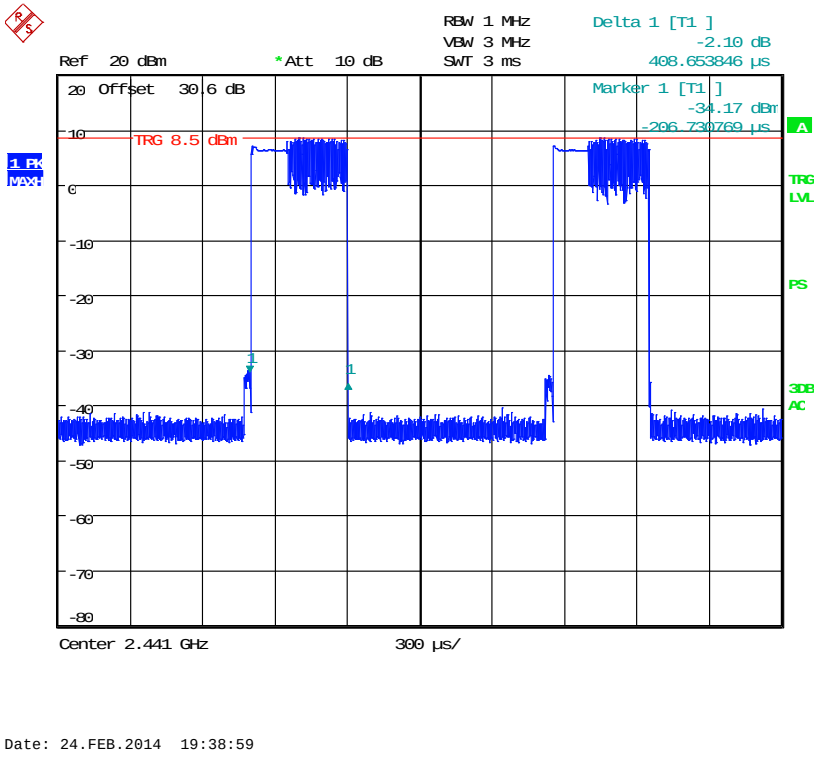
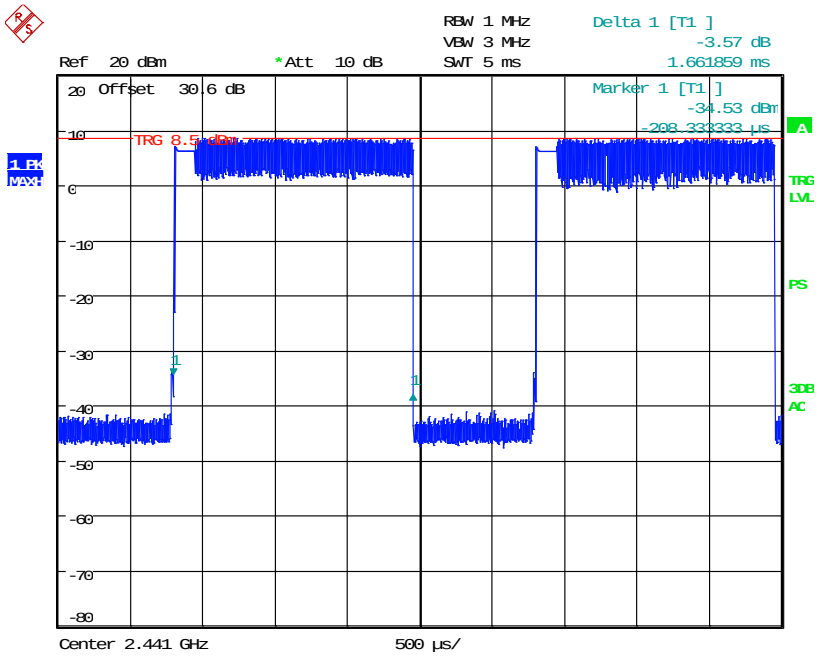
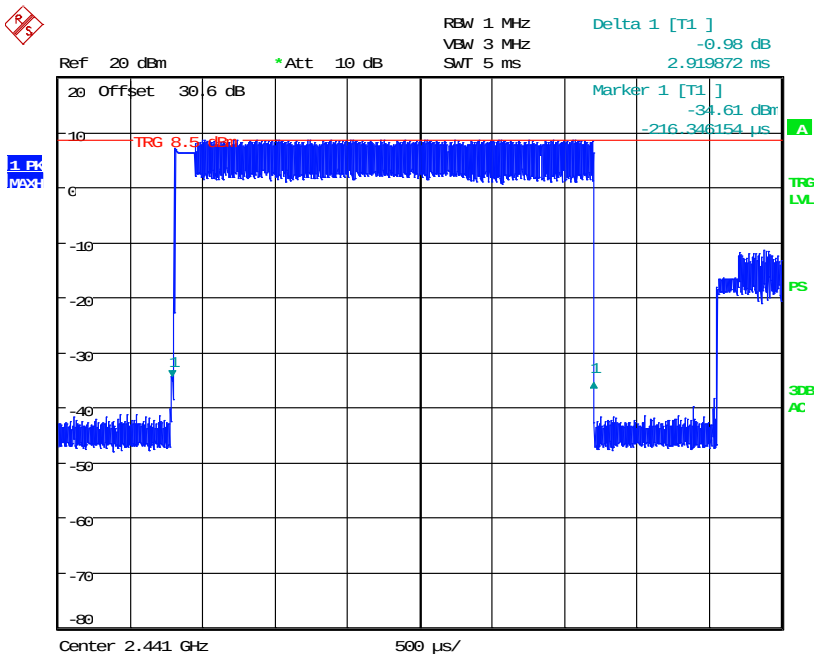


Figure 7.4.3.2-1: Channel Dwell Time – DH1



Date: 24.FEB.2014 19:32:31

Figure 7.4.3.2-2: Channel Dwell Time – DH3



Date: 24.FEB.2014 19:26:55

Figure 7.4.3.2-3: Channel Dwell Time – DH5

7.4.4 20dB / 99% Bandwidth - FCC: Section 15.247(a)(1)(i) IC: RSS-210 A8.1(a)

7.4.4.1 Measurement Procedure

The RF output port of the EUT was connected to the input of the spectrum analyzer through suitable attenuation.

For the 20 dB bandwidth measurements, the spectrum analyzer span was set to 2 to 3 times the estimated bandwidth of the emission. The RBW was to ≥ 1% of the estimated emission bandwidth. The trace was set to max hold with a peak detector active. The Delta function of the analyzer was utilized to determine the 20 dB bandwidth of the emission.

The 99% occupied bandwidth was measured with the spectrum analyzer span set to fully display the emission, including the emissions skirts. The RBW was to 1% of the span. . The occupied 99% bandwidth was measured by using a delta marker at the lower and upper frequencies leading to 0.5% of the total power.

7.4.4.2 Measurement Results

Results are shown below:

Table 7.4.4.2-1: 20dB / 99% Bandwidth (GFSK)

Frequency [MHz]	20dB Bandwidth [kHz]	99% Bandwidth [kHz]
2402	951.3	864.0
2441	957.7	861.0
2480	956.7	878.0

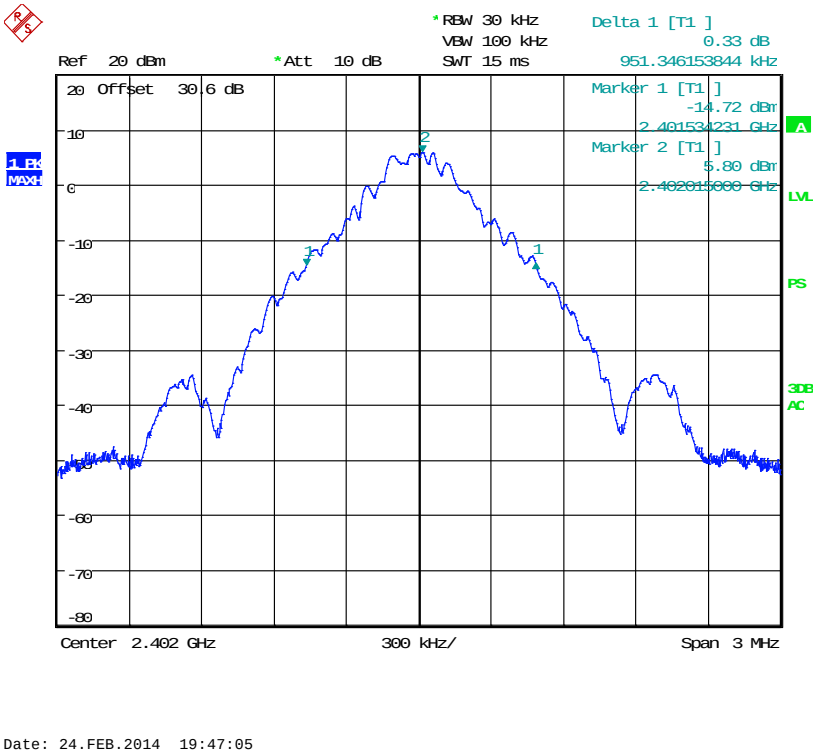


Figure 7.4.4.2-1: 20dB BW Low Channel (GFSK)

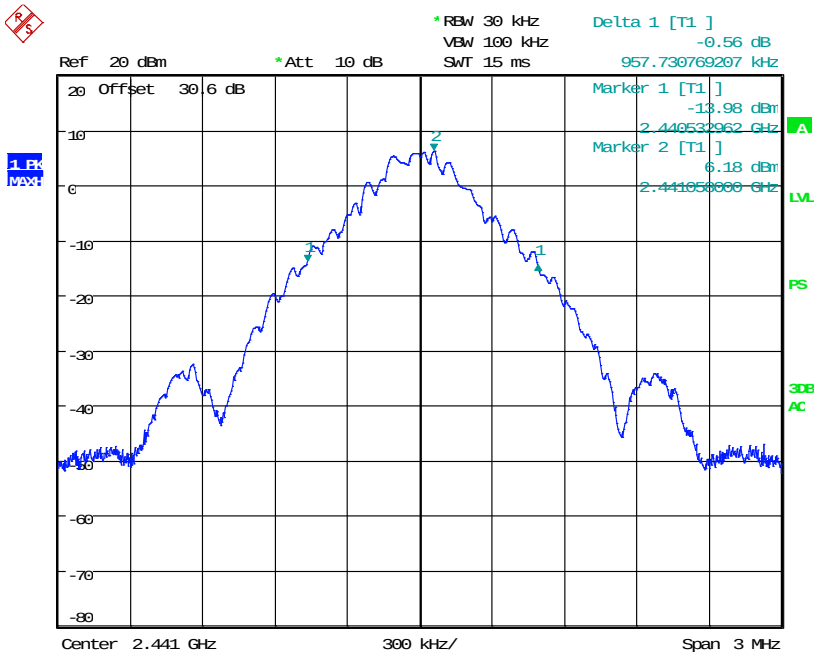


Figure 7.4.4.2-2: 20dB BW Middle Channel (GFSK)

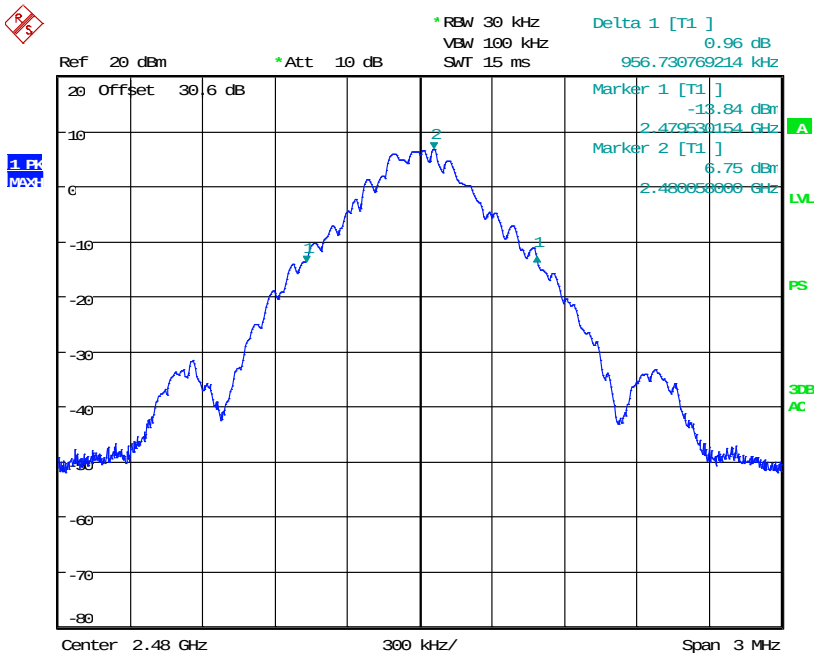


Figure 7.4.4.2-3: 20dB BW High Channel (GFSK)

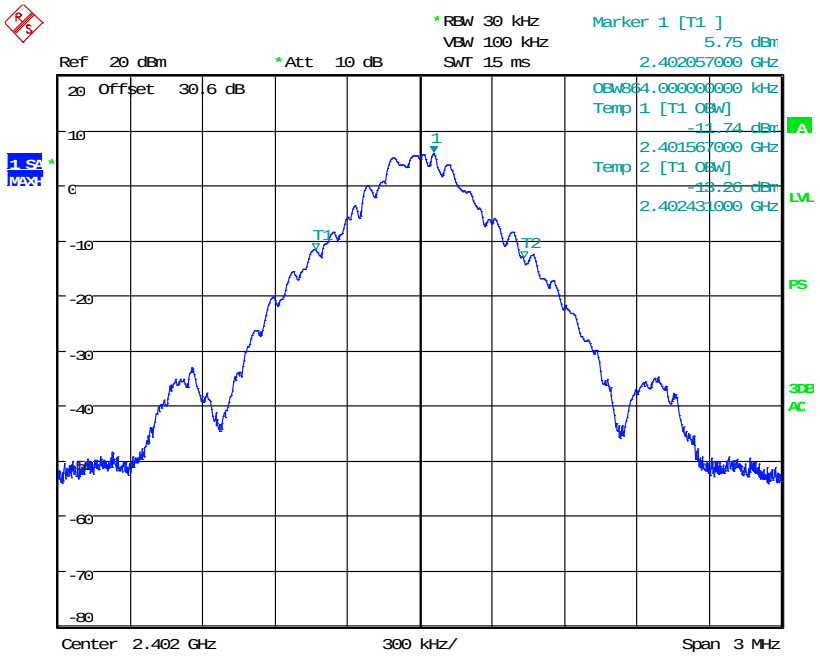


Figure 7.4.4.2-4: 99% OBW Low Channel (GFSK)

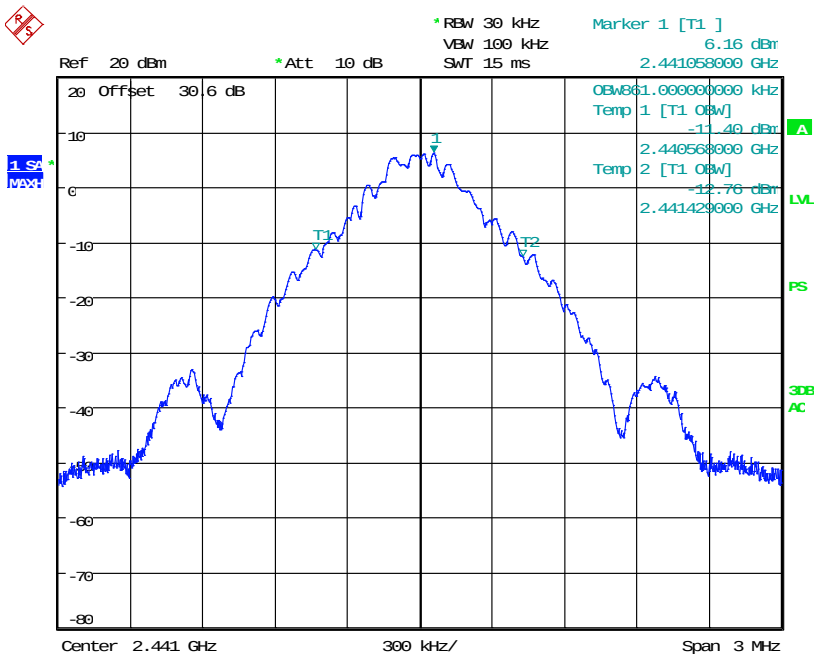


Figure 7.4.4.2-5: 99% OBW Middle Channel (GFSK)

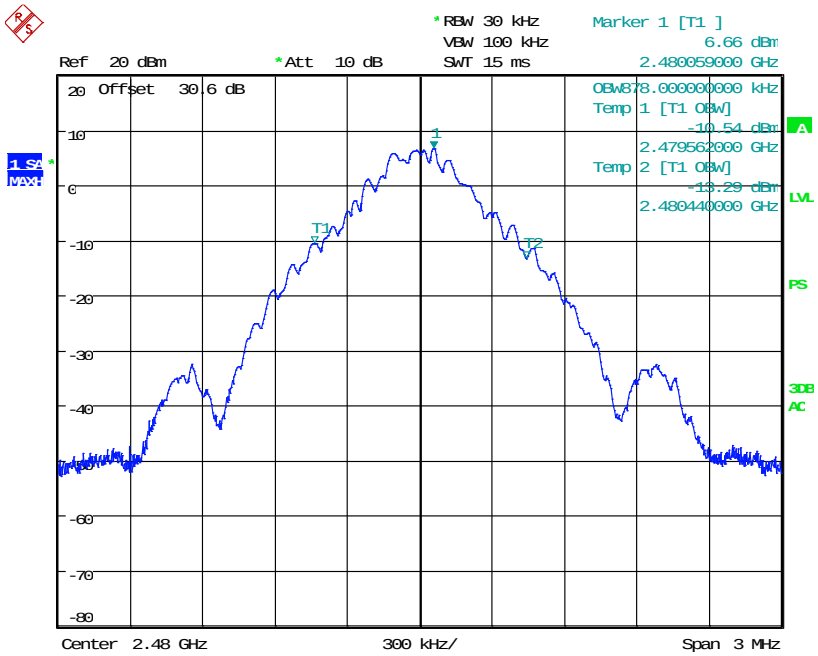


Figure 7.4.4.2-6: 99% OBW High Channel (GFSK)

Table 7.4.4.2-2: 20dB / 99% Bandwidth (π/4 DQPSK)

Frequency [MHz]	20dB Bandwidth [kHz]	99% Bandwidth [kHz]
2402	1386.4	1226.7
2441	1379.8	1231.7
2480	1375.0	1231.7

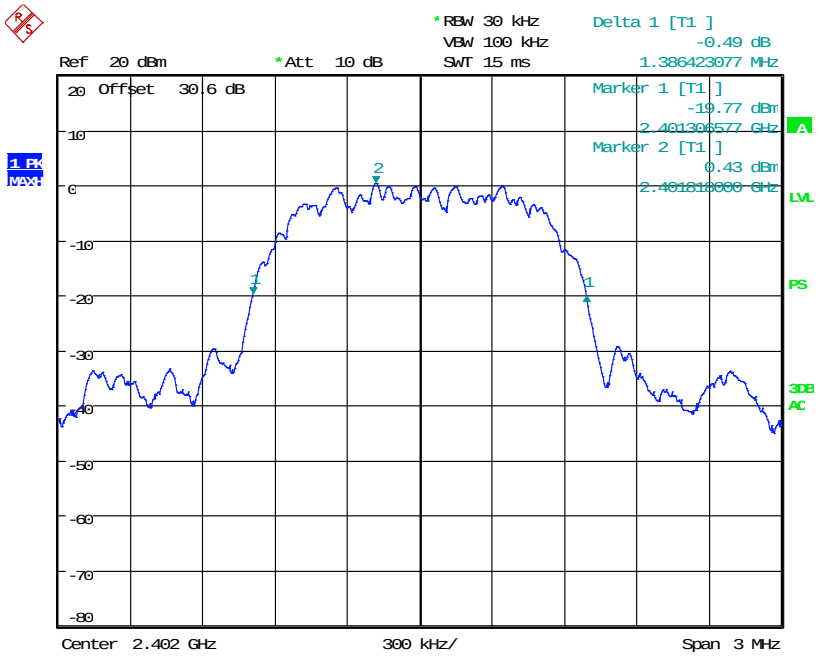


Figure 7.4.4.2-7: 20dB BW Low Channel (π/4 DQPSK)

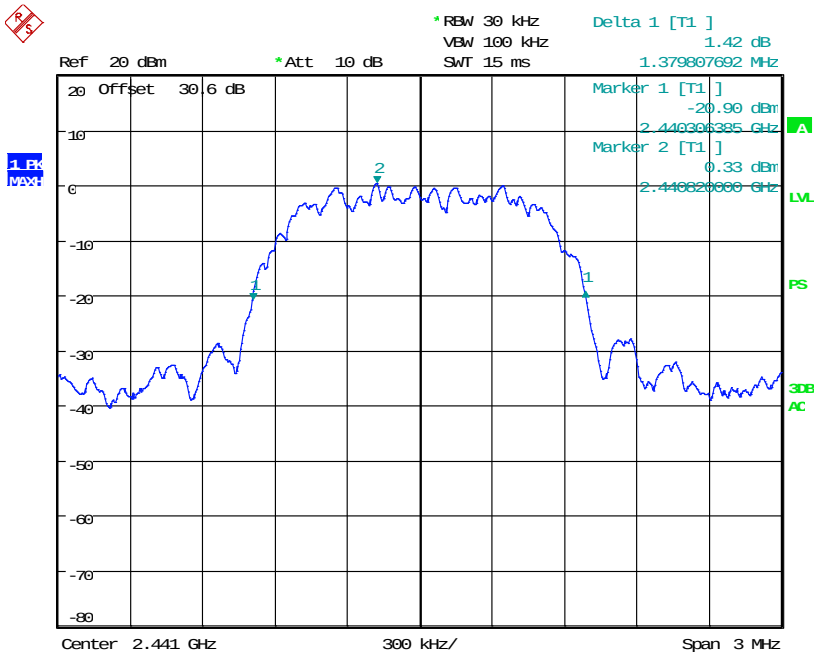


Figure 7.4.4.2-8: 20dB BW Middle Channel (π/4 DQPSK)

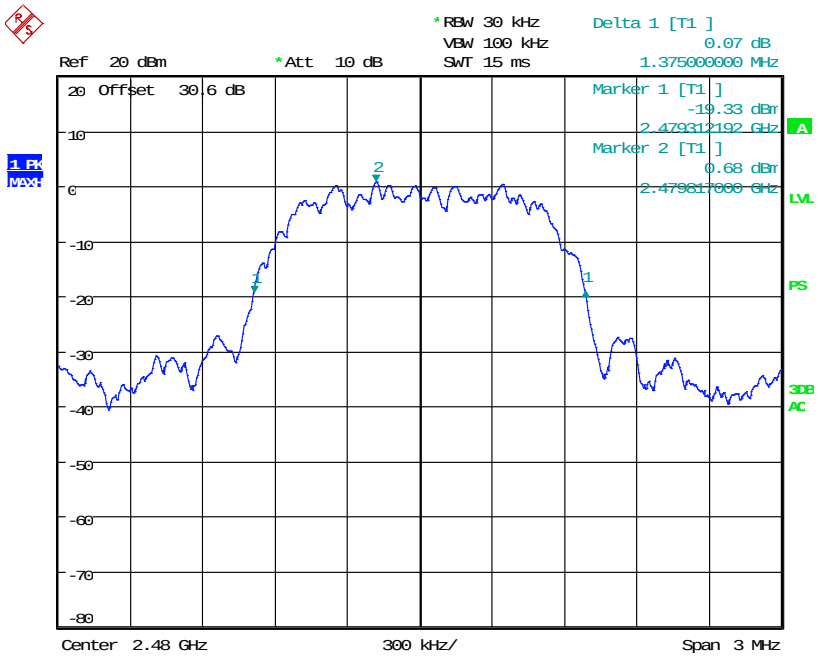


Figure 7.4.4.2-9: 20dB BW High Channel (π/4 DQPSK)

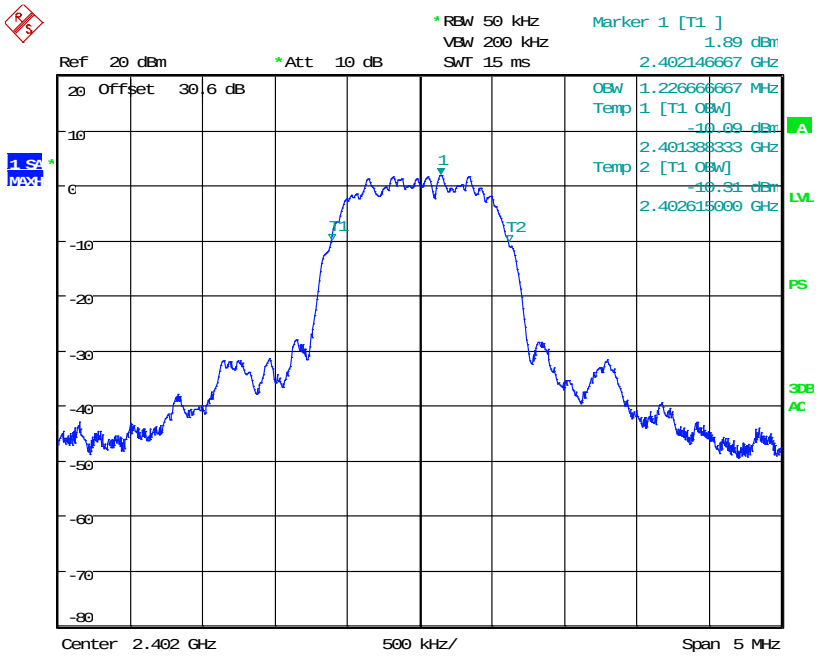


Figure 7.4.4.2-10: 99% OBW Low Channel (π/4 DQPSK)

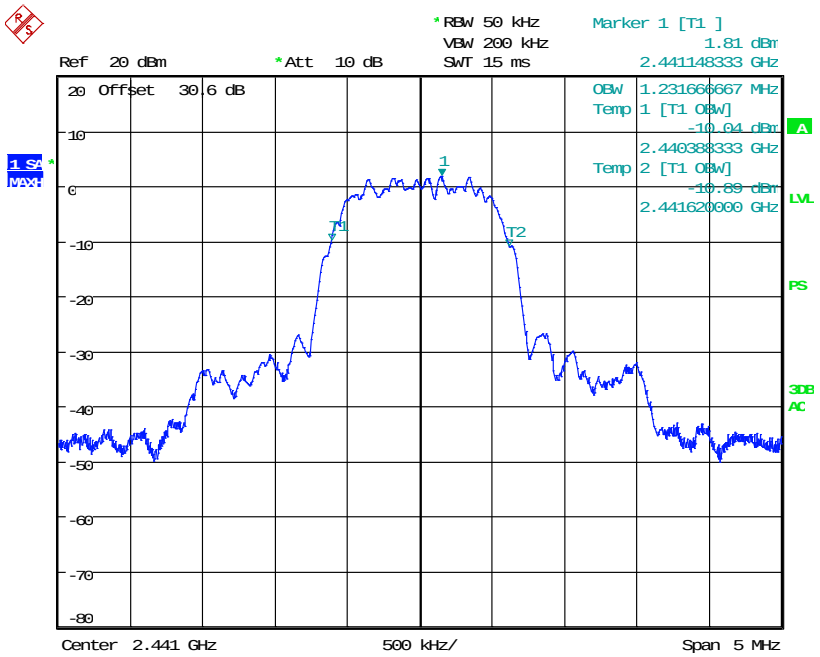


Figure 7.4.4.2-11: 99% OBW Middle Channel (π/4 DQPSK)

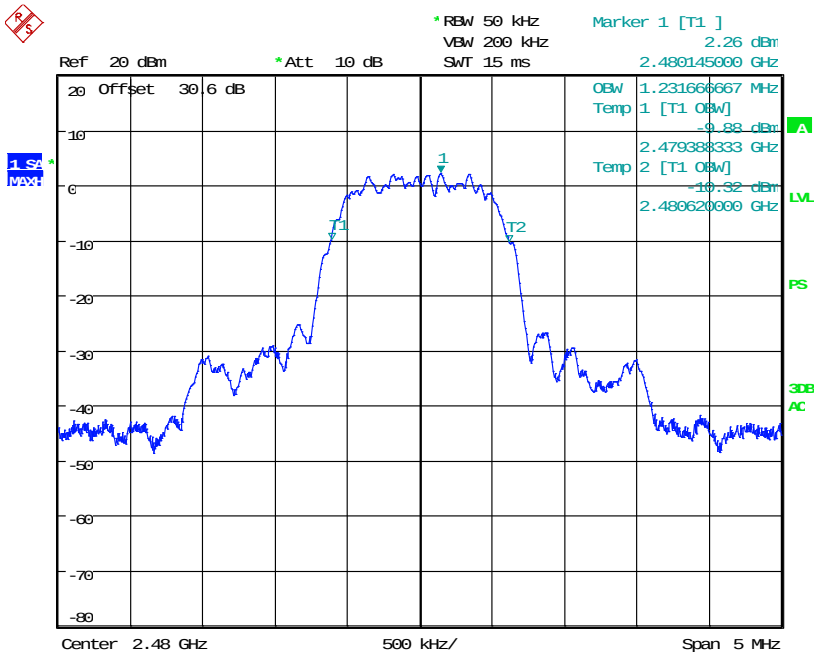


Figure 7.4.4.2-12: 99% OBW High Channel (π/4 DQPSK)

Table 7.4.4.2-3: 20dB / 99% Bandwidth (8DPSK)

Frequency [MHz]	20dB Bandwidth [kHz]	99% Bandwidth [kHz]
2402	1370.2	1235.0
2441	1358.8	1228.3
2480	1358.8	1230.0

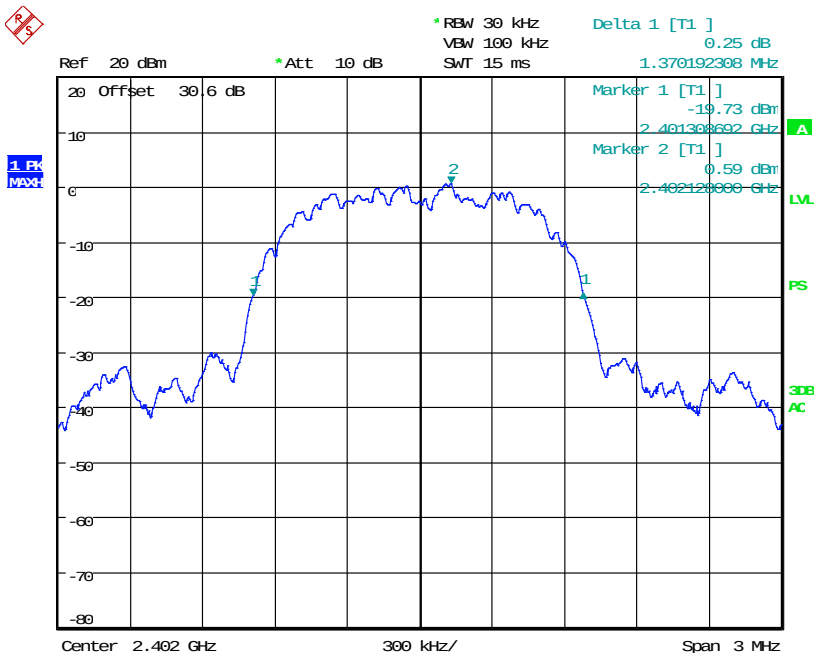


Figure 7.4.4.2-13: 20dB BW Low Channel (8DPSK)

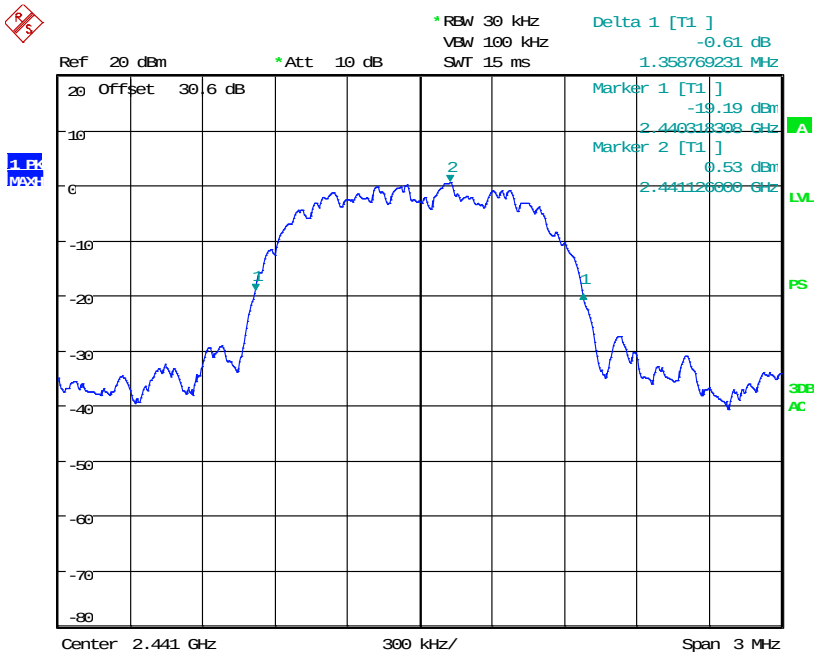


Figure 7.4.4.2-14: 20dB BW Middle Channel (8DPSK)

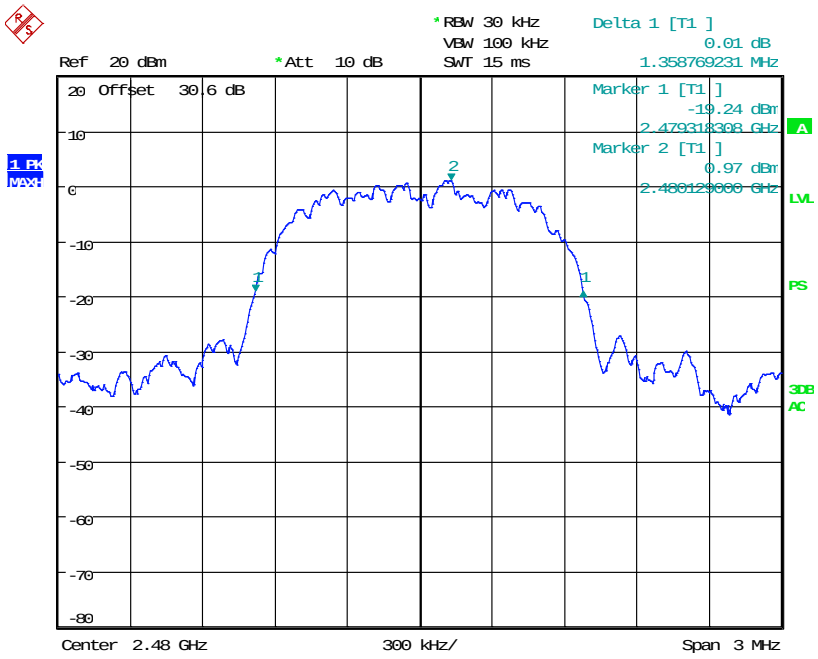


Figure 7.4.4.2-15: 20dB BW High Channel (8DPSK)

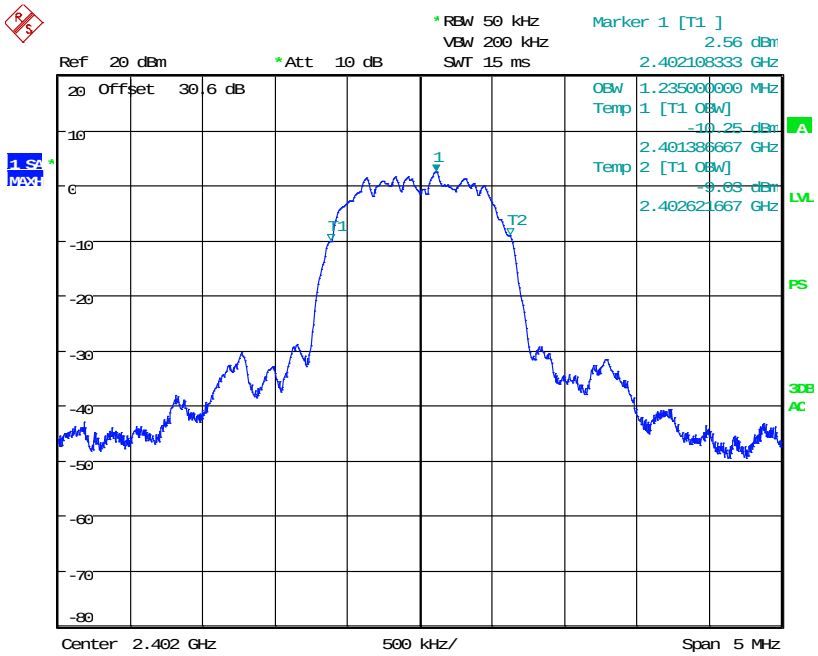


Figure 7.4.4.2-16: 99% OBW Low Channel (8DPSK)

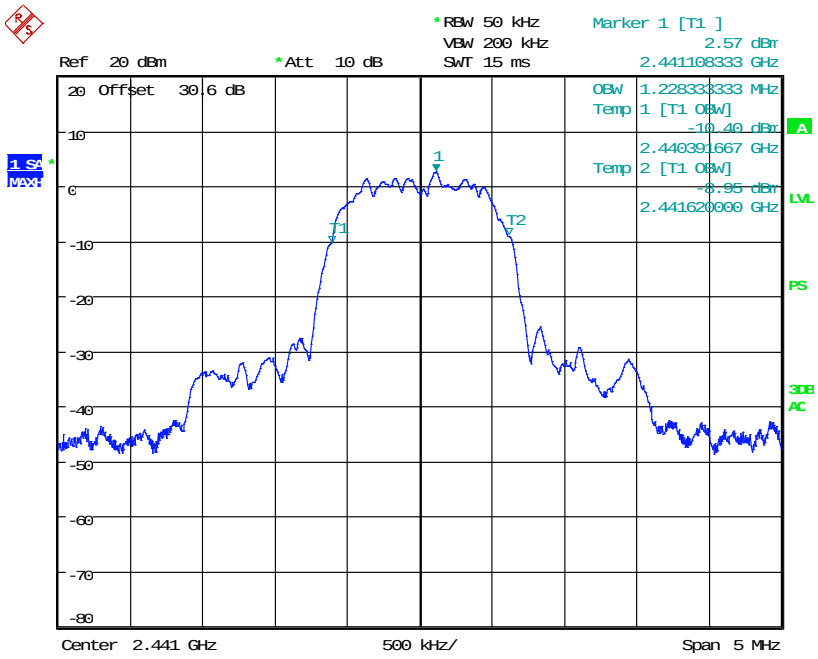


Figure 7.4.4.2-17: 99% OBW Middle Channel (8DPSK)

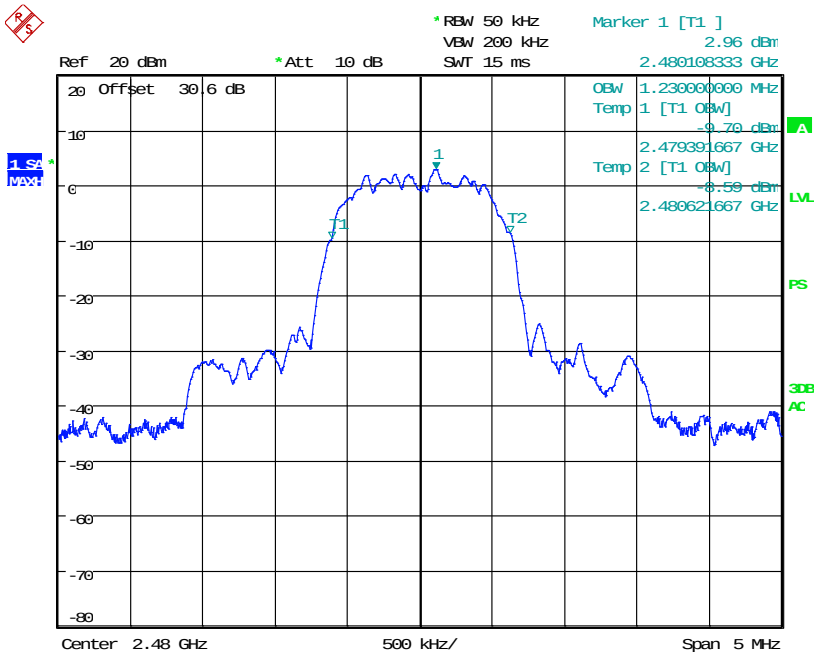


Figure 7.4.4.2-18: 99% OBW High Channel (8DPSK)

7.5 Band-Edge Compliance and Spurious Emissions-FCC 15.247(d) IC: RSS-210 A8.5

7.5.1 Band-Edge Compliance of RF Conducted Emissions

7.5.1.1 Measurement Procedure

The RF output port of the EUT was connected to the input of the spectrum analyzer through suitable attenuation. The EUT was investigated at the lowest and highest channels available to determine band-edge compliance. For each measurement the spectrum analyzer's RBW was set to 100 kHz, which is ≥ 1% of the span, and the VBW was set to >= 300 kHz.

7.5.1.2 Measurement Results

Results are shown below:

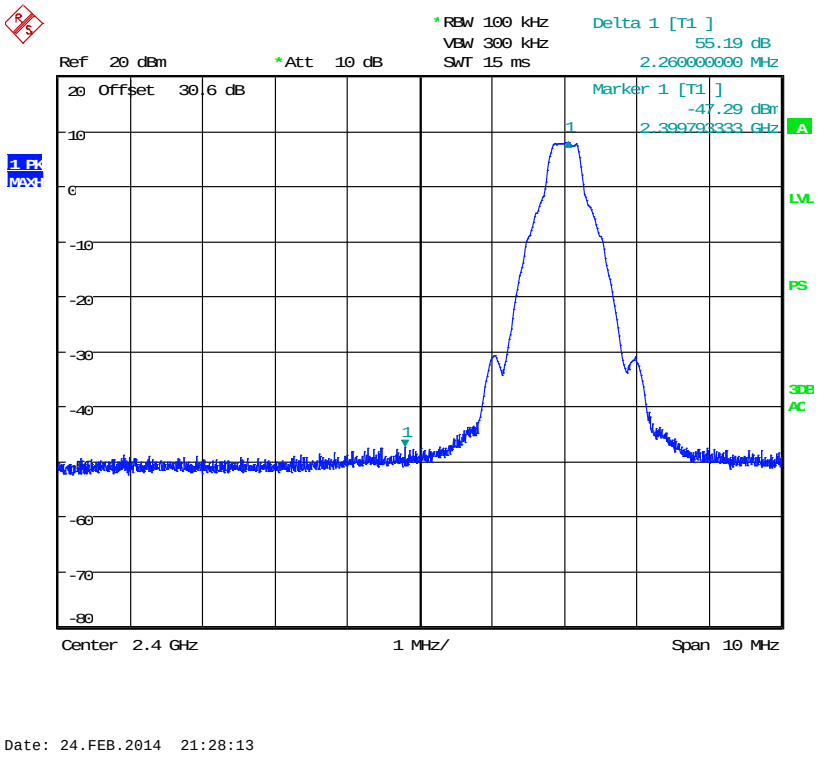


Figure 7.5.1.2-1: Lower Band-edge – Continuous Mode (GFSK)

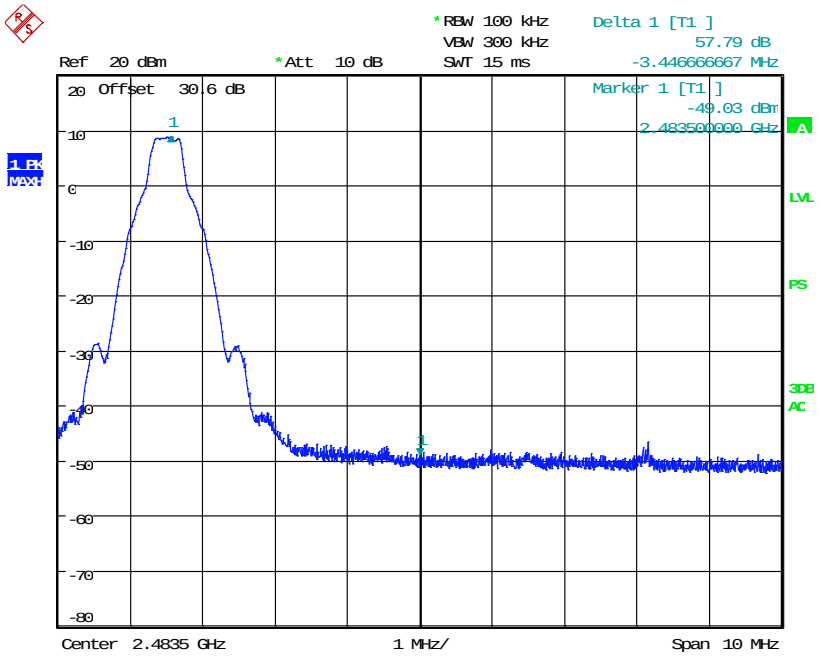


Figure 7.5.1.2-2: Upper Band-edge – Continuous Mode (GFSK)

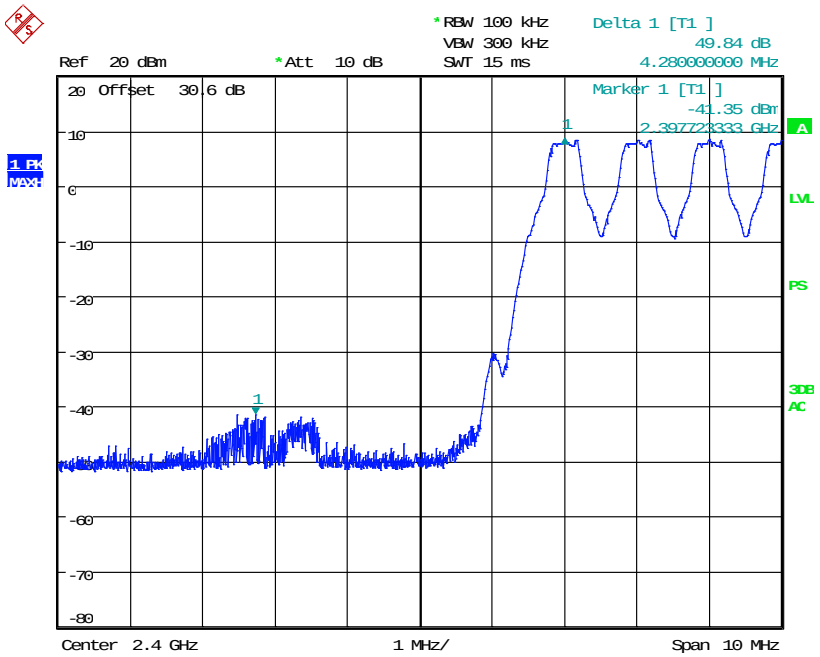


Figure 7.5.1.2-3: Lower Band-edge – Hopping Mode (GFSK)

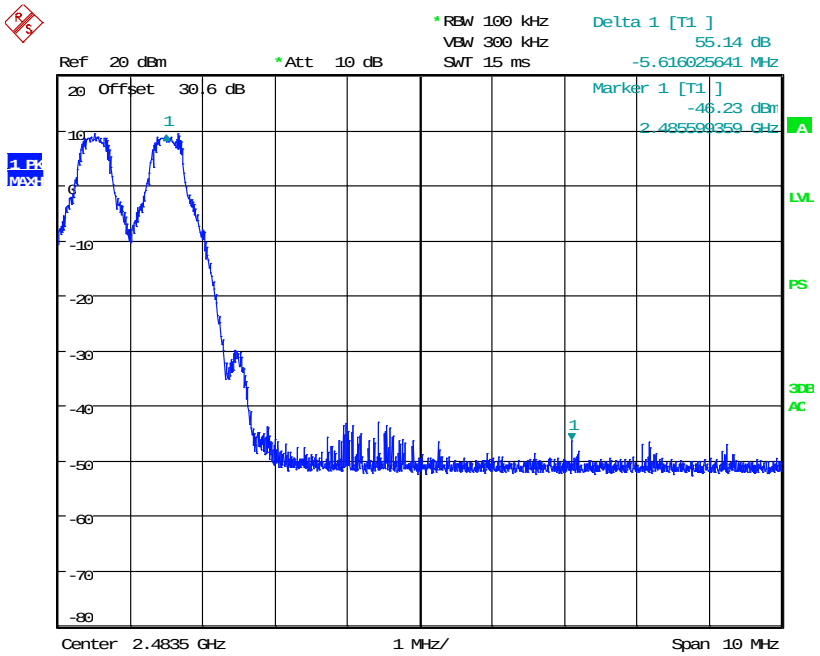


Figure 7.5.1.2-4: Upper Band-edge – Hopping Mode (GFSK)

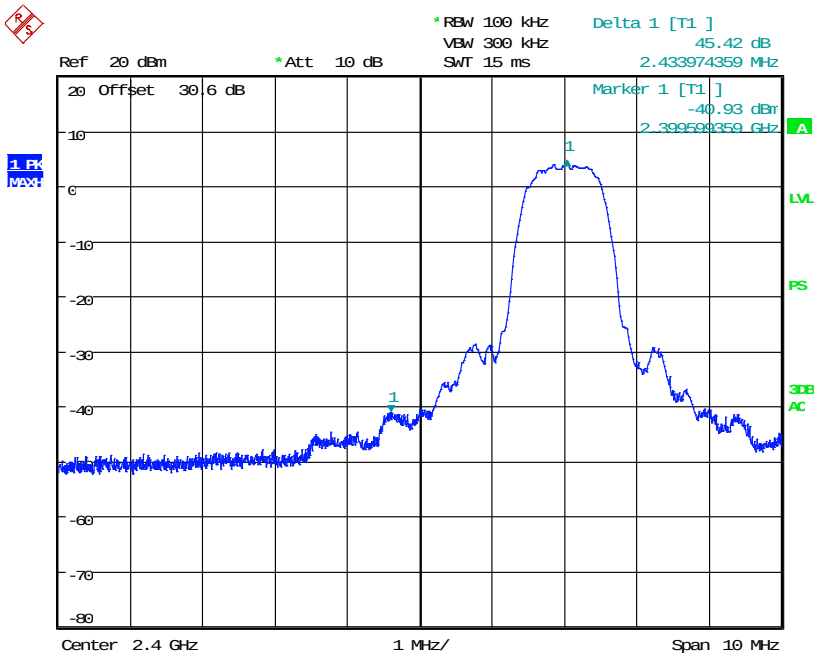
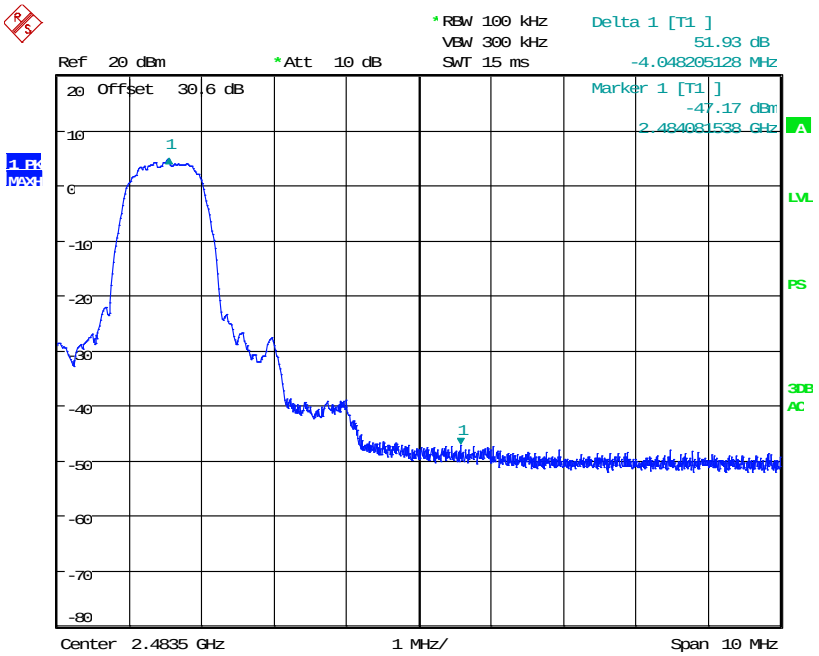
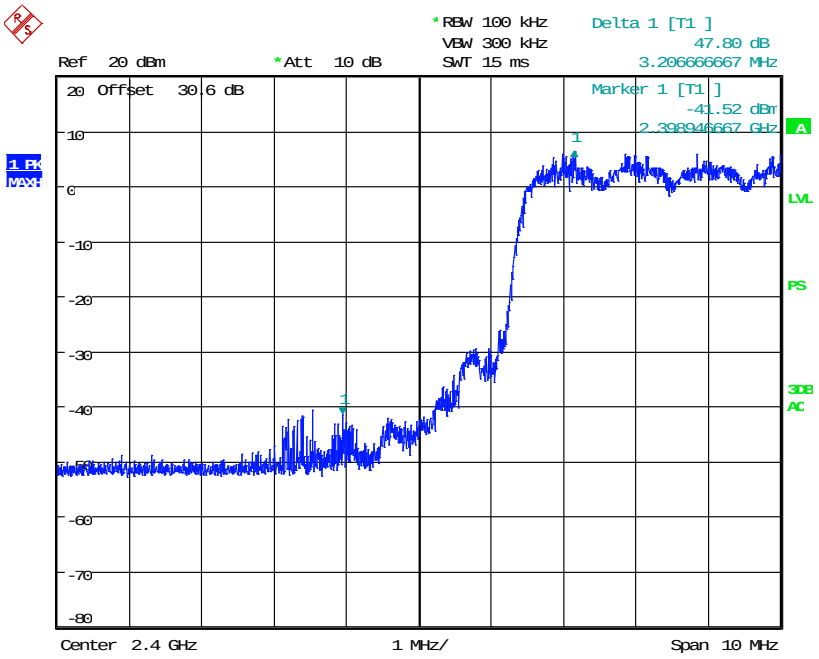


Figure 7.5.1.2-5: Lower Band-edge – Continuous Mode (π/4 DQPSK)



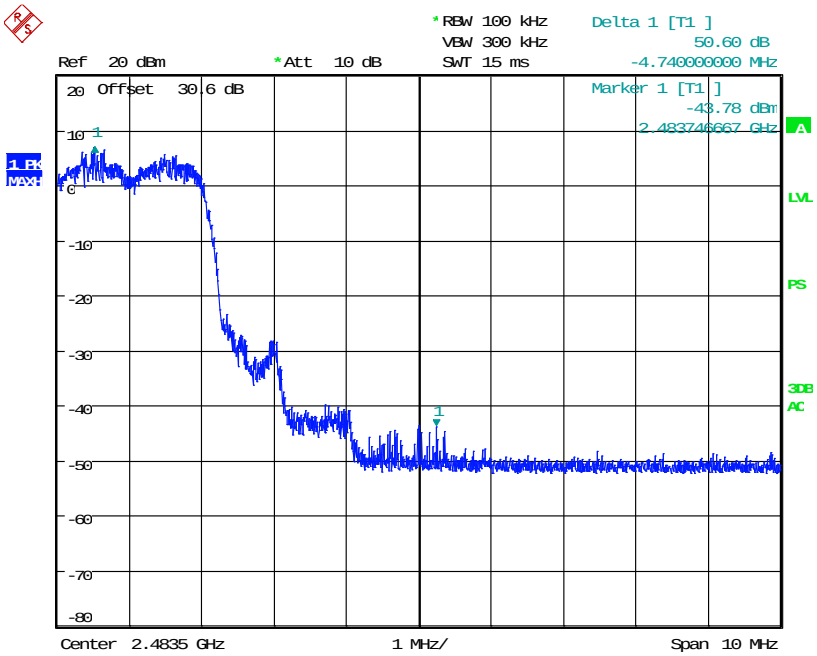
Date: 24.FEB.2014 20:50:06

Figure 7.5.1.2-6: Upper Band-edge – Continuous Mode (π/4 DQPSK)



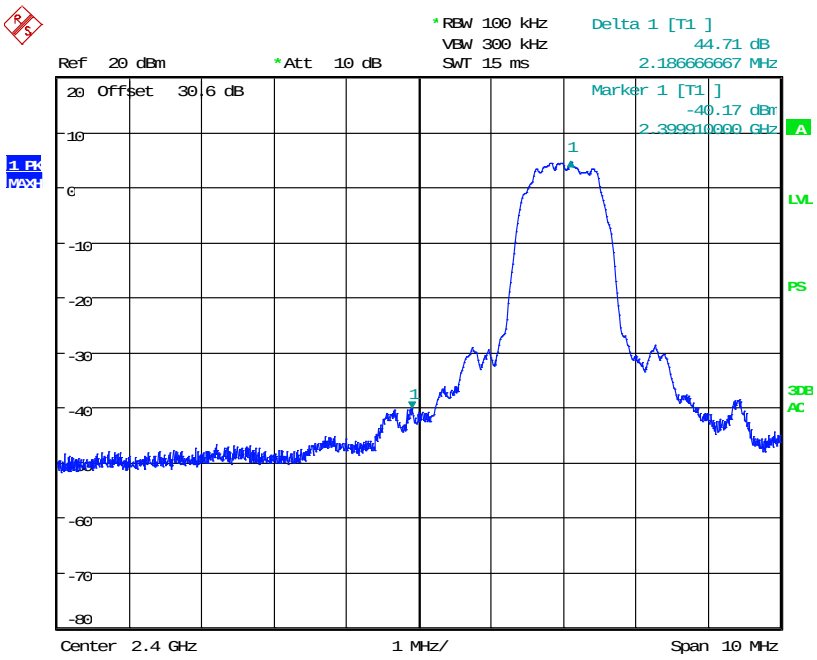
Date: 24.FEB.2014 21:18:19

Figure 7.5.1.2-7: Lower Band-edge – Hopping Mode (π/4 DQPSK)



Date: 24.FEB.2014 20:44:04

Figure 7.5.1.2-8: Upper Band-edge – Hopping Mode (π/4 DQPSK)



Date: 24.FEB.2014 21:24:39

Figure 7.5.1.2-9: Lower Band-edge – Continuous Mode (8DPSK)

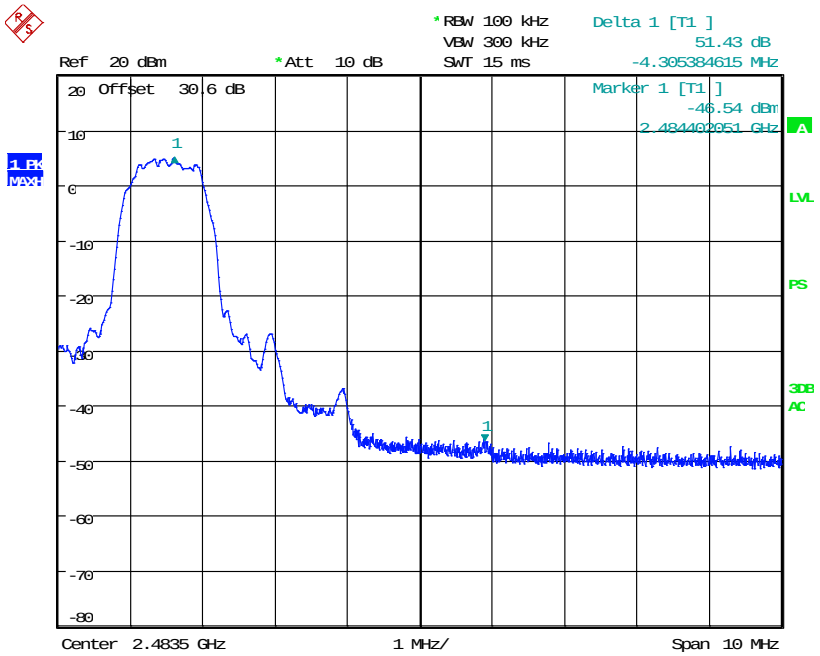


Figure 7.5.1.2-10: Upper Band-edge – Continuous Mode (8DPSK)

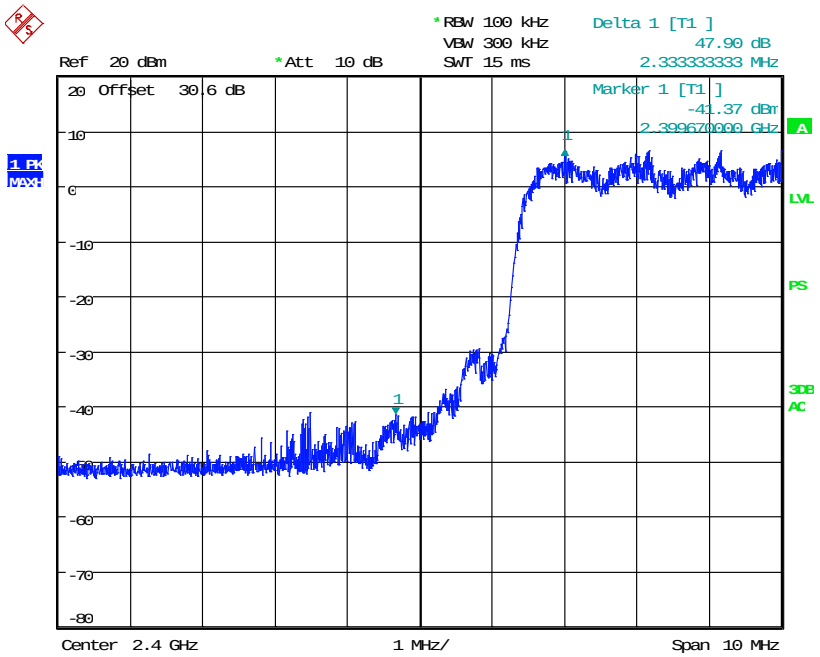


Figure 7.5.1.2-11: Lower Band-edge – Hopping Mode (8DPSK)

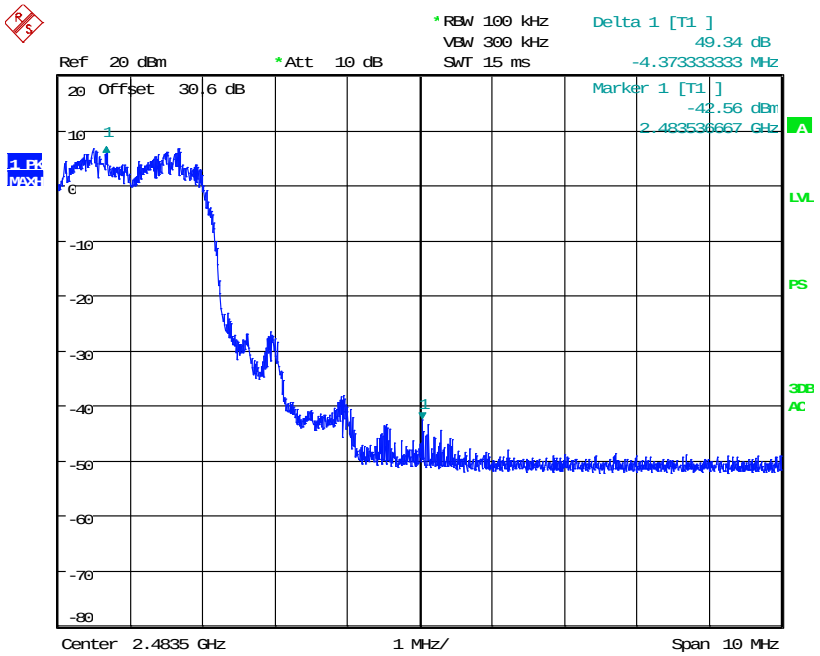


Figure 7.5.1.2-12: Upper Band-edge – Hopping Mode (8DPSK)

7.5.2 Band-Edge Compliance of Radiated Spurious Emissions

7.5.2.1 Measurement Procedure

Because the upper band-edge coincides with a restricted band, band-edge compliance for the upper band-edge was determined using the radiated mark-delta method. The radiated field strength of the fundamental emission was first determined and then the mark-delta method was used to determine the field strength of the band-edge emission.

7.5.2.2 Measurement Results

Results are shown below:

Frequency (MHz)	Uncorrected Level (dBuV)		Antenna Polarity	Correction Factors	Fundamental Level (dBuV/m)		Marker-Delta (dB)	Band-Edge Level (dBuV/m)		Margin to Limits (dB)	
										74	54
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg		pk	Qpk/Avg	pk	Qpk/Avg
2480	110.70	110.20	H	-7.62	103.08	102.58	54.36	48.72	48.22	25.28	5.78
2480	113.90	113.30	V	-7.62	106.28	105.68	57.42	48.86	48.26	25.14	5.74

Table 7.5.2.2-1: Upper Band-edge – GFSK

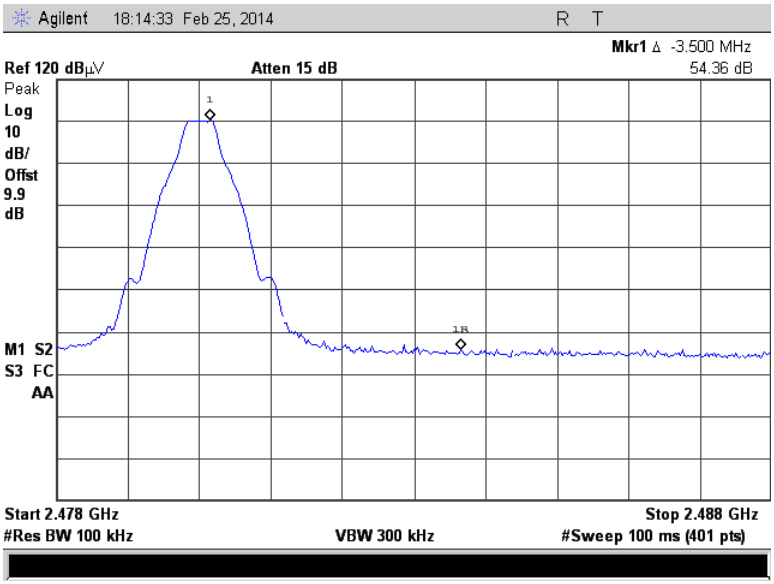


Figure 7.5.2.2-1: Upper Band-edge (GFSK - Horizontal)

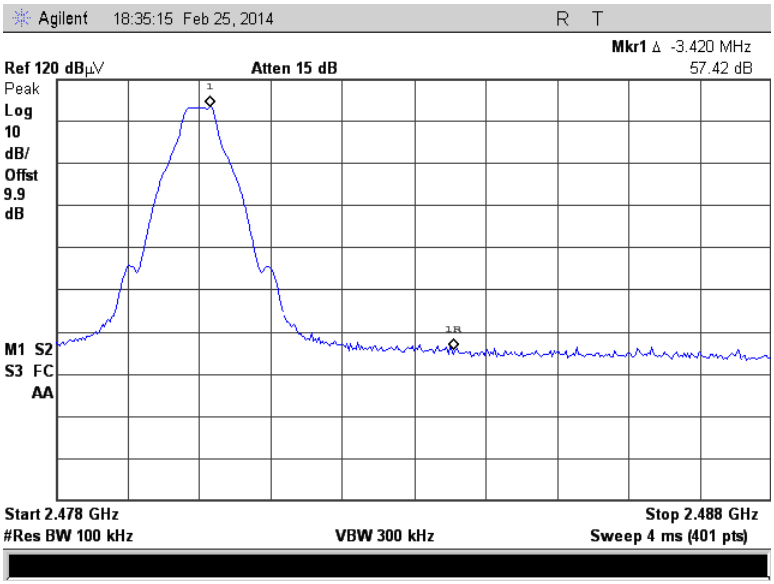


Figure 7.5.2.2-2: Upper Band-edge (GFSK - Vertical)

Table 7.5.2.2-2: Upper Band-edge – π/4 DQPSK

Frequency (MHz)	Uncorrected Level (dBuV)		Antenna Polarity	Correction Factors	Fundamental Level (dBuV/m)		Marker-Delta (dB)	Band-Edge Level (dBuV/m)		Margin to Limits (dB)	
										74	54
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg		pk	Qpk/Avg	pk	Qpk/Avg
2480	109.60	105.90	H	-7.62	101.98	98.28	50.06	51.92	48.22	22.08	5.78
2480	112.90	109.10	V	-7.62	105.28	101.48	52.14	53.14	49.34	20.86	4.66

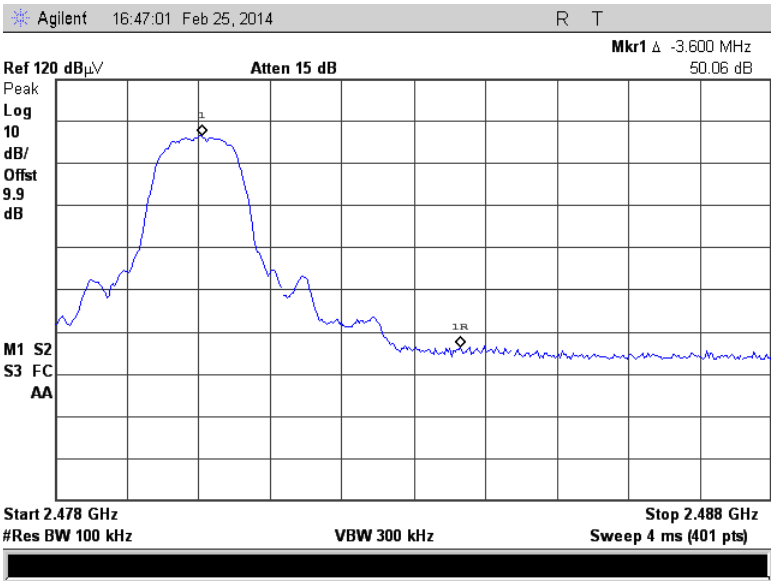


Figure 7.5.2.2-3: Upper Band-edge (π/4 DQPSK - Horizontal)

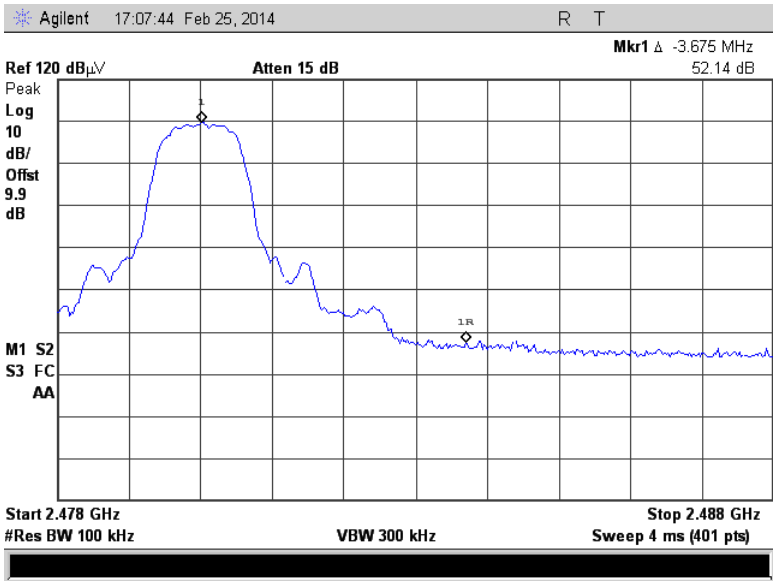


Figure 7.5.2.2-4: Upper Band-edge (π/4 DQPSK - Vertical)

Table 7.5.2.2-3: Upper Band-edge – 8DPSK

Frequency (MHz)	Uncorrected Level (dBuV)		Antenna Polarity	Correction Factors	Fundamental Level (dBuV/m)		Marker-Delta (dB)	Band-Edge Level (dBuV/m)		Margin to Limits (dB)	
										74	54
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg		pk	Qpk/Avg	pk	Qpk/Avg
2480	109.90	106.00	H	-7.62	102.28	98.38	49.71	52.57	48.67	21.43	5.33
2480	113.00	108.90	V	-7.62	105.38	101.28	51.36	54.02	49.92	19.98	4.08

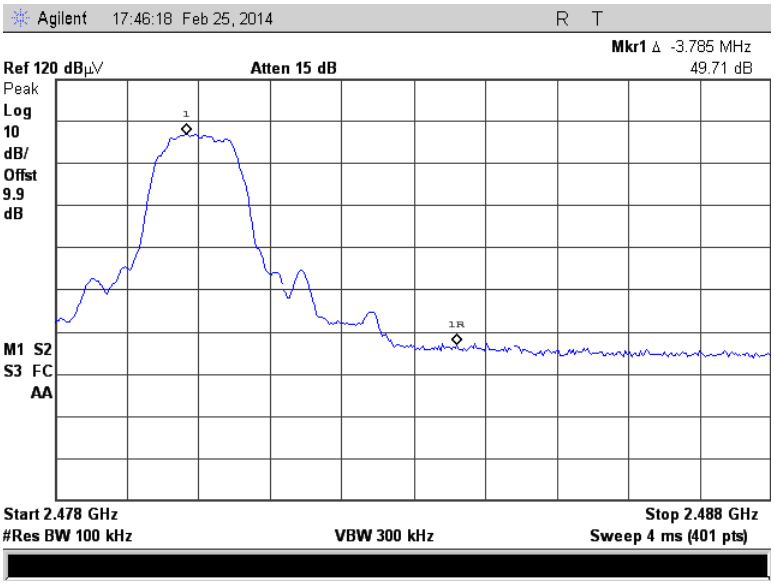


Figure 7.5.2.2-5: Upper Band-edge (8DPSK- Horizontal)

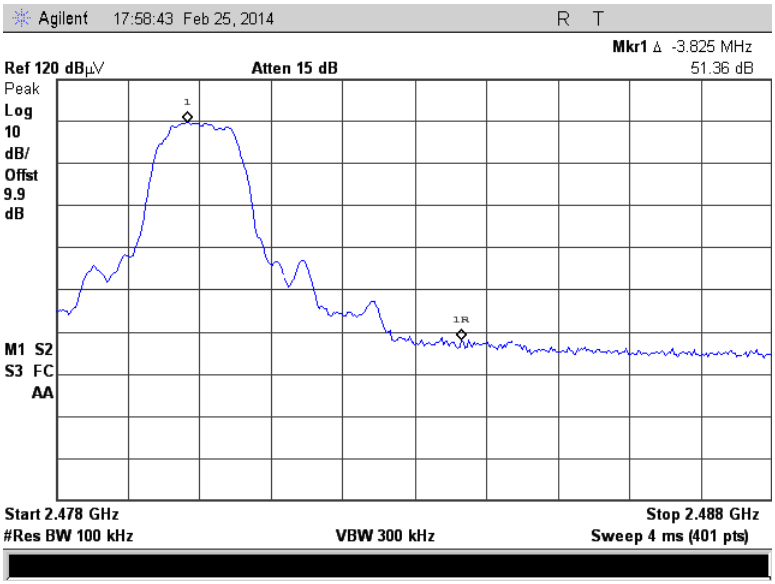


Figure 7.5.2.2-6: Upper Band-edge (8DPSK - Vertical)

7.5.3 RF Conducted Spurious Emissions

7.5.3.1 Measurement Procedure

The RF output port of the EUT was connected to the spectrum analyzer input using suitable attenuation. The EUT was investigated for conducted spurious emissions from 30MHz to 26 GHz, 10 times the highest fundamental frequency. Measurements were made at the low, center and high channels of the EUT. For each measurement, the spectrum analyzer's RBW was set to 100 kHz. A peak detector function was used with the trace set to max hold. The levels were corrected for cable and attenuator losses.

7.5.3.2 Measurement Results

Results are shown below:

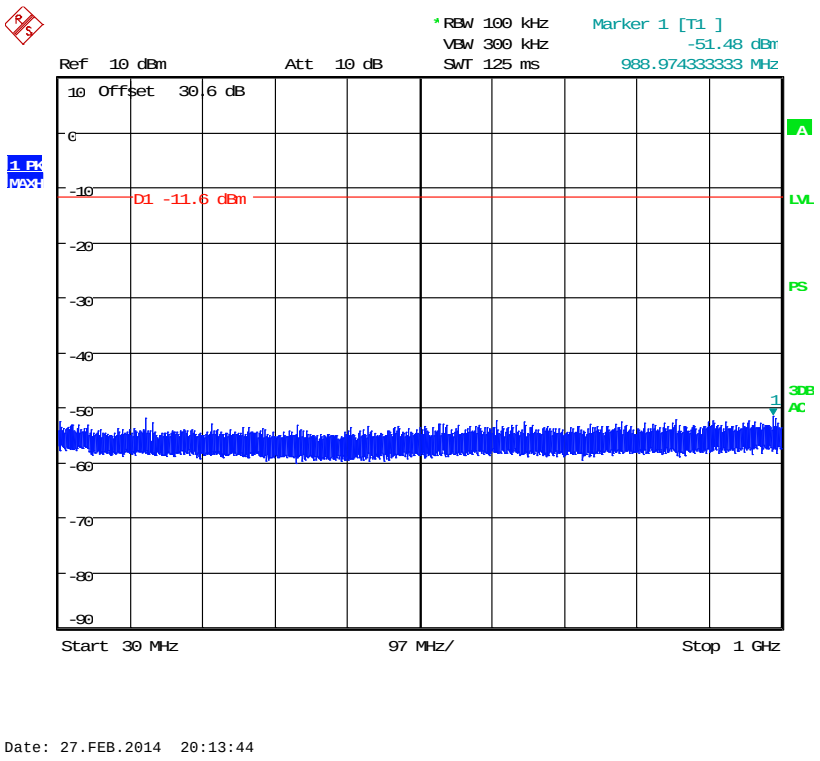


Figure 7.5.2.2-1: 30 MHz – 1 GHz – Low Channel (GFSK)

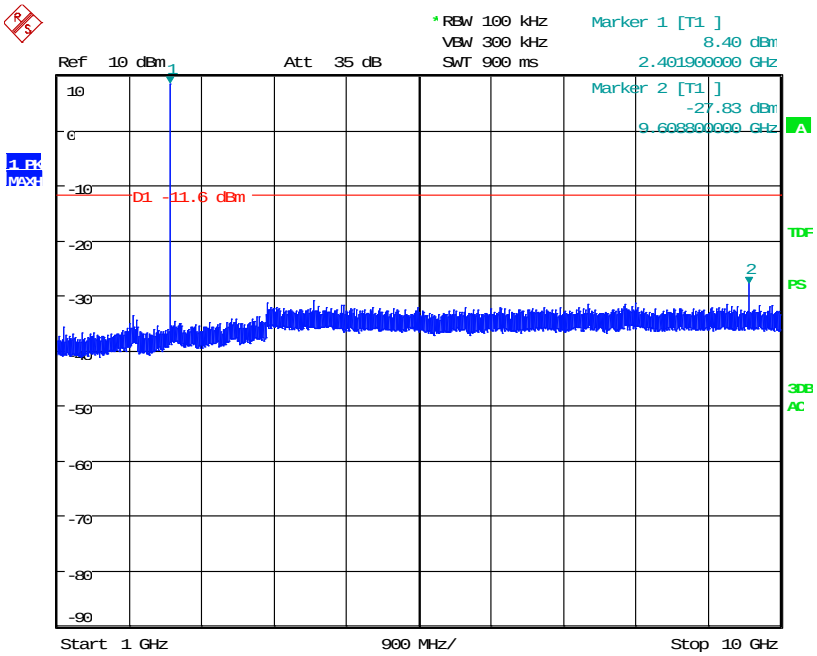


Figure 7.5.2.2-2: 1 GHz –10 GHz – Low Channel (GFSK)

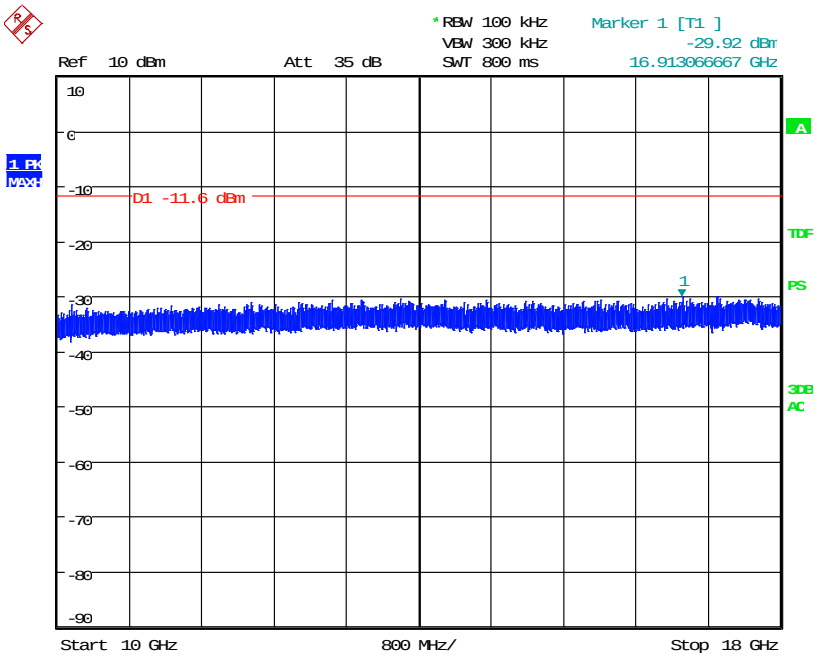


Figure 7.5.2.2-3: 10 GHz –18 GHz – Low Channel (GFSK)

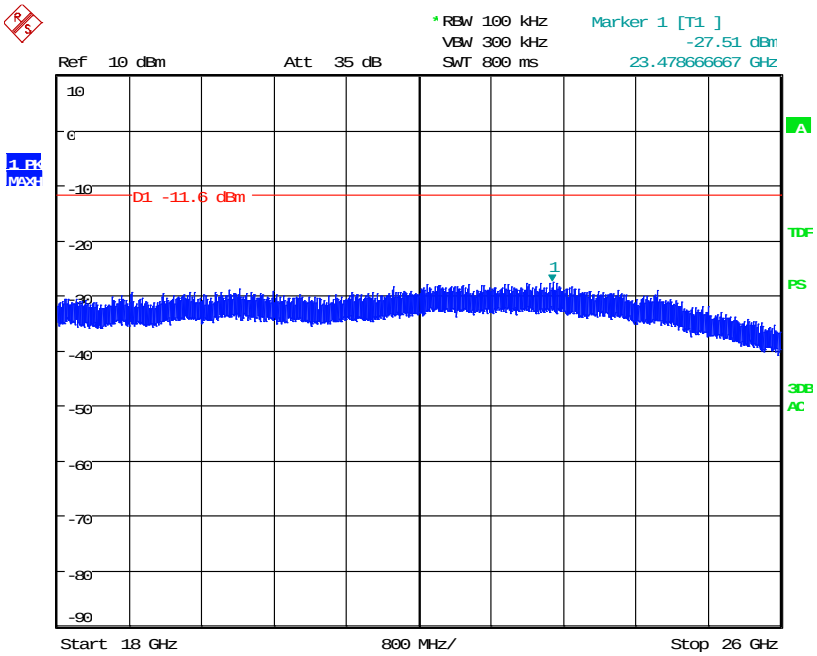


Figure 7.5.2.2-4: 18 GHz –26 GHz – Low Channel (GFSK)

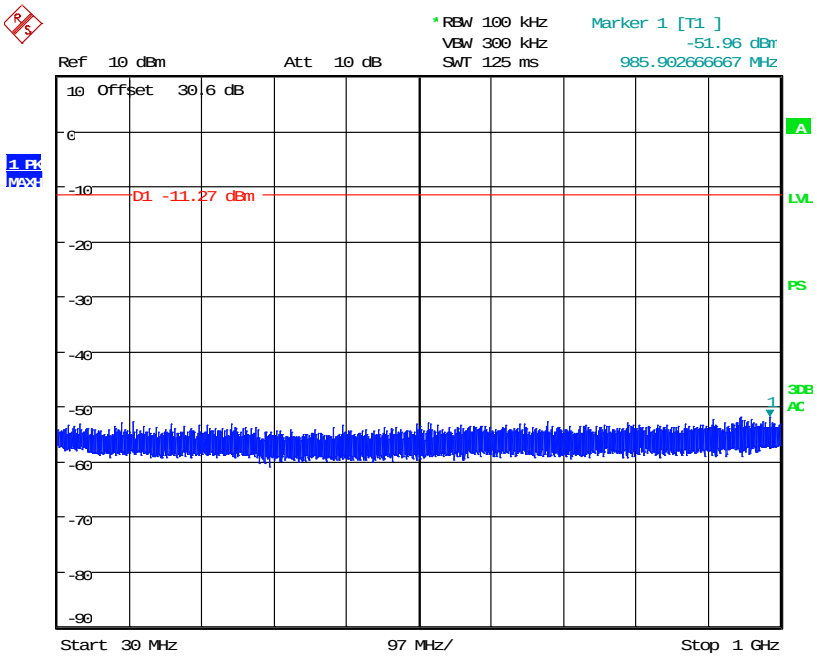


Figure 7.5.2.2-5: 30 MHz – 1 GHz –Middle Channel (GFSK)

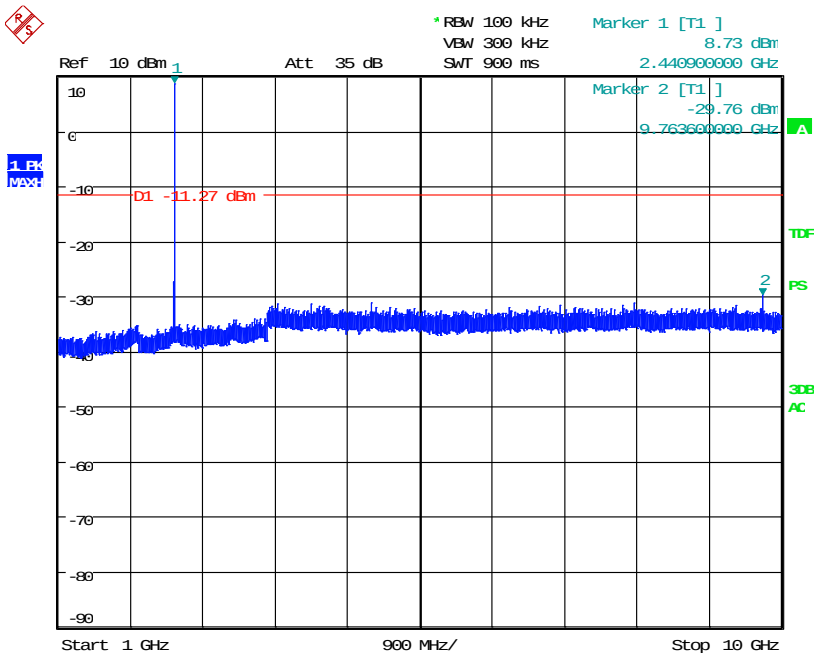


Figure 7.5.2.2-6: 1 GHz –10 GHz – Middle Channel (GFSK)

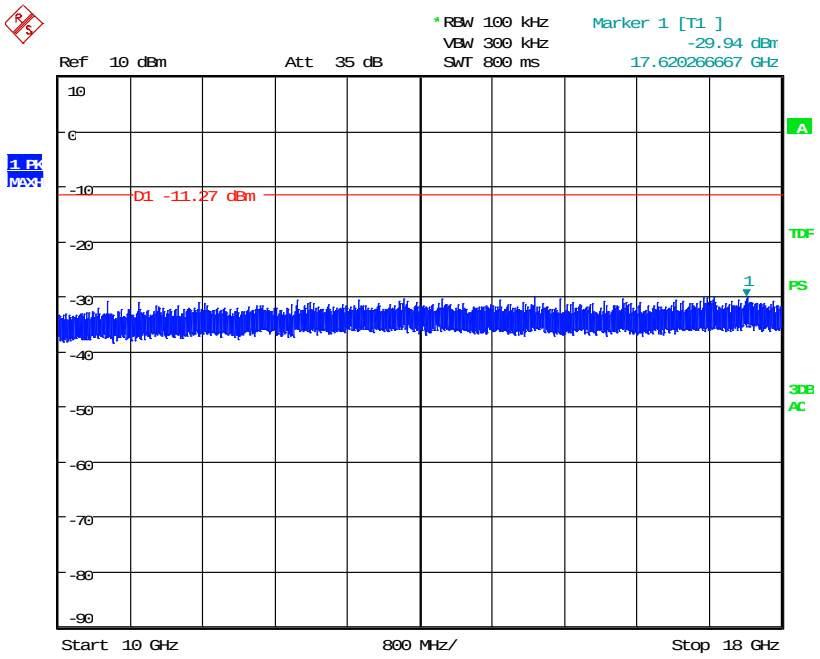


Figure 7.5.2.2-7: 10 GHz –18 GHz – Middle Channel (GFSK)

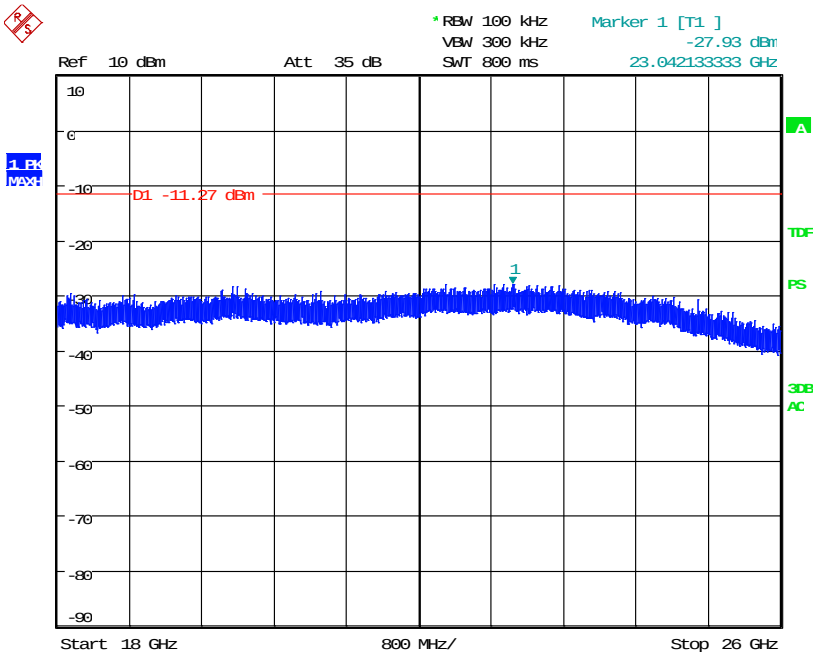


Figure 7.5.2.2-8: 18 GHz –26 GHz – Middle Channel (GFSK)

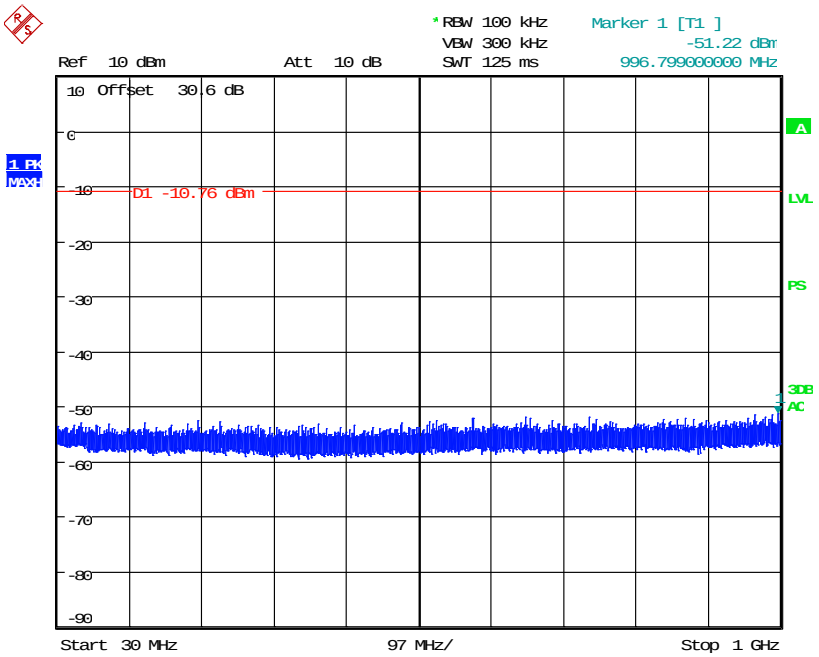


Figure 7.5.2.2-9: 30 MHz – 1 GHz – High Channel (GFSK)

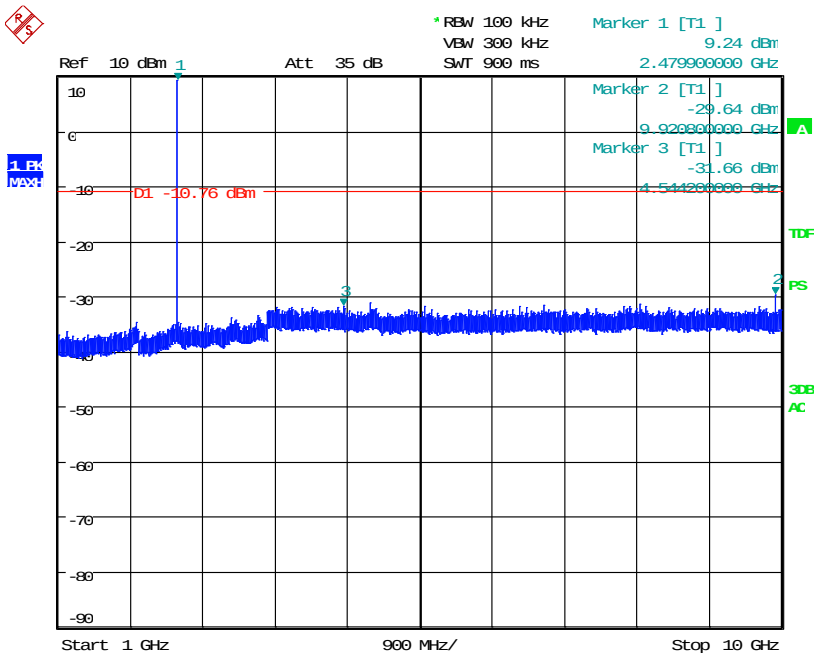


Figure 7.5.2.2-10: 1 GHz –10 GHz –High Channel (GFSK)

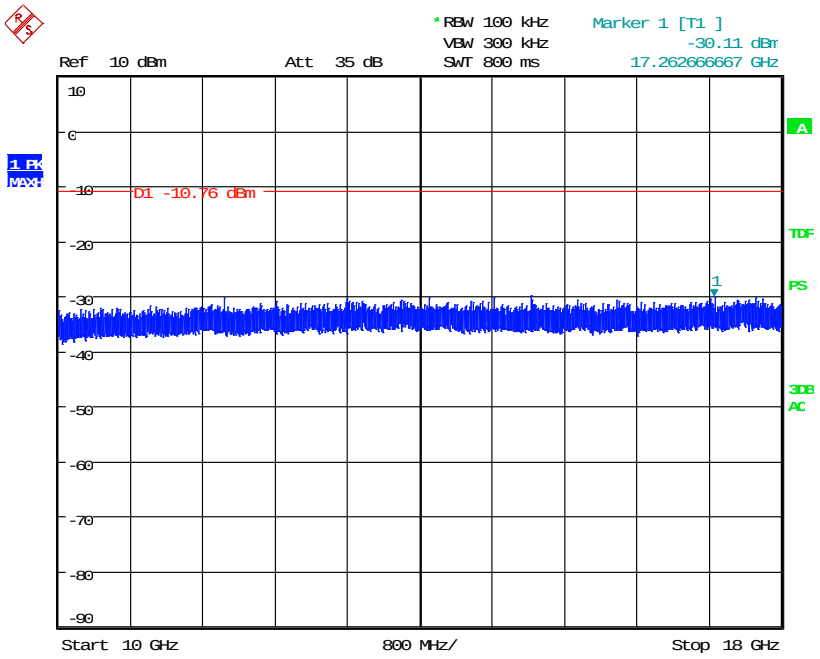


Figure 7.5.2.2-11: 10 GHz –18 GHz – High Channel (GFSK)

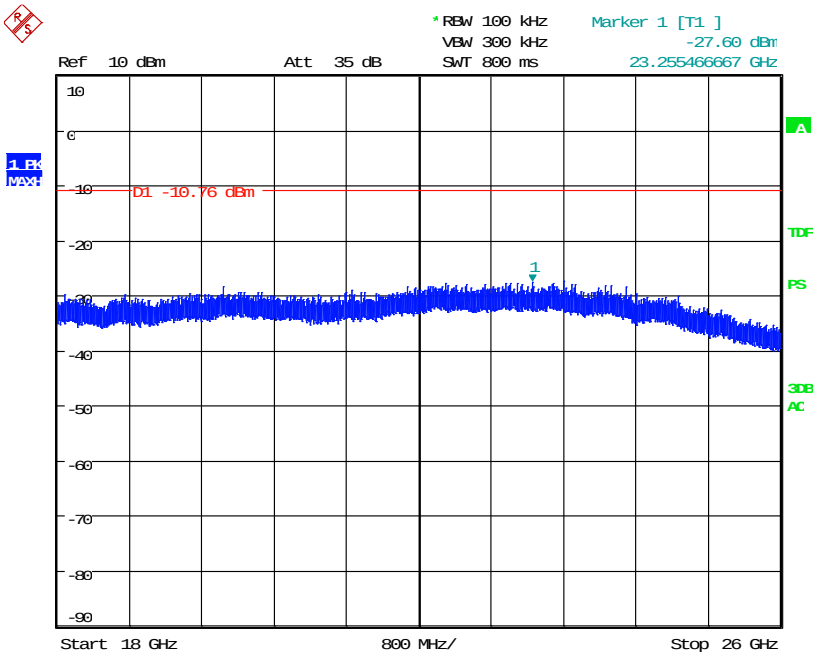


Figure 7.5.2.2-12: 18 GHz –26 GHz – High Channel (GFSK)

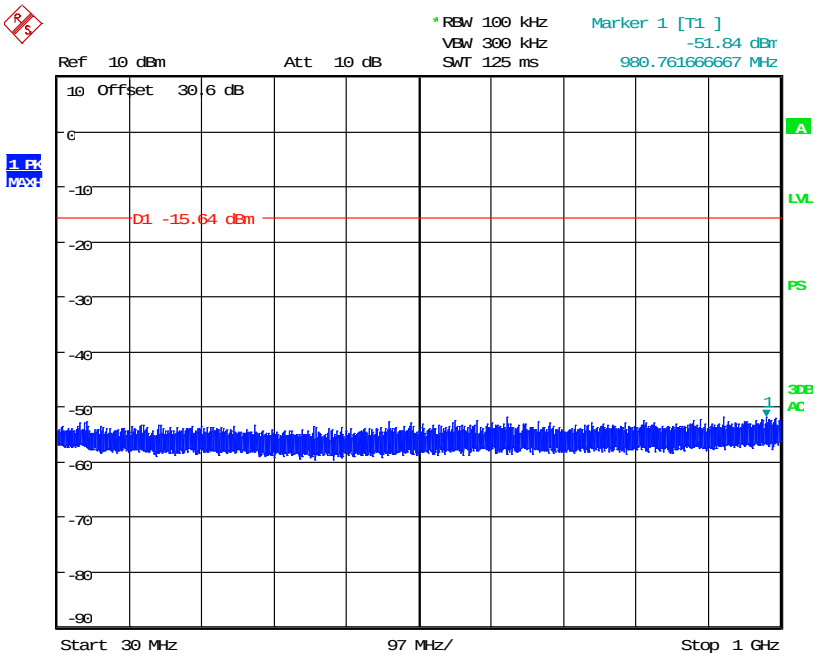


Figure 7.5.2.2-13: 30 MHz – 1 GHz – Low Channel (π/4 DQPSK)

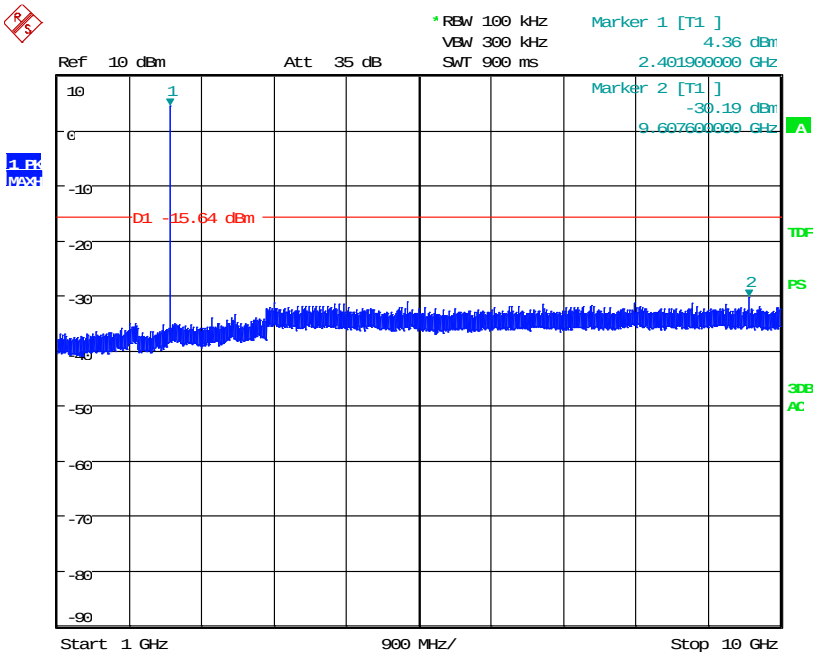


Figure 7.5.2.2-14: 1 GHz –10 GHz – Low Channel (π/4 DQPSK)

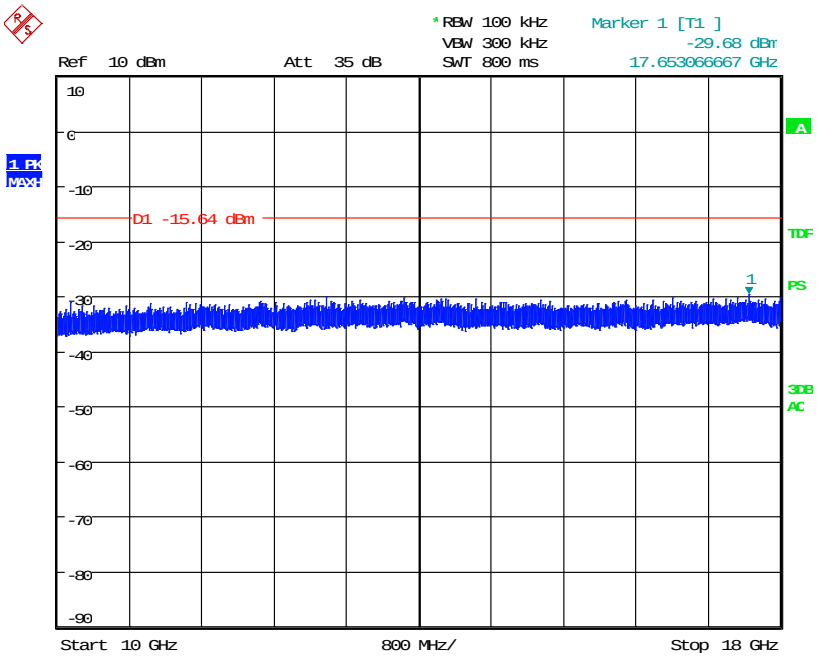


Figure 7.5.2.2-15: 10 GHz –18 GHz – Low Channel (π/4 DQPSK)

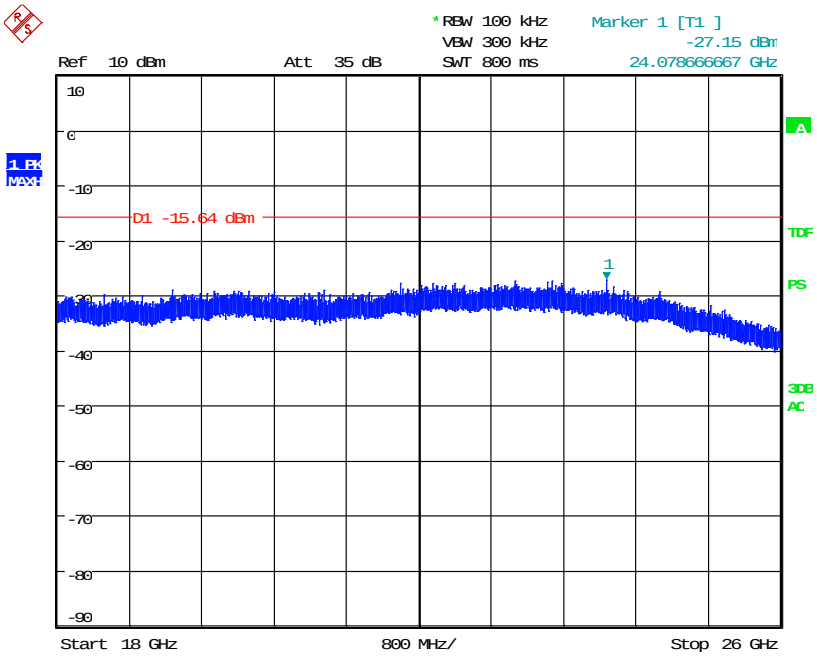


Figure 7.5.2.2-16: 18 GHz –26 GHz – Low Channel (π/4 DQPSK)

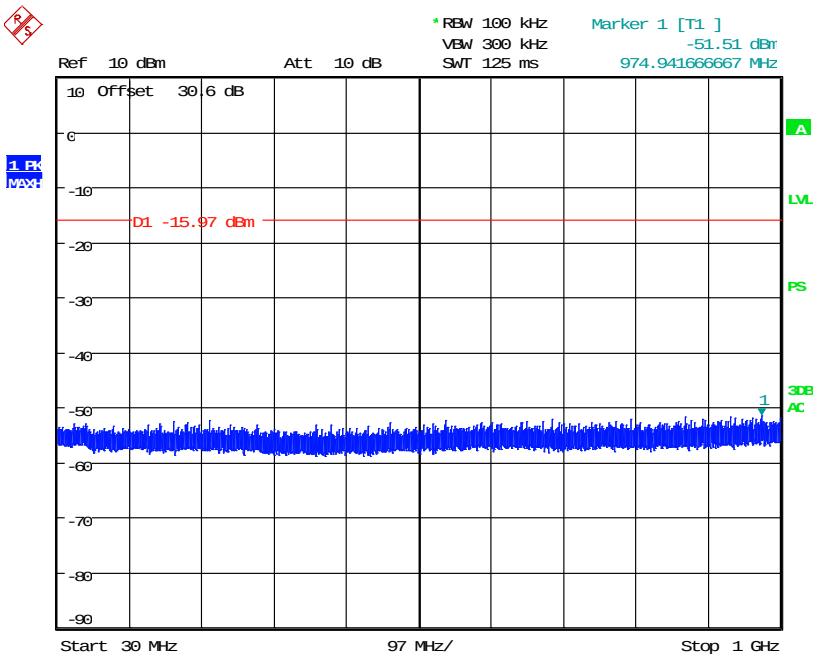


Figure 7.5.2.2-17: 30 MHz – 1 GHz –Middle Channel (π/4 DQPSK)

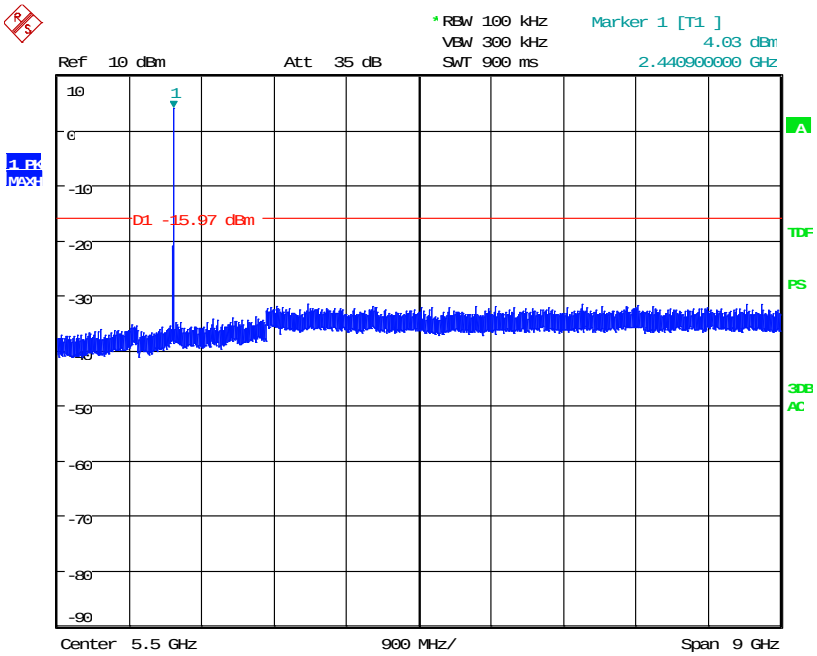


Figure 7.5.2.2-18: 1 GHz –10 GHz – Middle Channel (π/4 DQPSK)

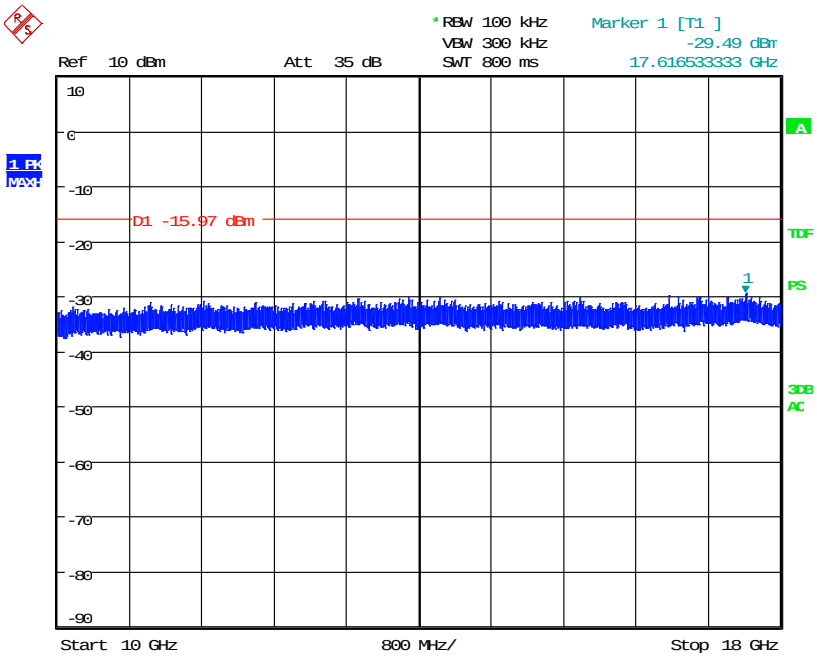


Figure 7.5.2.2-19: 10 GHz –18 GHz – Middle Channel (π/4 DQPSK)

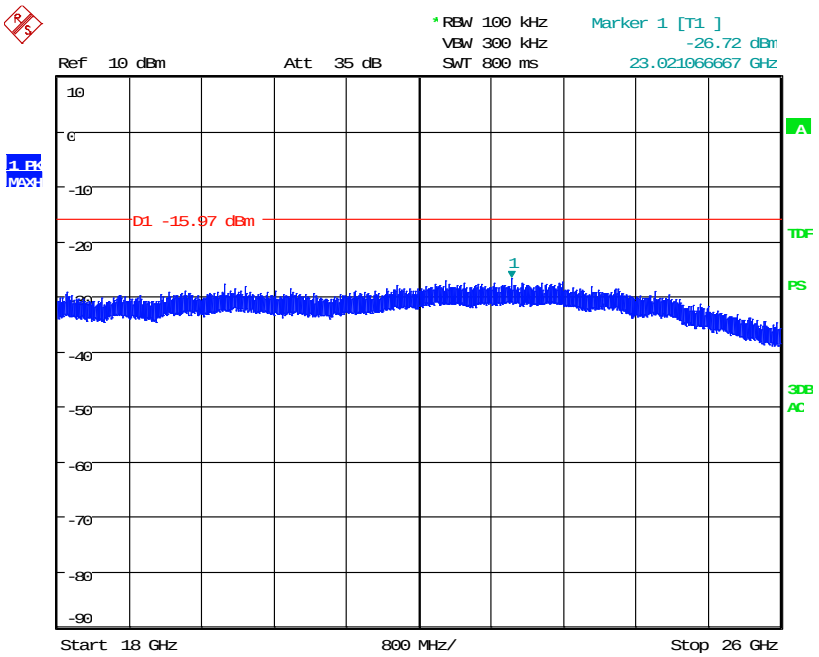


Figure 7.5.2.2-20: 18 GHz –26 GHz – Middle Channel (π/4 DQPSK)

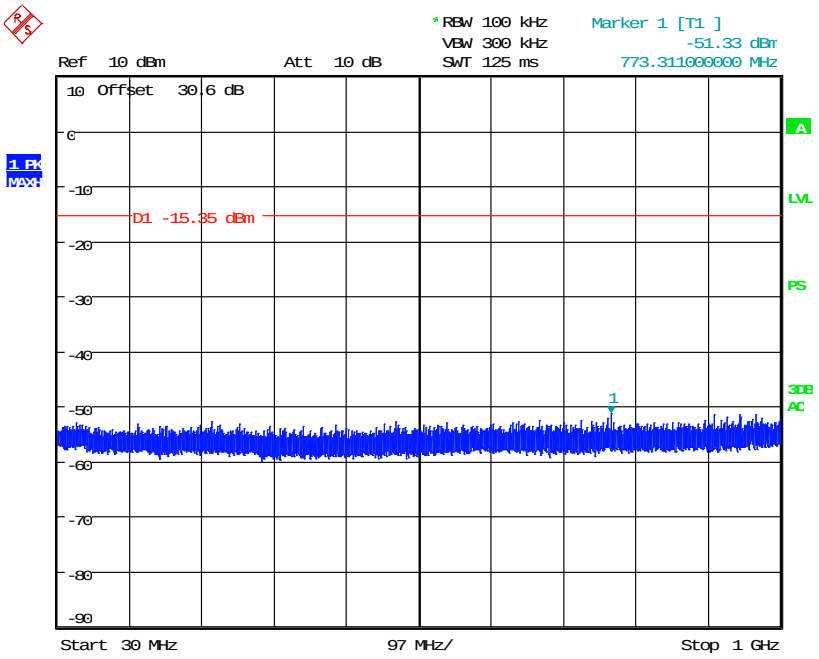


Figure 7.5.2.2-21: 30 MHz – 1 GHz – High Channel (π/4 DQPSK)

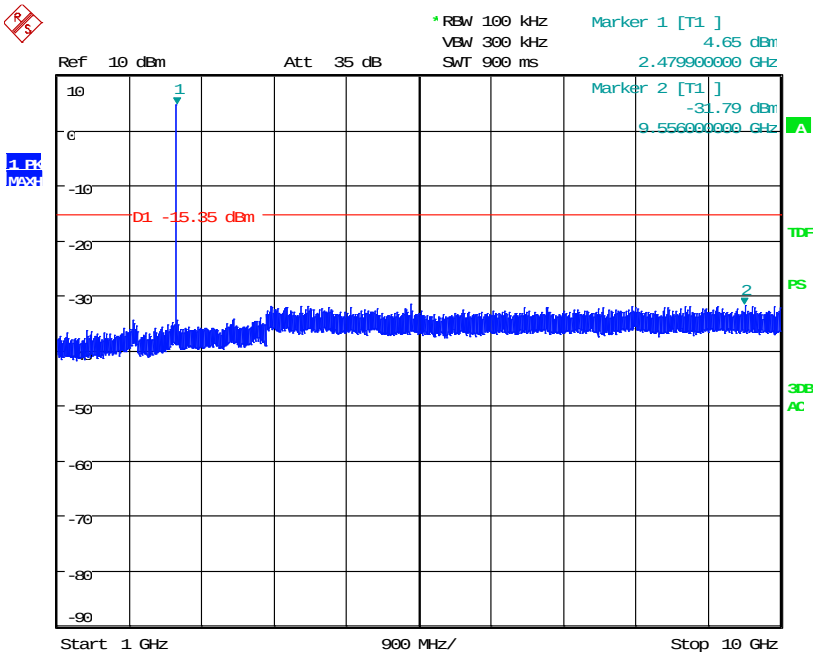


Figure 7.5.2.2-22: 1 GHz –10 GHz –High Channel (π/4 DQPSK)

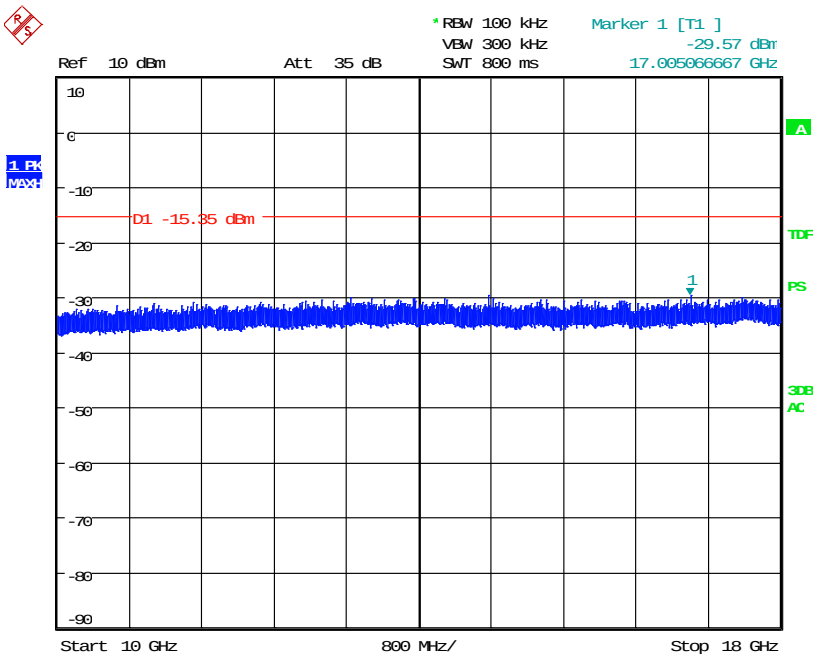


Figure 7.5.2.2-23: 10 GHz –18 GHz – High Channel (π/4 DQPSK)

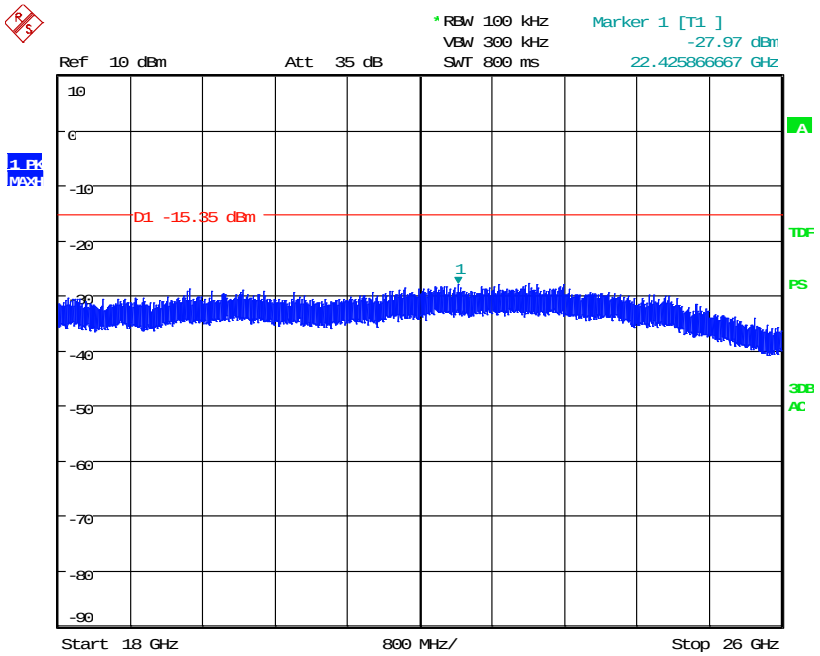


Figure 7.5.2.2-24: 18 GHz –26 GHz – High Channel (π/4 DQPSK)

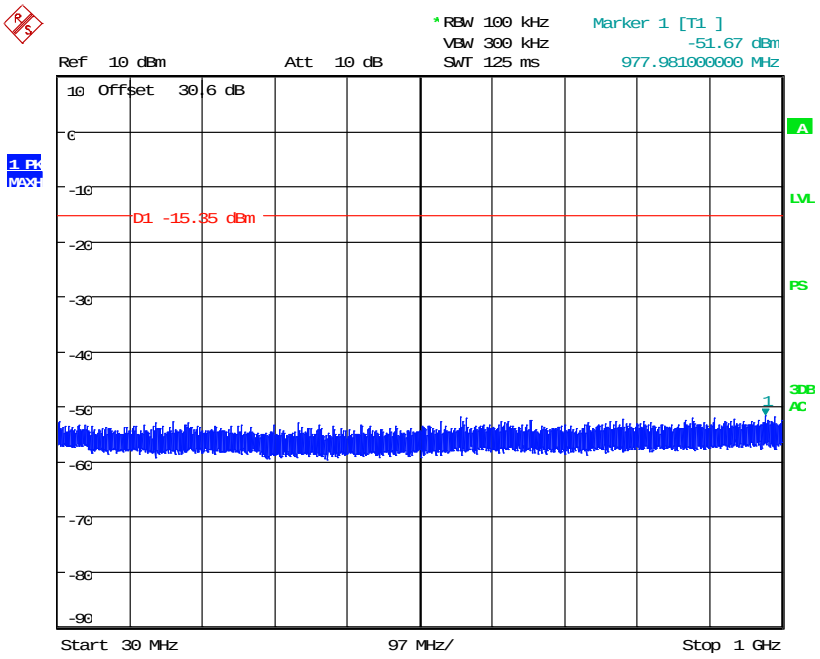


Figure 7.5.2.2-25: 30 MHz – 1 GHz – Low Channel (8DPSK)

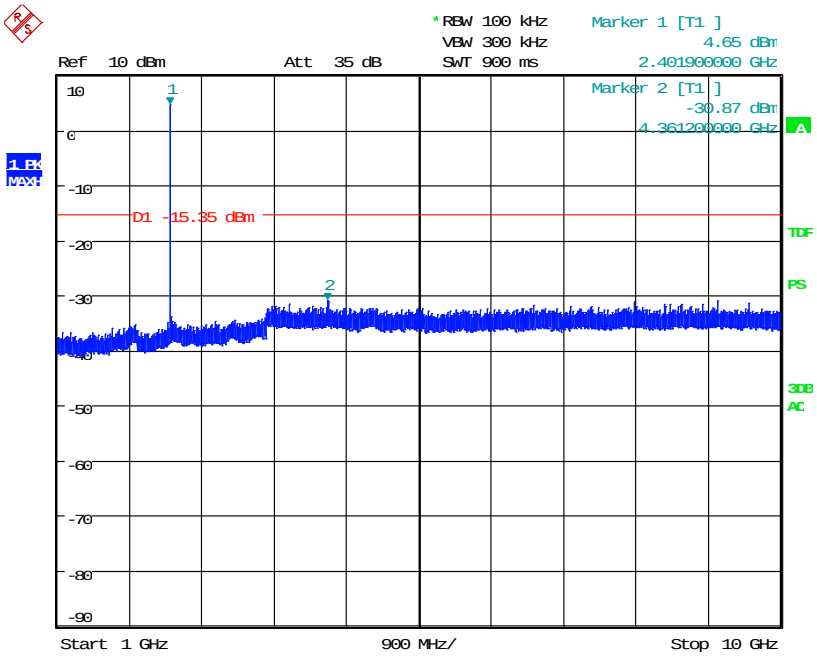


Figure 7.5.2.2-26: 1 GHz –10 GHz – Low Channel (8DPSK)

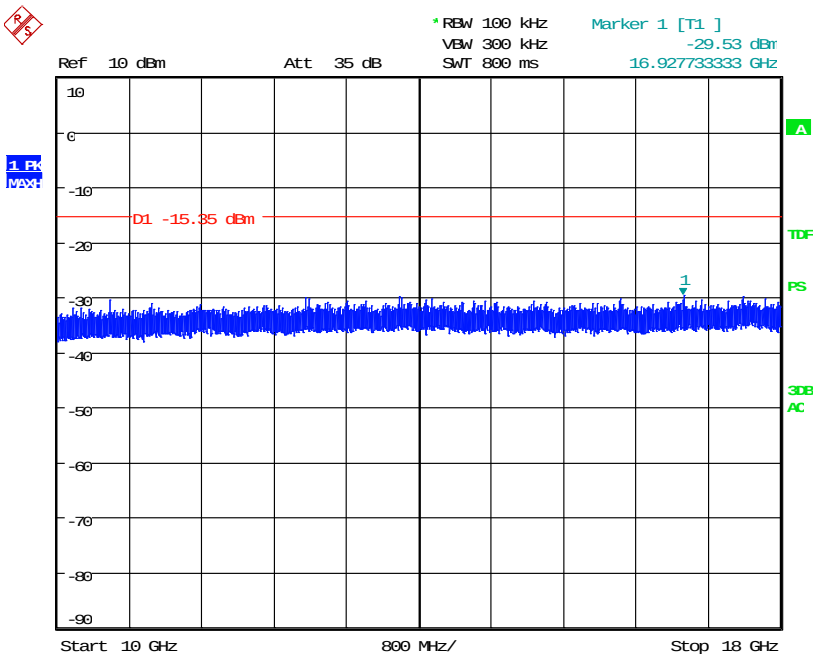


Figure 7.5.2.2-27: 10 GHz –18 GHz – Low Channel (8DPSK)

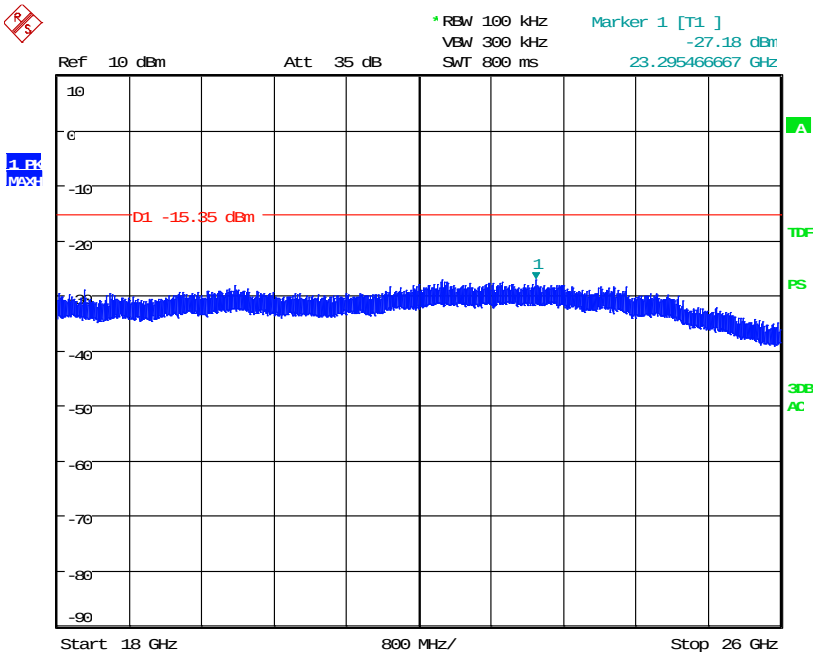


Figure 7.5.2.2-28: 18 GHz –26 GHz – Low Channel (8DPSK)

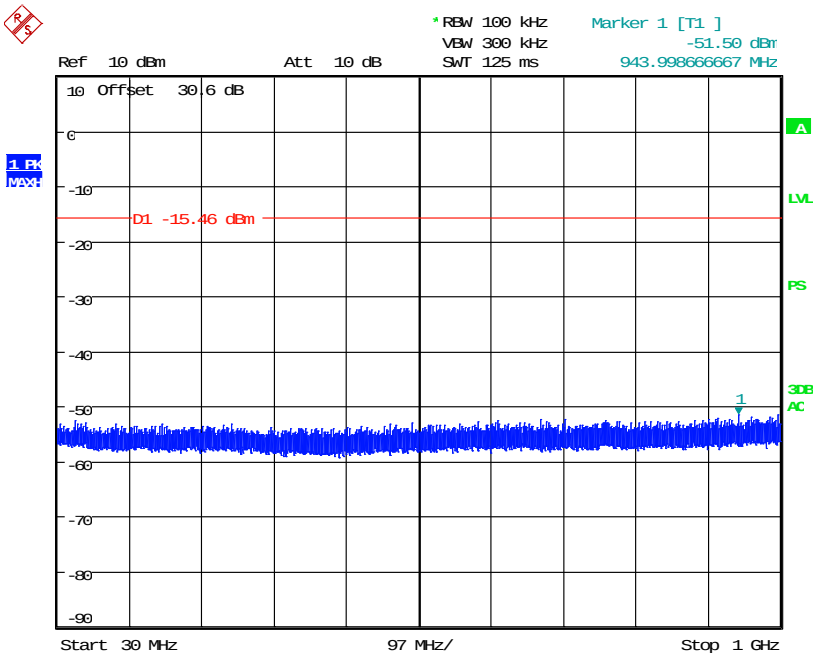


Figure 7.5.2.2-29: 30 MHz – 1 GHz –Middle Channel (8DPSK)

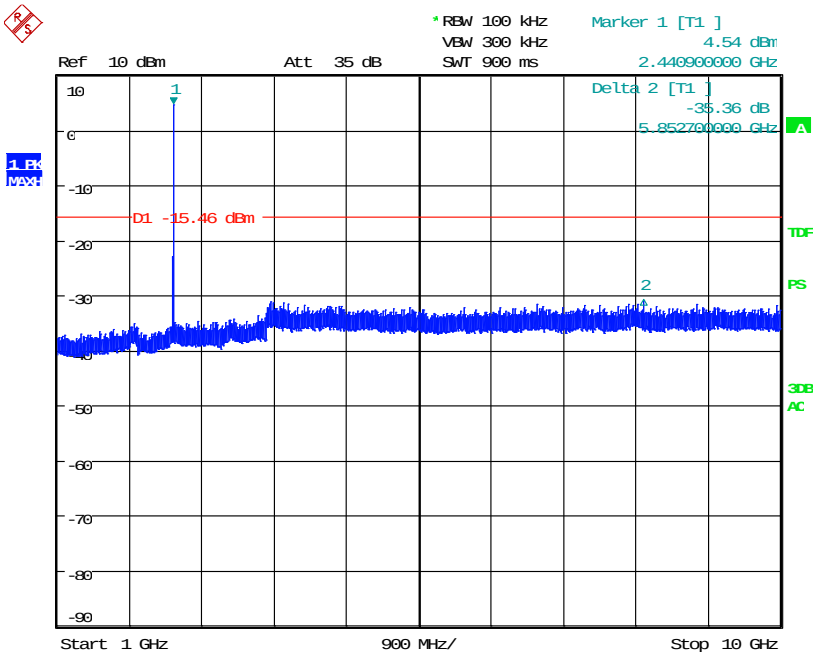


Figure 7.5.2.2-30: 1 GHz –10 GHz – Middle Channel (8DPSK)

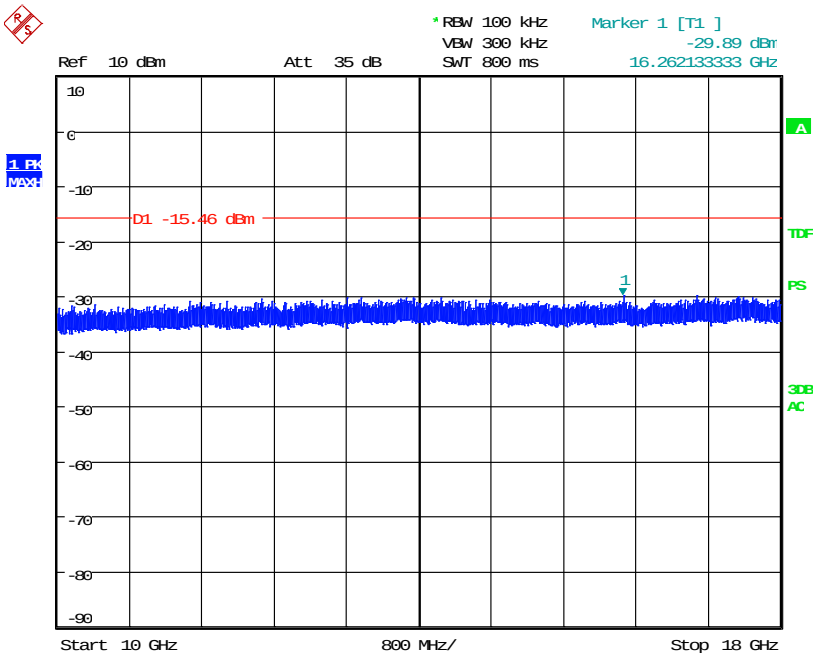


Figure 7.5.2.2-31: 10 GHz –18 GHz – Middle Channel (8DPSK)

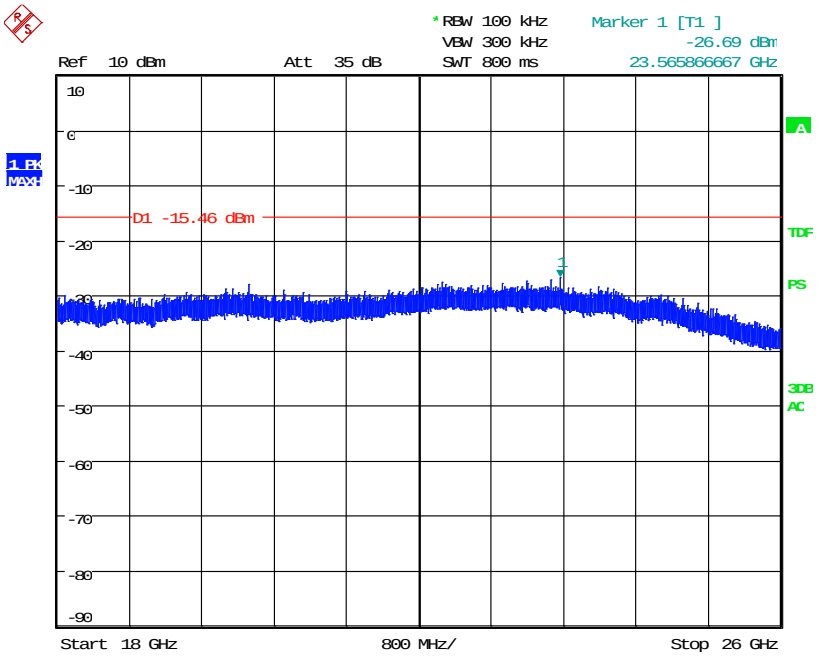


Figure 7.5.2.2-32: 18 GHz –26 GHz – Middle Channel (8DPSK)

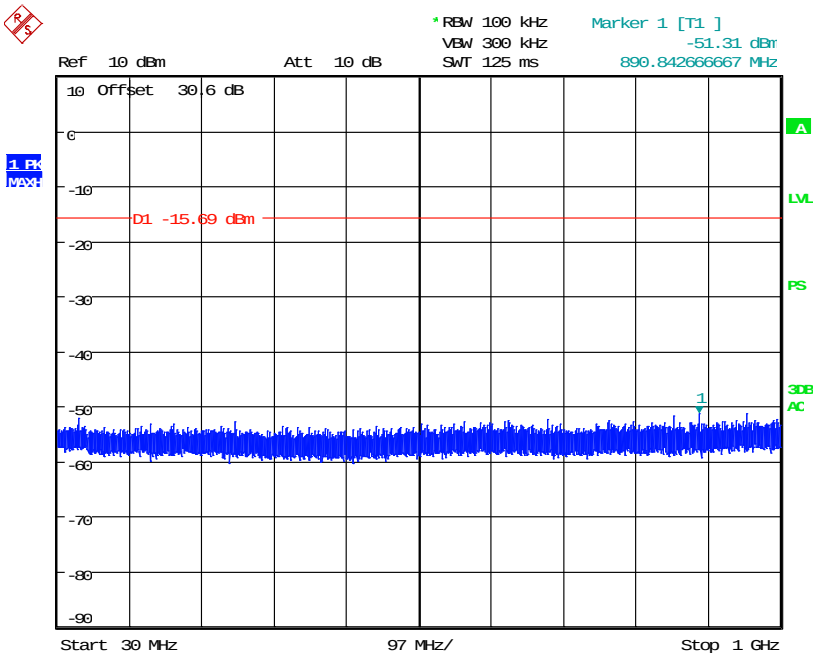


Figure 7.5.2.2-33: 30 MHz – 1 GHz – High Channel (8DPSK)

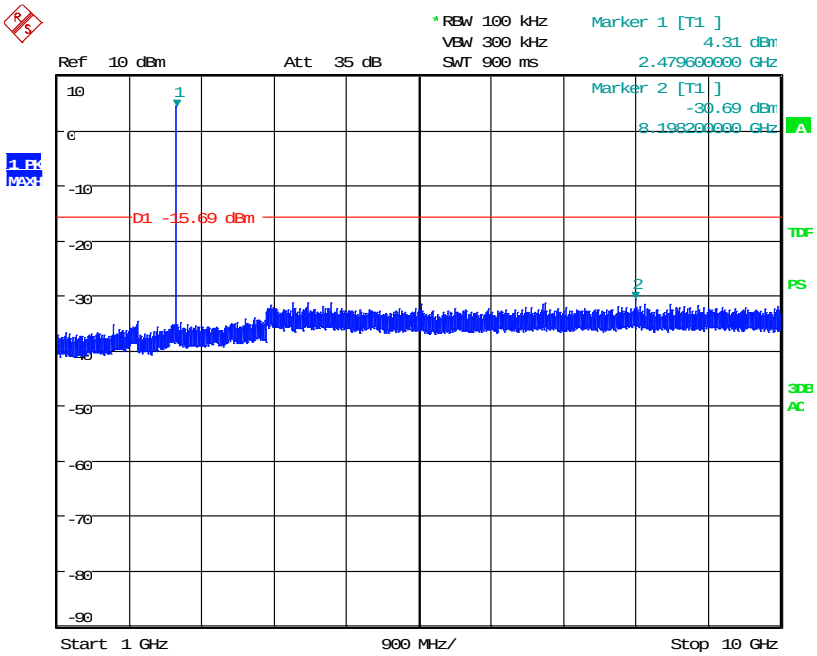


Figure 7.5.2.2-34: 1 GHz –10 GHz –High Channel (8DPSK)

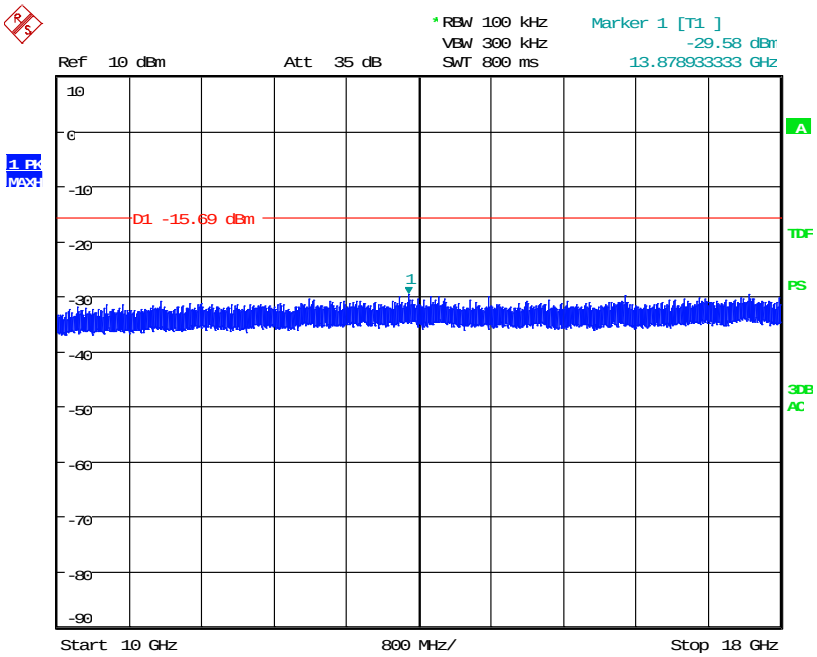


Figure 7.5.2.2-35: 10 GHz –18 GHz – High Channel (8DPSK)

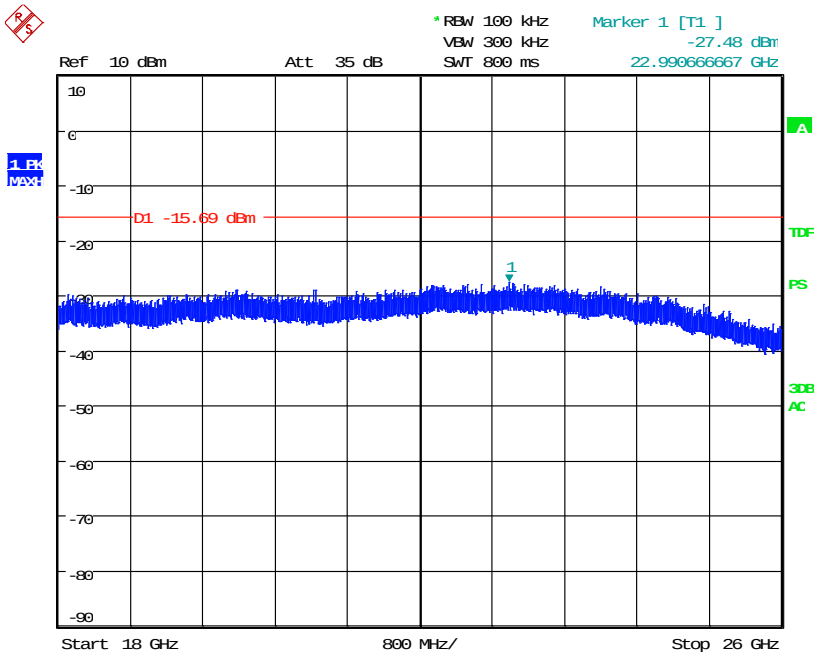


Figure 7.5.2.2-36: 18 GHz –26 GHz – High Channel (8DPSK)

7.5.4 Radiated Spurious Emissions within the Restricted Bands - FCC Section 15.205 IC: RSS-Gen 7.2.2

7.5.4.1 Measurement Procedure

Radiated emissions tests were made over the frequency range of 30 MHz to 26 GHz, 10 times the highest fundamental frequency. Each emission found to be in a restricted band, as defined by FCC section 15.205 and RSS-Gen 7.2.2, was compared to the radiated emission limits defined in FCC Section 15.209 and RSS-Gen 7.2.5.

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 120 kHz and a video bandwidth VBW of 300 kHz. For frequencies above 1000 MHz, peak and average measurements made with RBW and VBW of 1 MHz and 3 MHz respectively.

The EUT was caused to generate a continuous carrier signal on the hopping channel.

7.5.4.2 Measurement Results

Radiated spurious emissions found in the restricted frequency bands of 30MHz to 26 GHz are reported in the tables below.

Table 7.5.4.2-1: Radiated Spurious Emissions Tabulated Data - GFSK

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
4804	46.22	35.82	H	-0.27	45.95	35.55	74.0	54.0	28.1	18.5
4804	46.18	34.88	V	-0.27	45.91	34.61	74.0	54.0	28.1	19.4
12010	42.80	31.22	H	12.72	55.52	43.94	83.5	63.5	28.0	19.6
19216	45.10	34.08	H	10.94	56.04	45.02	83.5	63.5	27.5	18.5
19216	45.40	33.92	V	10.94	56.34	44.86	83.5	63.5	27.2	18.6
Middle Channel										
4882	45.49	33.66	H	-0.04	45.45	33.62	74.0	54.0	28.5	20.4
4882	45.77	34.32	V	-0.04	45.73	34.28	74.0	54.0	28.3	19.7
7323	47.61	36.23	H	5.59	53.20	41.82	74.0	54.0	20.8	12.2
7323	50.37	42.39	V	5.59	55.96	47.98	74.0	54.0	18.0	6.0
19528	42.68	30.91	H	11.34	54.02	42.25	83.5	63.5	29.5	21.2
19528	45.05	33.89	V	11.34	56.39	45.23	83.5	63.5	27.1	18.3
High Channel										
4960	48.02	38.27	H	-0.19	47.83	38.08	74.0	54.0	26.2	15.9
4960	46.68	36.00	V	-0.19	46.49	35.81	74.0	54.0	27.5	18.2
7440	47.64	37.28	H	5.30	52.94	42.58	74.0	54.0	21.1	11.4
7440	51.17	43.47	V	5.30	56.47	48.77	74.0	54.0	17.5	5.2
19840	42.74	30.83	H	12.94	55.68	43.77	83.5	63.5	27.8	19.7
19840	44.76	33.33	V	12.94	57.70	46.27	83.5	63.5	25.8	17.2

Notes:

- All emissions above 19840 MHz were attenuated below the limits and the noise floor of the measurement equipment.
- The emissions above 10 GHz were preformed at a distance of 1m. The limits are corrected accordingly using a distance factor of 20*log(3/1) ≈ 9.5 dB.

Table 7.5.4.2-2: Radiated Spurious Emissions Tabulated Data – (π/4) DQPSK

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
4804	46.33	33.48	H	-0.27	46.06	33.21	74.0	54.0	27.9	20.8
4804	45.39	32.84	V	-0.27	45.12	32.57	74.0	54.0	28.9	21.4
12010	42.54	31.21	H	12.72	55.26	43.93	83.5	63.5	28.2	19.6
19216	44.02	31.68	H	10.94	54.96	42.62	83.5	63.5	28.5	20.9
19216	43.98	31.58	V	10.94	54.92	42.52	83.5	63.5	28.6	21.0
Middle Channel										
4882	46.06	33.52	H	-0.04	46.02	33.48	74.0	54.0	28.0	20.5
4882	46.19	34.22	V	-0.04	46.15	34.18	74.0	54.0	27.8	19.8
7323	46.79	34.88	H	5.59	52.38	40.47	74.0	54.0	21.6	13.5
7323	50.12	40.67	V	5.59	55.71	46.26	74.0	54.0	18.3	7.7
19528	41.36	29.48	H	11.34	52.70	40.82	83.5	63.5	30.8	22.7
19528	44.06	31.41	V	11.34	55.40	42.75	83.5	63.5	28.1	20.7
High Channel										
4960	46.98	35.39	H	-0.19	46.79	35.20	74.0	54.0	27.2	18.8
4960	46.50	34.95	V	-0.19	46.31	34.76	74.0	54.0	27.7	19.2
7440	48.51	37.89	H	5.30	53.81	43.19	74.0	54.0	20.2	10.8
7440	50.46	42.02	V	5.30	55.76	47.32	74.0	54.0	18.2	6.7
19840	42.55	29.91	H	12.94	55.49	42.85	83.5	63.5	28.0	20.7
19840	42.59	30.49	V	12.94	55.53	43.43	83.5	63.5	28.0	20.1

Notes:

- All emissions above 19840 MHz were attenuated below the limits and the noise floor of the measurement equipment.
- The emissions above 10 GHz were preformed at a distance of 1m. The limits are corrected accordingly using a distance factor of 20*log(3/1) ≈ 9.5 dB.

Table 7.5.4.2-3: Radiated Spurious Emissions Tabulated Data – 8DPSK

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel										
4804	45.45	33.19	H	-0.66	44.79	32.53	74.0	54.0	29.2	21.5
4804	45.43	33.03	V	-0.66	44.77	32.37	74.0	54.0	29.2	21.6
19216	44.56	31.50	H	10.94	55.50	42.44	83.5	63.5	28.0	21.1
19216	44.25	31.31	V	10.94	55.19	42.25	83.5	63.5	28.3	21.2
Middle Channel										
4882	45.66	33.44	H	-0.04	45.62	33.40	74.0	54.0	28.4	20.6
4882	45.82	34.35	V	-0.04	45.78	34.31	74.0	54.0	28.2	19.7
7323	46.58	35.13	H	5.59	52.17	40.72	74.0	54.0	21.8	13.3
7323	50.23	40.21	V	5.59	55.82	45.80	74.0	54.0	18.2	8.2
19528	41.43	29.66	H	11.34	52.77	41.00	83.5	63.5	30.7	22.5
19528	43.21	31.21	V	11.34	54.55	42.55	83.5	63.5	28.9	20.9
High Channel										
4960	46.87	35.30	H	-0.19	46.68	35.11	74.0	54.0	27.3	18.9
4960	47.45	35.14	V	-0.19	47.26	34.95	74.0	54.0	26.7	19.1
7440	48.35	37.48	H	5.30	53.65	42.78	74.0	54.0	20.3	11.2
7440	50.93	41.52	V	5.30	56.23	46.82	74.0	54.0	17.8	7.2
19840	41.76	29.79	H	12.94	54.70	42.73	83.5	63.5	28.8	20.8
19840	42.19	30.09	V	12.94	55.13	43.03	83.5	63.5	28.4	20.5

Notes:

- All emissions above 19840 MHz were attenuated below the limits and the noise floor of the measurement equipment.
- The emissions above 10 GHz were preformed at a distance of 1m. The limits are corrected accordingly using a distance factor of 20*log(3/1) ≈ 9.5 dB.

7.5.4.3 Sample Calculation:

$R_C = R_U + CF_T$

Where:

CF_T	=	Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R_U	=	Uncorrected Reading
R_C	=	Corrected Level
AF	=	Antenna Factor
CA	=	Cable Attenuation
AG	=	Amplifier Gain
DC	=	Duty Cycle Correction Factor

Example Calculation: Peak
Corrected Level: 46.22+ (-0.27 = 45.95 dBµV/m
Margin: 74 dBµV/m – 45.95 dBµV/m = 28.1dB

Example Calculation: Average
Corrected Level: 35.82 + (-0.27) = 35.55 dBµV/m
Margin: 54 dBµV/m – 35.55 dBµV/m = 18.5dB

8 CONCLUSION

In the opinion of ACS, Inc., the AAM28UMN9KA1AN manufactured by Motorola Solutions SDNBHD meets the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-210.

END REPORT