

Nemko Korea Co., Ltd.

165-51, Yurim-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, 17042, Republic of Korea

TEL: +82 31 330-1700

FAX: +82 31 322 2332

FCC EVALUATION REPORT FOR CERTIFICATION

Project No. : NK-26-R-251**Dates of receipt :** July 6, 2026**Applicant :** QUDELIX, Inc.**Dates of Issue :** September 18, 2026B-1316, 190 Soha-ro., Gwangmyeong-si,
Gyeonggi-do, 14322, Korea (the Republic of)**Test Site :**

Nemko Korea Co., Ltd.

FCC ID :

2AVUO-5KP

Applicant :

QUDELIC, Inc.

Brand Name :**Model:**

Qudelix-5K Plus

Additional Model(s):

-

EUT Type:

BLUETOOTH DAX/AMP

Classification:

FCC Part 15 Spread Spectrum Transmitter (DSS)

Date of Test:

August 10, 2026 ~ August 28, 2026

Applied Standard:

FCC 47 CFR Part 15.247

The device bearing the brand name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2020. The client should not use it to claim product endorsement by TAF or any government agencies. The test results in the report only apply to the tested sample.

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them. This test report is prepared according to the requirements of ISO / IEC 17025.



Tested by : Jaehyong Lee
Test Engineer



Reviewed by : Hoonpyo Lee
Technical Manager

Revision History

Rev.	Issue Date	Revisions	Revised By
00	September 18, 2026	Initial issue	Jaehyong Lee

TABLE OF CONTENTS

1. INTRODUCTION.....	5
1.1 Test facility.....	5
2.2 Accreditation and listing.....	5
2. EUT INFORMATION & TEST CONDITIONS	6
2.1 EUT Information	6
2.2 Operation During Test.....	7
2.3 Support Equipment.....	9
2.4 Setup Drawing.....	9
3. ANTENNA REQUIREMENTS.....	10
4. SUMMARY OF TEST RESULTS	11
5. TEST METHODOLOGY	11
6. DESCRIPTION OF TESTS	12
6.1 Duty Cycle.....	12
6.2 20 dB Bandwidth	13
6.3 Carrier Frequency Separation	14
6.4 Average Time of Occupancy	15
6.5 Number of Hopping Channels	16
6.6 Peak Output Power	17
6.7 Conducted Spurious Emissions.....	18
6.8 Radiated Emissions.....	19
6.9 AC Line Conducted Emissions	20
7. TEST DATA.....	21
7.1 Duty Cycle.....	21
7.2 20 dB Bandwidth	23
7.3 Carrier Frequency Separation	26
7.4 Average Time of Occupancy.....	28
7.5 Number of Hopping Channels	35
7.6 Peak Output Power	38
7.7 Conducted Spurious Emissions.....	41
7.8 Radiated Spurious Emissions.....	46
7.9 Radiated Band Edge	50
7.10 Radiated Emissions_Below 1GHz	54
7.11 AC Line Conducted Emissions.....	56

8. TEST EQUIPMENT	58
9. ACCURACY OF MEASUREMENT & DECISION RULE	59
9.1 Uncertainty Calculation.....	59
9.2 Decision rule	59

1. INTRODUCTION

1.1 Test facility

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4-2014), the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2020) was used in determining radiated and conducted emissions emanating.

These measurement tests were conducted at **Nemko Korea Co., Ltd.**

The site address 165-51, Yurim-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, 17042, Rep. of Korea.

2.2 Accreditation and listing

Accreditation type		Accreditation number
	CAB Accreditation for DOC	Designation No. KR0026
	KOLAS Accredited Lab. (Korea Laboratory Accreditation Scheme)	Registration No. KT155
	Canada IC Registered site	Site No. 29506
	VCCI registration site(RE/CE/Telecom CE)	Member No. 2118
	EMC CBTL	TL124
	KCC(RRL)Designated Lab.	Registration No. KR0026

2. EUT INFORMATION & TEST CONDITIONS

2.1 EUT Information

2.1.1 Specifications:

EUT Type	BLUETOOTH DAC/AMP
Model Name	Qudelix-5K Plus
Frequency of Operation	2 402 MHz ~ 2 480 MHz
Peak Output Power (Conducted)	14.56 dBm
Number of Channels	79 CH
Modulations	GFSK, $\pi/4$ DQPSK, 8DPSK
Antenna Gain (peak)	2.87 dBi
Antenna Setup	1TX / 1RX
EUT Test Voltage	DC 3.7 V
Temperature Range	-10 °C ~ 50 °C
Hardware Version	4.0
Software Version	1.0
Remarks	-

2.2 Operation During Test

The EUT is a transceiver supporting Bluetooth v5.4 with Bluetooth BR/EDR, LE 1M, and LE 2M modes. The EUT was controlled by the BlueTest Tool running on a laptop PC to continuously transmit on the desired TX channel (duty cycle < 98%).

During testing, the EUT was powered by its internal 3.7 Vdc battery and connected to a laptop PC via a USB Type-C charging cable.

The EUT was tested on the lowest, middle, and highest channels at the maximum output power in accordance with the manufacturer's specifications. The worst-case data were recorded in this report.

2.2.1 Table of Test power setting

Frequency	Mode	Modulation	Power setting Level
2 402 MHz ~ 2 480 MHz	BDR	GFSK	6
	EDR	$\pi/4$ DQPSK, 8DPSK	7

2.2.2 Table of Test frequency

Frequency band	Modulation	Test Channel (CH)	Frequency (MHz)
2.4 GHz	GFSK, $\pi/4$ DQPSK, 8DPSK	0	2 402
		39	2 441
		78	2 480

2.2.3 Antenna Information

Frequency band	Modulation	Antenna TX mode	Support CDD	Support MIMO
2.4 GHz	GFSK, $\pi/4$ DQPSK, 8DPSK	☒ 1TX, ☐ 2TX	☐ Yes, ☒ No	☐ Yes, ☒ No

2.2.4 Additional Information Related to Testing

The cable and attenuator loss from 30 MHz to 26.5 GHz was reflected in spectrum analyzer with correction factor for all conducted testing.

2.2.5 Worst-case Configuration and Mode

Radiated emission below 1GHz was performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Radiated emission above 1GHz was performed with the EUT set to transmit low/mid/high channels.

The emissions (Band-edge & spurious emissions) were investigated in three orthogonal orientations X, Y and Z.

Accordingly, the orientation was determined and tested as shown in the table below:

Test Items	X	Y	Z
Band-edge	O	-	-
Spurious emissions	O	-	-

The peak output power of the GFSK, $\pi/4$ DQPSK, and 8DPSK modes was investigated. The GFSK and 8DPSK modes exhibited the worst-case results. Therefore, the radiated emission test plots are based on these modes to demonstrate compliance.

2.2.6 Maximum Output Power

The maximum peak and average conducted output powers of the transmitter are as follows:

Frequency (MHz)	Mode	Power Type	Output Power (dBm)	Output Power (mW)
2 402 ~ 2 480	GFSK	Peak	10.61	11.51
		Average	10.55	11.35
	$\pi/4$ DQPSK	Peak	14.56	28.58
		Average	11.97	15.74
	8DPSK	Peak	15.14	32.66
		Average	11.97	15.74

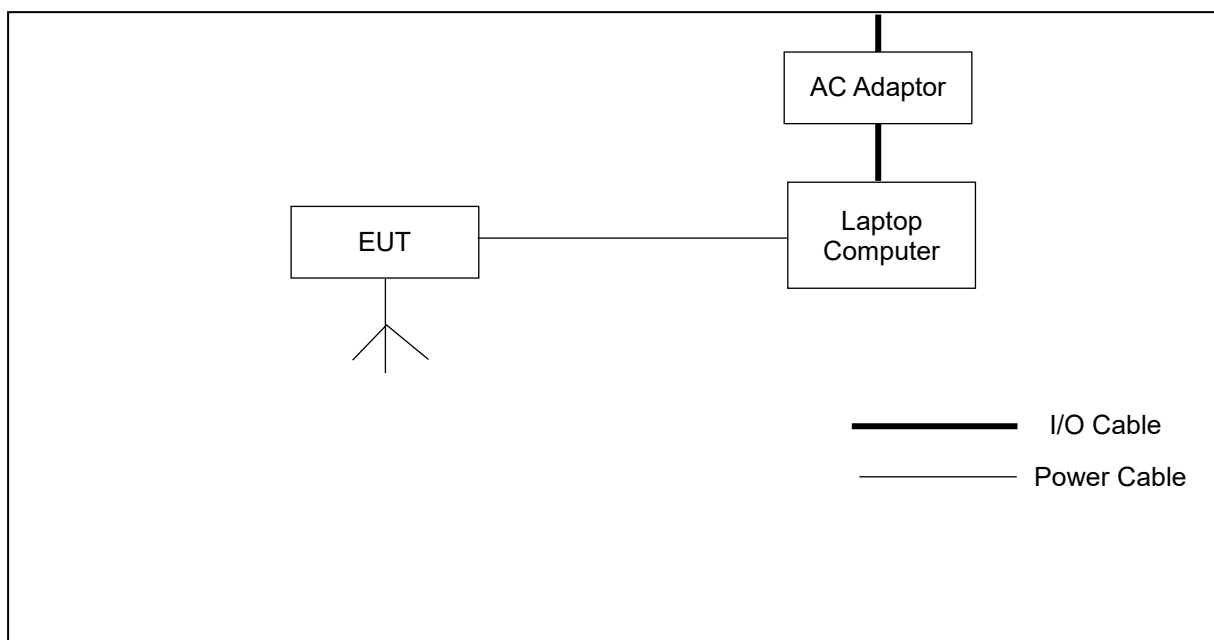
2.2.7 Additional model covered by this report

- N/A

2.3 Support Equipment

EUT	QUDELIX, Inc. Model : Qudelix-5k Plus	S/N: N/A
Laptop Computer	DELL MODEL : P56F	FCC DOC S/N : 17ZYNQ2
AC/DC Adapter	DELTA ELECTRONICS(JIANGSU) MODEL : DA130PM130	FCC DOC S/N : 09TXK7
Laptop Computer	LG MODEL : 15U47	FCC DOC S/N : 709QCTB565737
AC/DC Adapter	Chicony Power Technology MODEL : A13-040N3A	FCC DOC S/N : A040R066C

2.4 Setup Drawing



3. ANTENNA REQUIREMENTS

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 15.

§15.203 of the FCC Rules part 15 Subpart C

: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The antenna of the EUT and there are no provisions for connection to an external antenna. It complies with the requirement of §15.203.

The transmitter has a permanently attached LDS antenna inside the EUT enclosure.

Used Antenna	
Model name	2 402 MHz ~ 2 480 MHz
	Max. peak gain (dBi)
Qudelix 5K PRO	2.87

4. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specification:

Name of Test	FCC Paragraph No.	Test Limit	Test Condition	Result	Remark
20 dB Bandwidth	15.247(a)(1)(iii)	-	Conducted	Complies	-
Peak Output Power	15.247(b)(1)	< 125 mW		Complies	-
Carrier Frequency Separation	15.247(a)(1)	> two-thirds of the 20 dB bandwidth		Complies	-
Number of Hopping Channel	15.247(a)(1)(iii)	More than 15 channels		Complies	-
Average Time of Occupancy	15.247(a)(1)(iii)	< 0.4 s in 31.6 sec period		Complies	-
Band Edge / Conducted Spurious Emission	15.247(d)	$\geq$ 20 dBc		Complies	-
Radiated Spurious Emission	15.205, 15.209	< 74 dB μ V/m (PK) < 54 dB μ V/m (AV) Radiated limits detailed in 15.209	Radiated	Complies	-
AC Line Conducted Emission	15.207	FCC 15.207 Limits	Line Conducted	Complies	-

5. TEST METHODOLOGY

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 558074 D01 15.247 Meas Guidance v05r02.
4. ANSI C63.10-2020.

6. DESCRIPTION OF TESTS

6.1 Duty Cycle

Test Setup



Test Measurement Method

ANSI C63.10-2020, Section 11.6

Test Procedure

EUTs Duty Cycle is measured at low channel with a spectrum analyzer connected to the antenna terminal while the EUTs operating at its maximum power control level.

The spectrum analyzer setting is as follows.

RBW $\geq$ OBW

VBW $\geq$ RBW

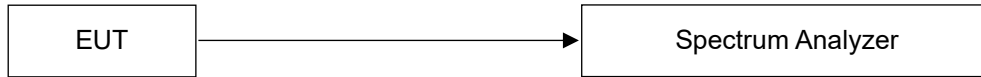
Span = zero span

Detector = Peak

The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$ and the number of sweep points across duration T exceeds 100.

6.2 20 dB Bandwidth

Test Setup



Test Measurement Method

ANSI C63.10-2020, Section 6.9.2

Test Procedure

The transmitter is set to the Low, Middle, High channels is connected to the spectrum analyzer.

Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hopping channel

RBW = 1% to 5% of the OBW

VBW = approximately 3 x RBW

Detector = Peak

Trace mode = max hold

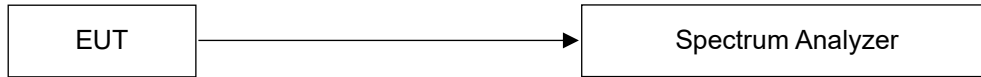
Sweep = auto

Allow trace to fully stabilize.

The bandwidth measurement function on the spectrum analyzer is used to measure the 20 dB bandwidth.

6.3 Carrier Frequency Separation

Test Setup



Test Measurement Method

ANSI C63.10-2020, Section 7.8.2

Test Procedure

The EUT must have its hopping function enabled. The following spectrum analyzer setting is used.

Span = wide enough to capture the peaks of two adjacent channels

RBW $\geq$ approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel

VBW $\geq$ RBW

Sweep = auto

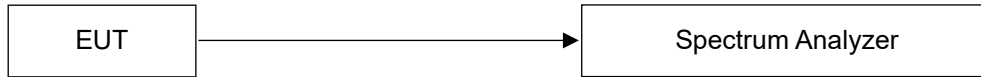
Detector = peak

Trace = max hold

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

6.4 Average Time of Occupancy

Test Setup



Test Measurement Method

ANSI C63.10-2020, Section 7.8.4

Test Procedure

The transmitter output is connected to a spectrum analyzer. The following spectrum analyzer setting is used.

Span = Zero span, centered on a hopping channel

RBW shall be $\leq$ channel spacing and where possible RBW should be set $\gg 1 / T$, where T is the expected dwell time per channel.

VBW $\geq$ RBW

Sweep = as necessary to capture the entire dwell time per hopping channel

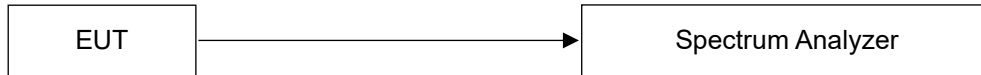
Detector = Peak

Trace = Single sweep

Use the marker-delta function to determine the width of pulse

6.5 Number of Hopping Channels

Test Setup



Test Measurement Method

ANSI C63.10-2020, Section 7.8.3

Test Procedure

Span = The frequency band of operation.

RBW = less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.

VBW $\geq$ RBW

Sweep = Auto

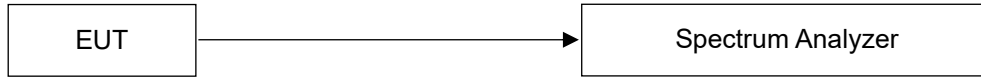
Detector = Peak

Trace = Max hold

Allow trace to fully stabilize.

6.6 Peak Output Power

Test Setup



Test Measurement Method

ANSI C63.10-2020, Section 7.8.5

Test Procedure

The transmitter is set to the Low, Middle, High channels is connected to the spectrum analyzer.

Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

RBW > 20 dB bandwidth of the emission being measured

VBW ≥ RBW

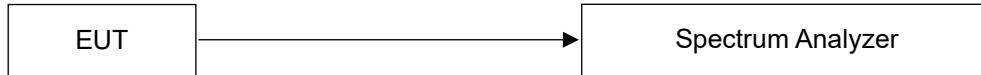
Sweep = auto

Detector = peak

Trace = max hold

6.7 Conducted Spurious Emissions

Test Setup



Test Measurement Method

ANSI C63.10-2020, Section 7.8.7

Test Procedure

Measurements are made over the 30 MHz to 26.5 GHz range with the transmitter set to the Lowest, middle and highest channels.

RBW = 100 kHz

VBW = 300 kHz

Sweep = auto

Detector = peak

Trace = max hold

6.8 Radiated Emissions

Test Measurement Method

ANSI C63.10-2020, Section 6.3, Section 6.6, Section 7.8.8

Test Procedure

The measurement was performed at the test site that is specified in accordance with ANSI C63.10-2020. The spurious emission was scanned from 9 kHz to 30 MHz using Loop Antenna and 30 to 1000 MHz using Trilog broadband test antenna. Above 1 GHz, Horn antenna was used.

For emissions testing at below 1GHz, The test equipment was placed on turntable with 0.8 m above ground. For emission measurements above 1 GHz, The test equipment was placed on turntable with 1.5 m above ground. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The EUT, cable, wire arrangement and mode of operation that has the highest amplitude relative to the limit was selected. Then, the turn table was rotated from 0° to 360° and an antenna mast was moved from 1 m to 4 m height to maximize the suspected highest amplitude signal. The final maximized level was recorded.

At frequencies below 1000 MHz, measurements performed using the CISPR quasi-peak detection. At frequencies above 1000 MHz, measurements performed using the peak and average measurement procedures described in ANSI 63.10-2020 section 11.12. Peak emission levels were measured by setting the analyzer RBW = 1 MHz, VBW = 3 MHz, Detector = Peak, Trace mode = max hold. Average emission levels were measured by setting the analyzer RBW = 1 MHz, VBW = 1 kHz, Detector = Peak, Trace mode = max hold. Allow max hold to run for at least 50 times (1/duty cycle) traces.

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

Radiated Emissions Limits per 47 CFR 15.209(a)

6.9 AC Line Conducted Emissions

Test Measurement Method

ANSI C63.10-2020, Section 6.2

Test Procedure

The Line conducted emission test facility is located inside a 4 x 7 x 2.5 meter shielded enclosure.

It is manufactured by EM engineering. The shielding effectiveness of the shielded room is in accordance with MIL-STD-285 or NSA 65-6. A 1 m x 1.5 m wooden table 0.8 m height is placed 0.4 m away from the vertical wall and 1.5 m away from the side of wall of the shielded room. Rohde & Schwarz (ENV216) of the 50 ohm/50 μ H Line Impedance Stabilization Network (LISN) are bonded to the shielded room. The EUT is powered from the Rohde & Schwarz LISN. Power to the LISNs are filtered by high-current high insertion loss Power line filters. The purpose of filter is to attenuate ambient signal interference and this filter is also bonded to shielded enclosure. All electrical cables are shielded by tinned copper zipper tubing with inner diameter of 1 / 2 ". If DC power device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the LISNs, All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1 meter length. Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT. The spectrum was scanned from 150 kHz to 30 MHz with 200 msec sweep time. The frequency producing the maximum level was re-examined using the EMI test receiver. (Rohde & Schwarz ESCI). The detector functions were set to CISPR quasi-peak mode & average mode. The bandwidth of receiver was set to 9 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by; switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; whichever determined the worst case emission.

Each EME reported was calibrated using the R&S signal generator.

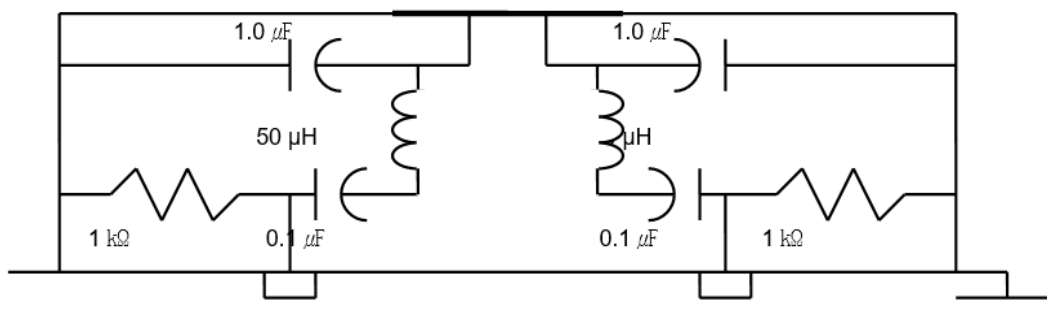


Fig. 2. LISN Schematic Diagram

7. TEST DATA

7.1 Duty Cycle

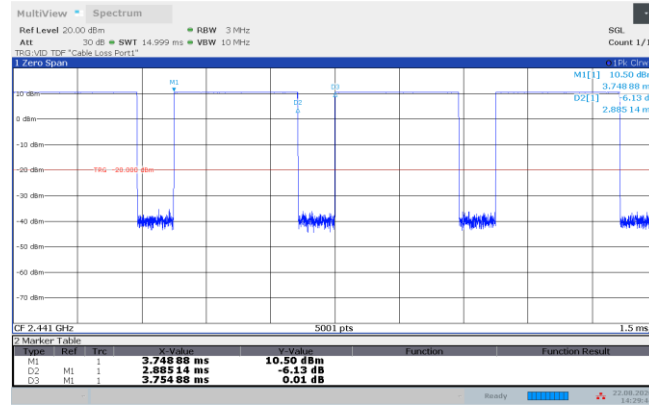
For reporting purposes only.

Result

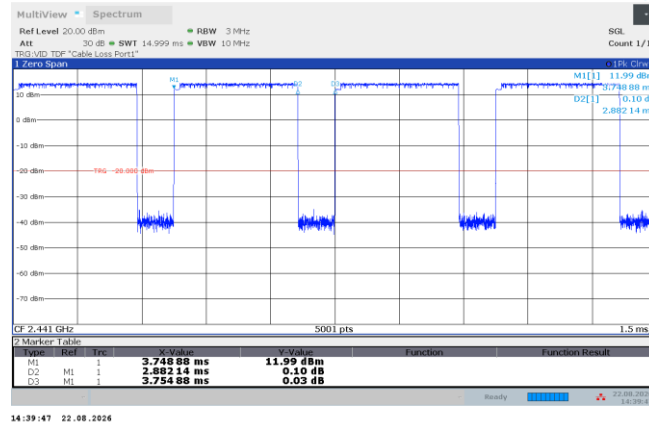
Mode	On time [msec]	Period [msec]	Duty Cycle [%]	1/T Minimum VBW [kHz]
GFSK	2.885	3.755	76.84	0.35
$\pi/4$ DQPSK	2.882	3.755	76.76	0.35
8DPSK	2.885	3.755	76.84	0.35

PLOTS OF EMISSIONS

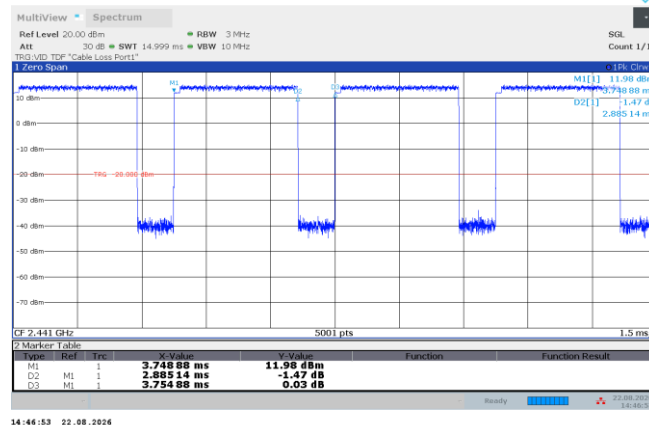
GFSK



$\pi/4$ DQPSK



8DPSK



7.2 20 dB Bandwidth

FCC §15.247(a)(2)

Test Mode : Set to Lowest channel, Middle channel and Highest channel

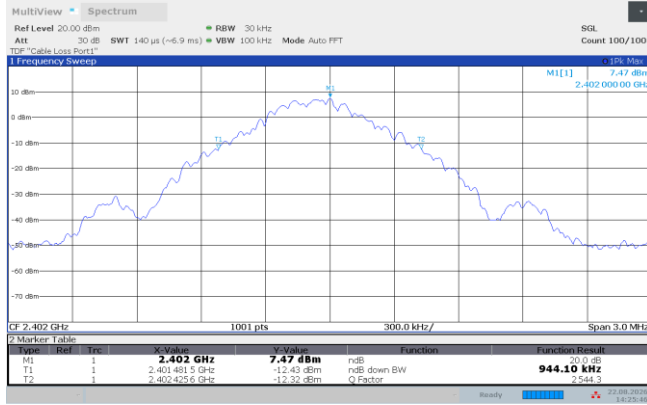
Result

Modulation	Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
GFSK	Lowest	2 402	0.94
	Middle	2 441	0.91
	Highest	2 480	0.91
$\pi/4$ DQPSK	Lowest	2 402	1.35
	Middle	2 441	1.35
	Highest	2 480	1.35
8DPSK	Lowest	2 402	1.32
	Middle	2 441	1.34
	Highest	2 480	1.35

PLOTS OF EMISSIONS

GFSK

Lowest Channel

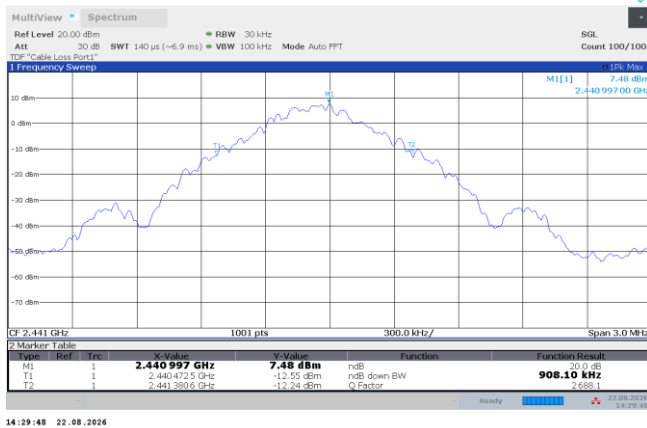


$\pi/4$ DQPSK

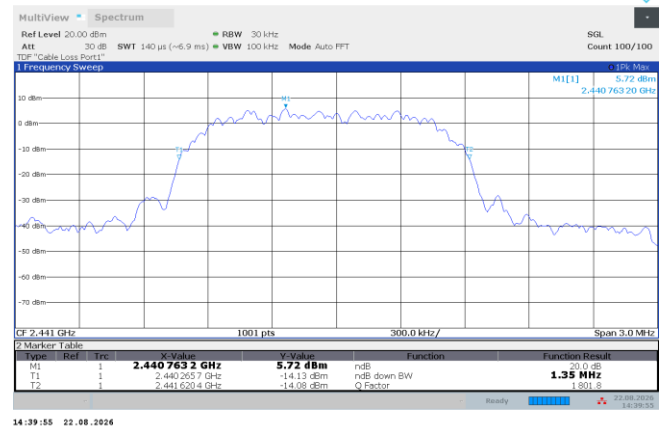
Lowest Channel



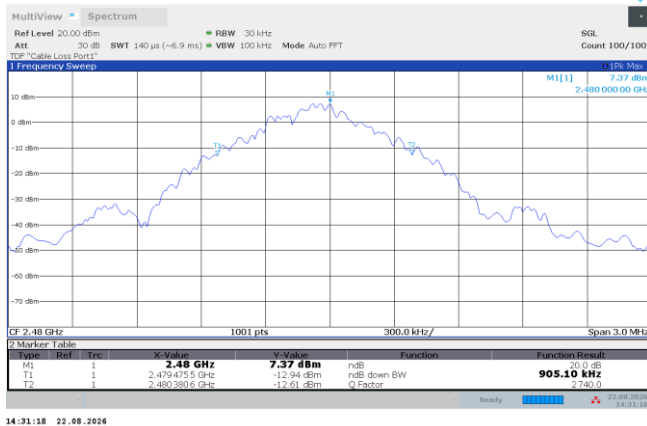
Middle Channel



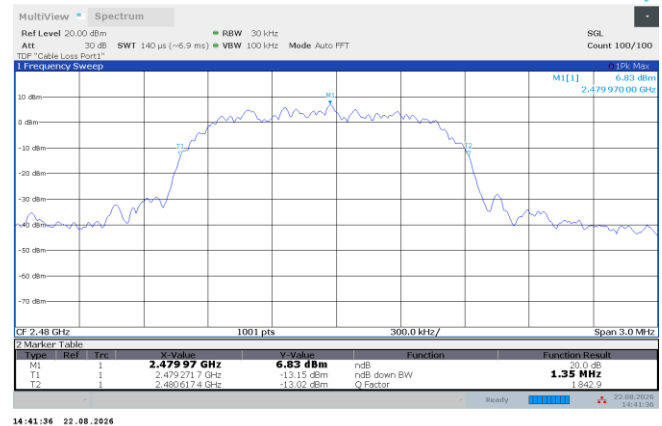
Middle Channel



Highest Channel

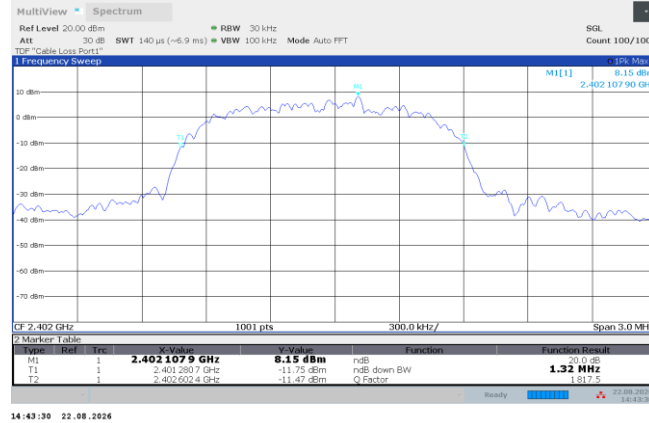


Highest Channel



8DPSK

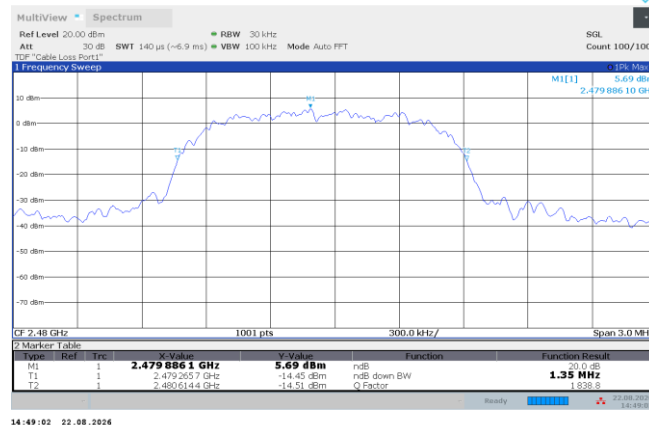
Lowest Channel



Middle Channel



Highest Channel



7.3 Carrier Frequency Separation

FCC §15.247(a)(1)

Test Mode : Set to Hopping mode

Result

Modulation	Carrier Frequency Separation (MHz)	Limit (2/3 of 20dB Bandwidth) (MHz)
GFSK	1.01	0.63
$\pi/4$ DQPSK	1.03	0.90
8DPSK	1.00	0.90

PLOTS OF EMISSIONS



7.4 Average Time of Occupancy

FCC §15.247(a)(1)

Test Mode : Set to Hopping mode

Result

Mode	Pulse width (ms)	Numbers of Pulse in 3.16 seconds	Average time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK_Nomal					
DH1	0.383	33	0.126	0.4	0.274
DH3	1.638	15	0.246	0.4	0.154
DH5	2.887	10	0.289	0.4	0.111
GFSK_AFH					
DH1	0.383	9	0.034	0.4	0.366
DH3	1.638	3	0.049	0.4	0.351
DH5	2.886	3	0.087	0.4	0.313
Mode	Pulse width (ms)	Numbers of Pulse in 3.16 seconds	Average time of Occupancy (sec)	Limit (sec)	Margin (sec)
$\pi/4$ DQPSK_Nomal					
DH1	0.385	32	0.123	0.4	0.277
DH3	1.637	15	0.246	0.4	0.154
DH5	2.885	4	0.115	0.4	0.285
$\pi/4$ DQPSK_AFH					
DH1	0.385	8	0.031	0.4	0.369
DH3	1.637	7	0.115	0.4	0.285
DH5	2.885	3	0.087	0.4	0.313
Mode	Pulse width (ms)	Numbers of Pulse in 3.16 seconds	Average time of Occupancy (sec)	Limit (sec)	Margin (sec)
8DPSK_Nomal					
DH1	0.385	32	0.123	0.4	0.277
DH3	1.636	12	0.196	0.4	0.204
DH5	2.887	10	0.289	0.4	0.111
8DPSK_AFH					
DH1	0.385	8	0.031	0.4	0.369
DH3	1.636	5	0.082	0.4	0.318
DH5	2.887	2	0.058	0.4	0.342

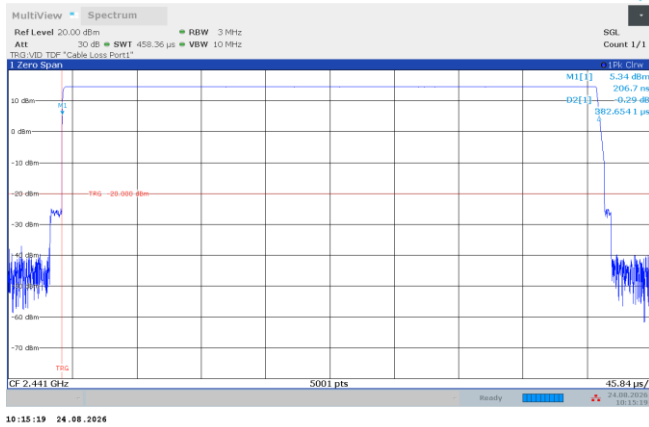
Notes:

- 1) The average time of occupancy during the specified 31.6 second period (79 channels $\times$ 0.4 s) is calculated as 10 $\times$ the number of pulses in 3.16 s $\times$ the pulse width (ms).
- 2) For AFH mode, the average time of occupancy during the specified 8 second period (20 channels $\times$ 0.4 s) is calculated as 10 $\times$ the number of pulses in 0.8 s $\times$ the pulse width (ms).

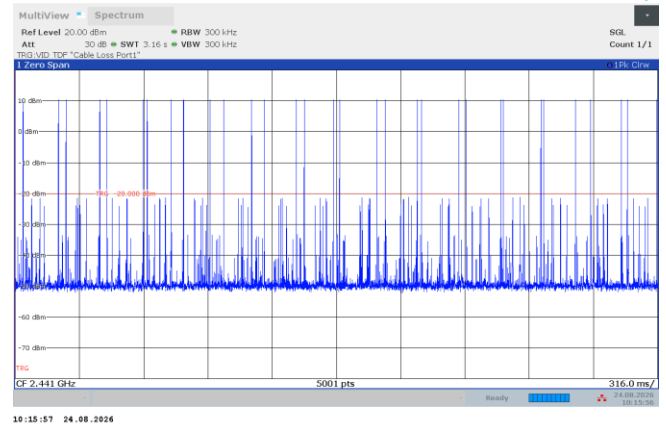
PLOTS OF EMISSIONS

GFSK_Normal

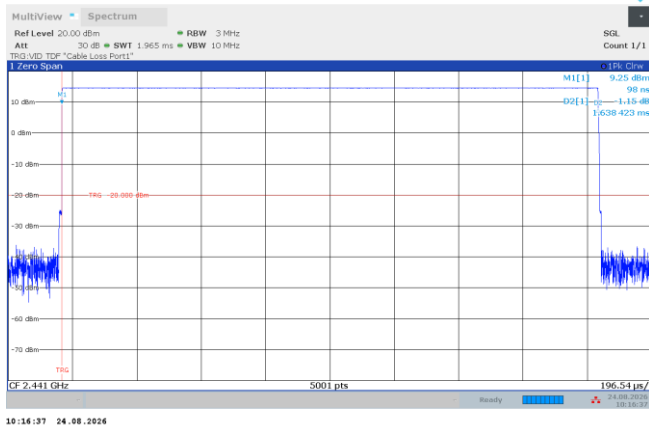
Pulse width_DH1



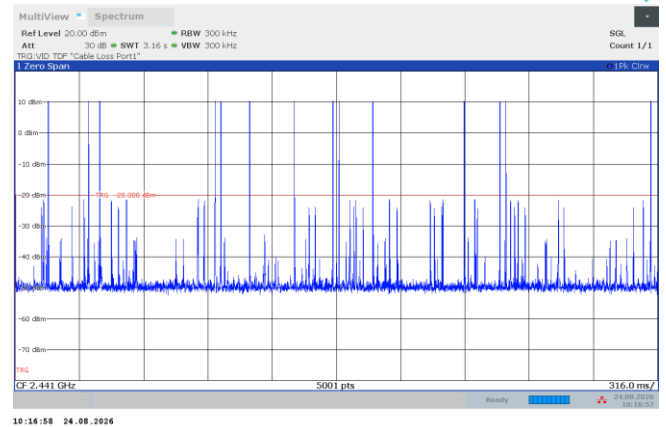
Numbers of Pulses in 3.16 Seconds_DH1



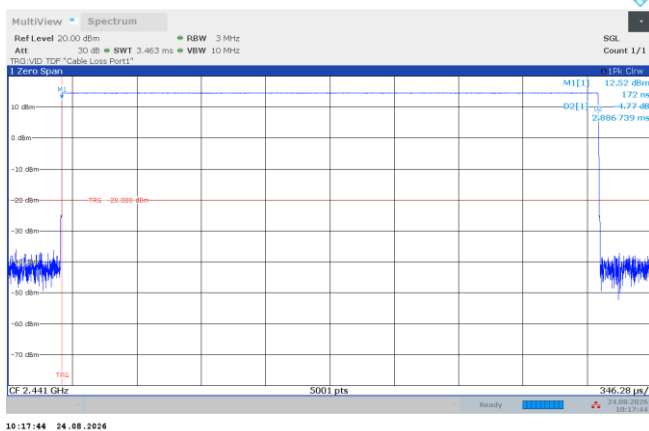
Pulse width_DH3



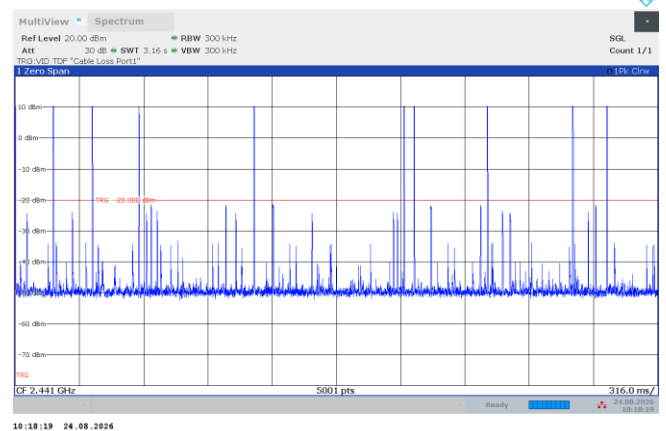
Numbers of Pulses in 3.16 Seconds_DH3



Pulse width_DH5

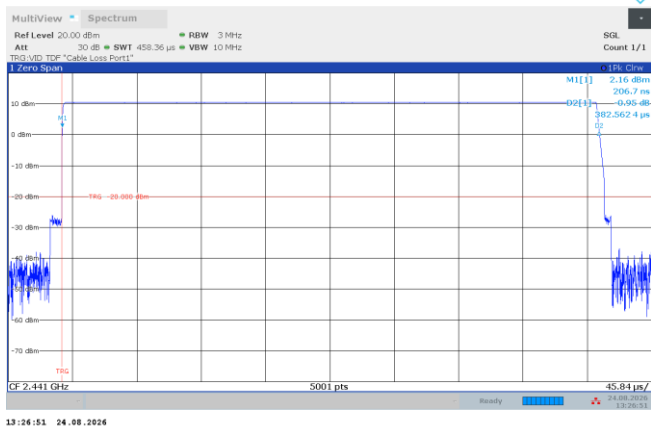


Numbers of Pulses in 3.16 Seconds_DH5

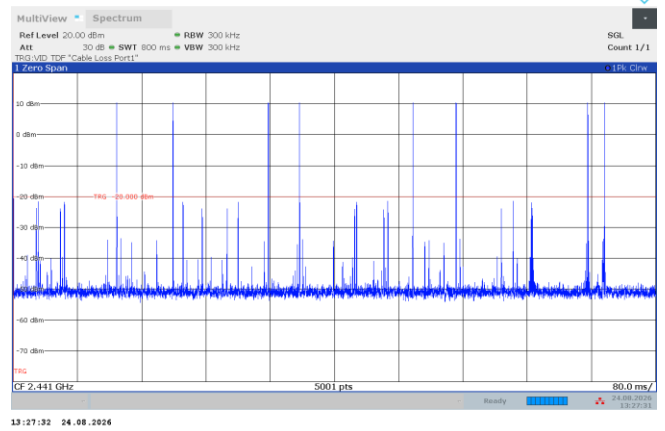


GFSK_AFH

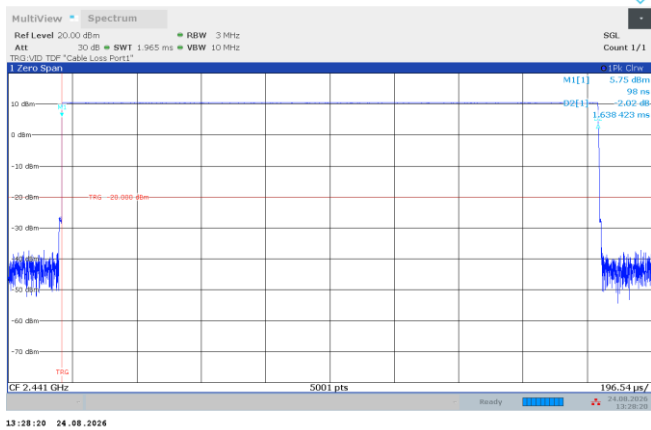
Pulse width_DH1



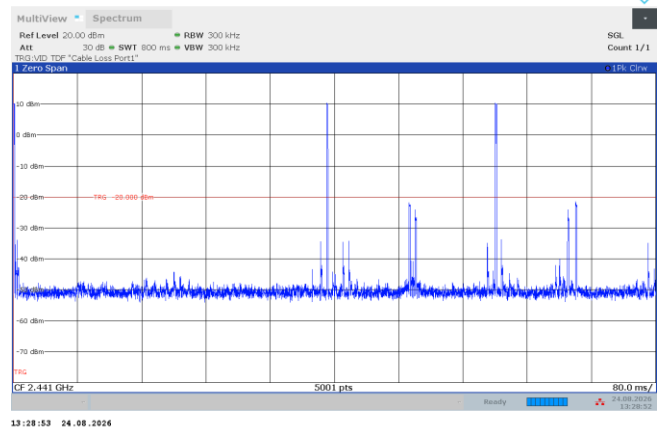
Numbers of Pulses in 0.8 Seconds_DH1



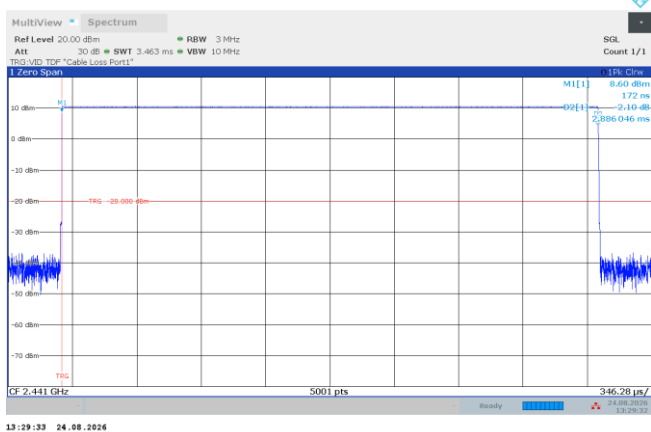
Pulse width_DH3



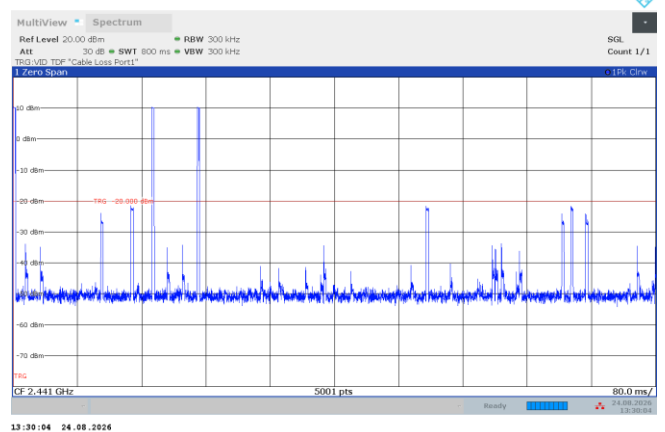
Numbers of Pulses in 0.8 Seconds_DH3



Pulse width_DH5

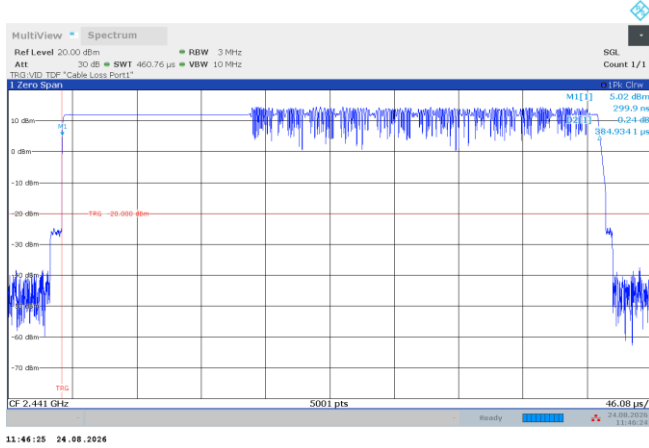


Numbers of Pulses in 0.8 Seconds_DH5

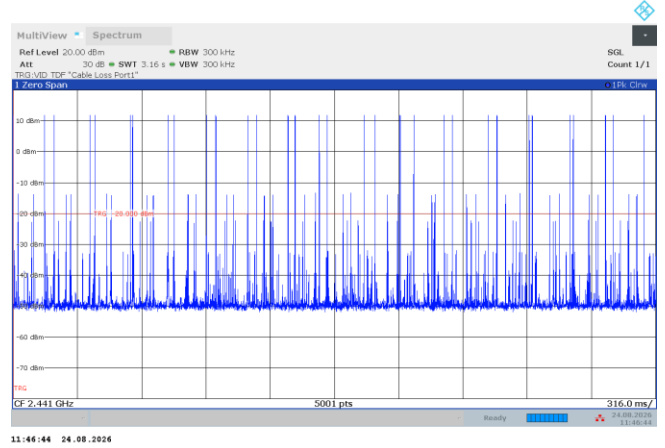


$\pi/4$ DQPSK_Normal

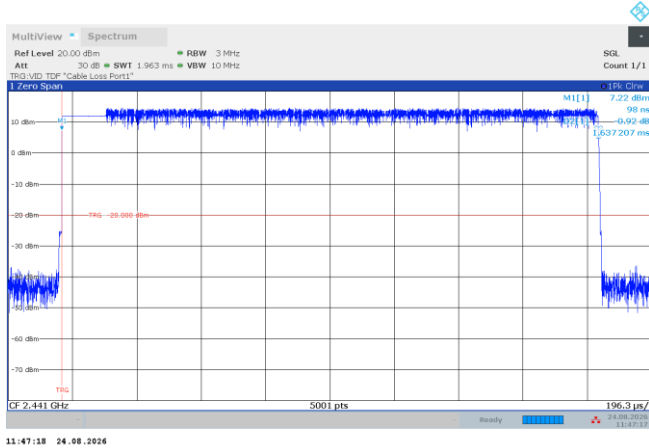
Pulse width_DH1



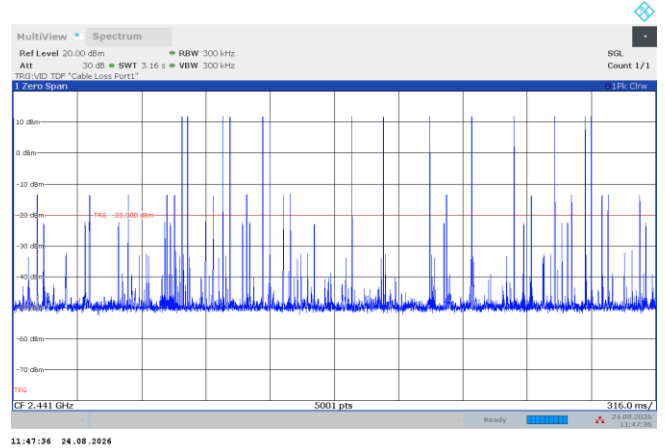
Numbers of Pulses in 3.16 Seconds_DH1



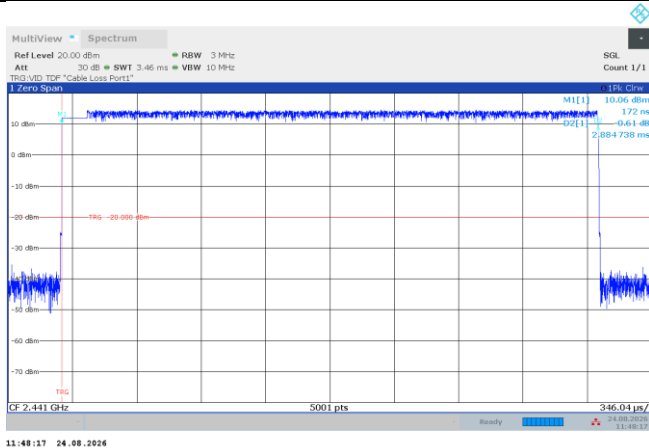
Pulse width_DH3



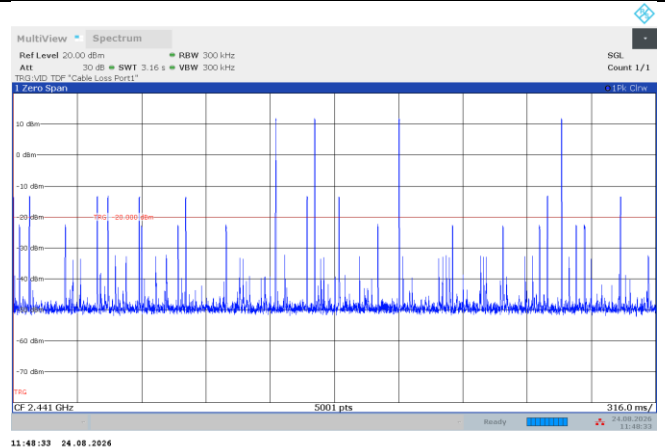
Numbers of Pulses in 3.16 Seconds_DH3



Pulse width_DH5

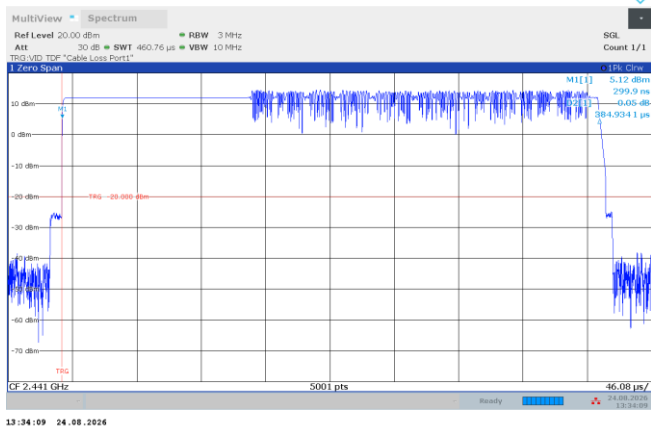


Numbers of Pulses in 3.16 Seconds_DH5

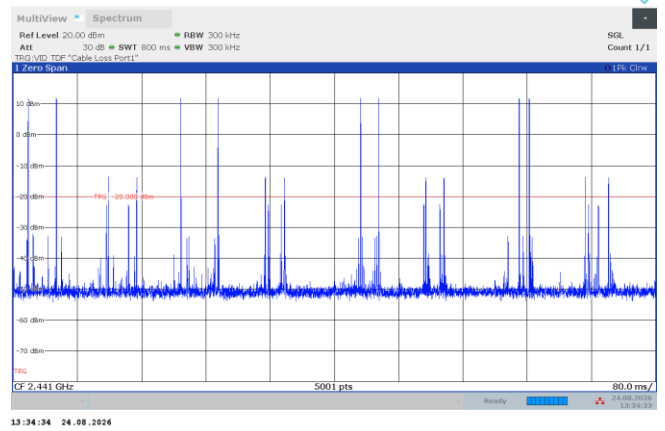


$\pi/4$ DQPSK_AFH

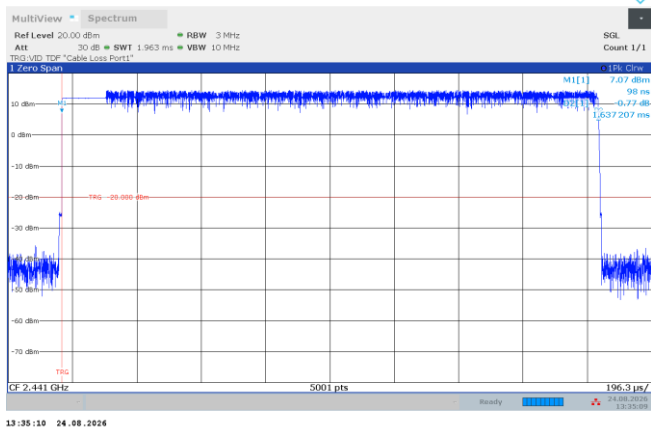
Pulse width_DH1



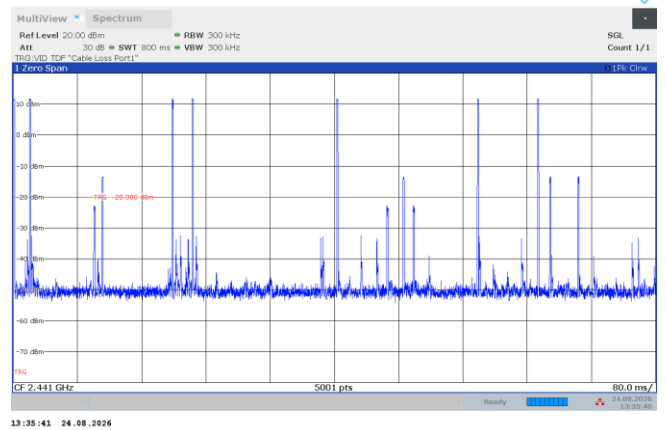
Numbers of Pulses in 0.8 Seconds_DH1



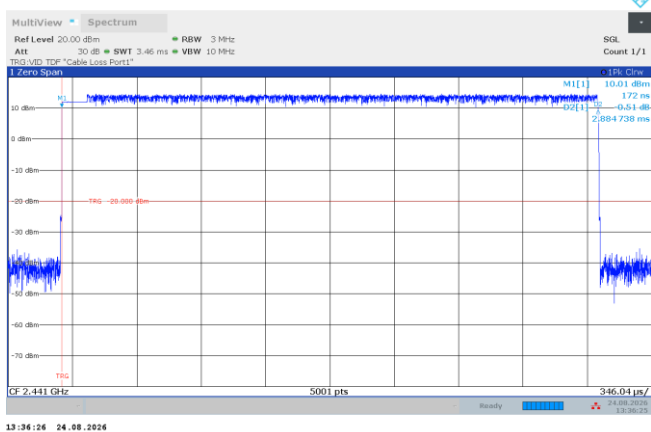
Pulse width_DH3



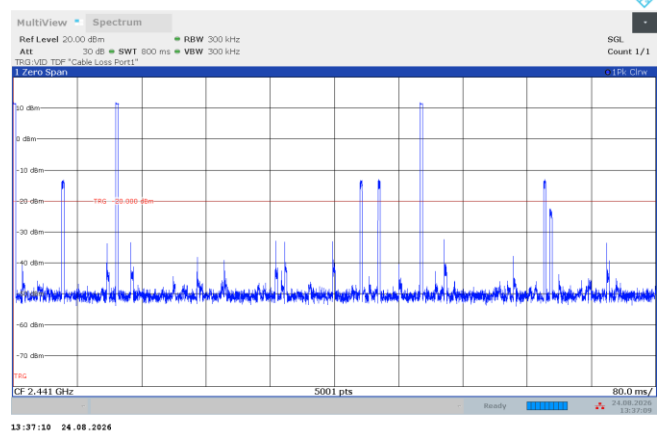
Numbers of Pulses in 0.8 Seconds_DH3



Pulse width_DH5

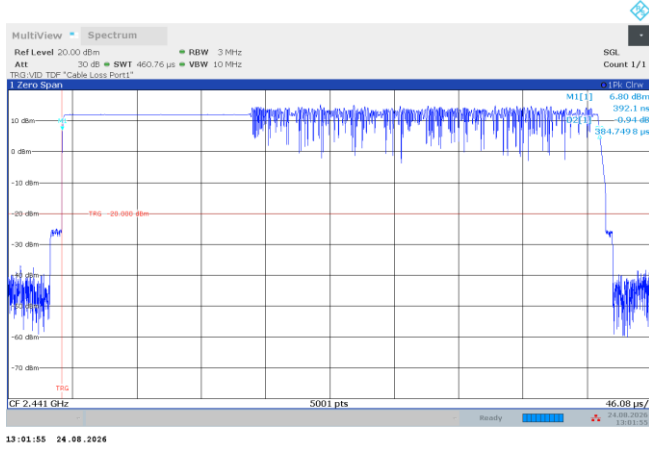


Numbers of Pulses in 0.8 Seconds_DH5

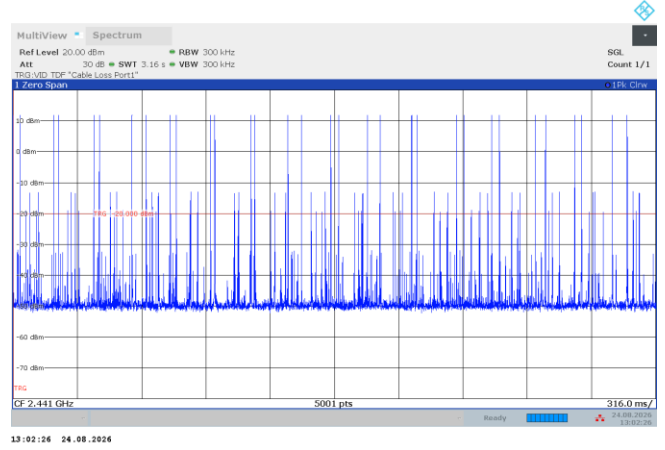


8DPSK_Normal

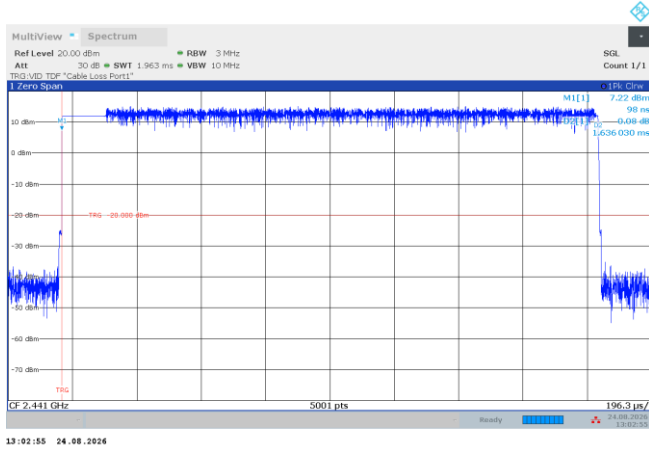
Pulse width_DH1



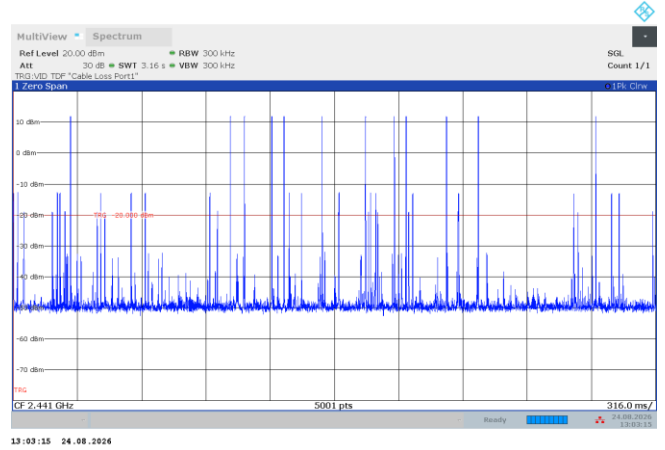
Numbers of Pulses in 3.16 Seconds_DH1



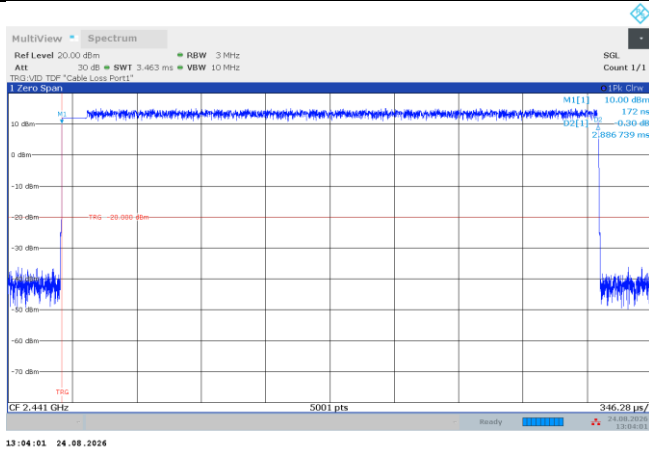
Pulse width_DH3



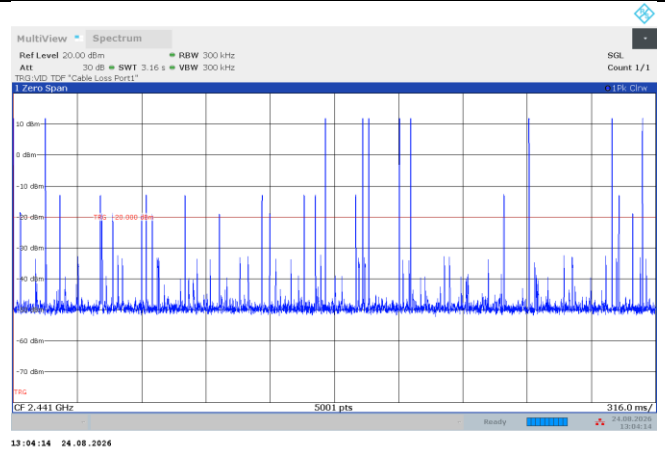
Numbers of Pulses in 3.16 Seconds_DH3



Pulse width_DH5

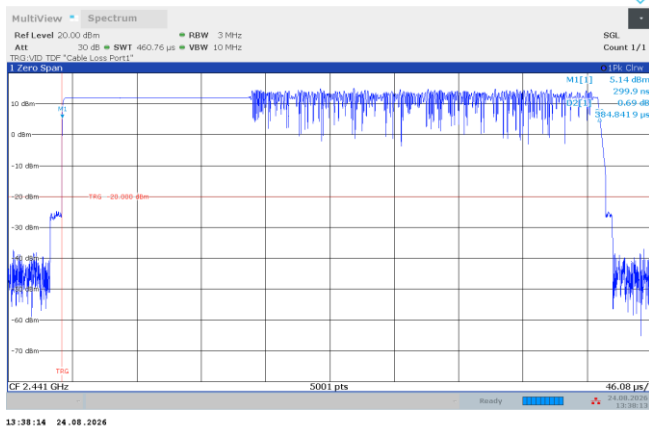


Numbers of Pulses in 3.16 Seconds_DH5

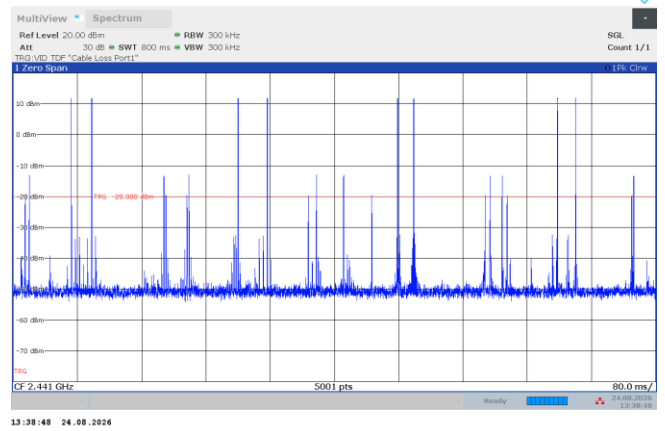


8DPSK_AFH

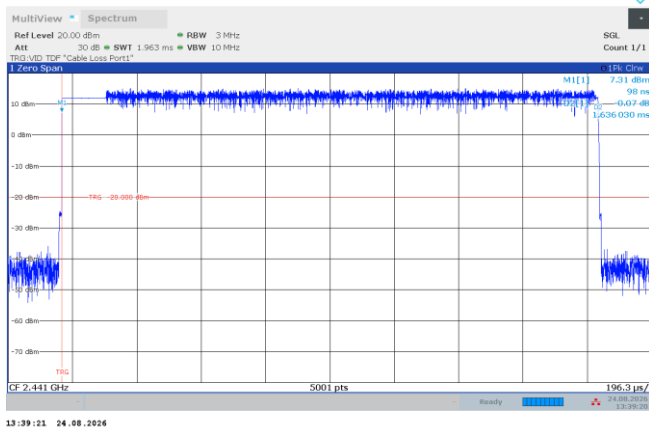
Pulse width_DH1



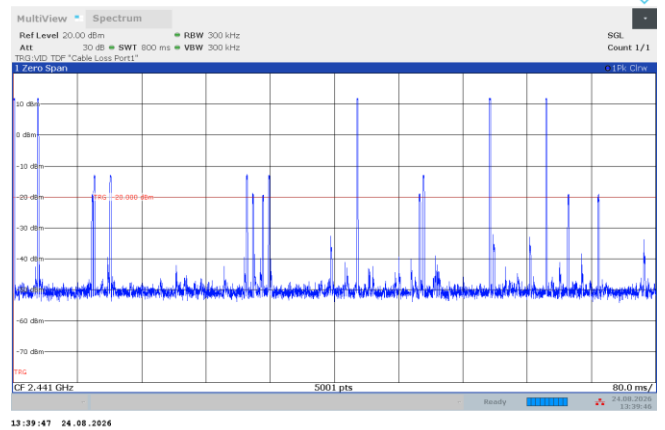
Numbers of Pulses in 0.8 Seconds_DH1



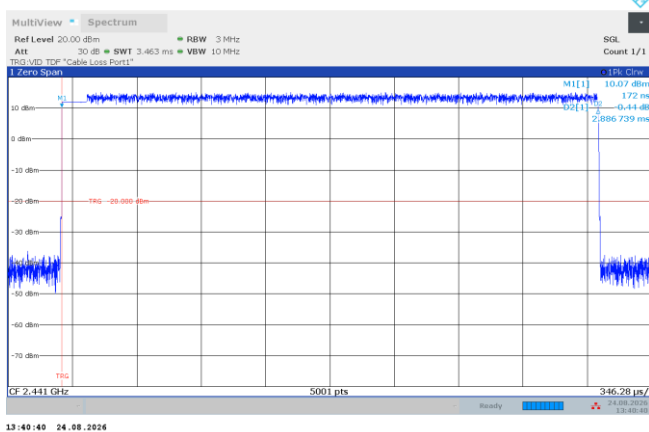
Pulse width_DH3



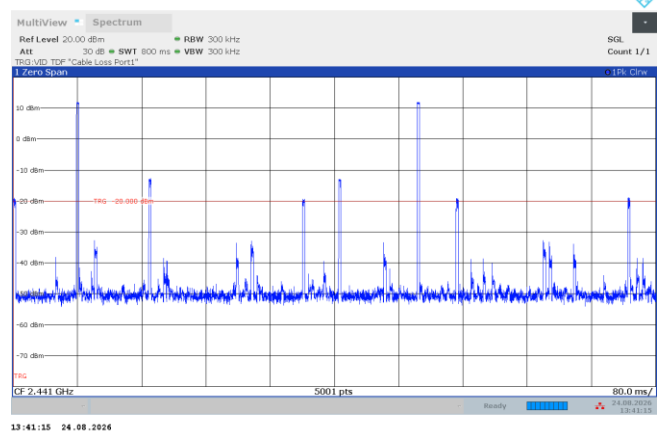
Numbers of Pulses in 0.8 Seconds_DH3



Pulse width_DH5



Numbers of Pulses in 0.8 Seconds_DH5



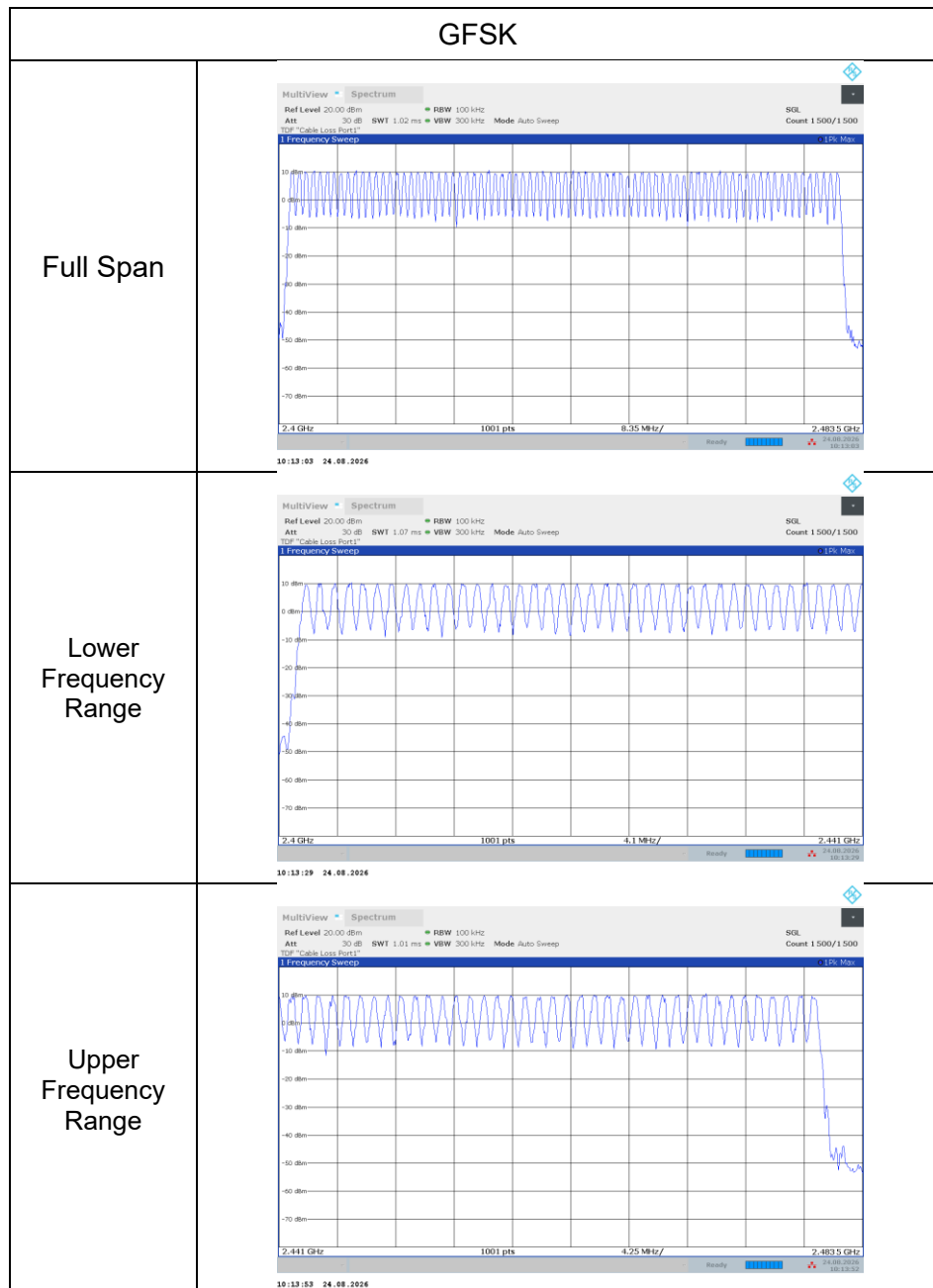
7.5 Number of Hopping Channels

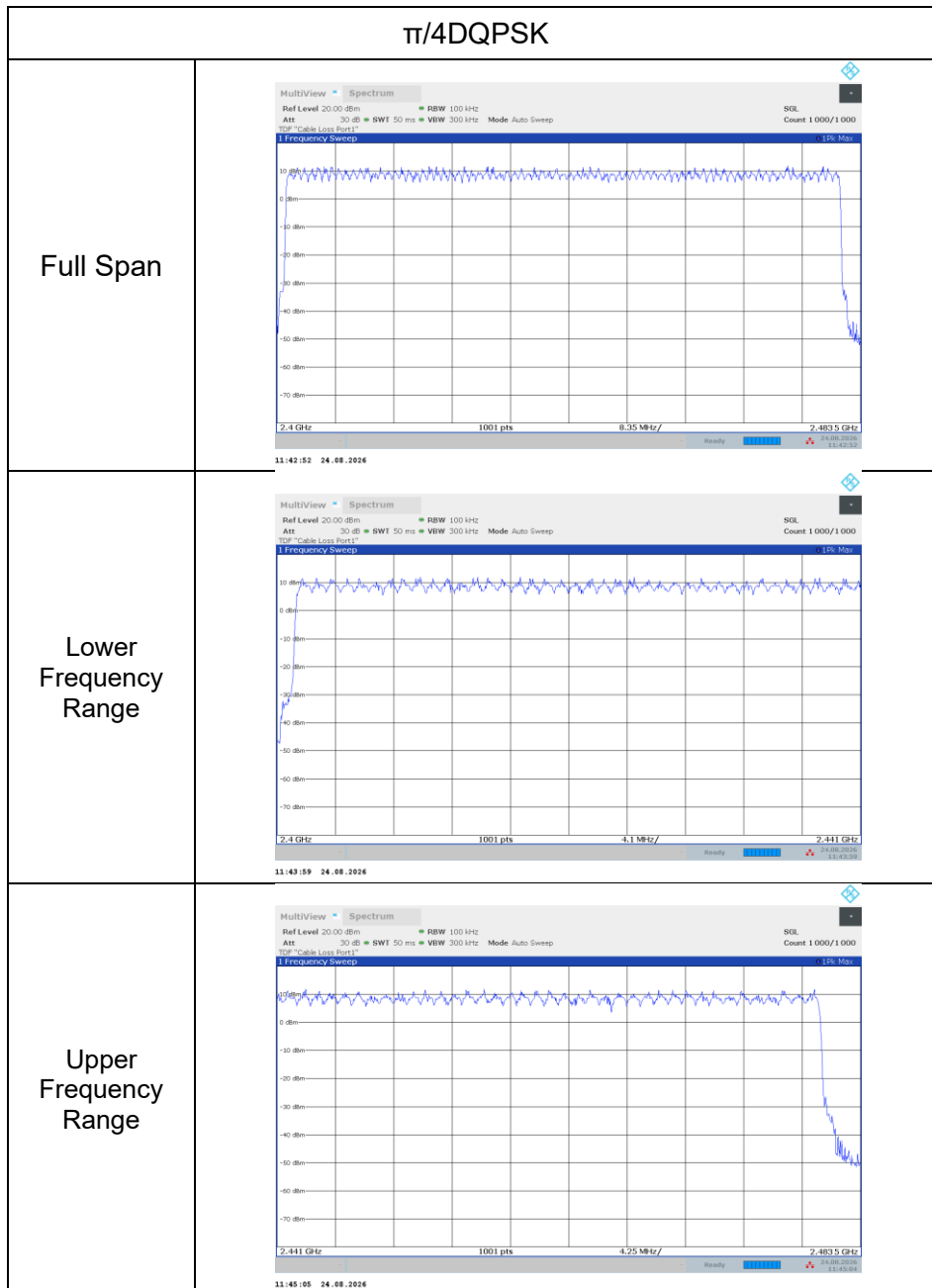
FCC §15.247(a)(1)(iii)

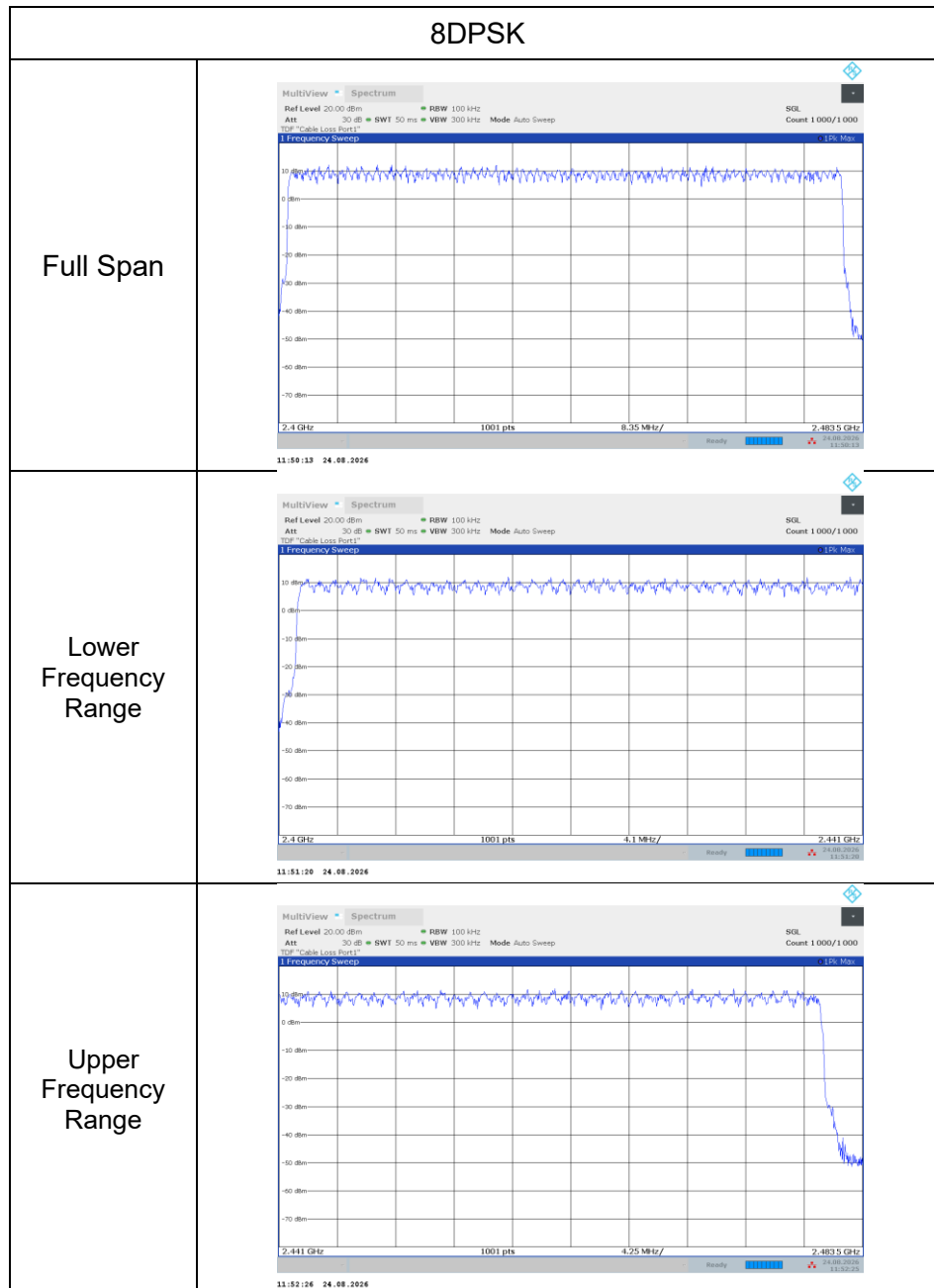
Test Mode : Set to Hopping mode

Result

The EUT complies with the minimum of 15 hopping channels when it is operating Normal mode using 79 channels and when operating in AFH mode using 20 channels.







7.6 Peak Output Power

FCC §15.247(b)(1)

Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result

Modulation	Channel	Frequency (MHz)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)
GFSK	Lowest	2 402	10.61	20.97	10.36
	Middle	2 441	10.53	20.97	10.44
	Highest	2 480	10.47	20.97	10.50
$\pi/4$ DQPSK	Lowest	2 402	14.56	20.97	6.41
	Middle	2 441	14.49	20.97	6.48
	Highest	2 480	14.41	20.97	6.56
8DPSK	Lowest	2 402	15.14	20.97	5.83
	Middle	2 441	15.05	20.97	5.92
	Highest	2 480	14.99	20.97	5.98

Notes:

1. The following equation was used for spectrum offset:

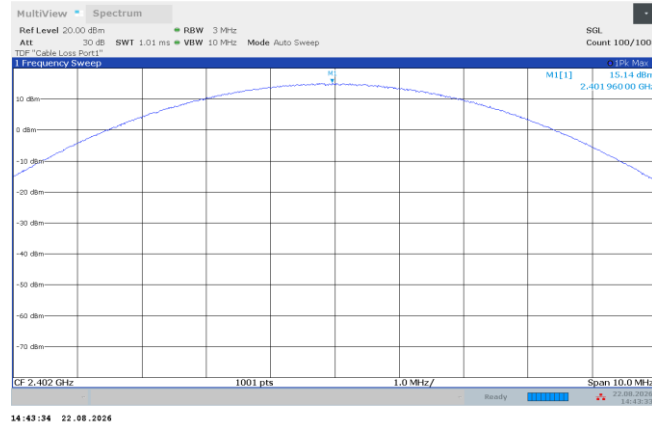
$$\text{Spectrum offset (dB)} = \text{Attenuator (dB)} + \text{Cable Loss (dB)} + \text{SMA Type Connector Loss (dB)}$$

PLOTS OF EMISSIONS

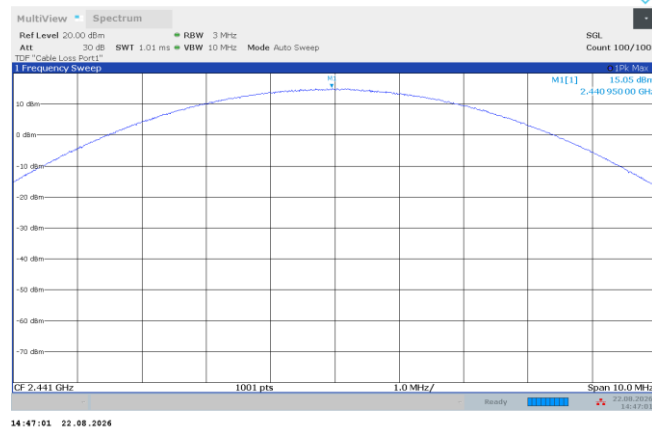


8DPSK

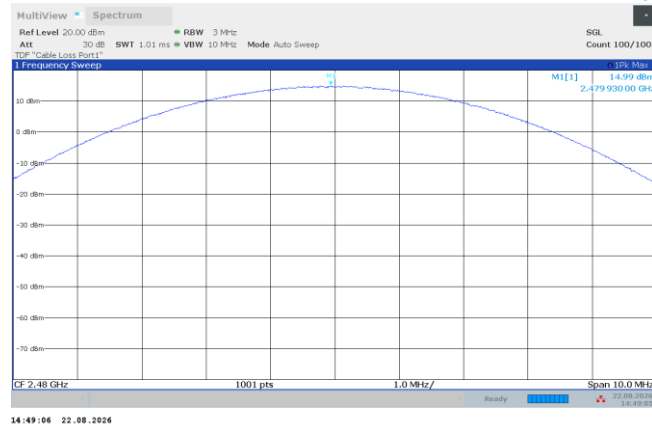
Lowest Channel



Middle Channel



Highest Channel



7.7 Conducted Spurious Emissions

FCC §15.247(d)

Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result

Modulation	Channel	Frequency (MHz)	Conducted Spurious Emissions (dBc)	Limit (dBc)
GFSK	Lowest	2 402	More than 20 dBc	20
	Middle	2 441	More than 20 dBc	20
	Highest	2 480	More than 20 dBc	20
$\pi/4$ DQPSK	Lowest	2 402	More than 20 dBc	20
	Middle	2 441	More than 20 dBc	20
	Highest	2 480	More than 20 dBc	20
8DPSK	Lowest	2 402	More than 20 dBc	20
	Middle	2 441	More than 20 dBc	20
	Highest	2 480	More than 20 dBc	20

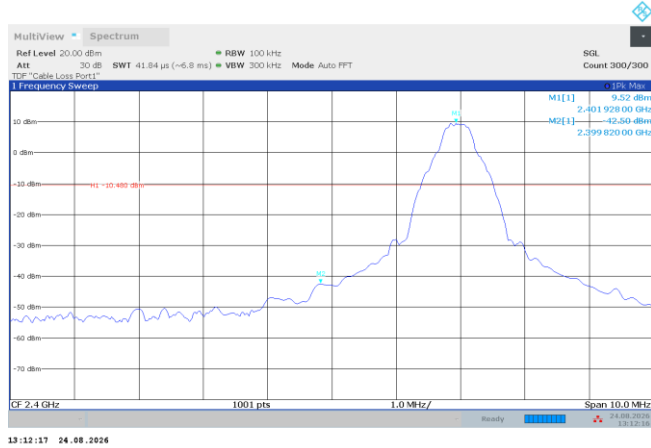
Notes:

1. The cable and attenuator loss from 30 MHz to 26.5 GHz was reflected in spectrum analyzer with correction factor for the spurious emissions test.
2. The band-edge emissions at 2.4 GHz and 2.4835 GHz were measured with the transmitter operating in normal hopping mode.

PLOTS OF EMISSIONS

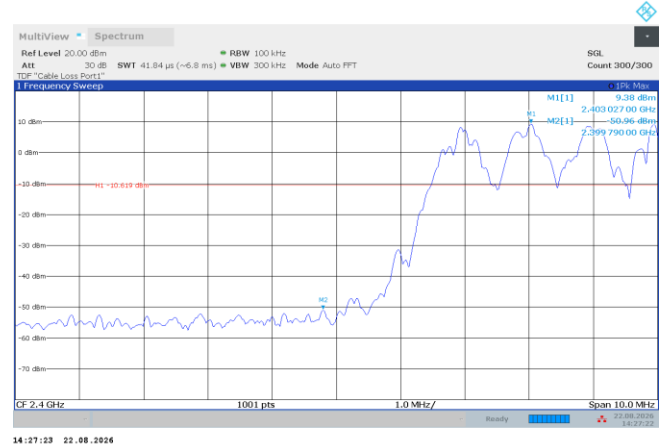
Band Edge, Non-Hopping mode

GFSK, Lowest Channel



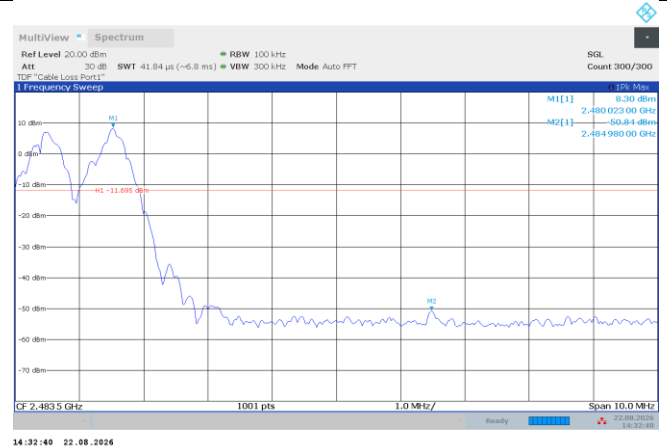
Band Edge, Hopping mode

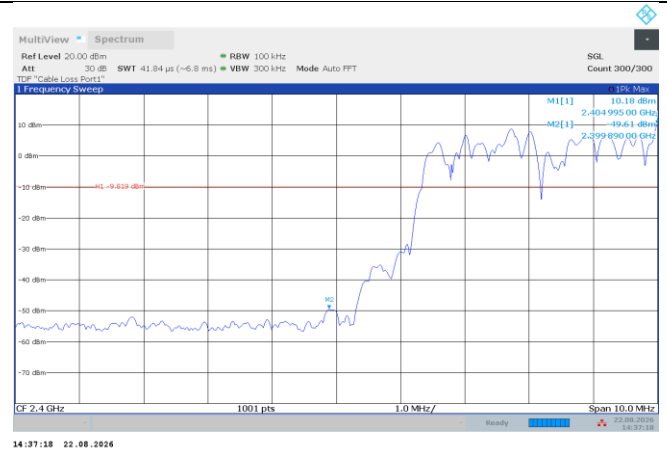
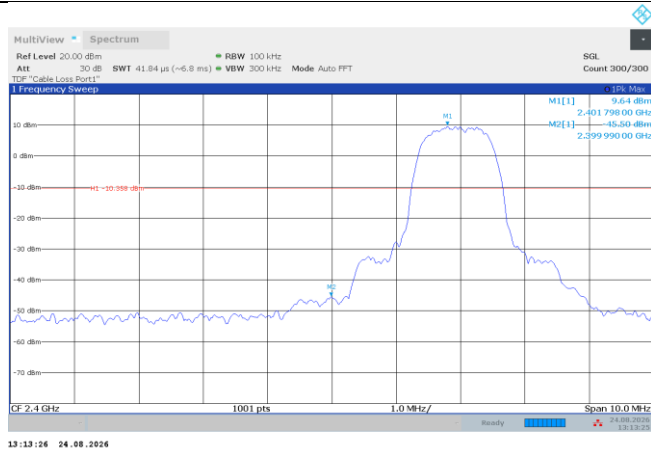
GFSK, Lower Band Edge



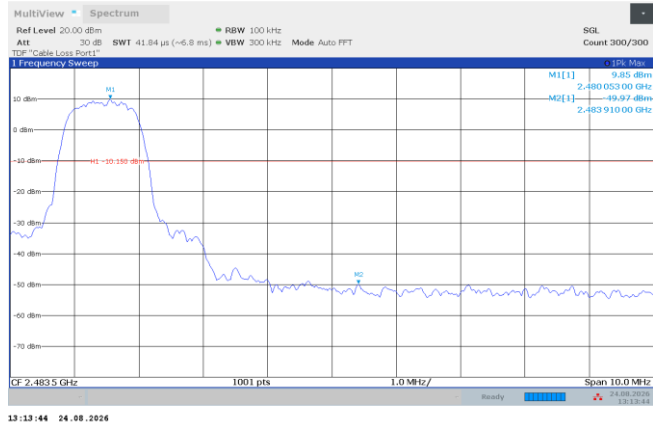
GFSK, Highest Channel

GFSK, Upper Band Edge

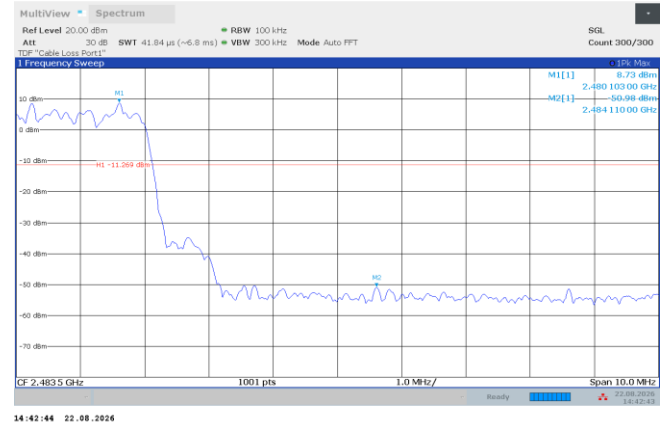

 $\pi/4$ DQPSK, Lowest Channel

 $\pi/4$ DQPSK, Lower Band Edge


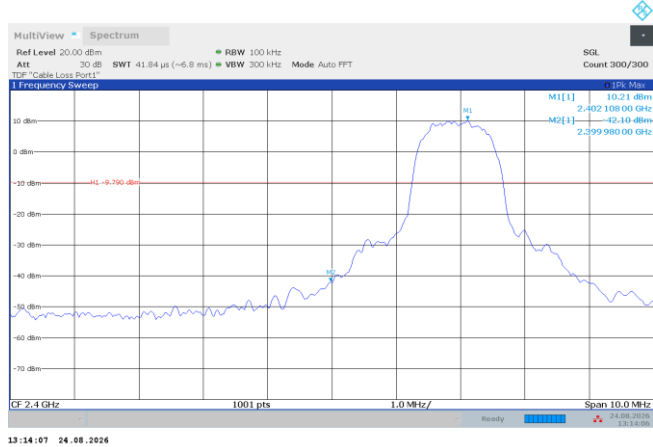
Band Edge, Non-Hopping mode

 $\pi/4$ DQPSK, Highest Channel


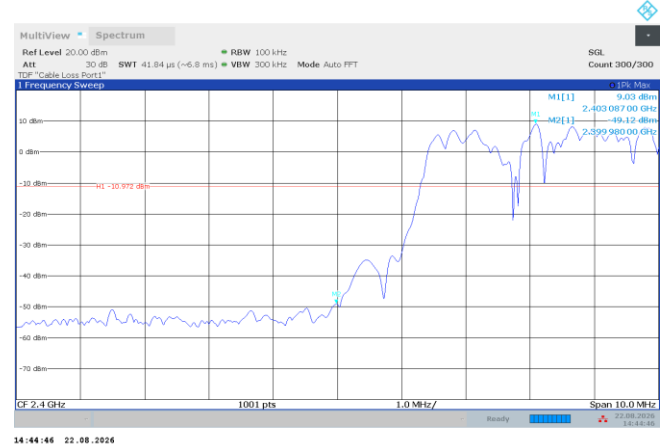
Band Edge, Hopping mode

 $\pi/4$ DQPSK, Upper Band Edge


8DPSK, Lowest Channel



8DPSK, Upper Band Edge



8DPSK, Highest Channel

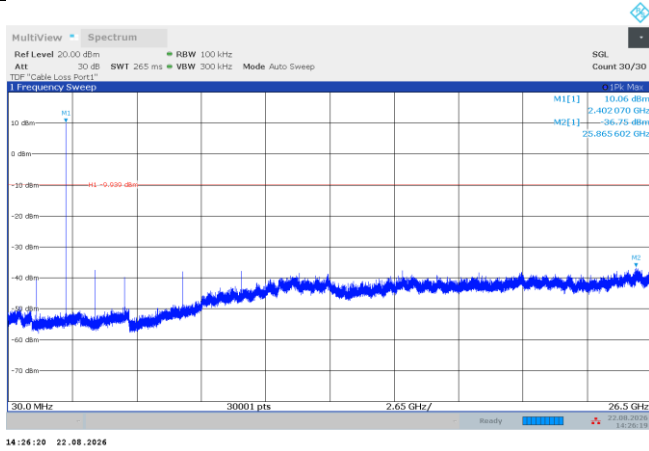


8DPSK, Upper Band Edge

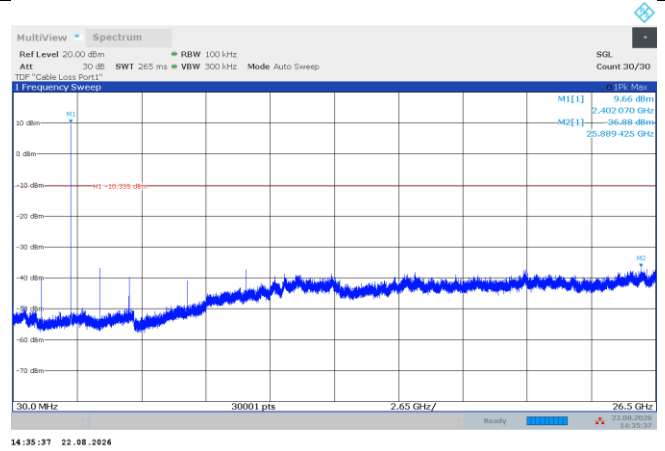


Conducted Spurious Emissions, GFSK

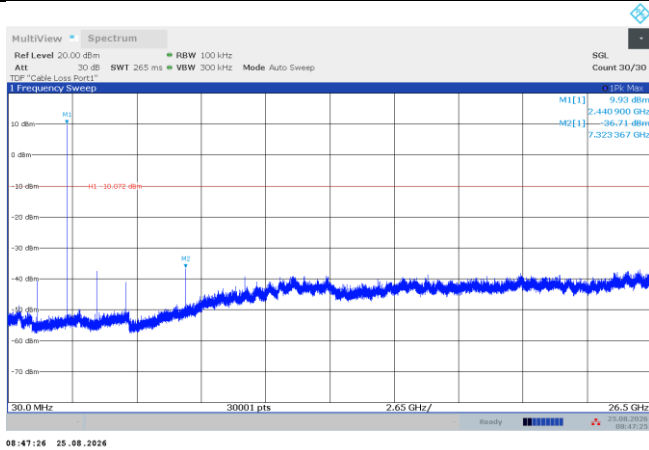
Lowest Channel


Conducted Spurious Emissions, $\pi/4$ DQPSK

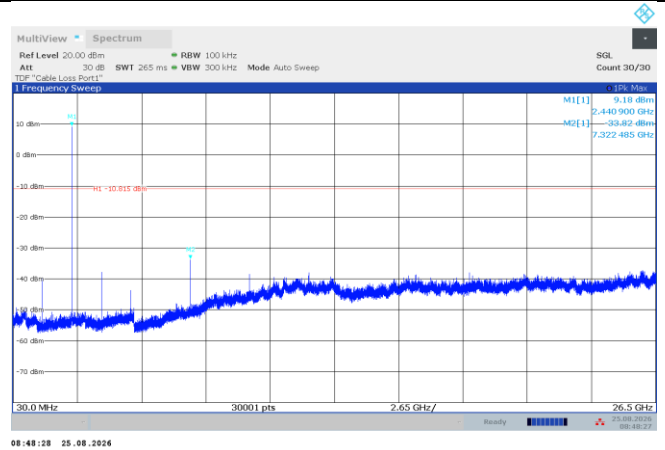
Lowest Channel



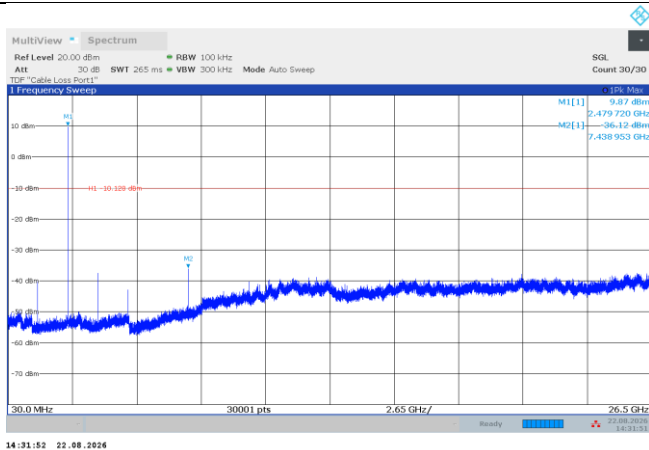
Middle Channel



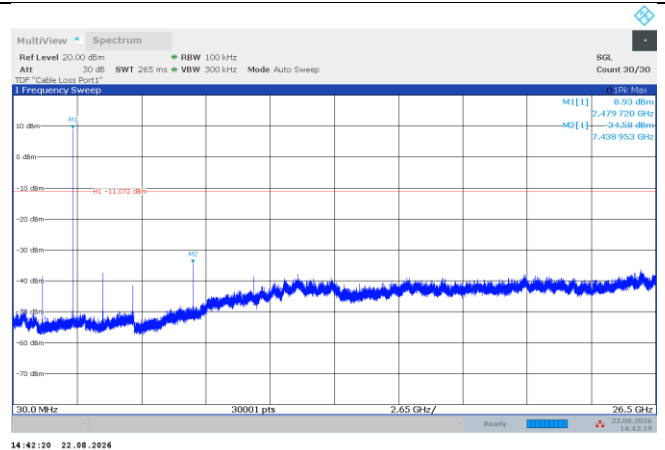
Middle Channel



Highest Channel

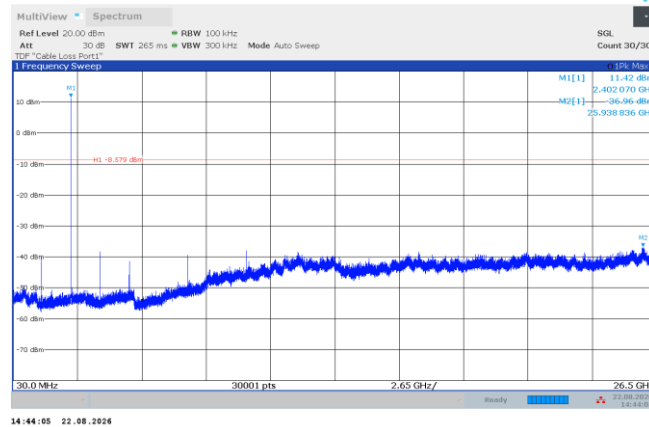


Highest Channel

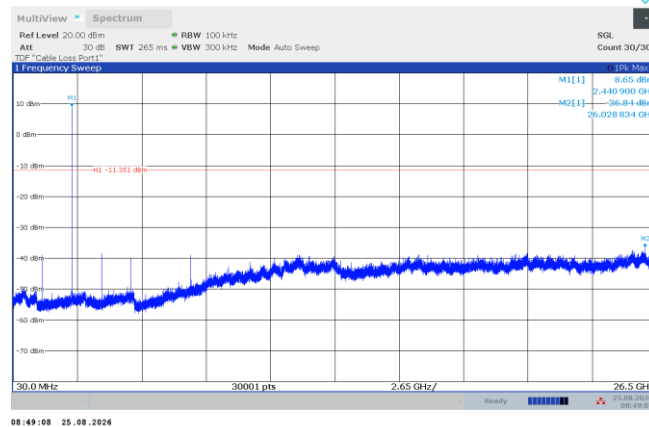


Conducted Spurious Emissions, 8DPSK

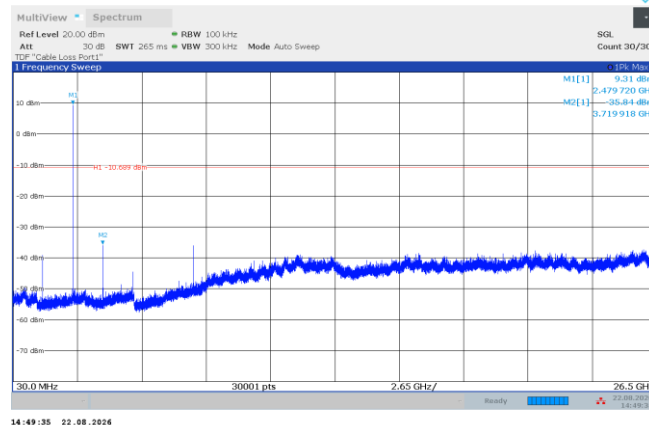
Lowest Channel



Middle Channel



Highest Channel



7.8 Radiated Spurious Emissions

FCC §15.205, §15.209, §15.247(d)

Test Mode : Set to Lowest channel, Middle channel and Highest channel

Result

GFSK_Lowest channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
3 602.87	42.19	H	PK	-0.3	41.89	74.00	32.11
3 602.83	38.38	H	AV	-0.3	38.08	54.00	15.92
4 805.57	40.04	V	PK	4.0	44.04	74.00	29.96
4 803.83	34.05	H	AV	4.0	38.05	54.00	15.95
9 608.43	38.61	V	PK	16.0	54.61	74.00	19.39

GFSK_Middle channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
3 618.40	40.69	H	PK	-0.3	40.39	74.00	33.61
3 614.60	32.24	V	AV	-0.3	31.94	54.00	22.06
4 881.63	40.61	H	PK	4.3	44.91	74.00	29.09
4 882.03	35.49	H	AV	4.3	39.79	54.00	14.21
9 763.00	37.10	H	PK	16.5	53.60	74.00	20.40

GFSK_Highest channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
3 703.43	41.64	V	PK	0.0	41.64	74.00	32.36
3 719.93	37.57	H	AV	0.1	37.67	54.00	16.33
4 959.63	39.74	V	PK	4.4	44.14	74.00	29.86
4 959.93	34.92	H	AV	4.4	39.32	54.00	14.68
9 919.50	37.63	H	PK	16.6	54.23	74.00	19.77

8DPSK_Lowest channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
3 602.93	42.68	H	PK	-0.3	42.38	74.00	31.62
3 602.83	39.50	H	AV	-0.3	39.20	54.00	14.80
4 805.95	39.93	V	PK	4.0	43.93	74.00	30.07
4 803.93	32.66	H	AV	4.0	36.66	54.00	17.34
9 608.18	39.00	V	PK	16.0	55.00	74.00	19.00

8DPSK_Middle channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
3 661.43	45.74	H	PK	-0.1	45.64	74.00	28.36
3 661.25	39.53	H	AV	-0.1	39.43	54.00	14.57
4 890.13	51.57	V	PK	4.3	55.87	74.00	18.13
4 881.98	34.43	H	AV	4.3	38.73	54.00	15.27
9 753.68	42.03	H	PK	16.5	58.53	74.00	15.47

8DPSK_Highest channel

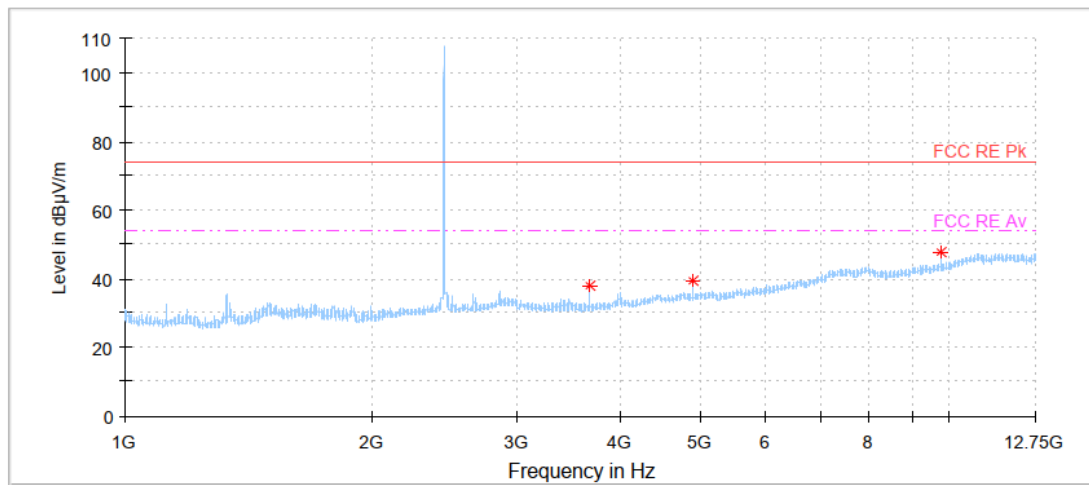
Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
3 661.43	45.74	H	PK	-0.1	45.64	74.00	28.36
3 720.20	38.52	H	AV	0.1	38.62	54.00	15.38
4 968.60	48.08	H	PK	4.5	52.58	74.00	21.42
4 960.08	33.98	H	AV	4.4	38.38	54.00	15.62
9 919.90	38.72	V	PK	16.6	55.32	74.00	18.68

Notes:

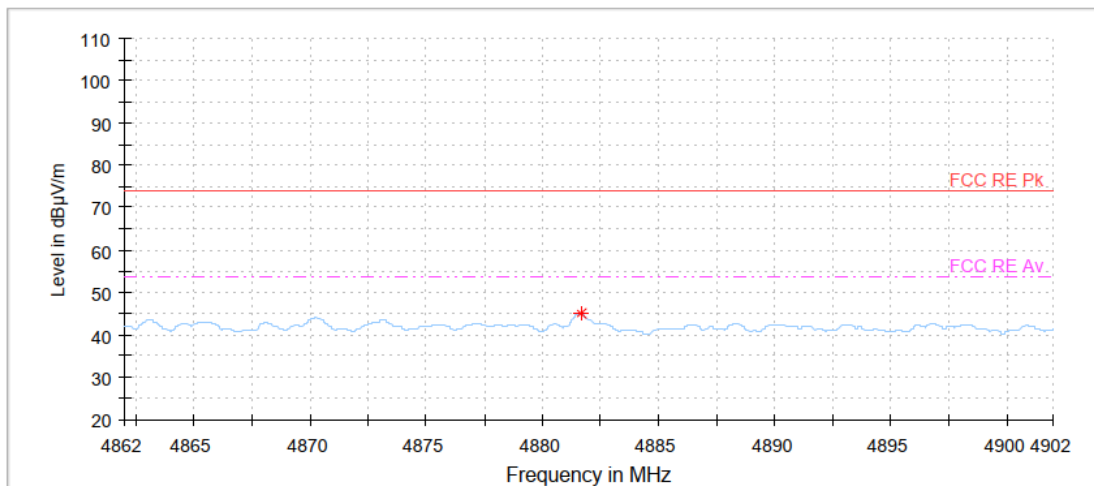
- *Pol. : H = Horizontal, V = Vertical, Mode : PK = Peak, AV = Average
- **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
- Nothing detected above 18GHz
- Other spurious was under 20 dB below Fundamental.
- The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, Vertical polarization.
- Peak emissions were measured using RBW = 1 MHz, VBW = 3 MHz, Detector = Peak.
- Average emissions were measured using RBW = 1 MHz, VBW = 10 kHz, Detector = Peak.
- The spectrum was measured from 1 GHz to 10th harmonic and the worst-case emissions were reported.

PLOTS OF EMISSIONS (Worst Case)

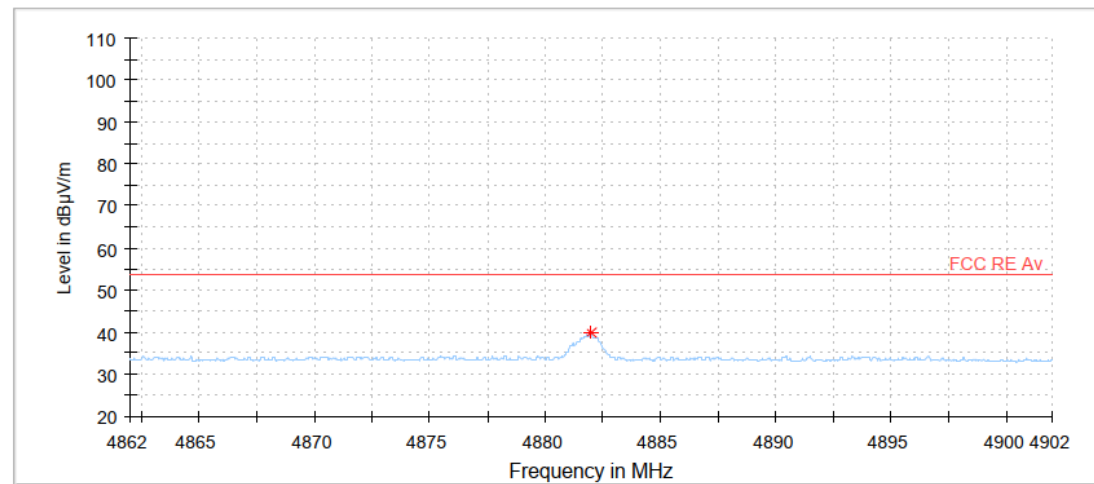
GFSK, Middle Channel, Full Scan



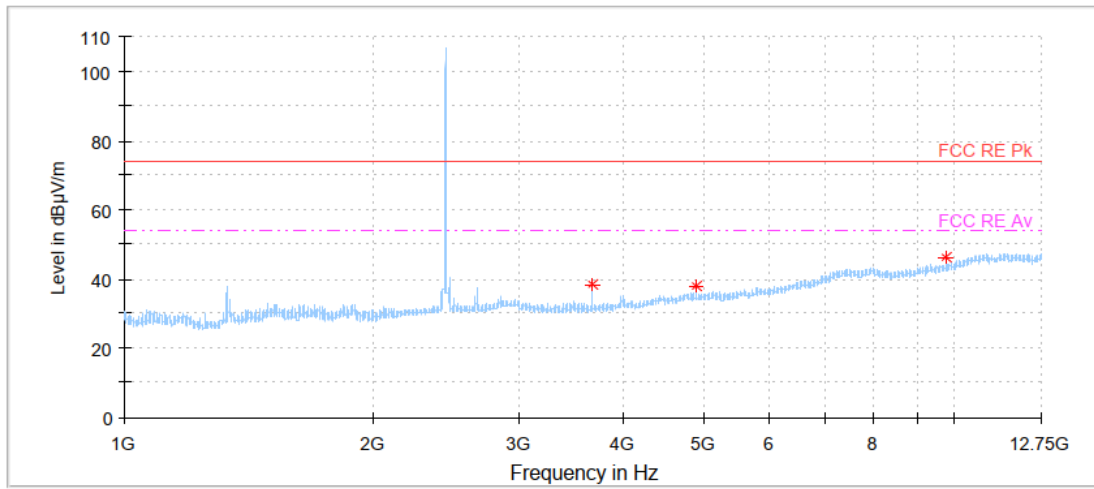
GFSK, Middle Channel, Zoom scan, 4 882 MHz, Peak



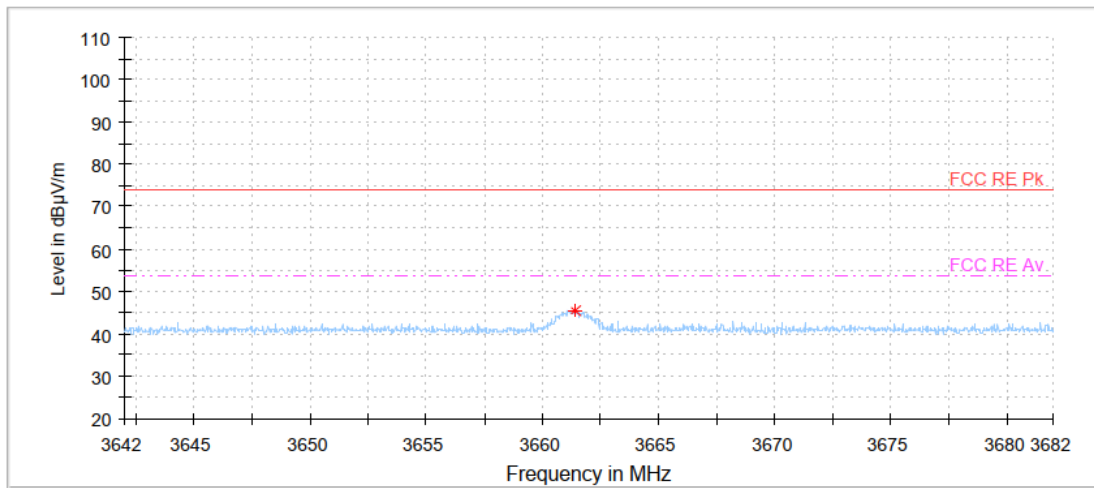
GFSK, Middle Channel, Zoom scan, 4 882 MHz, Average



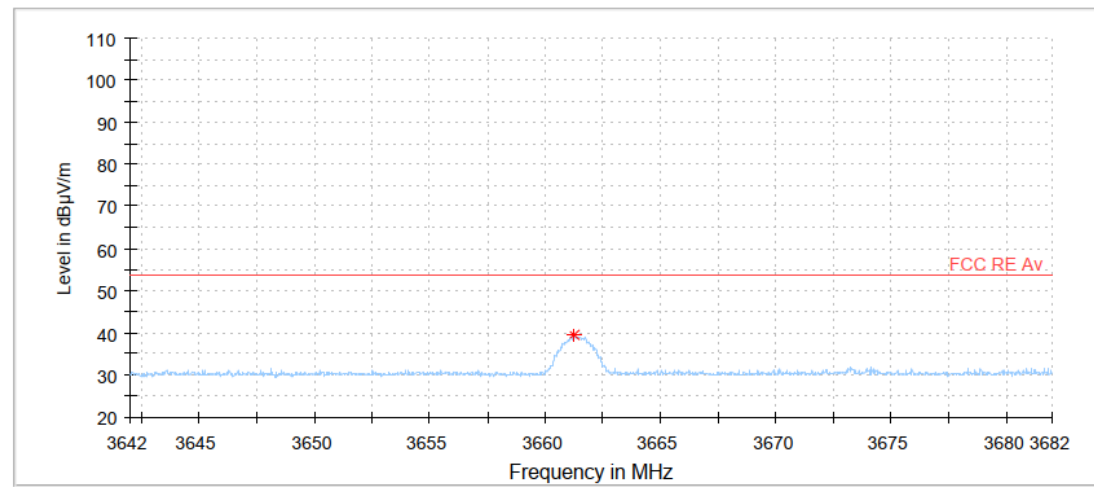
8DPSK, Middle Channel, Full Scan



8DPSK, Middle Channel, Zoom scan, 3 661 MHz, Peak



8DPSK, Middle Channel, Zoom scan, 3 661 MHz, Average



7.9 Radiated Band Edge

FCC §15.205, §15.209

Test Mode : Set to Lowest channel and Highest channel

Result

GFSK_Lowest channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2 376.72	54.79	V	PK	-5.0	49.79	74.00	24.21
2 376.72	34.70	H	AV	-5.0	29.70	54.00	24.30
2 389.99	48.31	H	PK	-5.1	43.21	74.00	30.79
2 389.99	39.97	H	AV	-5.1	34.87	54.00	19.13

GFSK_Highest channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2 483.50	56.25	H	PK	-5.0	51.25	74.00	22.75
2 483.50	46.72	H	AV	-5.0	41.72	54.00	12.28
2 483.60	59.95	H	PK	-5.0	54.95	74.00	19.05
2 483.60	46.44	H	AV	-5.0	41.44	54.00	12.56

8DPSK_Lowest channel

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2 353.79	55.63	V	PK	-5.0	50.63	74.00	23.37
2 353.79	34.22	H	AV	-5.0	29.22	54.00	24.78
2 389.99	50.18	H	PK	-5.1	45.08	74.00	28.92
2 389.99	40.42	H	AV	-5.1	35.32	54.00	18.68

8DPSK modulation_Highest channel

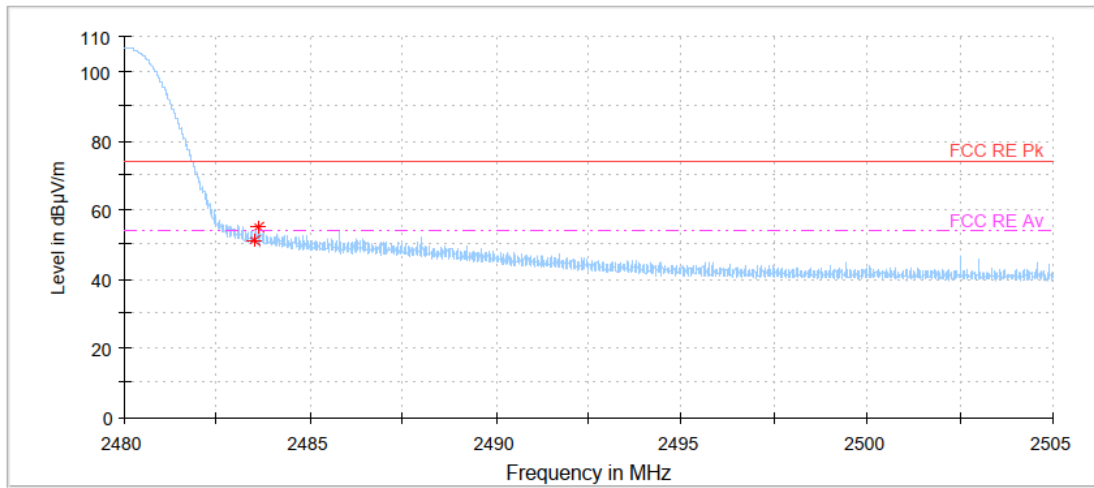
Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2 483.50	58.38	H	PK	-5.0	53.38	74.00	20.62
2 483.50	47.73	H	AV	-5.0	42.73	54.00	11.27
2 484.81	60.86	H	PK	-5.0	55.86	74.00	18.14
2 484.81	45.68	H	AV	-5.0	40.68	54.00	13.32

Notes:

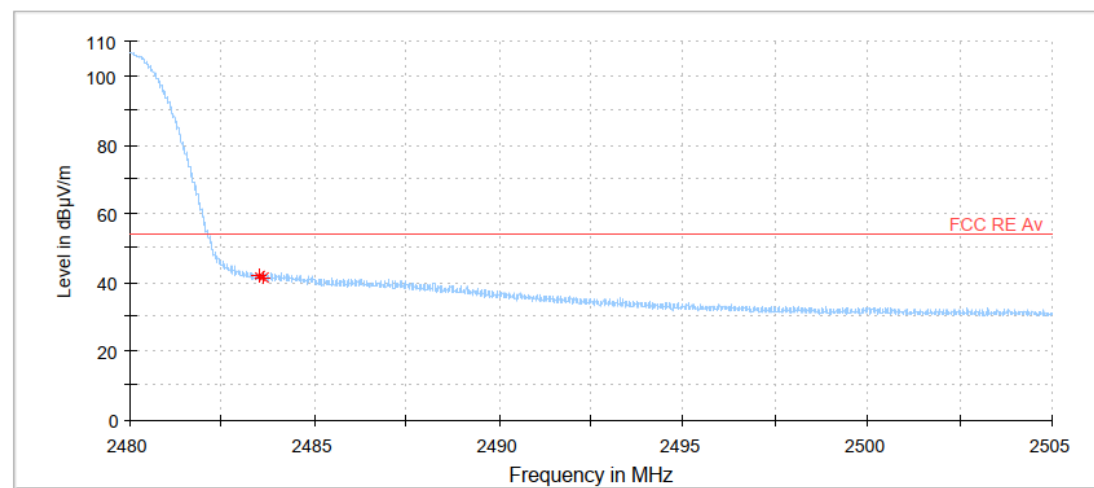
- *Pol. : H = Horizontal, V = Vertical, Mode : PK = Peak, AV = Average
- **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
- Other spurious was under 20 dB below Fundamental.
- The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, Vertical polarization.
- Peak emissions were measured using RBW = 1 MHz, VBW = 3 MHz, Detector = Peak.
- Average emissions were measured using RBW = 1 MHz, VBW = 10 kHz, Detector = Peak.

PLOTS OF EMISSIONS (Worst Case)

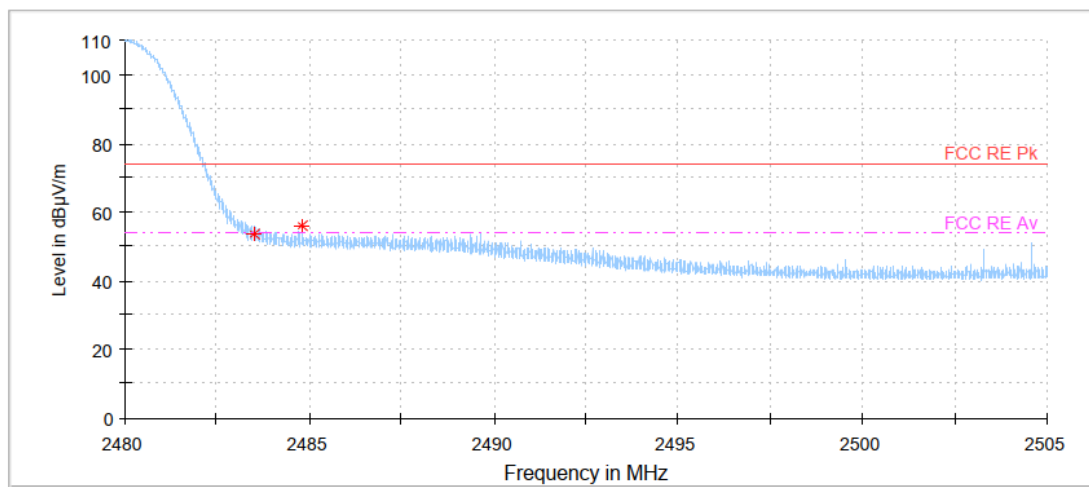
GFSK, Highest Channel, Peak



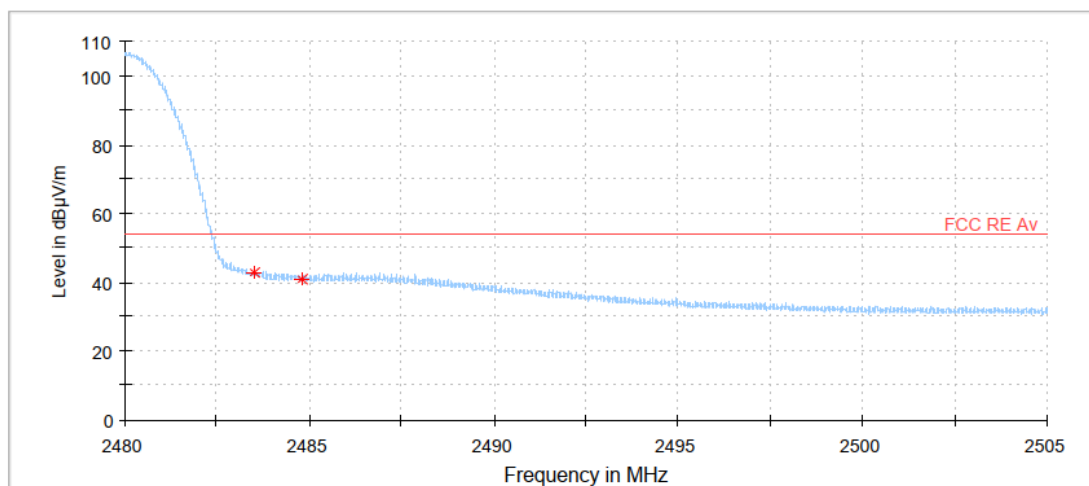
GFSK, Highest Channel, Average



8DPSK, Highest Channel, Peak



8DPSK, Highest Channel, Average



7.10 Radiated Emissions_Below 1GHz

FCC §15.209

Result

8DPSK Lowest channel

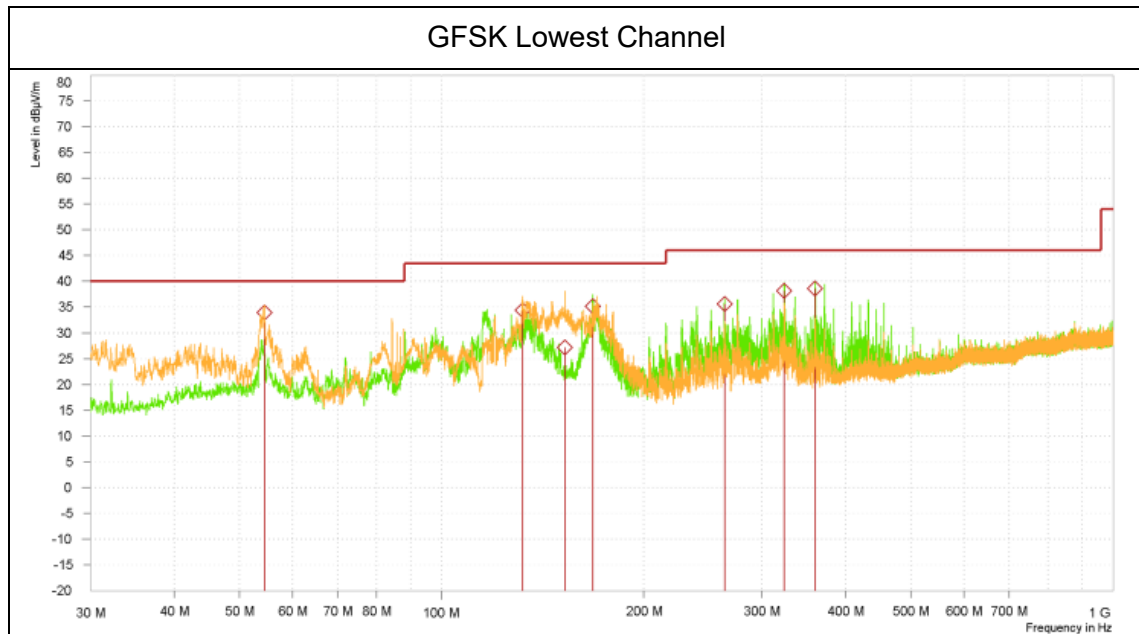
Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
54.47	39.59	V	QP	-5.7	33.89	40.00	6.11
132.12	44.81	V	QP	-10.5	34.34	43.50	9.16
152.76	37.74	V	QP	-10.5	27.20	43.50	16.30
168.06	44.83	H	QP	-9.7	35.15	43.50	8.35
264.04	40.75	H	QP	-5.2	35.56	46.00	10.44
323.91	41.80	H	QP	-3.6	38.18	46.00	7.82
359.91	41.88	H	QP	-3.3	38.60	46.00	7.40

Radiated Measurements at 3meters

Notes:

- The worst-case emission was reported.
- *Pol. H = Horizontal, V = Vertical
- **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
- Measurements using CISPR quasi-peak mode below 1 GHz.
- The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, Vertical polarization. The worst data was recorded.
- No emission found between lowest internal used/generated frequency to 30 MHz (9 kHz~30 MHz).
Per FCC part 15.31(o), test results were not reported.
Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open area test site.
Therefore, sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field based on KDB 414788.
- The limit is on the FCC §15.209.

PLOTS OF EMISSIONS (Worst Case)



7.11 AC Line Conducted Emissions

FCC §15.207

Result

GFSK Lowest Channel

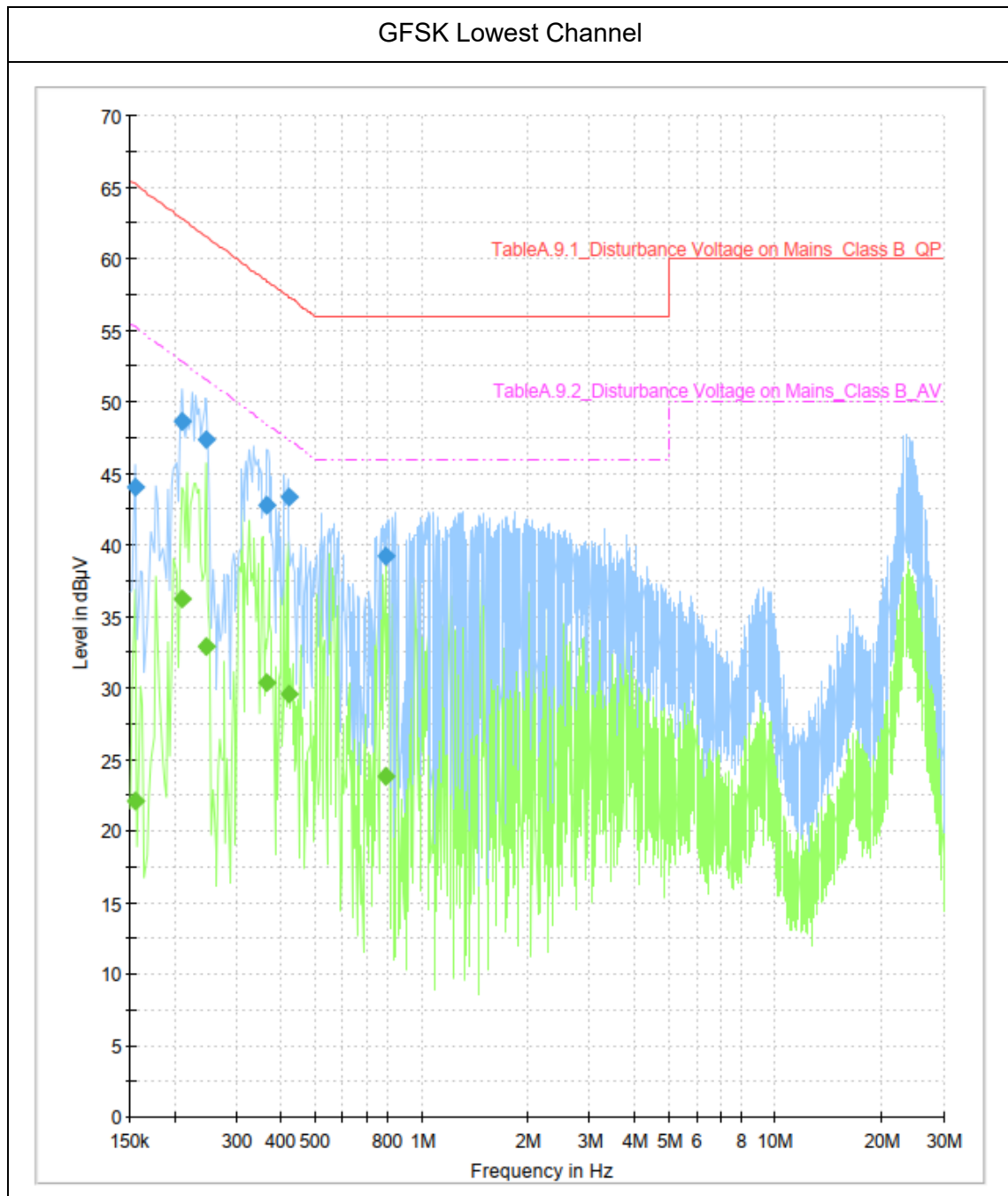
Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Line	Filter	Corr. (dB)
0.154975	---	22.11	55.20	33.09	L1	ON	9.8
0.154975	44.07	---	65.20	21.13	L1	ON	9.8
0.209700	---	36.18	52.83	16.65	N	ON	9.9
0.209700	48.63	---	62.83	14.19	N	ON	9.9
0.247013	47.40	---	61.54	14.14	L1	ON	9.6
0.247013	---	32.84	51.54	18.70	L1	ON	9.6
0.366413	42.79	---	58.44	15.66	L1	ON	9.7
0.366413	---	30.35	48.44	18.09	L1	ON	9.7
0.421138	43.29	---	57.35	14.05	L1	ON	9.7
0.421138	---	29.54	47.35	17.81	L1	ON	9.7
0.791775	39.21	---	56.00	16.79	L1	ON	9.7
0.791775	---	23.83	46.00	22.17	L1	ON	9.7

Notes:

1. Measurement using CISPR quasi-peak mode & average mode.
2. The worst channel was investigated and the worst-case emission are reported. See attached Plots.
3. Corr. Factor = LISN + Cable loss
4. L1 = Line, N = Neutral
5. QP = Qusi-Peak CAV = CISPR Average
6. The limit is on the FCC §15.207.

PLOTS OF EMISSIONS (Worst Case)



8. TEST EQUIPMENT

No.	Instrument	Manufacture	Model	Serial No.	Calibration Date	Next Calibration Date
3	Signal & Spectrum Analyzer	R&S	FSW67	101362	2026-03-30	2027-03-30
2	10 dB Attenuator	API technologies corp	40A2W-10	1914	2026-07-01	2027-07-01
3	Signal Generator	R&S	SMB100A	175861	2026-03-27	2027-03-27
4	Vector Signal Generator	R&S	SMBV100A	257152	2025-10-01	2026-10-01
5	Environment Detecor	YOWEXA	YEM-20AL-E	25061007	2026-07-09	2027-07-09
6	DIGITAL MULTIMETER	EZ DIGITAL	DM-334	2111395	2025-10-02	2026-10-02
7	Signal & Spectrum Analyzer	R&S	FSW43	104084	2026-03-26	2027-03-26
8	OPEN SWITCH AND CONTROL UNIT	R&S	OSP120	100081	N/A	N/A
9	Environment Detecor	YOWEXA	YEM-20AL-E	25081030	2025-11-06	2026-11-06
10	SWITCH AND EXTENSION UNIT CAN-BUS	R&S	OSP150	100922	N/A	N/A
11	BROADBAND LOW NOISE AMPLIFIER	EXYNOD	ELNA03-40D	631516	2026-07-02	2027-07-02
12	WiFi Filter Bank	R&S	U083	U083-001	N/A	N/A
13	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-508	2026-07-07	2027-07-07
14	Horn Antenna	Q-par Angus	QMS-00208	17636	2025-08-26	2026-08-26
15	Horn Antenna	Q-par Angus	QSH20S20	8179	2026-07-06	2027-07-06
16	Signal Conditioning Unit	R&S	SCU-18F	180025	2026-03-26	2027-03-26
17	Signal Conditioning Unit	R&S	SCU-26	10011	2026-07-06	2027-07-06
18	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESW44	103318	2026-01-07	2027-01-07
19	Open Switch and Control Unit	ROHDE & SCHWARZ	OSP220	102977	N/A	N/A
20	Humidity Temperature	DRETEC	O-230	NK-B-E-0157	2026-01-19	2027-01-19
21	AMPLIFIER	HP	8447F	2805A03406	2026-01-07	2027-01-07
22	TRILOG Broadband Test Antenna	Schwarzbeck	VULB 9163	01431	2024-11-11	2026-11-11
23	Active Loop Antenna	R&S	HFH2-Z2E	101190	2026-01-15	2027-01-15
24	BIAS UNIT	R&S	IN 600	101621	N/A	N/A
25	EMI TEST RECEIVER	R&S	ESR3	102930	2026-07-02	2027-07-02
26	TWO-LINE V-NETWORK	R&S	ENV216	102829	2026-07-02	2027-07-02
Test Software Version						
No.	Instrument	Manufacture	Model	Version		
1	AC Line Conducted Emissions	R&S	EMC32	11.50.00		
2	Radiated Emissions (Below 1GHz)	R&S	ELEKTRA	5.20.1		
3	Radiated Emissions (Above 1GHz)	R&S	EMC32	10.60.20		

9. ACCURACY OF MEASUREMENT & DECISION RULE

9.1 Uncertainty Calculation

The Measurement Uncertainties stated were calculated in accordance with the requirements of measurement uncertainty contained in CISPR 16-4-2 with the confidence level of 95%

PARAMETER	UNCERTAINTY
Radiated Disturbance, Below 30 MHz	4.6 dB
Radiated Disturbance, 30 MHz to 1 GHz	5.6 dB
Radiated Disturbance, 1 GHz to 18 GHz	3.5 dB
Radiated Disturbance, 18 GHz to 26.5 GHz	4.9 dB
AC Line Conducted Emission	1.82 dB

9.2 Decision rule

The choice of whether or not to include the measurement uncertainty of the measuring system used in the test in the conformance determination.:

- ☐ Application of internal procedures used in type testing where traceability of measurement uncertainty is established.
- ☒ Applying the decision that the standard used for type testing does not require it.

END REPORT