

Report No.: FR262109-02



RADIO TEST REPORT

FCC ID : 2AGYI-MRF61FI

Equipment : MRF61 FI

Brand Name : Mega Chips

Model Name : MBWM000002

Applicant : MegaChips Corporation

1-1-1, Miyahara, Yodogawa-ku, Osaka, Japan

Manufacturer : MegaChips Corporation

1-1-1, Miyahara, Yodogawa-ku, Osaka, Japan

Standard : 47 CFR FCC Part 15.247

The product was received on Jun. 22, 2022, and testing was started from Jul. 20, 2022 and completed on Jan. 31, 2023. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

Sporton International Inc. Hsinchu Laboratory

No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)

TEL: 886-3-656-9065 FAX: 886-3-656-9085

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: 01

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History of this test report

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Report No.	Version	Description	Issued Date
FR262109-02	01	Initial issue of report	Feb. 13, 2023

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Summary of Test Result

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Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.247(a)	DTS Bandwidth	PASS	-
3.3	15.247(b)	Maximum Conducted Output Power PASS		-
3.4	15.247(e)	Power Spectral Density	PASS	-
3.5 15.247(d) Emissions in Non-restricted Frequency Bands -				-
3.6	15.247(d)	missions in Restricted Frequency Bands PASS -		-
Note: Refe	erence to Sport	ton Project No.: 262109.		•

Declaration of Conformity:

- The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results.
- 2. The measurement uncertainty please refer to report "Measurement Uncertainty".

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Sam Chen

Report Producer: Sandy Chuang

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1 General Description

1.1 Information

1.1.1 RF General Information

Frequency Range	Modulation	Ch. Frequency (MHz)	Channel Spacing (MHz)	Channel Number
		903.5-927.5	1	25
902-928 MHz	OFDM	905-927	2	12
902-926 WITZ		906-926	4	6
		908-924	8	3

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Band	Mode	BWch (MHz)	Nant
902-928MHz	OFDM_1M	1	1TX
902-928MHz	OFDM_2M	2	1TX
902-928MHz	OFDM_4M	4	1TX
902-928MHz	OFDM_8M	8	1TX

Note:

- 902-928 MHz Band uses a combination of OFDM modulation.
- BWch is the nominal channel bandwidth.

1.1.2 Antenna Information

Ant.	Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	1	PulseLarsen	W1063	Dipole	Reversed-SMA	1

Note: The above information was declared by manufacturer.

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1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
OFDM_1M	0.897	0.47	3.403m	300
OFDM_2M	0.798	0.98	1.563m	1k
OFDM_4M	0.696	1.57	880u	3k
OFDM_8M	0.596	2.25	562.5u	3k

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- DC is Duty Cycle.
- DCF is Duty Cycle Factor.

1.1.4 EUT Operational Condition

EUT Power Type	DC power from Adapter			
Beamforming Function	☐ With beamforming ☐ Without beamforming			
Test Software Version	rf_tester.exe (v1.1)			

Note: The above information was declared by manufacturer.

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1.2 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

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- 47 CFR FCC Part 15.247
- ANSI C63.10-2013

The following reference test guidance is not within the scope of accreditation of TAF.

- FCC KDB 558074 D01 v05r02
- FCC KDB 414788 D01 v01r01

1.3 Testing Location Information

Testing Location Information

Test Lab.: Sporton International Inc. Hsinchu Laboratory

Hsinchu ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)

(TAF: 3787) TEL: 886-3-656-9065 FAX: 886-3-656-9085

Test site Designation No. TW3787 with FCC.

Conformity Assessment Body Identifier (CABID) TW3787 with ISED

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
RF Conducted	TH02-CB	Jay Lo	23.5~23.9 / 66~69	Jul. 20, 2022
Radiated < 1GHz	03CH05-CB	Black Lu	20.7-21.8 / 56-59	Jan. 19, 2023~
Radiated > 1GHz	03CH03-CB	DIACK LU	19.2-20.3 / 56-59	Jan. 30, 2023
AC Conduction	CO01-CB	Tim Chen	23~24 / 58~60	Jan. 31, 2023

Note: The tested sample of AC Conduction and Radiated tests was received on Nov. 15, 2022.

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.4 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	3.4 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	5.2 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	4.7 dB	Confidence levels of 95%
Conducted Emission	3.2 dB	Confidence levels of 95%
Output Power Measurement	0.8 dB	Confidence levels of 95%
Power Density Measurement	3.2 dB	Confidence levels of 95%
Bandwidth Measurement	2.0 %	Confidence levels of 95%

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2 Test Configuration of EUT

2.1 Test Channel Mode

Mode	Power Setting
OFDM_1M_Nss1_1TX	-
903.5MHz	0
914.5MHz	0
926.5MHz	0
927.5MHz	-14
OFDM_2M_Nss1_1TX	-
905MHz	0
915MHz	0
925MHz	0
927MHz	-11
OFDM_4M_Nss1_1TX	-
906MHz	0
914MHz	0
922MHz	0
926MHz	-10
OFDM_8M_Nss1_1TX	-
908MHz	-2
916MHz	0
924MHz	-9

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2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz	
Operating Mode	CTX
1	EUT + Adapter

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The Worst Case Mode for Following Conformance Tests	
Tests Item	DTS Bandwidth Maximum Conducted Output Power Power Spectral Density Emissions in Non-restricted Frequency Bands
Test Condition	Conducted measurement at transmit chains

The Worst Case Mode for Following Conformance Tests		
Tests Item	Emissions in Restricted Frequency Bands	
Test Condition Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in E regardless of spatial multiplexing MIMO configuration), the radiated test sho be performed with highest antenna gain of each antenna type.		
Operating Mode < 1GHz	СТХ	
The EUT was performed at X axis, Y axis and Z axis position for Emissions in Restricted Frequency Band above 1GHz test, and the worst case was found at Y axis. So the measurement will follow this same test configuration.		
1	EUT in Y axis + Adapter	
Operating Mode > 1GHz CTX		
The EUT was performed at X axis, Y axis and Z axis position, and the worst case was found at Y axis. So the measurement will follow this same test configuration.		
1	EUT in Y axis + Adapter	

Note: The Adapter is for measurement only, would not be marketed.

Adapter information as below:

Power	Brand	Model
Adapter	STONTRONICS	RPI-18PFCA-05

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2.3 EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

2.4 Accessories

N/A

2.5 Support Equipment

For AC Conduction:

To Ao Conduction.					
	Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID	
Α	Test Fixtrue	FTDI	MM_DEBUG	N/A	
В	NB	DELL	E6430	N/A	
С	Earphone	SHYARO CHI	MIC-04	N/A	
D	Mouse	acer	MOBVUO	N/A	
Е	Adapter	STONTRONICS	RPI-18PFCA-05	N/A	

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For Radiated:

	Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID	
Α	Notebook	DELL	E4300	N/A	
В	Test Fixture	FTDI	MM_DEBUG	N/A	
С	Adapter	STONTRONICS	RPI-18PFCA-05	N/A	

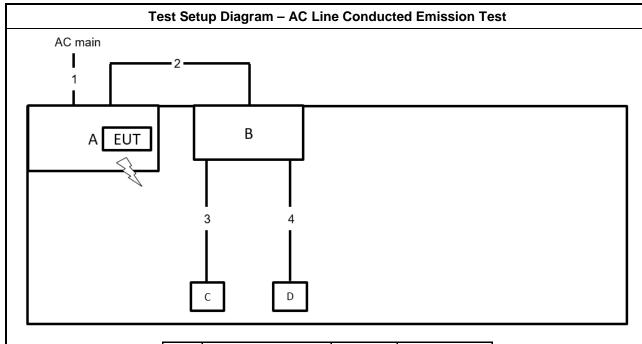
For RF Conducted:

	Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID	
Α	Notebook	DELL	E4300	N/A	
В	Test Fixtrue	FTDI	MM_DEBUG	N/A	
С	Adapter	STONTRONICS	RPI-18PFCA-05	N/A	

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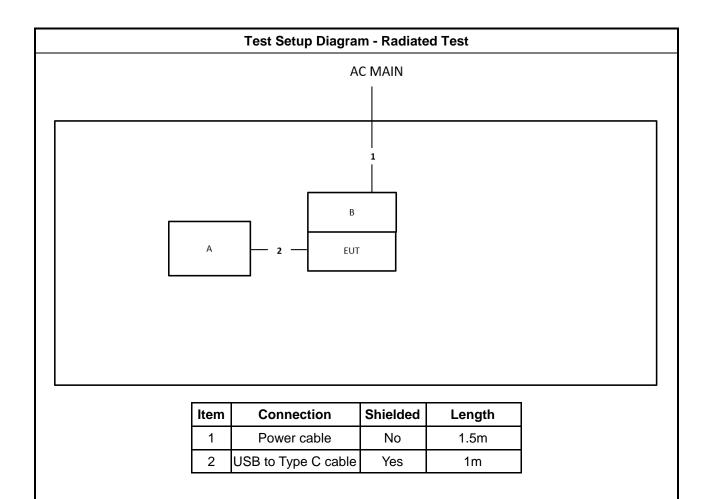
2.6 Test Setup Diagram



Connection	Shielded	Length
Power cable	No	1.5m
USB to TypeC cable	No	1.2m
Audio cable	No	1.2m
USB cable	Yes	1m
	Power cable USB to TypeC cable Audio cable	Power cable No USB to TypeC cable No Audio cable No

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3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50
Note 1: * Decreases with the logarithm of the frequency.		

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3.1.2 Measuring Instruments

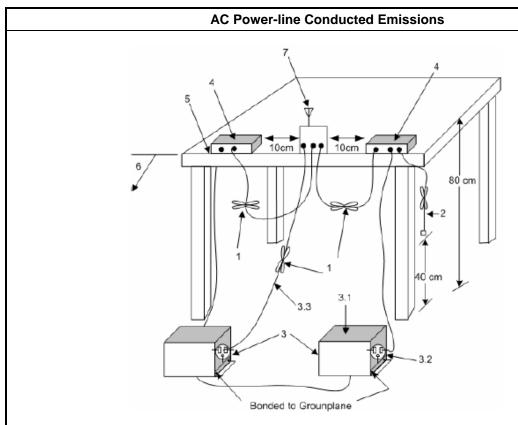
Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

Test Method	
Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.	

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3.1.4 **Test Setup**



-Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long.

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- 2—The I/O cables that are not connected to an accessory shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- 3—EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω loads. LISN may be placed on top of, or immediately beneath, reference ground plane.
- 3.1—All other equipment powered from additional LISN(s).
- 3.2—A multiple-outlet strip may be used for multiple power cords of non-EUT equipment.
 3.3—LISN at least 80 cm from nearest part of EUT chassis.
 4—Non-EUT components of EUT system being tested.

- –Rear of EUT, including peripheráls, shall all be aligned and flush with edge of tabletop.
- 6—Edge of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground
- 7—Antenna can be integral or detachable. If detachable, then the antenna shall be attached for this test.

Measurement Results Calculation

The measured Level is calculated using:

- Corrected Reading: LISN Factor (LISN) + Attenuator (AT/AUX) + Cable Loss (CL) + Read Level (Raw) = Level
- Margin = -Limit + Level

Test Result of AC Power-line Conducted Emissions 3.1.6

Refer as Appendix A

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3.2 DTS Bandwidth

3.2.1 6dB Bandwidth Limit

6dB Bandwidth Limit	
Systems using digital modulation techniques:	
■ 6 dB bandwidth ≥ 500 kHz.	

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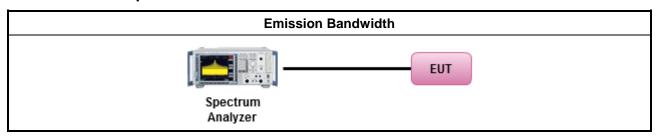
3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

	Test Method				
•	For	the emission bandwidth shall be measured using one of the options below:			
		Refer as FCC KDB 558074, clause 8.2 & C63.10 clause 11.8.1 Option 1 for 6 dB bandwidth measurement.			
		Refer as FCC KDB 558074, clause 8.2 & C63.10 clause 11.8.2 Option 2 for 6 dB bandwidth measurement.			
		Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.			

3.2.4 Test Setup



3.2.5 Test Result of Emission Bandwidth

Refer as Appendix B

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3.3 Maximum Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

Maximum Conducted Output Power Limit

- If $G_{TX} \le 6$ dBi, then $P_{Out} \le 30$ dBm (1 W)
- Point-to-multipoint systems (P2M): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 (G_{TX} 6)$ dBm
- Point-to-point systems (P2P): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 (G_{TX} 6)/3$ dBm
- Smart antenna system (SAS):
 - Single beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 (G_{TX} 6)/3$ dBm
 - Overlap beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 (G_{TX} 6)/3$ dBm
 - Aggregate power on all beams: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 (G_{TX} 6)/3 + 8$ dB dBm

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 P_{out} = maximum peak conducted output power or maximum conducted output power in dBm, G_{TX} = the maximum transmitting antenna directional gain in dBi.

3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

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3.3.3 Test Procedures

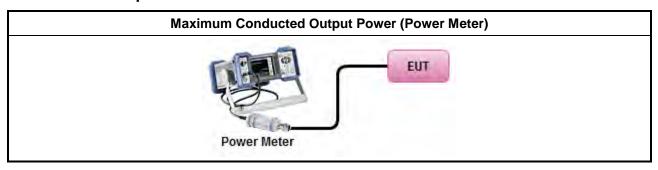
		Test Method
•	Max	imum Peak Conducted Output Power
		Refer as FCC KDB 558074, clause 8.3.1.1 & C63.10 clause 11.9.1.1 (RBW ≥ EBW method).
		Refer as FCC KDB 558074, clause 8.3.1.3 & C63.10 clause 11.9.1.3 (peak power meter).
•	Max	imum Conducted Output Power
	[duty	/ cycle ≥ 98% or external video / power trigger]
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.2 Method AVGSA-1.
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.3 Method AVGSA-1A. (alternative)
	duty	cycle < 98% and average over on/off periods with duty factor
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.4 Method AVGSA-2.
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.5 Method AVGSA-2A (alternative)
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.6 Method AVGSA-3
		Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.7 Method AVGSA-3A (alternative)
	Mea	surement using a power meter (PM)
		Refer as FCC KDB 558074, clause 8.3.2.3 & C63.10 clause 11.9.2.3.1 Method AVGPM (using an RF average power meter).
	\boxtimes	Refer as FCC KDB 558074, clause 8.3.2.3 & C63.10 clause 11.9.2.3.2 Method AVGPM-G (using an gate RF average power meter).
•	For	conducted measurement.
	•	If the EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.
	•	If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + + P_n \\ \text{(calculated in linear unit [mW] and transfer to log unit [dBm])} \\ \text{EIRP}_{total} = P_{total} + DG$

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3.3.4 Test Setup



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3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

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3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

Power Spectral Density Limit ■ Power Spectral Density (PSD) ≤ 8 dBm/3kHz

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3.4.2 Measuring Instruments

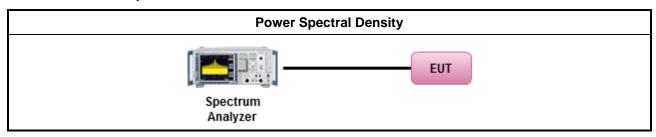
Refer a test equipment and calibration data table in this test report.

3.4.3 Test Procedures

		Test Method
•	output the out conduct of the a	power spectral density procedures that the same method as used to determine the conducted power. If maximum peak conducted output power was measured to demonstrate compliance to put power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum sted output power was measured to demonstrate compliance to the output power limit, then one average PSD procedures shall be used, as applicable based on the following criteria (the peak rocedure is also an acceptable option).
	⊠ R	efer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10 Method Max. PSD.
•	For cor	nducted measurement.
	• If	The EUT supports multiple transmit chains using options given below:
		Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.
		Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits,
		Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.

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3.4.4 Test Setup



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3.4.5 Test Result of Power Spectral Density

Refer as Appendix D

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3.5 Emissions in Non-restricted Frequency Bands

3.5.1 Emissions in Non-restricted Frequency Bands Limit

Un-restricted Band Emissions Limit					
RF output power procedure	Limit (dBc)				
Peak output power procedure	20				
Average output power procedure	30				

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- Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.
- Note 2: If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average PSD level.

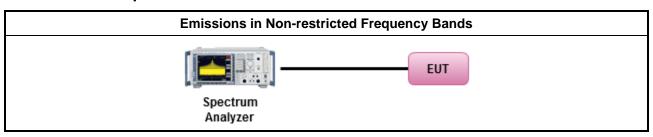
3.5.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.5.3 Test Procedures

	Test Method
•	Refer as FCC KDB 558074, clause 8.5 for unwanted emissions into non-restricted bands.

3.5.4 Test Setup



3.5.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix E

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3.6 Emissions in Restricted Frequency Bands

3.6.1 Emissions in Restricted Frequency Bands Limit

Restricted Band Emissions Limit								
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)					
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300					
0.490~1.705	24000/F(kHz)	33.8 - 23	30					
1.705~30.0	30	29	30					
30~88	100	40	3					
88~216	150	43.5	3					
216~960	200	46	3					
Above 960	500	54	3					

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- Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).
- Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.
- Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

3.6.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

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3.6.3 Test Procedures

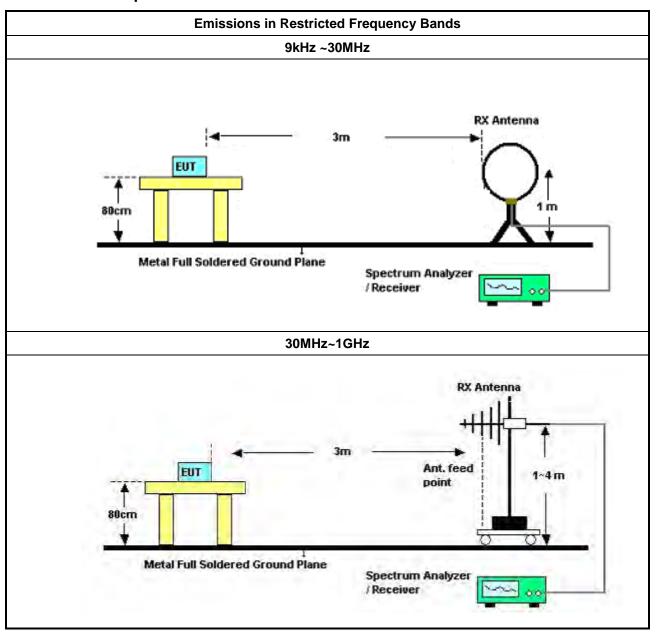
		Test Method					
•	The	average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].					
•		er as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency nnel and highest frequency channel within the allowed operating band.					
•	For	the transmitter unwanted emissions shall be measured using following options below:					
	•	Refer as FCC KDB 558074, clause 8.6 for unwanted emissions into restricted bands.					
	Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.1(trace averaging for decycle ≥98%).						
	Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.2(trace averaging + factor).						
		☐ Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.3(Reduced VBW≥1/T).					
		Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse to					
		Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.					
		Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.4 measurement procedure peak limit.					
•	For	the transmitter band-edge emissions shall be measured using following options below:					
	•	Refer as FCC KDB 558074 clause 8.7 & c63.10 clause 11.13.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.					
	•	Refer as FCC KDB 558074, clause 8.7 (ANSI C63.10, clause 6.10.6) for marker-delta method for band-edge measurements.					
	•	Refer as FCC KDB 558074, clause 8.7 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).					
	•	For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below: (1) Measure and sum the spectra across the outputs or (2) Measure and add 10 log(N) dB					
	•	For FCC KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred.					

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Test Setup 3.6.4



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Above 1GHz

Spectrum Analyzer

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3.6.5 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Antenna factor (AF) + Cable loss (CL) + Read level (Raw) - Preamp factor (PA)(if applicable) = Level.

3.6.6 Emissions in Restricted Frequency Bands (Below 30MHz)

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to KDB414788 Radiated Test Site, and the result came out very similar.

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

The radiated emissions were investigated from 9 kHz or the lowest frequency generated within the device, up to the 10th harmonic or 40 GHz, whichever is appropriate.

3.6.7 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix F

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4 Test Equipment and Calibration Data

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.4GHz	Feb. 22, 2022	Feb. 21, 2023	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50- 16-2	04083	150kHz ~ 100MHz	Feb. 09, 2022	Feb. 08, 2023	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Apr. 12, 2022	Apr. 11, 2023	Conduction (CO01-CB)
Pulse Limiter	Rohde&Schwarz	ESH3-Z2	100430	9kHz ~ 30MHz	Feb. 10, 2022	Feb. 09, 2023	Conduction (CO01-CB)
COND Cable	Woken	Cable	Low cable-CO01	9kHz ~ 30MHz	May 18, 2022	May 17, 2023	Conduction (CO01-CB)
Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	May 14, 2022	May 13, 2023	Radiation (03CH05-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH05-CB	30 MHz ~ 1 GHz	Aug. 03, 2022	Aug. 02, 2023	Radiation (03CH05-CB)
Bilog Antenna with 6dB Attenuator	TESEQ & EMCI	CBL 6112D & N-6-06	35236 & AT-N0610	30MHz ~ 2GHz	Mar. 25, 2022	Mar. 24, 2023	Radiation (03CH05-CB)
Pre-Amplifier	EMCI	EMC330N	980331	20MHz ~ 3GHz	Apr. 26, 2022	Apr. 25, 2023	Radiation (03CH05-CB)
Spectrum Analyzer	R&S	FSP40	100304	9kHz ~ 40GHz	Mar. 14, 2022	Mar. 13, 2023	Radiation (03CH05-CB)
RF Cable-low	Woken	RG402	Low Cable-04+23	30MHz~1GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH05-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH05-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH03-CB	1GHz ~18GHz 3m	May 05, 2022	May 04, 2023	Radiation (03CH03-CB)
Horn Antenna	SCHWARZBEC K	BBHA 9120 D	BBHA 9120 D 1370	1GHz~18GHz	Jun. 23, 2022	Jun. 22, 2023	Radiation (03CH03-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Aug. 22, 2022	Aug. 21, 2023	Radiation (03CH03-CB)
Pre-Amplifier	Agilent	8449B	3008A02097	1GHz ~ 26.5GHz	Jul. 01, 2022	Jun. 30, 2023	Radiation (03CH03-CB)
Pre-Amplifier	SGH	SGH184	20221107-3	18GHz ~ 40GHz	Nov. 16, 2022	Nov. 15, 2023	Radiation (03CH03-CB)
Spectrum Analyzer	R&S	FSP40	100019	9kHz ~ 40GHz	Jun. 10, 2022	Jun. 09, 2023	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-20+29	1GHz ~ 18GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH03-CB)
RF Cable-high	Woken	RG402	High Cable-29	1GHz ~ 18GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH03-CB)

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Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
High Cable	Woken	WCA0929M	40G#5+6	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH03-CB)
High Cable	Woken	WCA0929M	40G#5	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH03-CB)
High Cable	Woken	WCA0929M	40G#6	1GHz ~ 40 GHz	Dec. 07, 2022	Dec. 06, 2023	Radiation (03CH03-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH03-CB)
Spectrum analyzer	R&S	FSV40	101027	9kHz~40GHz	Aug. 02, 2021	Aug. 01, 2022	Conducted (TH02-CB)
Power Sensor	Anritsu	MA2411B	1126203	300MHz~40GHz	Oct. 25, 2021	Oct. 24, 2022	Conducted (TH02-CB)
Power Meter	Anritsu	ML2495A	1210004	300MHz~40GHz	Oct. 25, 2021	Oct. 24, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	High Cable-01	1 GHz – 18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	High Cable-02	1 GHz – 18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	High Cable-03	1 GHz – 18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	High Cable-04	1 GHz – 18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	High Cable-05	1 GHz – 18 GHz	Oct. 04, 2021	Oct. 03, 2022	Conducted (TH02-CB)
Switch	SPTCB	SP-SWI	SWI-02	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	SWI-02-P1	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	SWI-02-P2	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	SWI-02-P3	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	SWI-02-P4	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH02-CB)
RF Cable-high	Woken	RG402	SWI-02-P5	1 GHz –26.5 GHz	Dec. 13, 2021	Dec. 12, 2022	Conducted (TH02-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conducted (TH02-CB)

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Note: Calibration Interval of instruments listed above is one year.

NCR means Non-Calibration required.

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Conducted Emissions at Powerline

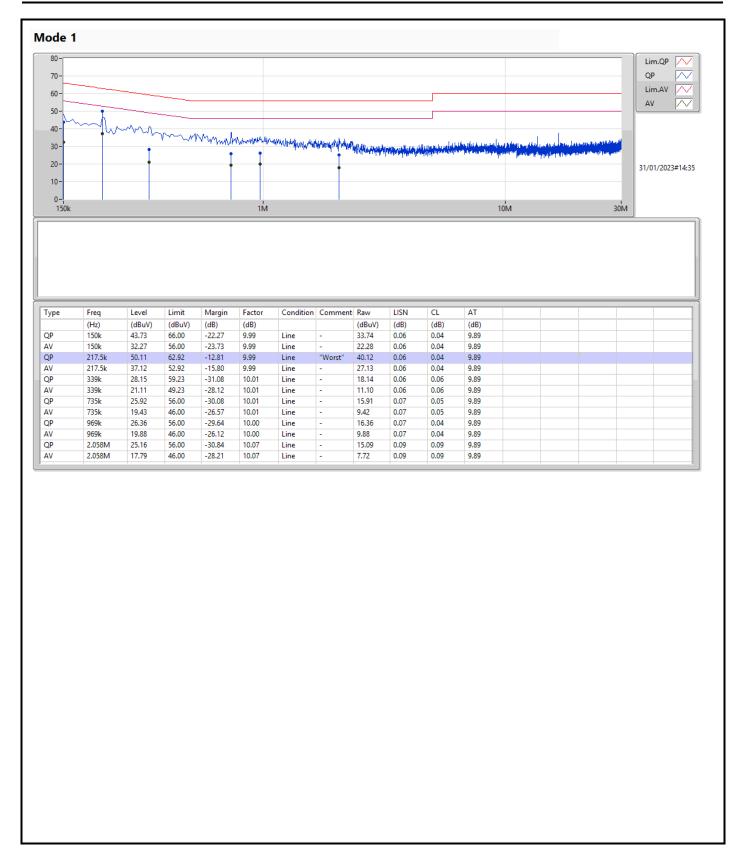
Appendix A

Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Condition
Mode 1	Pass	QP	217.5k	50.11	62.92	-12.81	Line

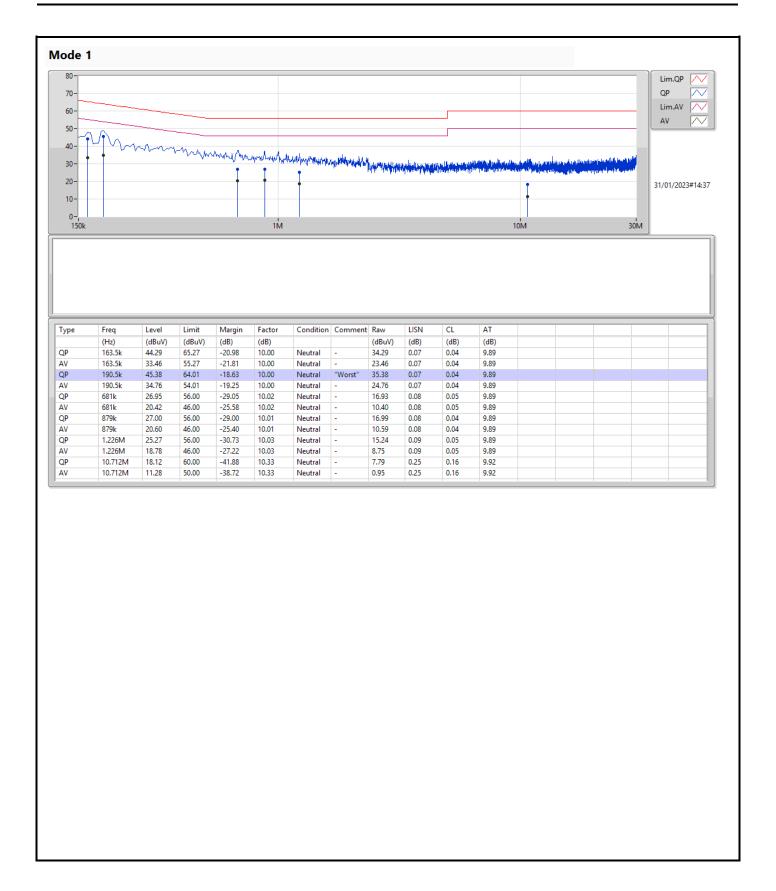
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Summary

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
902-928MHz	-	-	-	=	-
OFDM_1M_Nss1_1TX	827.5k	848.326k	848KD1D	808.75k	840.83k
OFDM_2M_Nss1_1TX	1.74M	1.774M	1M77D1D	1.713M	1.762M
OFDM_4M_Nss1_1TX	3.61M	3.653M	3M65D1D	3.59M	3.618M
OFDM_8M_Nss1_1TX	7.57M	7.566M	7M57D1D	7.53M	7.546M

 $Max-N\ dB = Maximum\ 6dB\ down\ bandwidth;\ Max-OBW = Maximum\ 99\%\ occupied\ bandwidth;\ Min-OBW = Minimum\ 99\%$

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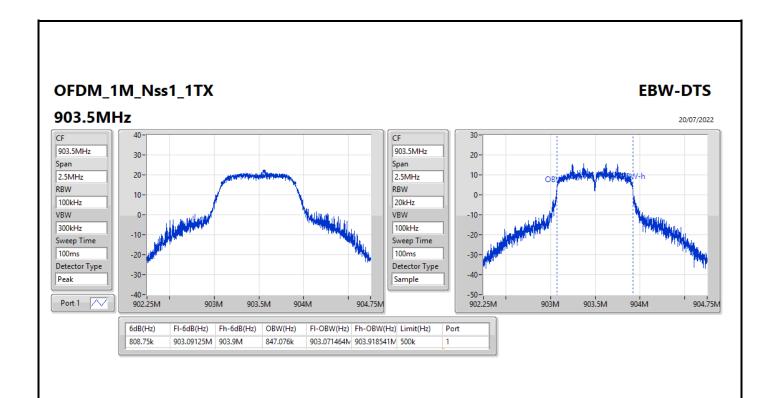
Result

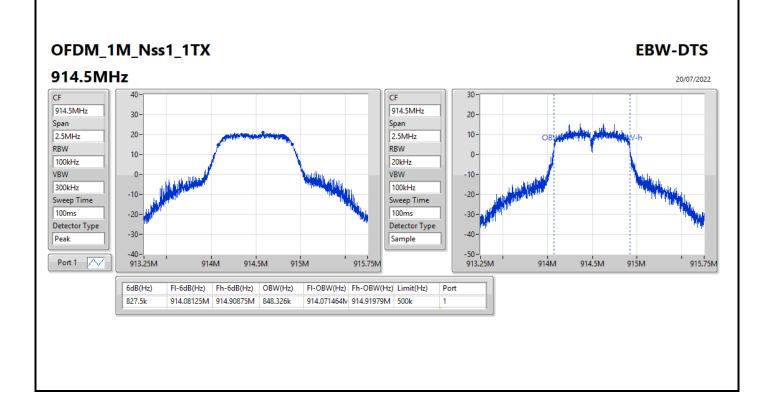
Mode	Result	Limit	Port 1-N dB	Port 1-OBW
		(Hz)	(Hz)	(Hz)
OFDM_1M_Nss1_1TX	-	-	-	-
903.5MHz	Pass	500k	808.75k	847.076k
914.5MHz	Pass	500k	827.5k	848.326k
926.5MHz	Pass	500k	822.5k	843.328k
927.5MHz	Pass	500k	813.75k	840.83k
OFDM_2M_Nss1_1TX	-	-	-	-
905MHz	Pass	500k	1.74M	1.772M
915MHz	Pass	500k	1.725M	1.774M
925MHz	Pass	500k	1.713M	1.769M
927MHz	Pass	500k	1.725M	1.762M
OFDM_4M_Nss1_1TX	-	-	-	-
906MHz	Pass	500k	3.595M	3.653M
914MHz	Pass	500k	3.595M	3.648M
922MHz	Pass	500k	3.61M	3.643M
926MHz	Pass	500k	3.59M	3.618M
OFDM_8M_Nss1_1TX	-	-	-	-
908MHz	Pass	500k	7.53M	7.556M
916MHz	Pass	500k	7.57M	7.566M
924MHz	Pass	500k	7.54M	7.546M

Port X-N dB = Port X 6dB down bandwidth; Port X-OBW = Port X 99% occupied bandwidth

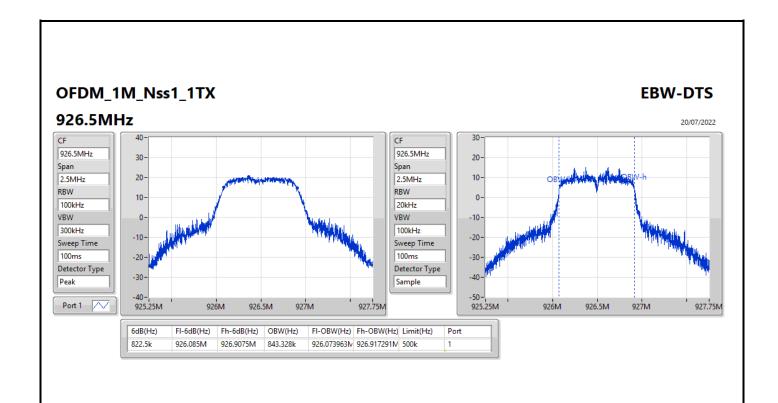
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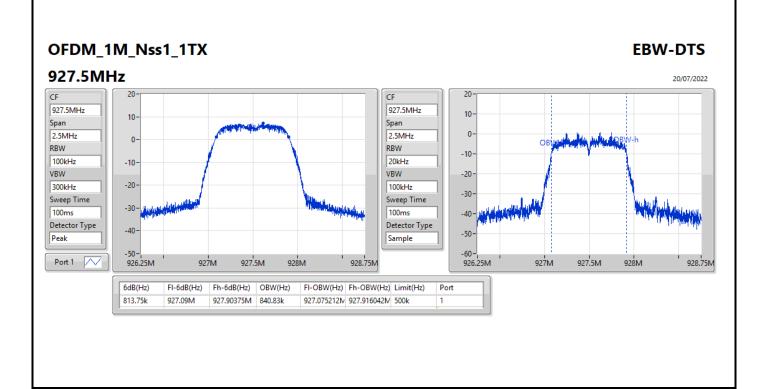
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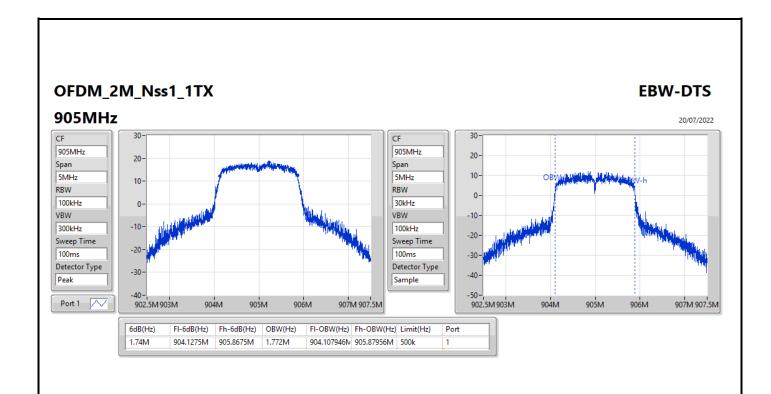


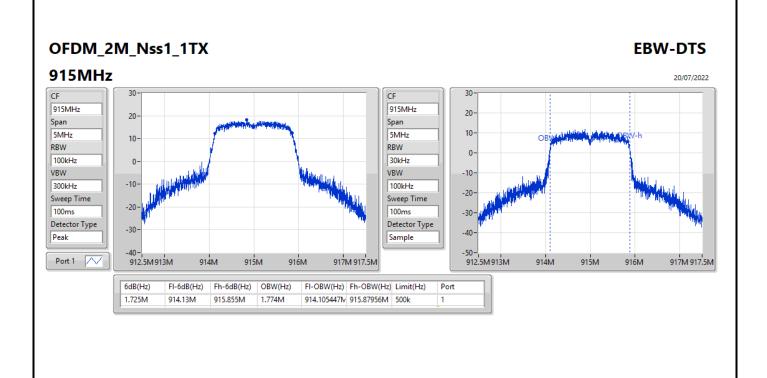
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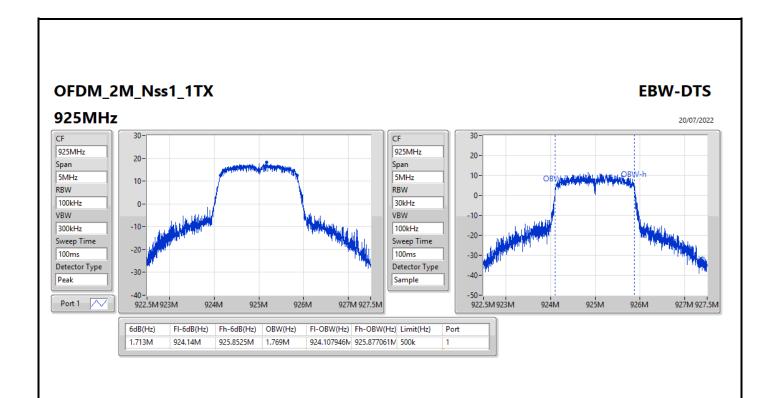


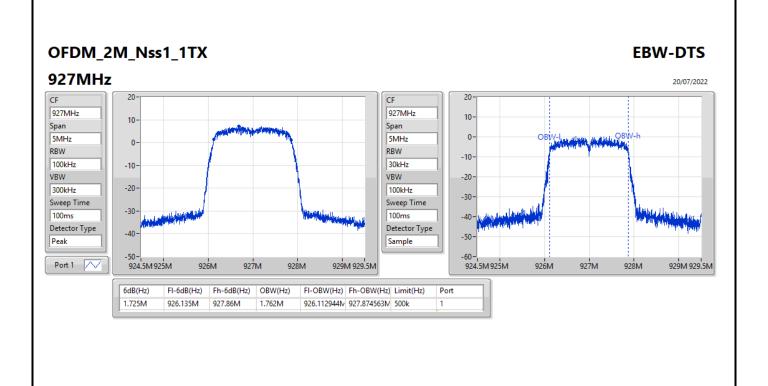
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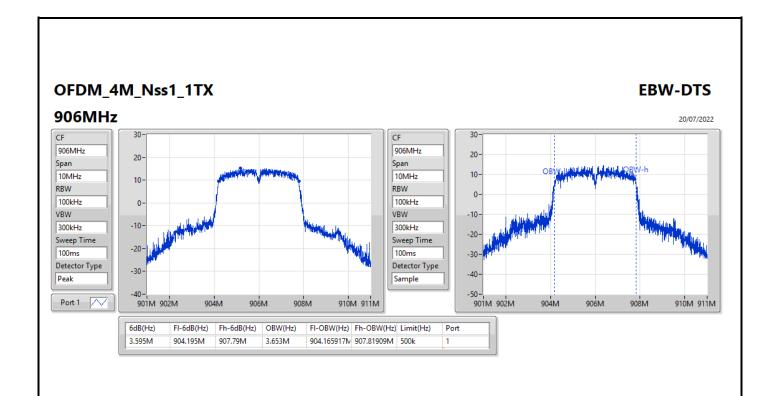


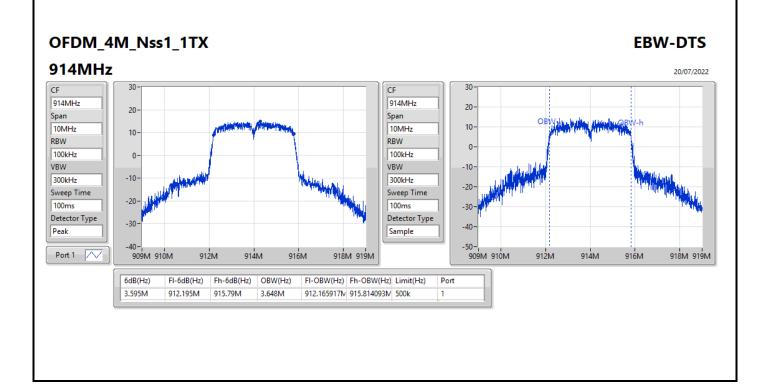
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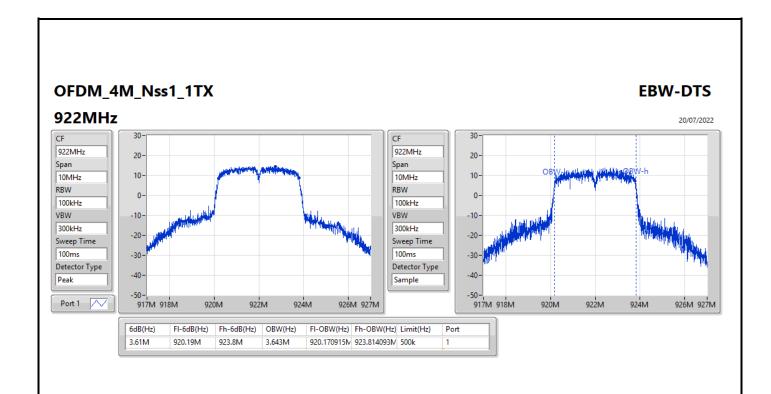


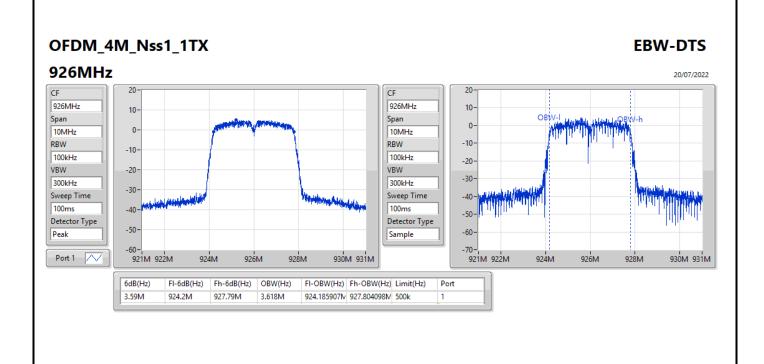
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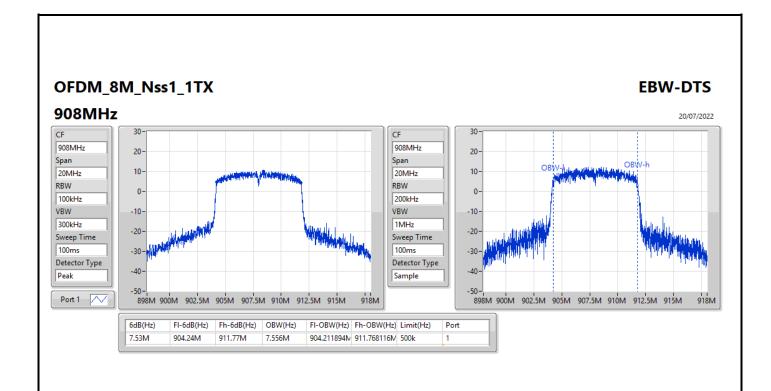


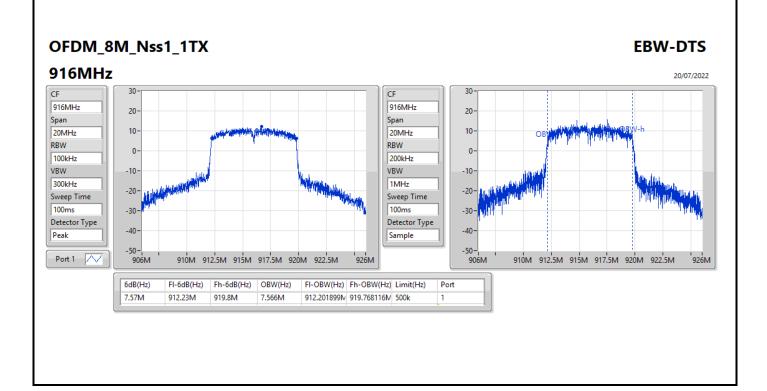
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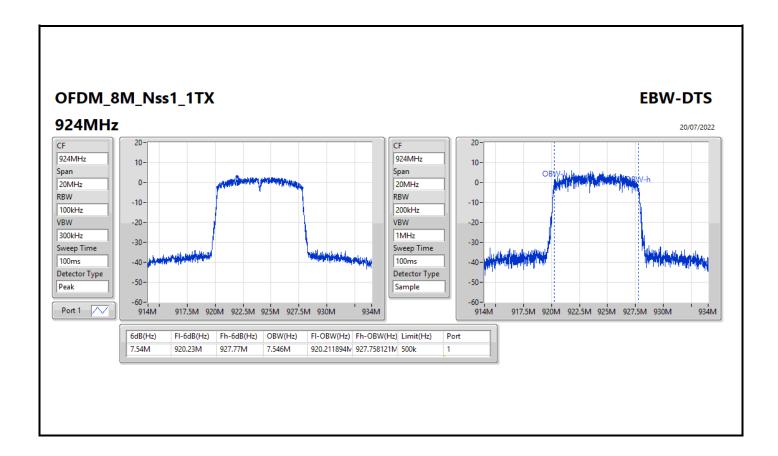


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Average Power-DTS

Appendix C

Summary

Mode	Power	Power
	(dBm)	(W)
902-928MHz	-	-
OFDM_1M_Nss1_1TX	20.82	0.12078
OFDM_2M_Nss1_1TX	20.87	0.12218
OFDM_4M_Nss1_1TX	20.73	0.11830
OFDM_8M_Nss1_1TX	20.56	0.11376

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Result

Mode	Result	Gain	Power	Power Limit
		(dBi)	(dBm)	(dBm)
OFDM_1M_Nss1_1TX	-	-	-	-
903.5MHz	Pass	1.00	20.72	30.00
914.5MHz	Pass	1.00	20.82	30.00
926.5MHz	Pass	1.00	20.47	30.00
927.5MHz	Pass	1.00	6.78	30.00
OFDM_2M_Nss1_1TX	-	-	•	-
905MHz	Pass	1.00	20.86	30.00
915MHz	Pass	1.00	20.87	30.00
925MHz	Pass	1.00	20.41	30.00
927MHz	Pass	1.00	9.80	30.00
OFDM_4M_Nss1_1TX	-	-	-	-
906MHz	Pass	1.00	20.69	30.00
914MHz	Pass	1.00	20.73	30.00
922MHz	Pass	1.00	20.38	30.00
926MHz	Pass	1.00	10.68	30.00
OFDM_8M_Nss1_1TX	-	-	•	-
908MHz	Pass	1.00	18.86	30.00
916MHz	Pass	1.00	20.56	30.00
924MHz	Pass	1.00	11.52	30.00

DG = Directional Gain; Port X = Port X output power

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PSD-DTS Appendix D

Summary

Mode	PD
	(dBm/RBW)
902-928MHz	-
OFDM_1M_Nss1_1TX	6.53
OFDM_2M_Nss1_1TX	4.44
OFDM_4M_Nss1_1TX	1.14
OFDM_8M_Nss1_1TX	-1.25

RBW = 3kHz;

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Appendix D **PSD-DTS**

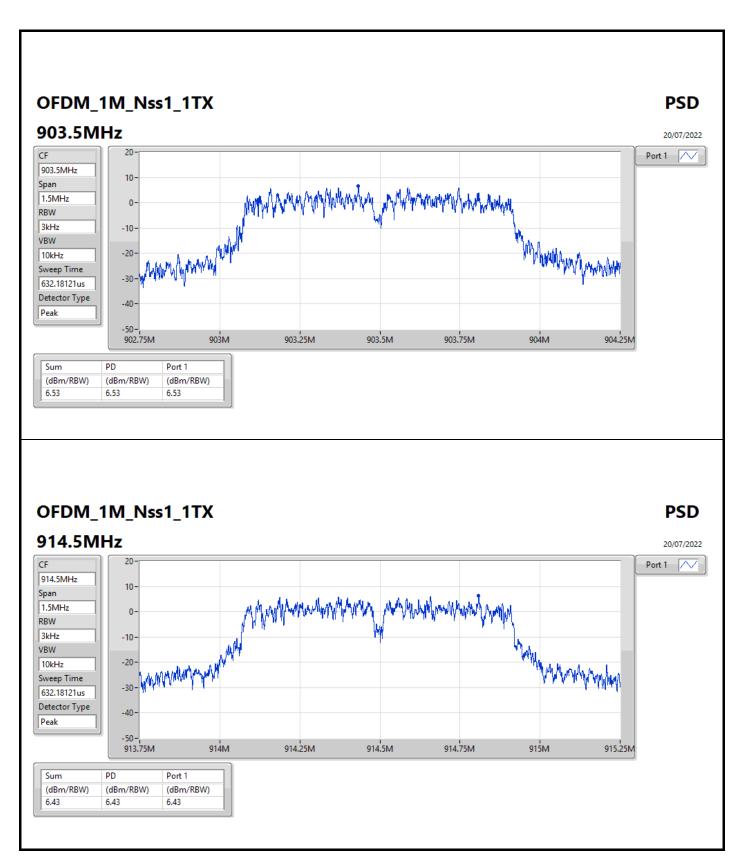
Result

Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
OFDM_1M_Nss1_1TX	-	-	-	-
903.5MHz	Pass	1.00	6.53	8.00
914.5MHz	Pass	1.00	6.43	8.00
926.5MHz	Pass	1.00	5.63	8.00
927.5MHz	Pass	1.00	-8.31	8.00
OFDM_2M_Nss1_1TX	-	-	-	-
905MHz	Pass	1.00	2.93	8.00
915MHz	Pass	1.00	4.44	8.00
925MHz	Pass	1.00	2.85	8.00
927MHz	Pass	1.00	-6.14	8.00
OFDM_4M_Nss1_1TX	-	-	-	-
906MHz	Pass	1.00	1.14	8.00
914MHz	Pass	1.00	0.57	8.00
922MHz	Pass	1.00	0.97	8.00
926MHz	Pass	1.00	-9.73	8.00
OFDM_8M_Nss1_1TX	-	-	-	-
908MHz	Pass	1.00	-2.83	8.00
916MHz	Pass	1.00	-1.25	8.00
924MHz	Pass	1.00	-11.08	8.00

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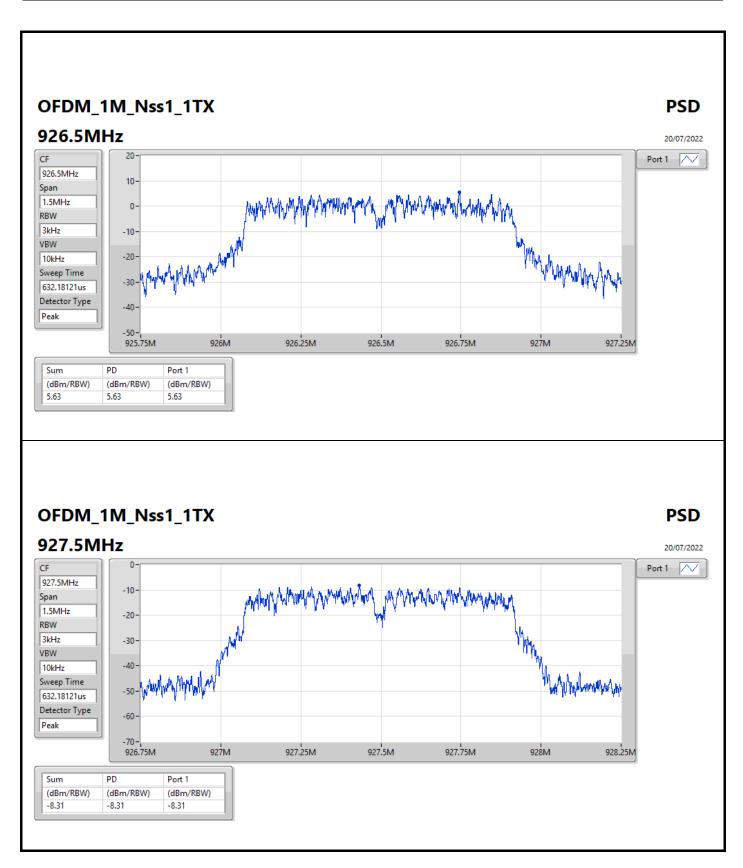
DG = Directional Gain; RBW = 3kHz; PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port X Power Density;





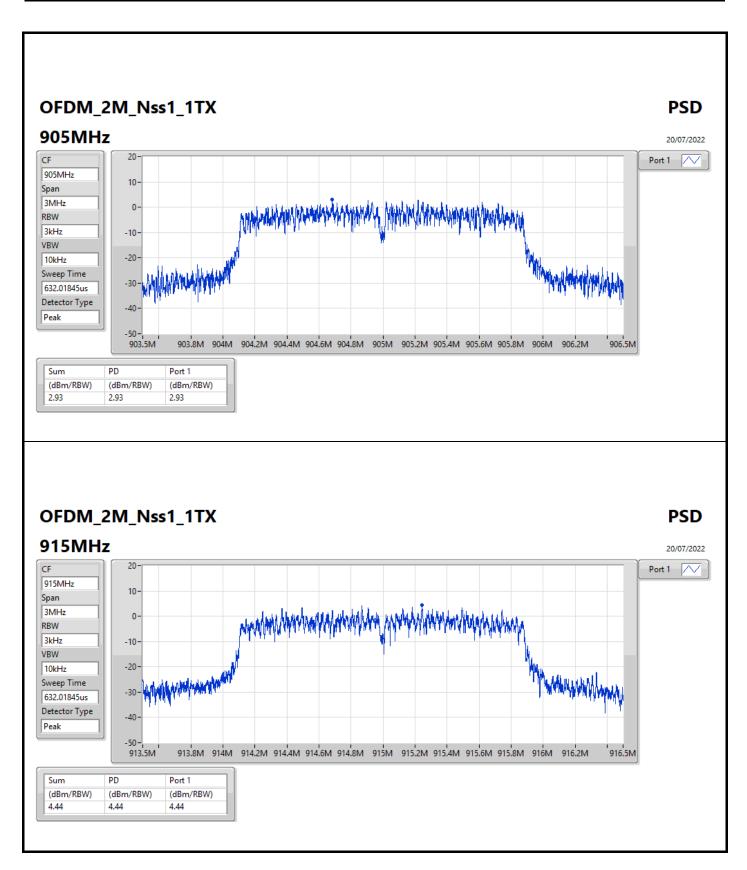
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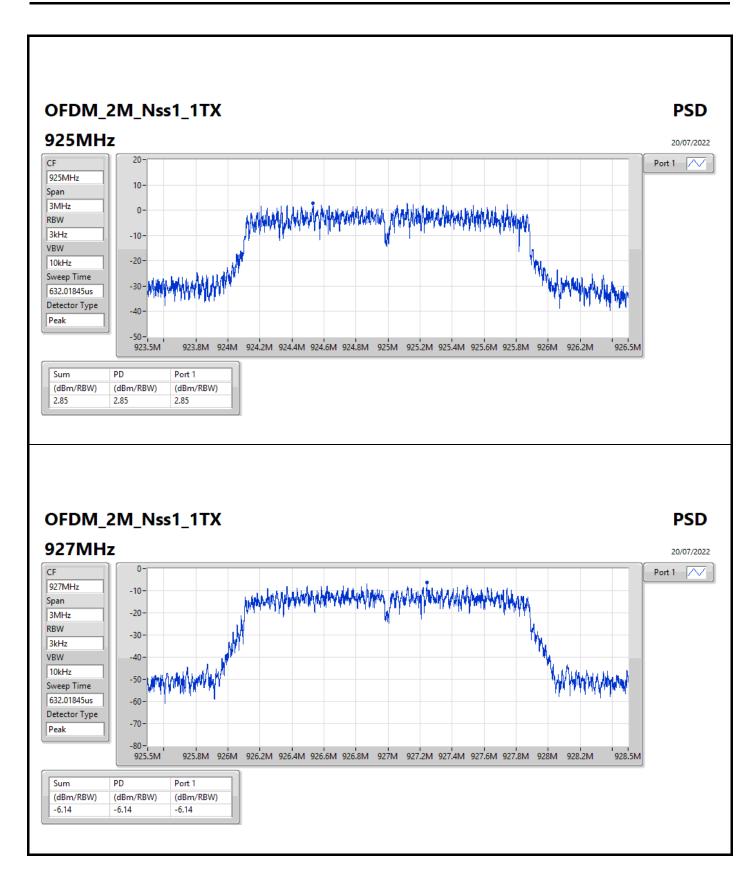
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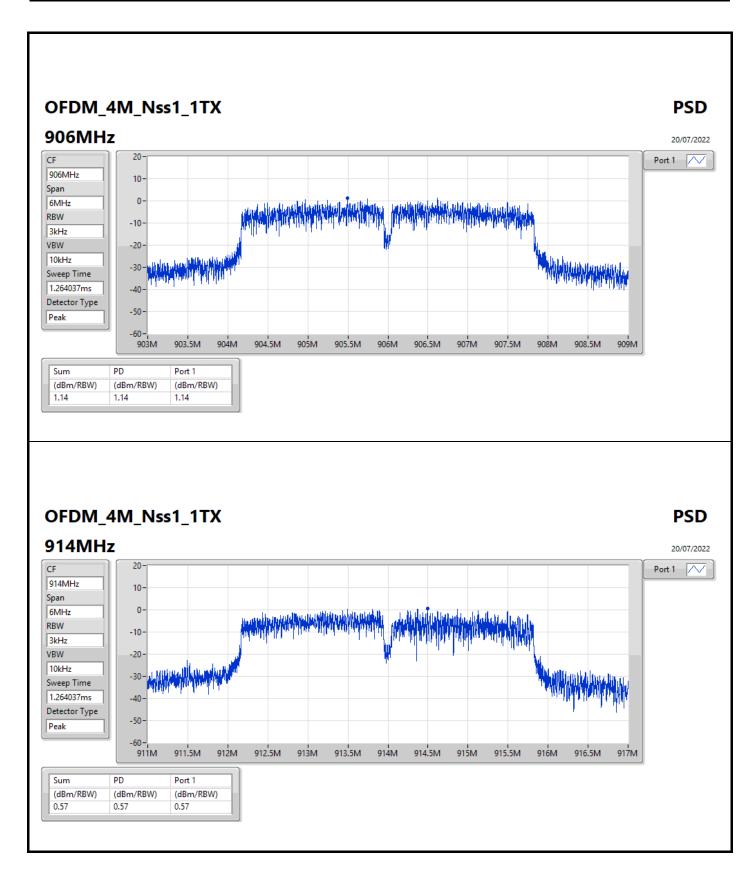
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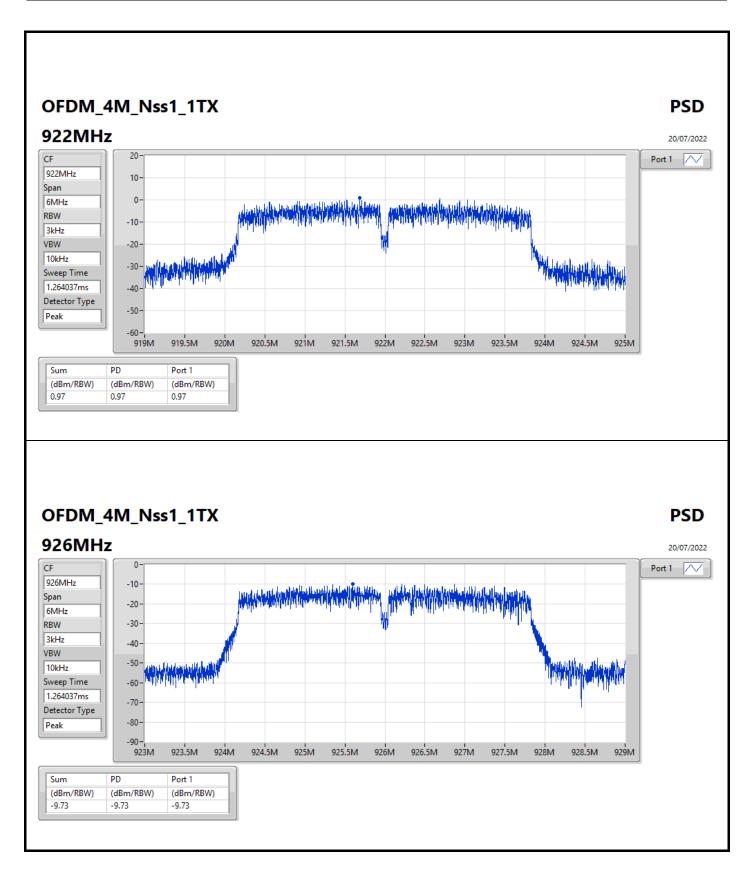
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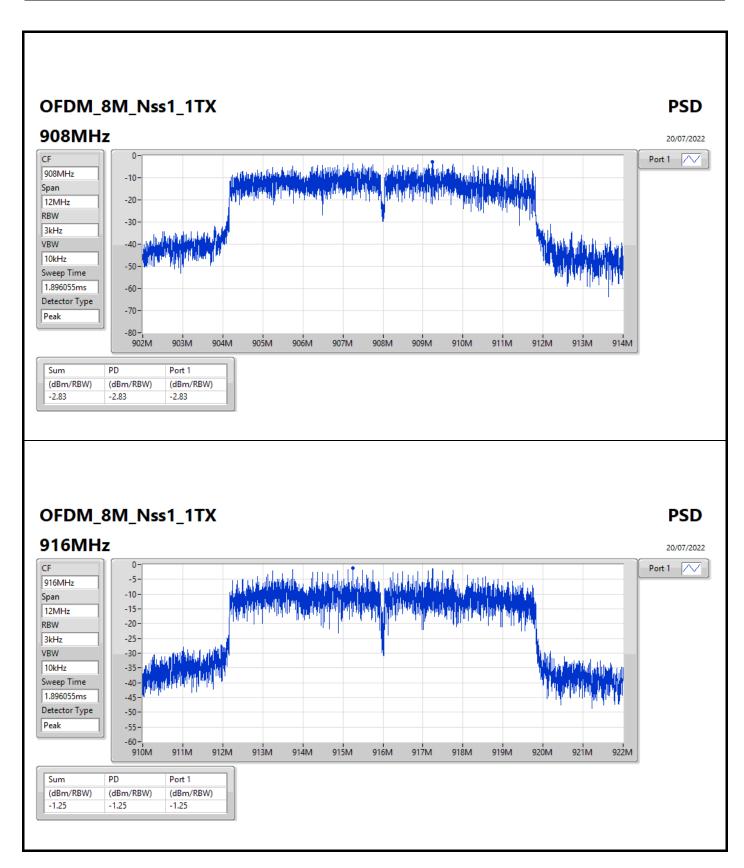
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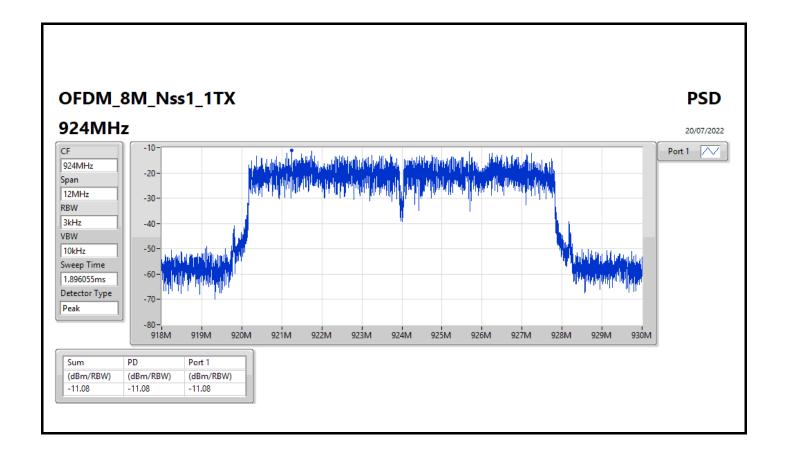


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CSE (Non-restricted Band)-DTS

Appendix E

Summary

Mode	Result	Ref	Ref	Limit	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Port
		(Hz)	(dBm)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	
902-928MHz	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OFDM_1M_Nss1_1TX	Pass	914.36M	20.42	-9.58	735.35M	-51.02	901.62M	-49.64	928M	-10.64	928M	-11.02	6.95513G	-48.01	1
OFDM_2M_Nss1_1TX	Pass	914.55M	17.14	-12.86	862.62M	-49.21	901.31M	-46.49	928M	-13.99	928M	-15.10	6.37694G	-47.33	1
OFDM_4M_Nss1_1TX	Pass	914.3M	14.74	-15.26	875.61M	-43.37	901.92M	-16.79	902M	-17.19	938.35M	-41.90	950.26M	-46.81	1
OFDM_8M_Nss1_1TX	Pass	916.98M	11.46	-18.54	881.15M	-44.49	898.58M	-40.87	928M	-19.01	928.01M	-18.63	952.53M	-46.34	1

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CSE (Non-restricted Band)-DTS

Appendix E

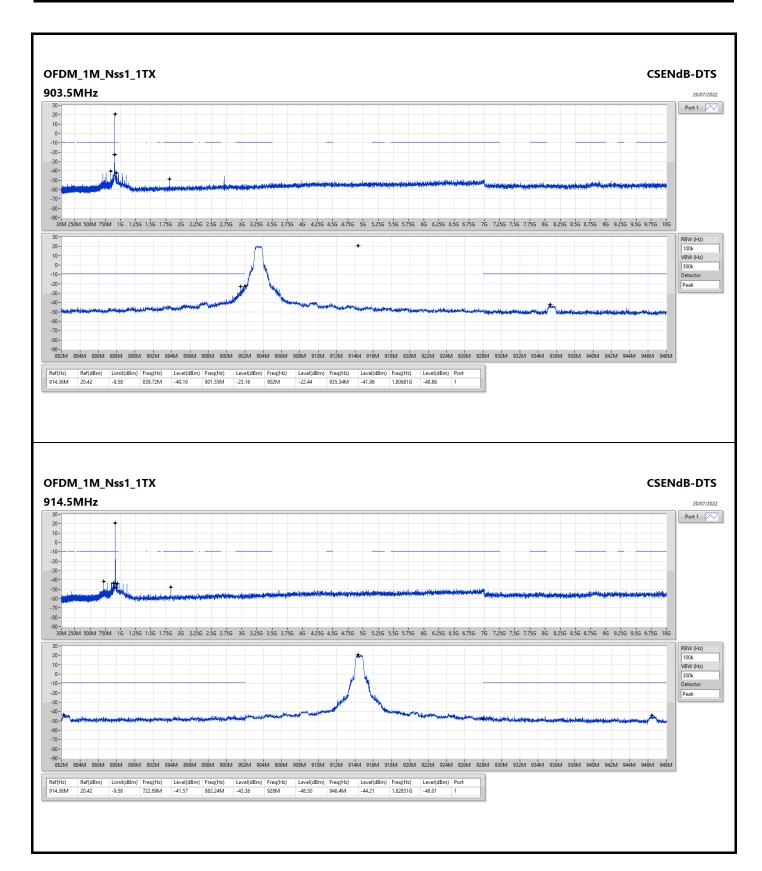
Result

Mode	Result	Ref	Ref	Limit	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Freq	Level	Port
		(Hz)	(dBm)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	(Hz)	(dBm)	
OFDM_1M_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
903.5MHz	Pass	914.36M	20.42	-9.58	839.72M	-40.19	901.55M	-23.16	902M	-22.44	935.34M	-41.96	1.80681G	-48.86	1
914.5MHz	Pass	914.36M	20.42	-9.58	722.89M	-41.57	882.24M	-43.36	928M	-48.50	946.4M	-44.21	1.82831G	-48.01	1
926.5MHz	Pass	914.36M	20.42	-9.58	862.4M	-40.85	894.13M	-41.67	928M	-24.20	928.05M	-25.67	958.18M	-47.22	1
927.5MHz	Pass	914.36M	20.42	-9.58	735.35M	-51.02	901.62M	-49.64	928M	-10.64	928M	-11.02	6.95513G	-48.01	1
OFDM_2M_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
905MHz	Pass	914.55M	17.14	-12.86	841.1M	-43.87	901.85M	-26.49	902M	-30.01	929.93M	-43.03	6.9755G	-49.49	1
915MHz	Pass	914.55M	17.14	-12.86	723.74M	-41.82	890.81M	-42.00	902M	-45.77	929.28M	-42.89	958.18M	-47.95	1
925MHz	Pass	914.55M	17.14	-12.86	861.23M	-42.06	892.26M	-41.35	928M	-32.04	928.07M	-28.53	953.66M	-47.23	1
927MHz	Pass	914.55M	17.14	-12.86	862.62M	-49.21	901.31M	-46.49	928M	-13.99	928M	-15.10	6.37694G	-47.33	1
OFDM_4M_Nss1_1TX	-		-	-	-	-	-	-	-	-	-	-		-	
906MHz	Pass	914.3M	14.74	-15.26	875.61M	-43.37	901.92M	-16.79	902M	-17.19	938.35M	-41.90	950.26M	-46.81	1
914MHz	Pass	914.3M	14.74	-15.26	876.68M	-42.48	883.92M	-40.88	928M	-43.58	929.58M	-41.61	952.53M	-45.21	1
922MHz	Pass	914.3M	14.74	-15.26	875.93M	-41.77	882.56M	-37.92	928M	-32.68	928.42M	-31.32	952.53M	-44.85	1
926MHz	Pass	914.3M	14.74	-15.26	879.87M	-47.19	891.16M	-44.45	928M	-18.28	928M	-18.82	949.13M	-48.23	1
OFDM_8M_Nss1_1TX	-		-	-	-	-	-	-	-	-	-	-		-	
908MHz	Pass	916.98M	11.46	-18.54	875.18M	-41.64	901.85M	-20.32	902M	-22.31	937.5M	-41.59	949.13M	-44.59	1
916MHz	Pass	916.98M	11.46	-18.54	880.4M	-41.35	901.55M	-33.50	928M	-31.07	928.64M	-32.37	957.05M	-43.93	1
924MHz	Pass	916.98M	11.46	-18.54	881.15M	-44.49	898.58M	-40.87	928M	-19.01	928.01M	-18.63	952.53M	-46.34	1

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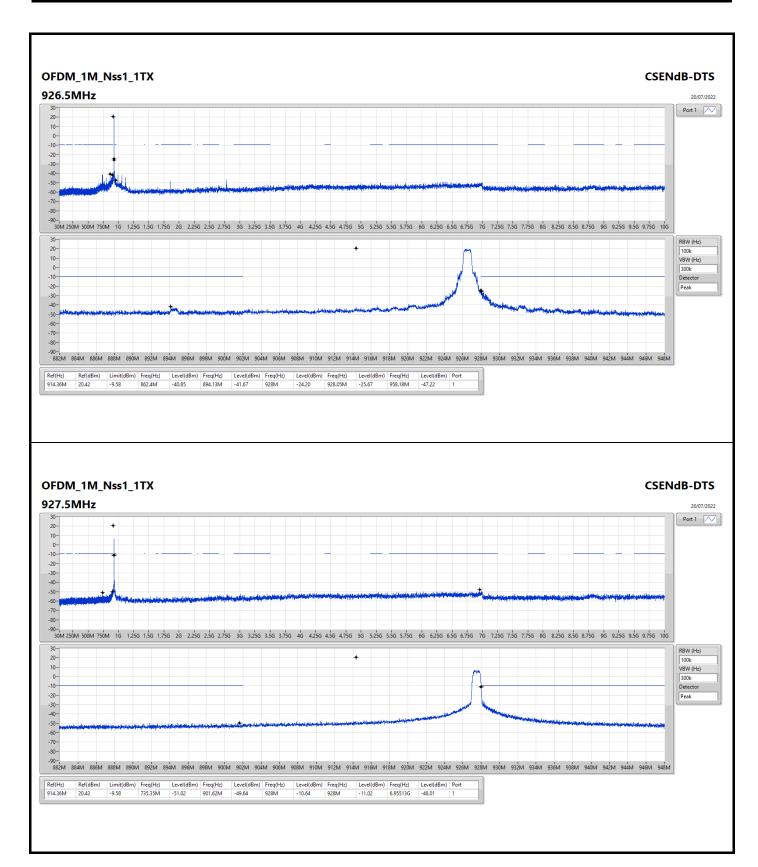
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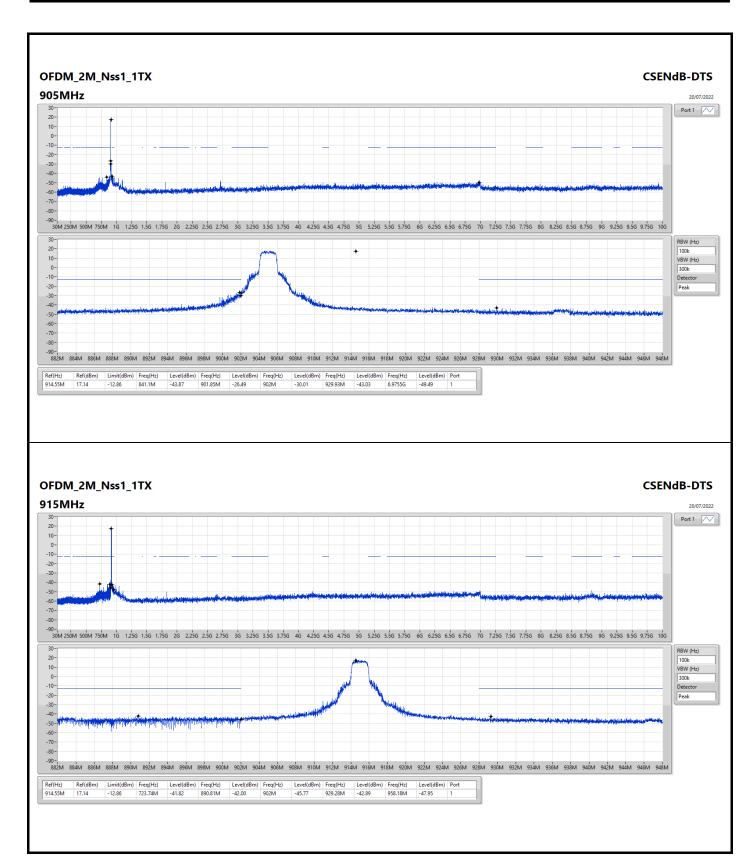
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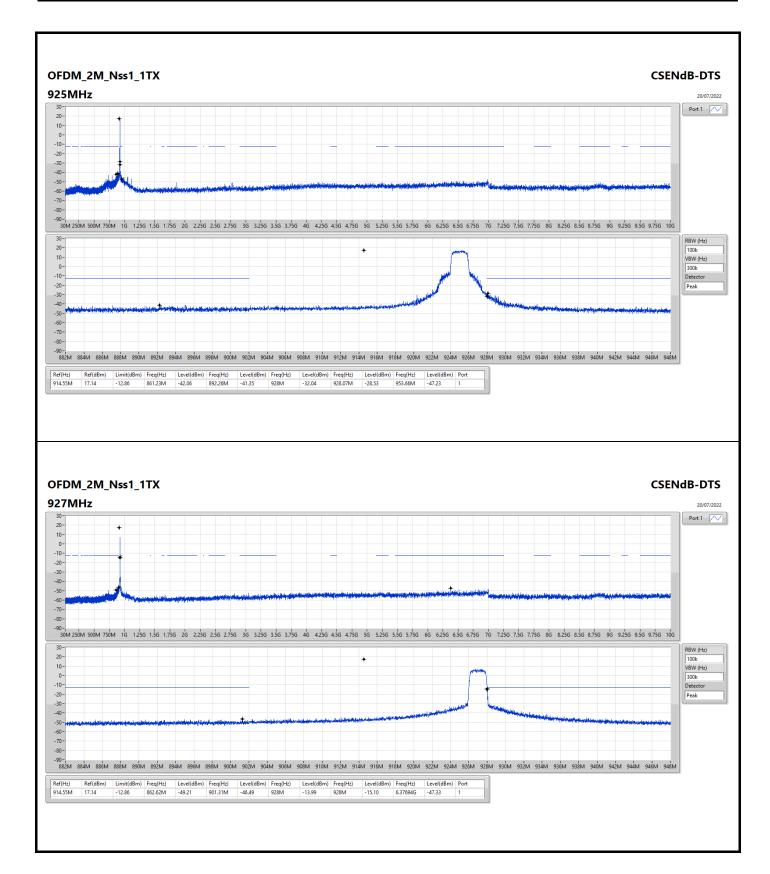
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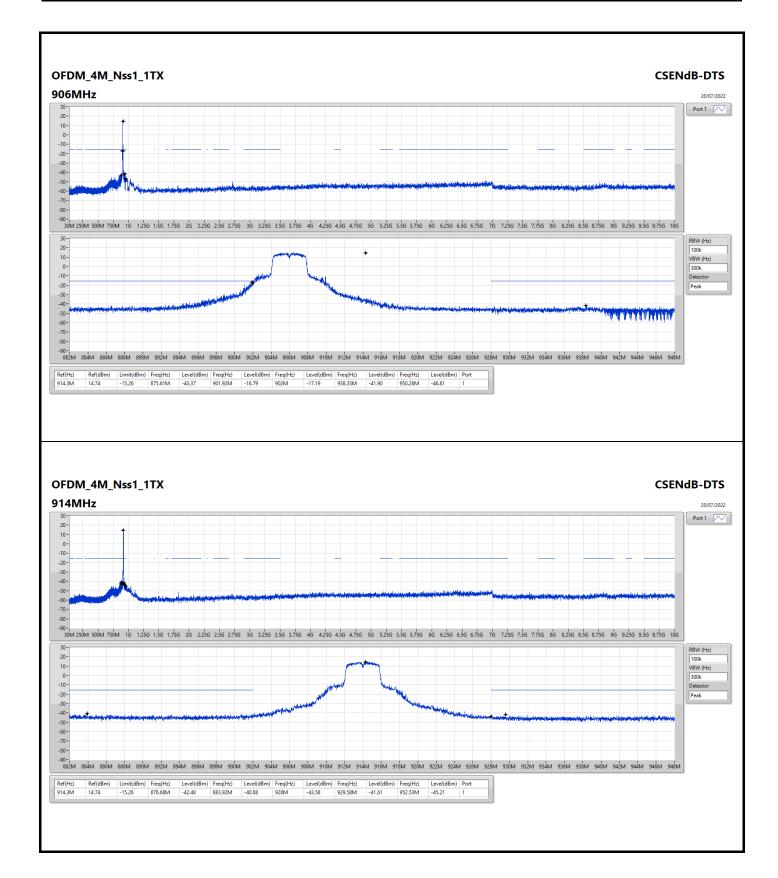
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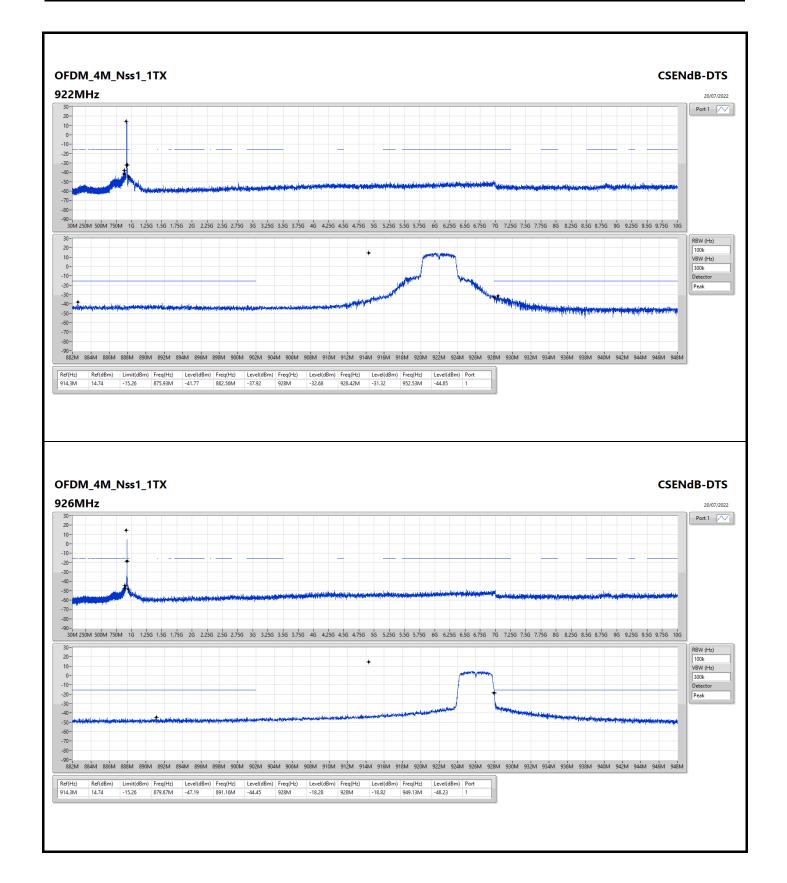
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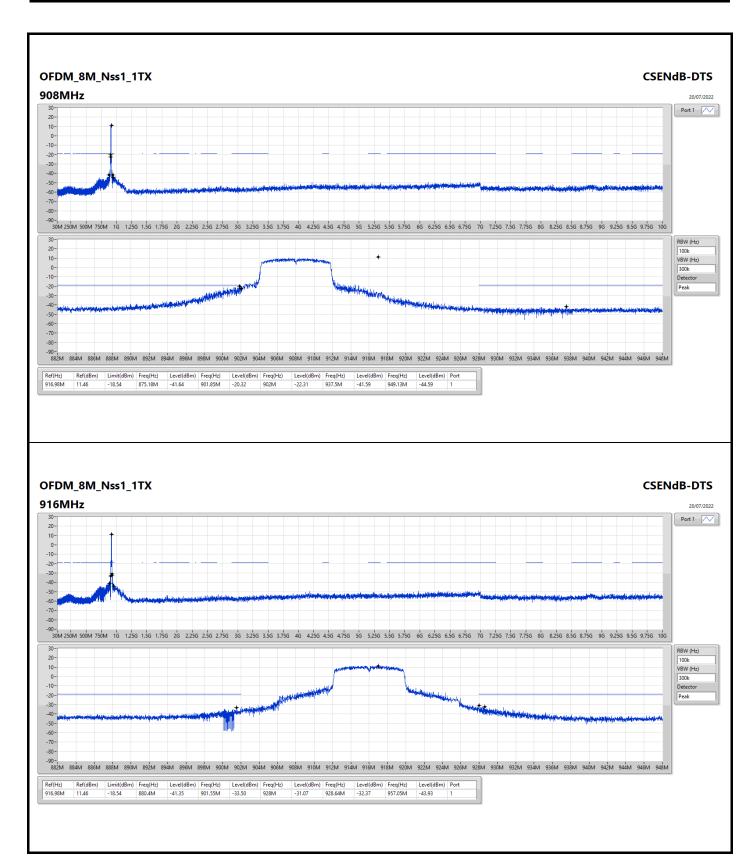
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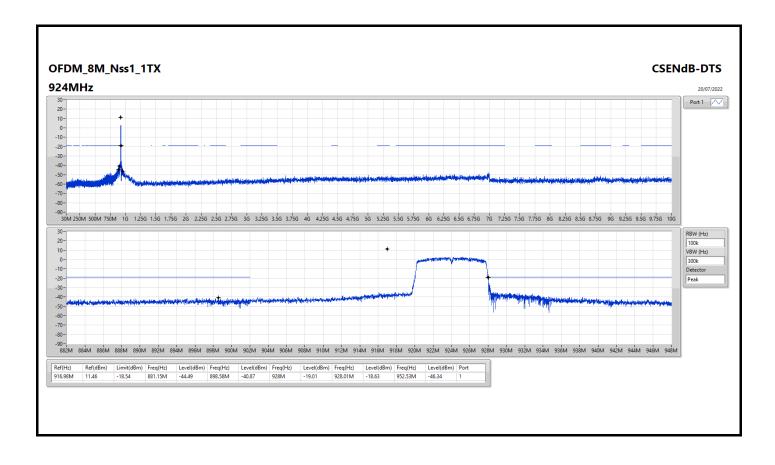
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Radiated Emissions below 1GHz

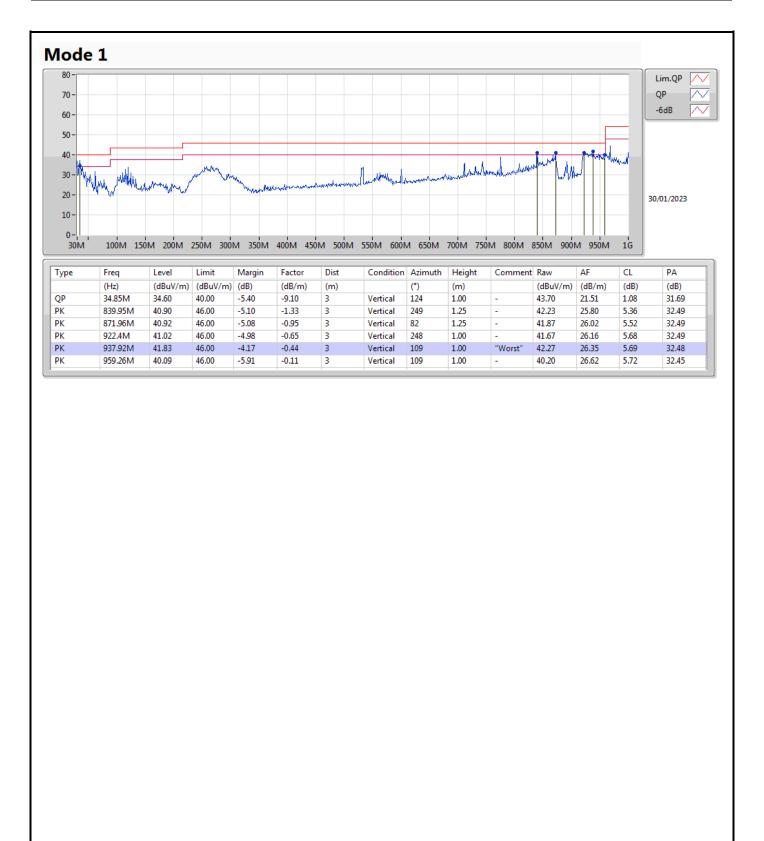
Appendix F.1

Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	QP	775.93M	45.46	46.00	-0.54	Horizontal

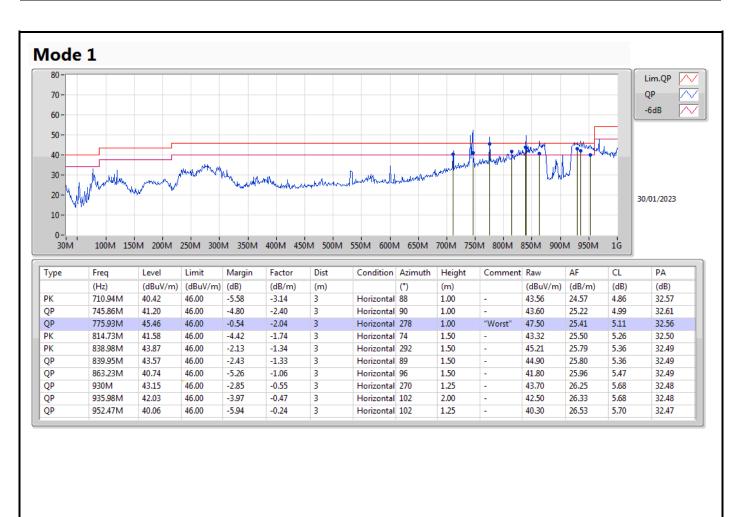
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RSE TX above 1GHz

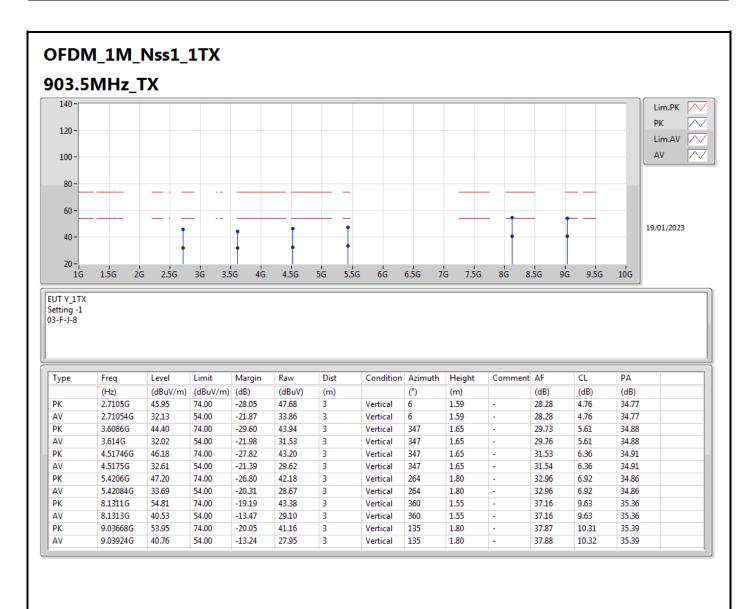
Appendix F.2

Summary

Mode	Result	Туре	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist	Condition	Azimuth	Height (m)	Comments
000 000411-			(П2)	(ubuv/iii)	(ubuv/iii)	(ub)	(m)		()	(III)	
902-928MHz	-	-	-	-	-	-	-	-	-	-	-
OFDM_4M_Nss1_1TX	Pass	AV	9.14486G	43.48	54.00	-10.52	3	Horizontal	358	1.63	•

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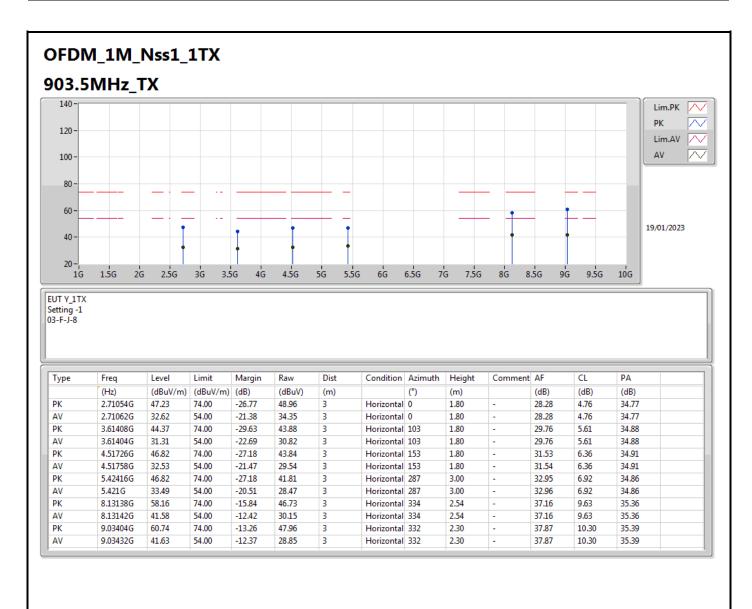




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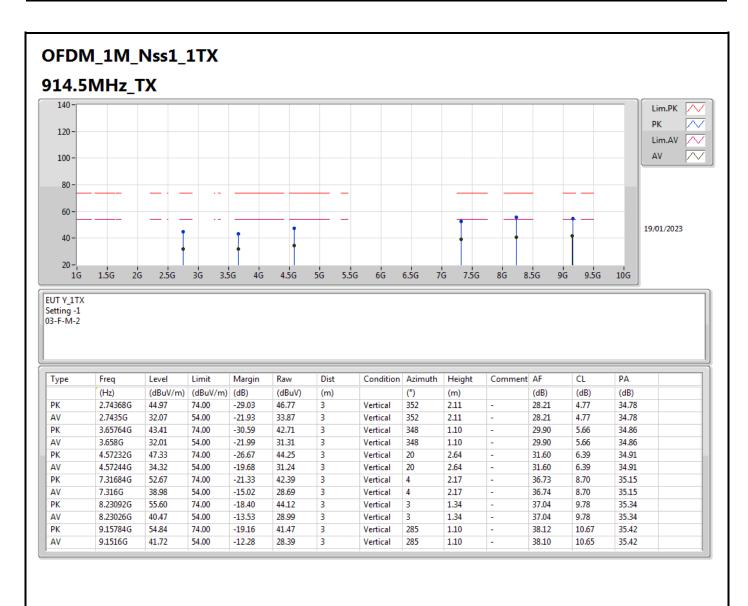




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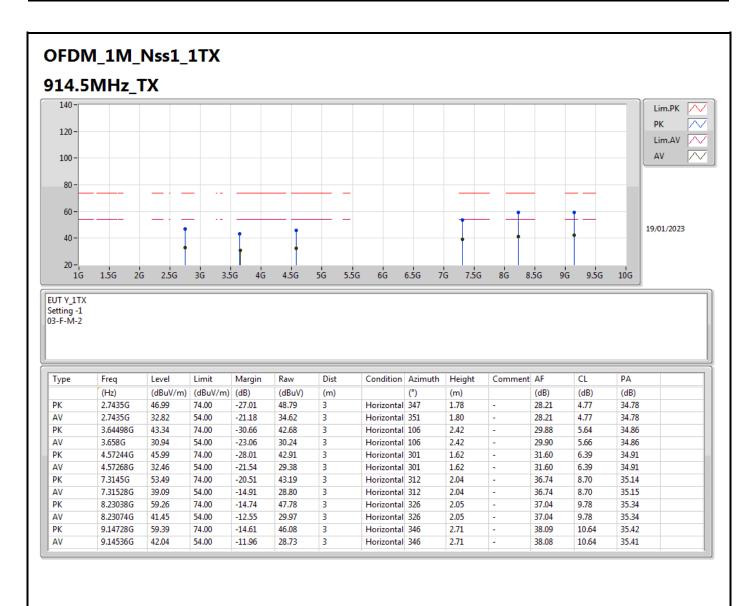




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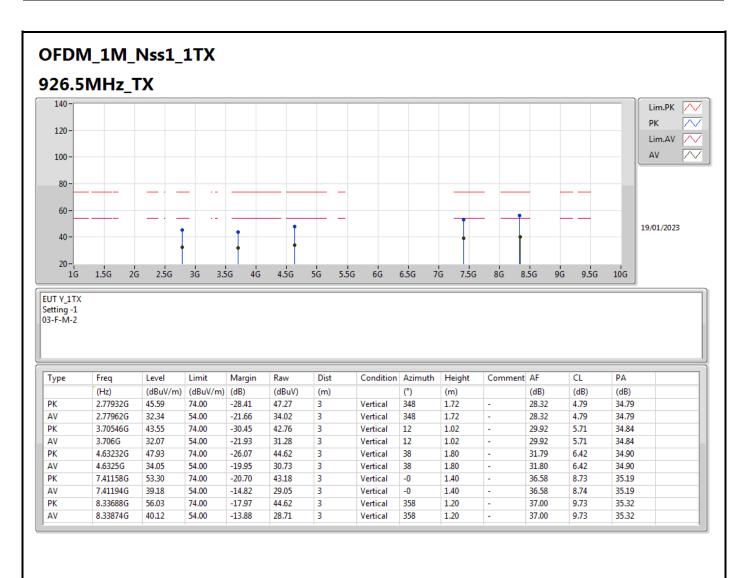




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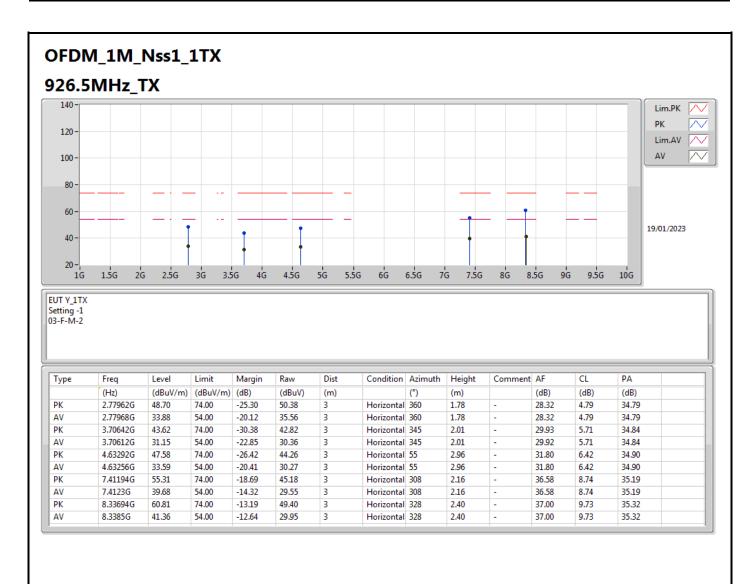




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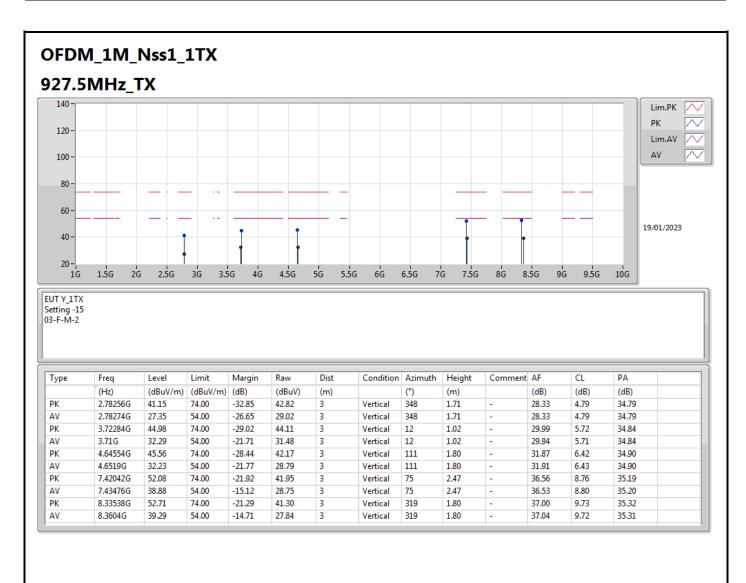




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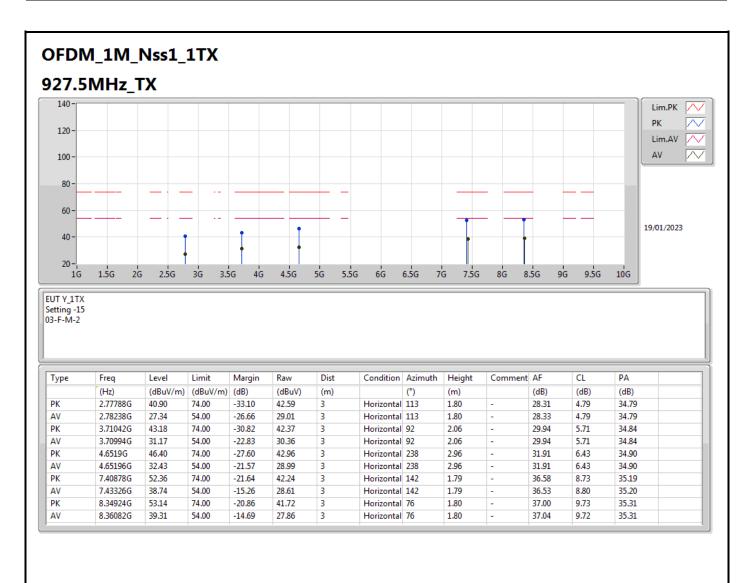




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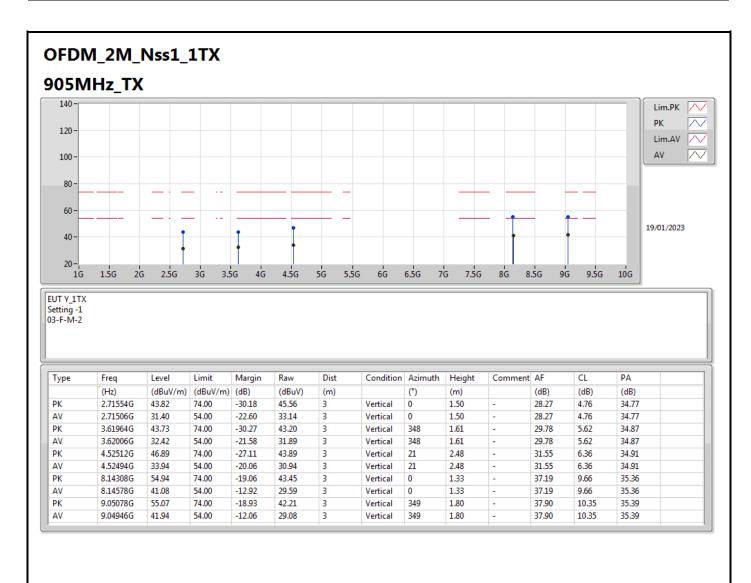




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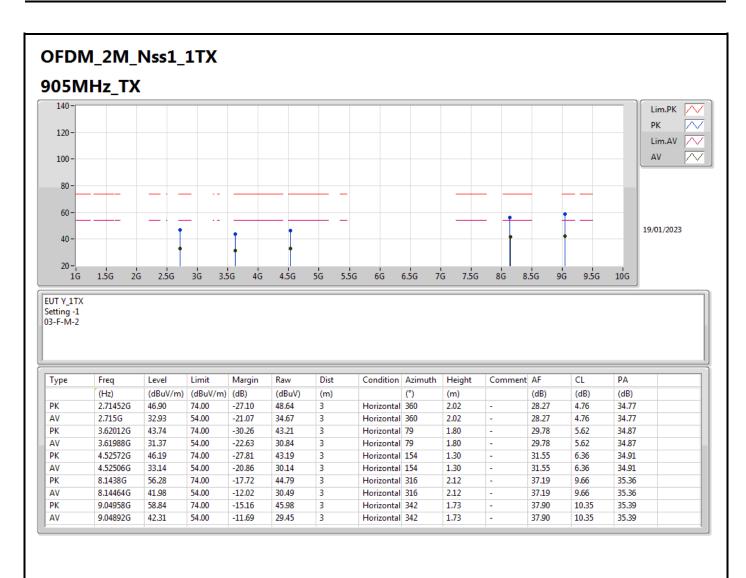
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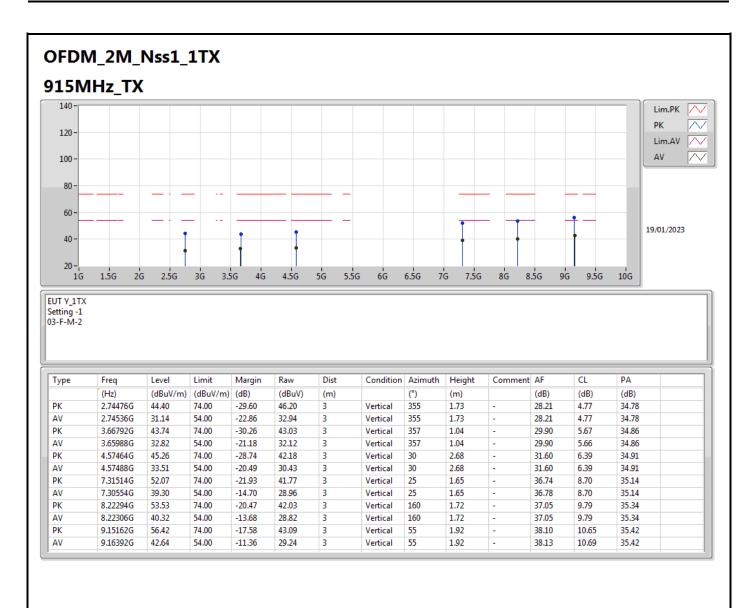
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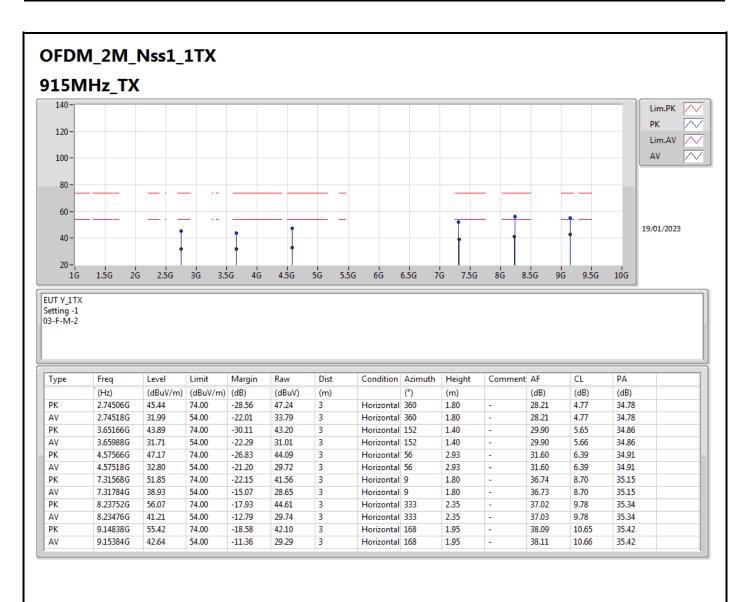
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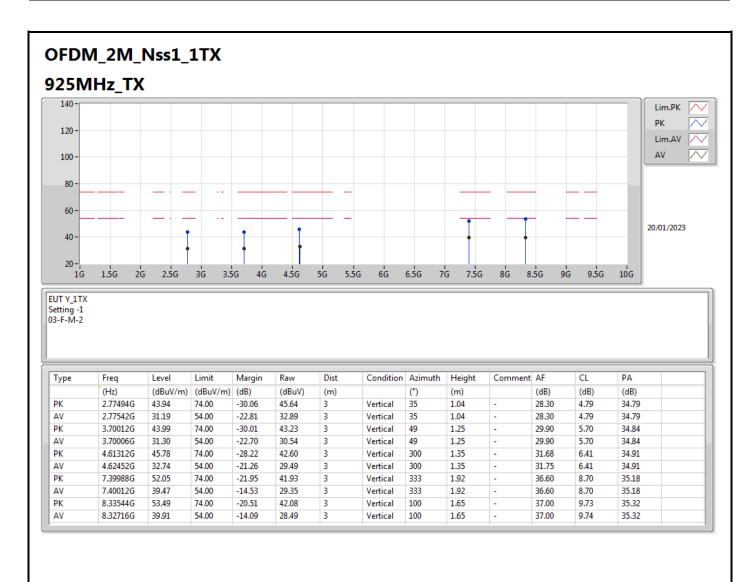
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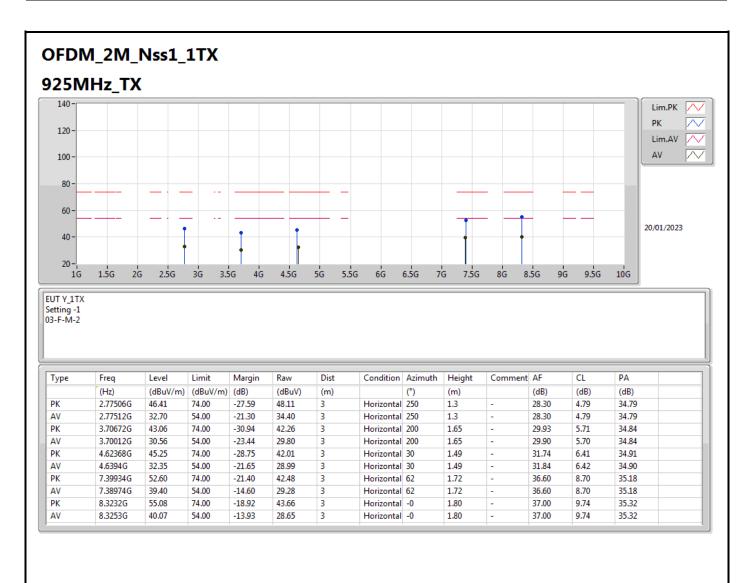
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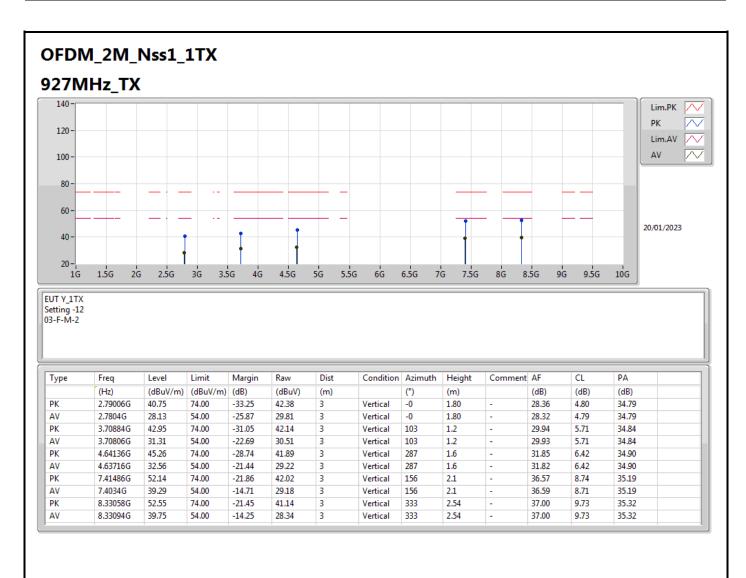




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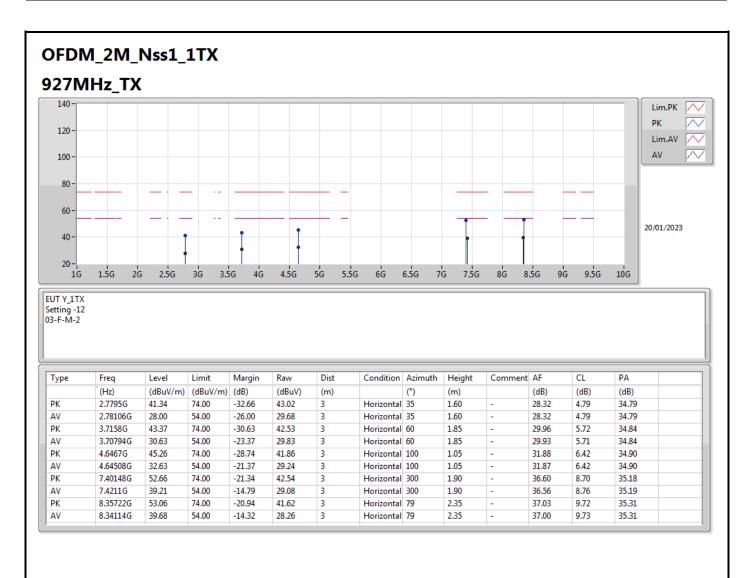
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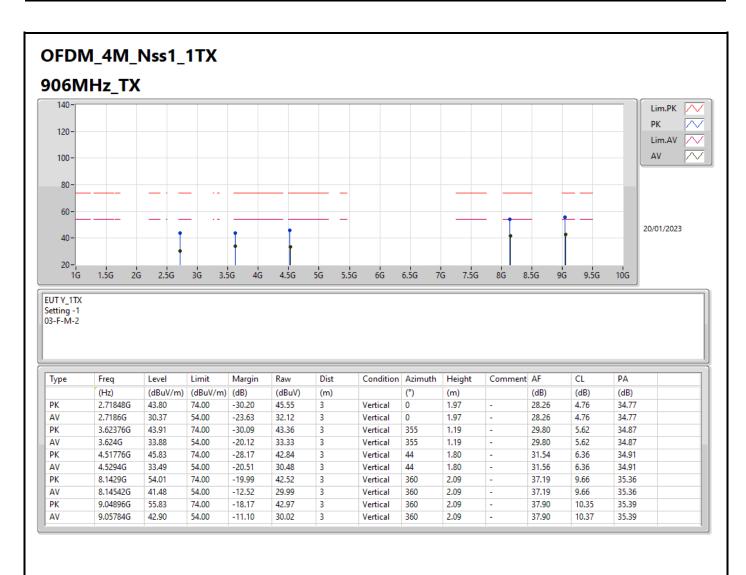




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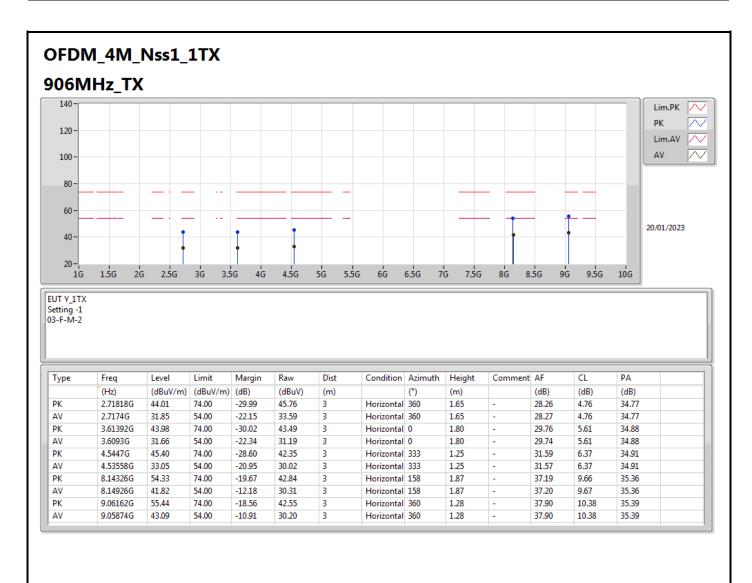




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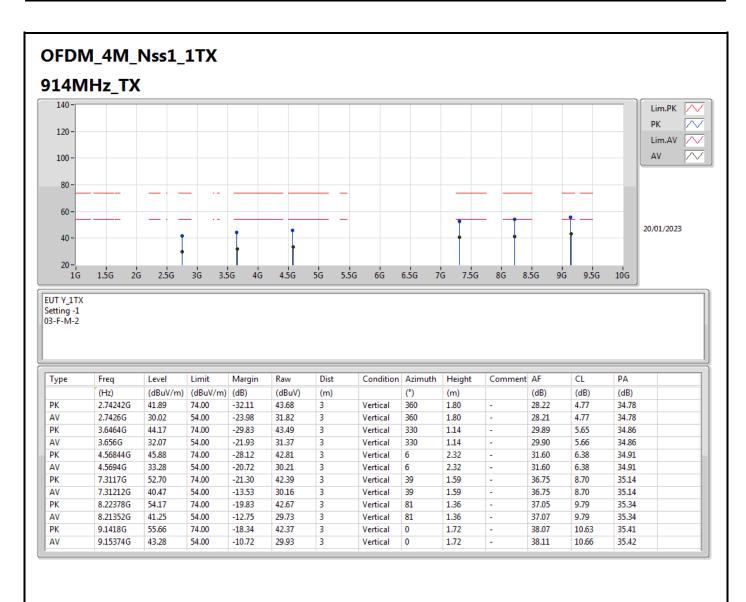
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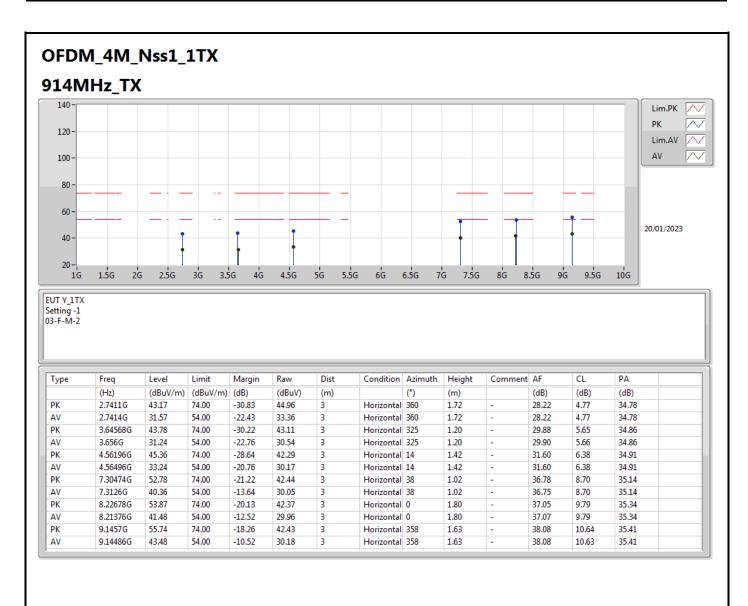
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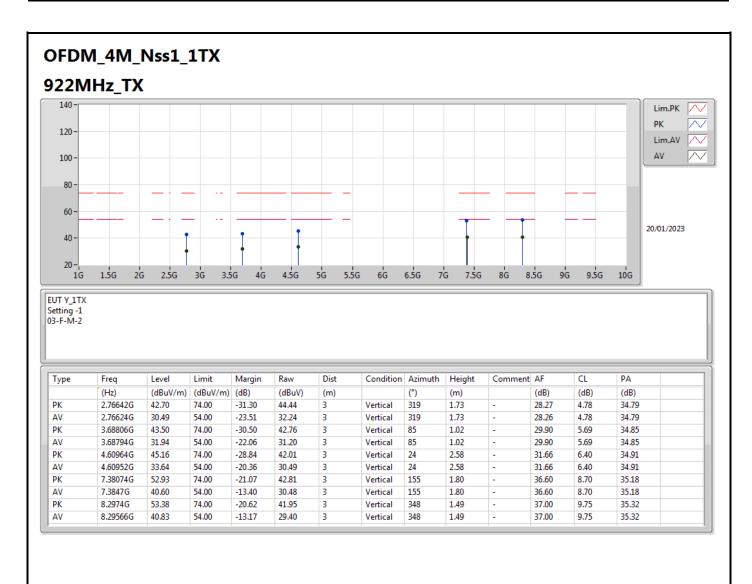
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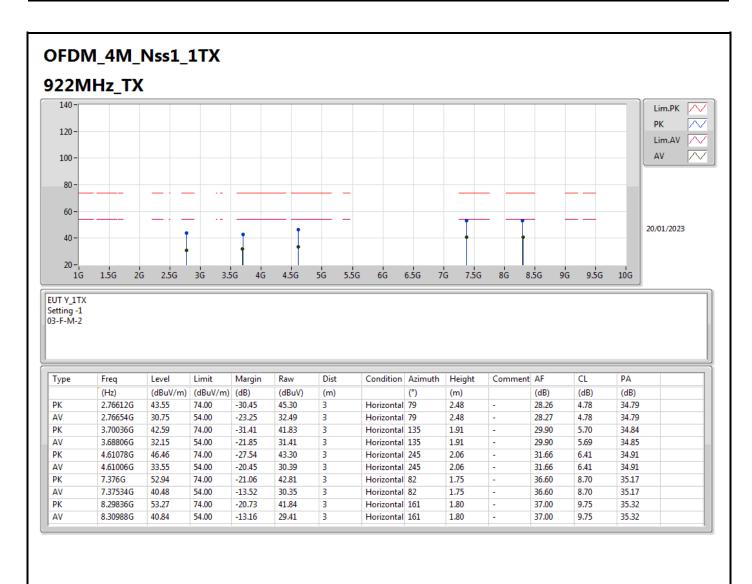
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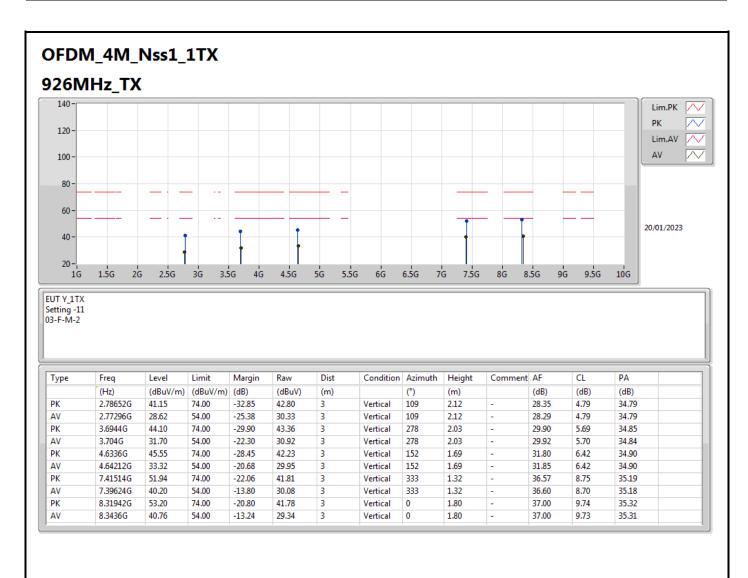
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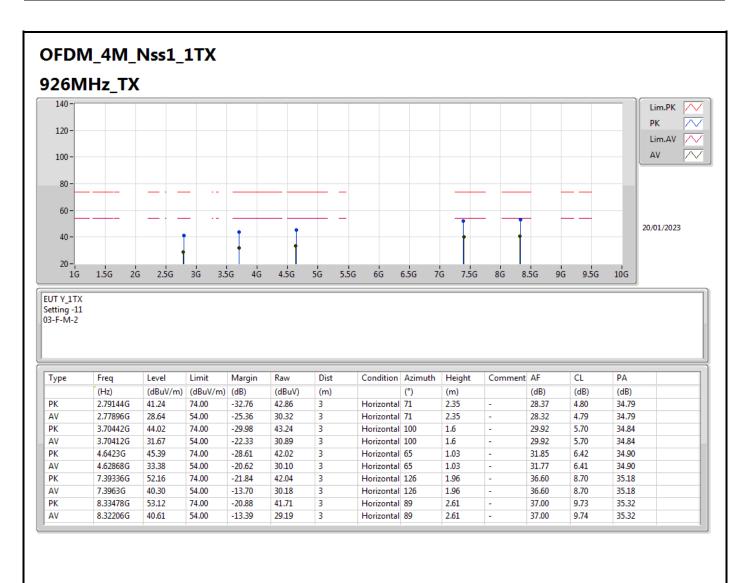
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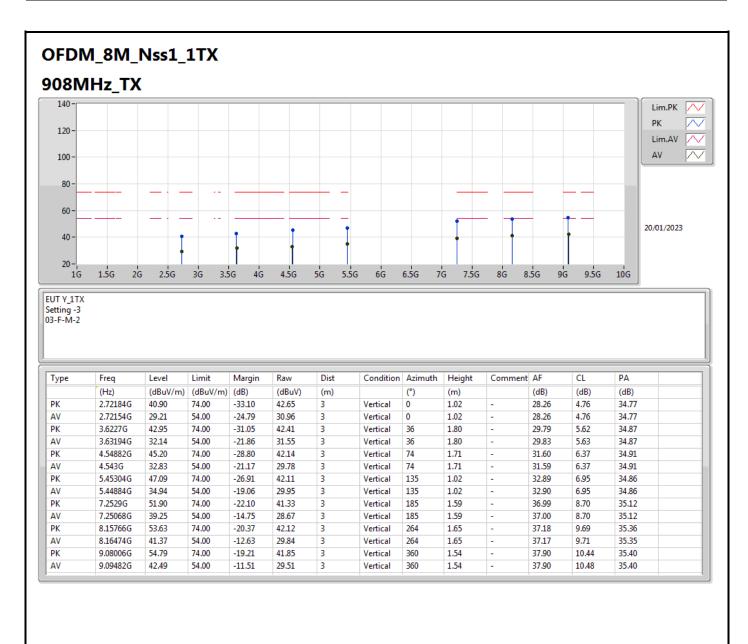
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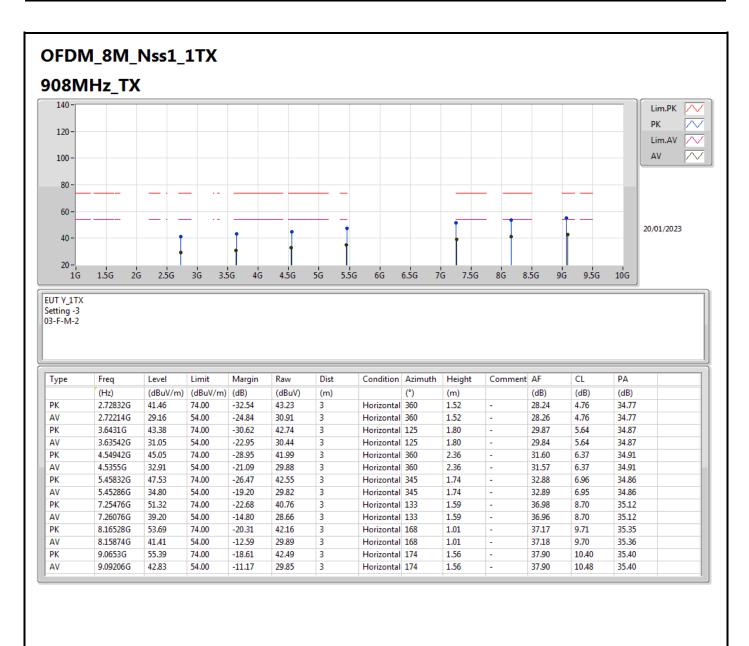
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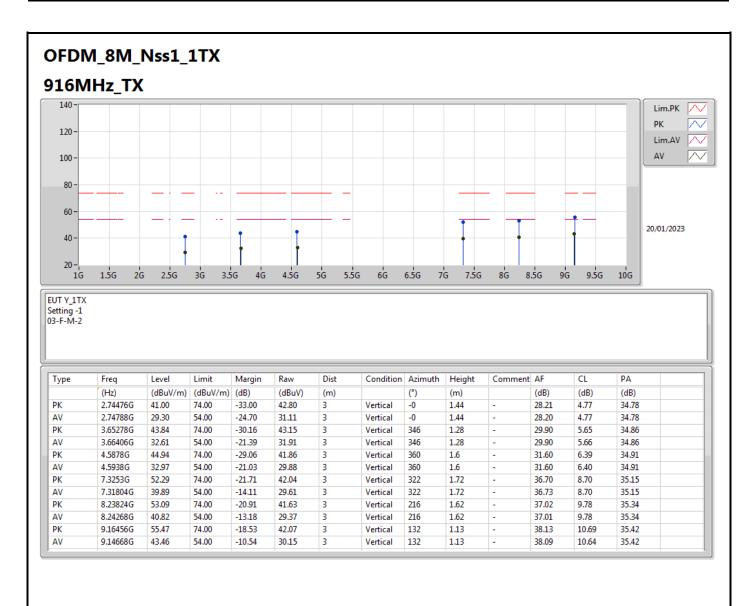
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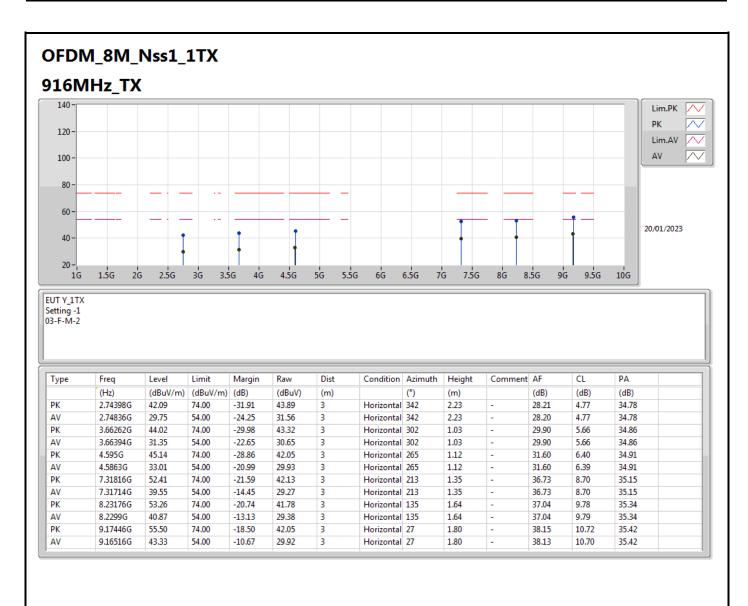
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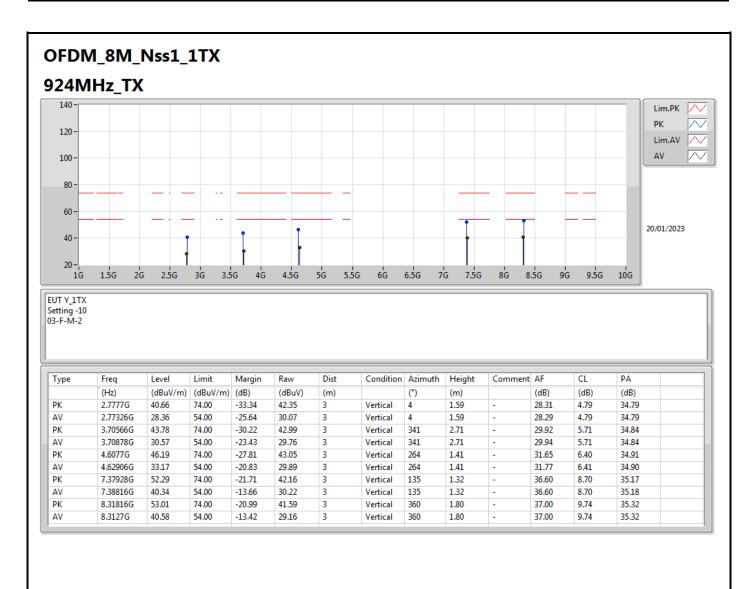
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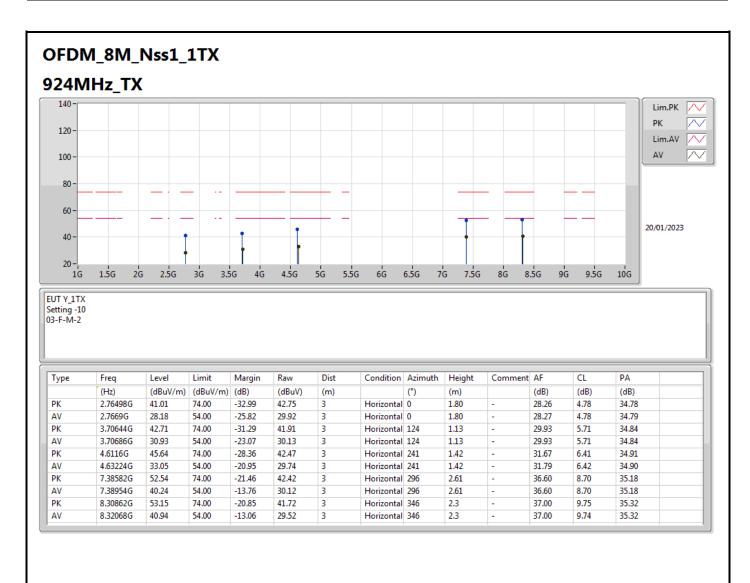
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