Produkte
Products

Prüfbericht-Nr.: *Test Report No.:*	**CN2218VL 001**	**Auftrags-Nr.:** *Order No.:*	**158256203**	**Seite 1 von 15** *Page 1 of 15*
Kunden-Referenz-Nr.: *Client Reference No.:*	**N/A**	**Auftragsdatum:** *Order date:*	**26.05.2021**	
Auftraggeber: *Client:*	**Arwin Technology Limited** **Unit 541B, 5/F, Building 1W, 1 Science Park West Avenue, N.T.**			
Prüfgegenstand: *Test item:*	**Indoor Air Quality Sensor Device**			
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	**LRS10701**			
Auftrags-Inhalt: *Order content:*	**FCC Certification**			
Prüfgrundlage: *Test specification:*	**FCC Part 15 Subpart C, ANSI C63.10-2013**			

Wareneingangsdatum: *Date of receipt:*	**14.07.2022**	
Prüfmuster-Nr.: *Test sample No.:*	**A003300268 001~004**	
Prüfzeitraum: *Testing period:*	**04.08.2021 - 11.09.2022**	
Ort der Prüfung: *Place of testing:*	**Hong Kong**	
Prüflaboratorium: *Testing laboratory:*	**TÜV Rheinland Hong Kong Ltd.**	
Prüfergebnis*: *Test result*:*	**Pass**	

geprüft von / *tested by:*

10/12/2022 Eddy Tsang / Engineer

Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

kontrolliert von / *reviewed by:*

10/12/2022 Sharon Li / Senior Manager

Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / *Other:* FCC ID: 2AMWTLRS10701

"Decision Rule" document announced in our website (https://www.tuv.com/landingpage/en/qm-gcn/) describes the statement of conformity and its rule of enforcement for test results are applicable throughout this test report.

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery:* Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.
This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.

Table of Content

Product information

Manufacturers declarations

	Transceiver
Operating frequency range	903.0 - 914.2 MHz
Type of modulation	DSSS modulation
Number of channels	8
Channel separation	1.6 MHz
Type of antenna	Internal Antenna
Antenna gain (dBi)	-2.32 dBi
Power level	fix
Type of equipment	Stand-alone Radio Device
Connection to public utility power line	No
Nominal voltage	7.2 VDC
Independent Operation Modes	Transceiver

Product function and intended use

The equipment under test (EUT) is a LoRa Radio Module.

FCC ID: 2AMWTLRS10701

Models	Product description	Authorized Antenna
LRS10701	Indoor Air Quality Sensor Device	YP-A200-JK-015

Submitted documents

Circuit Diagram
Block Diagram
Technical Description
User manual
Label

Independent Operation Modes

The basic operation modes are:

- Transceiver mode.

For further information refer to User Manual

Related Submittal(s) Grants

- This is a single application for certification of the Transceiver Module.

Remark

The test results in this test report are only relevant to the tested sample and does not involve any assessment in the production.

Test Set-up and Operation Mode

Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

Test Operation and Test Software

Test operation should refer to test methodology.

- During test, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power is fixed.

Special Accessories and Auxiliary Equipment

- Nil

Countermeasures to achieve EMC Compliance

- Nil

Test Methodology

Radiated Emission

The radiated emission measurements of the transmitter part were performed according to the procedures in ANSI C63.10-2013.

For measurement below 1GHz - the equipment under test (EUT) was placed at the middle of the 80 cm height turntable. For measurement above 1GHz - the EUT was placed at the middle of the 1.5 m height turntable and RF absorbing material was placed on ground plane between turntable and measuring antenna. During the testing, the EUT was operated standalone and arranged for maximum emissions. The EUT was tested in three orthogonal planes.

The investigation is performed with the EUT rotated 360 ° , the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

All radiated tests were performed at an antenna to EUT with 3 meters distance, unless stated otherwise in particular parts of this test report.

Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

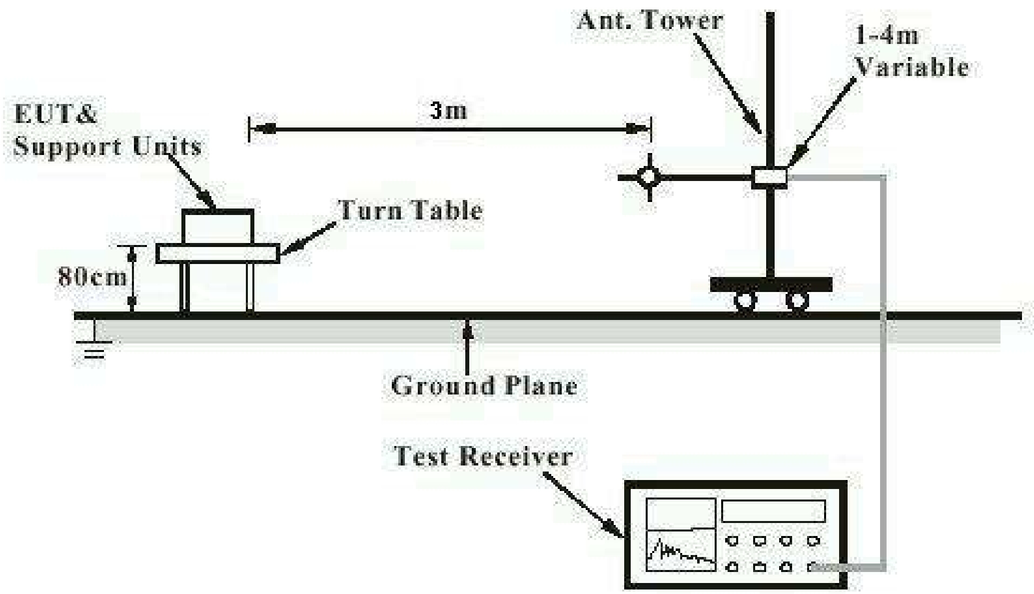
FS = R + AF + CF + FA – PA

Where FS = Field Strength in dBuV/m at 3 meters.
R = Reading of Spectrum Analyzer in dBuV.
AF = Antenna Factor in dB.
CF = Cable Attenuation Factor in dB.
FA = Filter Attenuation Factor in dB.
PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

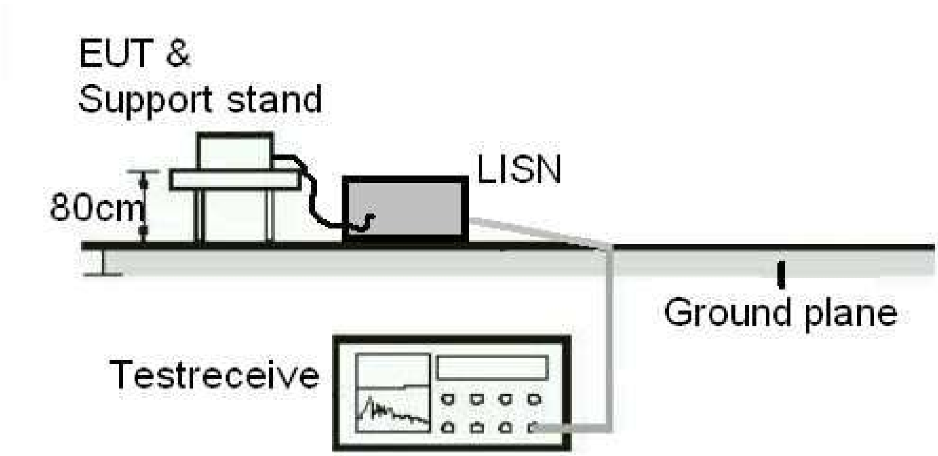
Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1 GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)



Test Facility

Test Laboratory Information

TÜV Rheinland Hong Kong Ltd.
Address: 3-4/F, Fou Wah Industrial Building, 10-16 Pun Shan Street, Tsuen Wan, N.T., Hong Kong·
Tel.: +852 2192 1000
Fax: +852 2192 1001
Email service-gc@tuv.com

The test facility is recognized or accredited by the following organizations:

FCC

Test Firm Registration Number : 371735

List of Test and Measurement Instruments

Hong Kong Productivity Council

Radiated Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Multi-functional Anechoic Chamber (SVSWR)	Albatross	N/A	04 Jan 21	04 Jan 23
Standard Gain Horn	ETS-Lindgren	3160-07	24 Nov 20	24 Nov 22
Standard Gain Horn	ETS-Lindgren	3160-08	24 Nov 20	24 Nov 22
Standard Gain Horn	ETS-Lindgren	3160-10	30 Nov 20	30 Nov 22
Double-Ridged Waveguide Horn	EMCO	3116	30 Nov 20	30 Nov 22
Double-Ridged Waveguide Horn	EMCO	3117	11 Nov 20	11 Nov 22
Test Receiver	R & S	ESU26	07 Oct 21	07 Oct 22
Coaxial cable	Huber+Suhner	SF118/11N/11N /12000MM	07 Jan 21	07 Jan 23
Microwave Preamplifier	COM-POWER Corporation	PAM-118A	06 Mar 21	06 Mar 23
Preamplifier 18GHz to 40GHz with cable	A.H. Systems, Inc.	PAM-1840VH	29 Jan 21	29 Jan 23
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	30 Oct 19	30 Oct 22
High Frequency Cable	Pasternack	PE3VNA4001-3M	29 Jan 21	29 Jan 23
Multi-functional Anechoic Chamber (NSA)	Albatross	Nil	6-Jan-21	6-Jan-23
Bi-conical Antenna	R & S	HK116	15-Sep-20	15-Sep-22
Log Periodic Antenna	R & S	HL223	15-Sep-20	15-Sep-22
Coaxial cable	Huber+Suhner	SF118/11N/11N /12000MM	7-Jan-21	7-Jan-23
Active Loop Antenna	EMCO	6502	3-Nov-20	3-Nov-22

TÜV Rheinland Hong Kong Ltd.

Radio Test

Equipment	Manufacturer	Type	Cal. Date	Due Date
Spectrum Analyzer	R & S	FSV40	10 Jun 22	10 Jun 23

Measurement Uncertainty

The estimated combined standard uncertainty for power-line conducted emissions measurements is ±2.42dB.

The estimated combined standard uncertainty for radiated emissions measurements is ±4.81dB (9kHz to 30MHz) and ±4.62dB (30MHz to 200MHz) and ±5.67dB (200MHz to 1000MHz) and is ±5.07dB (1GHz to 8.2GHz) and ±4.58dB (8.2GHz to 12.4GHz) and ±4.78dB (12.4GHz to 18GHz)

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of k=2, which for the level of confidence is approximately 95%.

Results FCC Part 15 – Subpart C

FCC 15.203 – Antenna Requirement 1			**Pass**
FCC Requirement:	No antenna other than that furnished by the responsible party shall be used with the device		
Results :			
Antenna 1	a) Antenna type:	Internal PCB Antenna	
	b) Manufacturer and model no:	JIAKANG TECHNOLOGY YP-A200-JK-015	
	c) Peak Gain:	-2.32 dBi	
Verdict:	Pass		

FCC 15.204 – Antenna Requirement 2		**Pass**
FCC Requirement:	An intentional radiator may be operated only with the antenna with which it is authorized. If an antenna is marketed with the intentional radiator, it shall be of a type which is authorized with the intentional radiator.	
Results:	Only one authorized antennas can be used.	
Verdict:	Pass	
FCC 15.207 / RSS-Gen 8.8 – Conducted Emission on AC Mains		**N/A**
There is no AC power input or output ports on the EUT.		

FCC 15.247 (a) – Receiver Input Bandwidth		**Pass**
FCC Requirement:	The associated receiver(s) complies with the requirement that its input bandwidth matches the bandwidth of the transmitted signal.	
Refer to LoRa Specification		

FCC 15.247 (a)(2) – 6dB Bandwidth Measurement		Pass
FCC Requirement: Systems using digital modulation techniques may operate in the 902 – 928 MHz, 2400 – 2483.5 MHz, and 5725 – 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500kHz.		
Test Specification : ANSI C63.10 – 2013 Test date : 04.09.2021 Mode of operation : Tx mode Supply voltage : 7.2 VDC Temperature : 23ºC Humidity : 51%		
Results: For test protocols please refer to Appendix 1		
Channel frequency (MHz)	**6dB bandwidth (kHz)**	**Limit (kHz)**
903.0	631.0	500
909.4	631.0	500
914.2	630.9	500

FCC 15.247(b)(3) – Maximum conducted (average) output power				Pass
FCC Requirement: For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850MHz bands: 1 Watt (30dBm)				
Test Specification : ANSI C63.10 – 2013 Test date : 08.09.2021 Mode of operation : Tx mode Supply voltage : 7.2 VDC Temperature : 23ºC Humidity : 51%				
Results: For test protocols please refer to Appendix 1				
Frequency (MHz)	**Measured Band Power (dBm)**	**Average Output Power (dBm) | (mW)**	**Limit (dBm | W)**	**Verdict**
903.0	-3.69	18.77 | 75.34	30.0 | 1	Pass
909.4	-3.96	18.51 | 65.01	30.0 | 1	Pass
914.2	-4.33	18.13 | 25.64	30.0 | 1	Pass
Duty cycle < 98% and the transmissions exhibit a constant duty cycle during the measurement duration, therefore method AVGPSD-2 applied. Average output power is calculated by adding [10 log (1 / D)] dB to Measured Band Power, where D is duty cycle, 1 / D = period / pulse duration				
Frequency (MHz)	**Pulse duration (ms)**	**Period (ms)**	**1 / Duty Cycle**	**10 log (1 / D) (dB)**
903.0	28.36	5001	176.340	22.46
909.4	28.34	5002	176.450	22.47
914.2	28.35	5000	176.367	22.46

FCC 15.247(e) – Power Spectral Density	Pass
FCC Requirement: For systems using digital modulation, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.	
Test Specification : ANSI C63.10 – 2013 Test date : 15.07.2021 Mode of operation : Tx mode Supply voltage : 7.2 VDC Temperature : 23ºC Humidity : 51%	
Results: For test protocols please refer to Appendix 1.	

Frequency (MHz)	Measured PSD (dBm)	10 log (1 / D) (dB)	Average Power Spectral Density (dBm)	Limit (dBm)	Verdict
903.0	-3.69	22.46	-1.19	8.0	Pass
909.4	-3.96	22.47	-1.59	8.0	Pass
914.2	-4.33	22.46	-1.71	8.0	Pass

Duty cycle < 98% and the transmissions exhibit a constant duty cycle during the measurement duration, therefore method AVGPSD-2 applied.

Average output power is calculated by adding [10 log (1 / D)] dB to Measured Band Power, where D is duty cycle, 1 / D = period / pulse duration

FCC 15.247(d) – Spurious Conducted Emissions						Pass
Test Specification : ANSI C63.10 – 2013 Test date : 15.07.2021 (DTS) Mode of operation : Tx mode Supply voltage : 7.2 VDC Temperature : 25ºC Humidity : 56%						
FCC Requirement:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.					
Results:	Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. Only the worst cases is shown below. For test protocols refer to Appendix 1					
Operating frequency (MHz)	**Spurious frequency (MHz)**	**Spurious Level (dBm)**	**Reference value (dBm)**	**Limit (dBm)**	**Margin (dB)**	**Verdict**
903.0	459.96	-48.52	18.86	-1.14	47.38	Pass
903.0	3,822.25	-46.38	18.86	-1.14	45.24	Pass
903.0	6,971.85	-42.77	18.86	-1.14	41.63	Pass
903.0	6,981.15	-42.81	18.86	-1.14	41.67	Pass
909.4	468.60	-47.74	18.56	-1.44	46.30	Pass
909.4	2,903.35	-45.32	18.56	-1.44	43.88	Pass
909.4	6,884.95	-42.77	18.56	-1.44	41.33	Pass
909.4	6,998.45	-42.48	18.56	-1.44	41.04	Pass
914.2	733.73	-47.22	18.20	-1.80	45.42	Pass
914.2	3,729.16	-46.06	18.20	-1.80	44.26	Pass
914.2	6,639.96	-42.77	18.20	-1.80	40.97	Pass
914.2	6,990.05	-42.38	18.20	-1.80	40.58	Pass

FCC 15.205 – Radiated Emissions in Restricted Frequency Bands	Pass

Test Specification : ANSI C63.10 – 2013
Test date : 04.08.2021
Mode of operation : Tx mode
Frequency range : 9kHz – 10GHz
Supply voltage : 7.2 VDC
Temperature : 25.2ºC
Humidity : 50%

FCC Requirement: In any 100kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission general limits.

Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate.
All three transmit frequency modes comply with the field strength within the restricted bands. There is no spurious found below 30MHz.

Mode: 903.0 MHz TX Vertical Polarization

Frequency MHz	Level dBuV/m	Limit/ Detector dBuV/m
855.680	24.2	46.0 / QP
1806.000	35.0	74.0 / PK
1806.000	20.8	54.0 / AV

Mode: 903.0 MHz TX Horizontal Polarization

Frequency MHz	Level dBuV/m	Limit/ Detector dBuV/m
1806.000	42.4	74.0 / PK
1806.000	23.9	54.0 / AV

Mode: 909.4 MHz TX Vertical Polarization

Frequency MHz	Level dBuV/m	Limit/ Detector dBuV/m
887.480	27.8	46.0 / QP
1818.800	41.8	74.0 / PK
1818.800	24.1	54.0 / AV

Mode: 909.4 MHz TX Horizontal Polarization

Frequency MHz	Level dBuV/m	Limit/ Detector dBuV/m
882.230	25.4	46.0 / QP
1818.800	46.6	74.0 / PK
1818.800	27.8	54.0 / AV

Mode: 914.2 MHz TX Vertical Polarization

Frequency MHz	Level dBuV/m	Limit/ Detector dBuV/m
898.970	24.0	46.0 / QP
1828.400	43.9	74.0 / PK
1828.400	26.1	54.0 / AV

Mode: 914.2 MHz TX Horizontal Polarization

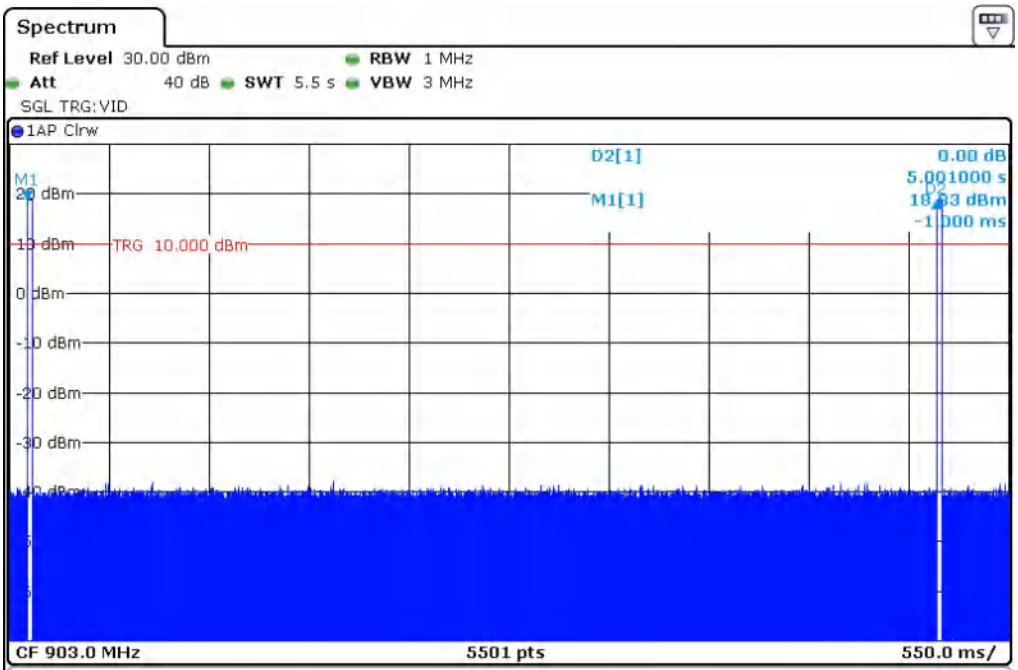
Frequency MHz	Level dBuV/m	Limit/ Detector dBuV/m
1828.400	49.3	74.0 / PK
1828.400	29.9	54.0 / AV

Appendix 1

Test Results

Transmission Period

TX Frequency 903.0MHz

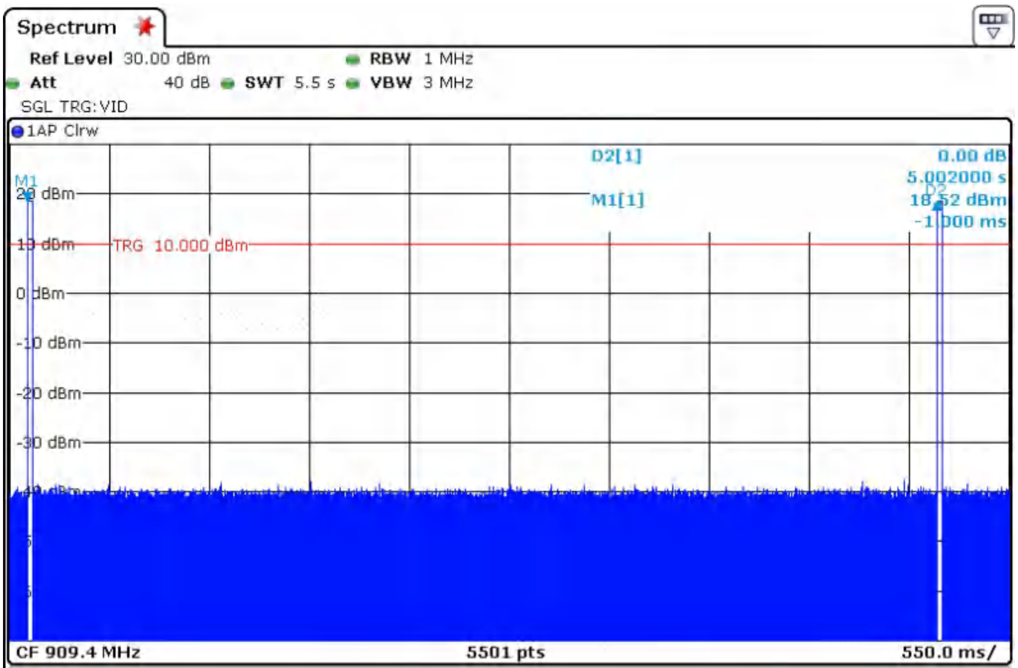


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	-1000.0 µs	18.83 dBm		
D2	M1	1	5.001 s	-0.00 dB		

Date: 11.SEP.2022 16:44:29

TX Frequency : 909.4MHz

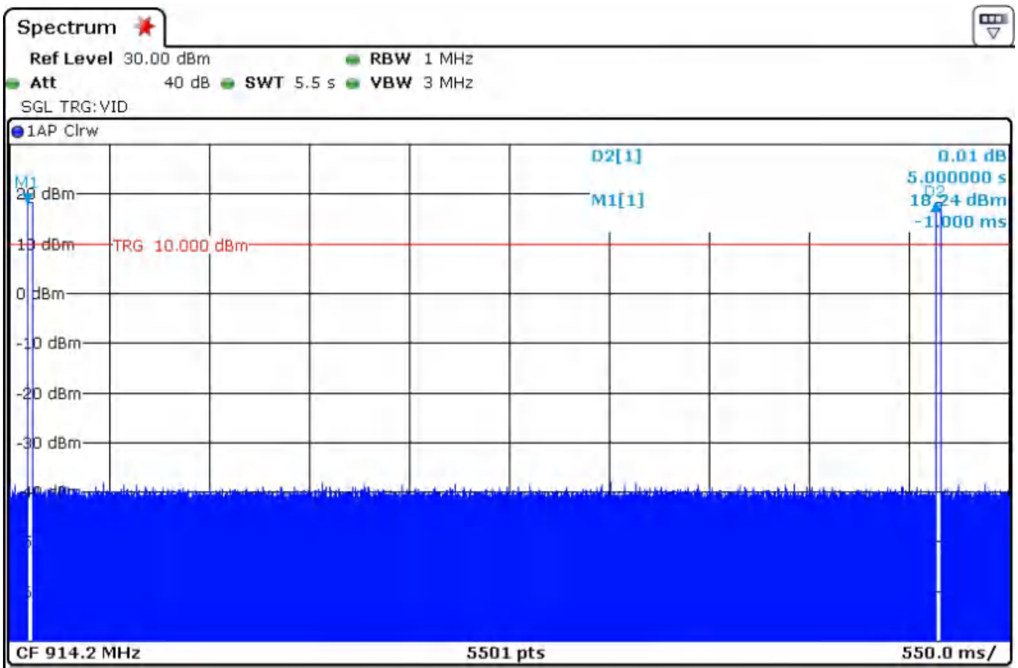


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	-1000.0 µs	18.52 dBm		
D2	M1	1	5.002 s	-0.00 dB		

Date: 11.SEP.2022 16:46:27

TX Frequency 914.2MHz



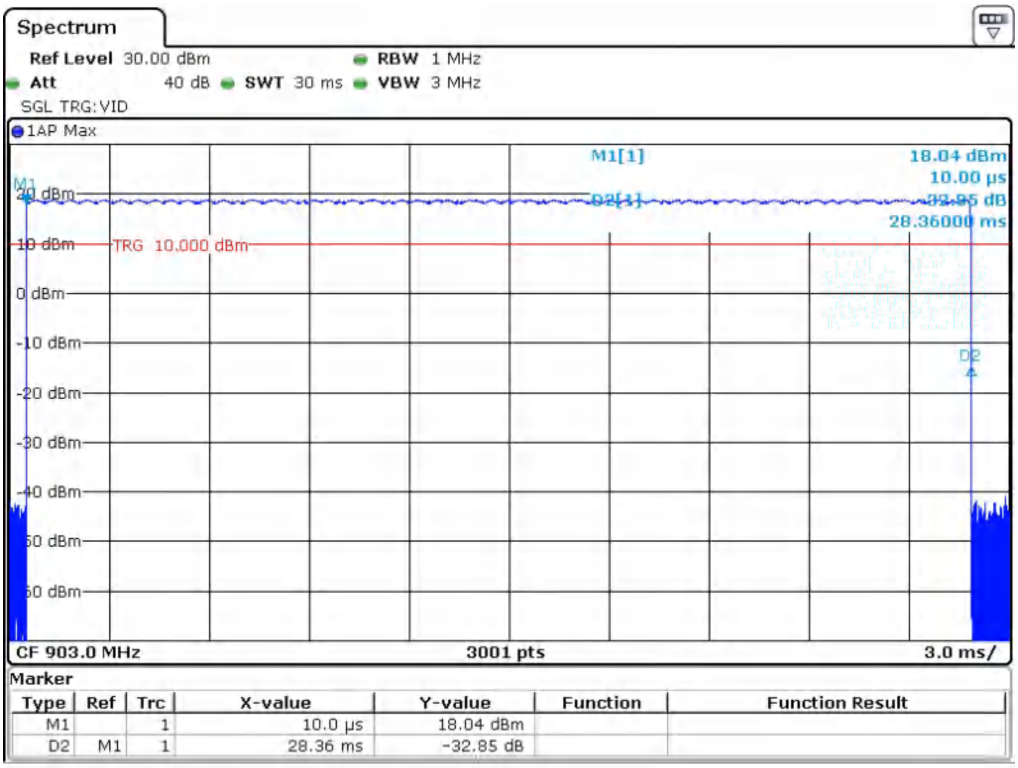
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	-1000.0 µs	18.24 dBm		
D2	M1	1	5.0 s	0.01 dB		

Date: 11.SEP.2022 16:49:34

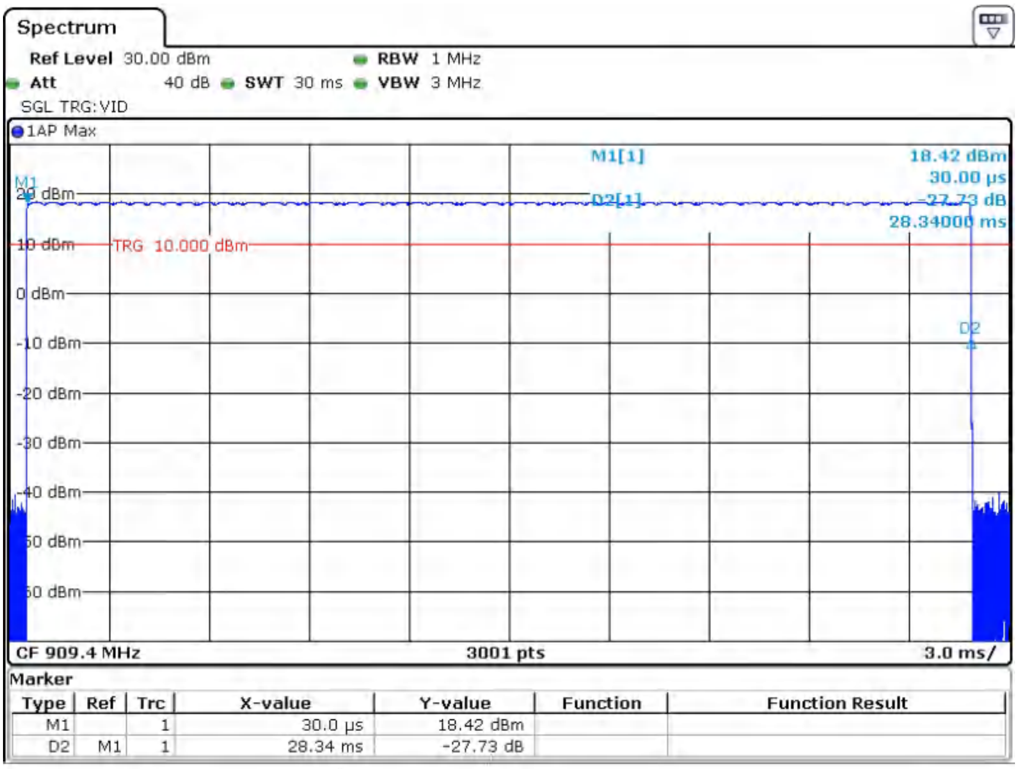
Transmission Pulse Duration

TX Frequency 903.0MHz



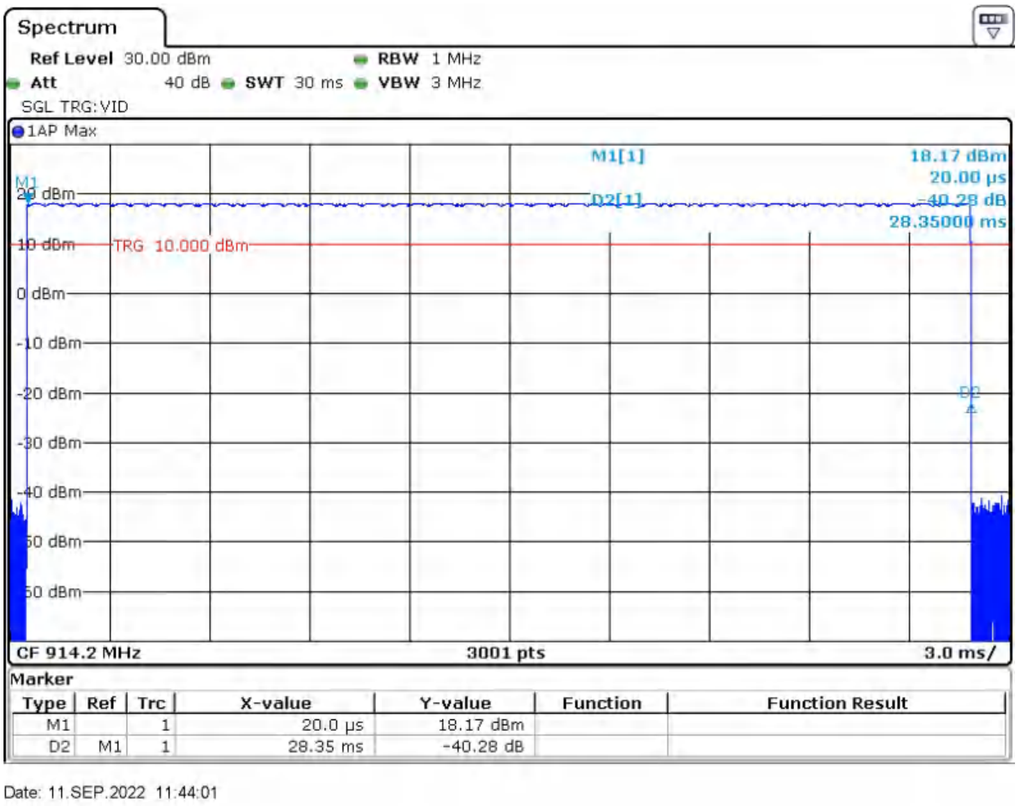
Date: 11.SEP.2022 11:38:49

TX Frequency : 909.4MHz



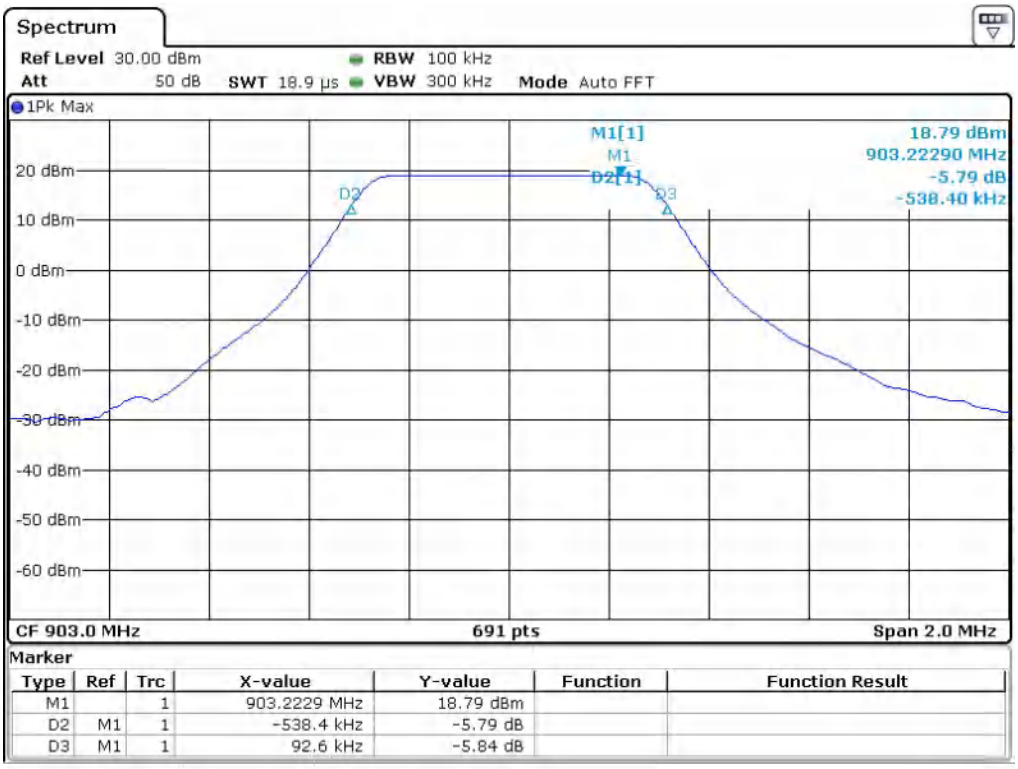
Date: 11.SEP.2022 11:41:56

TX Frequency 914.2MHz



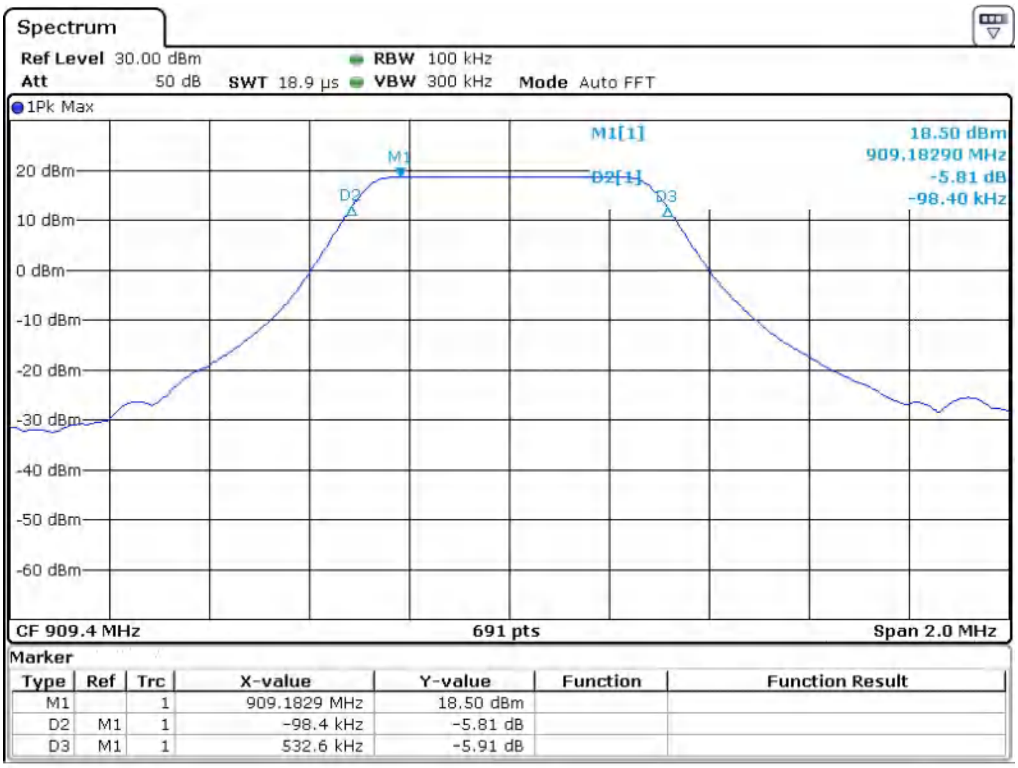
6 dB Bandwidth Measurement

TX Frequency 903.0MHz



Date: 4.SEP.2022 09:44:01

TX Frequency : 909.4MHz

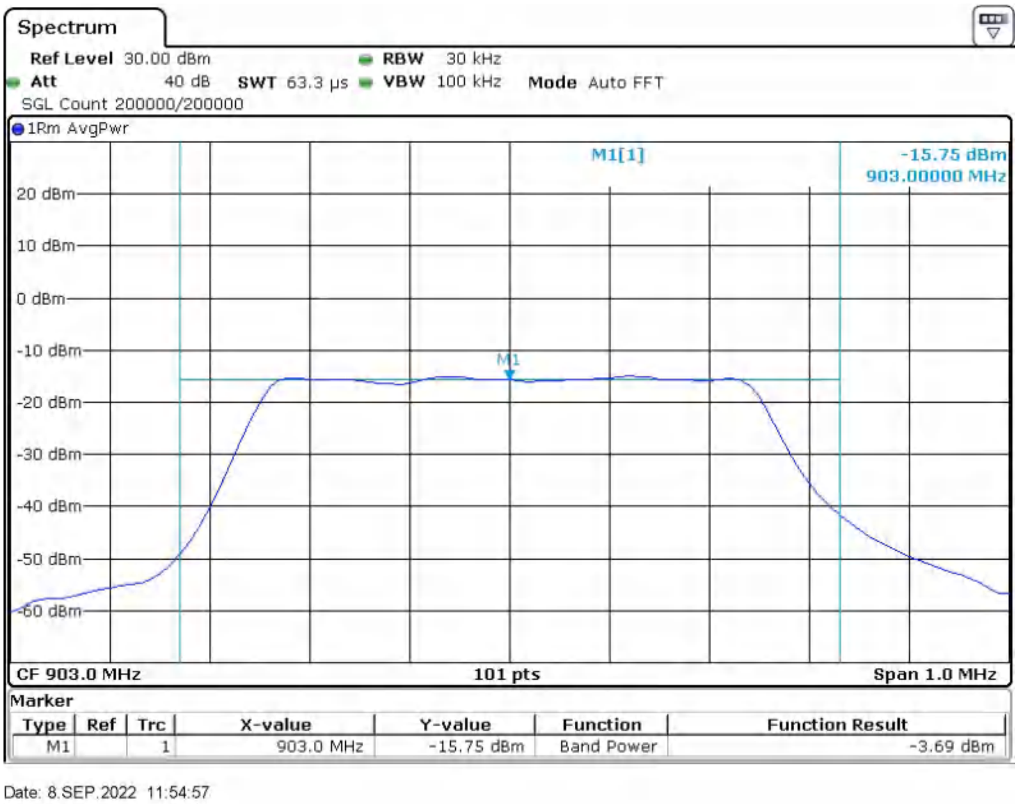


Date: 4.SEP.2022 11:14:23

TX Frequency 914.2MHz

Conducted (Average) Output power

TX Frequency 903.0MHz



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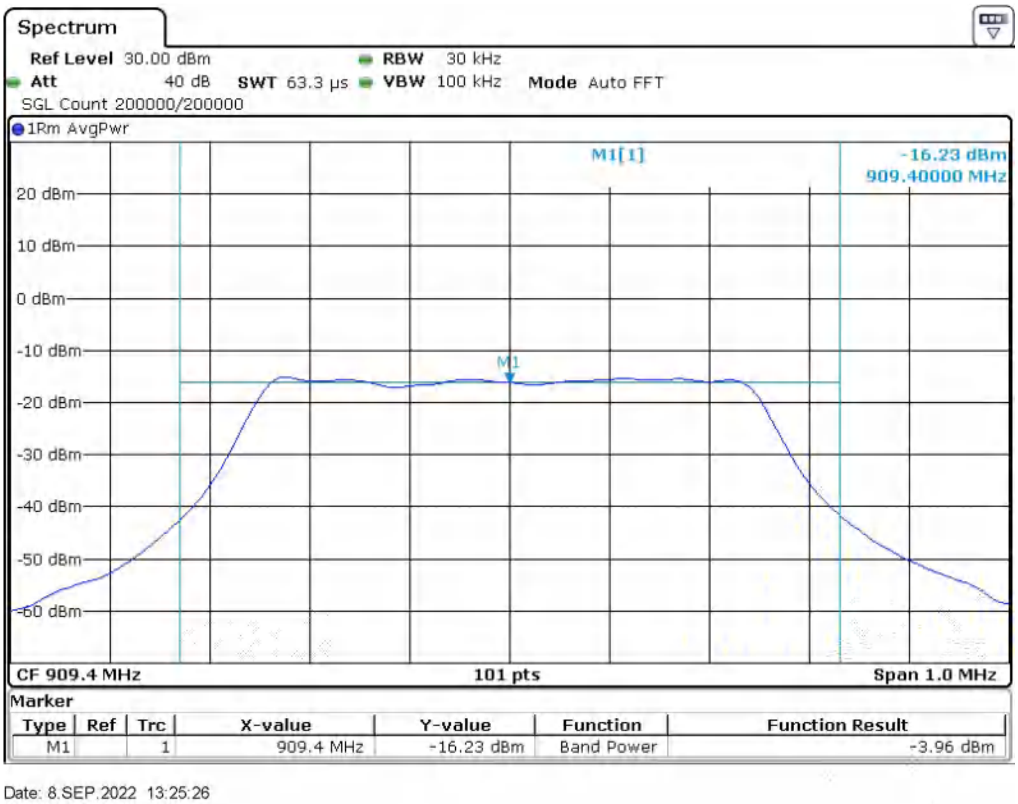
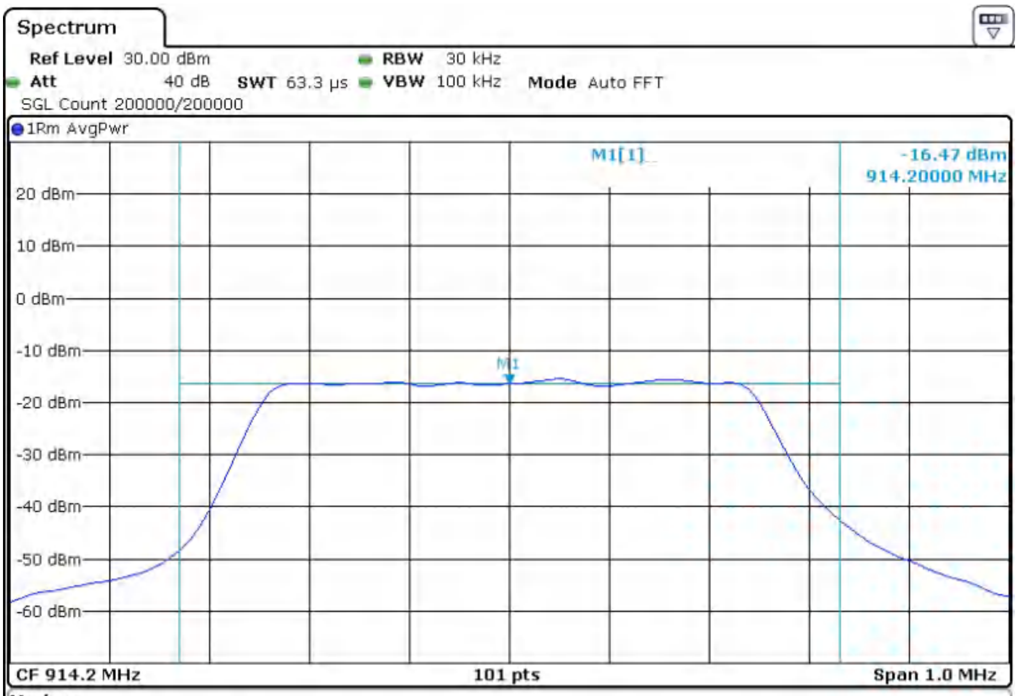


TX Frequency 914.2MHz



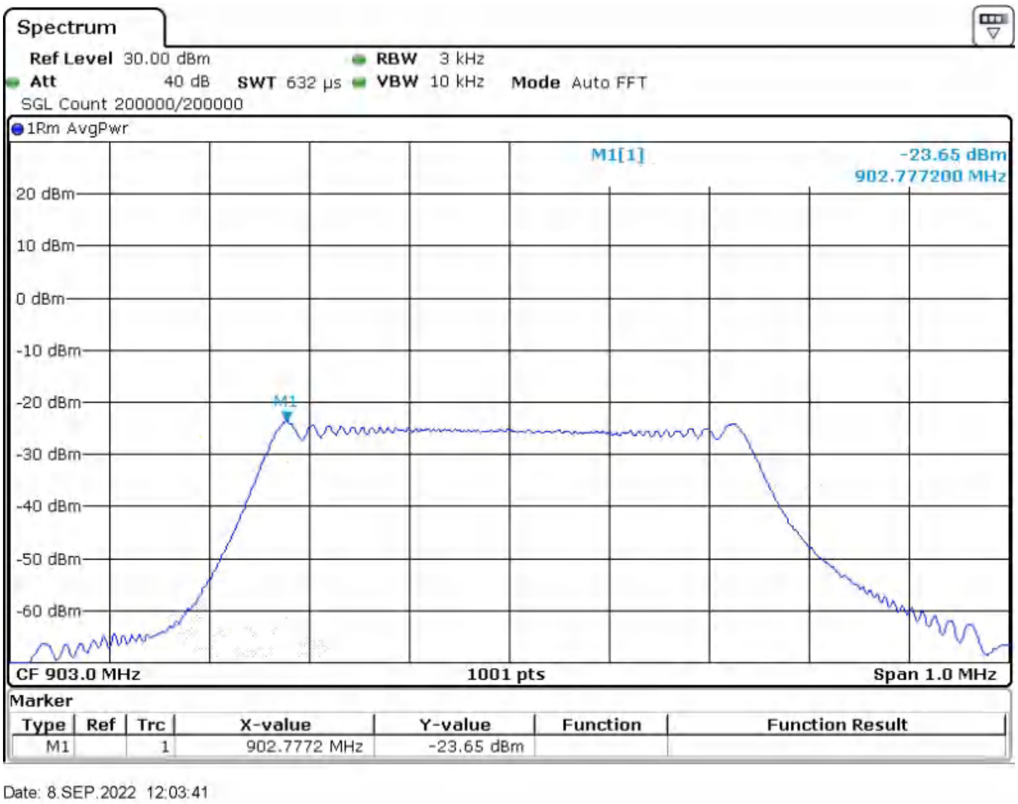
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	914.2 MHz	-16.47 dBm	Band Power	-4.33 dBm

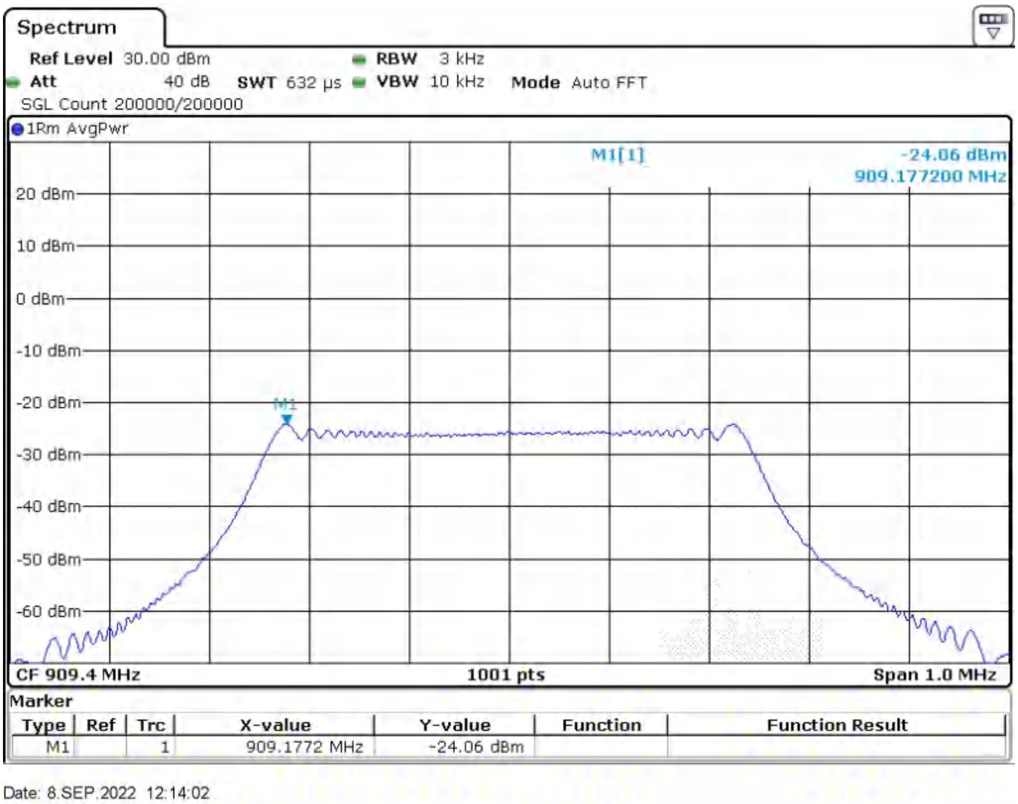
Date: 8.SEP.2022 13:30:58

Power Spectral Density

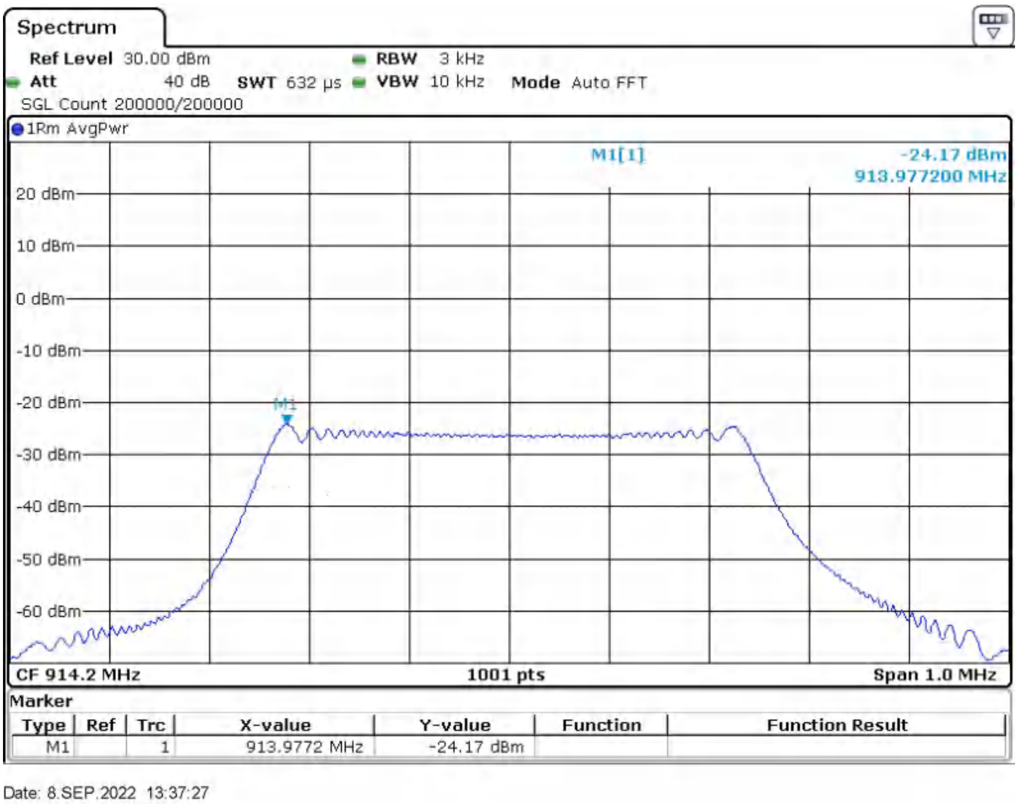
TX Frequency 903.0MHz



TX Frequency : 909.4MHz

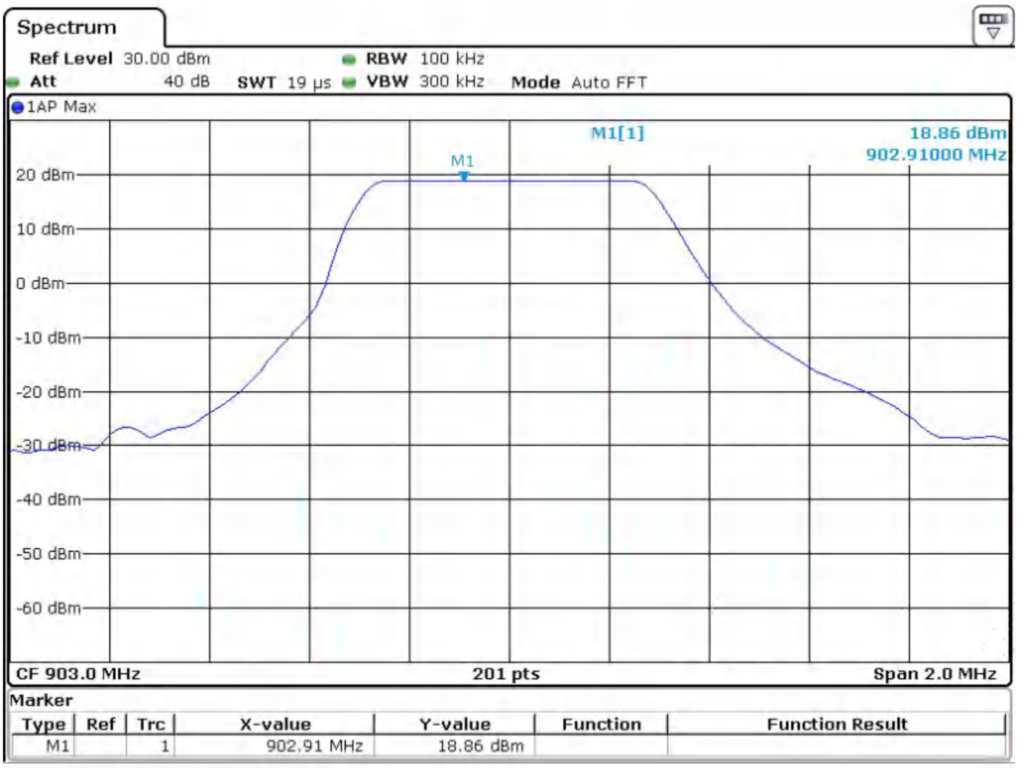


TX Frequency 914.2MHz



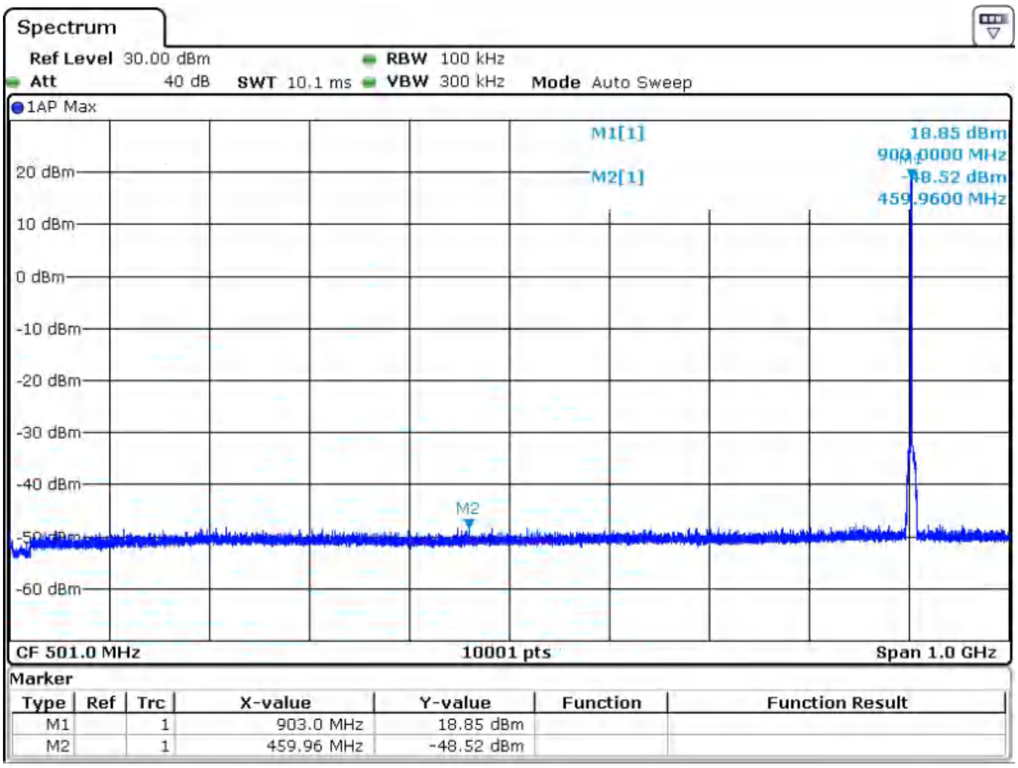
Spurious Conducted Emissions

TX Frequency 903.0MHz _ Reference



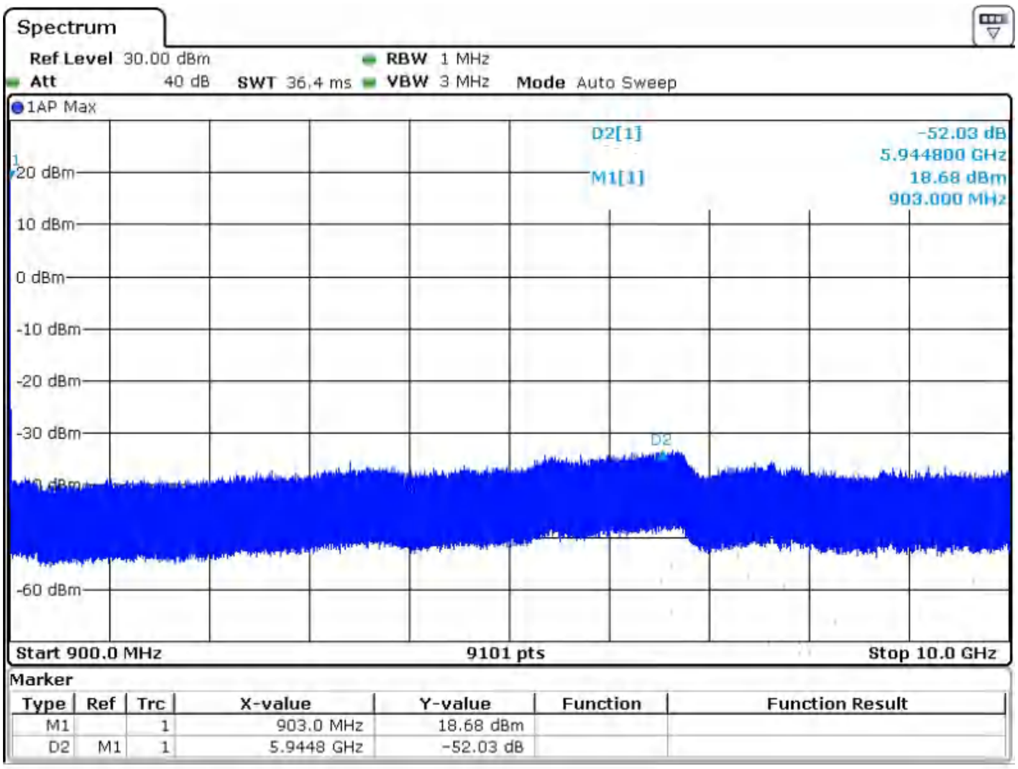
Date: 8.SEP.2022 14:35:12

TX Frequency 903.0MHz _ 1M~1GHz



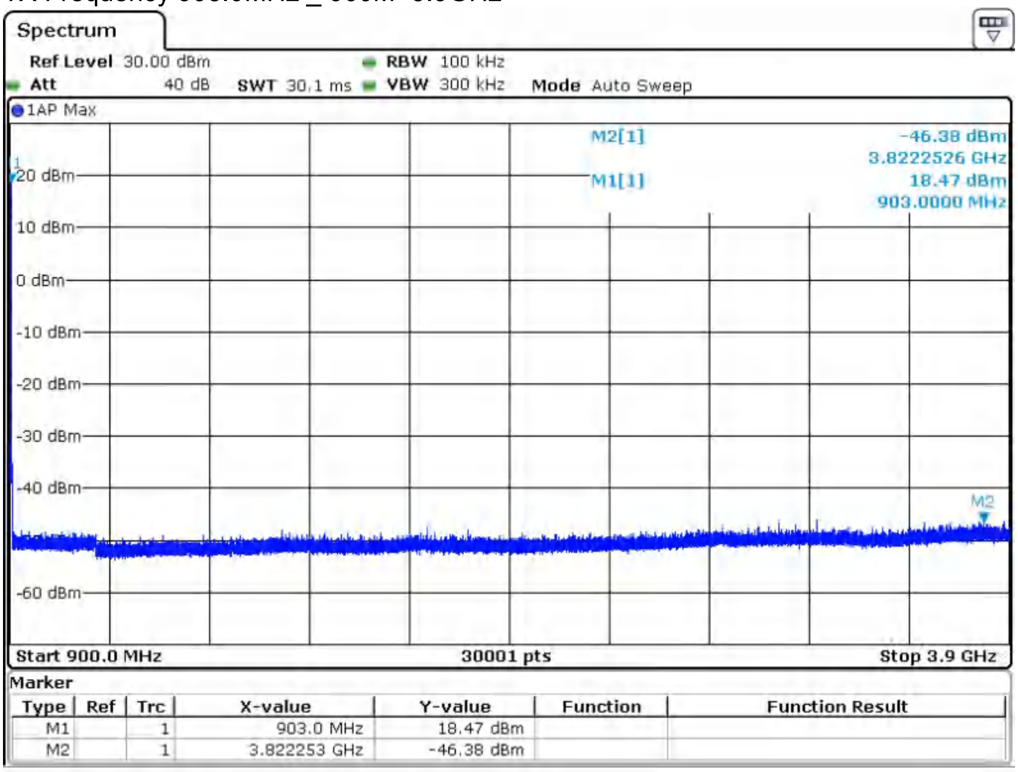
Date: 8.SEP.2022 15:22:14

TX Frequency : 903.0MHz _ Pre-Scan



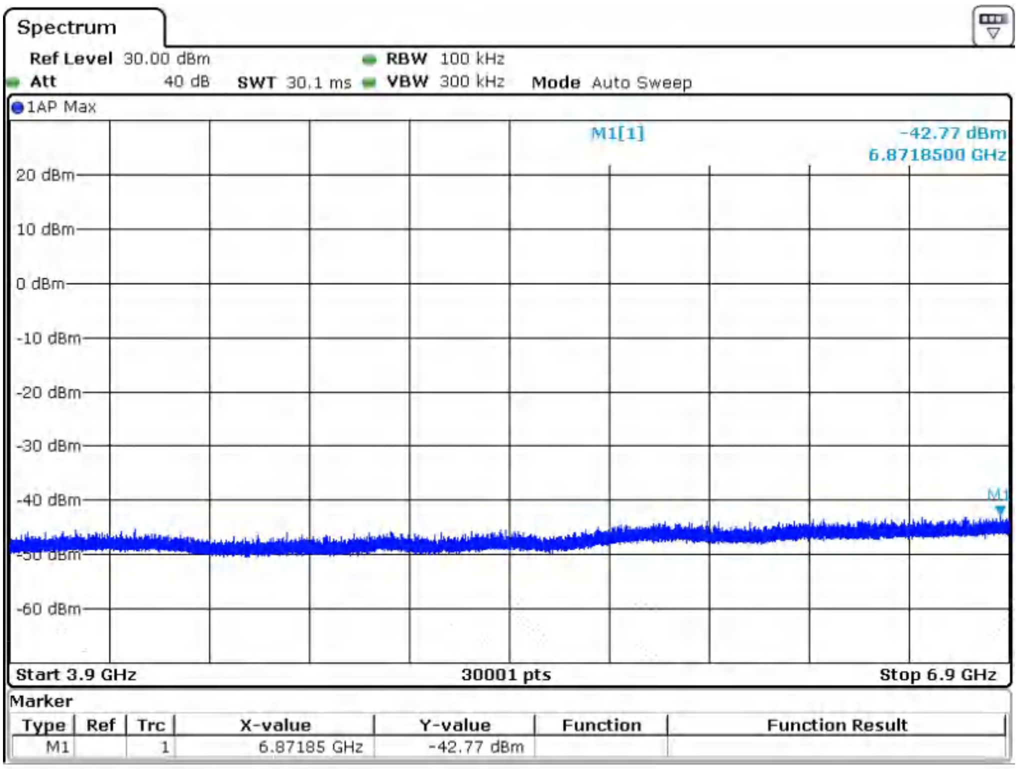
Date: 11.SEP.2022 10:11:03

TX Frequency 903.0MHz _ 900M~3.9GHz



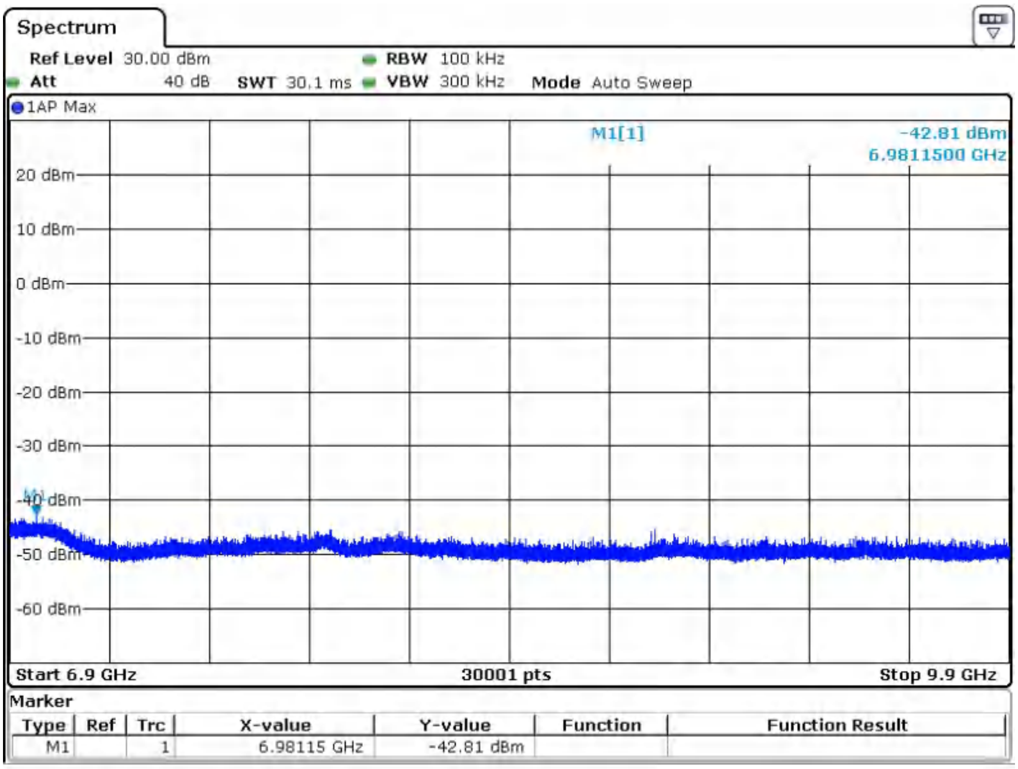
Date: 11.SEP.2022 09:47:13

TX Frequency 903.0MHz _ 3.9~6.9GHz



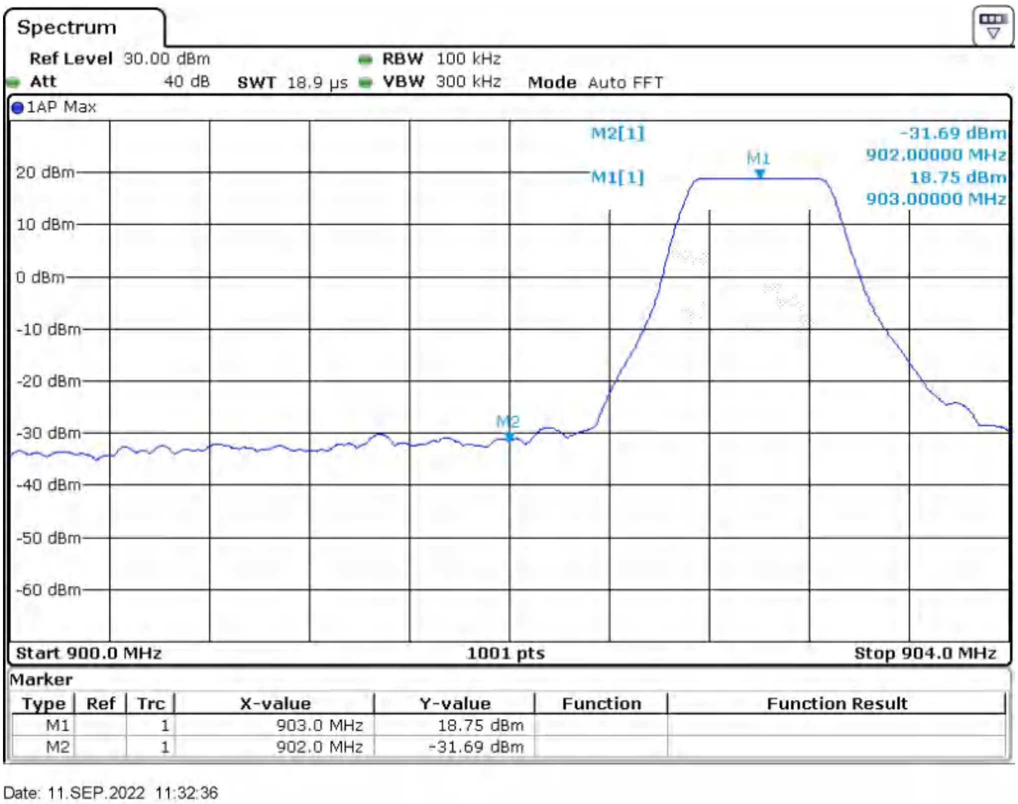
Date: 11.SEP.2022 09:56:27

TX Frequency 903.0MHz _ 6.9~9.9GHz

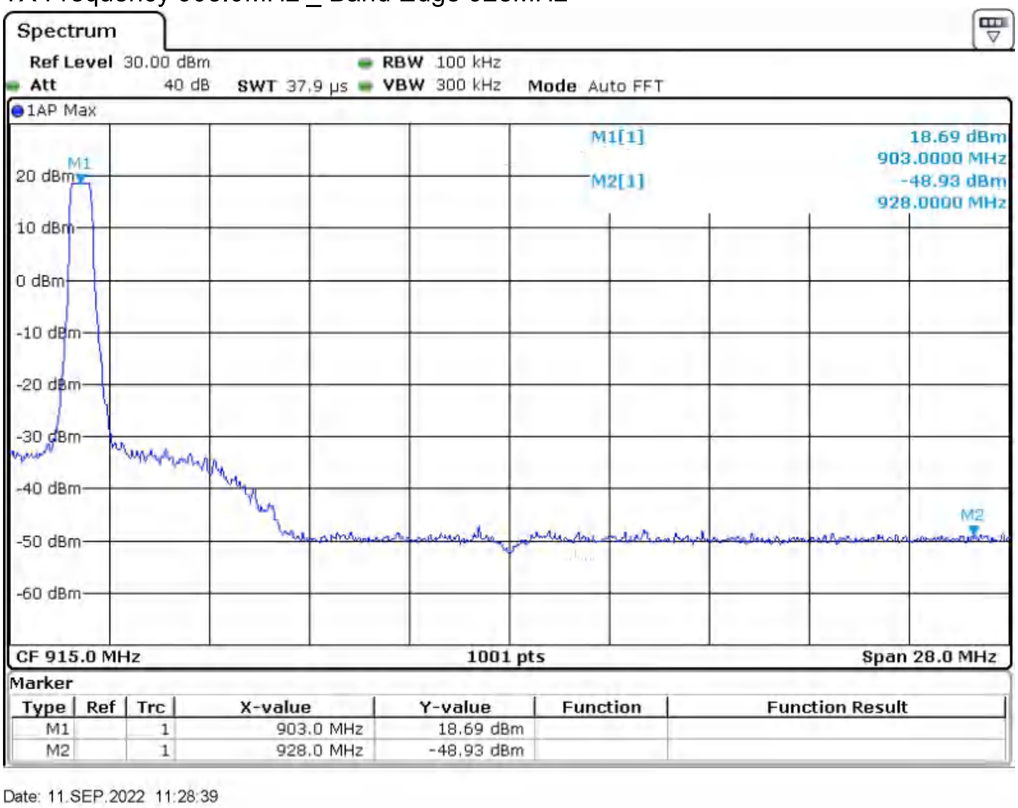


Date: 11.SEP.2022 10:06:12

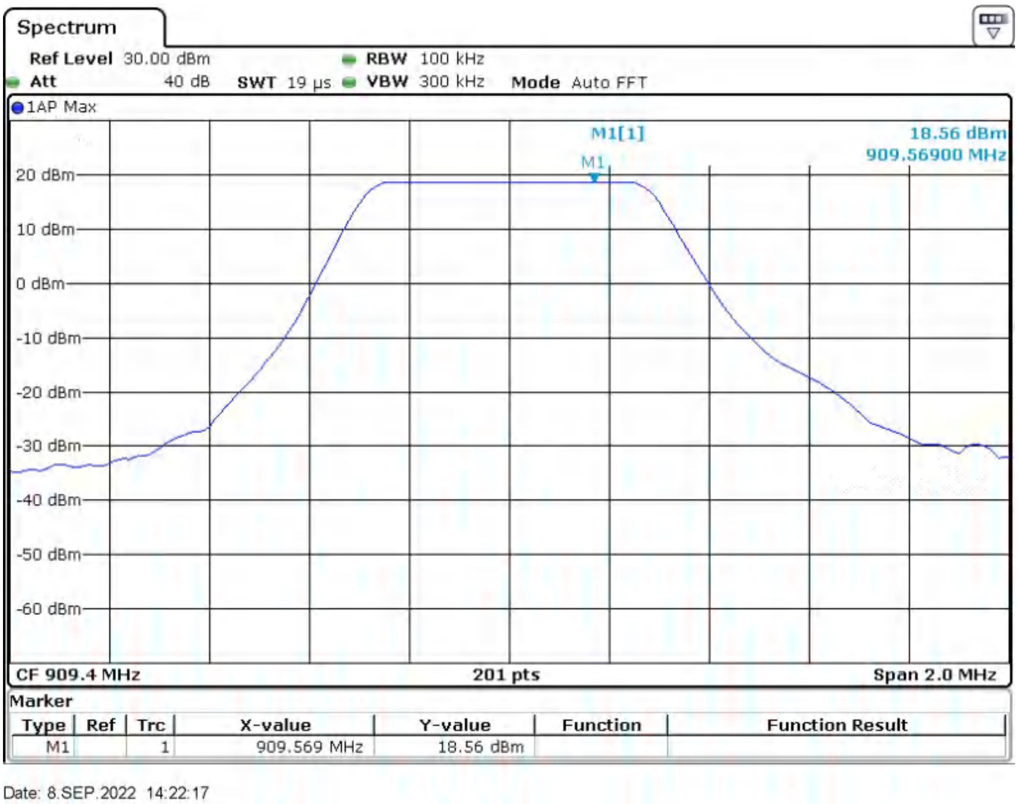
TX Frequency : 903.0MHz _ Band Edge 902MHz



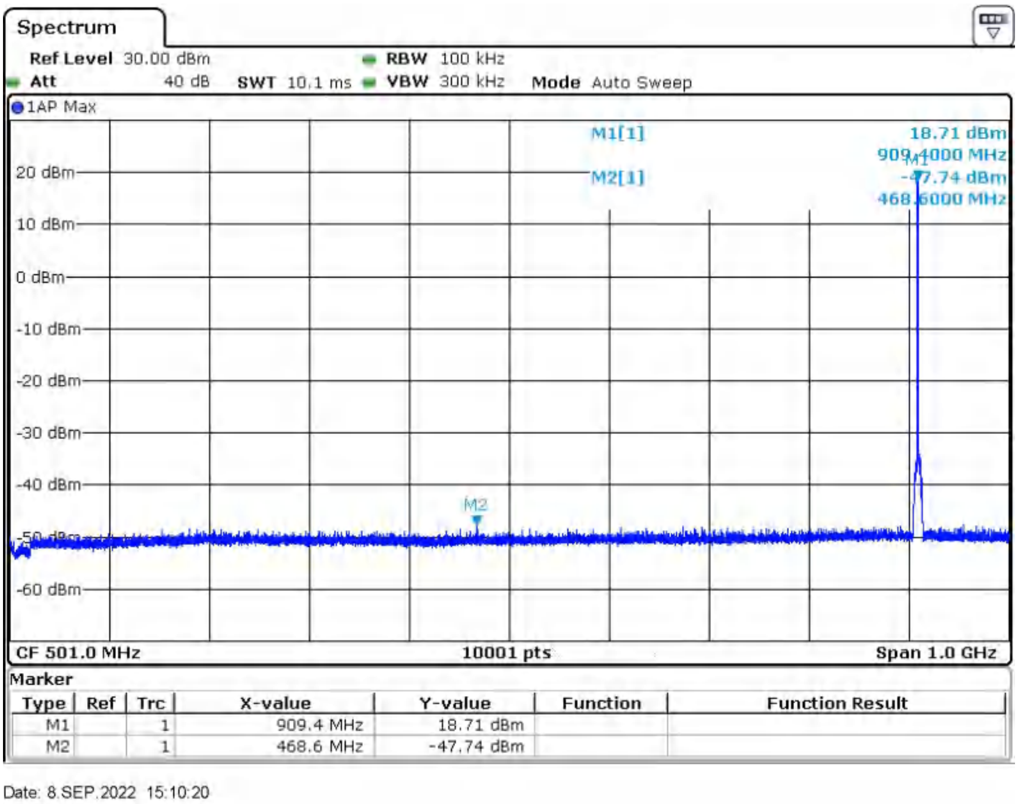
TX Frequency 903.0MHz _ Band Edge 928MHz



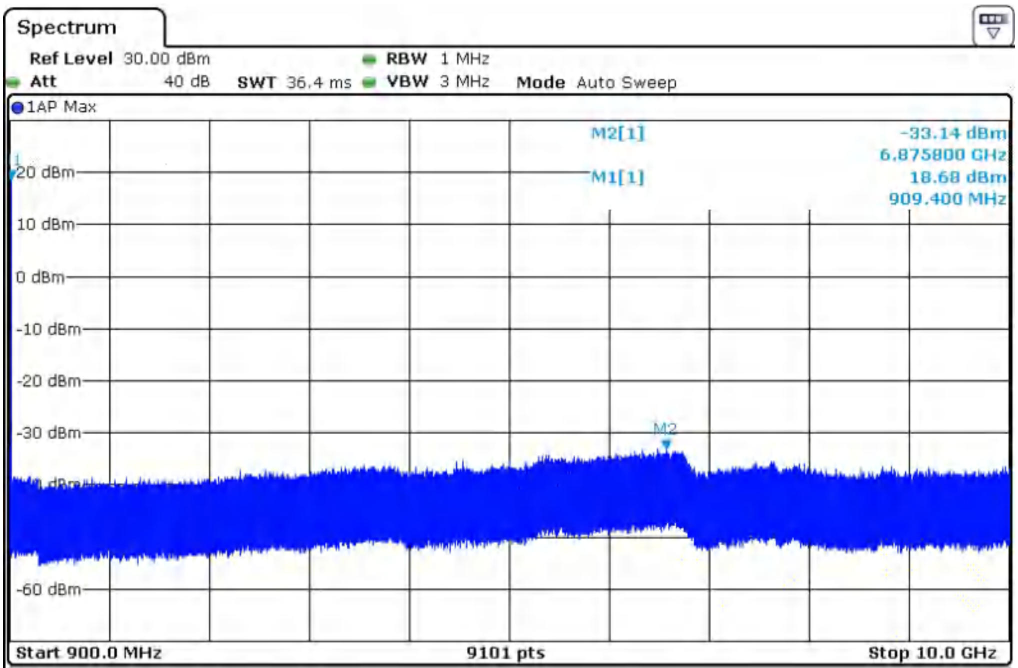
TX Frequency 909.4MHz _ Reference



TX Frequency 909.4MHz _ 1M~1GHz



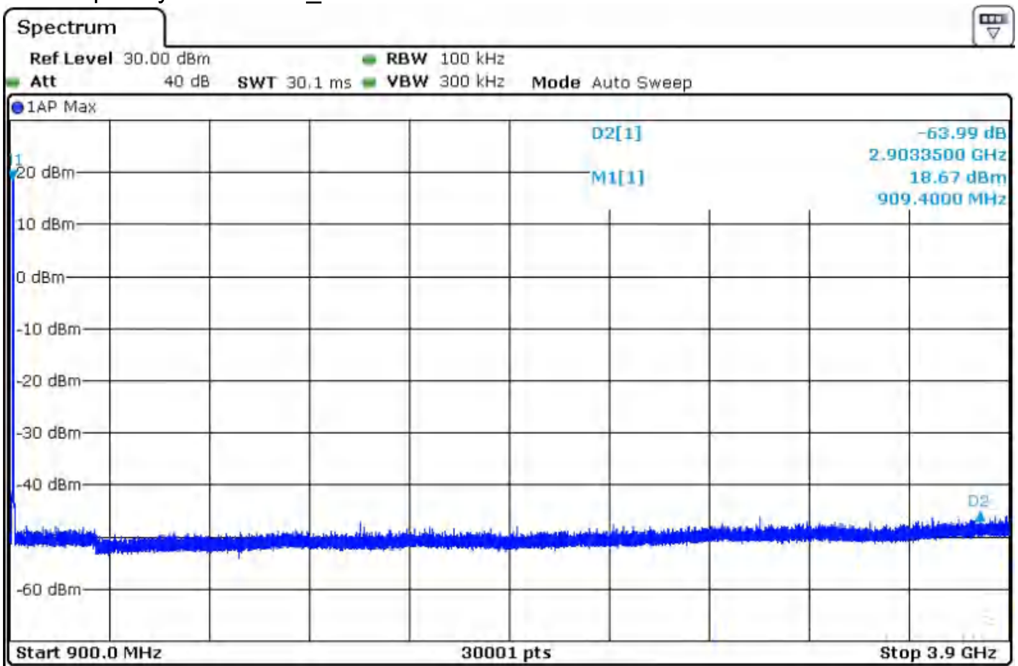
TX Frequency : 909.4MHz _ Pre-Scan



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	909.4 MHz	18.68 dBm		
M2		1	6.8758 GHz	-33.14 dBm		

Date: 8.SEP.2022 18:01:02

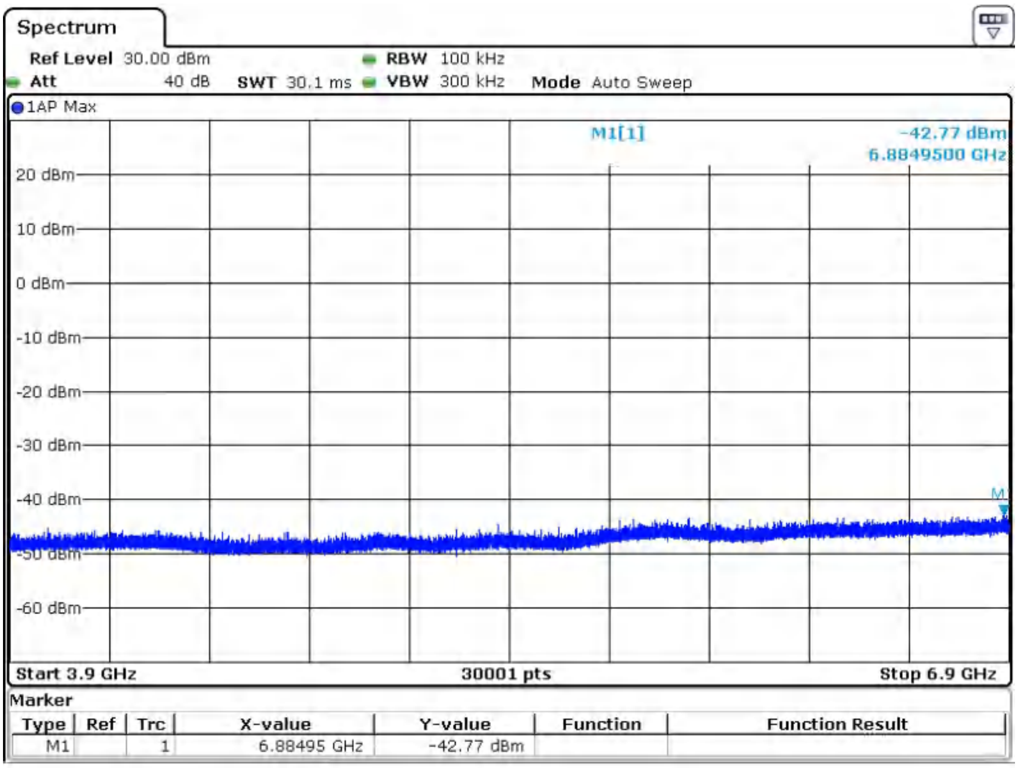
TX Frequency 909.4MHz _ 900M~3.9GHz



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	909.4 MHz	18.67 dBm		
D2	M1	1	2.90335 GHz	-63.99 dB		

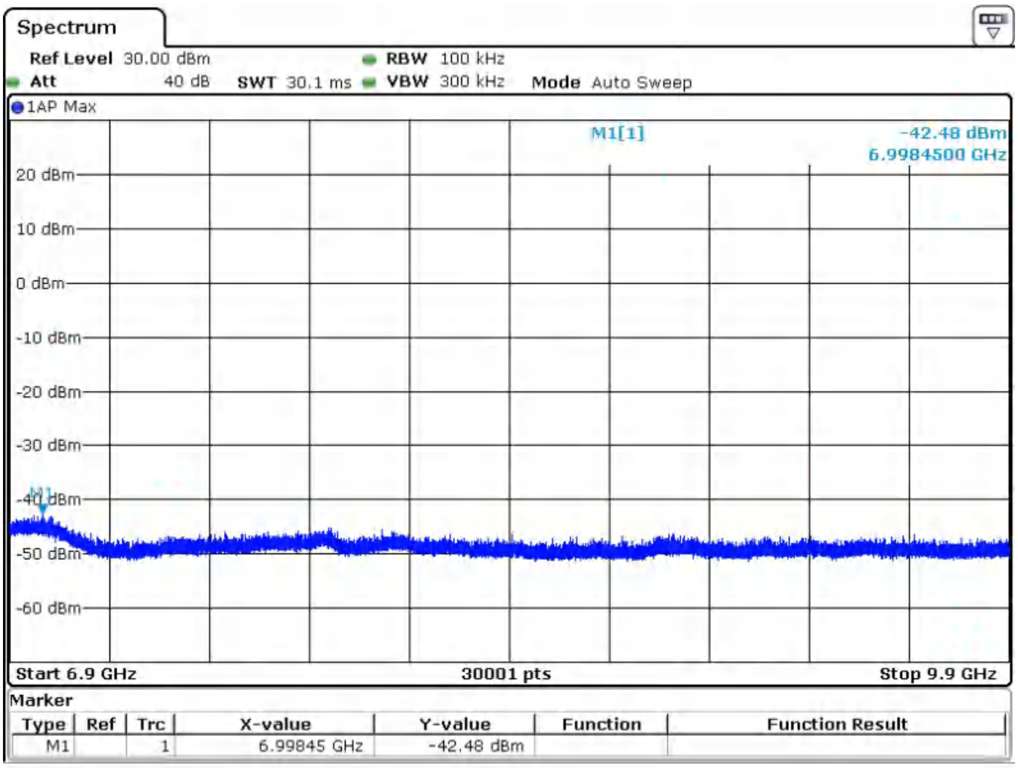
Date: 8.SEP.2022 18:09:52

TX Frequency 909.4MHz _ 3.9~6.9GHz



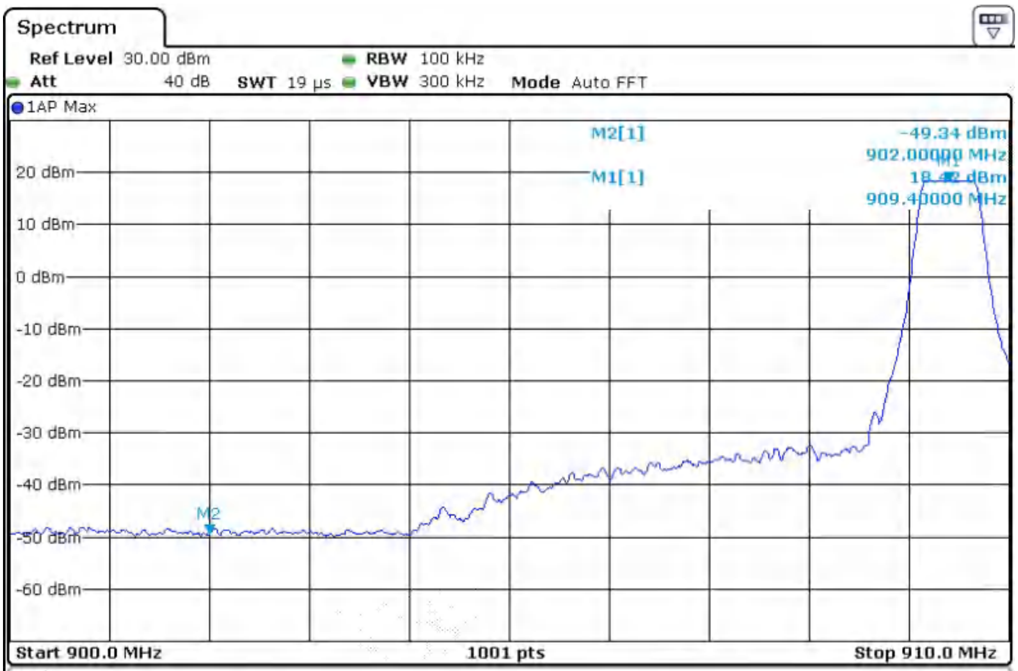
Date: 8.SEP.2022 18:18:25

TX Frequency 909.4MHz _ 6.9~9.9GHz



Date: 8.SEP.2022 18:29:51

TX Frequency : 909.4MHz _ Band Edge 902MHz

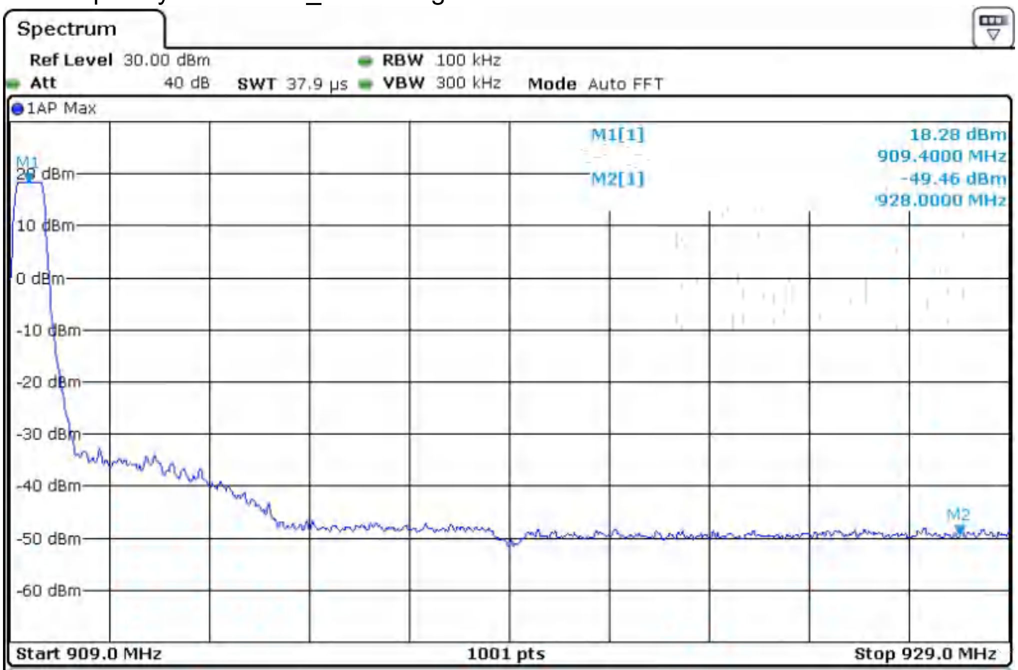


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	909.4 MHz	18.42 dBm		
M2		1	902.0 MHz	-49.34 dBm		

Date: 11.SEP.2022 11:03:21

TX Frequency 909.4MHz _ Band Edge 928MHz

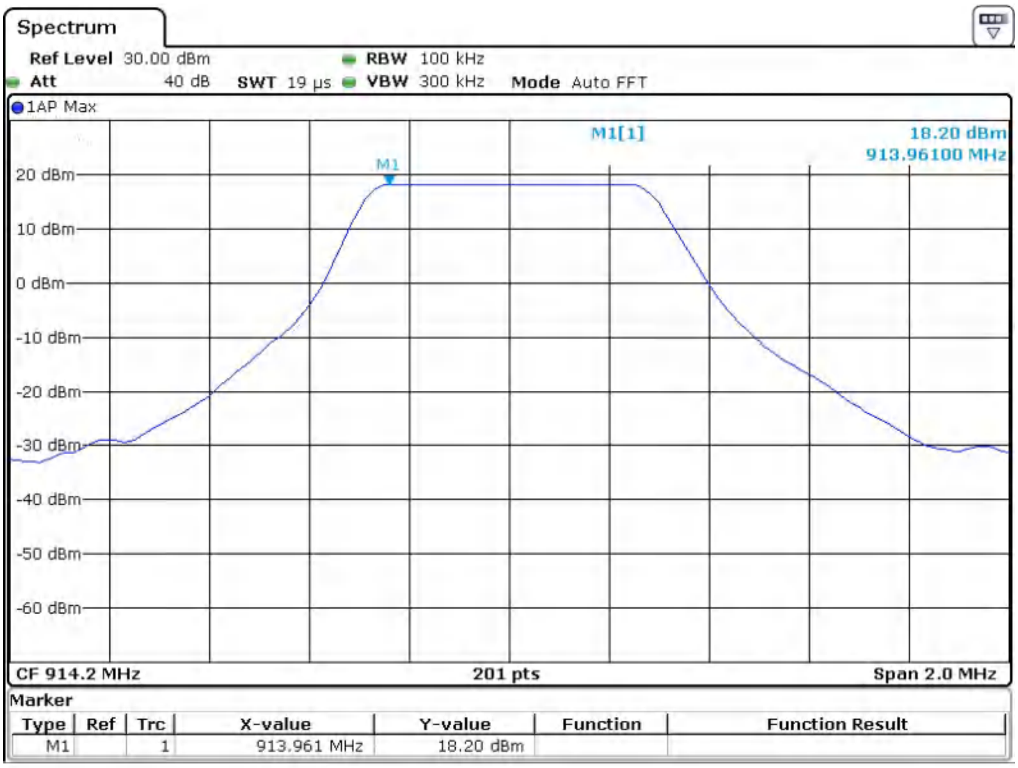


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	909.4 MHz	18.28 dBm		
M2		1	928.0 MHz	-49.46 dBm		

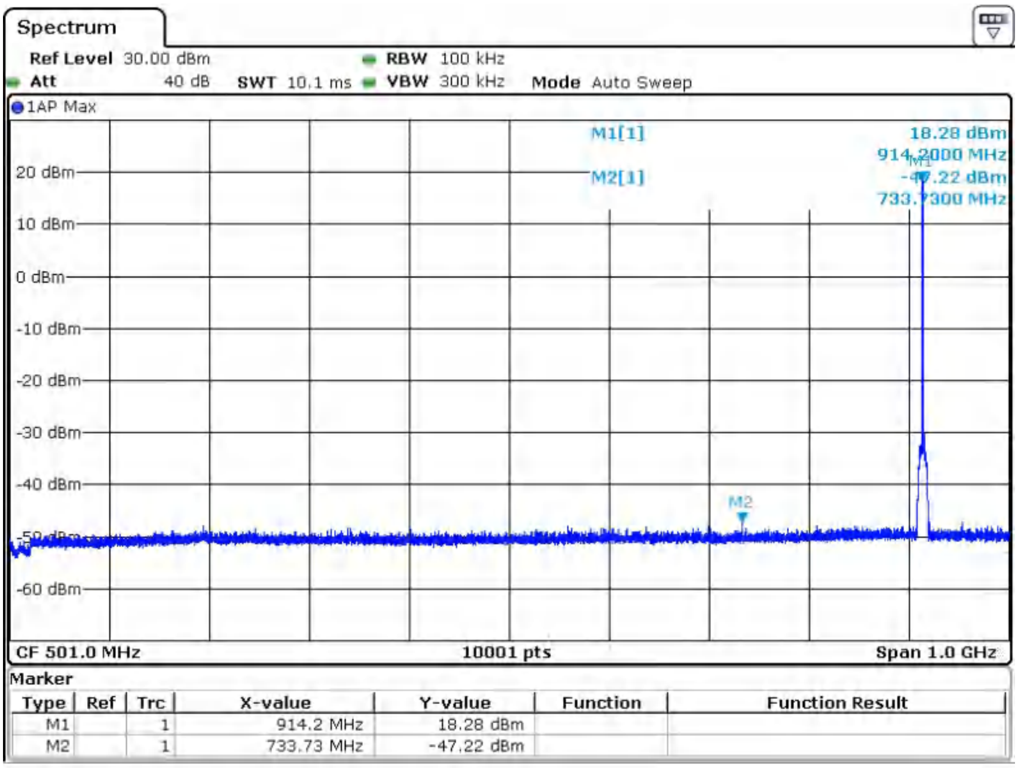
Date: 11.SEP.2022 11:17:14

TX Frequency 914.2MHz _ Reference



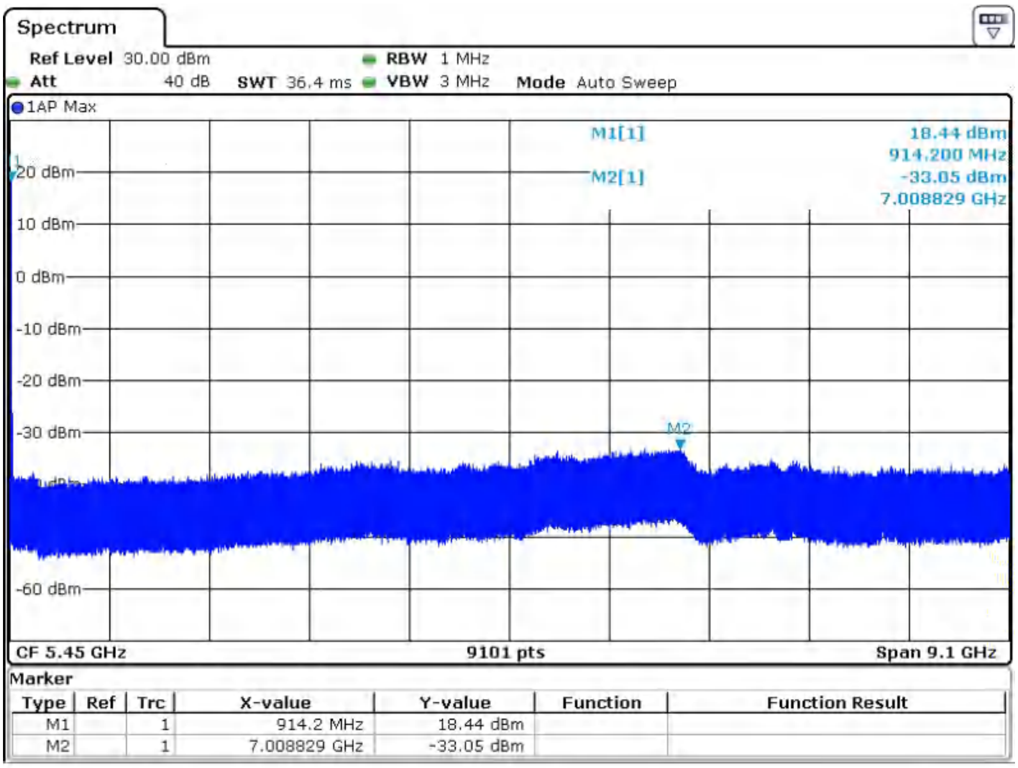
Date: 8.SEP.2022 14:19:35

TX Frequency 914.2MHz _ 1M~1GHz



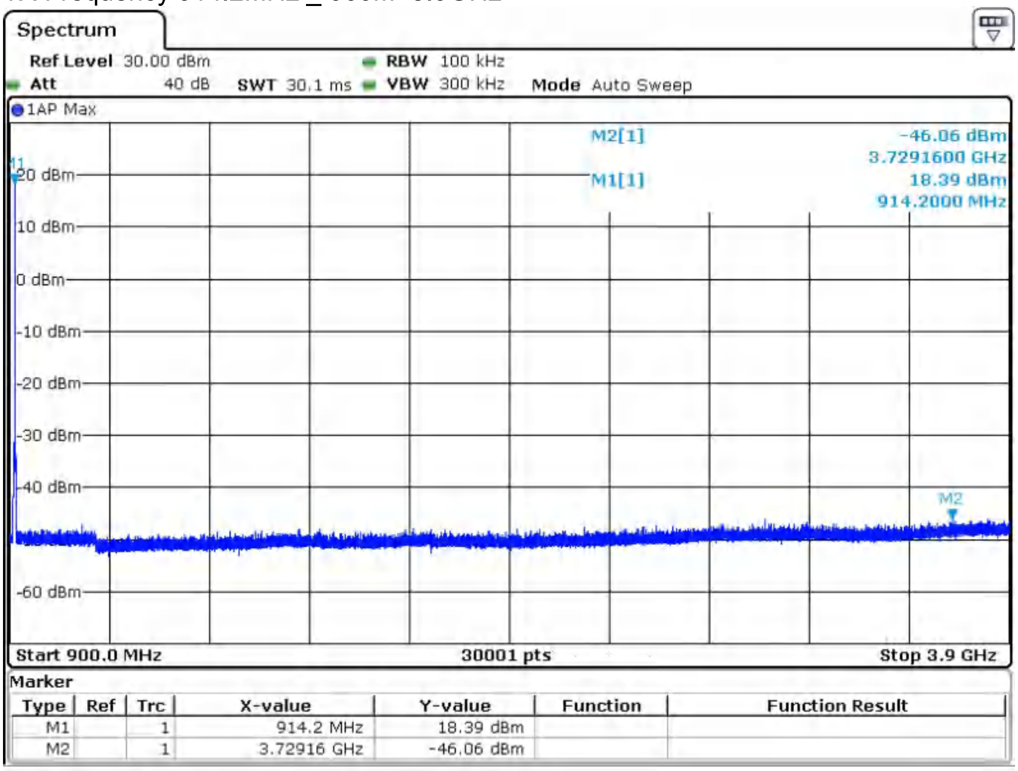
Date: 8.SEP.2022 15:36:35

TX Frequency : 914.2MHz _ Pre-Scan



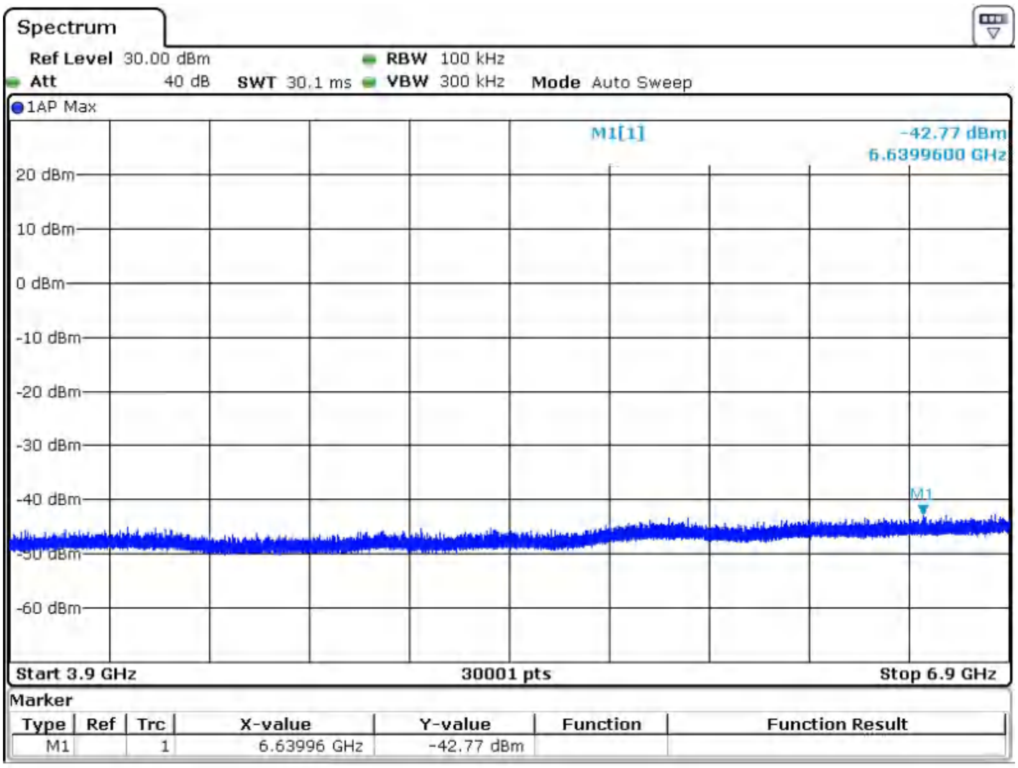
Date: 8.SEP.2022 15:49:11

TX Frequency 914.2MHz _ 900M~3.9GHz



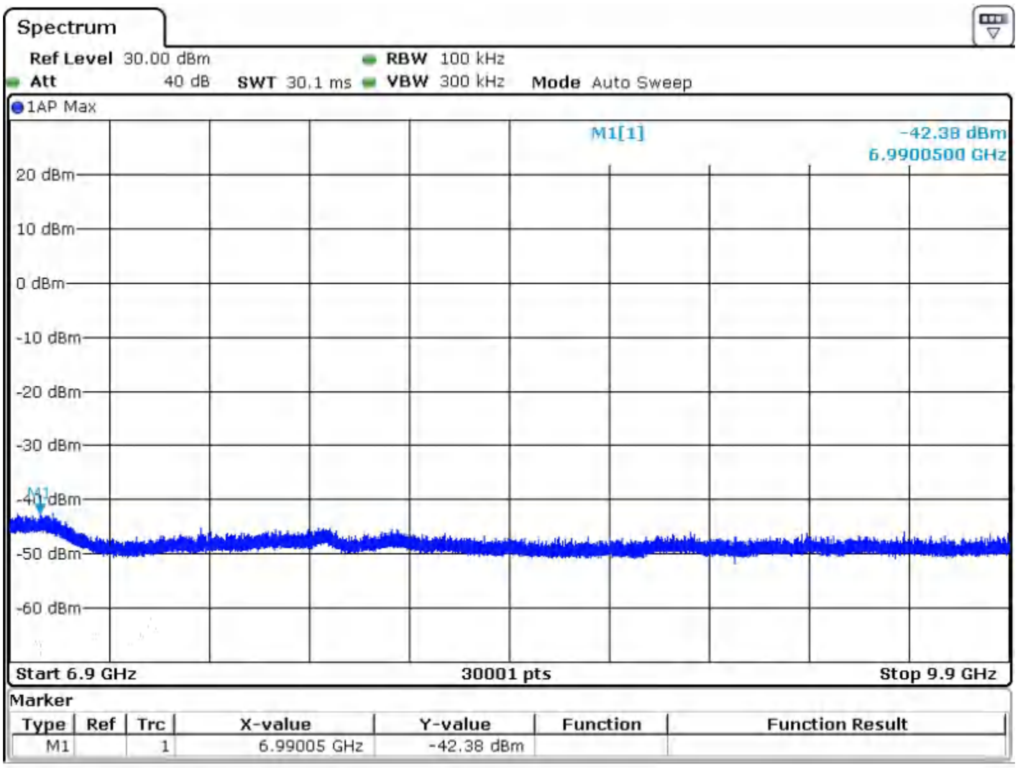
Date: 8.SEP.2022 16:13:22

TX Frequency 914.2MHz _ 3.9~6.9GHz



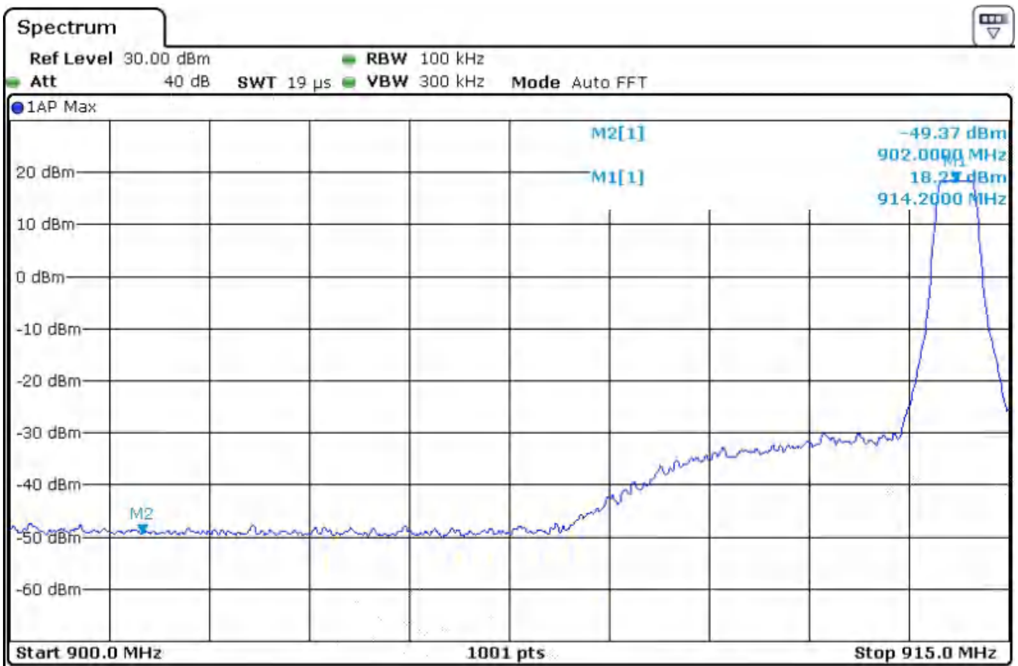
Date: 8.SEP.2022 16:24:54

TX Frequency 914.2MHz _ 6.9~9.9GHz



Date: 8.SEP.2022 16:49:02

TX Frequency : 914.2MHz _ Band Edge 902MHz

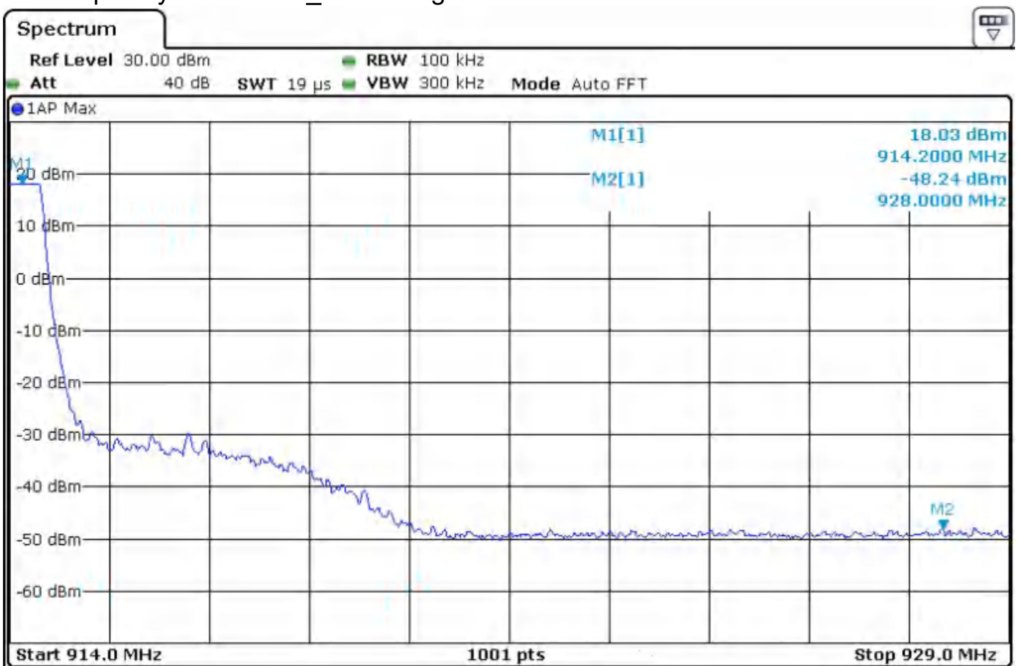


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	914.2 MHz	18.25 dBm		
M2		1	902.0 MHz	-49.37 dBm		

Date: 11.SEP.2022 16:28:26

TX Frequency 914.2MHz _ Band Edge 928MHz



Marker

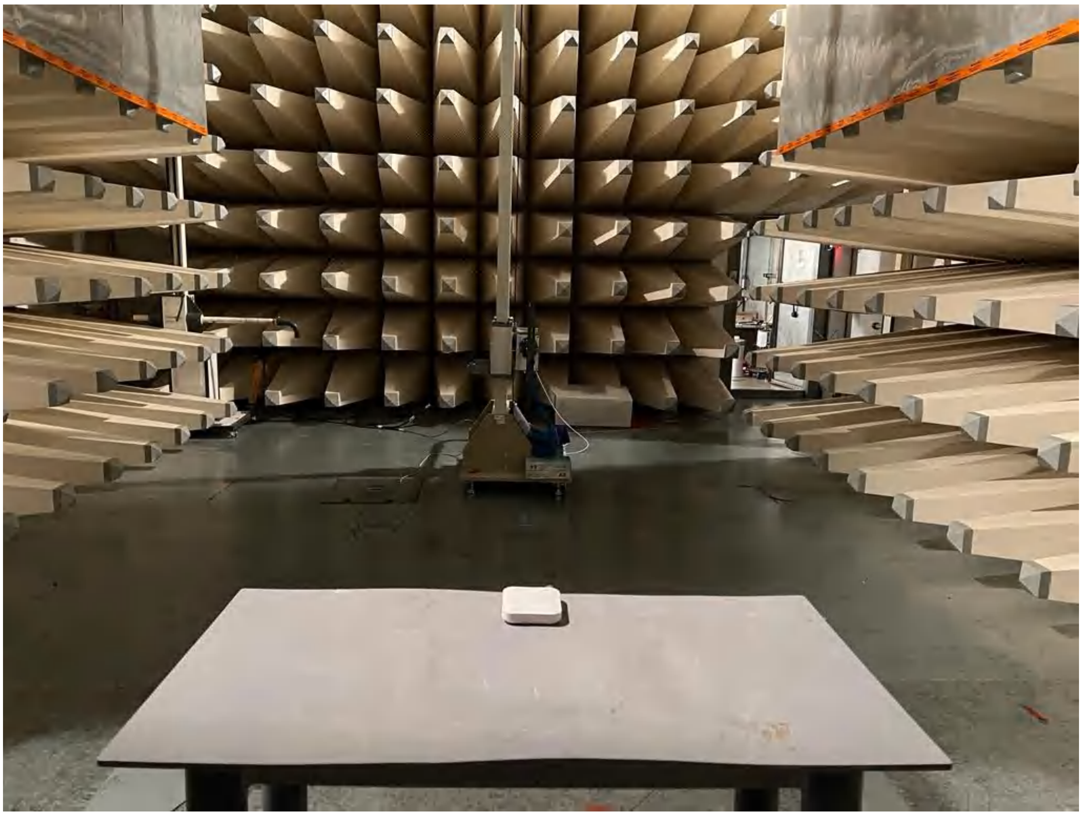
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	914.2 MHz	18.03 dBm		
M2		1	928.0 MHz	-48.24 dBm		

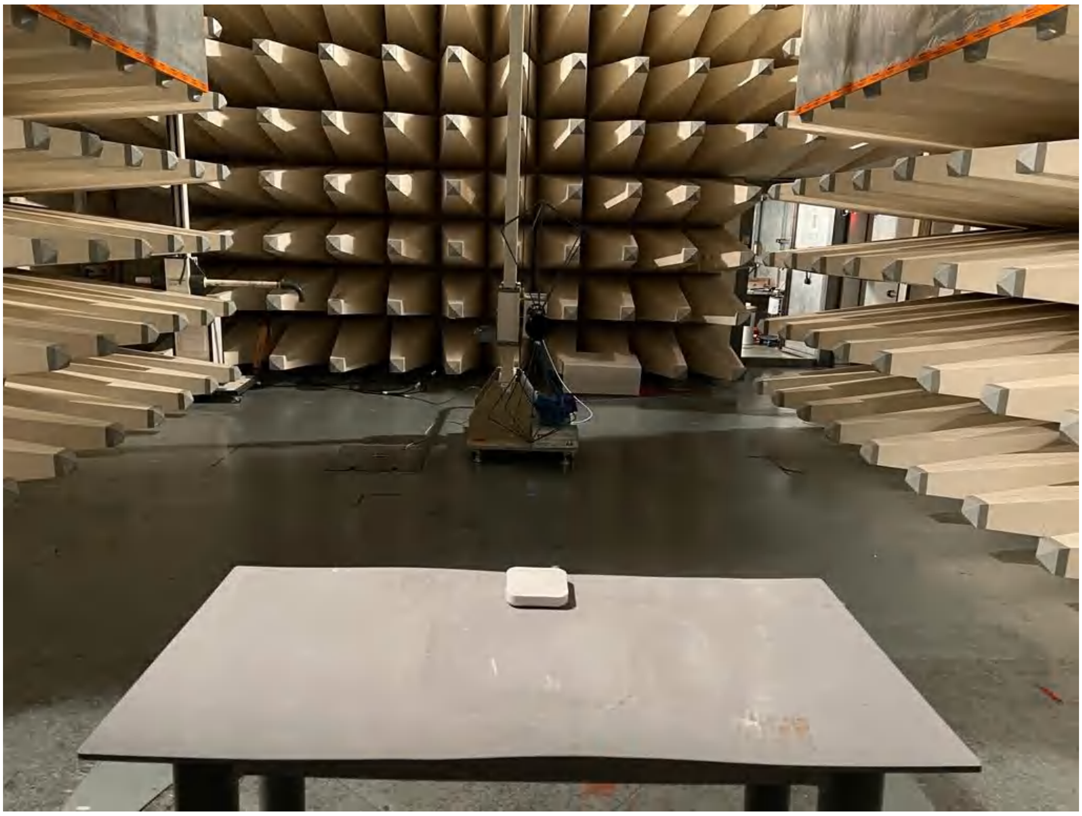
Date: 11.SEP.2022 11:22:55

Appendix 2

Test Setup Photos


Set up for Radiated Emission Above 1G


Set up for Radiated Emission Below 200M~1G


Set up for Radiated Emission 30M~200MHz

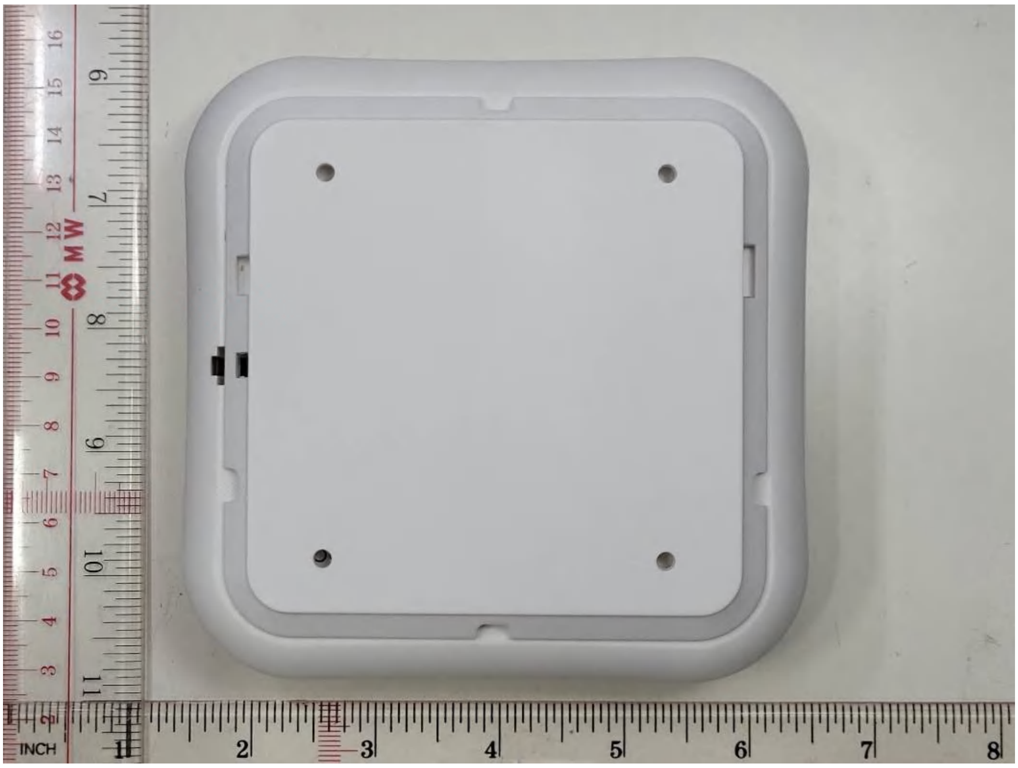

Set up for Radiated Emission Below 30MHz

Appendix 3

EUT External Photos

FCC ID: 2AMWTLRS10701

External View



External View

External View

External View

External View

External View

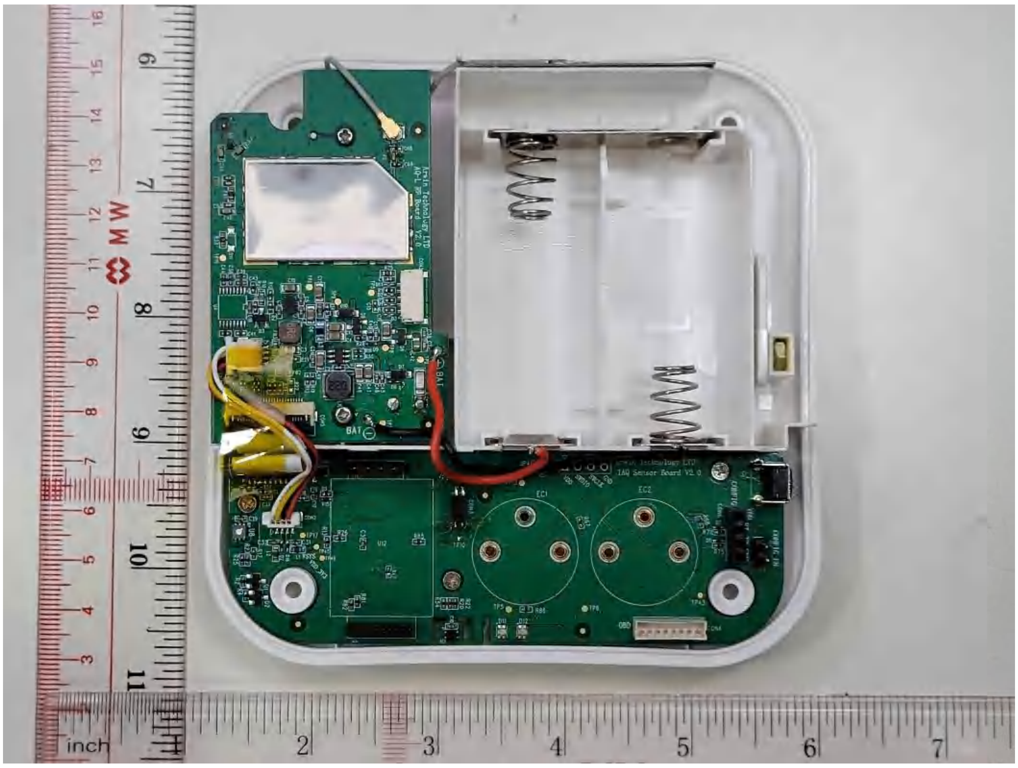
External View

External View

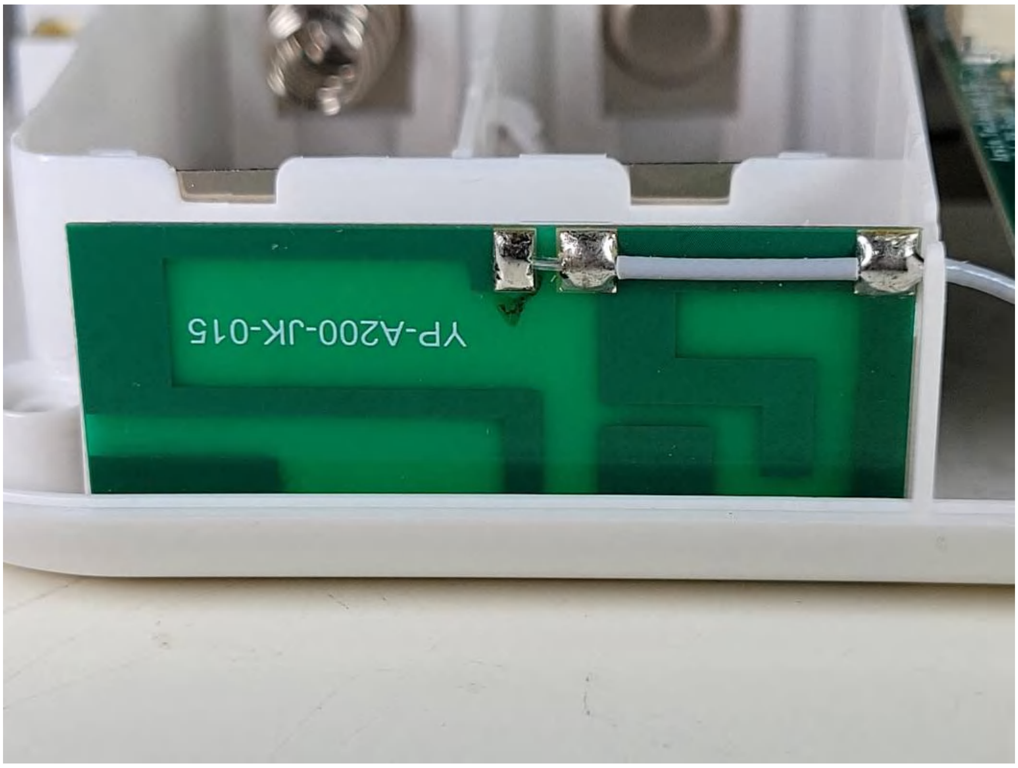
Appendix 4
EUT Internal Photos

FCC ID: 2AMWTLRS10701

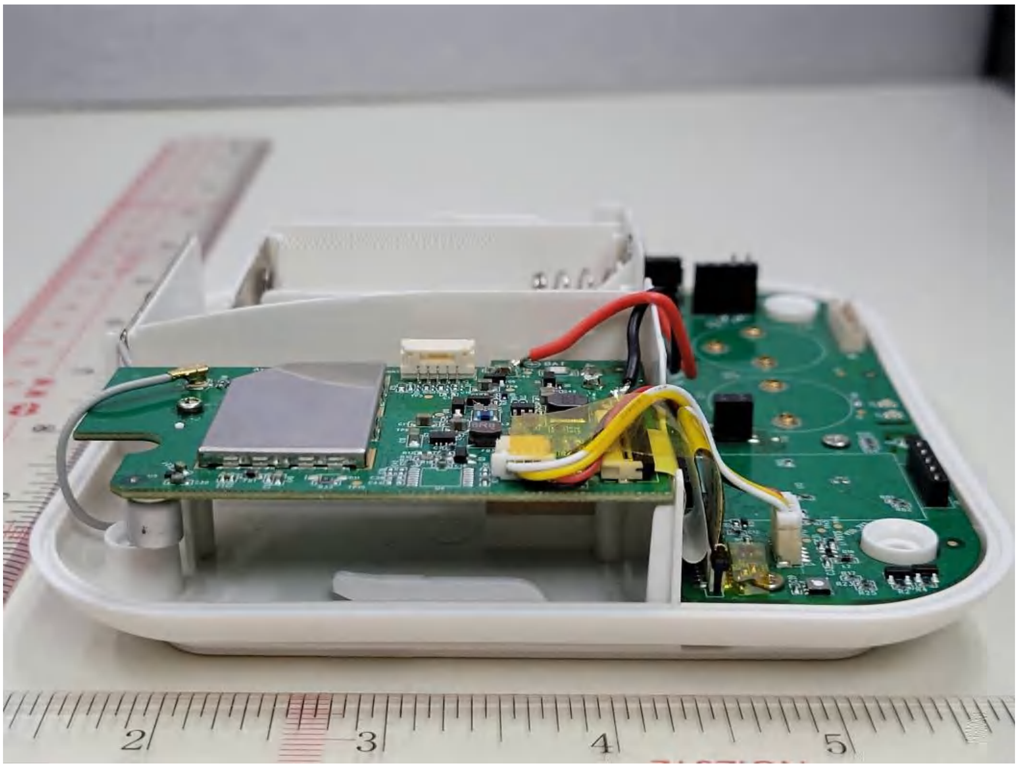
Internal View



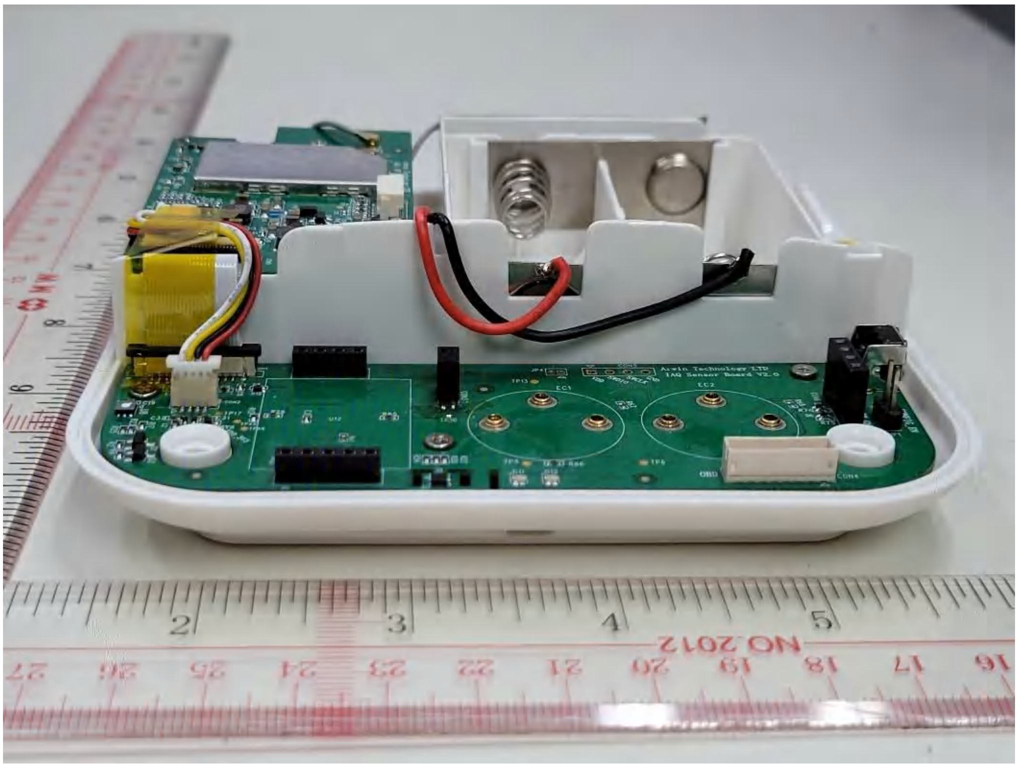
Internal View



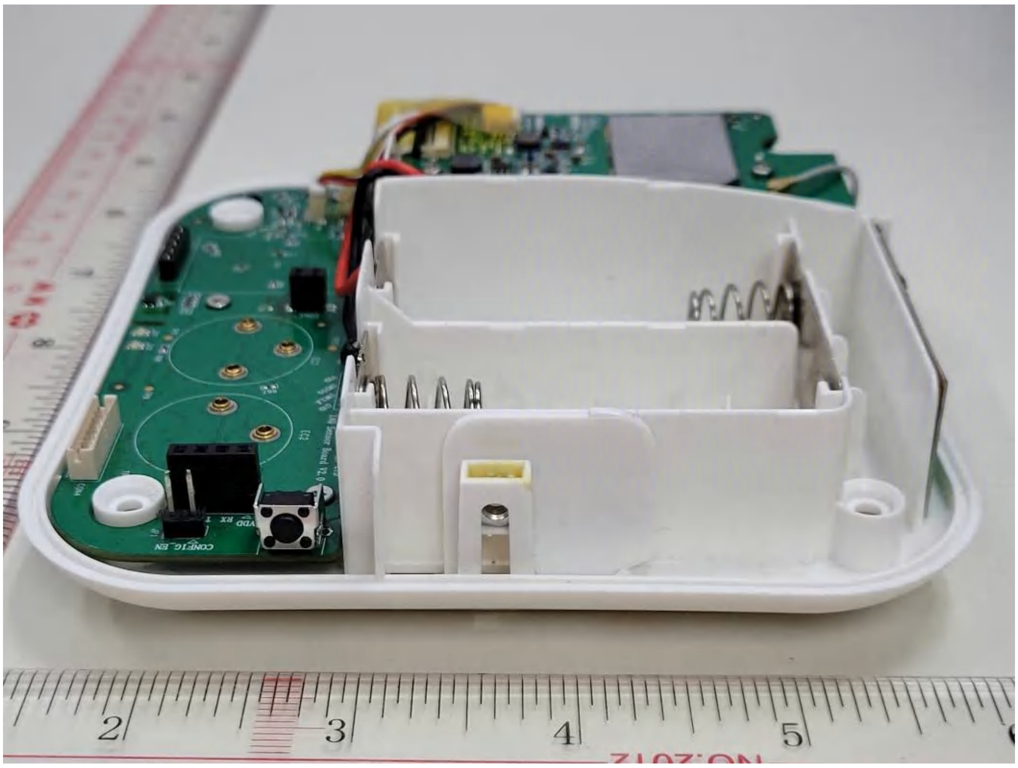
Internal View



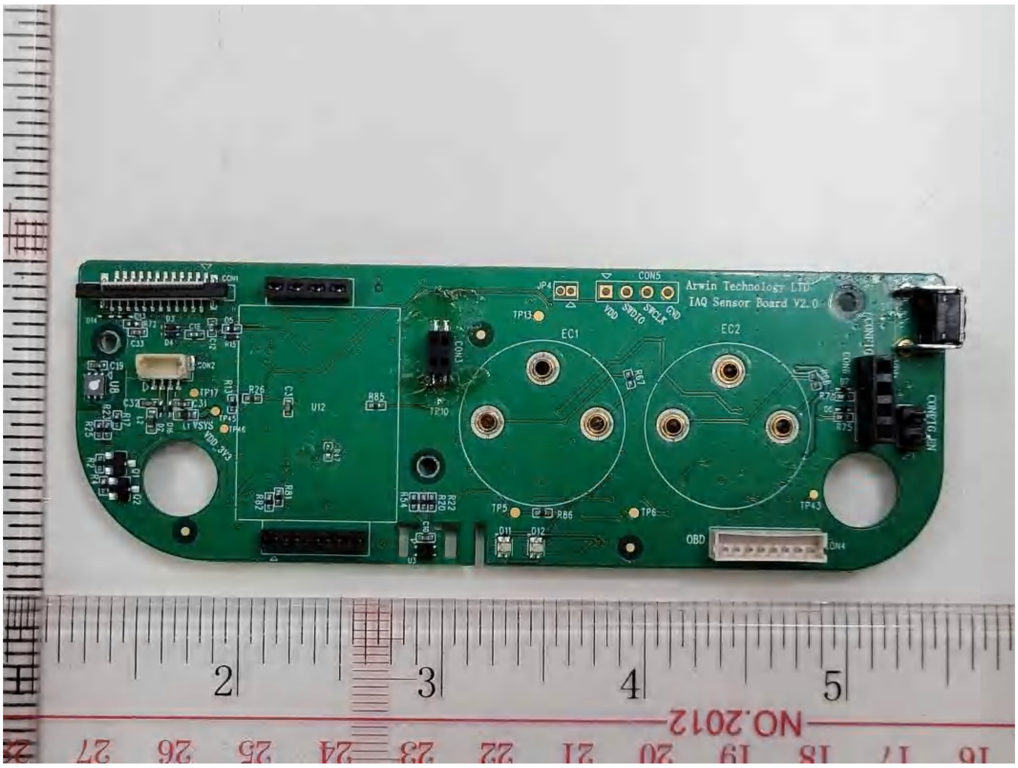
Internal View



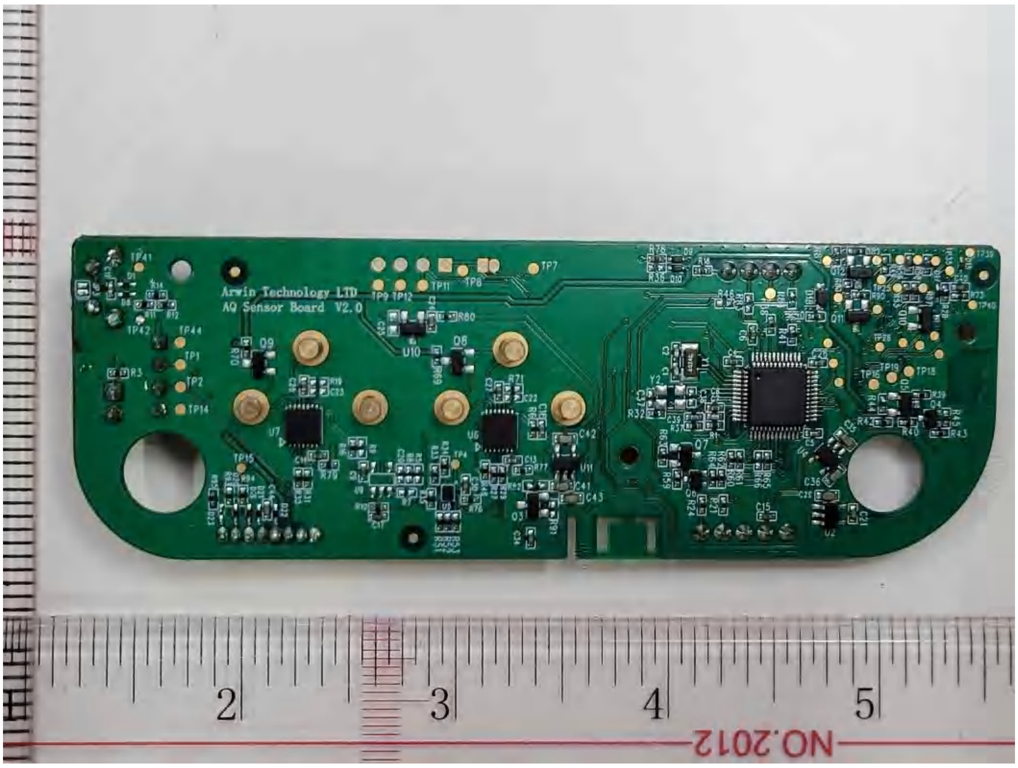
Internal View



Internal View



Internal View

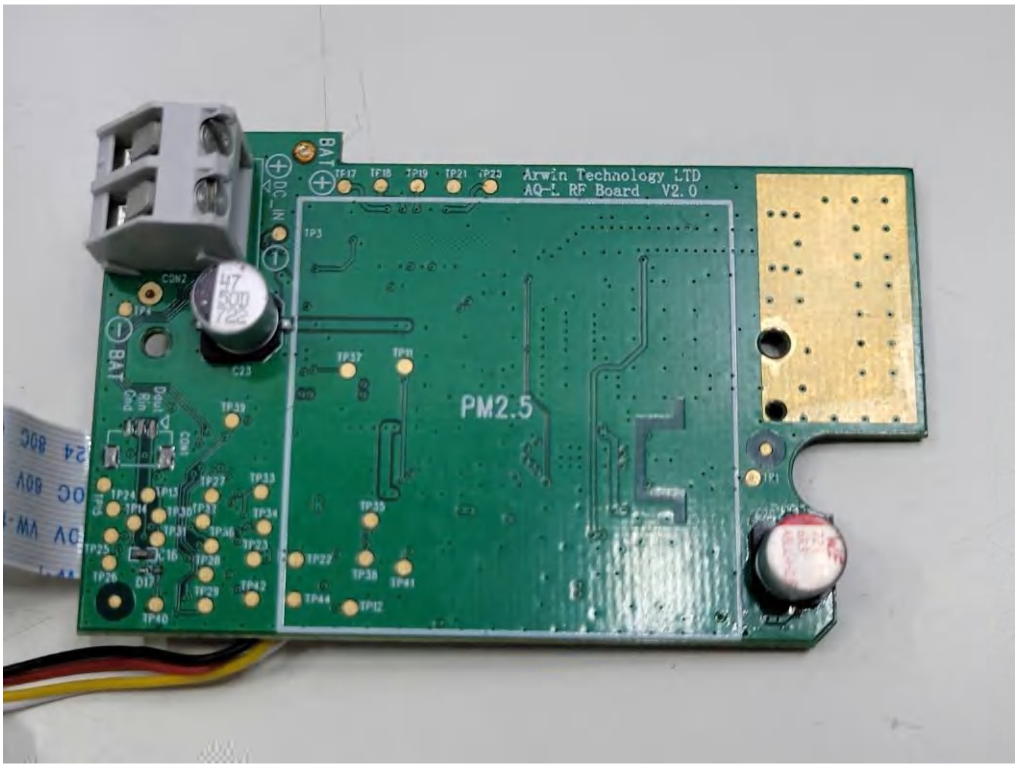


Internal View

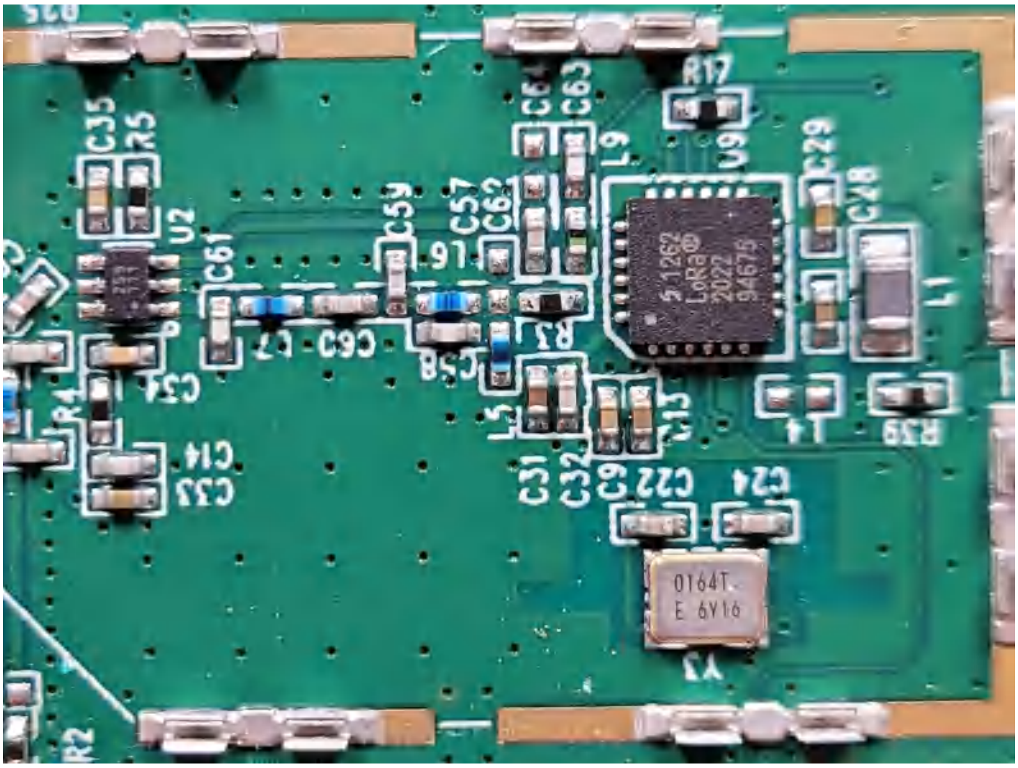
Internal View

Internal View

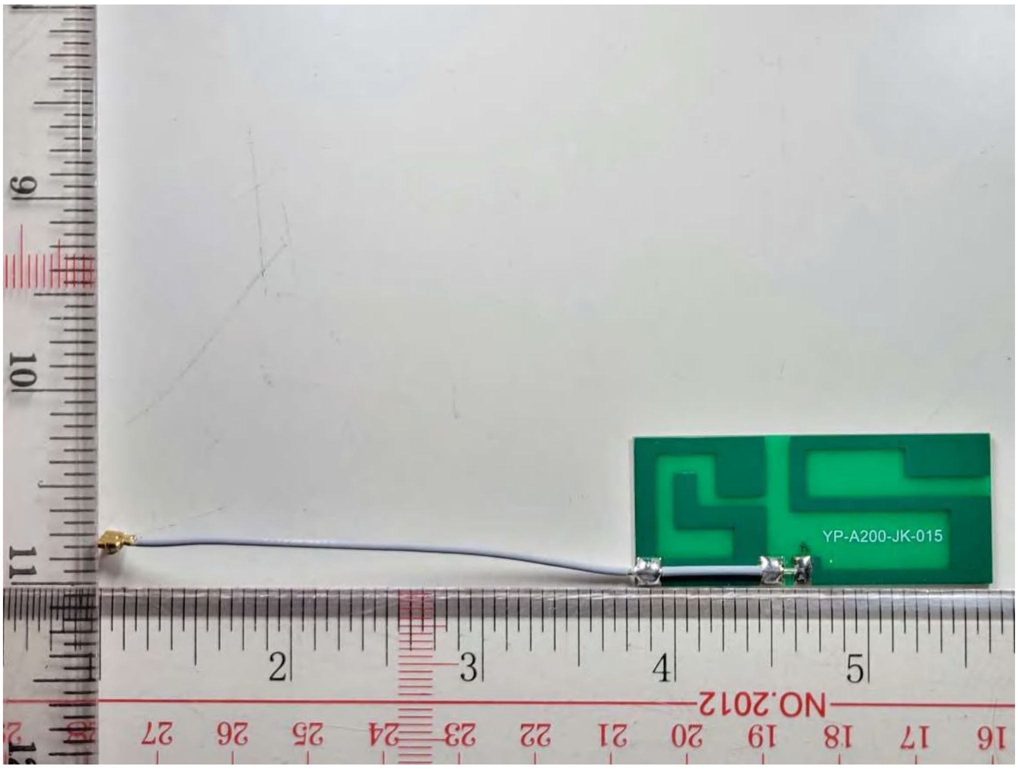
Internal View



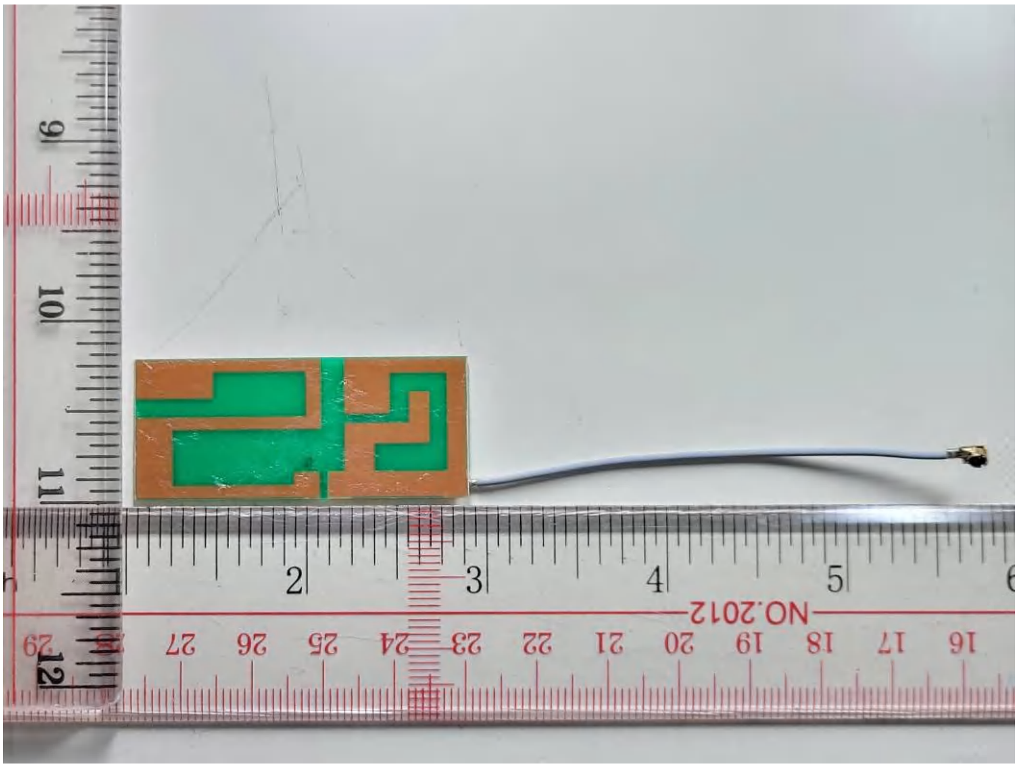
Internal View



Internal View



Internal View



Internal View

Appendix 5

RF Exposure Information

FCC ID: 2AMWTLRS10701

Maximum Effective Radiated Power

According to KDB 447498 D04, MPE based exemption is determine in § 1.1307(b)(3)(i)(C) :

A single RF source is exempt if using Table 1 of § 1.1307(b)(3)(i)(C) and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency.

RF Source frequency (MHz)	Threshold ERP (watts)
300 ~ 1,500	$0.0128\ R^2\ f$
1,500 ~ 100,000	$19.2\ R^2$

Table 1 of § 1.1307(b)(3)(i)(C)

Where R = 20cm, the minimum distance mentioned in module datasheet.

For the exemption in Table 1 to apply, R must be at least λ/2π, where λ is the free-space operating wavelength in meters

For Frequency between 300MM~1,500M, Max. ERP is no more than the Threshold ERP = $0.0128 \times (0.2m)^2 \times f$ (in MHz)

λ/2π and Threshold ERP is calculated in below table

Frequency (MHz)	Wavelength λ (m)	λ/2π (cm)	R (cm)	Threshold ERP (W)
903.0	0.332	5.29	20	0.4623
909.4	0.330	5.25	20	0.4656
914.2	0.328	5.22	20	0.4681

Result :

Max. ERP (dBm) = P + T + G
Where

P = Maximum pear output power
T = Maximum tune up tolerance declare by customer
G = Antenna Gain relative to half-wave dipole (dBd)

Frequency (MHz)	Maximum Output power (dBm)	Maximum Tune Up Tolerance (dB)	Antenna Gain relative to half-wave dipole (dBd)	Max. ERP (dBm)	Max. ERP (W)	Threshold ERP (W)
903.0	18.77	+2	-4.47	16.30	0.0427	0.4623
909.4	18.51	+2	-4.47	16.04	0.0402	0.4656
914.2	18.13	+2	-4.47	15.66	0.0368	0.4681

Note :

- highest antenna gain within the operating range of the antenna is taken
- dBd = dBi - 2.15dB as per KDB 447498 D04 note 10

Conclusion:
Max. ERP of all frequencies lower than Threshold ERP
No SAR is required.