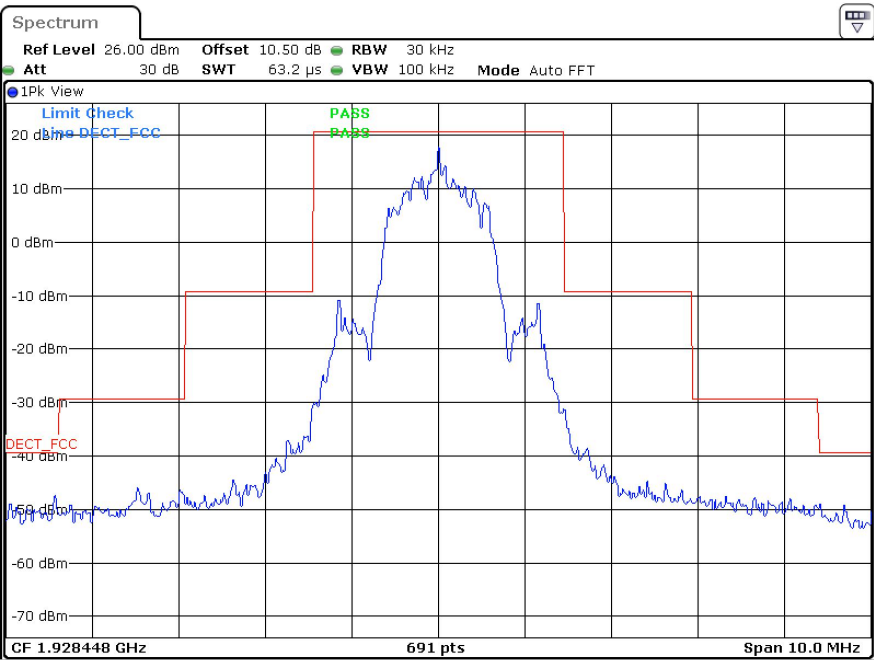


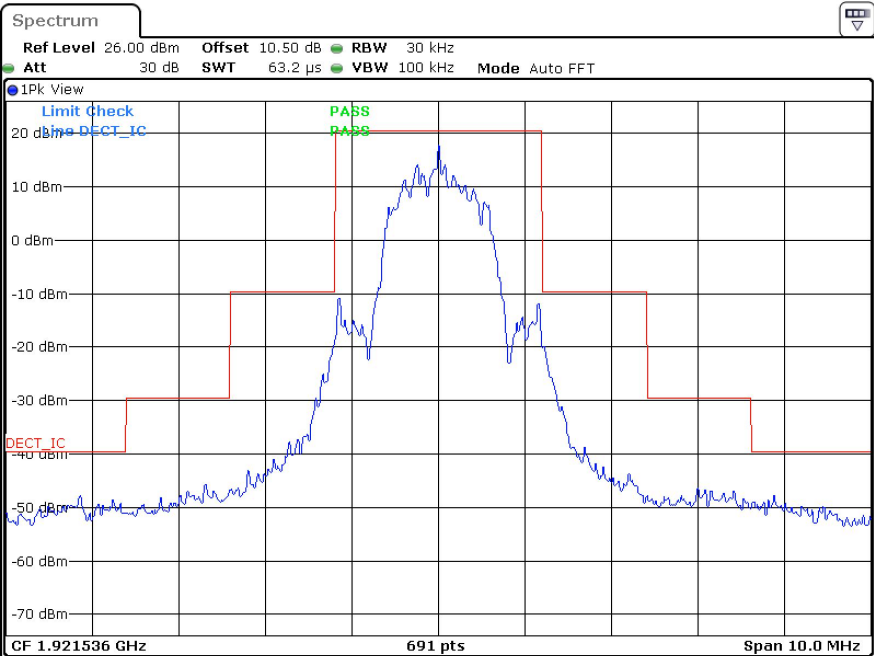
High Channel (Unwanted Emission inside the Sub-band)



ProjectNo.:2501R02198E-RF-FP Tester:Rainbow Zhu
Date: 25.MAR.2025 19:00:43

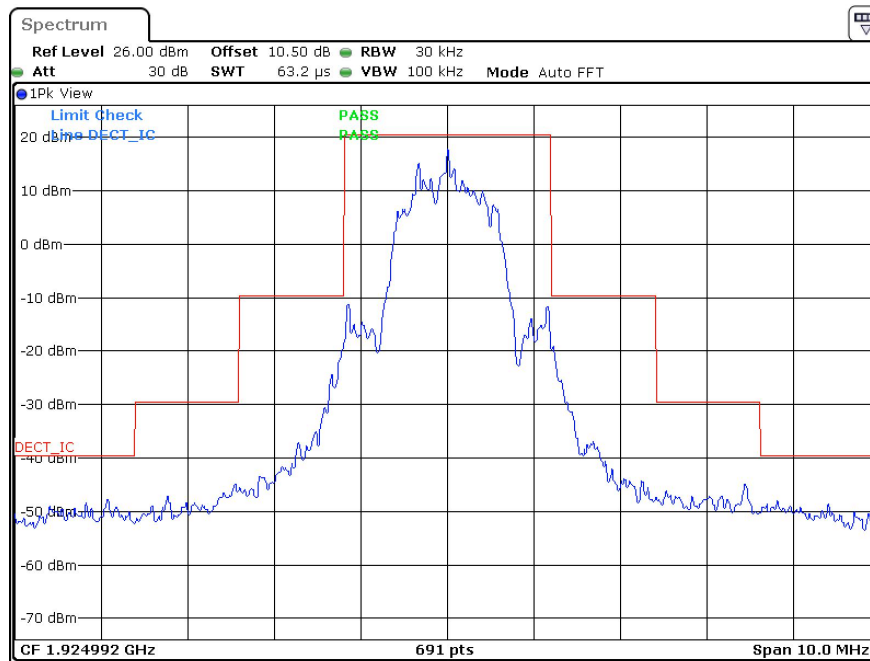
ISED:

Low Channel (Unwanted Emission inside the Sub-band)



ProjectNo.:2501R02198E-RF-FP Tester:Rainbow Zhu
Date: 25.MAR.2025 19:08:38

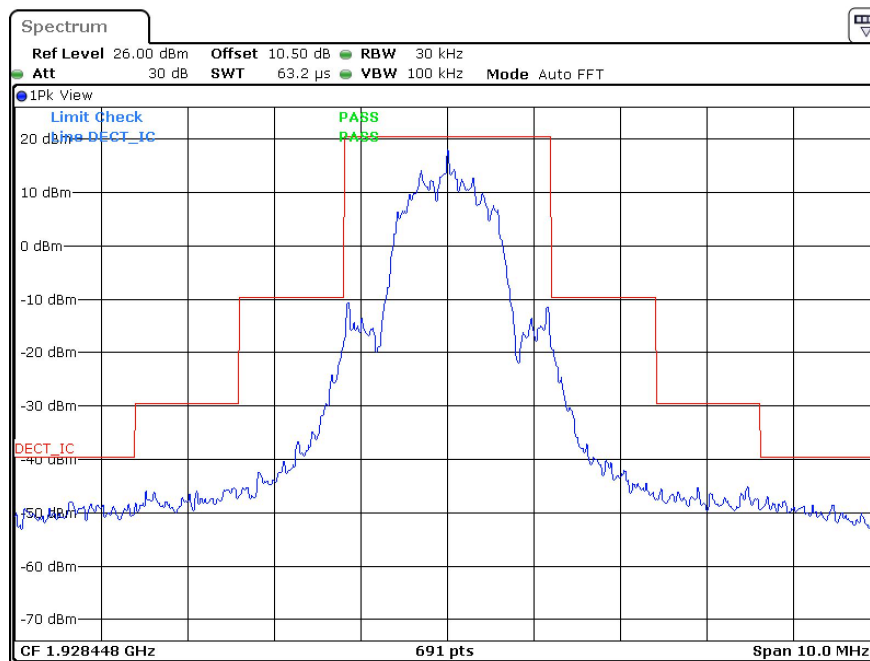
Middle Channel (Unwanted Emission inside the Sub-band)



ProjectNo.:2501R02198E-RF-FP Tester:Rainbow Zhu

Date: 25.MAR.2025 19:07:05

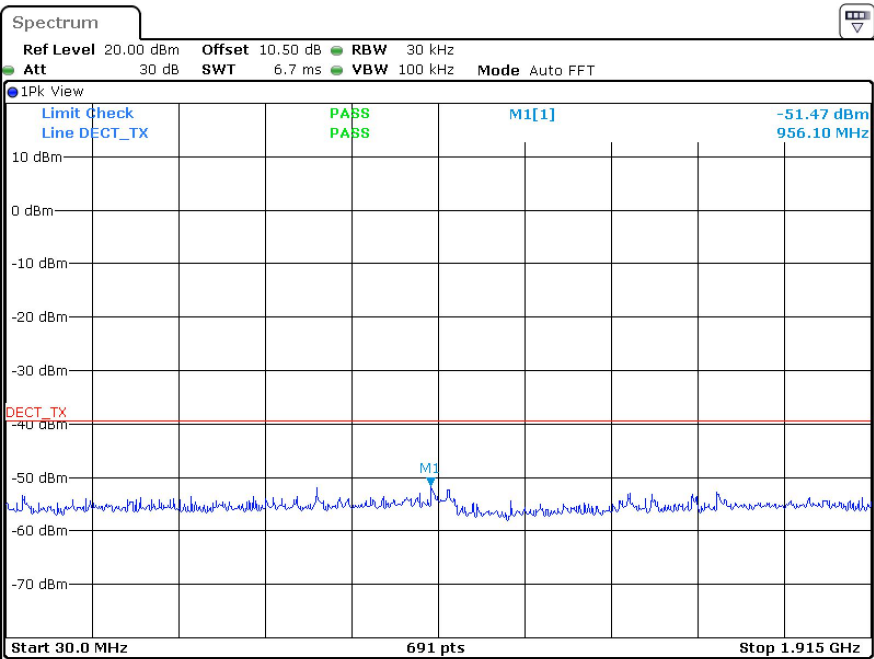
High Channel (Unwanted Emission inside the Sub-band)



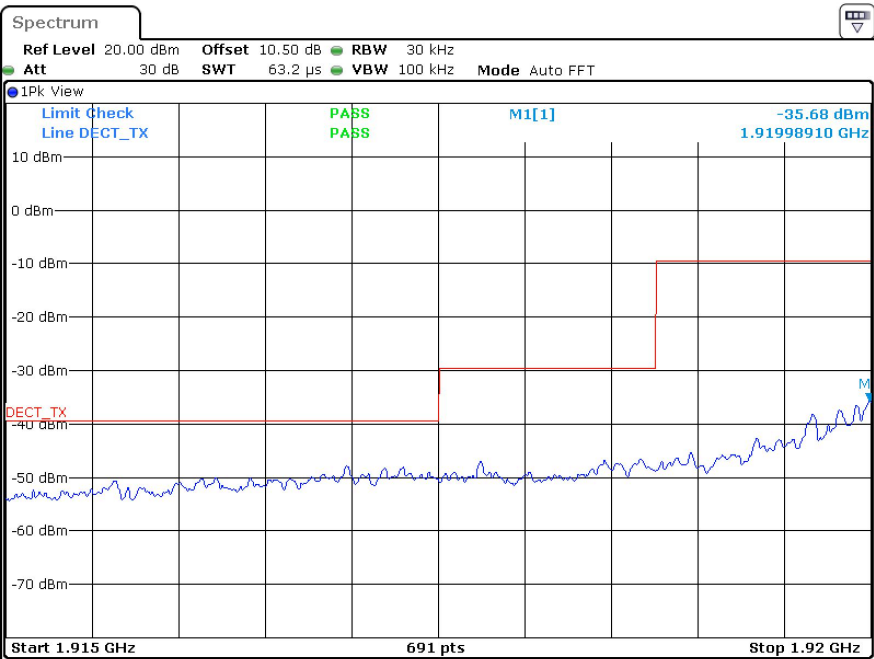
ProjectNo.:2501R02198E-RF-FP Tester:Rainbow Zhu

Date: 25.MAR.2025 19:05:34

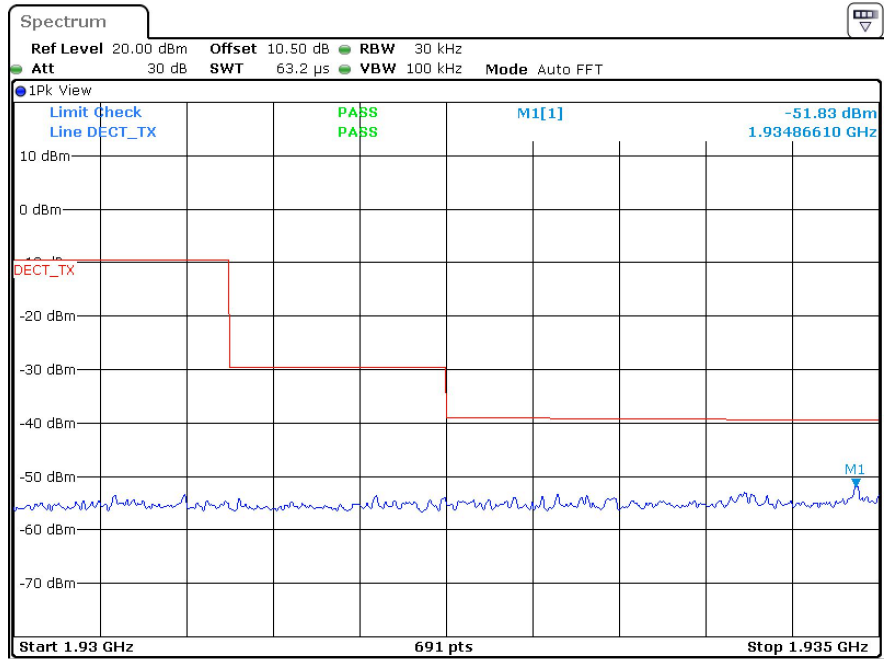
Low Channel (Unwanted Emission outside the Sub-band)



ProjectNo.:2501R02198E-RF-FP Tester:Rainbow Zhu
Date: 25.MAR.2025 18:42:31

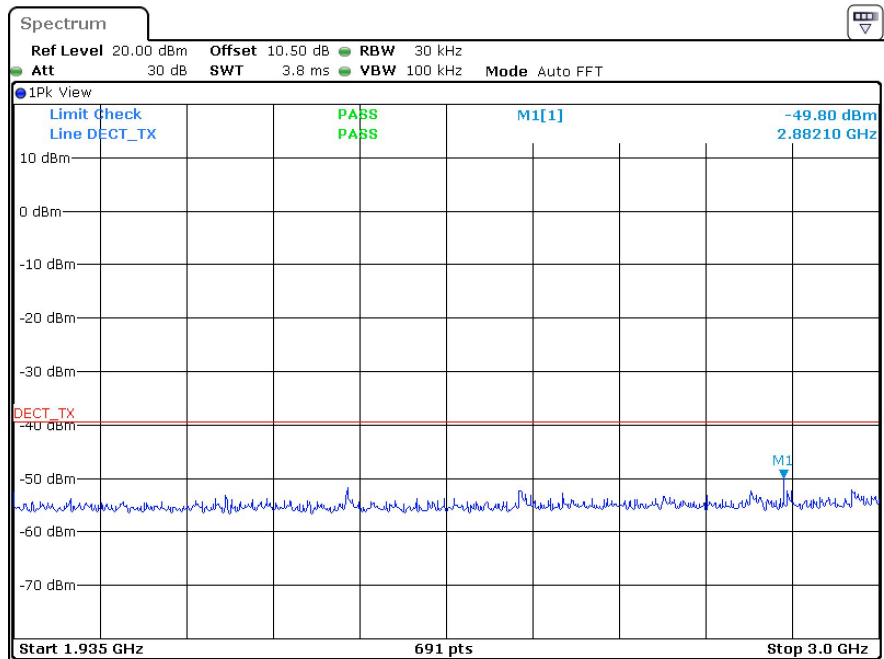


ProjectNo.:2501R02198E-RF-FP Tester:Rainbow Zhu
Date: 25.MAR.2025 18:44:36



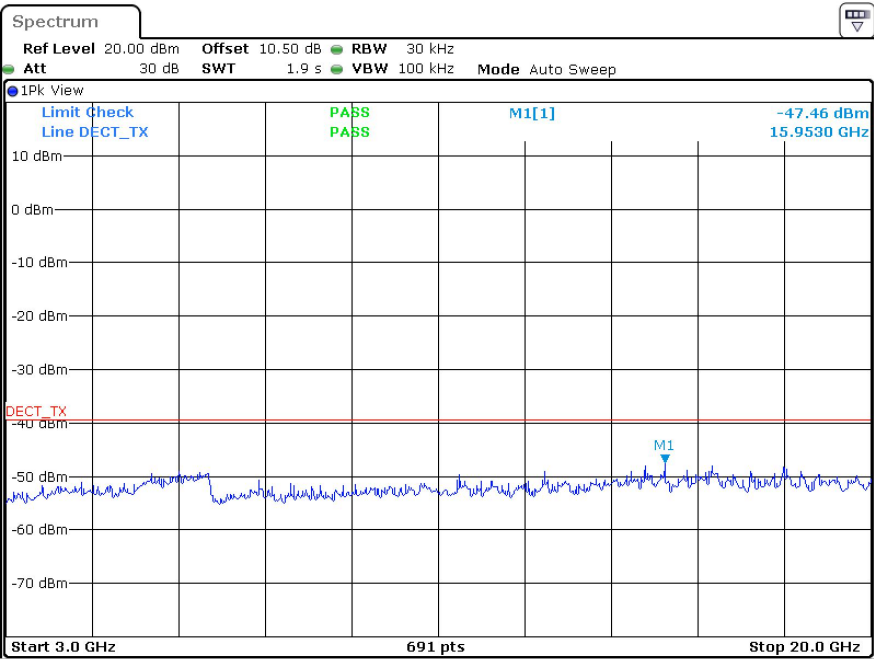
ProjectNo.:2501R02198E-RF-FP Tester:Rainbow Zhu

Date: 25.MAR.2025 18:46:33



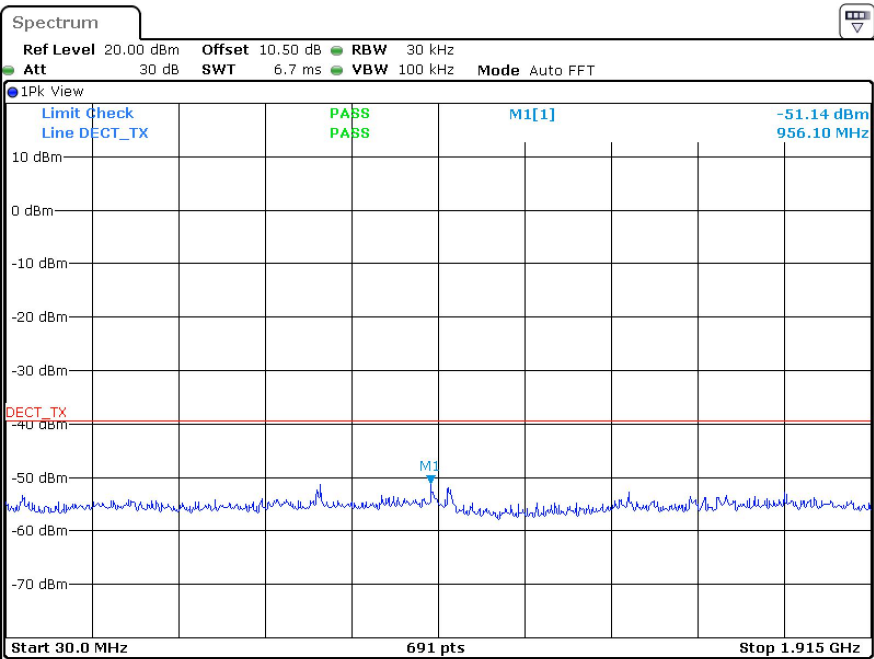
ProjectNo.:2501R02198E-RF-FP Tester:Rainbow Zhu

Date: 25.MAR.2025 18:48:47

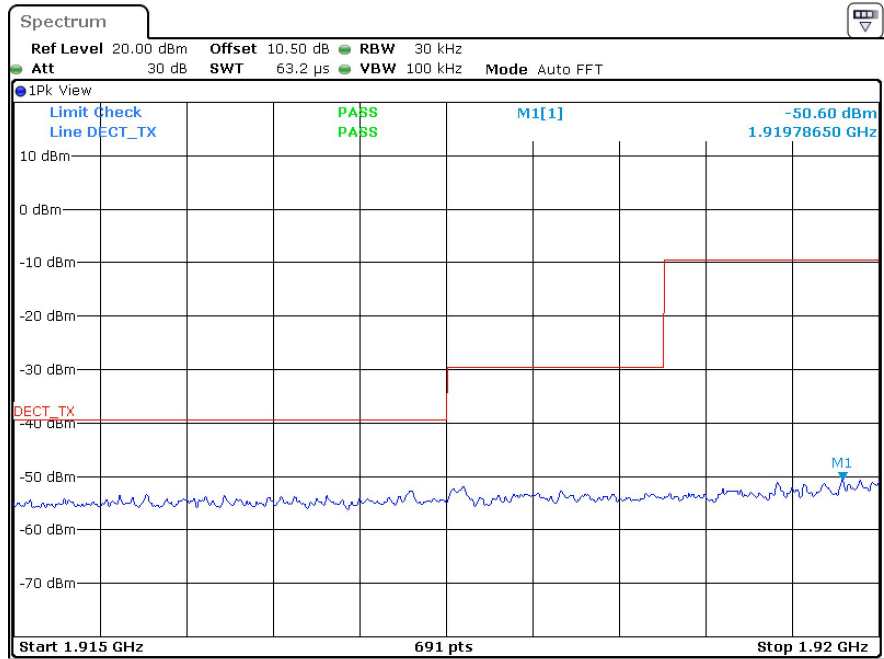


ProjectNo.:2501R02198E-RF-FP Tester:Rainbow Zhu
Date: 25.MAR.2025 18:50:28

Middle Channel (Unwanted Emission outside the Sub-band)

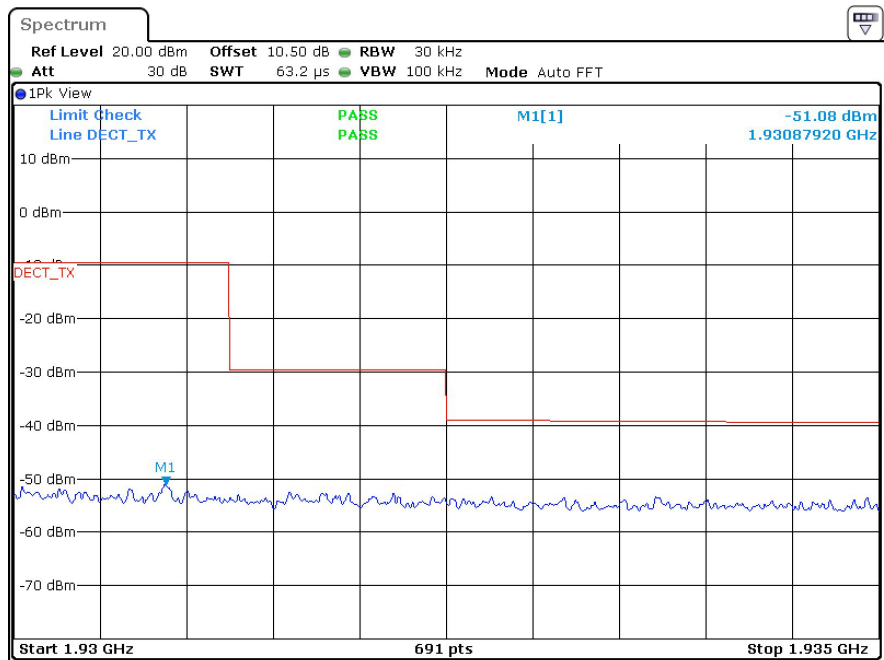


ProjectNo.:2501R02198E-RF-FP Tester:Rainbow Zhu
Date: 25.MAR.2025 18:33:11



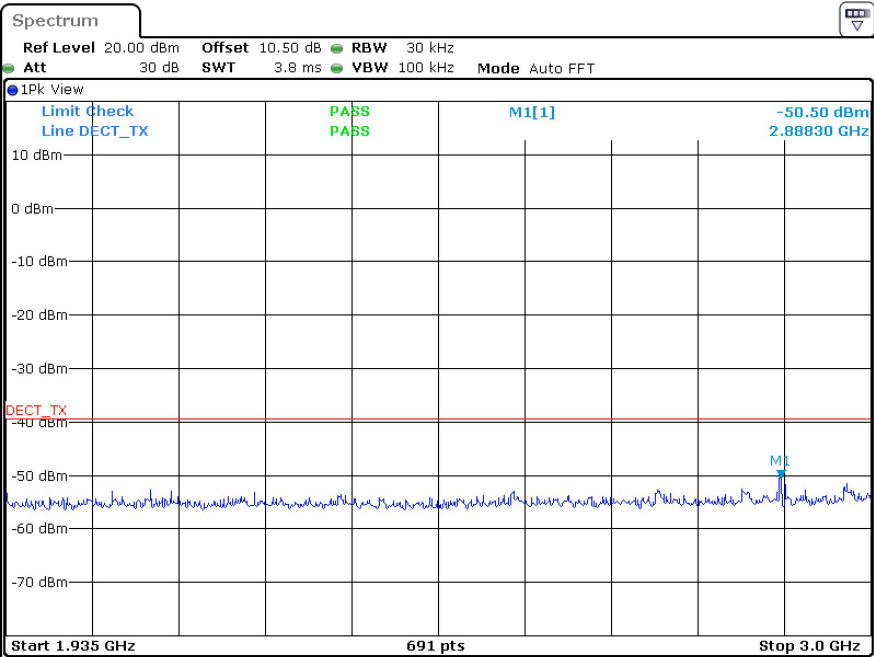
ProjectNo.:2501R02198E-RF-FP Tester:Rainbow Zhu

Date: 25.MAR.2025 18:34:53

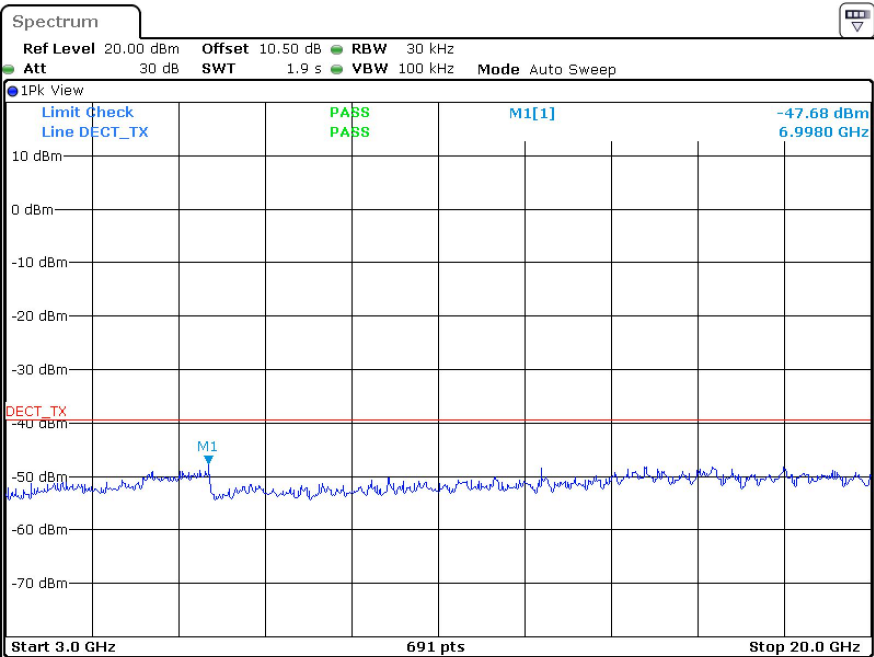


ProjectNo.:2501R02198E-RF-FP Tester:Rainbow Zhu

Date: 25.MAR.2025 18:37:00

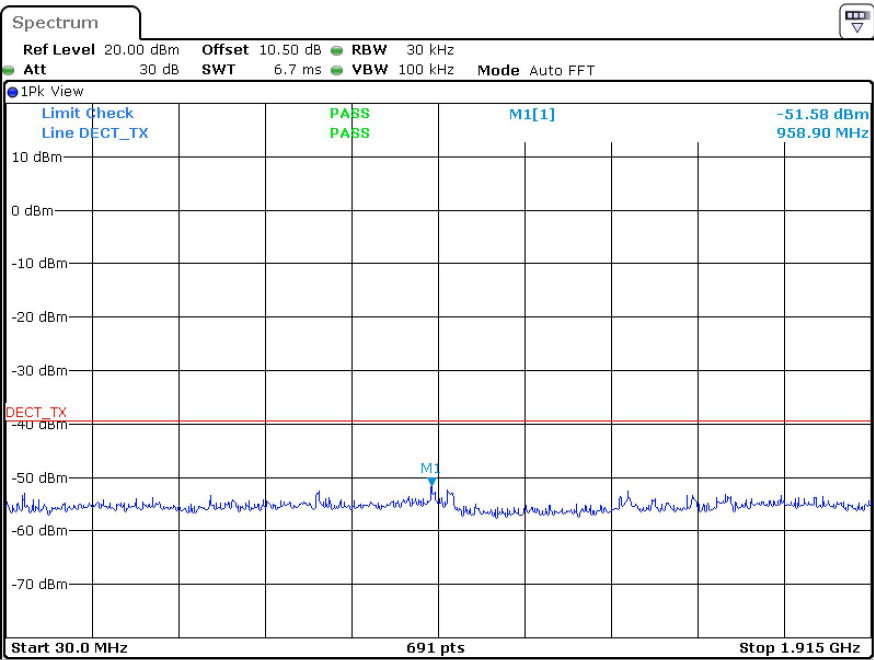


ProjectNo.:2501R02198E-RF-FP Tester:Rainbow Zhu
Date: 25.MAR.2025 18:39:02

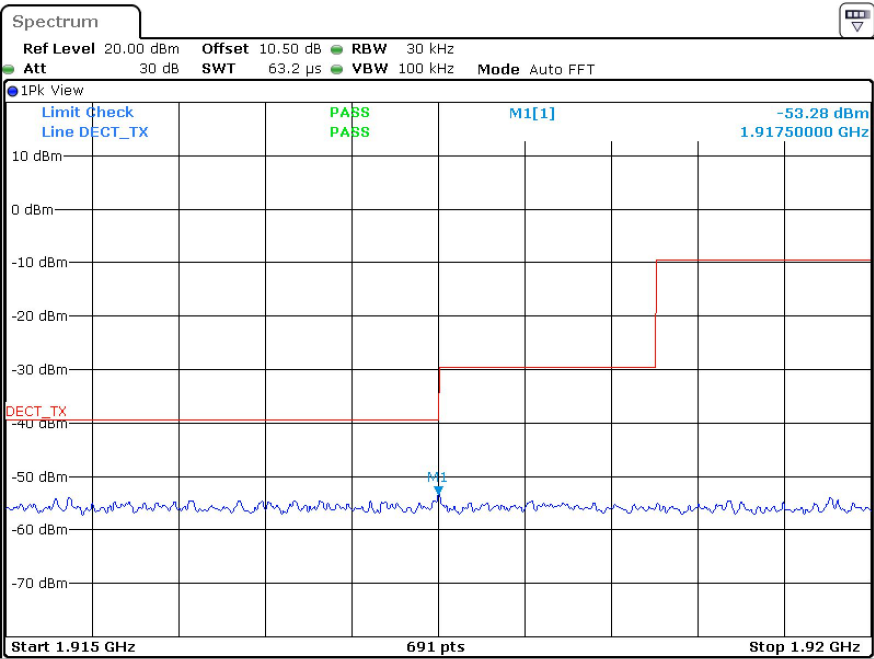


ProjectNo.:2501R02198E-RF-FP Tester:Rainbow Zhu
Date: 25.MAR.2025 18:40:14

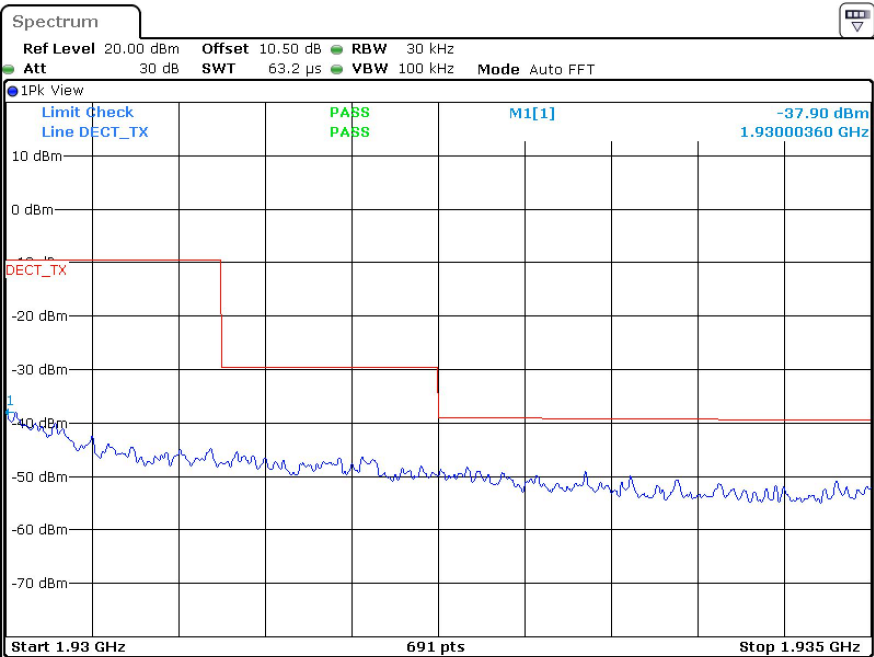
High Channel (Unwanted Emission outside the Sub-band)



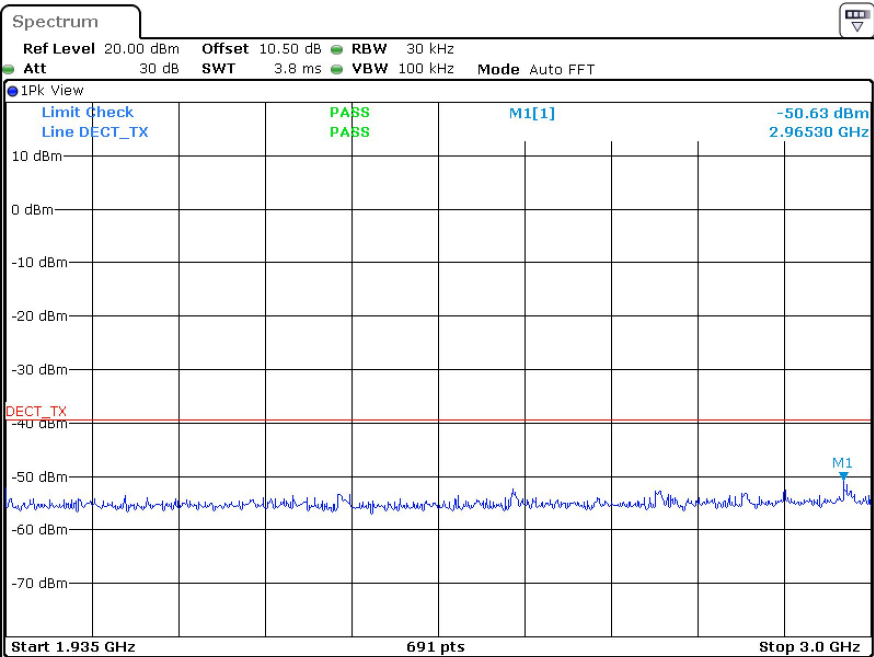
ProjectNo.:2501R02198E-RF-FP Tester:Rainbow Zhu
Date: 25.MAR.2025 18:26:11



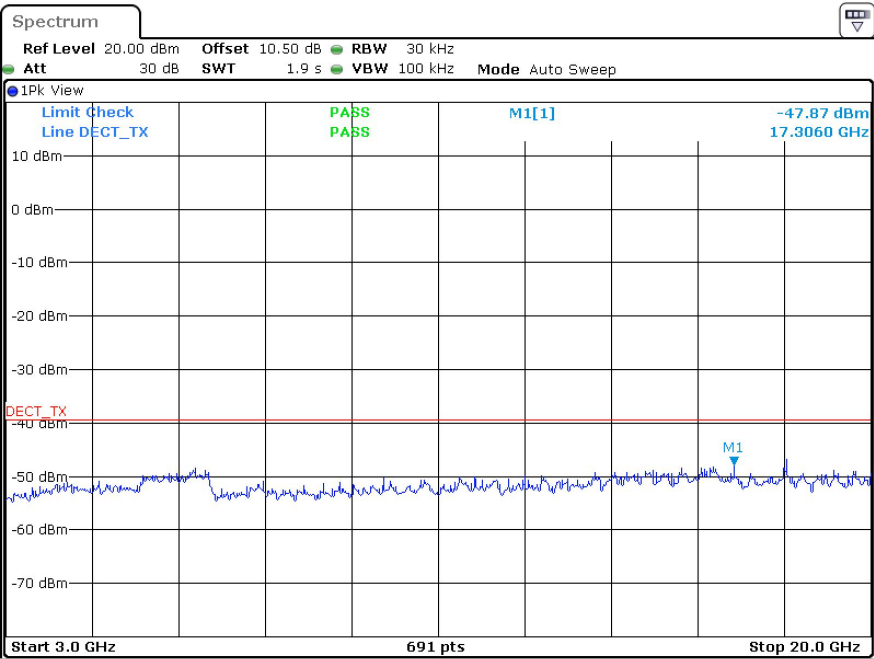
ProjectNo.:2501R02198E-RF-FP Tester:Rainbow Zhu
Date: 25.MAR.2025 18:27:15



ProjectNo.:2501R02198E-RF-FP Tester:Rainbow Zhu
Date: 25.MAR.2025 18:28:48



ProjectNo.:2501R02198E-RF-FP Tester:Rainbow Zhu
Date: 25.MAR.2025 18:30:07



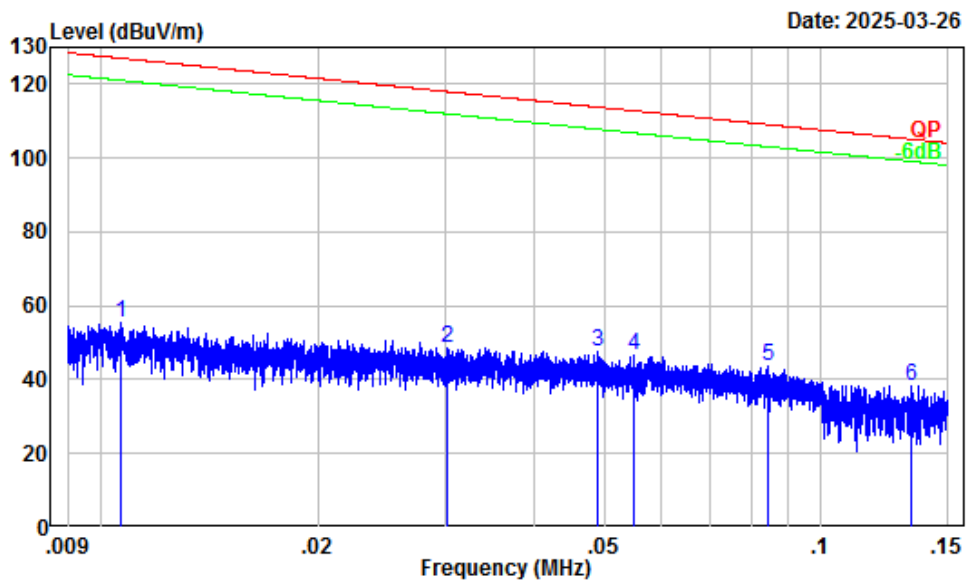
ProjectNo.:2501R02198E-RF-FF Tester:Rainbow Zhu
Date: 25.MAR.2025 18:31:09

ANT0

9 kHz-30MHz: (Maximum output power mode, High Channel; Worst case is parallel)

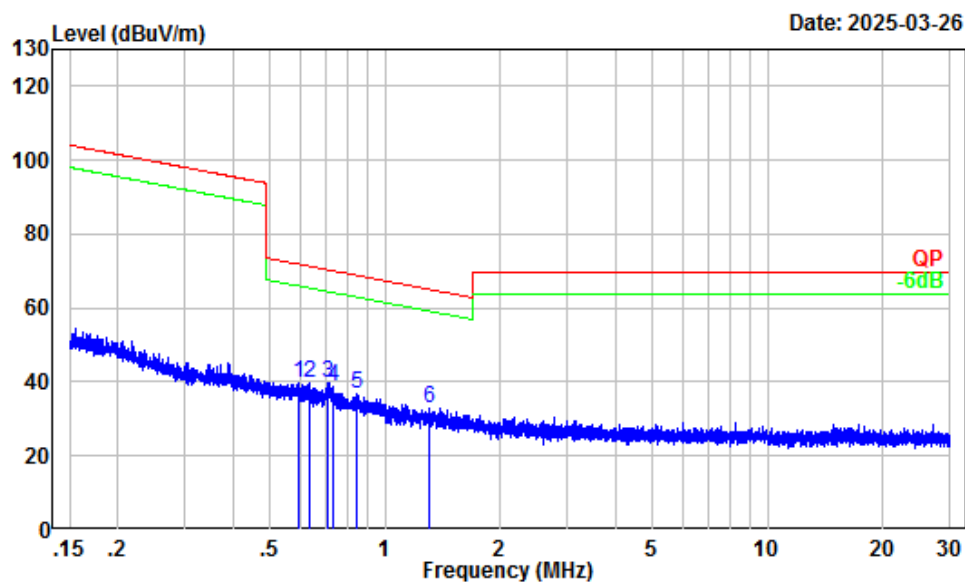
Note: The spurious emission from 9 kHz-30MHz of IC RSS-GEN standard, the unit of final result on the test plots are dB μ V/m, so the limit should be added by 51,5 dB from dB μ A/m to dB μ V/m.

When the test result of peak was less than the limit of QP more than 6dB, just peak value were recorded.



Site : Chamber A
Condition : 3m
Project Number : 2501R02198E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 100/300kHz
Tester : Alex Yan

	Freq	Factor	Read Level	Limit Level	Over Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.01	32.17	23.09	55.26	127.04	-71.78	Peak
2	0.03	28.47	19.88	48.35	117.99	-69.64	Peak
3	0.05	26.52	20.87	47.39	113.83	-66.44	Peak
4	0.06	25.89	20.93	46.82	112.79	-65.97	Peak
5	0.08	23.08	20.60	43.68	109.06	-65.38	Peak
6	0.13	20.03	18.43	38.46	105.11	-66.65	Peak

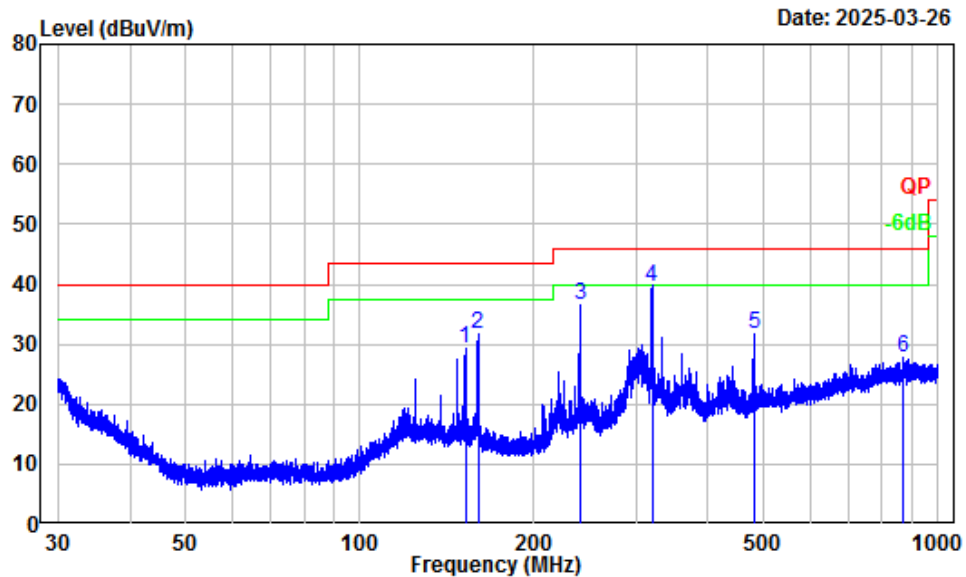


Site : Chamber A
 Condition : 3m
 Project Number : 2501R02198E-RF
 Test Mode : Transmitting
 Detector: Peak RBW/VBW: 100/300kHz
 Tester : Alex Yan

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.60	5.22	34.71	39.93	72.07	-32.14	Peak
2	0.64	4.69	35.04	39.73	71.45	-31.72	Peak
3	0.71	3.81	35.95	39.76	70.51	-30.75	Peak
4	0.73	3.56	35.41	38.97	70.26	-31.29	Peak
5	0.85	2.34	34.24	36.58	68.93	-32.35	Peak
6	1.31	0.33	32.65	32.98	65.08	-32.10	Peak

30MHz-1GHz: (Maximum output power mode, High Channel)

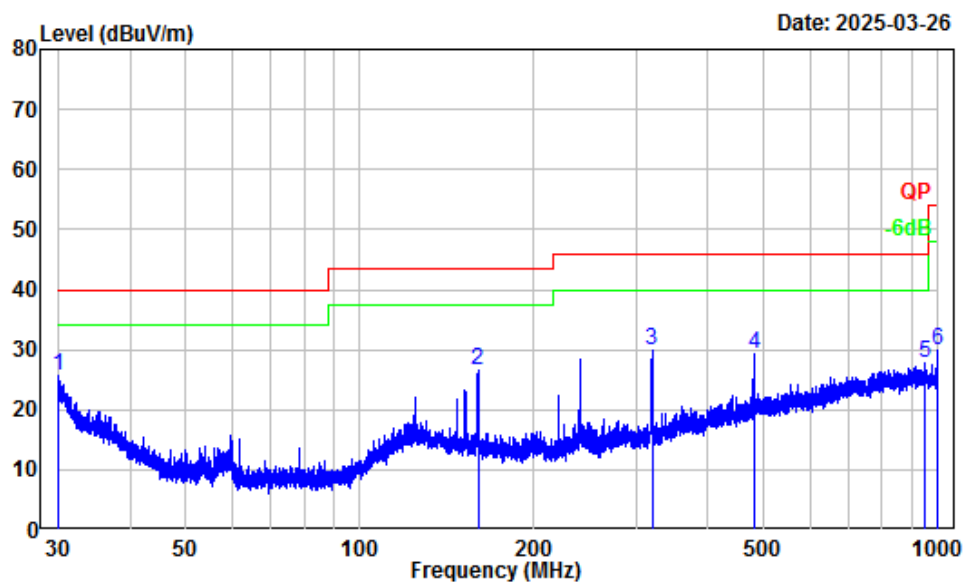
Note: When the test result of peak was less than the limit of QP more than 6dB, just peak value were recorded.

Horizontal

Site : Chamber A
Condition : 3m Horizontal
Project Number : 2501R02198E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 100/300kHz
Tester : Alex Yan

	Freq Factor		Read	Limit	Over	Remark
	MHz	dB/m	Level	Line	Limit	
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB
1	152.13	-12.55	41.89	29.34	43.50	-14.16 Peak
2	159.99	-12.72	44.44	31.72	43.50	-11.78 Peak
3	239.99	-13.32	49.73	36.41	46.00	-9.59 Peak
4	320.08	-10.81	50.25	39.44	46.00	-6.56 QP
5	480.11	-6.34	37.93	31.59	46.00	-14.41 Peak
6	868.37	-1.62	29.36	27.74	46.00	-18.26 Peak

Vertical



Site : Chamber A
Condition : 3m Vertical
Project Number : 2501R02198E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 100/300kHz
Tester : Alex Yan

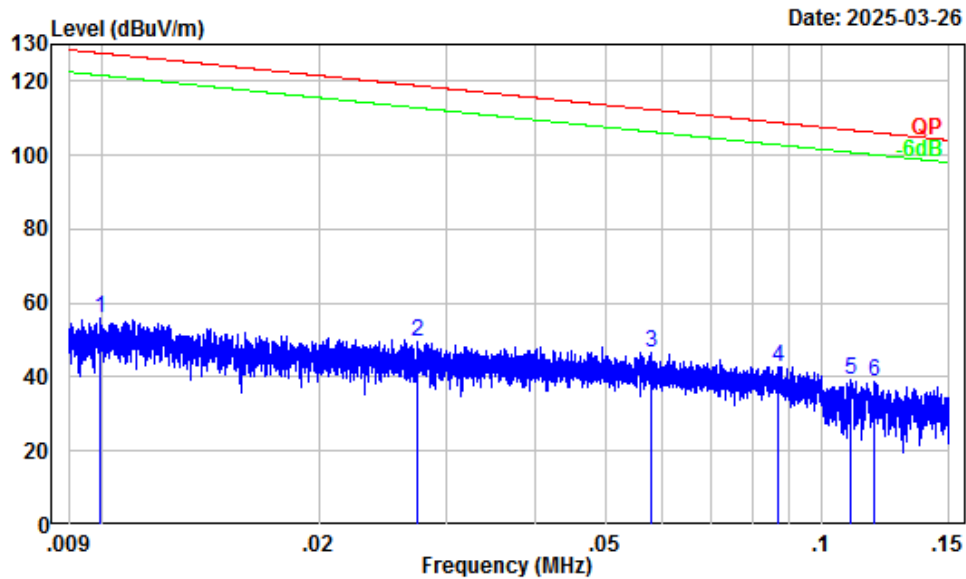
	Freq Factor		Read Level	Limit Level	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB
1	30.03	-5.97	31.70	25.73	40.00	-14.27 Peak
2	159.99	-12.72	39.42	26.70	43.50	-16.80 Peak
3	320.08	-10.81	40.60	29.79	46.00	-16.21 Peak
4	480.11	-6.34	35.65	29.31	46.00	-16.69 Peak
5	948.76	-0.98	28.66	27.68	46.00	-18.32 Peak
6	999.56	-0.41	30.29	29.88	54.00	-24.12 Peak

ANT1

9 kHz-30MHz: (Maximum output power mode, High Channel; Worst case is parallel)

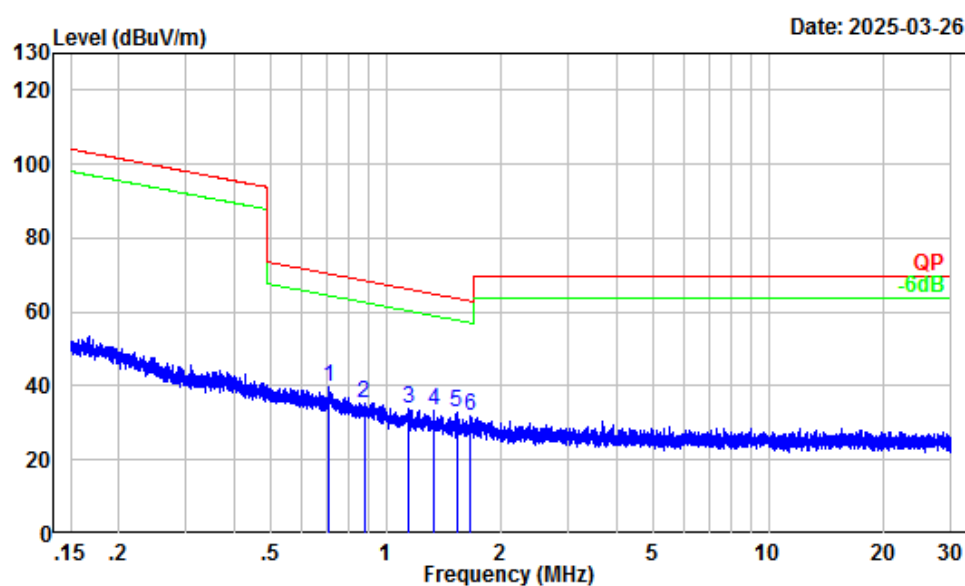
Note: The spurious emission from 9 kHz-30MHz of IC RSS-GEN standard, the unit of final result on the test plots are dB μ V/m, so the limit should be added by 51,5 dB from dB μ A/m to dB μ V/m.

When the test result of peak was less than the limit of QP more than 6dB, just peak value were recorded.



Site : Chamber A
Condition : 3m
Project Number : 2501R02198E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 0.3/1kHz
Tester : Alex Yan

	Freq	Factor	Read Level	Limit Level	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB
1	0.01	32.31	23.59	55.90	127.65	-71.75 Peak
2	0.03	28.98	20.69	49.67	118.83	-69.16 Peak
3	0.06	25.62	21.22	46.84	112.36	-65.52 Peak
4	0.09	22.92	19.82	42.74	108.83	-66.09 Peak
5	0.11	21.45	17.92	39.37	106.83	-67.46 Peak
6	0.12	20.94	18.00	38.94	106.17	-67.23 Peak

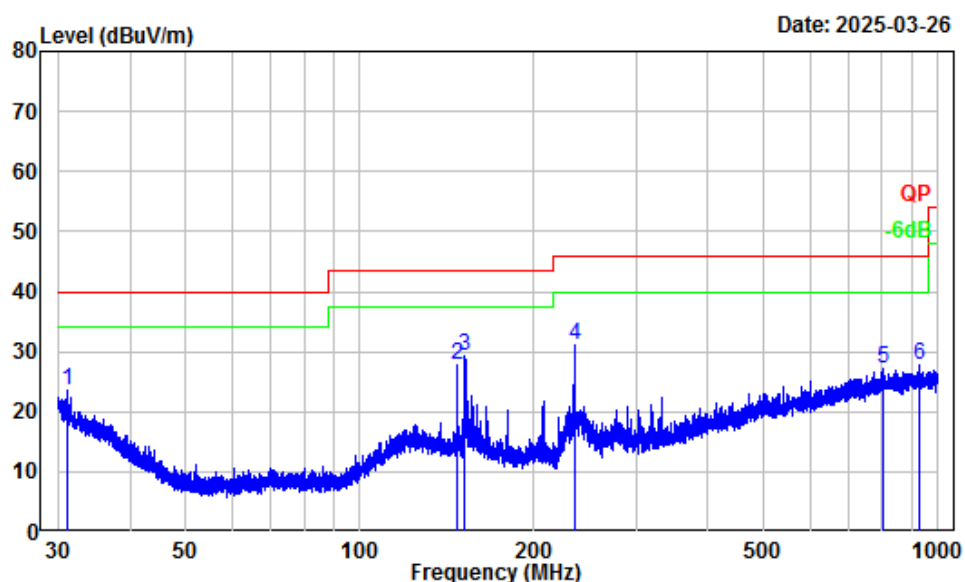


Site : Chamber A
 Condition : 3m
 Project Number : 2501R02198E-RF
 Test Mode : Transmitting
 Detector: Peak RBW/VBW: 10/30kHz
 Tester : Alex Yan

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	0.71	3.79	35.72	39.51	70.49	-30.98	Peak
2	0.88	2.12	33.44	35.56	68.64	-33.08	Peak
3	1.14	0.80	33.12	33.92	66.29	-32.37	Peak
4	1.33	0.27	33.04	33.31	64.93	-31.62	Peak
5	1.53	-0.28	33.25	32.97	63.70	-30.73	Peak
6	1.65	-0.63	32.51	31.88	63.01	-31.13	Peak

30MHz-1GHz: (Maximum output power mode, High Channel; Worst case is parallel)

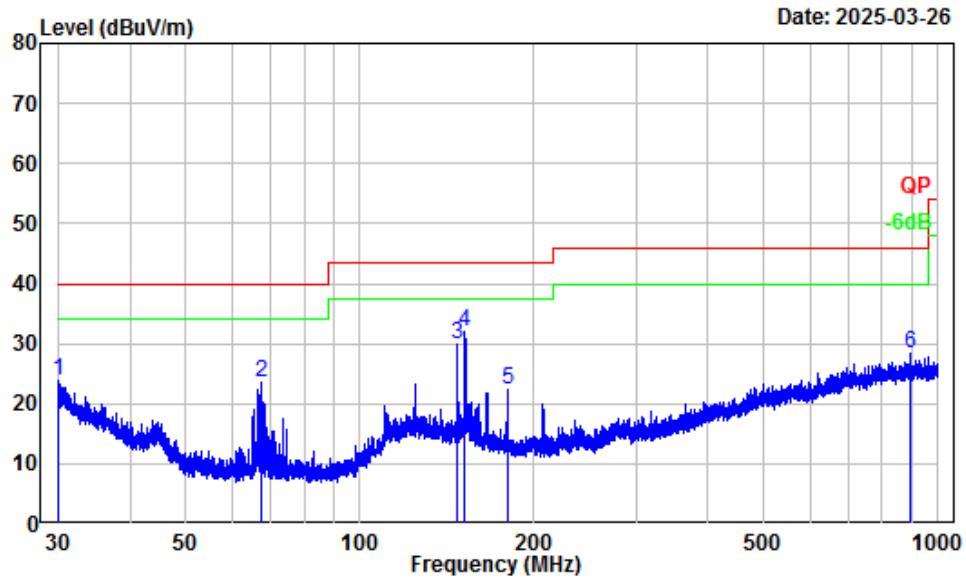
Note: When the test result of peak was less than the limit of QP more than 6dB, just peak value were recorded.

Horizontal

Site : Chamber A
Condition : 3m Horizontal
Project Number : 2501R02198E-RF
Test Mode : Transmitting
Detector: Peak RBW/VBW: 100/300kHz
Tester : Alex Yan

	Freq	Factor	Read Level	Limit Level	Over Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	31.07	-6.51	30.15	23.64	40.00	-16.36	Peak
2	147.47	-12.32	40.05	27.73	43.50	-15.77	Peak
3	152.06	-12.55	41.94	29.39	43.50	-14.11	Peak
4	234.99	-13.54	44.62	31.08	46.00	-14.92	Peak
5	802.49	-2.14	29.28	27.14	46.00	-18.86	Peak
6	925.35	-1.12	28.99	27.87	46.00	-18.13	Peak

Vertical



Site : Chamber A
 Condition : 3m Vertical
 Project Number : 2501R02198E-RF
 Test Mode : Transmitting
 Detector: Peak RBW/VBW: 100/300kHz
 Tester : Alex Yan

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	30.07	-5.99	29.84	23.85	40.00	-16.15	Peak
2	67.73	-17.88	41.30	23.42	40.00	-16.58	Peak
3	147.47	-12.32	42.09	29.77	43.50	-13.73	Peak
4	152.06	-12.55	44.69	32.14	43.50	-11.36	Peak
5	179.70	-13.65	36.07	22.42	43.50	-21.08	Peak
6	896.60	-1.31	29.74	28.43	46.00	-17.57	Peak

Above 1GHz:

Frequency (MHz)	Receiver		Polar (H/V)	Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/AV					
ANT0							
Low Channel							
1921.54	122.51	PK	H	-13.26	109.25	/	/
1921.54	125.69	PK	V	-13.26	112.43	/	/
3843.07	69.13	PK	H	-9.96	59.17	74	-14.83
3843.07	66.45	PK	V	-9.96	56.49	74	-17.51
Middle Channel							
1924.99	122.48	PK	H	-13.24	109.24	/	/
1924.99	126.35	PK	V	-13.24	113.11	/	/
3849.98	68.29	PK	H	-9.97	58.32	74	-15.68
3849.98	66.49	PK	V	-9.97	56.52	74	-17.48
High Channel							
1928.45	122.41	PK	H	-13.21	109.20	/	/
1928.45	125.90	PK	V	-13.21	112.69	/	/
3856.90	67.90	PK	H	-9.95	57.95	74	-16.05
3856.90	67.14	PK	V	-9.95	57.19	74	-16.81
ANT1							
Low Channel							
1921.54	123.80	PK	H	-13.26	110.54	/	/
1921.54	122.45	PK	V	-13.26	109.19	/	/
3843.07	66.57	PK	H	-9.96	56.61	74	-17.39
3843.07	65.97	PK	V	-9.96	56.01	74	-17.99
Middle Channel							
1924.99	123.93	PK	H	-13.24	110.69	/	/
1924.99	123.03	PK	V	-13.24	109.79	/	/
3849.98	66.82	PK	H	-9.97	56.85	74	-17.15
3849.98	66.76	PK	V	-9.97	56.79	74	-17.21
High Channel							
1928.45	123.46	PK	H	-13.21	110.25	/	/
1928.45	122.51	PK	V	-13.21	109.30	/	/
3856.90	67.35	PK	H	-9.95	57.40	74	-16.60
3856.90	67.02	PK	V	-9.95	57.07	74	-16.93

Note:

Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor

Corrected Amplitude = Factor + Reading

Margin = Corrected. Amplitude - Limit

ANT0

Field Strength of Average							
Frequency (MHz)	Peak Measurement @3m (dB μ V/m)	Polar (H/V)	Duty Cycle Correction Factor (dB)	Corrected Amplitude (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Comment
1921.536MHz							
1921.54	109.25	H	-27.83	81.42	/	/	Fundamental
1921.54	112.43	V	-27.83	84.60	/	/	Fundamental
3843.07	59.17	H	-27.83	31.34	54	-22.66	Harmonic
3843.07	56.49	V	-27.83	28.66	54	-25.34	Harmonic
1924.992MHz							
1924.99	109.24	H	-27.83	81.41	/	/	Fundamental
1924.99	113.11	V	-27.83	85.28	/	/	Fundamental
3849.98	58.32	H	-27.83	30.49	54	-23.51	Harmonic
3849.98	56.52	V	-27.83	28.69	54	-25.31	Harmonic
1928.448MHz							
1928.45	109.20	H	-27.83	81.37	/	/	Fundamental
1928.45	112.69	V	-27.83	84.86	/	/	Fundamental
3856.90	57.95	H	-27.83	30.12	54	-23.88	Harmonic
3856.90	57.19	V	-27.83	29.36	54	-24.64	Harmonic

ANT1

Field Strength of Average							
Frequency (MHz)	Peak Measurement @3m (dBμV/m)	Polar (H/V)	Duty Cycle Correction Factor (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Comment
1921.536MHz							
1921.54	110.54	H	-27.83	82.71	/	/	Fundamental
1921.54	109.19	V	-27.83	81.36	/	/	Fundamental
3843.07	56.61	H	-27.83	28.78	54	-25.22	Harmonic
3843.07	56.01	V	-27.83	28.18	54	-25.82	Harmonic
1924.992MHz							
1924.99	110.69	H	-27.83	82.86	/	/	Fundamental
1924.99	109.79	V	-27.83	81.96	/	/	Fundamental
3849.98	56.85	H	-27.83	29.02	54	-24.98	Harmonic
3849.98	56.79	V	-27.83	28.96	54	-25.04	Harmonic
1928.448MHz							
1928.45	110.25	H	-27.83	82.42	/	/	Fundamental
1928.45	109.30	V	-27.83	81.47	/	/	Fundamental
3856.90	57.40	H	-27.83	29.57	54	-24.43	Harmonic
3856.90	57.07	V	-27.83	29.24	54	-24.76	Harmonic

Duty cycle:

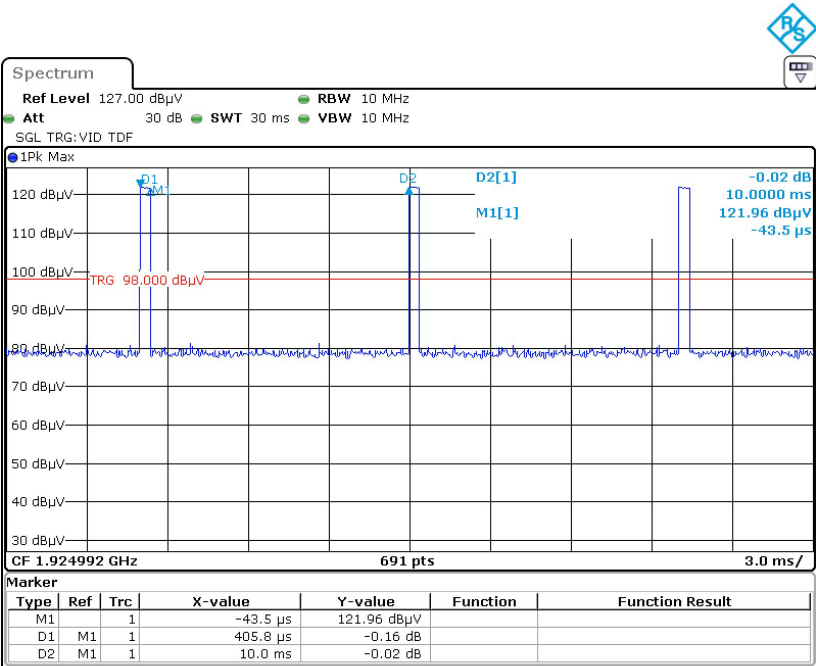
Ton =0.4058ms

Tp = 10ms

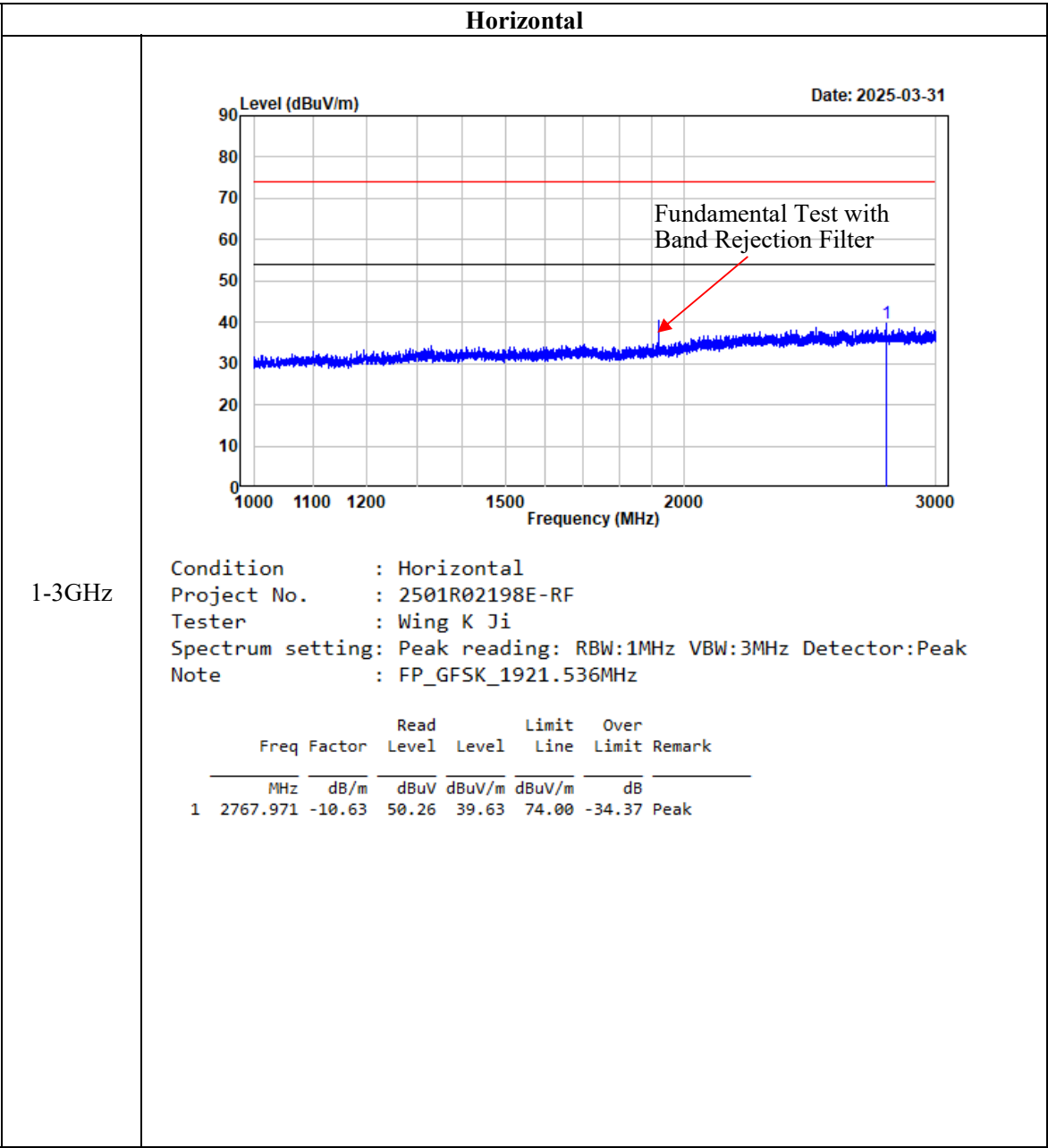
Duty cycle = Ton/Tp = 0.4058/10=0.04058

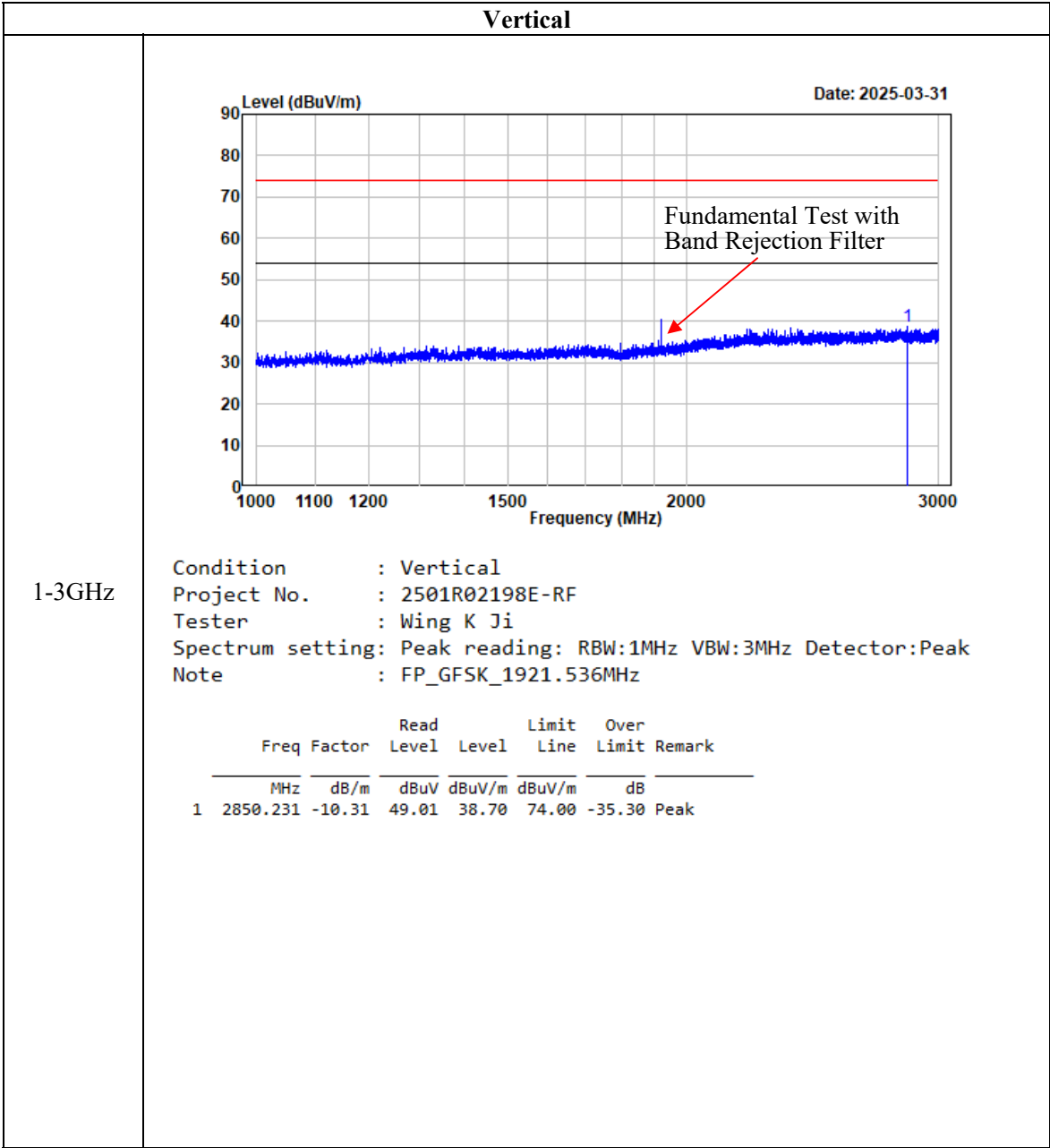
Duty Cycle Corrected Factor = 20lg (Duty cycle) = 20lg0.04058= -27.83

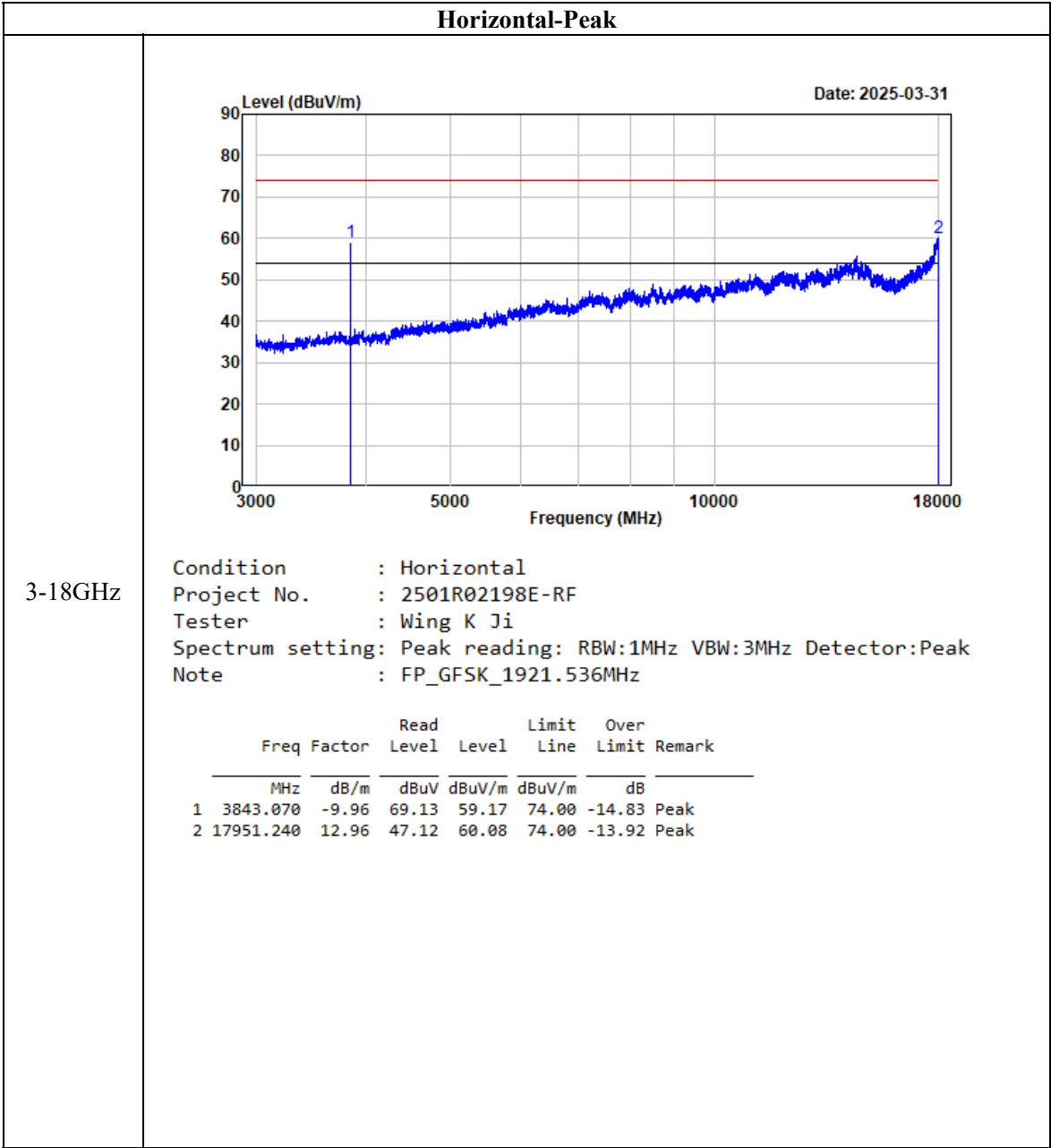
Duty cycle

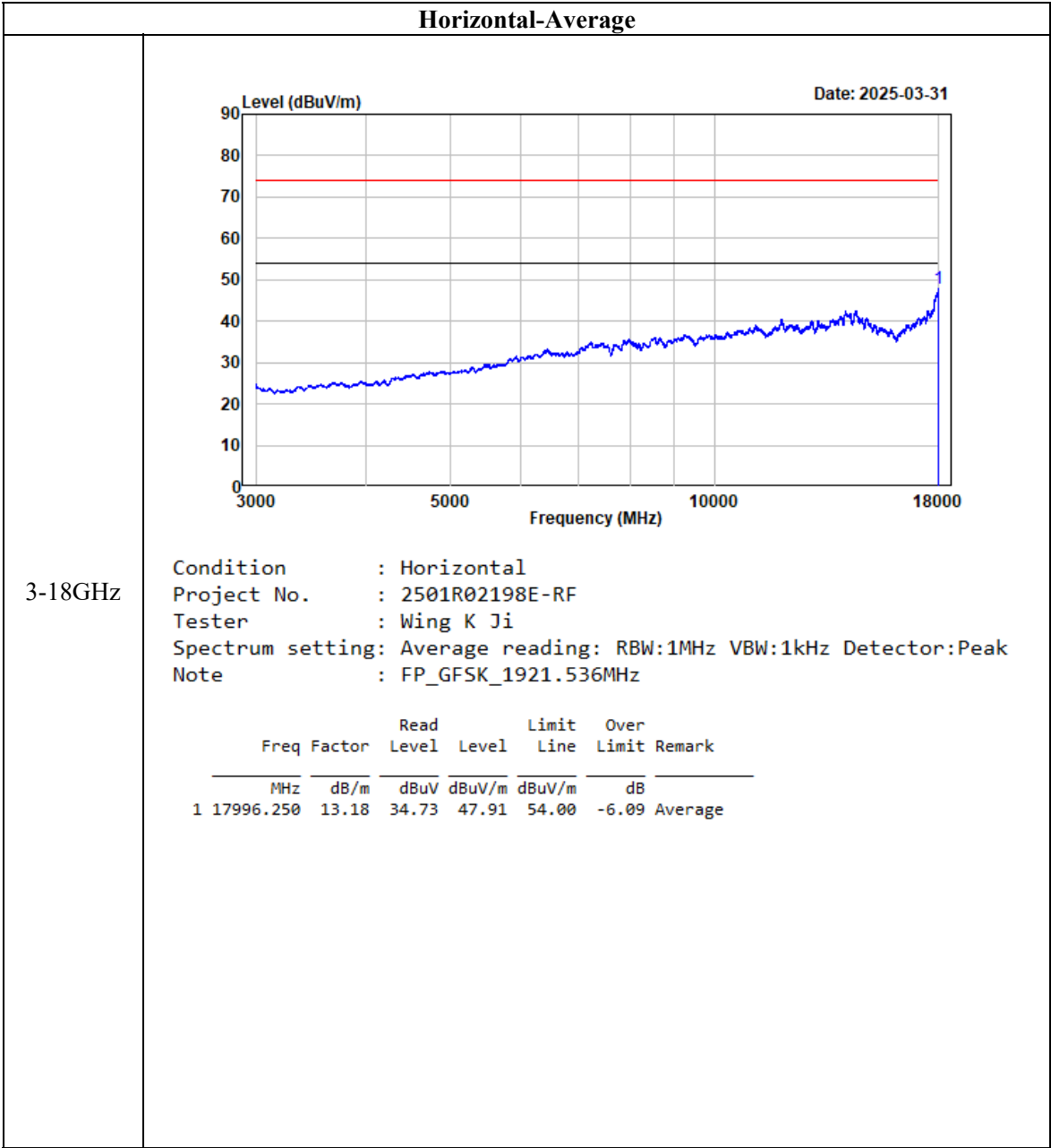


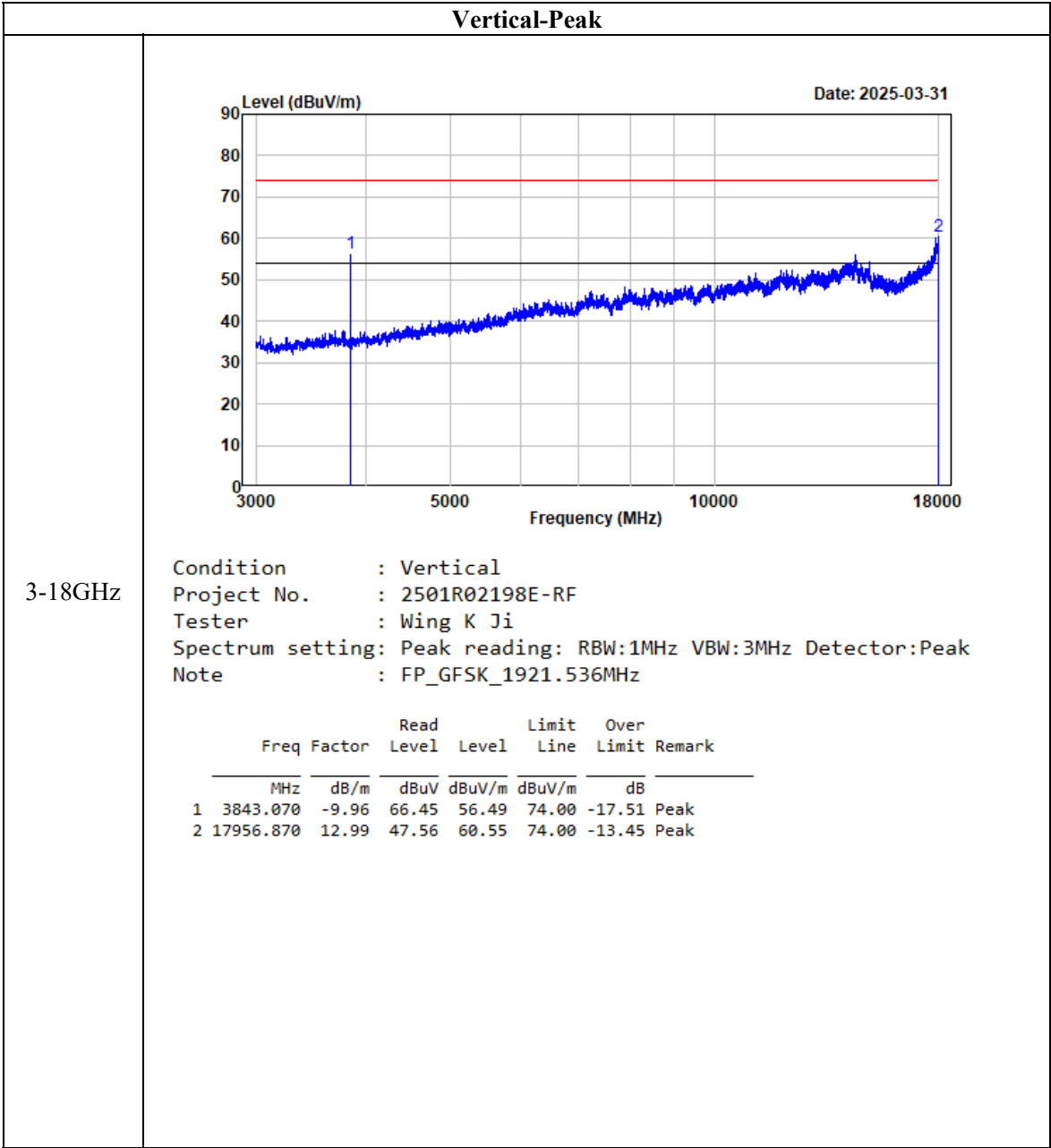
Listed with the worst harmonic margin test plot: ANT0 Low Channel

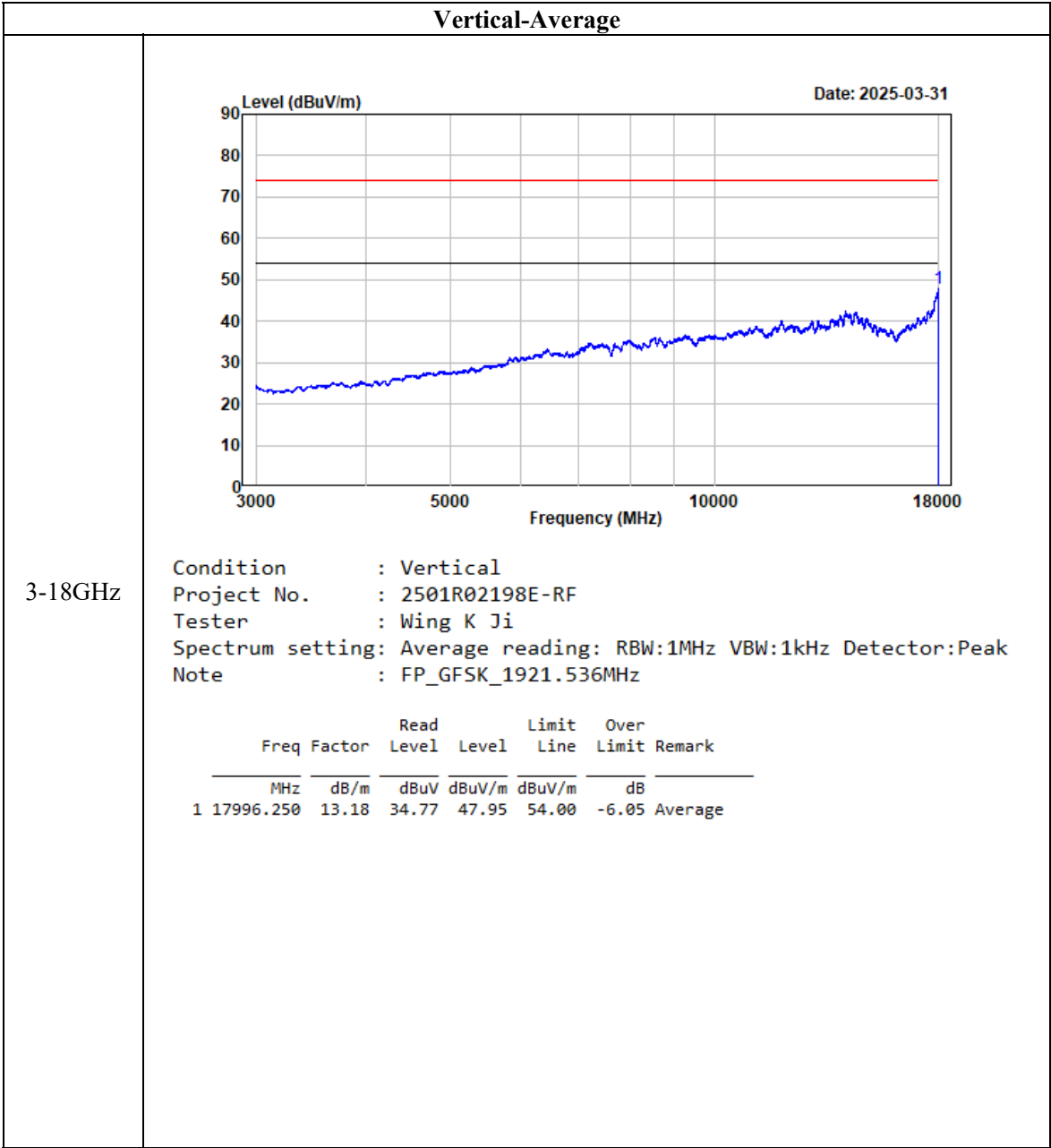


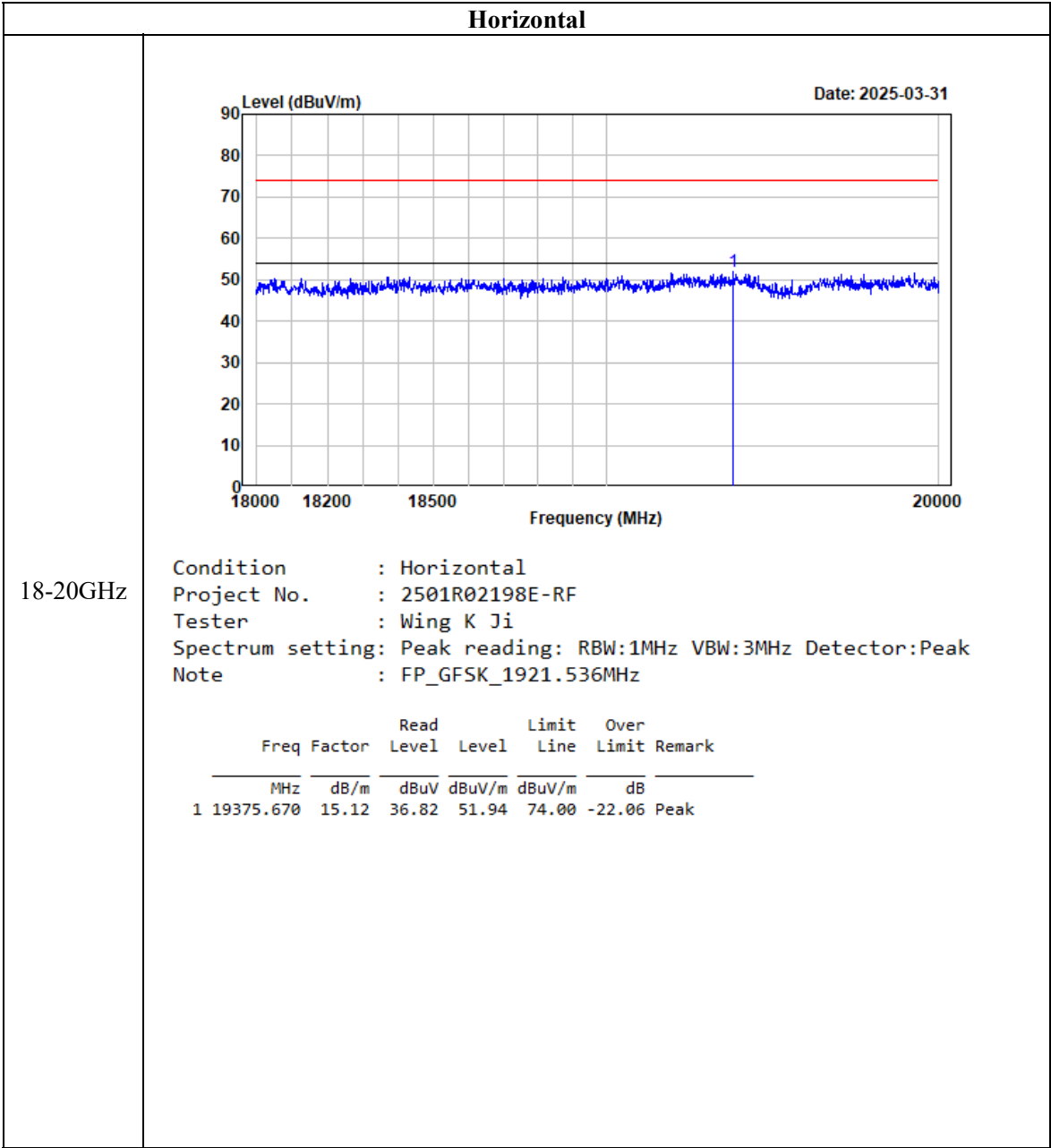


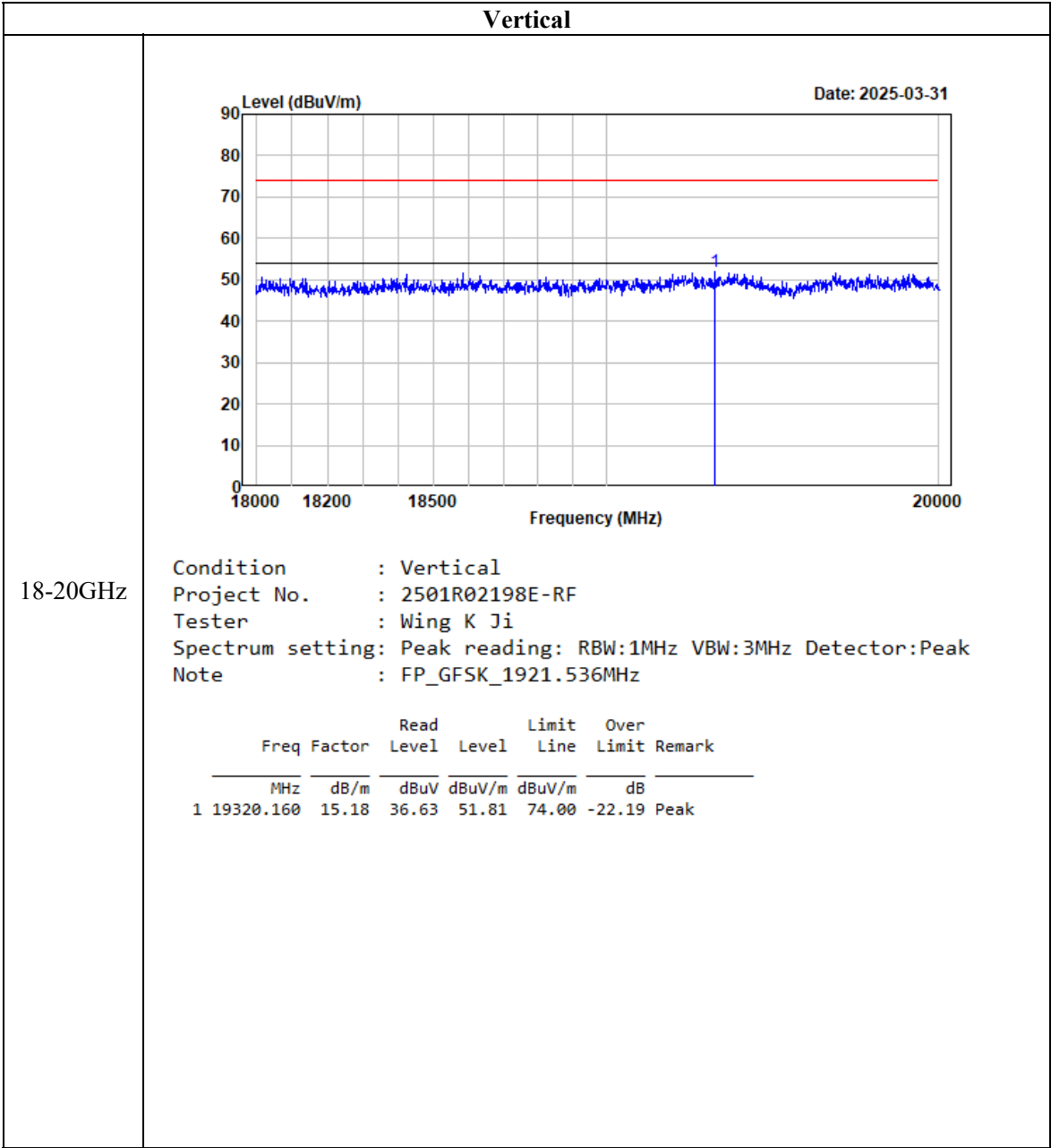












FCC § 15.323 (f) & RSS-213 §5.3 FREQUENCY STABILITY**Applicable Standard**

Per §15.323(f) & ANSI C63.17-2013 Clause 6.2.1, the frequency stability of the carrier frequency of the intentional radiator shall be maintained within ± 10 ppm over 1 hour or the interval between channel access monitoring, whichever is shorter. The frequency stability shall be maintained over a temperature variation of -20°C to $+50^{\circ}\text{C}$ or as declared by the manufacturer at normal supply voltage, and over a variation in the primary supply voltage of 85 percent to 115 percent of the rated supply voltage at a temperature of 20°C . For equipment that is capable only of operating from a battery, the frequency stability tests shall be performed using a new battery without any further requirement to vary supply voltage.

According to RSS-213 Issue 3 (2015-03) § (5.3):

The carrier frequency stability shall be maintained within ± 10 ppm ($\pm 0.001\%$).

According to RSS-Gen Issue 5 (2021-02) § (8.11):

Transmitter frequency stability for licence-exempt radio apparatus shall be measured in accordance with Section 6.11. For licence-exempt radio apparatus, the frequency stability shall be measured at temperatures of -20°C (-4°F), $+20^{\circ}\text{C}$ ($+68^{\circ}\text{F}$) and $+50^{\circ}\text{C}$ ($+122^{\circ}\text{F}$) instead of at the temperatures specified in Section 6.11.

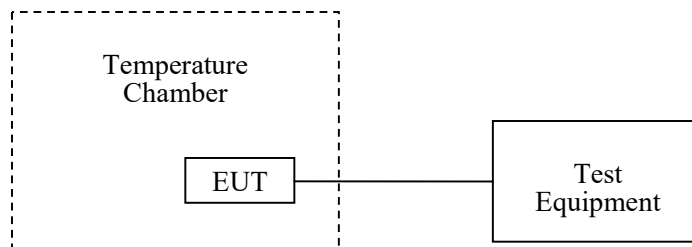
Test Procedure

This procedure should be carried out for each of the following test cases:

Temperature	Supply Voltage
20°C	85-115% or new batteries
-20°C	Normal
$+50^{\circ}\text{C}$	Normal

During test, the equipment shall be placed in the boxes and set the temperature to the specified requirement until the thermal balance has been reached.

Using the mean carrier frequency at 20°C and at nominal supply voltage as the reference, the mean carrier frequency shall be maintained within ± 10 ppm at the two extreme temperatures (or as declared by the manufacturer) and at normal temperature (typically 20°C) at the two extreme supply voltages. This test does not apply to a EUT that is capable only of operating from a battery.



Test Data**Environmental Conditions**

Temperature:	25.2 °C
Relative Humidity:	46 %
ATM Pressure:	101.6 kPa

The testing was performed by Rainbow Zhu on 2025-03-25.

Test Result: Compliant

Test mode: Transmitting

Temperature (°C)	Voltage (V_{AC} ☒, V_{DC} ☐)	Channel Frequency (MHz)	Measured Frequency Offset (kHz)	Measured Frequency Offset (ppm)	Limit (ppm)
-20	120	1924.992	4	2.08	±10
20	102	1924.992	6	3.12	±10
	138	1924.992	8	4.16	±10
50	120	1924.992	10	5.19	±10

Note: the extreme test condition was declared by applicant.

FCC § 15.323 (c)(e) & § 15.319 (f) & RSS-213 §5.1&§5.2 SPECIFIC REQUIREMENTS FOR UPCS DEVICE

Applicable Standard

FCC§15.323(c)(e) & §15.319(f) Specific Requirements for UPCS device.

ANSI C63.17 2013 §6.2 Frequency and time stability and §7.Monitoring tests and §8.Time and spectrum window access procedure.

According to RSS-213 §5.1&§5.2 type of modulation and access protocol

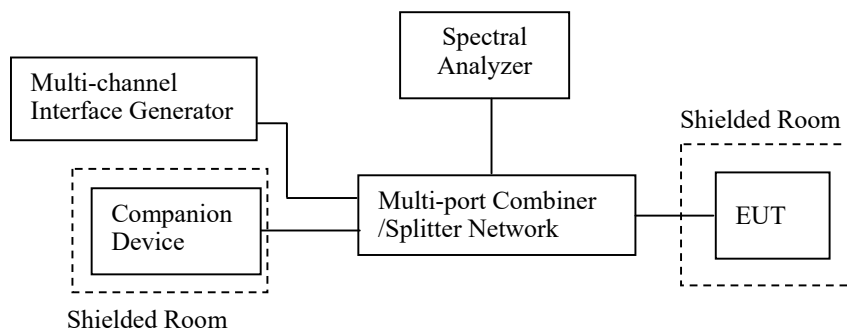
Equipment certified under this standard shall use digital modulation.

In order to provide equitable access to the radio frequency spectrum, the licence-exempt PCS device must possess an access protocol.

Test Procedure

Measurement method according to ANSI C63.17- 2013

Test configuration as below



Test Data

Environmental Conditions

Temperature:	25.2 °C
Relative Humidity:	46 %
ATM Pressure:	101.6 kPa

The testing was performed by Rainbow Zhu on 2025-03-25.

Test Result: Compliant

Please see the below data

1) Automatic Discontinuation of Transmission

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. The provisions in this section are not intended to preclude transmission of control and signaling information or use of repetitive codes used by certain digital technologies to complete frame or burst intervals.

Test result:

The following tests were performed after a connection had been established with Handset.

Test condition	Reaction of EUT	Pass/Fail
Adapter removed from EUT	Connection break down	Pass
Battery remove from Handset	Connection break down	Pass

2) Monitoring Time

Immediately prior to initiating transmission, devices must monitor the combined time and spectrum window in which they intend to transmit. For a period of at least 10 milliseconds for systems designed to use a 10 milliseconds or shorter frame period or at least 20 milliseconds for systems designed to use a 20 milliseconds frame period

Test procedure:

Measurement method is in according to ANSI C63.17 -2013 clause 7.3.3.

RF signal generators apply uniform CW interference on all system carriers except two carriers (designated f_1 and f_2), each at level $T_L + U_M$. EUT can only transmit on these two carriers.

Test result:

This requirement is covered by the results of Least Interfered Channel (LIC).

Interference (Refer to ANSI C63.17 clause 7.3.3)	Reaction of EUT	Results
a) Apply the interference on f_1 at level $T_L + U_M + 20\text{dB}$ and no interference on f_2 . Initiate transmission and verify the transmission only on f_2 . Then terminate it.	EUT transmits on f_2	Pass
b) Apply the interference on f_2 at level $T_L + U_M + 20\text{dB}$ and immediately remove all interference from f_1 . The EUT should immediately attempt transmission on f_1 (but at least 20 ms after the interference on f_2 is applied), verify the transmission only on f_1 .	EUT transmission f_1	Pass

3) Lower Monitoring Threshold

The monitoring threshold must not be more than 30 dB above the thermal noise power for a bandwidth equivalent to the emission bandwidth used by the device.

Test procedure:

Measurement method according to ANSI C63.17 -2013 clause 7.3.1

Test result:

Not applicable because the EUT has more 40 defined duplex system access channels and meet the provision of the Least Interfered Channel (LIC).

4) Maximum Transmit Period

If no signal above the threshold level is detected, transmission may commence and continue with the same emission bandwidth in the monitored time and spectrum windows without further monitoring. However, occupation of the same combined time and spectrum windows by a device or group of cooperating devices continuously over a period of time longer than 8 hours is not permitted without repeating the access criteria.

Test procedure:

The test procedure is as follows:

- a) Activate the EUT and initiate a communication channel with the companion device, and start a timer or frame counter.
- b) The centre frequency of spectrum analyzer was set to the carrier frequency and SPAN was set to ZERO. The spectrum analyzer was used to monitor the time and spectrum window of the communication channel.
- c) Stop the timer at the end of the EUT transmission on the current time and frequency window (measure the time until the EUT changes to a different slot).

Test result:

Repetition of Access Criteria	Measured Maximum Transmission Time (Second)	Limit (Second)	Results
First	17267	28,800	Pass

5) System Acknowledgement

Once access to specific combined time and spectrum windows is obtained an acknowledgment from a system participant must be received by the initiating transmitter within one second or transmission must cease.

Periodic acknowledgments must be received at least every 30 seconds or transmission must cease. Channels used exclusively for control and signaling information may transmit continuously for 30 seconds without receiving an acknowledgment, at which time the access criteria must be repeated.

Test procedure:

Measurement method according to ANSI C63.17 2013 clause 8.1, 8.2, 8.2.1

During testing initial transmission without acknowledgement, the signal from the EUT to the companion device is blocked by the circulator.

The test of the transmission time after loss of acknowledgements is performed by cutting off the signal from the companion device by a RF switch and measuring the time until the EUT stops transmitting.

Test result:

Test	Time taken (second)	Limit (second)	Result
Initial Connection acknowledgement	0.24	1	Pass
Change of access criteria for control information	N/A	30	N/A
Transmission cease time	7.42	30	Pass

Note: N/A=Not Applicable

6) Least Interfered Channel (LIC)

If access to spectrum is not available as determined by the above, and a minimum of 20 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level may be accessed.

A device utilizing the provisions of this paragraph (5) must have monitored all access channels defined for its system within the last 10 seconds and must verify, within the 20 milliseconds (40 milliseconds for devices designed to use a 20 millisecond frame period) immediately preceding actual channel access, that the detected power of the selected time and spectrum windows is no higher than the previously detected value.

The power measurement resolution bandwidth for this comparison must be accurate to within 6 dB.

No device or group of cooperating devices located within 1 metre of each other shall during any frame period occupy more than 6 MHz of aggregate bandwidth, or alternatively, more than one third of the time and spectrum windows defined by the system.

Calculation of monitoring threshold limits for isochroous devices:

Lower threshold: $T_L = -174 + 10\log_{10}B + M_L + P_{MAX} - P_{EUT}$ (dBm)

Where: B=Emission bandwidth (Hz)

M_L = dB the threshold may exceed thermal noise (30 for T_L)

$P_{MAX} = 5\log_{10}B - 10$ (dBm)

P_{EUT} = Transmitted power (dBm)

Calculated thresholds:

Monitor Threshold	B(MHz)	M _L (dB)	P _{MAX} (dBm)	P _{EUT} (dBm)	Threshold (dBm)
Lower threshold	1.437	30	20.79	19.88	-81.52

Note: 1.The upper threshold is applicable as the EUT utilizes more than 20 duplex system channels

Test procedure:

Measurement method according to ANSI C63.17 clause 7.3.2, 7.3.3

C63.17 clause 7.3.2, LIC procedure test:

- Allow EUT transmission on only two carrier frequencies, which will be designated f_1 and f_2 .
- Apply interference to the EUT on f_1 at a level of $TL + UM + 7$ dB and on f_2 at a level of $TL + UM$. Initiate transmission. The EUT should transmit on f_2 . Terminate the connection. Repeat five times. If the EUT transmits once on f_1 , the test failed.
- Apply interference to the EUT on f_1 at a level of $TL + UM$ and on f_2 at a level of $TL + UM + 7$ dB. Initiate transmission. The EUT should transmit on f_1 . Terminate the connection. Repeat five times. If the EUT transmits once on f_2 , the test failed.
- Apply interference to the EUT on f_1 at a level of $TL + UM + 1$ dB and on f_2 at a level of $TL + UM - 6$ dB. Initiate transmission. If the EUT transmits on f_2 , terminate the connection. Repeat five times. If the EUT transmits once on f_1 , the test failed.
- Apply interference to the EUT on f_1 at a level of $TL + UM - 6$ dB and on f_2 at a level of $TL + UM + 1$ dB. Initiate transmission. If the EUT transmits on f_1 , terminate the connection. Repeat five times. If the EUT transmits once on f_2 , the test failed.

C63.17 clause 7.3.3, Selected channel confirmation:

- Allow EUT transmission on only two carrier frequencies, which will be designated f_1 and f_2 . This limitation to carriers f_1 and f_2 is performed preferably by administration commands for the EUT, or alternatively by applying by a multicarrier interference generator uniform interference on all system carriers except f_1 and f_2 , at a level of $TL + UM + 20$ dB in-band per carrier. Set the interference level to the EUT on f_1 to a level of $TL + UM + 20$ dB, and let there be no interference applied on f_2 .
- Initiate transmission and verify that the EUT transmits on f_2 . If a connection was made, terminate it.
- Apply interference on f_2 at a level of $TL + UM + 20$ dB in-band, and immediately remove all interference from f_1 and immediately (but not sooner than 20 ms after the interference on f_2 is applied) cause the EUT to attempt transmission. The EUT should now transmit on f_1 , if it transmits.
- If the EUT transmits on f_2 , it fails.

Test result:**1) LIC procedure test:**

Interference (Refer to ANSI C63.17 clause 7.3.3)	Reaction of EUT	Results
a) Apply the interference on f_1 at level $T_L+U_M+7\text{dB}$ and the interference on f_2 at level T_L+U_M . Initiate transmission and verify the transmission only on f_2 . Repeat 5 times.	EUT transmits on f_2	Pass
b) Apply the interference on f_1 at level T_L+U_M and the interference on f_2 at level $T_L+U_M+7\text{dB}$. Initiate transmission and verify the transmission only on f_1 . Repeat 5 times.	EUT transmits on f_1	Pass
c) Apply the interference on f_1 at level $T_L+U_M+1\text{dB}$ the interference on f_2 at level $T_L+U_M-6\text{dB}$. Initiate transmission and verify the transmission only on f_2 . Repeat 5 times.	EUT transmits on f_2	Pass
d) Apply the interference on f_1 at level $T_L+U_M-6\text{dB}$ and the interference on f_2 at level $T_L+U_M+1\text{dB}$. Initiate transmission and verify the transmission only on f_1 . Repeat 5 times.	EUT transmits on f_1	Pass

2) Selected channel confirmation:

Interference (Refer to ANSI C63.17 clause 7.3.4)	Reaction of EUT	Results
a) Apply the interference on f_1 at level T_U+U_M and no interference on f_2 . Initiate transmission and verify the transmission only on f_2 . Then terminate it.	EUT transmits on f_2	Pass
b) Apply the interference on f_2 at level T_L+U_M and immediately remove all interference from f_1 . The EUT should immediately attempt transmission on f_1 (but at least 20 ms after the interference on f_2 is applied), verify the transmission only on f_1 .	EUT transmission f_1	Pass

7) Random waiting

If the selected combined time and spectrum windows are unavailable, the device may either monitor and select different windows or seek to use the same window after waiting an amount of time, randomly chosen from a uniform random distribution between 10 and 150 milliseconds, commencing when the channel becomes available.

Test procedure:

This test is for EUTs that transmit control and signaling channels and that use the provisions of FCC §15.323(c)(6) & IC RSS-213 5.2(6), thus to verify that the EUT (if in deferral) waits for a channel to go clear, then implements a 10 ms to 150 ms hold off prior to using the channel. FCC §15.323(c)(6) is not restrictive for EUTs that use the LIC and offer 20 or more duplex communications channels, as a combined time and spectrum window cannot become unavailable as there is no threshold limit. Test method according to ANSI C63.17 2013 clause 8.1.2 or 8.1.3

- a) Restrict operation of the EUT to a single carrier designated f_1 . For TDMA system, further restrict EUT transmission to a single timeslot of the usable timeslots available in the TDMA frame structure and synchronize the interference so as to occur centered within the timeslot.

- b) Activate the EUT with no interference present. The EUT must transmit on f_1 . Then apply CW interference on f_1 . The interference level shall be at $TL + UM$ as appropriate for EUTs that do or do not meet the requirements for using the upper threshold. The EUT must stop transmitting within 30 s.
- c) Cancel the interference. Measure the time interval between the end of the interference transmission and the beginning of transmission by the EUT.
- d) Repeat step b) and step c) 100 times. If the measured time intervals vary uniformly between 10 ms and 150 ms, the EUT passes the test.

Note: This is Not Applicable

8) Monitoring Bandwidth and Reaction Time

The monitoring system bandwidth must be equal to or greater than the emission bandwidth of the intended transmission and have a maximum reaction time less than $50 \times \text{SQRT}(1.25/\text{emission bandwidth in MHz})$ microseconds for signals at the applicable threshold level but shall not be required to be less than 50 microseconds.

Note: Testing of the monitoring system bandwidth is not required if the designed bandwidth from the manufacturer is available and given in the test report.

The maximum reaction time of the monitor shall be less than $50 \sqrt{1.25/\text{occupied bandwidth in MHz}}$ μs for signals at the applicable threshold level but shall not be required to be less than 50 μs .

If a signal of 6 dB or more above the threshold level is detected, the maximum reaction time shall be $35 \sqrt{1.25/\text{occupied bandwidth in MHz}}$ μs but shall not be required to be less than 35 μs .

Test procedure:

Measurement method according to ANSI C63.17 2013 clause 7.4 & 7.5

- a) Restrict the EUT to a single transmit carrier frequency f_1 , and verify that the EUT can establish a connection with no interference applied on f_1 .
- b) Apply time-synchronized, pulsed interference on f_1 at the pulsed level $TL + UM$, verify that the EUT does not establish a connection when the width of the interference pulse exceeds the largest of 50 μs and $50 \sqrt{1.25/B}$ μs , where B is the emission bandwidth of the EUT in megahertz.
- c) With the channel interference level 6 dB above $TL + UM$, verify that the EUT does not establish a connection when the width of the interference pulse exceeds the largest of 35 μs and $35 \sqrt{1.25/B}$ μs , where B is the emission bandwidth of the EUT in megahertz.

Test Pulse width Equation (μs)	B(bandwidth) (MHz)	Pulse width (μs)	Limit (largest) (μs)
$50 (1.25/B)^{1/2}$	1.437	46.63	50
$35 (1.25/B)^{1/2}$	1.437	32.64	35

Test result:**1) Monitoring Bandwidth:**

The antenna of the EUT used for monitoring is the same interior antenna that used for transmission, so the monitoring system bandwidth is equal to the emission bandwidth of the intended transmission

2) Reaction Time Test:

No.	Interference Pulse width (μs)	Reaction of EUT	Observing time (μs)	Result
1	50μs with level T_L+U_M	No transmission	26.35	Pass
2	35μs with level $T_L+U_M+6\text{dB}$	No transmission	26.18	Pass

9) Monitoring Antenna

The monitoring system shall use the same antenna used for transmission, or an antenna that yields equivalent reception at that location.

Test procedure:

Measurement method according to ANSI C63.17 -2013 paragraph 4

Test result:

The antenna of the EUT used for transmission is the same interior antenna that used for monitoring.

10) Monitoring threshold relaxation

Devices that have a power output lower than the maximum permitted under the rules can increase their monitoring detection threshold by one decibel for each one decibel that the transmitter power is below the maximum permitted.

Test procedure:

Measurement method according to ANSI C63.17 -2013 clause 7.4 & paragraph 4

Test result:

This requirement is covered by the results of Least Interfered Channel (LIC).

11) Duplex Connections

An initiating device may attempt to establish a duplex connection by monitors both its intended transmit and receive time and spectrum windows. If both the intended transmit and receive time and spectrum windows meet the access criteria, then the initiating device can initiate a transmission in the intended transmit time and spectrum window. If the power detected by the responding device can be decoded as a duplex connection signal from the initiating device, then the responding device may immediately begin transmitting on the receive time and spectrum window monitored by the initiating device.

Test procedure:

This test validates proper operation of an EUT that operates according to the provisions of FCC §15.323(c)(10) using a check of both transmit and receive channels on one end of the link to qualify both ends of the link for transmissions. Test method according to ANSI C63.17 clause 8.3.2 Validation of dual access criteria check for EUTs that implement the upper threshold

- a) Adjust the path loss between the EUT and its companion device such that the received signal to the EUT from the companion device is at least 40 dB above $TL + UM$.
- b) Restrict the EUT and its companion device to operation at a single carrier f_1 for TDMA systems and on f_1 and f_2 and corresponding duplex carriers for FDMA systems. Verify that the EUT and its companion device can establish a connection on a time/spectrum window on the enabled carrier(s). Terminate the connection.
- c) Apply interference to the EUT on the EUT's *transmit* time/spectrum windows at $TL + UM$ per carrier on all time/spectrum windows except for one, which has interference at least 10 dB below TL . Adjust the interference to the EUT on its *receive* time/spectrum windows such that a single time/spectrum window has interference at least 10 dB below TL , and the interference on the other time/spectrum windows is at $TL + UM + 7$ dB. The interference to the companion device should be at least 10 dB below TL on all active time/spectrum windows. The interference-free *receive* time/spectrum window must not be the duplex mate of the interference-free *transmit* time/spectrum window.
- d) Cause the EUT to attempt to establish a connection. The connection should be made on the interference-free *receive* time/spectrum window and its duplex mate. Otherwise, the EUT fails the test.
- e) If a connection exists, terminate it. Reduce the interference on the EUT's *receive* time/spectrum windows to a level of $TL + UM$ per carrier on all time/spectrum windows except for one, which has interference at least 10 dB below TL . Raise the interference on the EUT's *transmit* time/spectrum windows to a level of $TL + UM + 7$ dB, maintaining one time/spectrum window with interference at least 10 dB below TL . The interference to the companion device should be at least 10 dB below TL on all active time/spectrum windows. Again, the interference-free *transmit* and *receive* time/spectrum windows should not constitute a duplex pair if the system designates a specific duplex pairing for time/spectrum windows.
- f) Cause the EUT to attempt to establish a connection. The connection should be made on the interference-free *transmit* time/spectrum window and its duplex mate. Otherwise, the system fails the test.
- g) Terminate the connection and raise the interference to the EUT on all of the EUT's *transmit* and *receive* time/spectrum windows to $TU + UM$ per carrier on all time/spectrum windows except for a single *transmit* time/spectrum window and a single *receive* time/spectrum window, which shall have interference at least 10 dB below TL . The low-interference *transmits* and *receives* time/spectrum windows shall not constitute a duplex pair. Adjust the path loss between the EUT and its companion device such that the received signal to the EUT from the companion device is at least 30 dB above TU . Cause the EUT to attempt to establish a connection. If a connection is established, the test fails.

Test result:

Interference (Refer to ANSI C63.17 § 8.3& § 8.3.2)	Reaction of EUT	Results
a) Only a single carrier f_1 for EUT TDMA systems and on f_1 and f_2 and corresponding duplex carriers for FDMA systems.	EUT can transmit	Pass
b) All Tx windows with level $TL+UM$ except one & Rx windows with level $TL+UM+7dB$ except one, which are not the duplex mate.	Connected on the target Rx window and its duplex mate.	Pass
c) All Tx windows with level $TL+UM+7dB$ except one & Rx windows with level $TL+UM$ except one, which are not duplex mate.	Connected on the target Tx window and its duplex mate.	Pass
d) All Tx & Rx windows with level $TU+UM$, except one for Tx window & one for Rx window, which are not duplex mate.	No connection possible	Pass

12) Alternative monitoring interval

An initiating device that is prevented from monitoring during its intended transmit window due to monitoring system blocking from the transmissions of a co-located (within one meter) transmitter of the same system, may monitor the portions of the time and spectrum windows in which they intend to receive over a period of at least 10 milliseconds. The monitored time and spectrum window must total at least 50 percent of the 10 millisecond frame interval and the monitored spectrum must be within 1.25 MHz of the center frequency of channel(s) already occupied by that device or co-located co-operating devices. If the access criteria is met for the intended receive time and spectrum window under the above conditions, then transmission in the intended transmit window by the initiating device may commence.

Test procedure:

This test validates the ability of the EUT to distinguish between same-system and other-system interference for purposes of satisfying the requirement of 47CFR15.323(c) (11). Test method according to ANSI C63.17 2013 clause 8.4

- Adjust the path loss between the EUT and its companion device such that the received signal to the EUT from the companion device is at least 30 dB above TL .
- Restrict the EUT and its companion device to operation at a single carrier f_1 for TDMA systems and on f_1 and f_2 and corresponding duplex carriers for FDMA systems. Verify that the EUT and its companion device can establish a connection.
- Apply interference at $TL + UM$ per carrier to the EUT on all *transmit* time/spectrum windows on the enabled carrier(s). The interference must use the same physical layer parameters (modulation, frame format, etc.) as the EUT transmissions, but with a system identifier different from that used by the EUT and the companion device. Ensure that the interference level at the companion device is at least 10 dB below TL . Apply no interference to the *receive* time/spectrum windows on the enabled carriers.
- Cause the EUT to attempt to establish a connection. If a connection is established, the test fails.

Test result:

Interference (Refer to ANSI C63.17 § 8.4)	Reaction of EUT	Results
a) Only a single carrier f_1 for EUT TDMA systems and on f_1 and f_2 and corresponding duplex carriers for FDMA systems.	EUT can transmit	Pass
b) Apply interference with same parameters as EUT transmissions on all Tx windows with level TL+UM on the enabled carrier(s) and no interference on the Rx windows on the enabled carriers.	No connection is established	Pass

IC:

Not appropriate, as the system always monitor both the transmit and receive time/spectrum windows, it is not a co-located device.

13) Fair Access

The provisions of FCC §15.323 (c) & paragraphs 5.2 (10) or (11) shall not be used to extend the range of spectrum occupied over space or time for the purpose of denying fair access to spectrum to other devices.

Test result:

The manufacturer declares that this device does not use any mechanisms as provided by FCC §15.323(c)(10) or (11) & IC RSS-213 5.2(10) and (11) to extend the range of spectrum occupied over space or time for the purpose of denying fair access to spectrum to other device.

14) Frame Repetition Stability Frame Period and Jitter

The frame period (a set of consecutive time slots in which the position of each time slot can be identified by reference to a synchronizing source) of an intentional radiator operating in these sub-bands shall be 20 milliseconds or 10 milliseconds/X where X is a positive whole number. Each device that implements time division for the purposes of maintaining a duplex connection on a given frequency carrier shall maintain a frame repetition rate with a frequency stability of at least 50 parts per million (ppm). Each device which further divides access in time in order to support multiple communication links on a given frequency carrier shall maintain a frame repetition rate with a frequency stability of at least 10 ppm. The jitter (time-related, abrupt, spurious variations in the duration of the frame interval) introduced at the two ends of such a communication link shall not exceed 25 microseconds for any two consecutive transmissions. Transmissions shall be continuous in every time and spectrum window during the frame period defined for the device.

Test procedure:

Measurement method according to ANSI C63.17 2013 clause 6.2.2, 6.2.3

Test result:

Frame Period and Jitter:

Max. pos. Jitter (μ s)	Max. neg. Jitter (μ s)	Frame period (ms)	Limit	
			Frame Period (ms)	Jitter (μ s)
0.8	-0.06	10.25	20 or 10/X	25

Note: X is a positive whole number.

EUT PHOTOGRAPHS

Please refer to the attachment 2501R02198E-RFA External photo and 2501R02198E-RFA Internal photo.

TEST SETUP PHOTOGRAPHS

Please refer to the attachment 2501R02198E-RFB Test Setup photo.

******* END OF REPORT *******