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RF Test Report On

FCC Testing of the Vernon C BAND 8T8R 40W Radio (JA-RU-SB-02-7700-0001)
in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 27C

COMMERCIAL-IN-CONFIDENCE

FCC ID: 2A652-JA-SB-77-01

PREPARED BY	APPROVED BY	DATED
Steve McFarlane	Scott Drysdale	Oct, 19, 2022

Report Issued: 10/19/2022

Report File #: TR-7169011235-002

ACCREDITED
Testing Laboratory
Certificate #2955.19

CONTENTS

Section **Page No**

SECTION 1

REPORT INFORMATION

1.1 REPORT DETAILS

Manufacturer	Jabil
Manufacturer Description	C BAND 8T8R 40W Radio
Address	1 BREWER HUNT WAY, KANATA, ON, CANADA K2K 2B5
Product Name	Vernon
Product Number	JA-RU-SB-02-7700-0001
Serial Number(s)	JO2219VERNON004
Hardware Version(s)	AB
Software Version(s)	CONF46_01_2226_SUB6_T1_Ver. 0.5 rev. 9.65283
Test Specification/Issue/Date	FCC CFR 47 Part 2: 2021 FCC CFR 47 Part 27: 2021
Start of Test	18-JUL 2022
Finish of Test	05-AUG 2022
Name of Test Personnel(s)	Scott Drysdale
Related Document(s)	KDB 971168 D01 v02r02 KDB 662911 D01 v02r01
Test report revision history	Issue 000. Initial Draft release. Issue 001. Minor modifications, including update of test equipment list. Issue 002. Correction to FCC ID.

1.2 BRIEF SUMMARY OF RESULTS

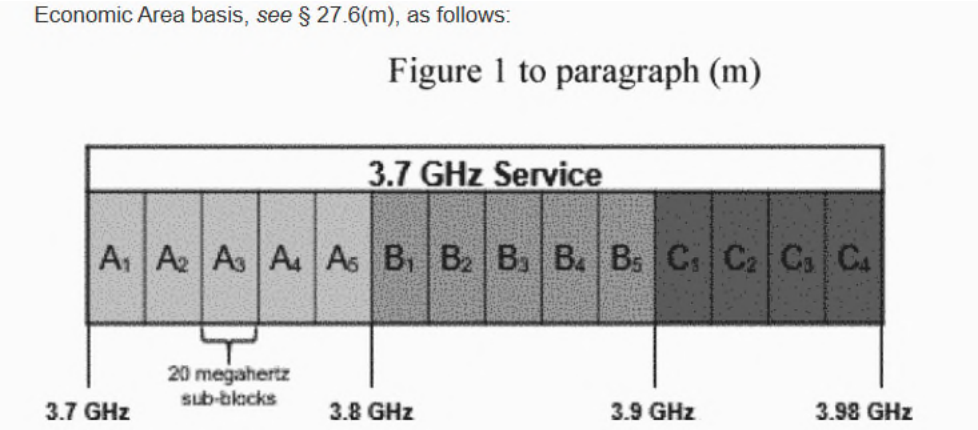
A brief summary of results for each configuration, in accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 27 is shown below.

Section	Test Description		Result	
	FCC CFR 47 Part 2	FCC CFR 47 Part 27		
2.1	2.1046	27.50	Maximum Peak Output Power and Peak to Average Ratio - Conducted	Pass
2.2	2.1049	27.53	Occupied Bandwidth	Pass
2.3	2.1051	27.53 (h)	Band Edge	Pass
2.4	2.1051	27.53 (h)	Transceiver Spurious Emissions	Pass
2.5	2.1055	27.54	Frequency Stability	Pass
-	-	15.111	Receiver Spurious Emissions	<Note 1>
Note 1. Not applicable as this is a transceiver				

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) is a Vernon C BAND 8T8R 40W Radio (JA-RU-SB-02-7700-0001) unit working in supports 5G in the A/B/C Band (3700 MHz – 3980 MHz).



A full technical description can be found in the Manufacturer's documentation.

1.3.2 Configuration Description

The **Vernon** C BAND 8T8R 40W Radio (JA-RU-SB-02-7700-0001), herein referred to as EUT, supports Single Mode operation from a 8 port configuration and operates in 5G in the C Band (3900 MHz – 3980 MHz).

TX test cases: Maximum Conducted Output Power, Spurious Emissions at Antenna Terminals (±1MHz) and Conducted Spurious Emissions, measurements were performed on the RF Ports. The test limits shown are representative of the worst case. All testing was performed with the EUT transmitting at maximum RF power unless as designated setting by client, otherwise stated.

The EUT was powered via a 48VDC power supply.

Channel Configurations: 5G in Band C (3700 MHz – 3980 MHz)

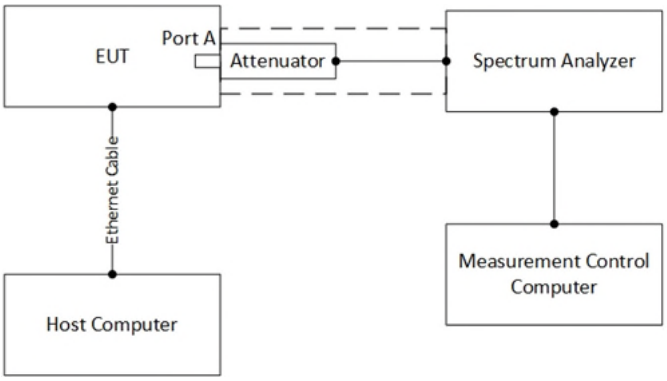
RAT	Band	No. Of Carriers	Modulation	Carrier Bandwidth(s)	**Carrier Frequency Configuration (MHz)**		
					Bottom/B_{RFBW} (MHz)	Middle/M_{RFBW} (MHz)	Top/ T_{RFBW} (MHz)
5G	n77	1	QPSK	100 MHz	3750	3850	3930

1.4 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	C BAND 8T8R 40W Radio
MANUFACTURER	Jabil
TYPE	Base station
PRODUCT NUMBER(S)	JA-RU-SB-02-7700-0001
SERIAL NUMBER(S)	JO2219VERNON004
HARDWARE VERSION(S)	AB
SOFTWARE VERSIONS(S)	CONF46_01_2226_SUB6_T1_Ver. 0.5 rev. 9.65283
TRANSMITTER OPERATING RANGE	3700-3980 MHz
RECEIVER OPERATING RANGE	3700-3980 MHz
COUNTRY OF ORIGIN	Canada
EMISSION DESIGNATOR(S): (i.e. G1D, GXW)	W7D
MODULATION TYPES: (i.e. GMSK, QPSK)	5G: QPSK
HIGHEST INTERNALLY GENERATED FREQUENCY	4915.2MHz
HIGHEST OUTPUT POWER (W or dBm)	46 dBm per port, 8 ports (320W total).
FCC ID	2A652-JA-SB-77-01
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	Vernon is an 8T8R remote radio head transceiver operating in the FCC defined C-band in TDD mode. It is designed to be mounted outdoors on a mast.

Equipment Under Test (EUT)

Figure 1. Connection Diagram General Test Setup



1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated as described in the Test Method for each Test.

The EUT was powered from -48Vdc supply.

FCC Measurement Facility Registration Number: CA4810

Under our group A2LA Accreditation, TÜV SÜD conducted the following tests at Ericsson, Ottawa.

Test Name	Name of Test Specialist(s)
Maximum Peak Output Power and Peak to Average Ratio - Conducted	Scott Drysdale
Occupied Bandwidth	Scott Drysdale
Band Edge	Scott Drysdale
Transmitter Spurious Emissions	Scott Drysdale
Frequency Stability	Scott Drysdale

1.6 JUSTIFICATIONS AND DEVIATIONS

No deviations from the applicable test standards or test plan were made during testing.

Testing was performed on each modes of modulation available of the EUT and QPSK is presented as worst case and/or representative in all cases. Testing in this test reports shows data obtained in QPSK mode.

Each port of the EUT was tested and test data is presented for each test based on readings from the antenna port on which the highest output power was obtained as worst case and/or representative. Test data for each port(s) output power is presented.

1.7 MODIFICATION RECORD

No modifications were made to the EUT during testing.

1.8 ADDITIONAL INFORMATION

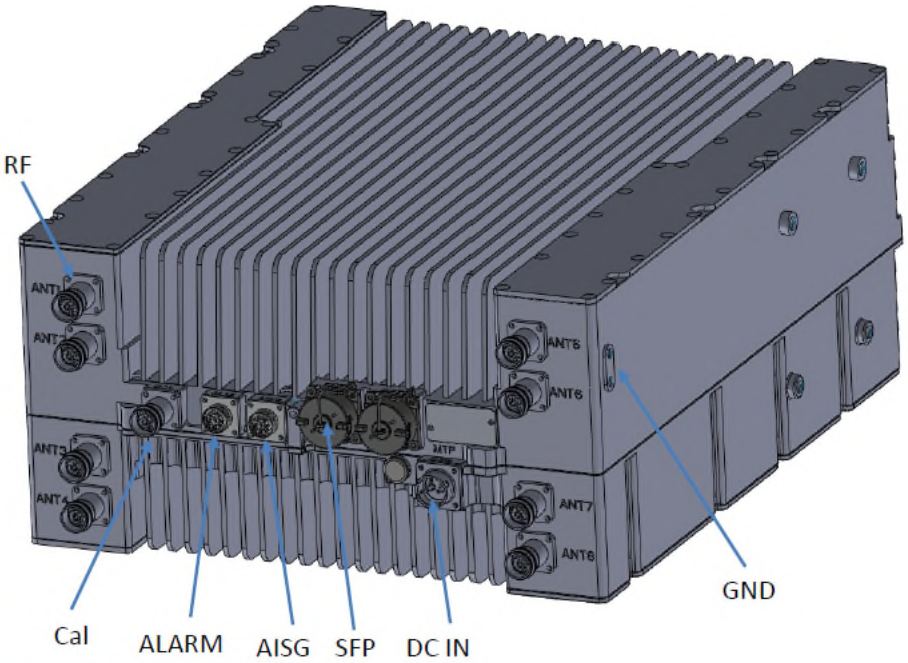
Vernon is an 8T8R remote radio head transceiver operating in the FCC defined C-band in TDD mode. It is designed to be mounted outdoors on a mast and deployed in North American Markets.

Project Name
Product Code JA-RU-SB-02-7700-0001
Operating Band C-band
Uplink/Downlink Frequency Range 3700-3980MHz

Duplex Mode	TDD
Antenna Ports	8T8R
Total Transmit Power per Port	40W, 320W total
Maximum Carriers per Port	1 NR carrier
Carrier Type/Bandwidth	100MHz BW NR 30kHz SCS QPSK, 16/64/256QAM
Fronthaul Ports	ORAN 7.2x, Category A Two optical 25GE ports
Timing / Synchronization	PTP
Ancillary Ports	AISG v3.0, External Alarms
Input Power	-48 VDC
Volume	39 L
Weight	<41 KG

.

EUT Diagram



External Interfaces List:

- 8x Antenna Ports (4.3-10)
- 2x SFP/Optical
- 1x DC Power (-48V nominal, 2-pin connector)
- 1x External Chassis Ground
- 1x AISG
- 1x ALARM
- 1x Calibration (not used)

Size: 480mm x 400mm x 205mm

Weight: < 41 kg

Environmental Conditions:

- -40C to +55C ambient operating temperature range is supported
- Product shall be compliant with ETSI 300 019-2-4 Class 4.1E
- Ingress Protection IP65 according to CEI/EN60529
- Relative Humidity 4% to 100% (condensing)
- Product intended for outdoor operation
- Maximum operating altitude of 4000m

SECTION 2

TEST DETAILS

2.1 MAXIMUM PEAK OUTPUT POWER AND PEAK TO AVERAGE RATIO - CONDUCTED

2.1.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1046
FCC CFR 47 Part 27, Clause 27.50

2.1.2 Date of Test and Modification State

July 21 2022 - Modification State 0

2.1.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.4 Environmental Conditions

Ambient Temperature	23.1°C
Relative Humidity	33.4%

2.1.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01, clause 5.2.1. The attenuation value in Figure 1 and used throughout is 35.4 to 36.9 dB, being frequency and branch dependant.

Measurements were performed with a Spectrum Analyser using the Band Power measurement function. The detector was set to RMS with an RBW of at least 1 % of the carrier bandwidth and a VBW of at least 3 times the RBW. The integration bandwidth was configured to be wider than the total bandwidth of the carrier or combinations of carriers, (multi-carrier). Using a sweep time of auto, measurements were performed over 200 samples, with the average measurement recorded.

Due to Average measurements being recorded, an additional Peak to Average power ratio (PAPR) measurement was made. This was achieved using the CCDF function of the Spectrum Analyser.

The EUT was configured to transmit on maximum power on the configurations defined in the tables below.

The peak to average ratio measurement was performed at the conducted ports of the EUT. The spectrum analyzer's Complementary Cumulative Distribution Function (CCDF) was used and 0.1% probability value recorded.

The RMS Power and Peak to Average Ratio were measured and recorded with the results being compared with the limits.

2.1.6 Test Results

2.1.6.1 Summary of factored output power for each branch and bottom, middle, top

Frequency [MHz]	Branch 1 [dBm]	Branch 2 [dBm]	Branch 3 [dBm]	Branch 4 [dBm]	Branch 5 [dBm]	Branch 6 [dBm]	Branch 7 [dBm]	Branch 8 [dBm]
3750	45.7393	45.4841	45.271	45.4309	45.3516	45.8269	45.3689	45.5268
3850	45.2434	45.0567	45.1458	45.1026	45.0143	45.3974	45.351	45.2291
3930	45.4025	45.2594	45.0509	45.2554	45.2643	45.5722	45.1461	45.3741

Note: Does not into account number of ports or antenna gain.

2.1.6.2 Summary of output power each port (raw readings- unfactored)

Frequency [MHz]	Branch 1 [dBm]	Branch 2 [dBm]	Branch 3 [dBm]	Branch 4 [dBm]	Branch 5 [dBm]	Branch 6 [dBm]	Branch 7 [dBm]	Branch 8 [dBm]
3750	9.38	8.8	8.64	8.52	8.51	9.73	9.08	9.3
3850	9.35	8.74	8.89	8.63	8.6	9.79	8.89	9.46
3930	9.78	9.14	9.13	8.92	8.85	10.19	9.73	9.9

2.1.6.3 Summary of Factors

Frequency [MHz]	Branch 1 [dB]	Branch 2 [dB]	Branch 3 [dB]	Branch 4 [dB]	Branch 5 [dB]	Branch 6 [dB]	Branch 7 [dB]	Branch 8 [dB]
3750	36.3593	36.6841	36.631	36.9109	36.8416	36.0969	36.2889	36.2268
3850	35.8934	36.3167	36.2558	36.4726	36.4143	35.6074	36.461	35.7691
3930	35.6225	36.1194	35.9209	36.3354	36.4143	35.3822	35.4161	35.4741

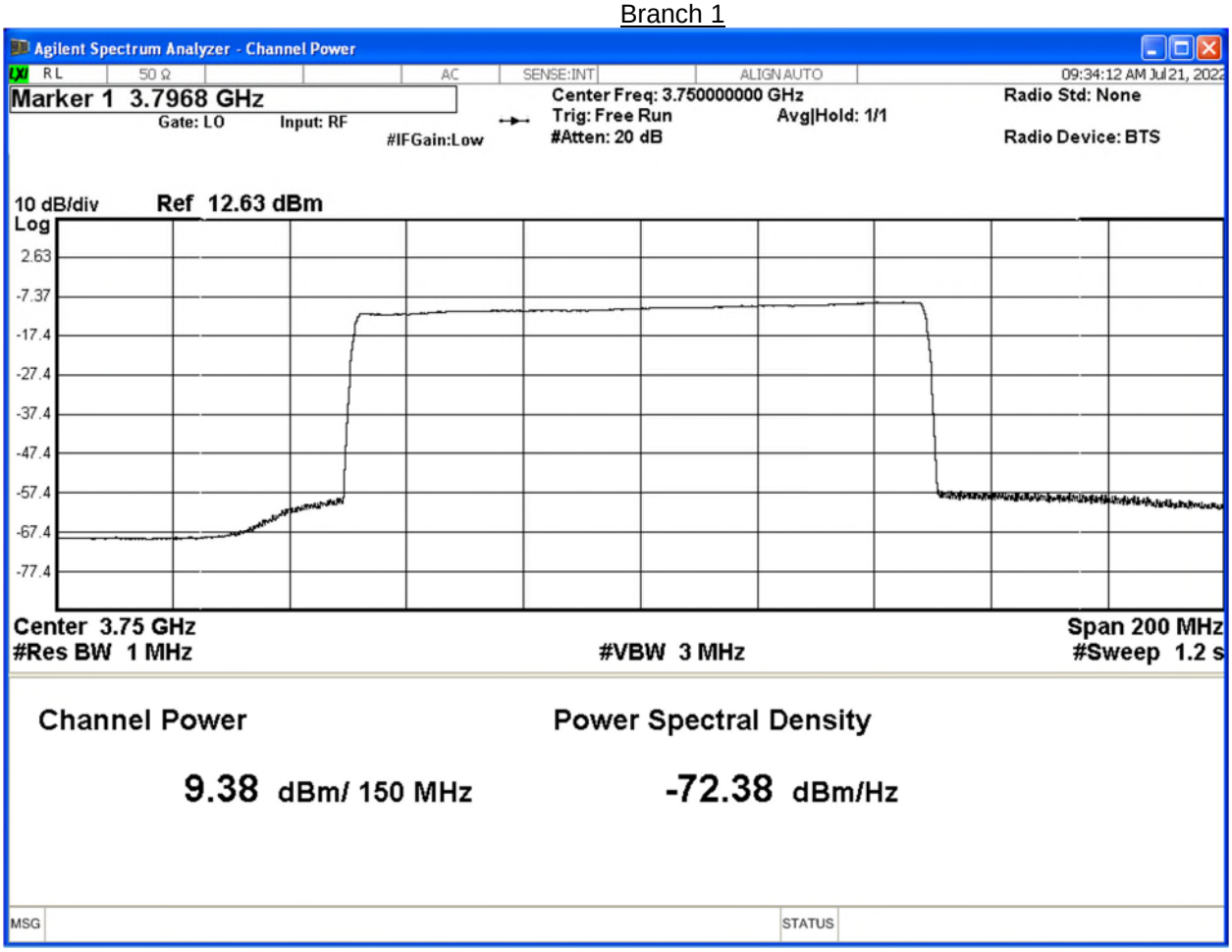
2.1.6.4 Summary EIRP PSD (dBm / MHz)

Frequency [MHz]	dBm/MHz	Max Antenna gain (dBi)	Port gain 8 ports (dB)	EIRP dBm/MHz	Limit dBm/MHz	Margin dB	Pass/Fail
3750	30.08	21	9.03	60.11	62.15	2.04	Pass
3850	29.61	21	9.03	59.64	62.15	2.51	Pass
3930	29.74	21	9.03	59.77	62.15	2.38	Pass

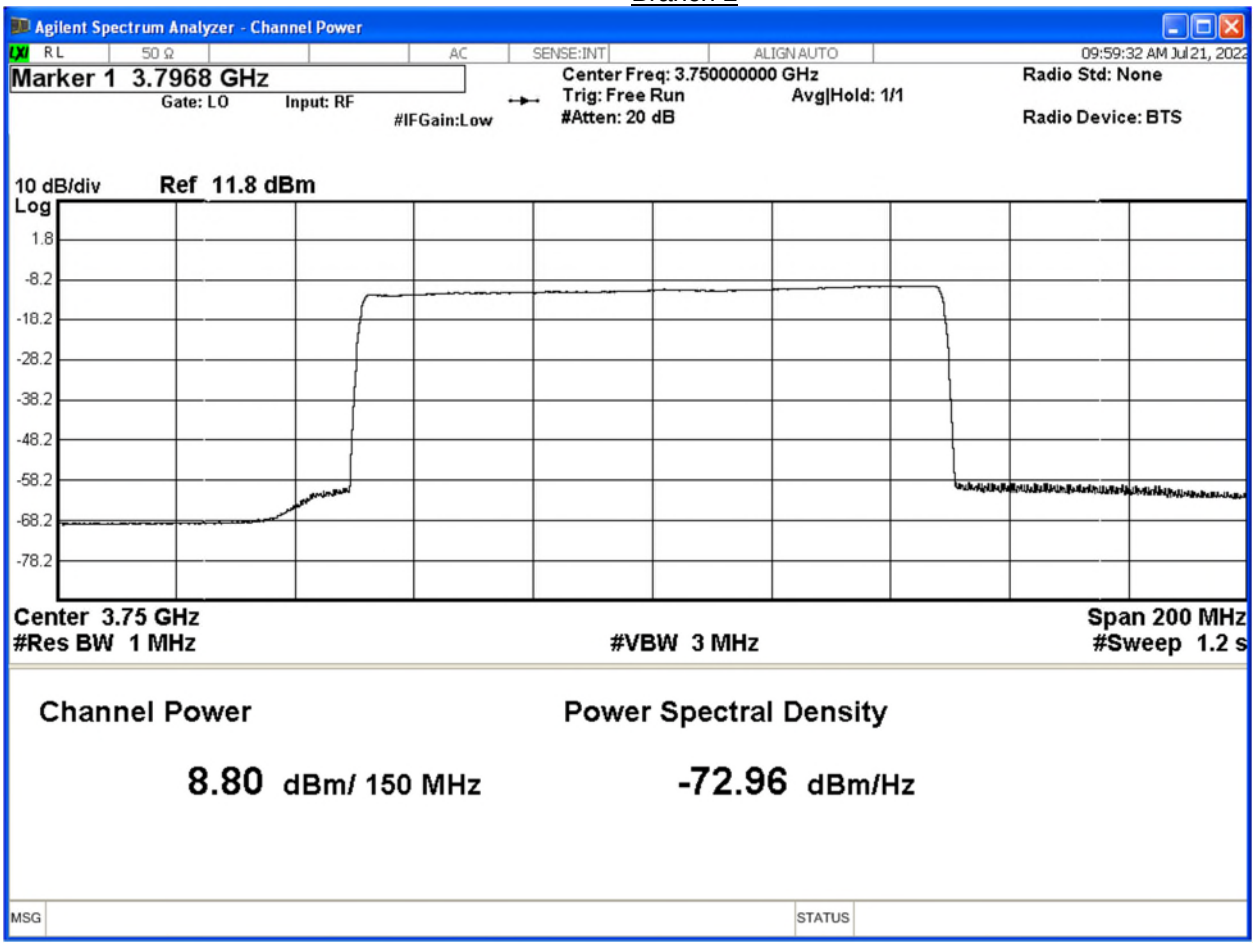
Note: Branch 6 had the highest output power and the PSD readings shown is representative/worst case of all branches. The maximum antenna gain stated be the client is 21 dBi. PSD graph is presented for worst case as shown in the table above.

2.1.6.5 Graphs (Power)- Raw - Bottom Channel – 3750 MHz

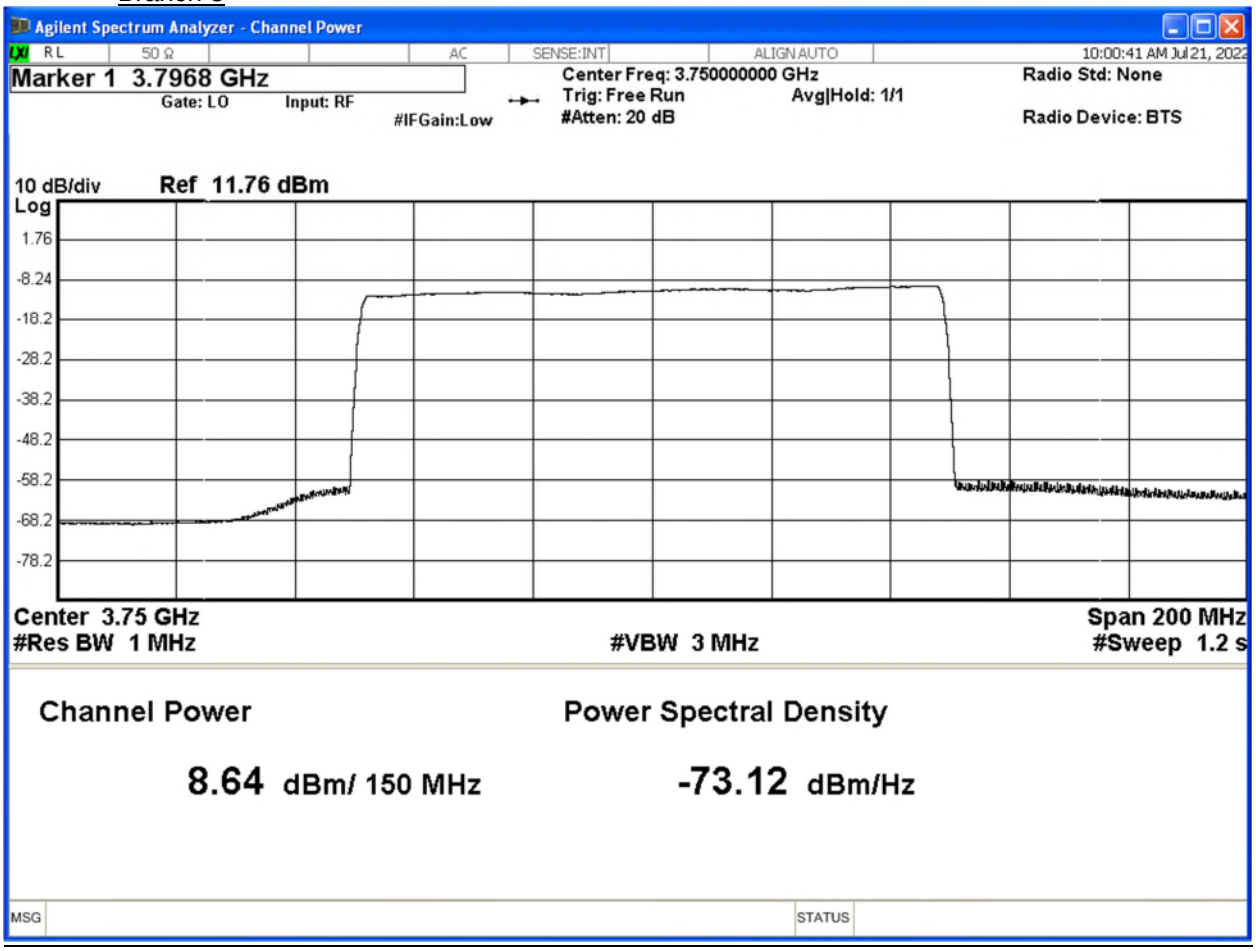
Branch 1



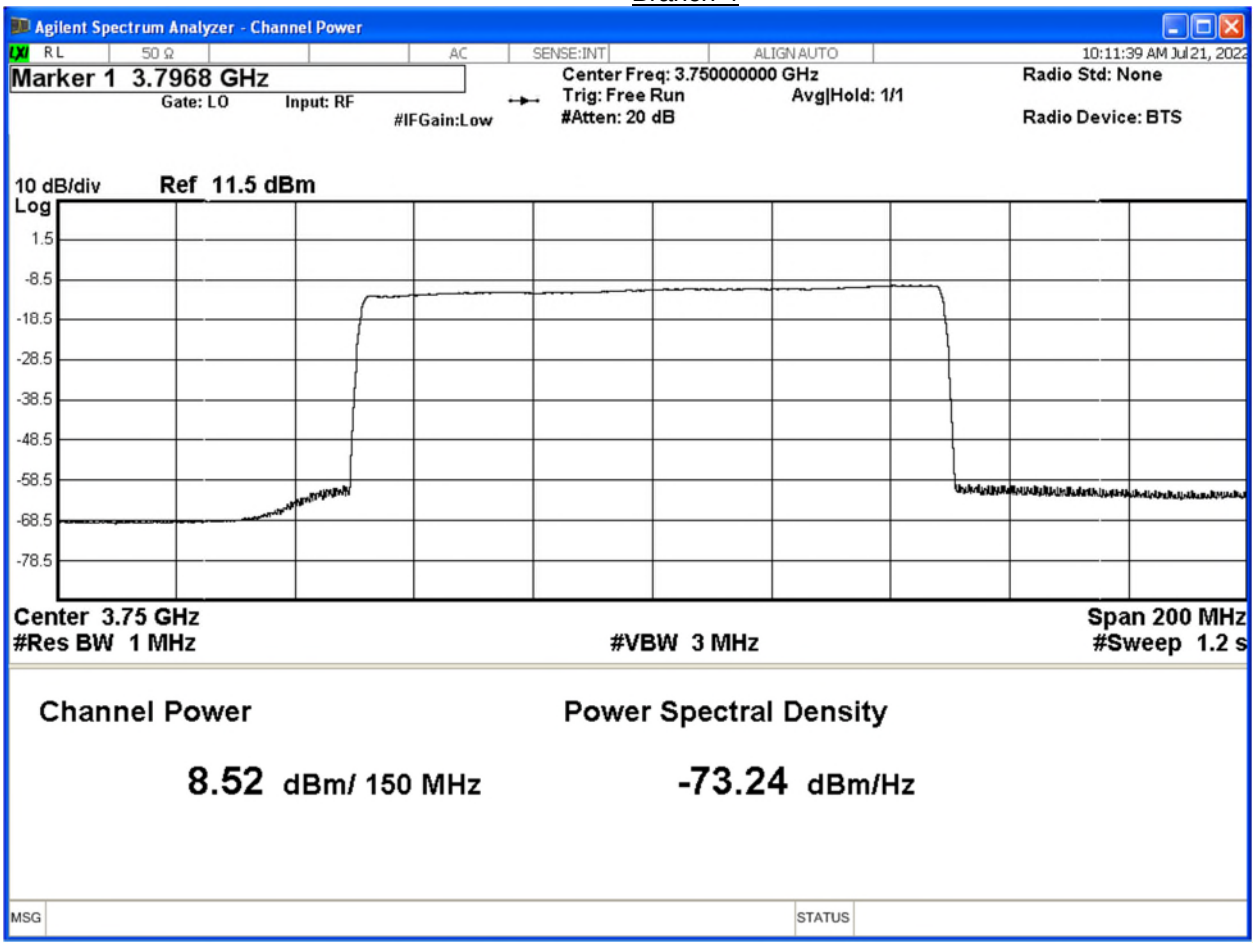
Branch 2



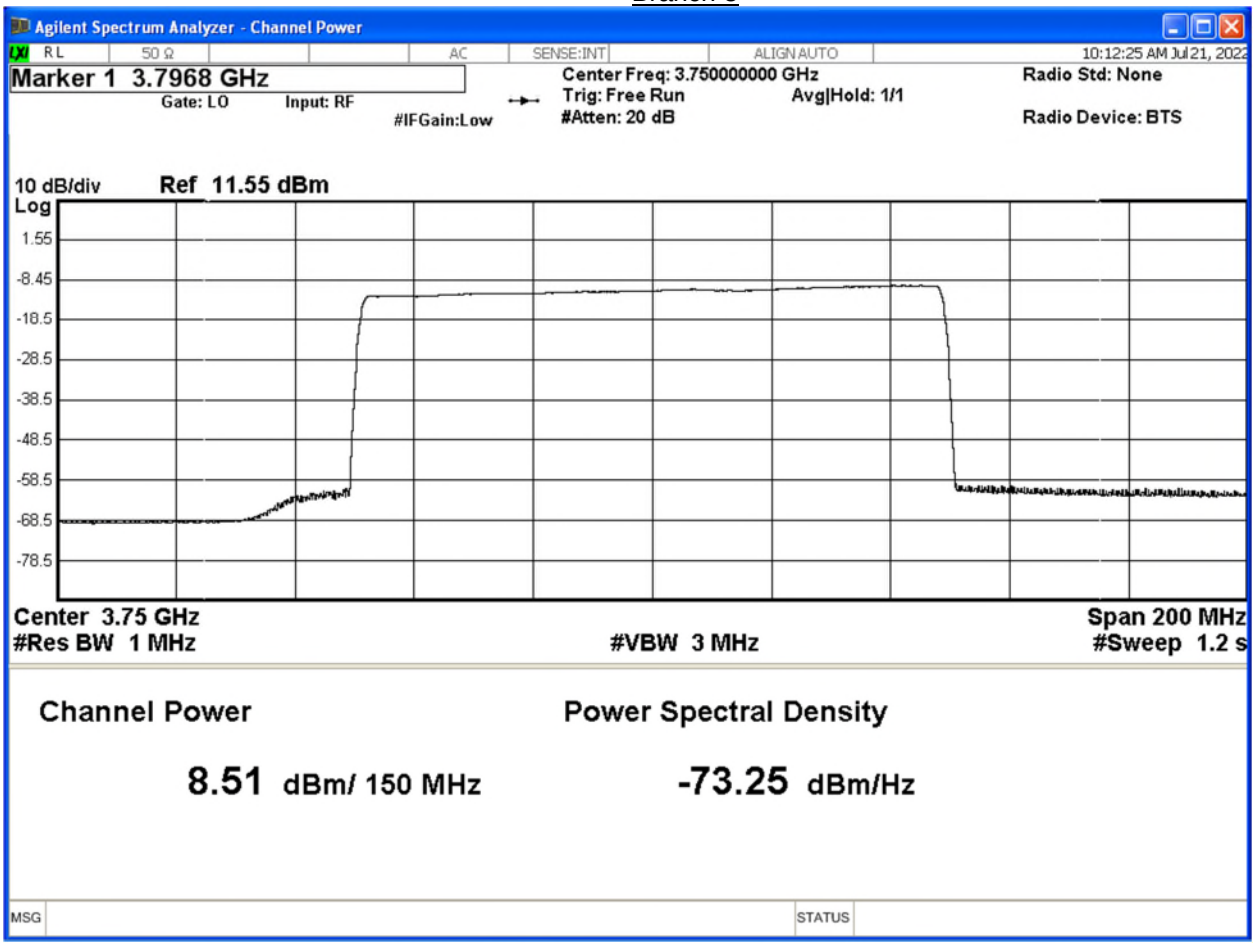
Branch 3



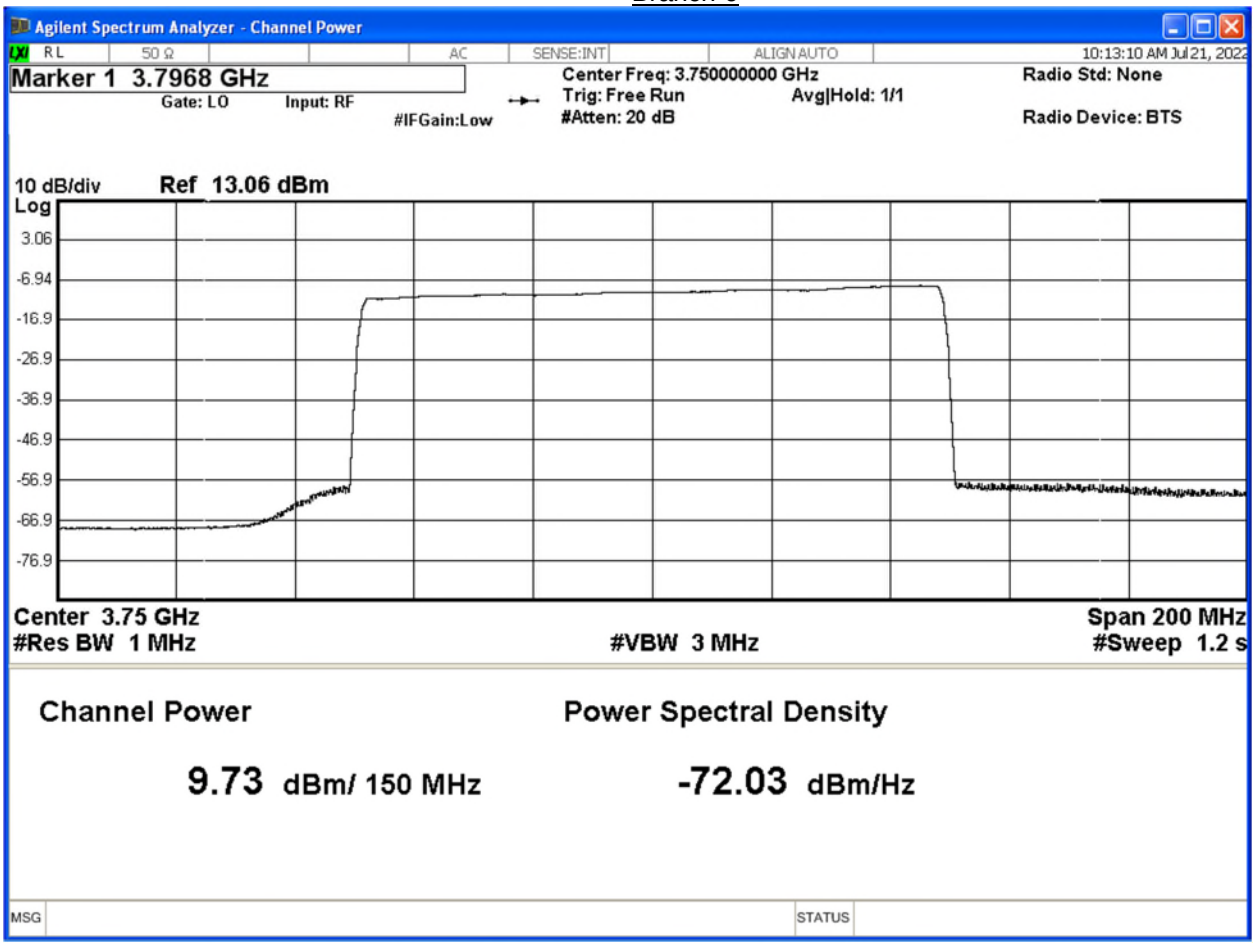
Branch 4



Branch 5



Branch 6

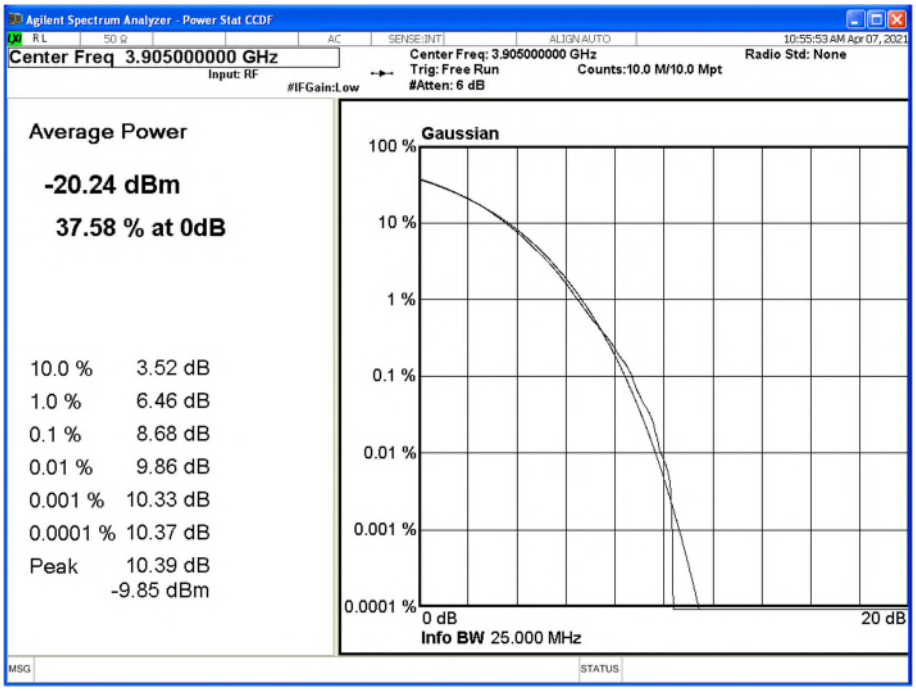


Branch 7

Branch 8

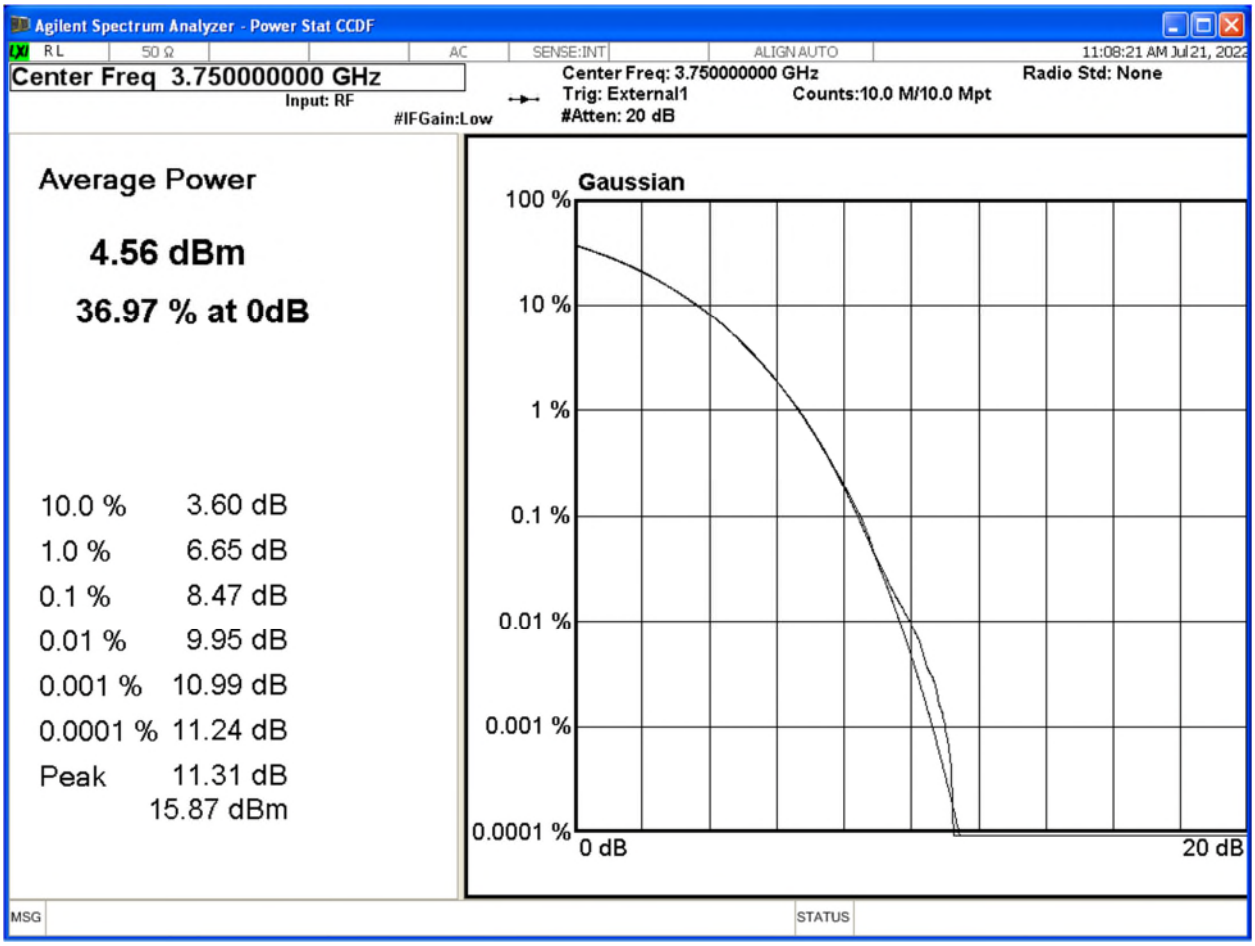
Calculation: 49.5 dB – 19.93 dBm = 29.57 dBm.

Branch 1 Pk-Av Ratio - Modulation 5G: QPSK - Carrier Bandwidth 10.0 MHz - Channel Position: 3905 MHz



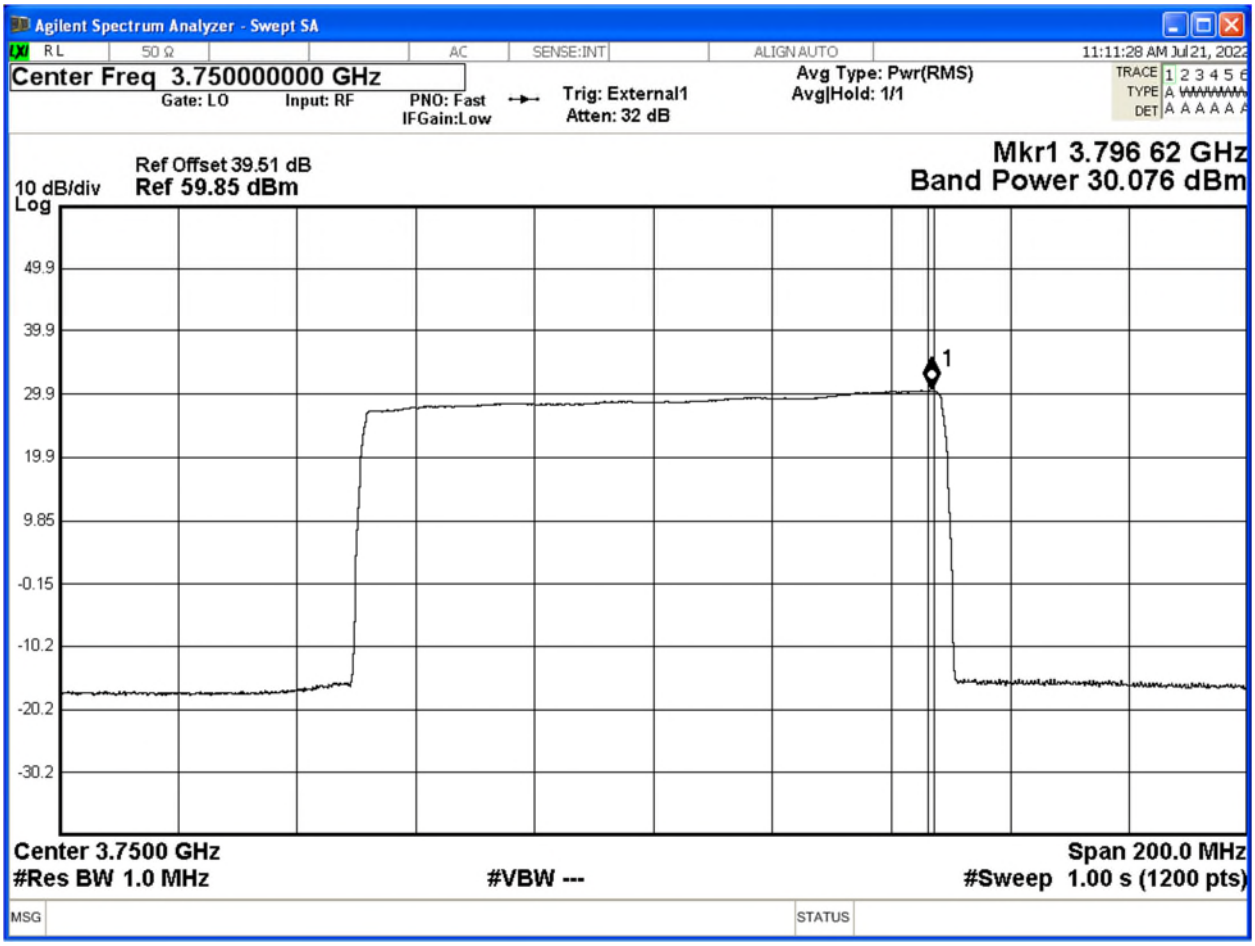
Calculation: Limit (13 dB) – 0.1% (8.68 dB) = 4.32 dB: Pass.

2.1.6.6 Graph (Peak to Average ratio)- Bottom Channel – 3750 MHz



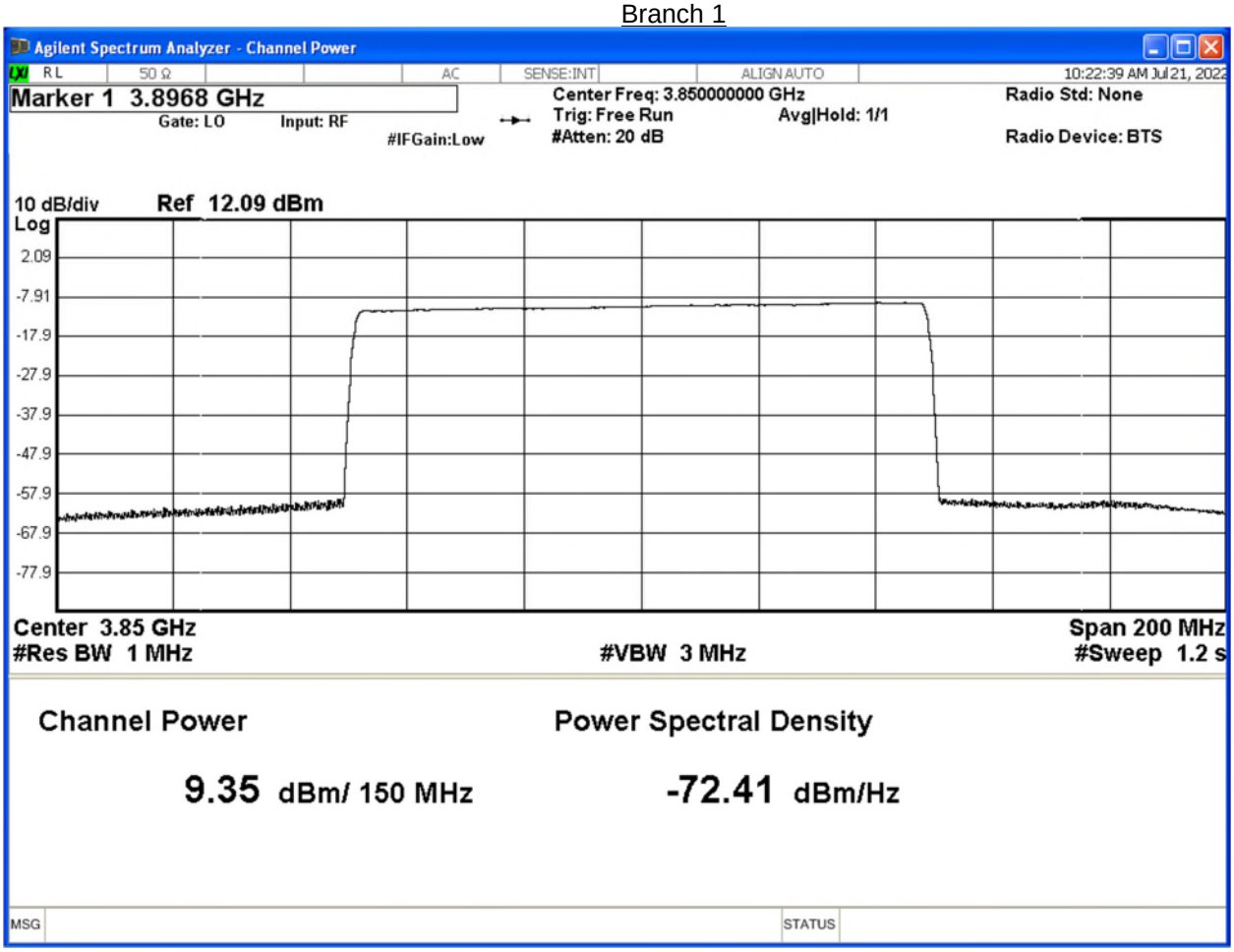
Limits	
Peak to Average Ratio	13 dB - Pass

2.1.6.7 Graph (PSD)- Worst case - Bottom Channel – 3750 MHz

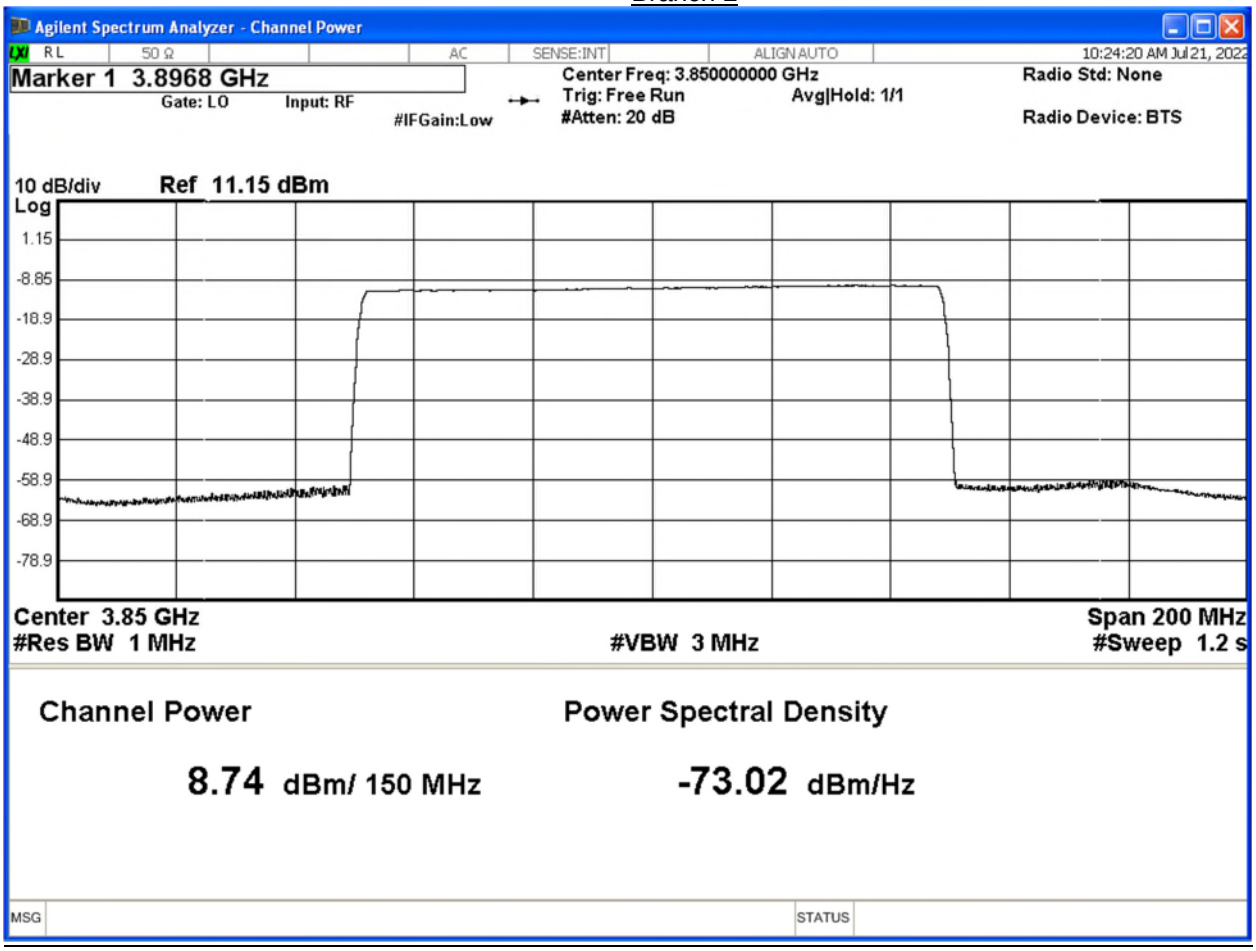


2.1.6.8 Graphs (Power) - Middle Channel: 3850 MHz

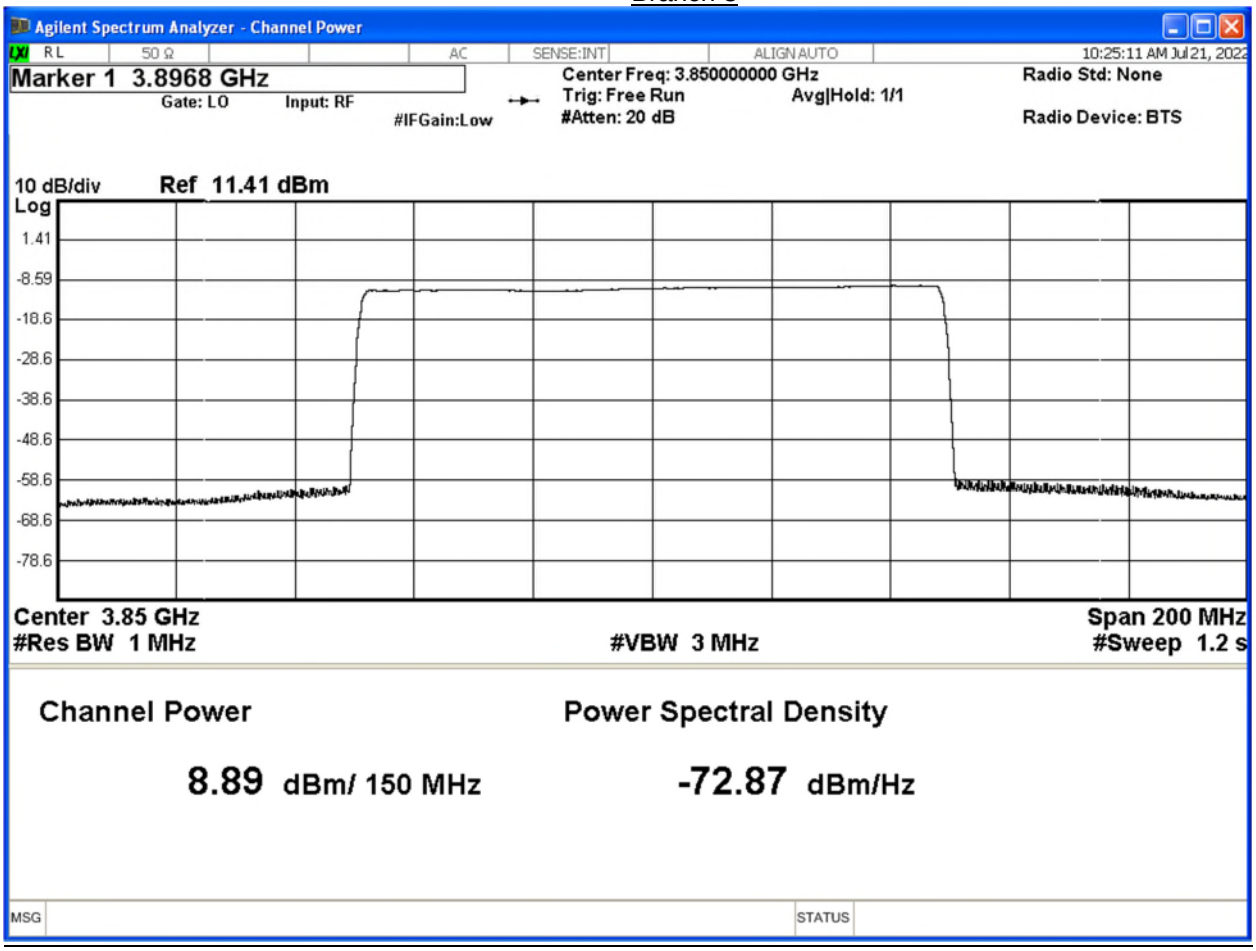
Branch 1



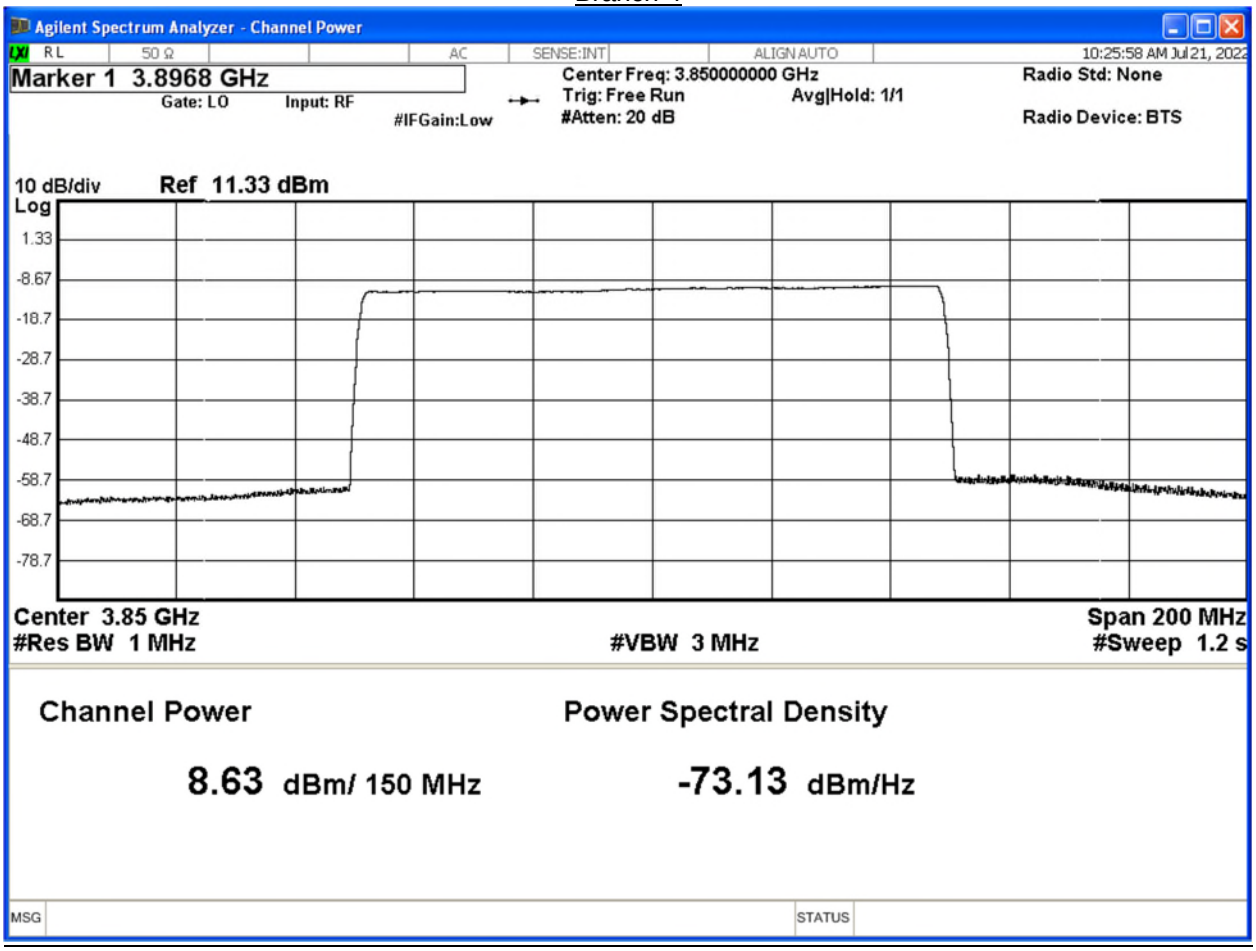
Branch 2



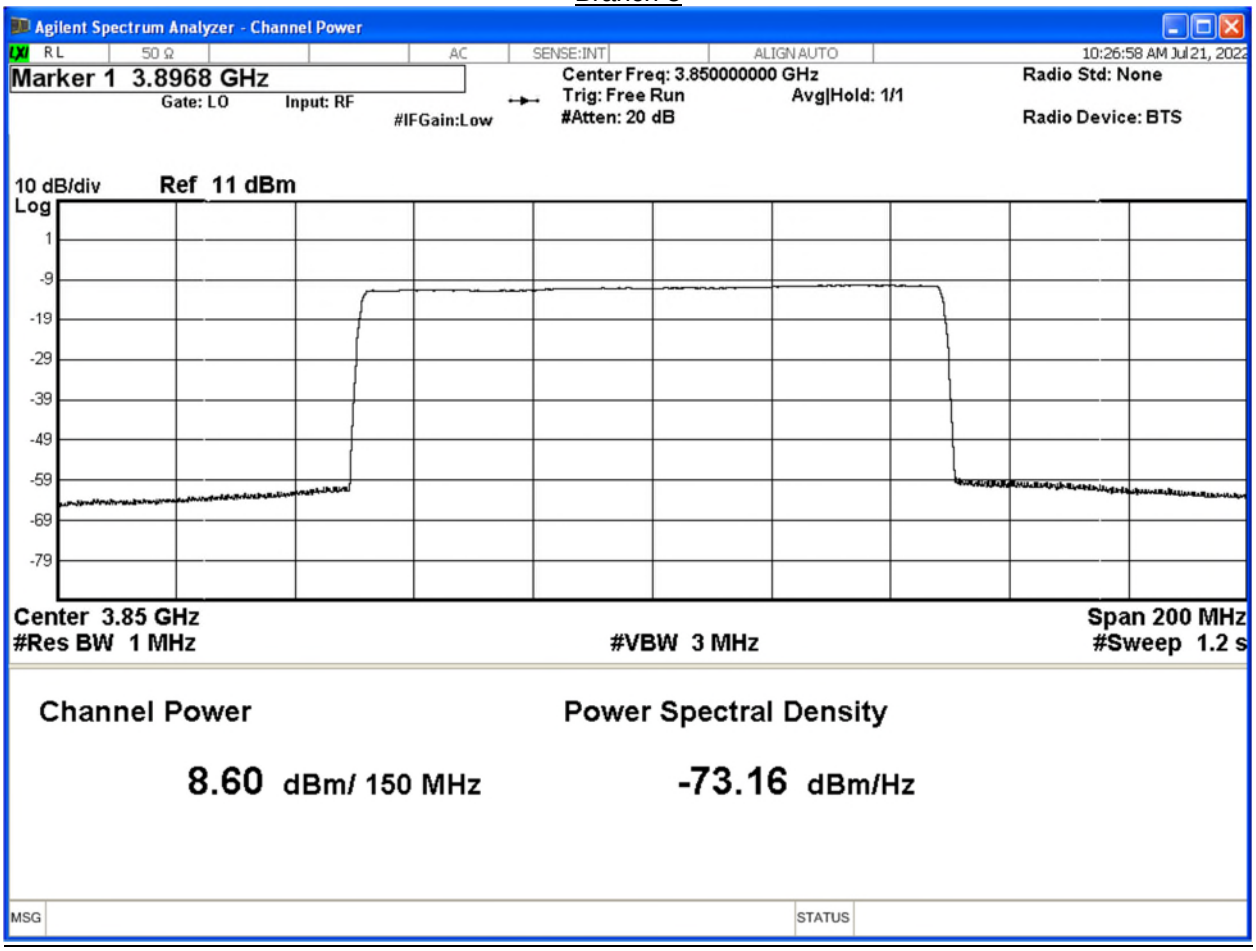
Branch 3



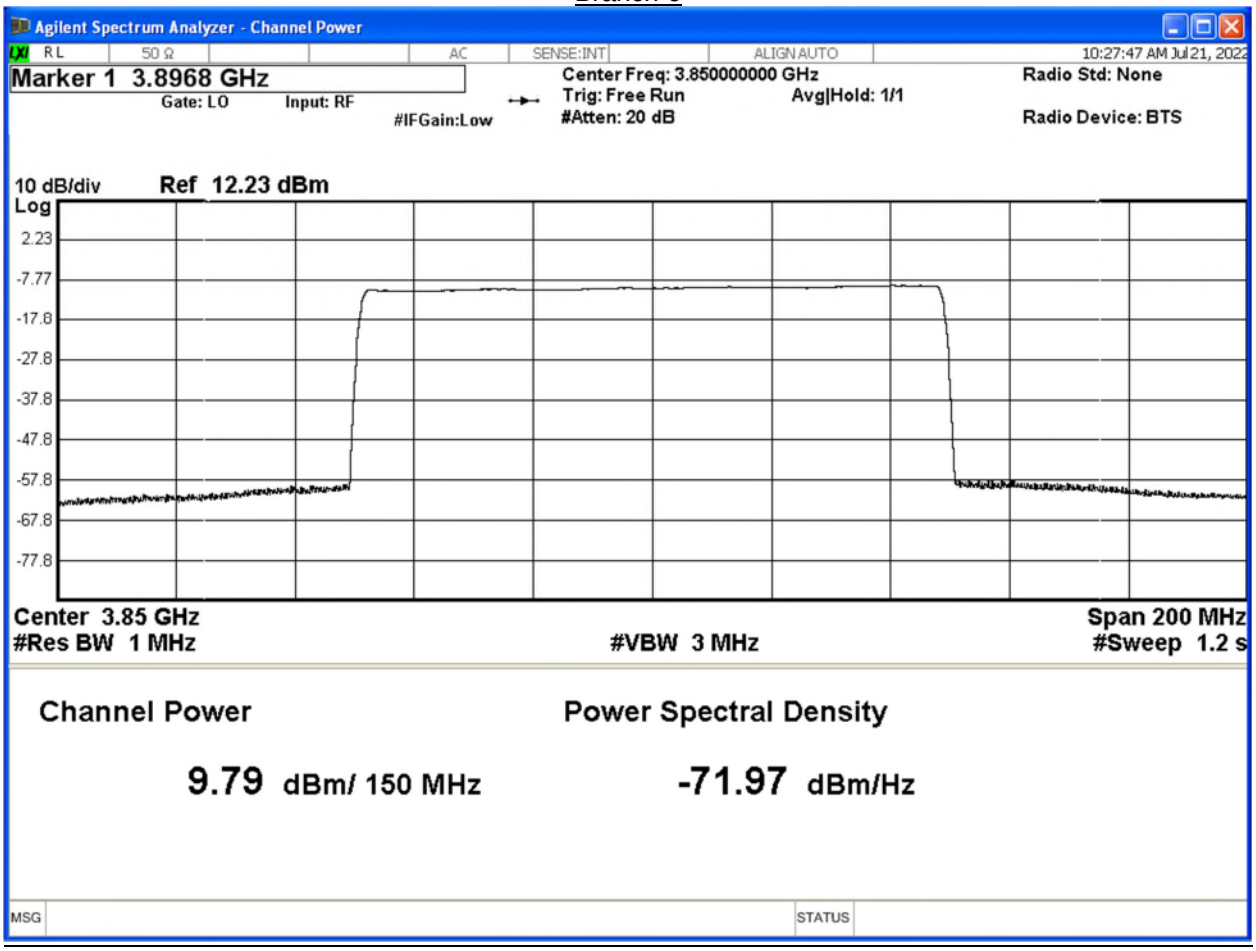
Branch 4



Branch 5



Branch 6



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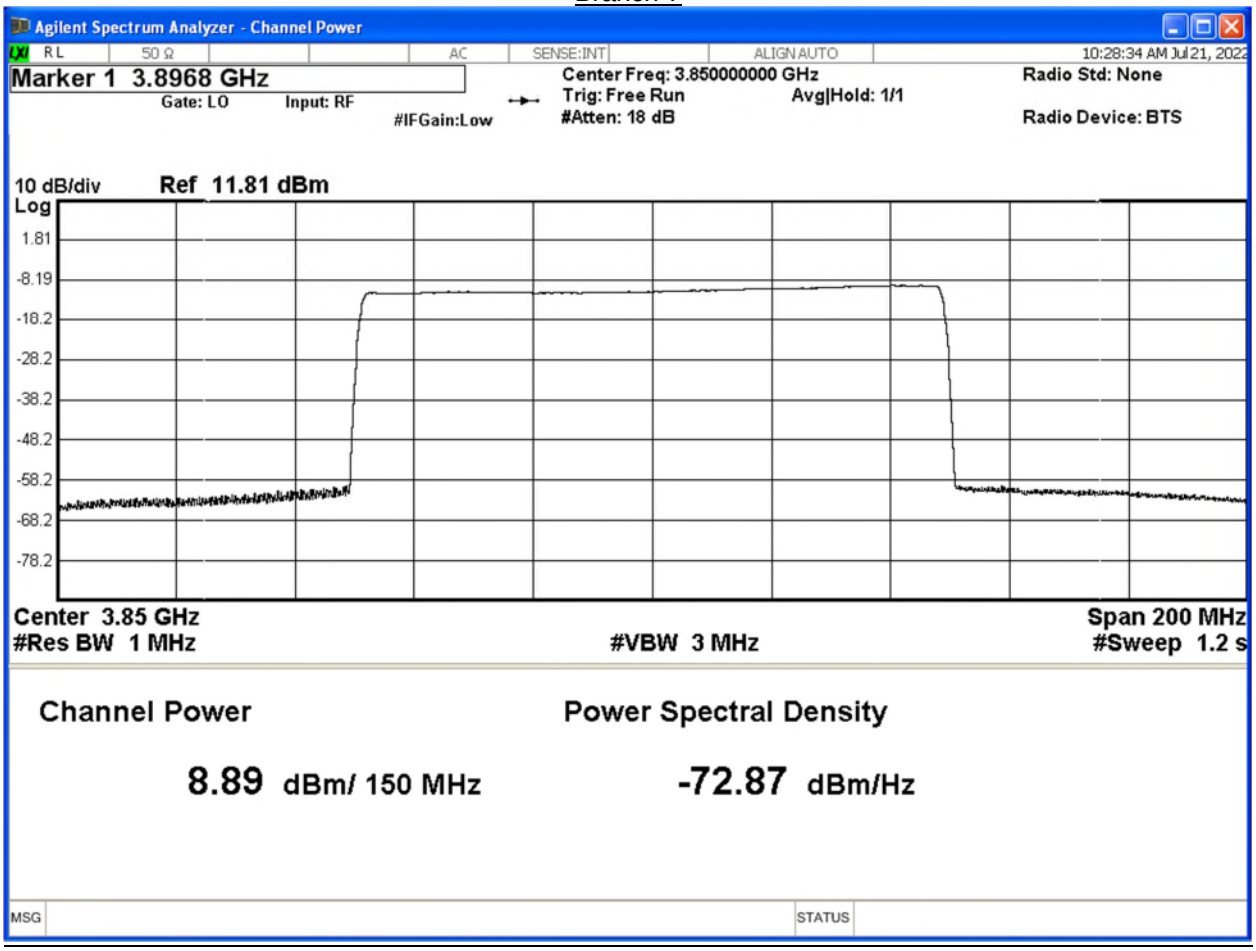

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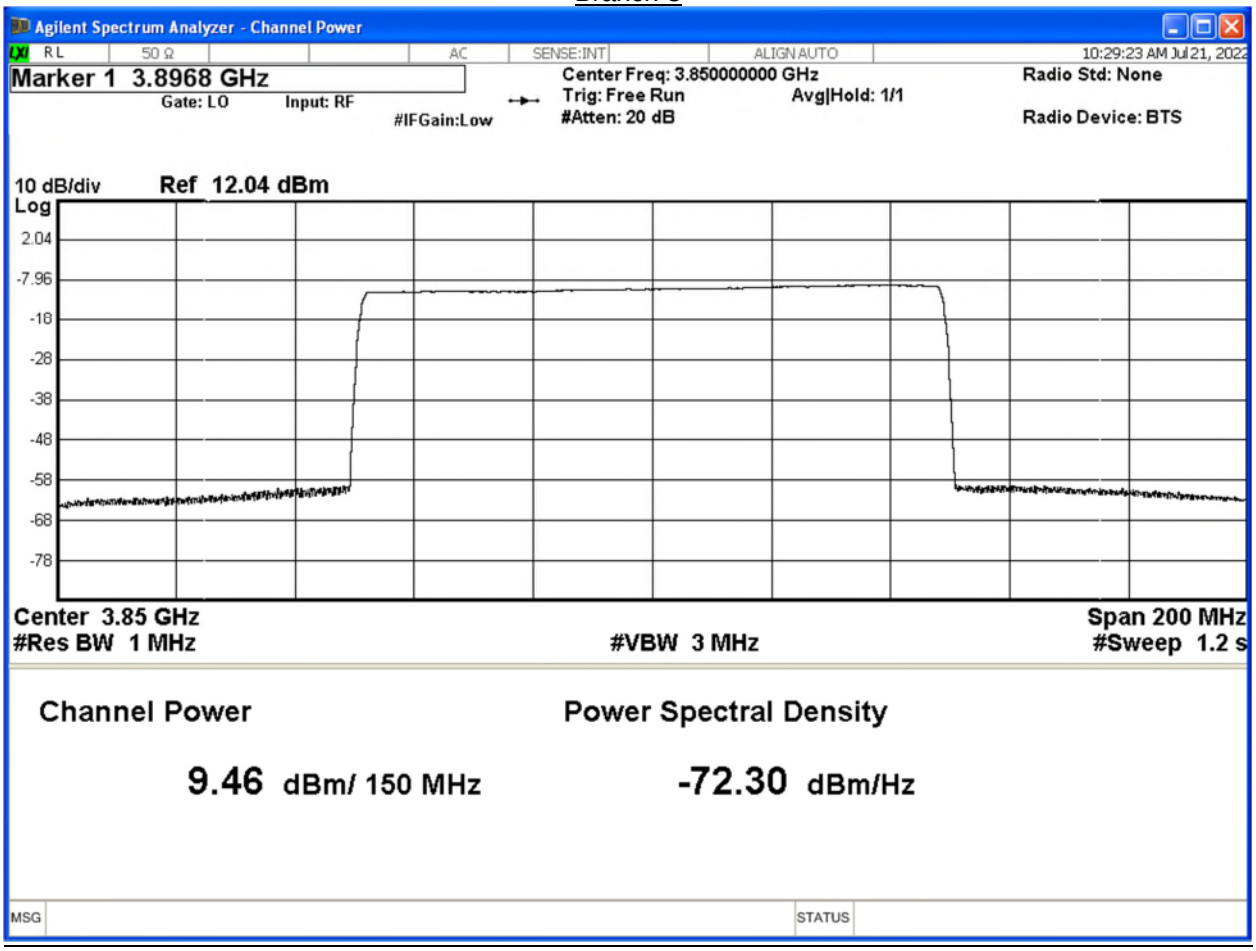
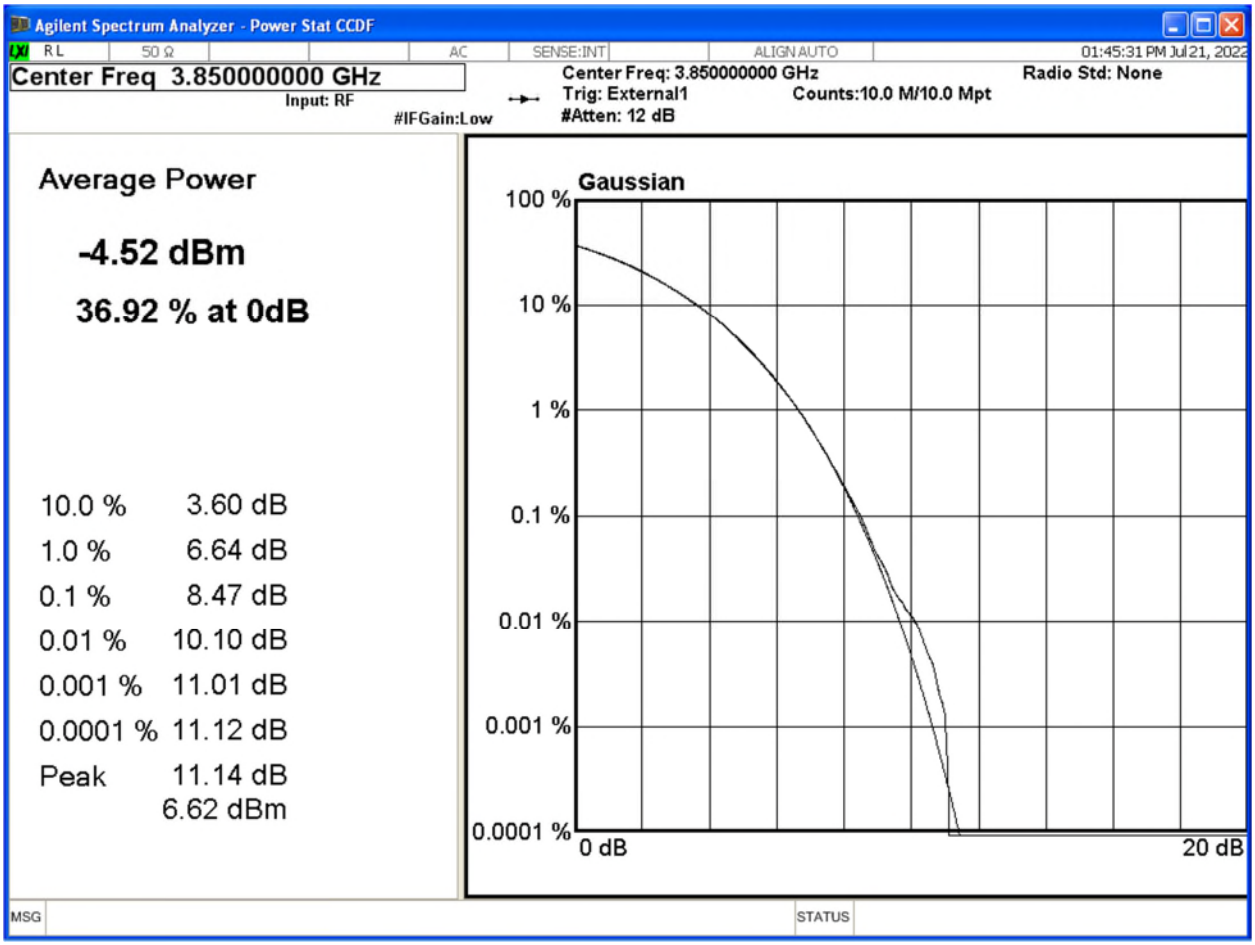


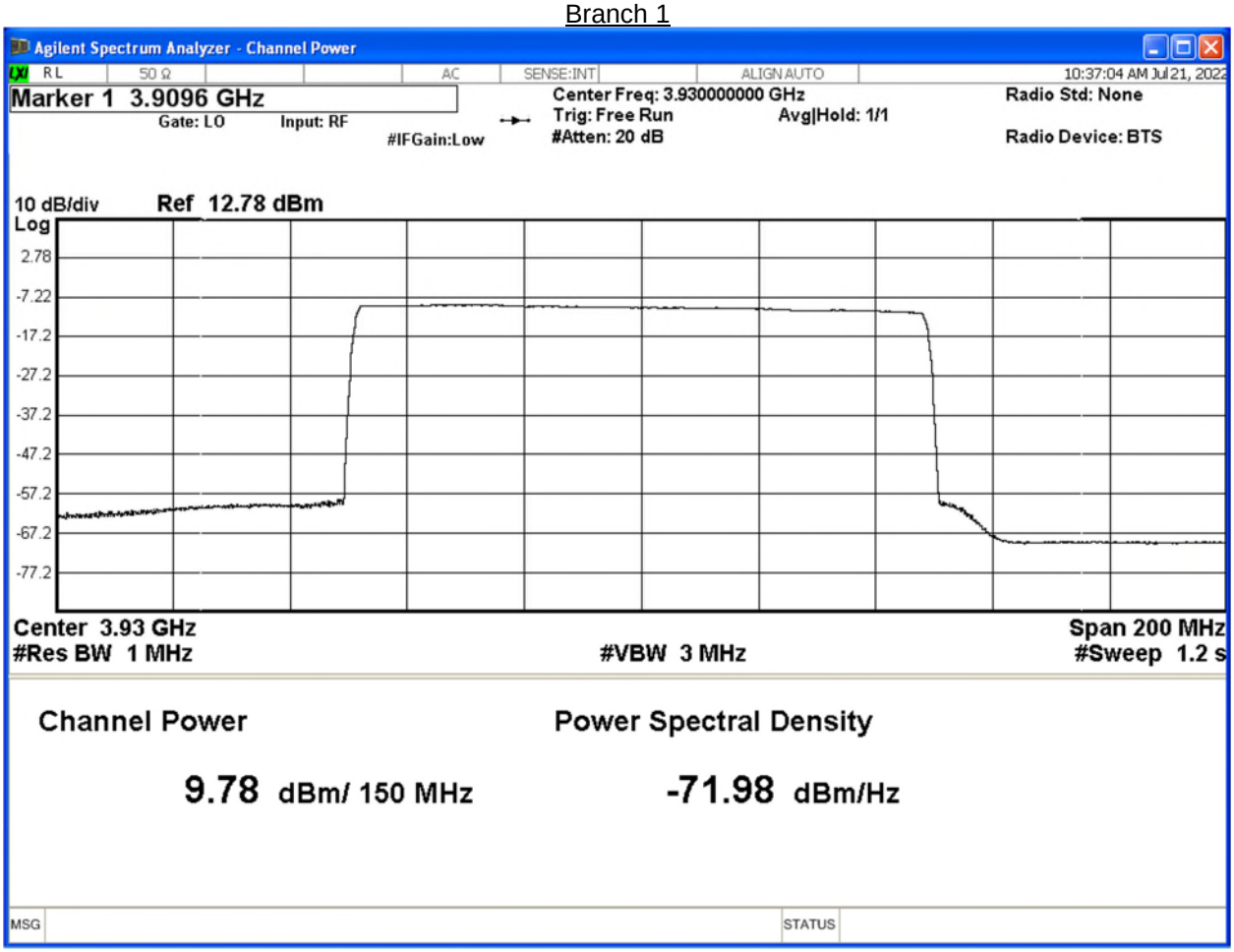
2.1.6.9 Graph (Peak to Average ratio)- Middle Channel – 3850 MHz



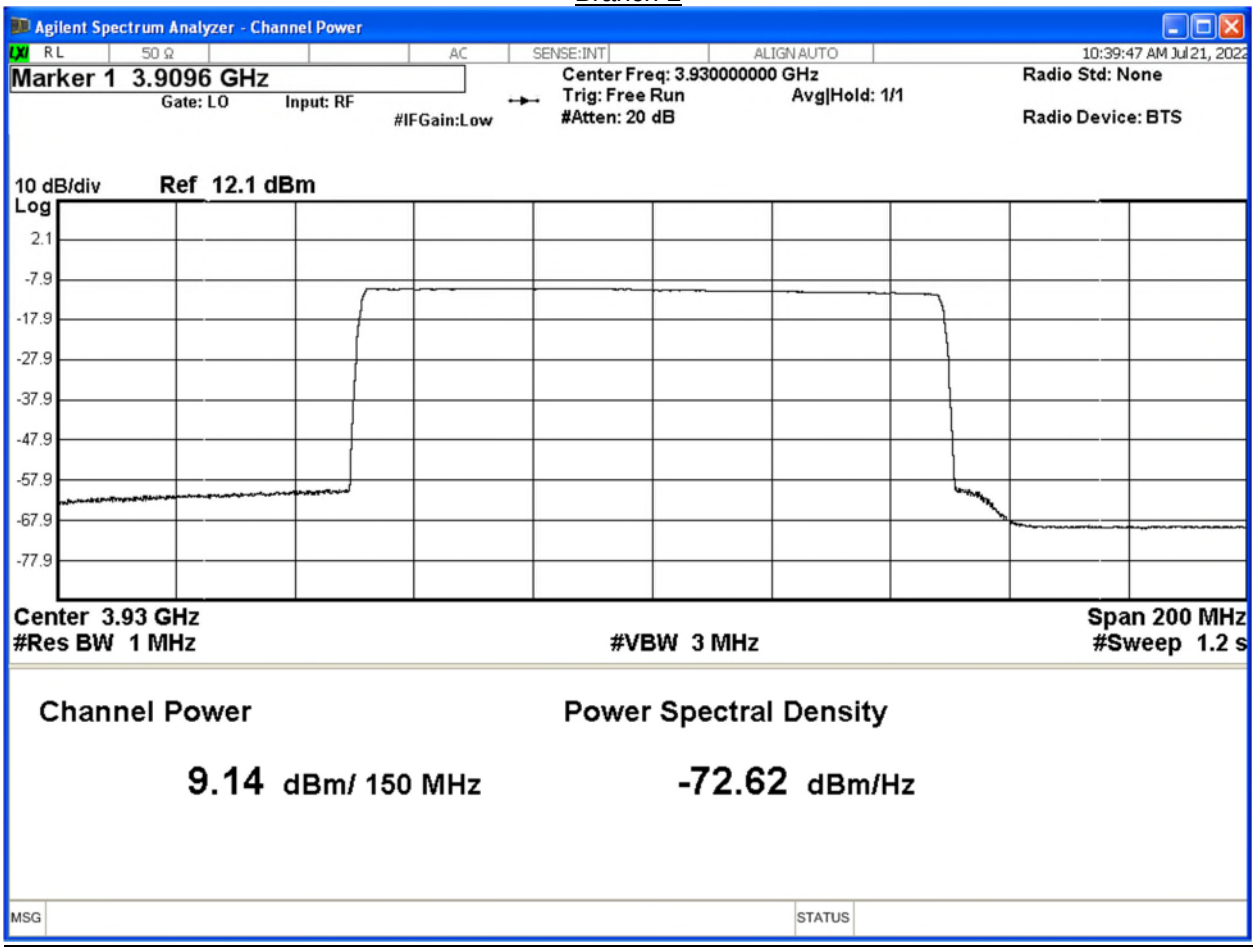
Limits	
Peak to Average Ratio	13 dB - Pass

2.1.6.10 Graphs (Power) - Top Channel: 3930 MHz

Branch 1



Branch 2



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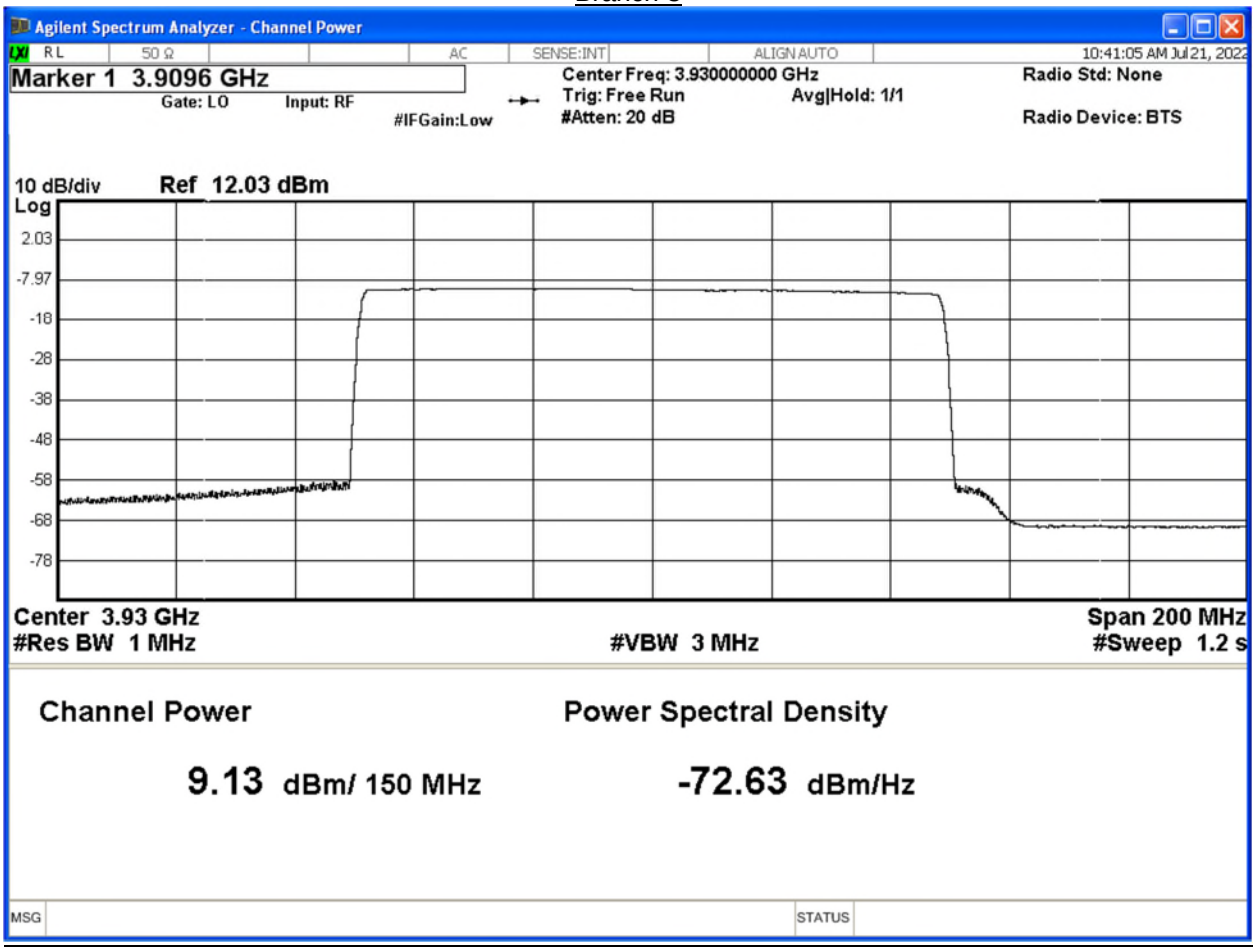

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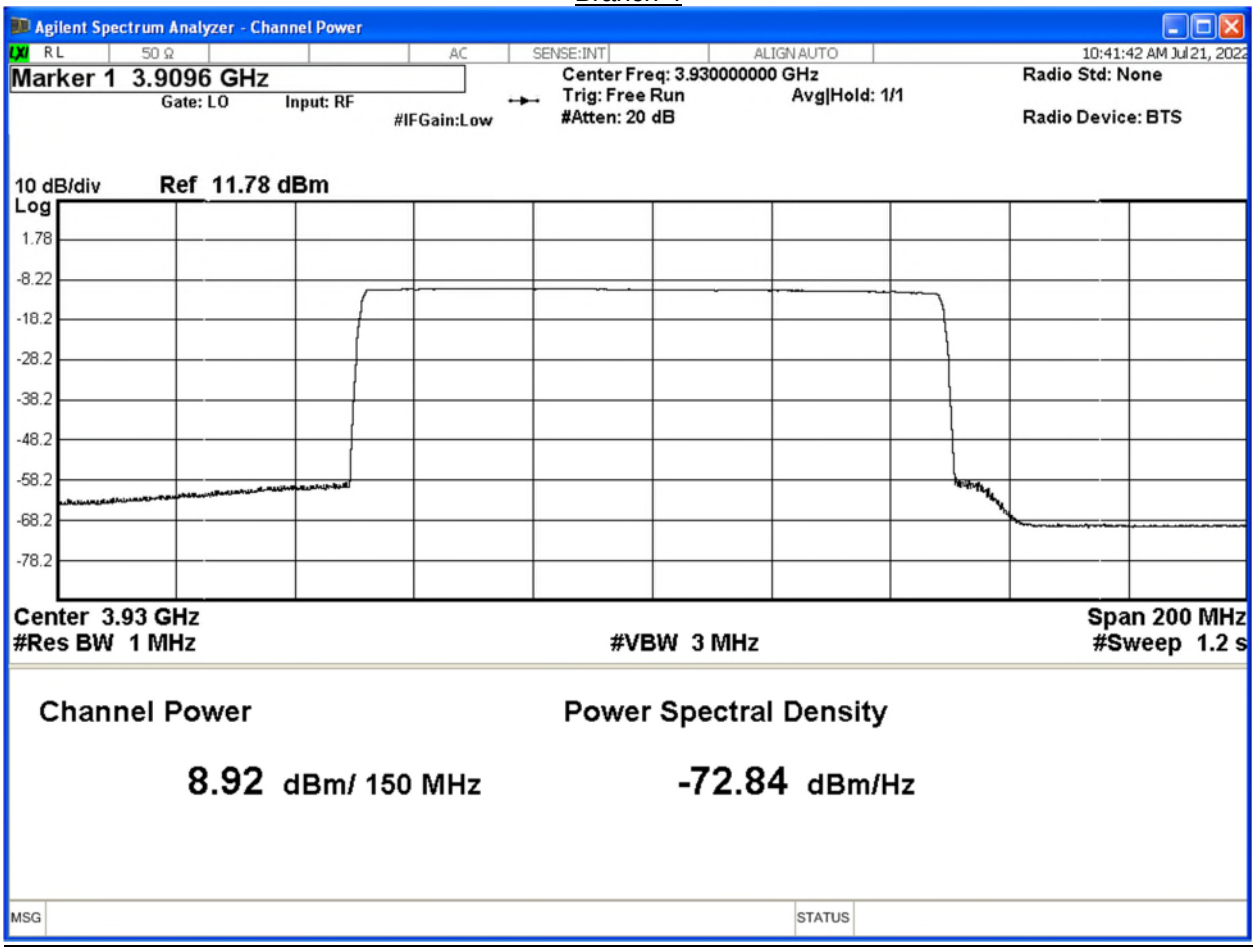

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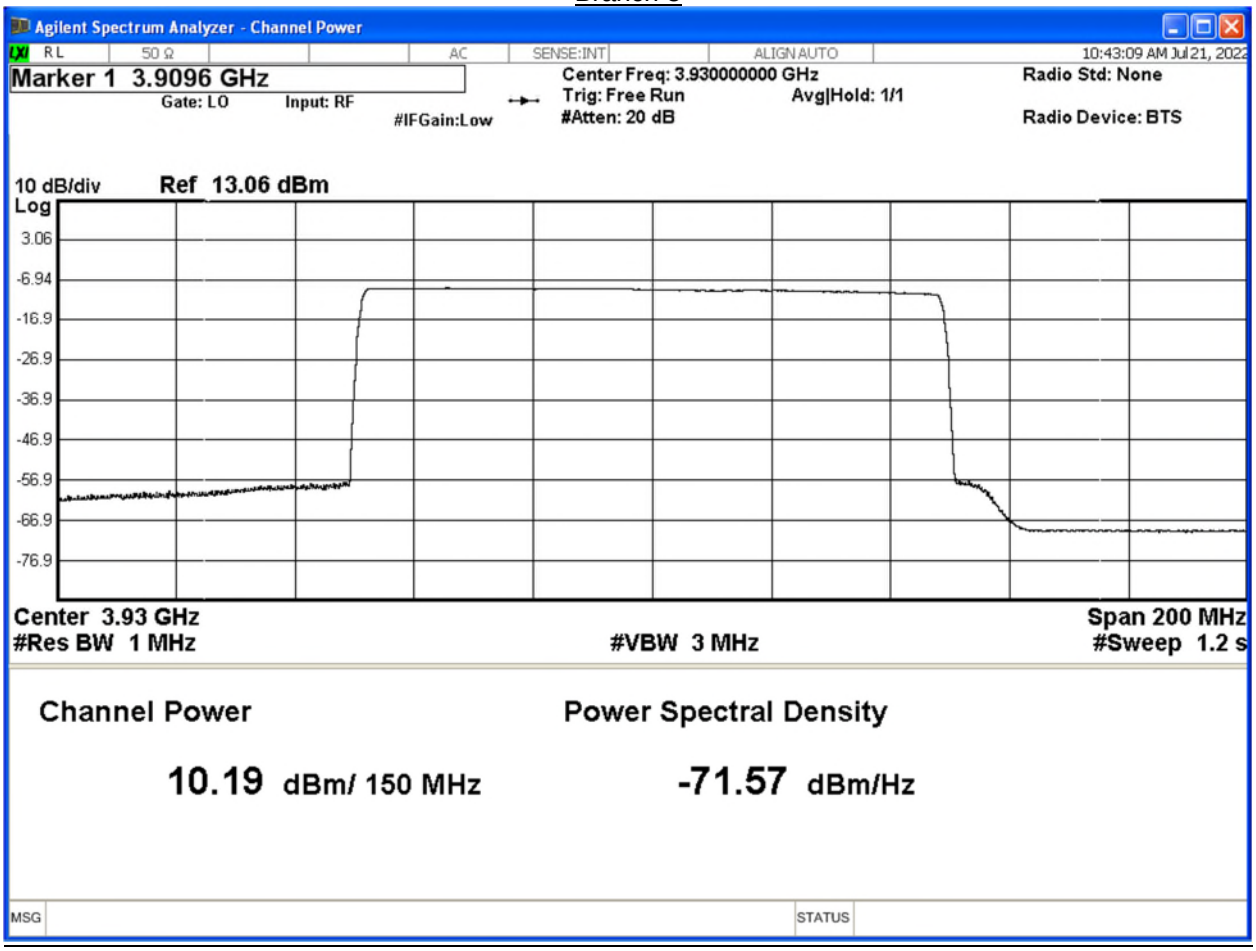

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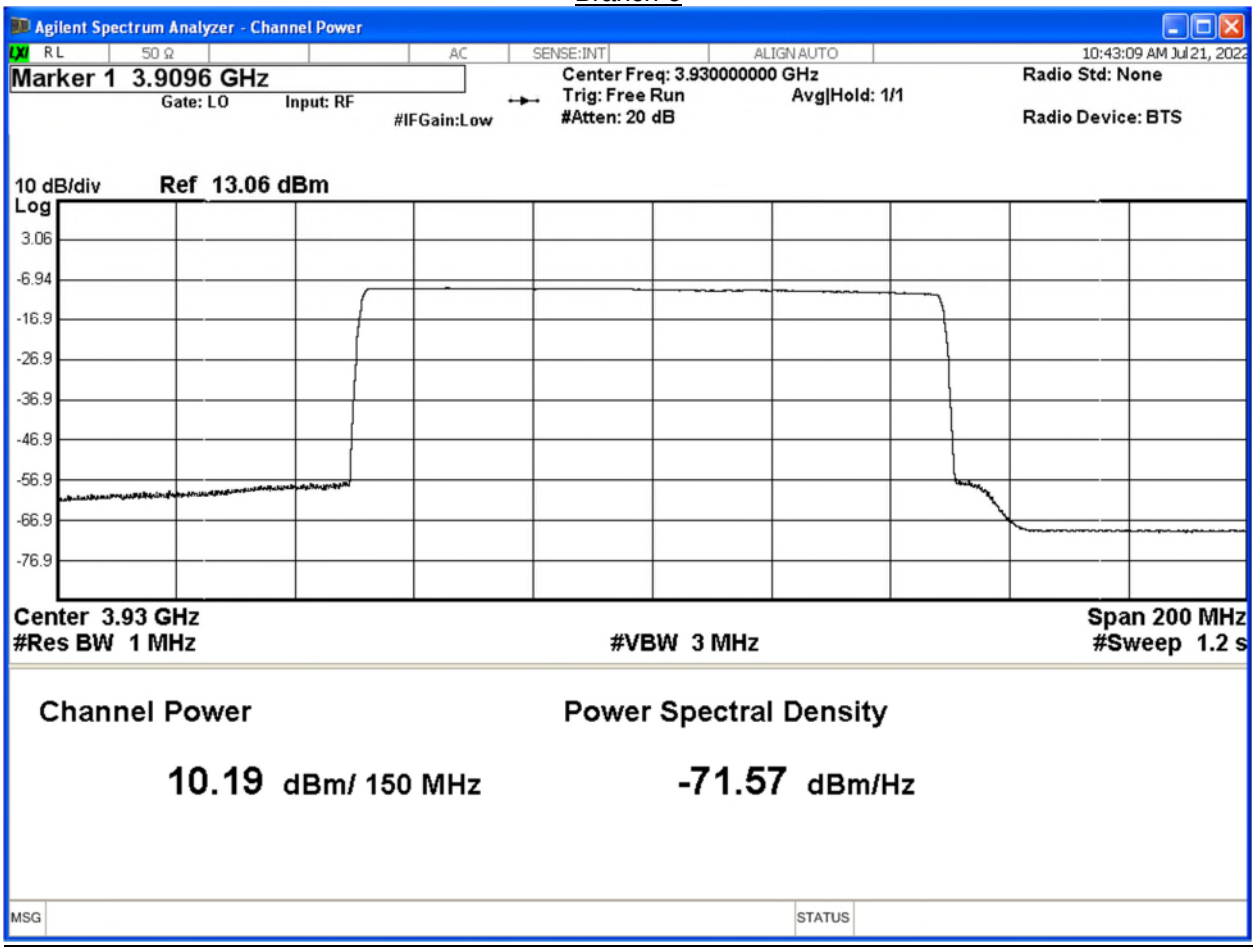

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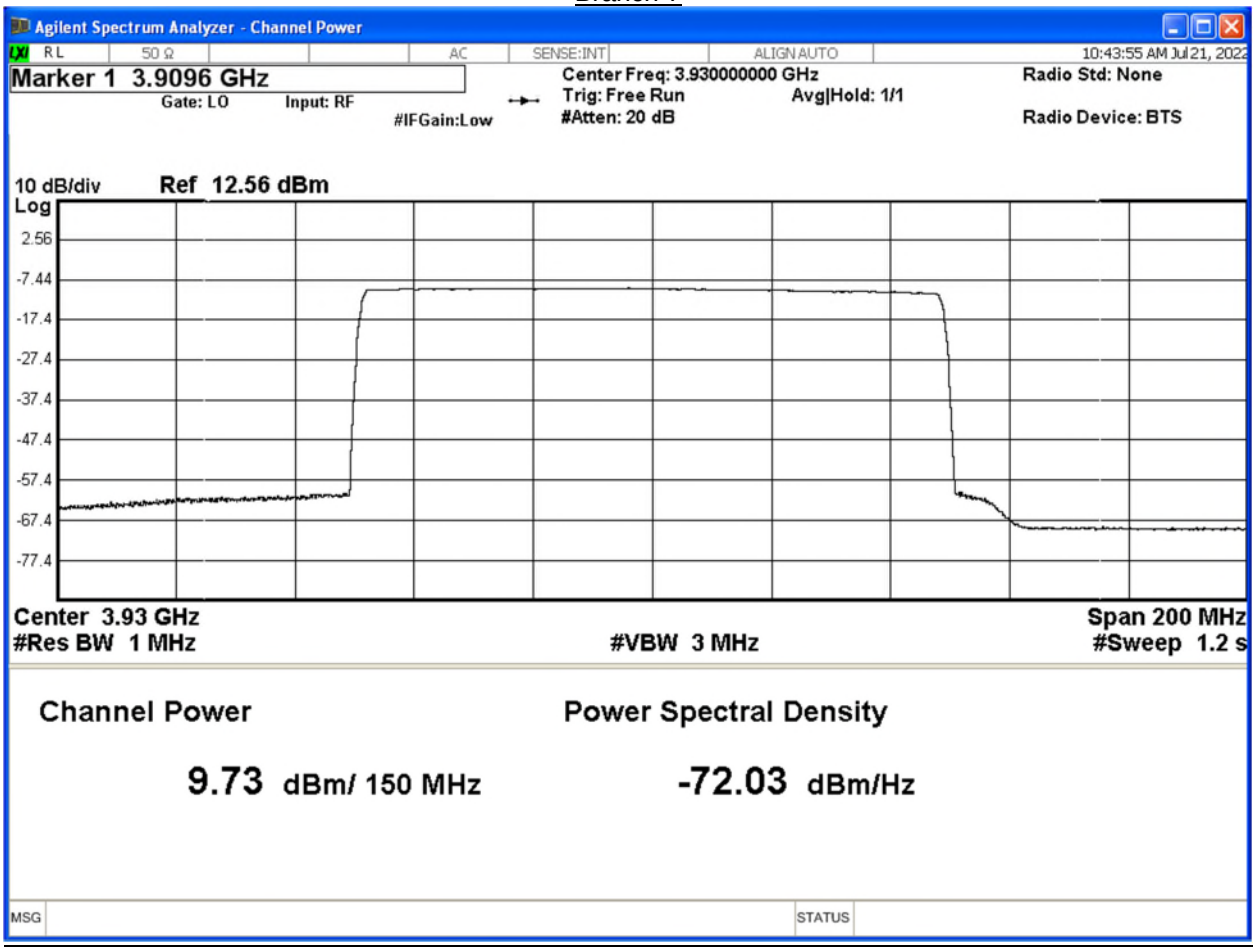

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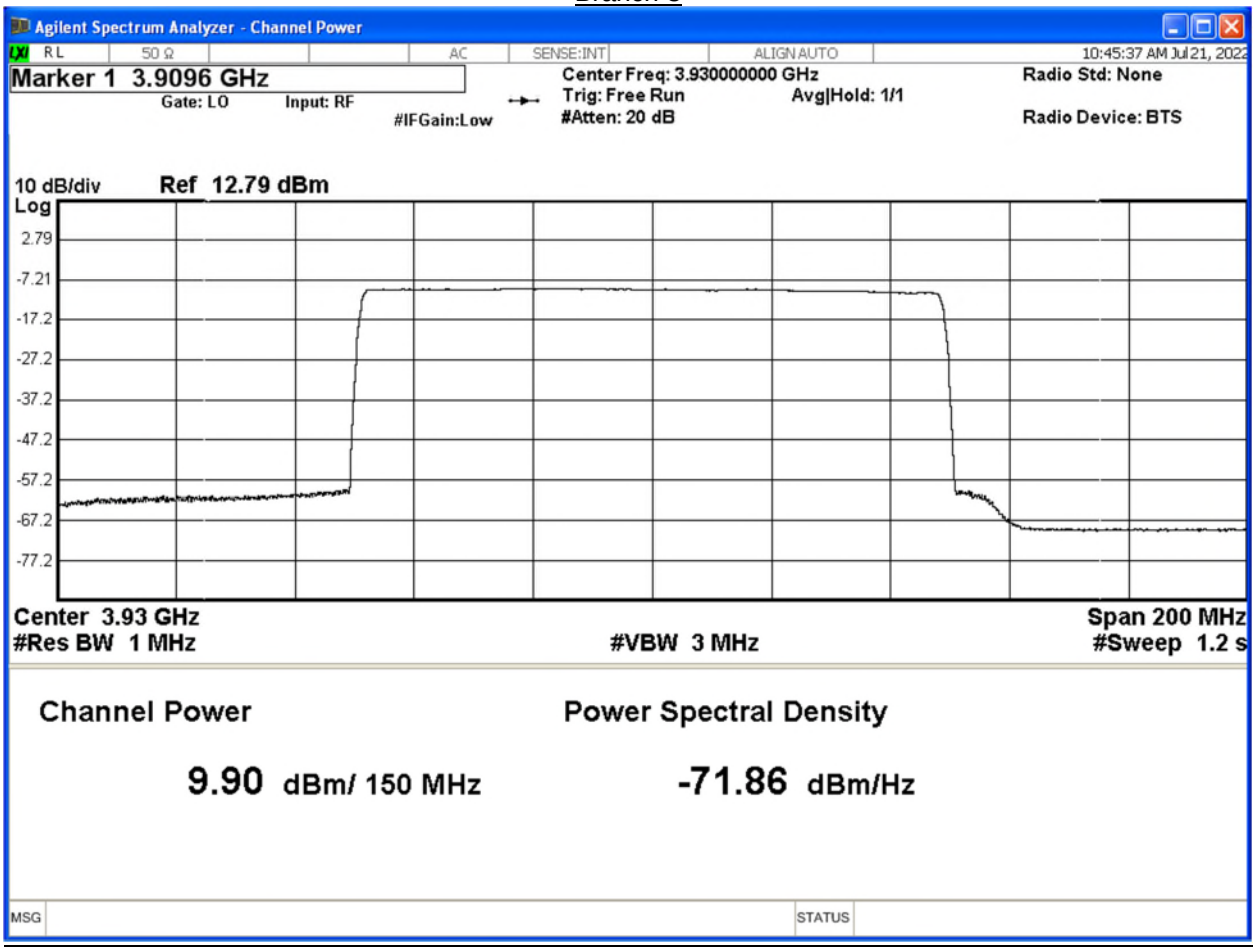
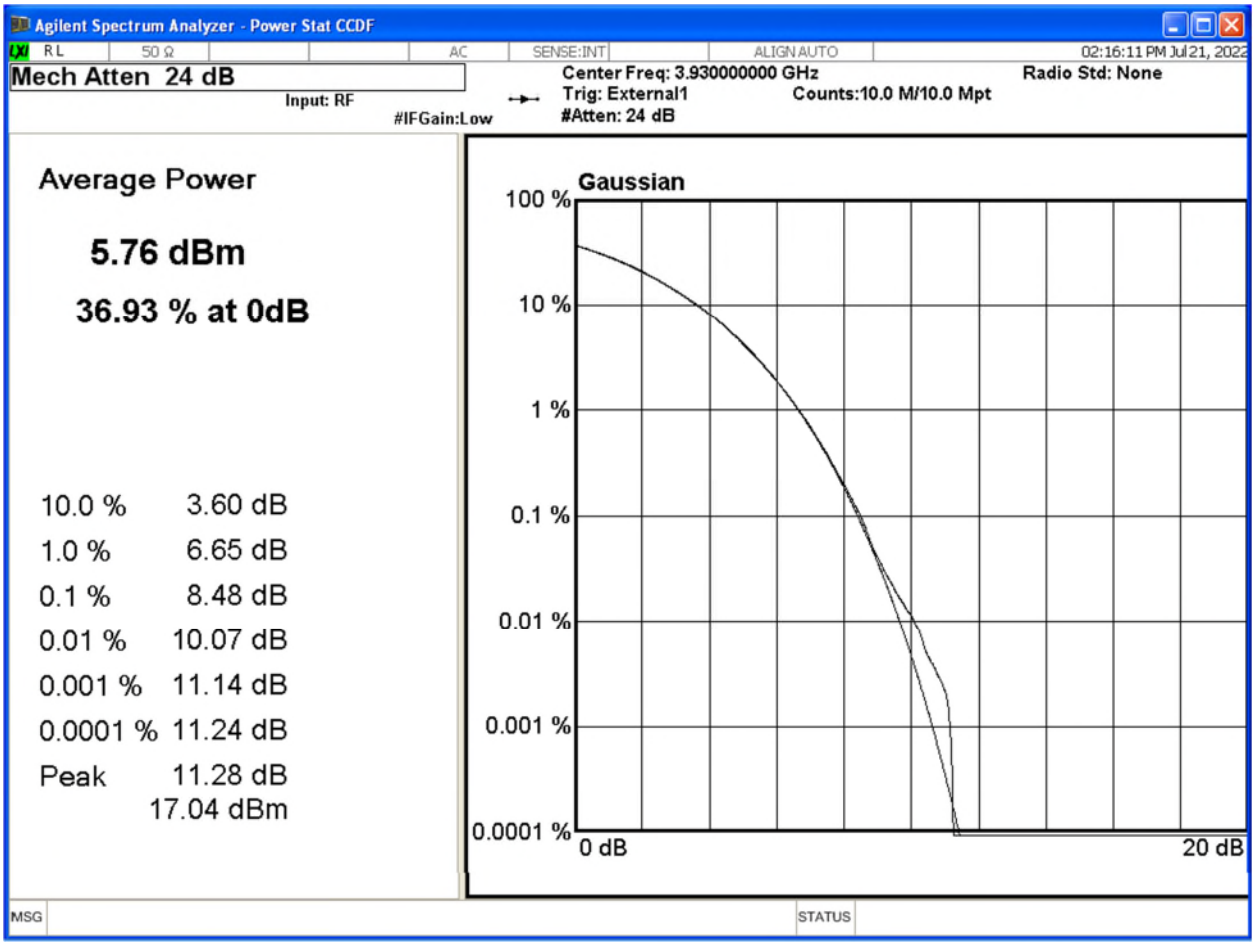


2.1.6.11 Graph (Peak to Average ratio)- Top Channel – 3930 MHz



Limits	
Peak to Average Ratio	13 dB - Pass

2.2 OCCUPIED BANDWIDTH

2.2.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049
FCC CFR 47 Part 27, Clause 27.53

2.2.2 Date of Test and Modification State

July 21 - Modification State 0

2.2.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.4 Environmental Conditions

Ambient Temperature	23.1°C
Relative Humidity	33.4%

2.2.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01.

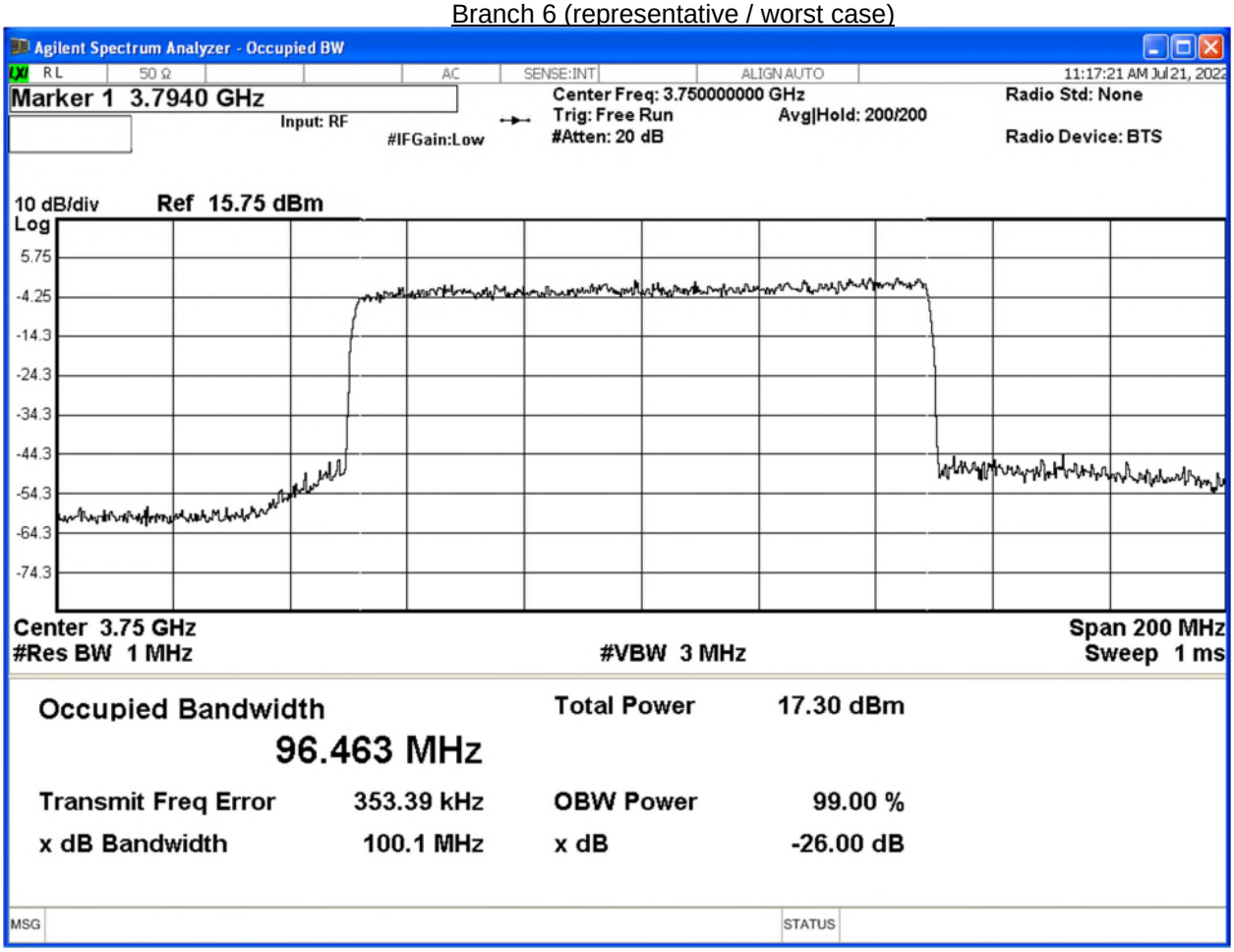
2.2.6 Test Results

Maximum Output Power: B: 30 dBm; M: 47 dBm and T: 30 dBm. The worst-case scenario of middle channels is provided.

2.2.6.1 Bottom Channel – 3750 MHz

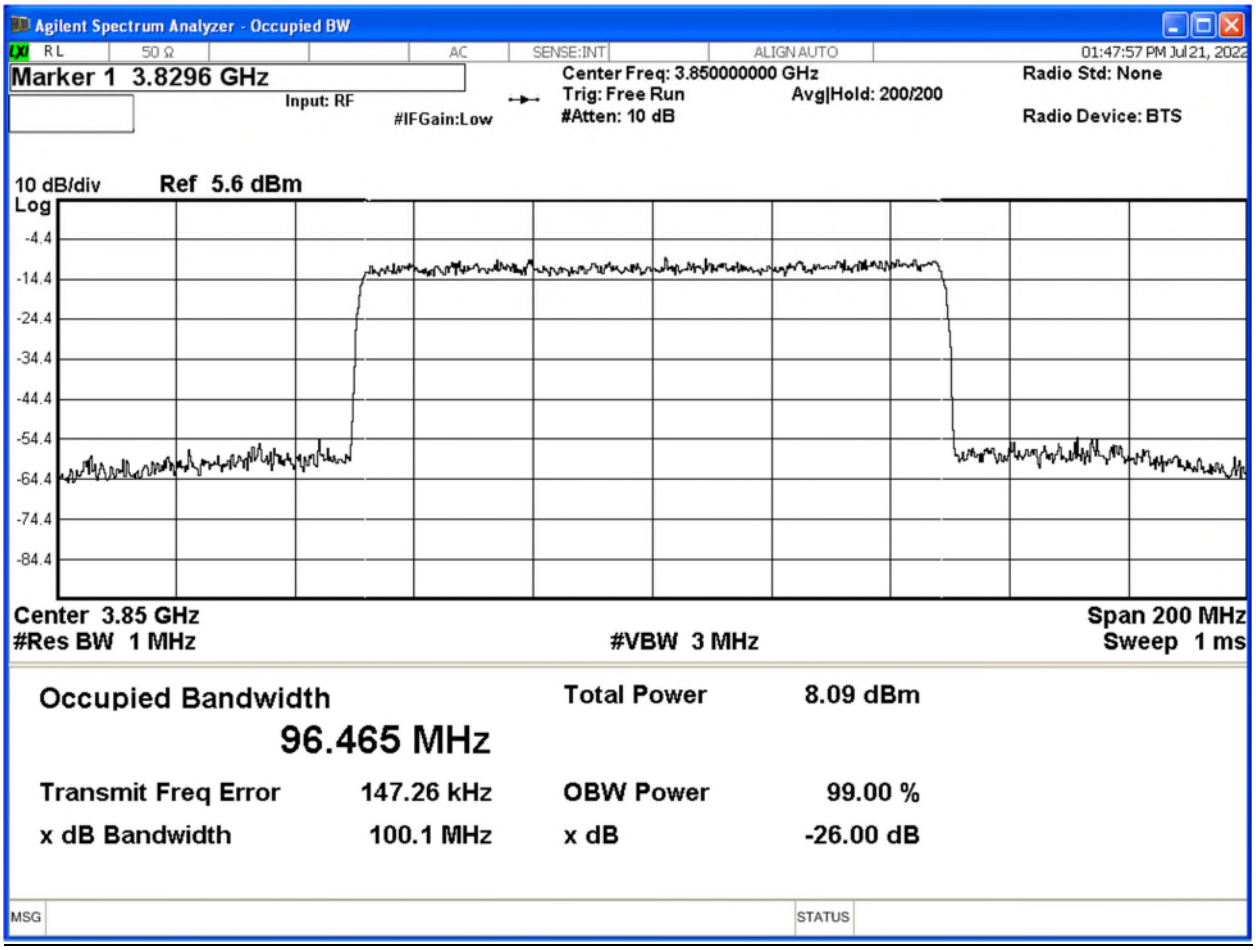
Modulation	Carrier Bandwidth	Result (MHz)	
		Channel Bandwidth	
		Occupied Bandwidth	-26 dB Bandwidth
5G: QPSK	5G: 100.0 MHz	96.463 MHz	100.1

Branch 6 (representative / worst case)



2.2.6.2 Middle Channel: 3850 MHz

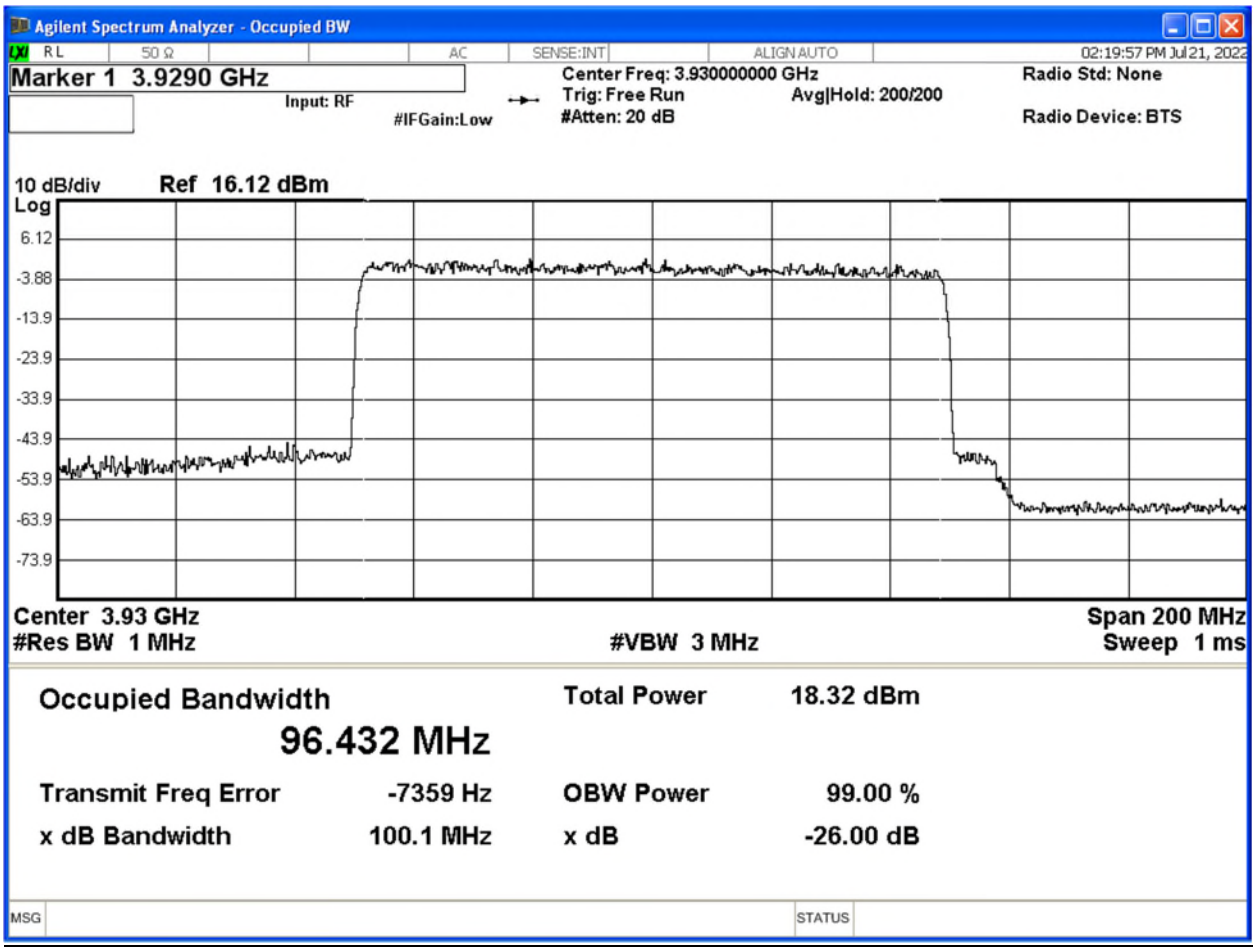
Modulation	Carrier Bandwidth	Result (MHz)	
		Channel Bandwidth	
		Occupied Bandwidth	-26 dB Bandwidth
5G: QPSK	5G: 100.0 MHz	96.465 MHz	100.1 MHz



2.2.6.1 Top Channel – 3930 MHz

Modulation	Carrier Bandwidth	Result (MHz)	
		Channel Bandwidth	
		Occupied Bandwidth	-26 dB Bandwidth
5G: QPSK	5G: 100.0 MHz	96.432	100.1

Antenna A – 5G, Bandwidth QPSK – Branch 6 3975 MHz



2.3 BAND EDGE

2.3.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 27, Clause 27.53 (h)

2.3.2 Date of Test and Modification State

23 July 2022 - Modification State 0

2.3.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.4 Environmental Conditions

Ambient Temperature	23.1°C
Relative Humidity	13.4%

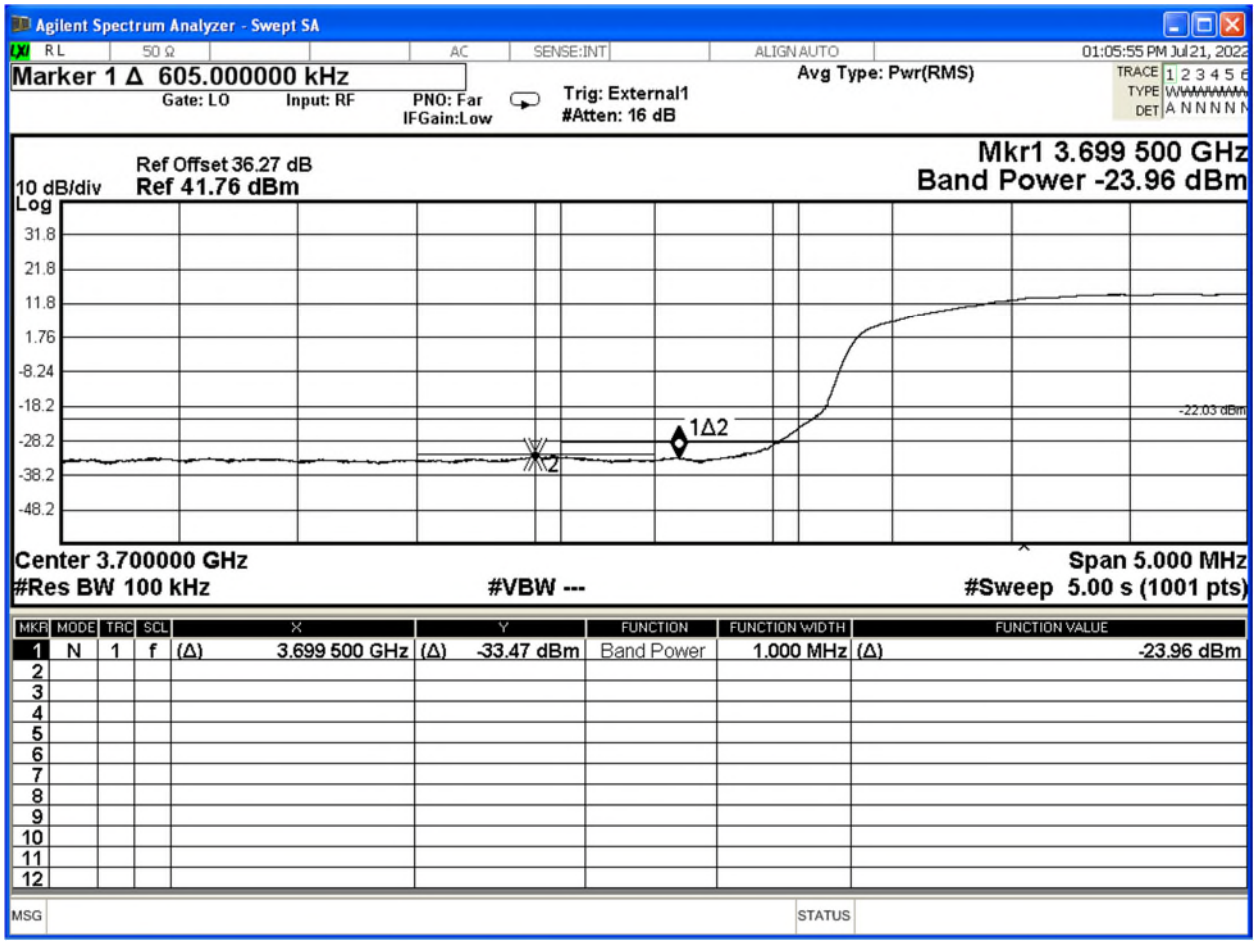
2.3.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01, clause 6.
The EUT was connected to a Spectrum Analyser via an attenuator and switching box. The pathloss between the EUT and the Spectrum Analyser was measured using a Network Analyser. The measured path loss was entered as a Reference Level Offset in the Spectrum Analyser. The Spectrum Analyser RBW was adjusted to be at least 1% of the measured 26dB Bandwidth. Using an RMS detector, the frequency spectrum up to 1MHz away from the Band Edge was Investigated. The EUT has one transmit port, testing was performed on this port with a test limit of 43+10log(P) = -13 dBm.

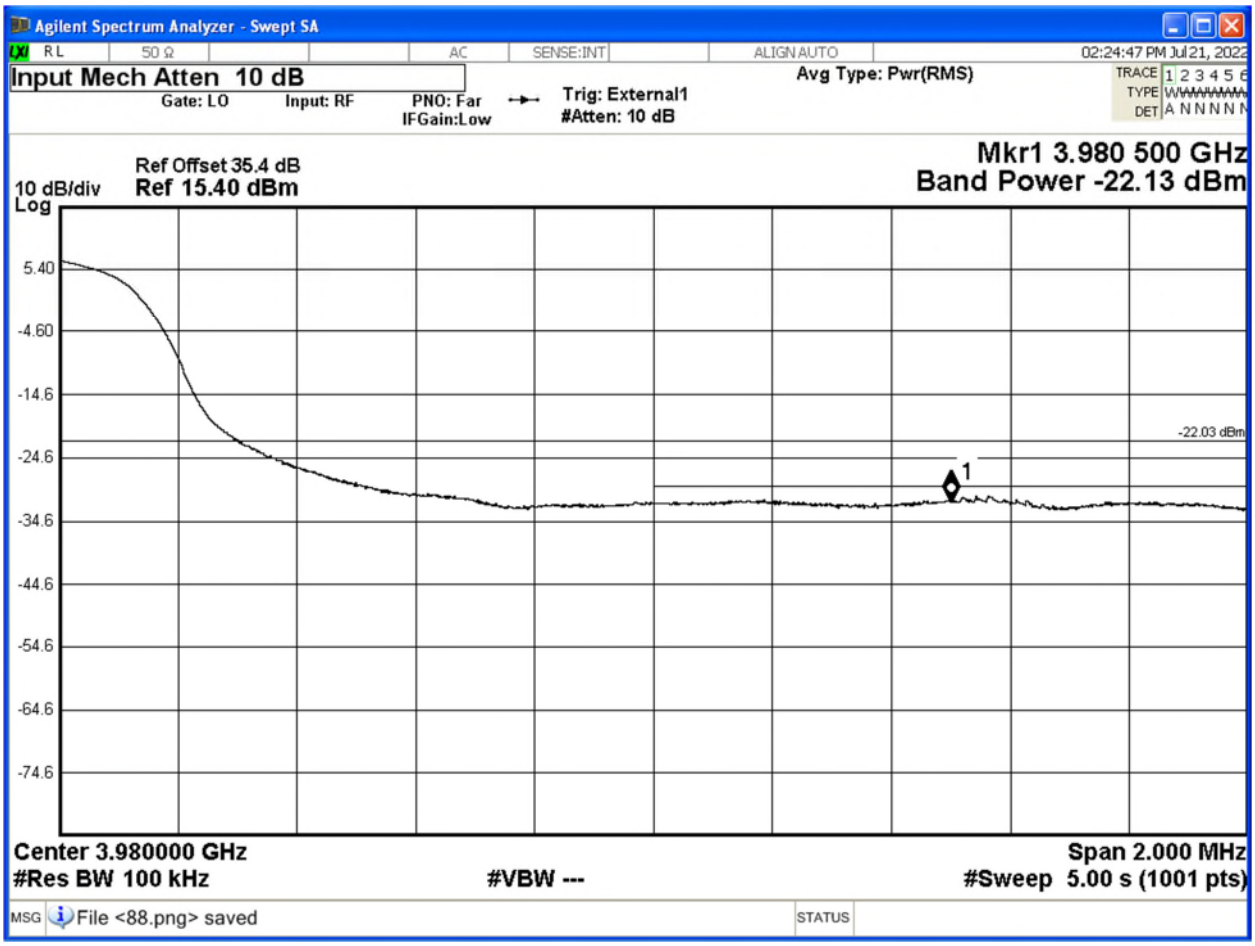
2.3.6 Test Results

Maximum Output Power: B: 30 dBm; M: 47 dBm and T: 30 dBm. The band edges of middle channels were determined and only the worst scenario is provided.

2.3.6.1 Bottom Channel: 3750 MHz



2.3.6.2 Top Channel: 3930 MHz



Note: The band power shown for the marker in the graph above is integrated over a 1 MHz bandwidth as depicted by the marker integration width line.

Limit	-22 dBm - Pass

2.4 TRANSCEIVER SPURIOUS EMISSIONS – CONDUCTED

2.4.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 27, Clause 27.53 (h)

2.4.2 Date of Test and Modification State

July 21-23 2022 - Modification State 0

2.4.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.4 Environmental Conditions

Ambient Temperature	23.1°C
Relative Humidity	33.4%

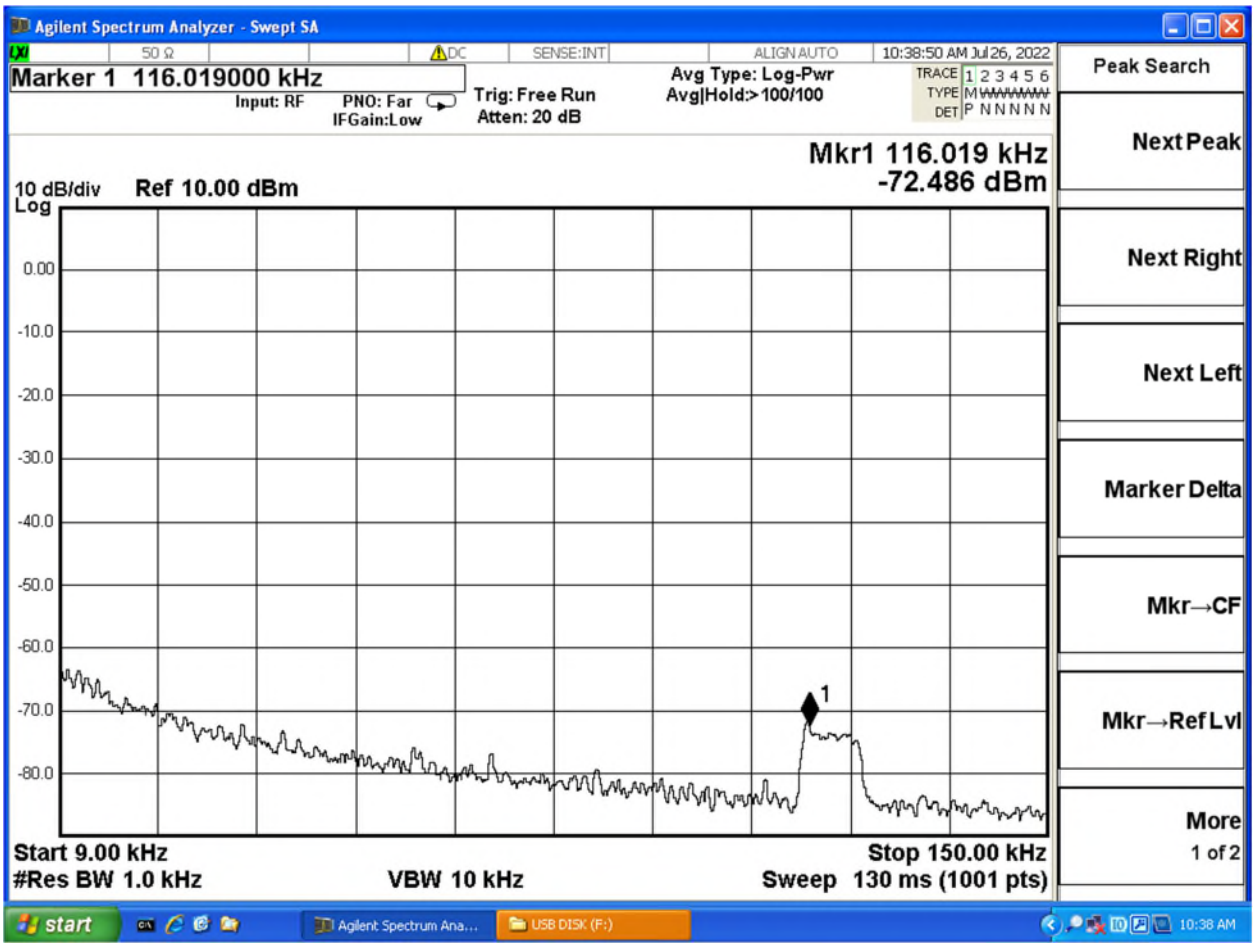
2.4.5 Test Method

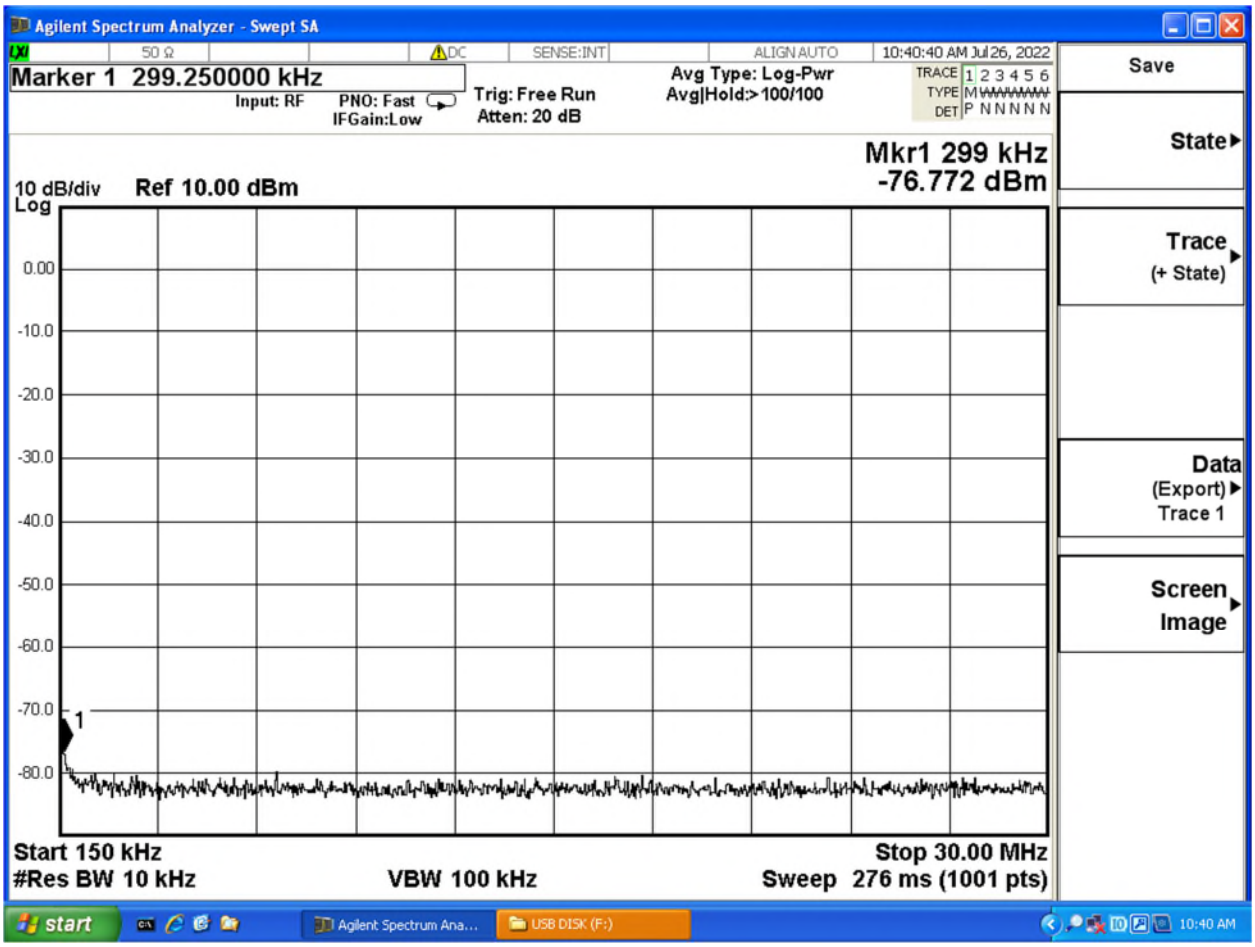
All measurements were made in accordance with FCC KDB 971168 D01.

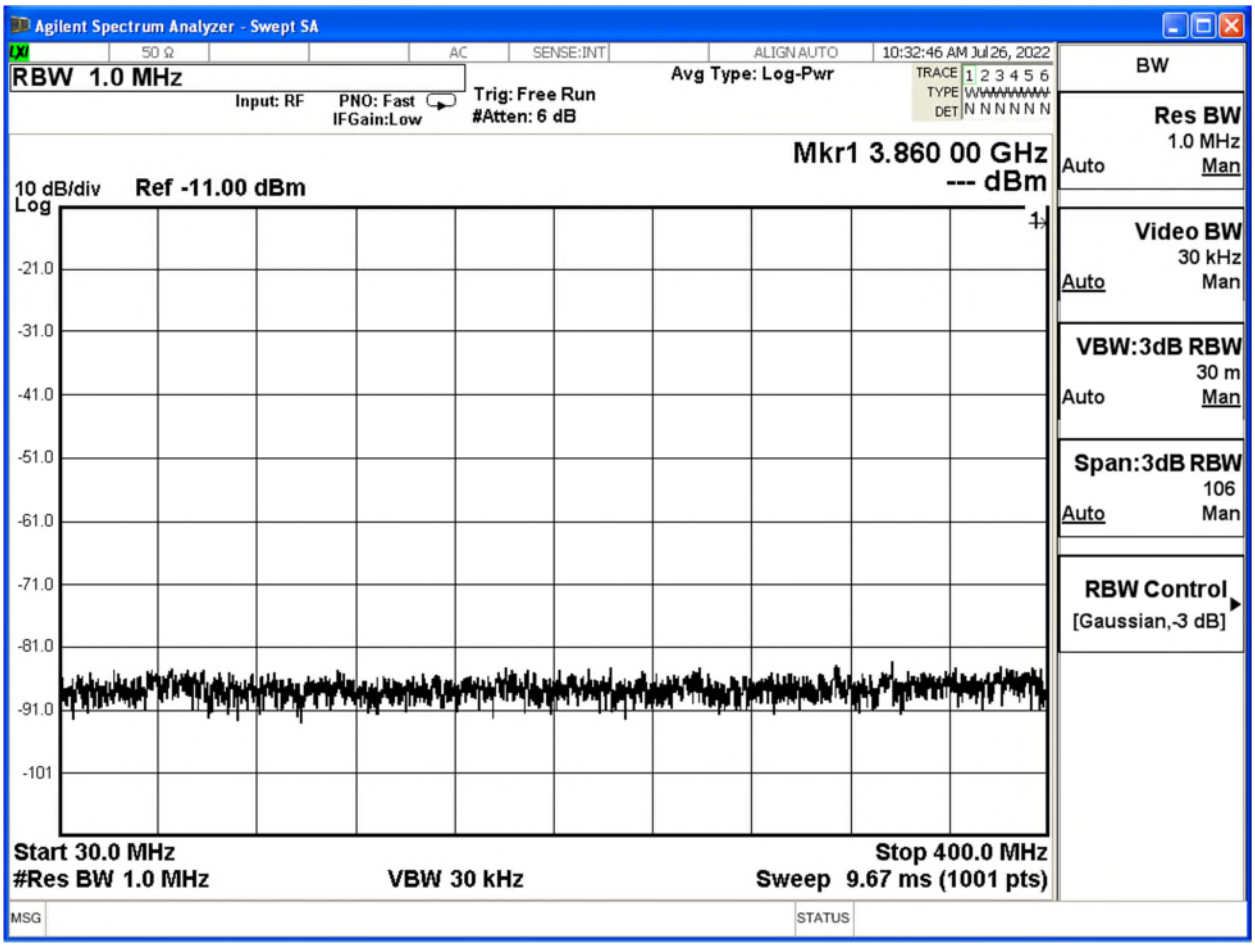
All measurements were made in accordance with FCC KDB 971168 D01 Clause 6. The EUT was connected to a Spectrum Analyser via an attenuator and switching box. Prior to testing, a Network Analyser was used to calibrate the path loss between the EUT and the Spectrum Analyser. The worst-case path loss in the measured ranges was entered as a reference level offset. Over the measured ranges, the RBW was set to 1MHz with a VBW of 3MHz. All measurement results are specified as average with an RMS detector being used in conjunction with a trace setting of Max Hold. Measurements were performed in configurations of the EUT as reported below. Testing was performed on this port with a test limit of 43+10log(P) - 10Log(number of ports)
= -13 dBm – 9.03 = -22.03 dBm

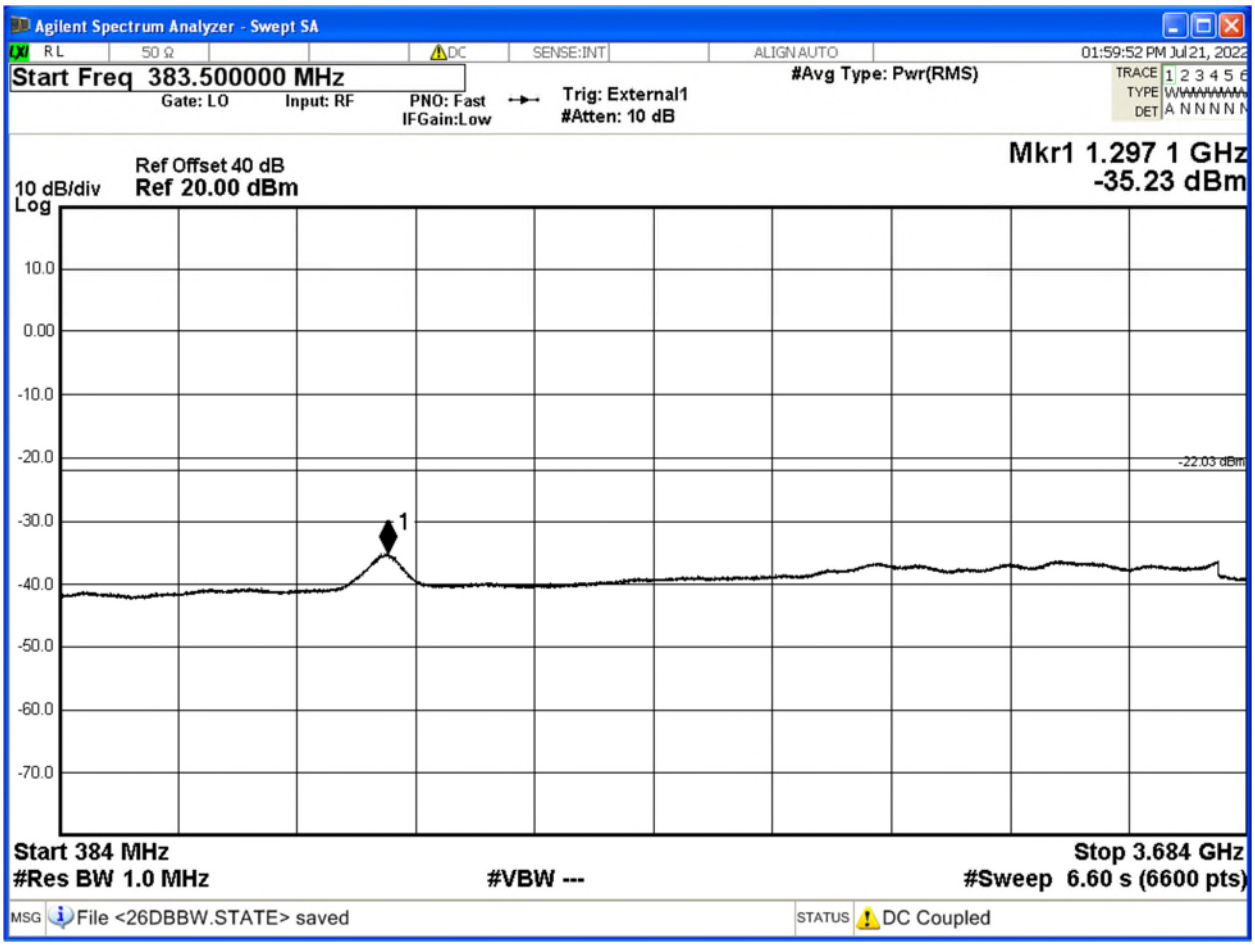
2.4.6 Test Results

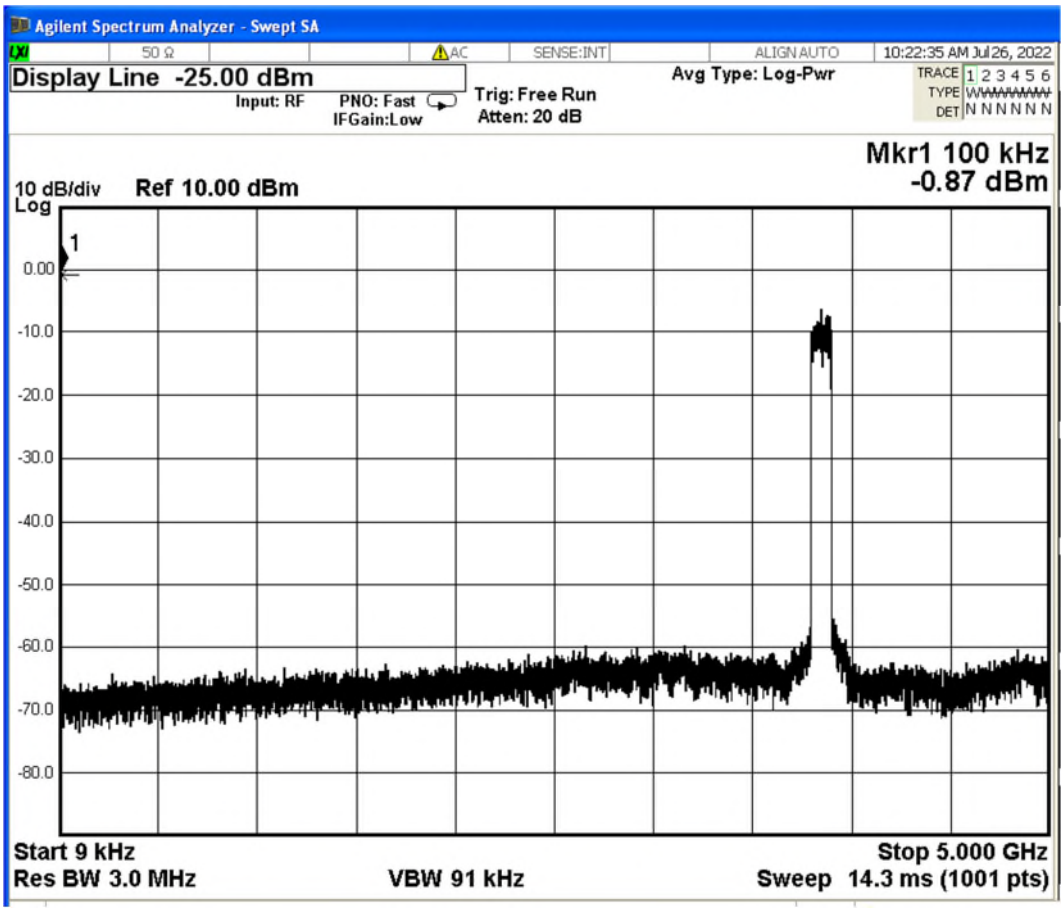
Range Frequency	Limit (dBm)	Result
9kHz to 3GHz	-13	Pass
3GHz to 5G	-13	Pass
5G to 26GHz	-13	Pass
26GHz to 40GHz	-13	Pass <Note 1>
Note 1. The device was scanned up to 40Ghz with no emission		



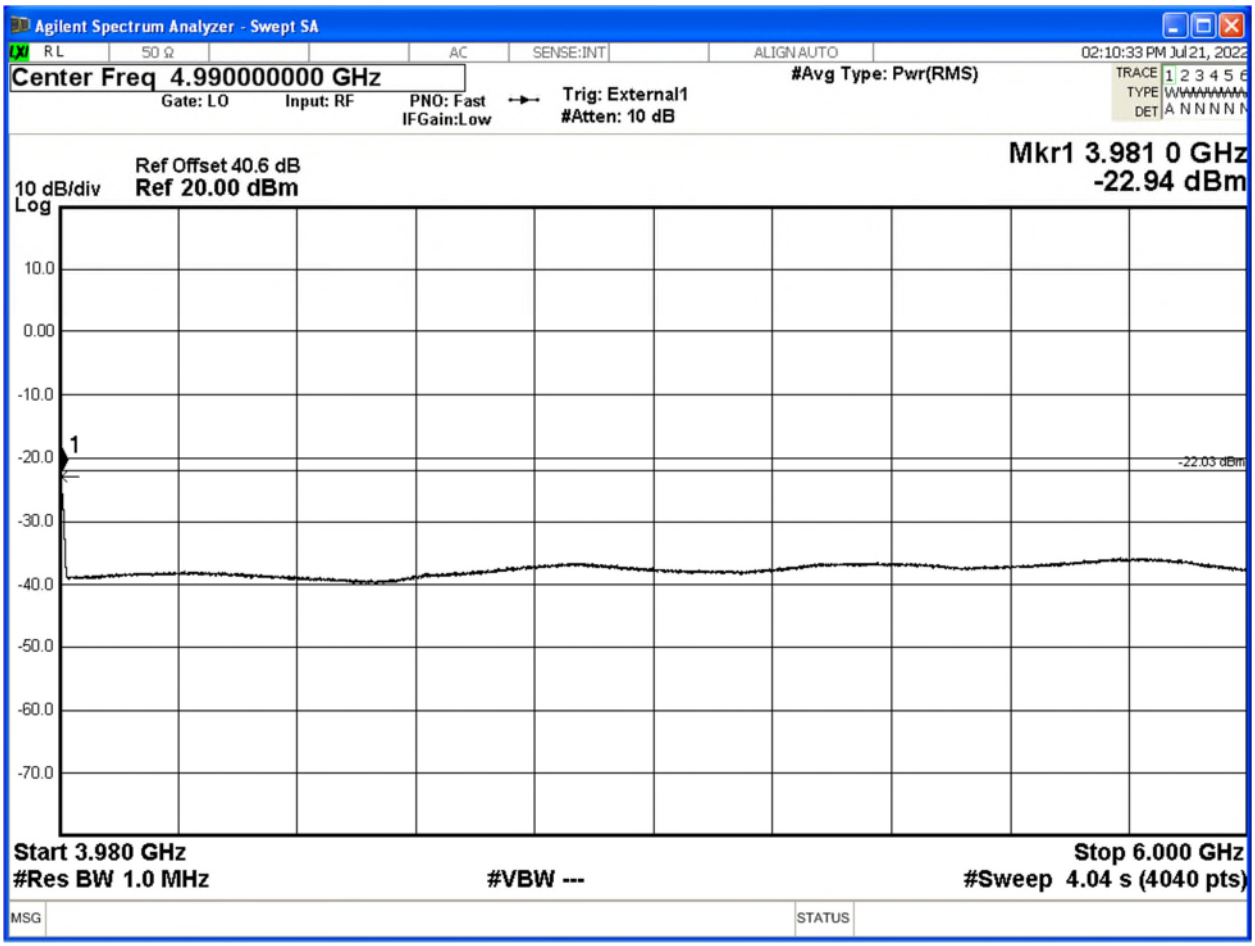


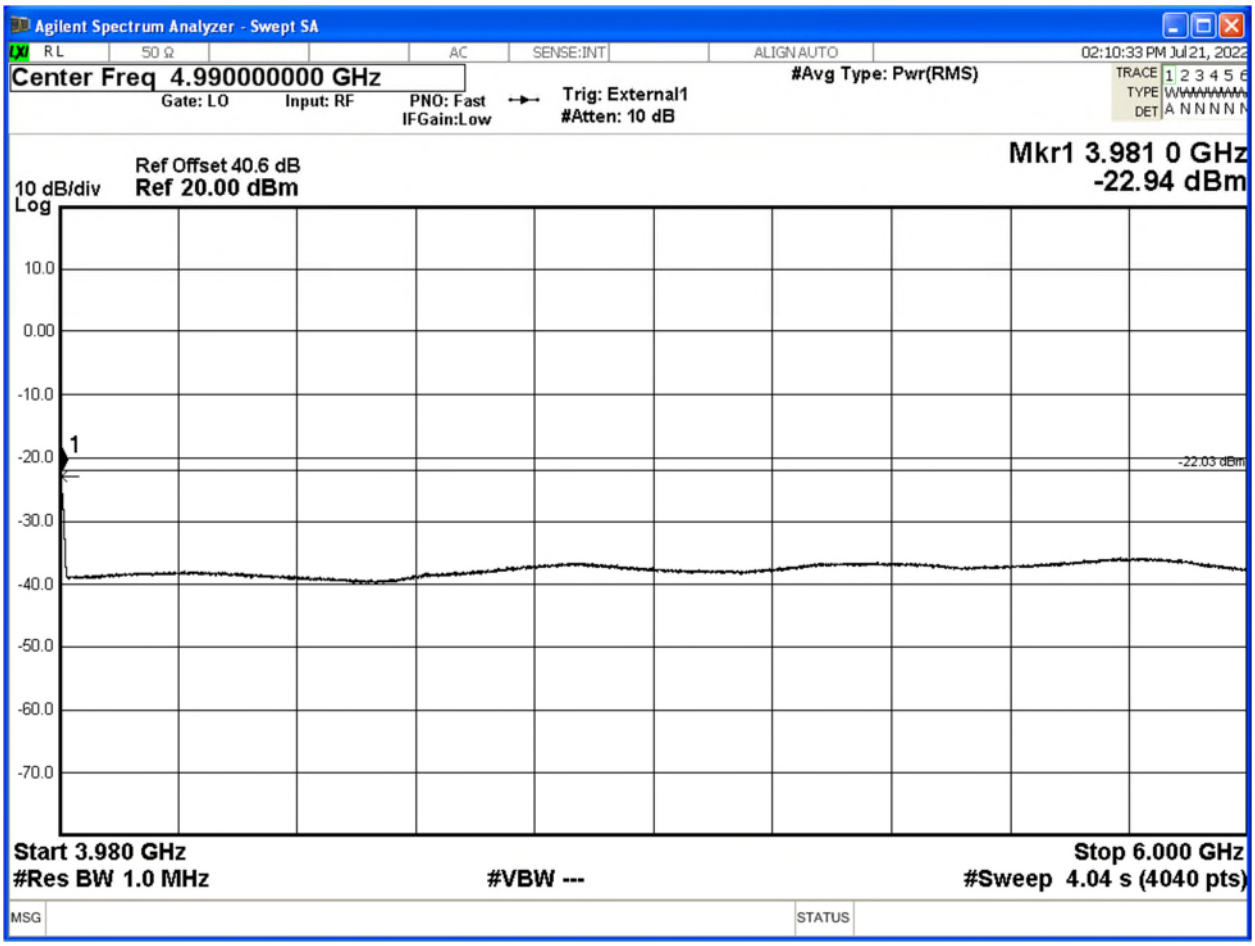


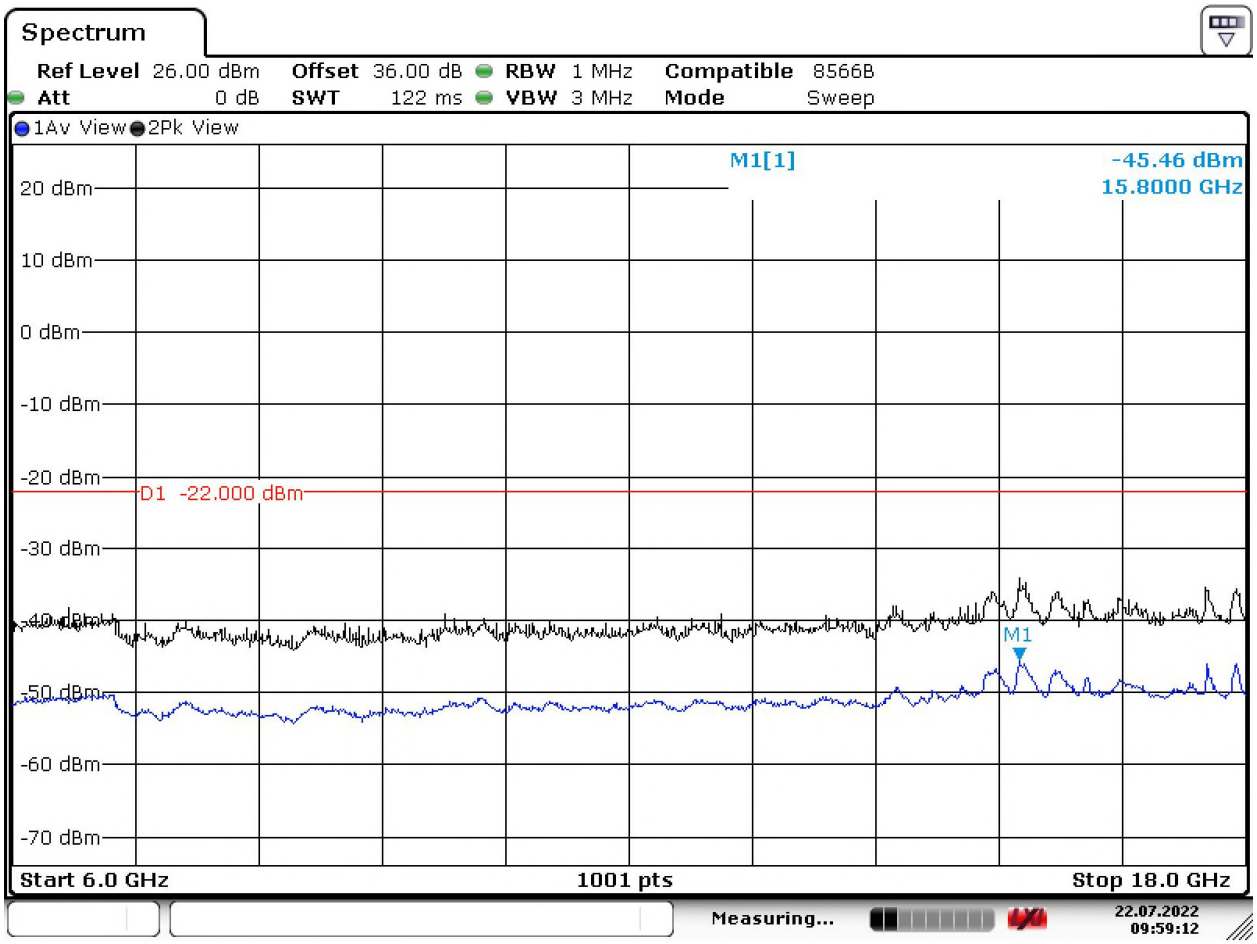




Peak readings with RF on from 9 kHz to 5 GHz (Raw Readings)

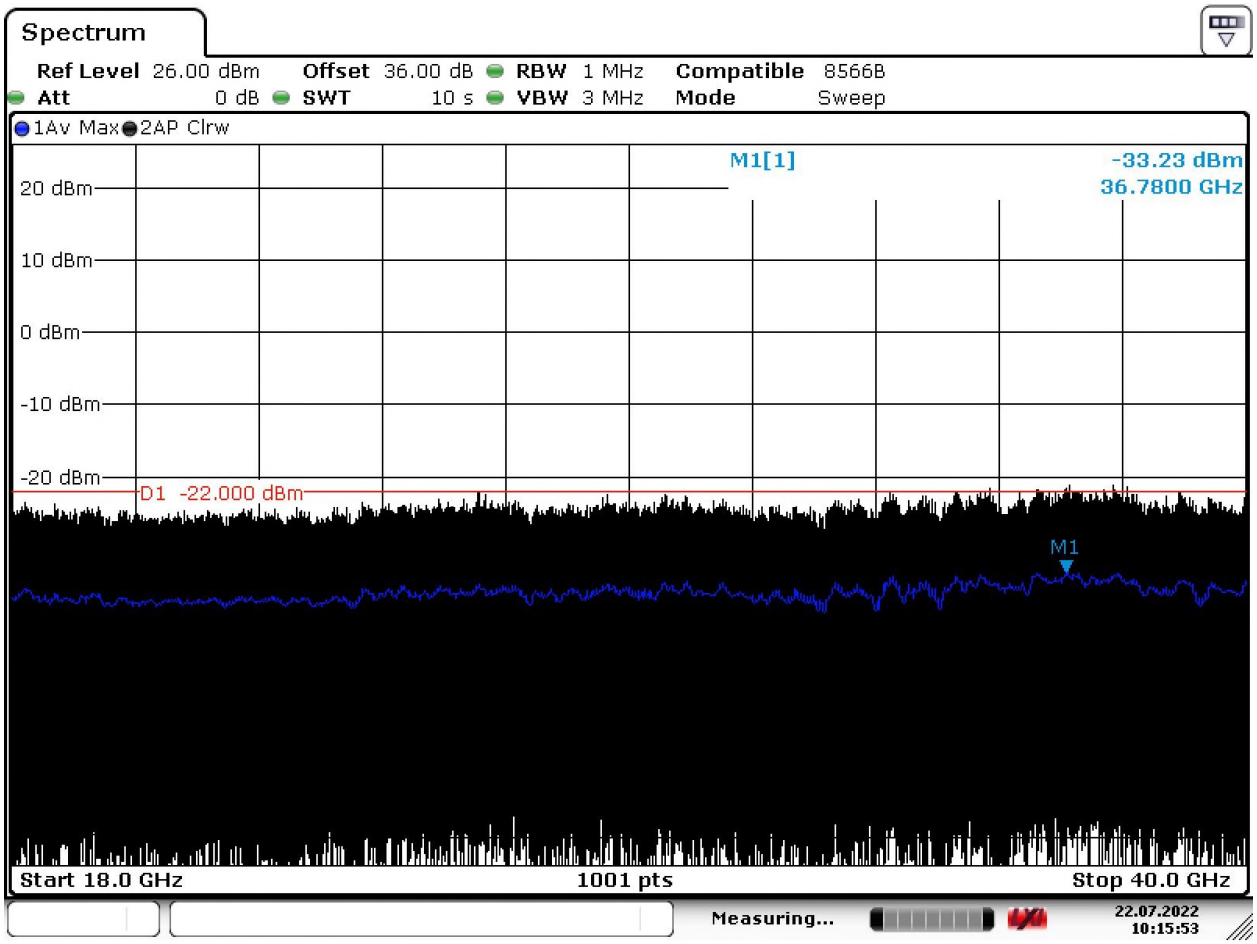






Date: 22.JUL.2022 09:59:12

Note: Black trace is peak reading, blue trace is average reading. No emissions were detected.



Date: 22.JUL.2022 10:15:54

Note: Black trace is peak reading, blue trace is average reading. No emissions were detected.

2.5 FREQUENCY STABILITY

2.5.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1055
FCC CFR 47 Part 27, Clause 27.54

2.5.2 Date of Test and Modification State

05 April 2021 - Modification State 0

2.5.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.4 Environmental Conditions

Ambient Temperature	26.7°C
Relative Humidity	32.2%

2.5.5 Test Method

All measurements were made in accordance with FCC KDB 971168 D01.

2.5.6 Test Results

2.5.6.1 Summary: Pass. Table below

Temp	Frequency (Hz)	Vaisala SSG012637	
Ambient 21.7	3840100500		
		Time	Delta (Hz)
50	3840101220	10:43	720
40	3840101150	11:15	650
30	3840100790	12:03	290
20	3840100690	12:46	190
10	3840100690	13:33	190
0	3840100580	14:02	80
-10	3840100620	14:42	120
-20	3840100730	15:19	230
-30	3840100640	15:52	140
	allowable=192KHz or 50 ppm		

Note: The EUT was tested at ambient temperature over power supply range from 40 Vdc to 56 Vdc (nominal 48Vdc) and there was no observable deviation in frequency.

2.6 Field Strength of Radiated Spurious Emissions

2.6.1 Specification Reference

FCC CFR 47 Part 27

2.6.2 Date of Test and Modification State

March 30th 2021 - Modification State 0

2.6.3 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.4 Environmental Conditions

Ambient Temperature	23.1°C
Relative Humidity	13.4%

2.6.5 Test Method

All measurements were made in accordance with:
- 971168 D01 Power Meas License Digital Systems v03r01 Clause 5.6
- 971168 D01 Power Meas License Digital Systems v03r01 Clause 7

Measurements were performed in configurations of the EUT as reported below. Testing was performed on this port with a test limit of FCC 15 Subpart B Class A, which is more restricted than -22dBm EIRP or 62.35 dBµV/m at 3m.

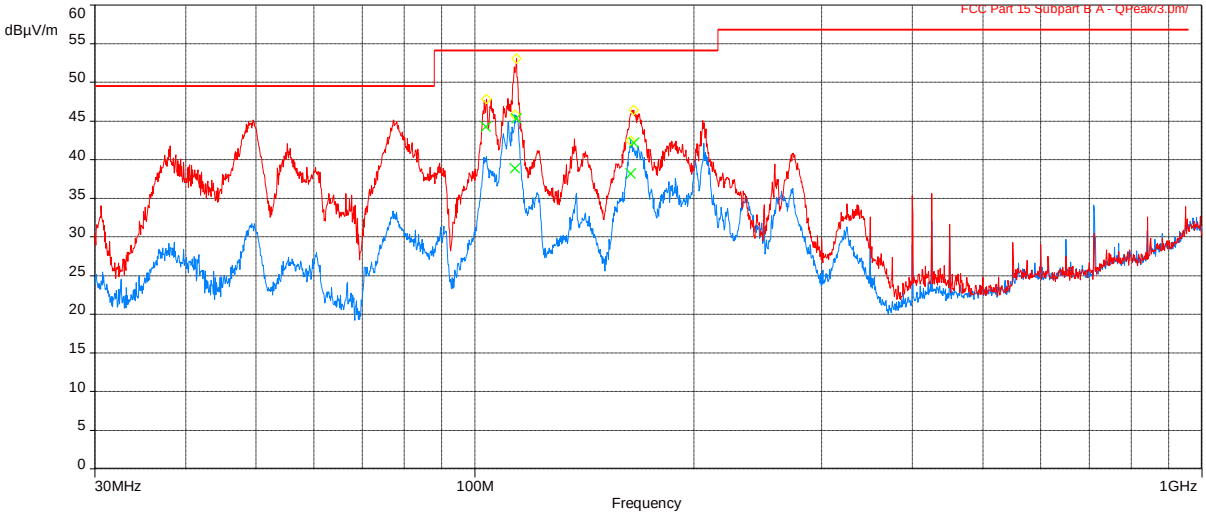
2.6.6 Test Results

A summary of the test result is depicted in the table below.

Range Frequency	Limit (dBuV/m @ 3m)	Result
9kHz to 150kHz	62.35	Pass <Note 1>
150kHz to 30MHz	62.35	Pass <note 1)
30MHz to 1GHz	62.35	Pass
1GHz to 10GHz	62.35	Pass
10GHz to 18GHz	62.35	Pass
18GHz to 40GHz	62.35	Pass <Note 2>
Note 1. Radiated Spurious unintentional emissions was performed according to FCC 15 Subpart B, therefore extended down to 9 kHz following the limits provided in 15.209. No emissions were detected and the peak reading met the requirement. Note 2. The device was scanned up to 40Ghz with no emission (peak values less than 6Bd from the limit)		

Spurious Radiation Emission –
Spurious Radiation Emission –30MHz to 1GHz

Emi CC test:C1 30-1000 MHz 3m FCC Class A Number :122 Execution date: **8/3/2022 1:23:40 PM**	
Limit	FCC Part 15 Subpart B
Class	Class : A
Test Plan Number	7169011235
Configuration Information	Config 1 DC
Results	Pass
Model	Jabil Vernon
Tested by	SM
Comments	Optimized



Red=Vertical, Blue=Horizontal

Suspects

Manual suspects (5)

Frequency (MHz)	SR	Level (dBµV/m)	Height (m)	Angle (°)	Position
103.6553333	1	47.81	1.00	359.50	Vertical
114.0666667	1	53.06	1.00	150.75	Vertical
165.3796667	1	46.37	1.98	28.75	Vertical
113.5816667	2	45.80	2.98	123.75	Horizontal
163.8276667	2	42.42	2.98	85.75	Horizontal

Finals

QuasiPeak (5)

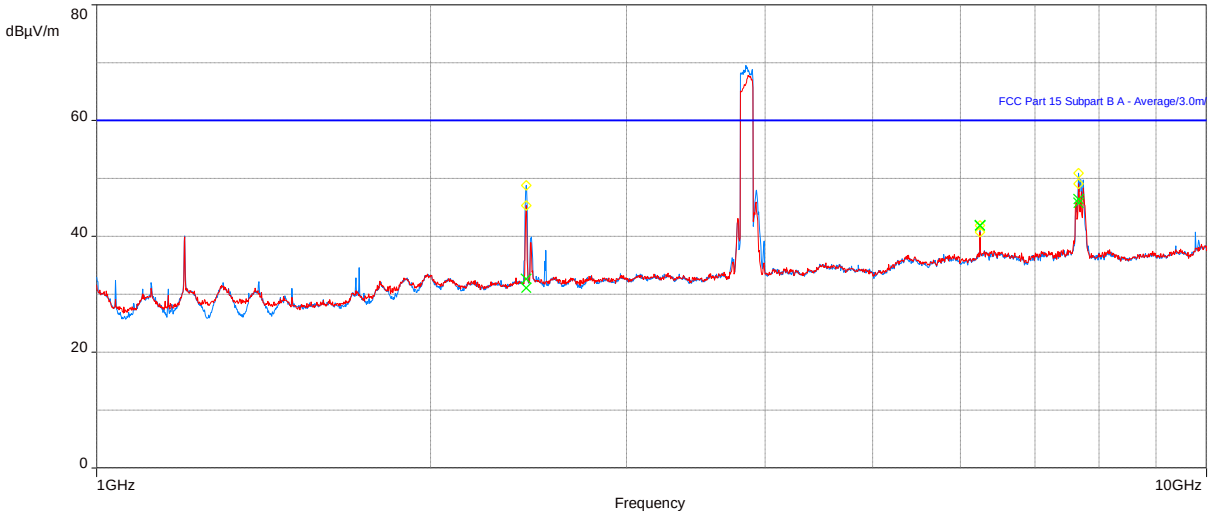
Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (m) (dB)	Azimuth (°) (dB)	Polarization	Correction (dB)
103.6287274	1	44.22	54.08	-9.86	1.11	360.00	Vertical	-9.71
114.02917	1	45.33	54.08	-8.75	1.00	33.75	Vertical	-8.77
165.3663687	1	42.20	54.08	-11.88	2.90	0.00	Vertical	-9.47

113.5702918	2	38.81	54.08	-15.27	4.00	62.50	Horizontal	-8.81
163.8610033	2	38.20	54.08	-15.88	3.01	76.75	Horizontal	-9.44

Note 1. The spurious emissions comply with the limit of 62.35 dBµV/m at 3m

Spurious Radiation Emission –1GHz to 10GHz

Emi CC test:C2 1-10 GHz 3m FCC Class A Number :123 Execution date: **8/3/2022 2:54:49 PM**	
Limit	FCC Part 15 Subpart B
Class	Class : A
Test Plan Number	7169011235
Configuration Information	Config 1 DC
Results	Pass
Model	Jabil Vernon
Tested by	SM
Comments	Optimized - intentional radiator at 3.9GHz



Red=Vertical, Blue=Horizontal

Suspects

Manual suspects (6)

Frequency (MHz)	SR	Level (dBµV/m)	Height (m)	Angle (°)	Position
2437.6	1	45.31	3.50	62.75	Vertical
6250	1	40.74	1.99	225.25	Vertical
7671.4	1	49.06	2.50	283.75	Vertical
2436.1	2	48.81	3.49	344.50	Horizontal
6250	2	41.95	3.49	296.75	Horizontal
7670.2	2	50.91	3.00	355.00	Horizontal

Finals

AVG (6)

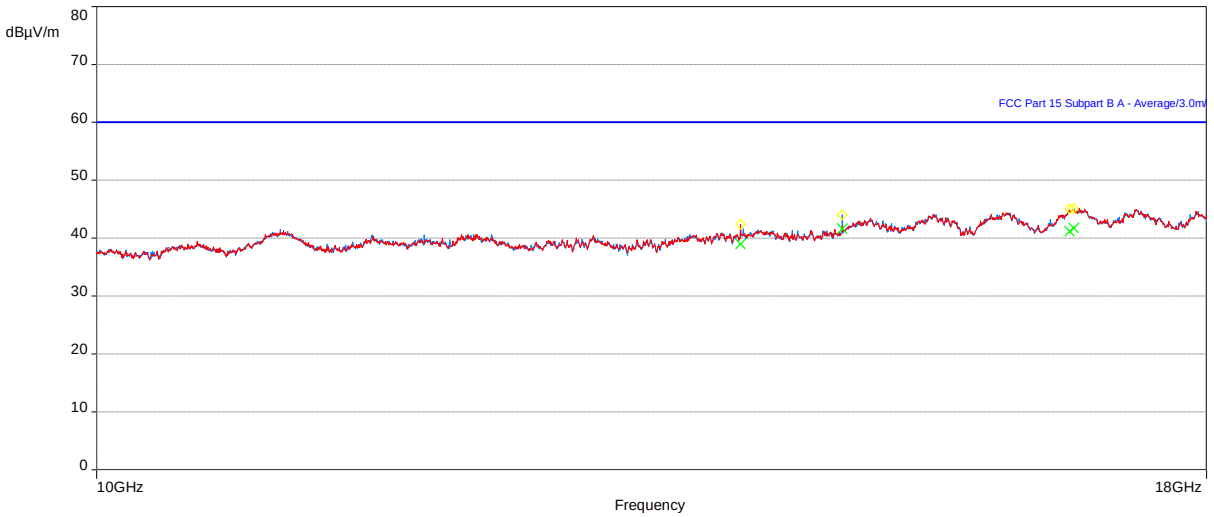
Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (m) (dB)	Azimuth (°) (dB)	Polarization (dB)	Correction (dB)
2437.583974	1	31.08	59.96	-28.88	3.40	68.75	Vertical	-5.57
6249.961538	1	41.88	59.96	-18.08	2.03	225.75	Vertical	0.68
7671.396795	1	45.78	59.96	-14.18	2.70	360.00	Vertical	4.27
2436.051923	2	32.64	59.96	-27.32	3.21	247.50	Horizontal	-5.58

6249.961538	2	41.94	59.96	-18.02	3.39	297.75	Horizontal	0.68
7670.19359	2	46.40	59.96	-13.56	3.04	355.25	Horizontal	4.28

Note 1. Transmission at 3.85 GHz of 68.49 dBµV/m was radiation from the load attenuators used and is not considered spurious emissions.

Note 2. The spurious emissions comply with the limit of 84.38 dBµV/m at 3m

Emi CC test:C3 10-18 GHz 3m FCC Class A Number :124 Execution date: **8/3/2022 3:58:34 PM**	
Limit	FCC Part 15 Subpart B
Class	Class : A
Test Plan Number	7169011235
Configuration Information	Config 1 DC
Results	Pass
Model	Jabil Vernon
Tested by	SM
Comments	Optimized intentional radiator at 3.9GHz



Red=Vertical, Blue=Horizontal

Suspects

Manual suspects (4)

Frequency (MHz)	SR	Level (dBµV/m)	Height (m)	Angle (°)	Position
14062.4	1	42.35	2.99	306.50	Vertical
16740.8	1	45.02	2.99	86.75	Vertical
14843.73333	2	44.08	3.00	14.75	Horizontal
16775.46667	2	45.11	1.49	146.50	Horizontal

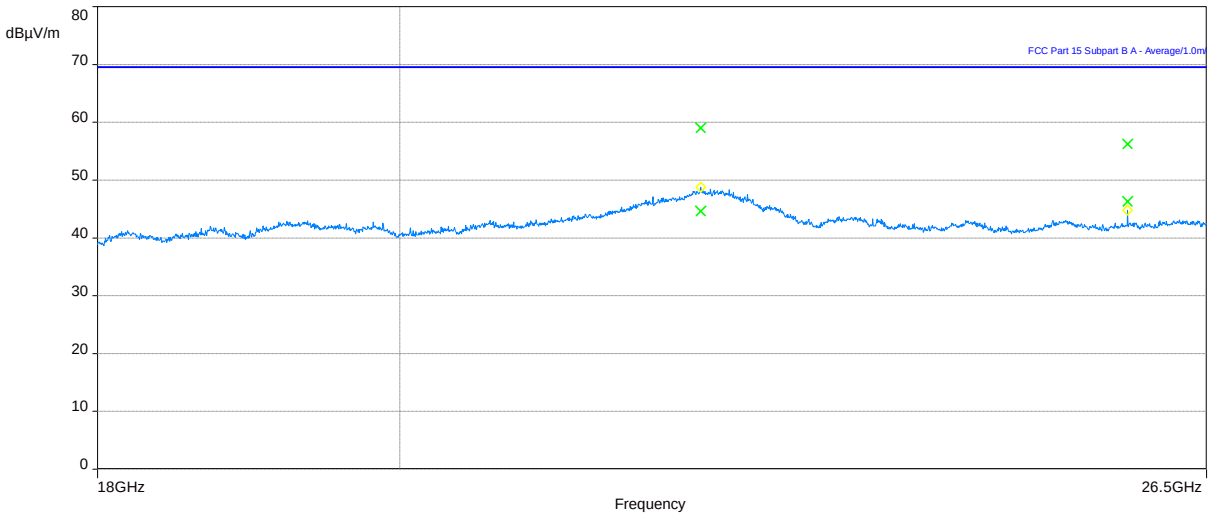
Finals

AVG (4)

Frequency (MHz)	SR	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (m) (dB)	Azimuth (°) (dB)	Polarization (dB)	Correction (dB)
14062.41442	1	39.04	59.96	-20.92	2.87	291.50	Vertical	10.91
16740.72147	1	41.22	59.96	-18.74	3.40	315.00	Vertical	14.12
14843.65928	2	41.61	59.96	-18.35	2.47	358.50	Horizontal	10.01
16775.58399	2	41.75	59.96	-18.21	3.50	360.00	Horizontal	14.53

Note 1. The spurious emissions comply with the limit of 62.35 dBµV/m at 3m

Emi CC test:C4 18-26 GHz 1m Number :125 Execution date: **8/3/2022 5:15:47 PM**	
Limit	FCC Part 15 Subpart B
Class	Class : A
Test Plan Number	7169001235
Configuration Information	Config 1 DC
Results	Pass
Model	Jabil Vernon
Tested by	SM
Comments	Optimized



Red=Vertical, Blue=Horizontal

Suspects

Manual suspects (2)

Frequency (MHz)	SR	Level (dBµV/m)	Position
22212.88333	1	48.78	Horizontal
25781.18333	1	44.80	Horizontal

Finals

Meas. Avg (2)

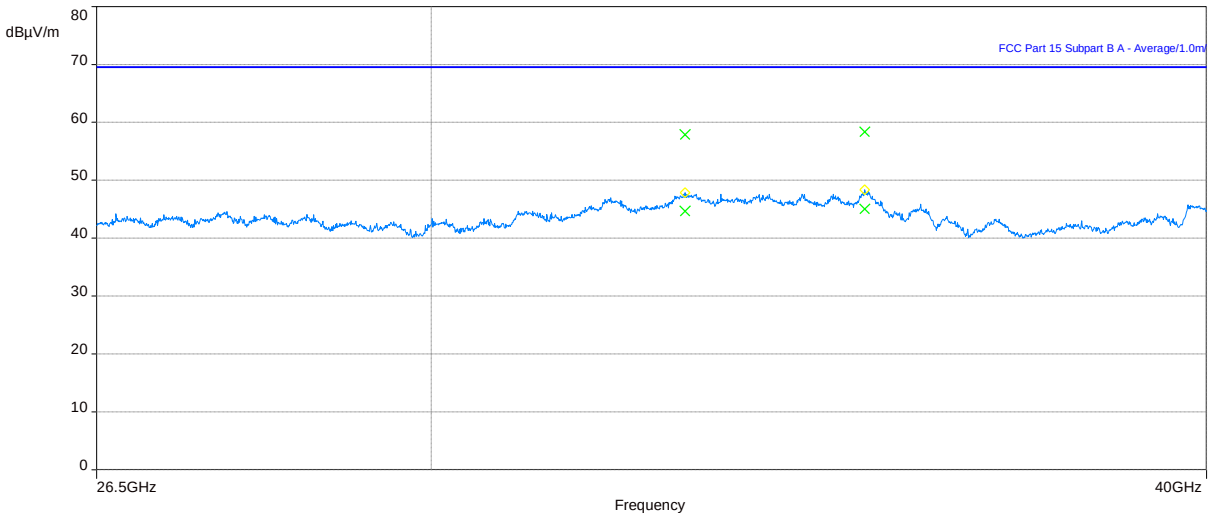
Frequency (MHz)	SR	Meas.Avg (dBµV/m)	Limit (dBµV/m)	Meas. - Lim. (dB)	Polarization / Comments	Correction (dB)
22212.85463	1	44.63	69.54	-24.91	Horizontal /	15.83
25781.19614	1	46.30	69.54	-23.24	Horizontal /	9.30

Meas. peak (2)

Frequency (MHz)	SR	Meas.Peak (dBµV/m)	Limit (dBµV/m)	Meas. - Lim. (dB)	Polarization / Comments	Correction (dB)
22212.85463	1	59.00	89.50	-30.50	Horizontal /	15.83
25781.19614	1	56.18	89.50	-33.32	Horizontal /	9.30

Note: No emissions were detected 18 GHz to 26 GHz.

Emi CC test:C5 26-40 GHz 1m Number :126 Execution date: **8/3/2022 5:21:28 PM**	
Limit	FCC Part 15 Subpart B
Class	Class : A
Test Plan Number	7169011235
Configuration Information	Config 1 DC
Results	Pass
Model	Jabil Vernon
Tested by	SM
Comments	Optimized



Red=Vertical, Blue=Horizontal

Suspects

Manual suspects (2)

Frequency (MHz)	SR	Level (dBµV/m)	Position
32962	1	47.86	Horizontal
35234.95	1	48.35	Horizontal

Finals

Meas. Avg (2)

Frequency (MHz)	SR	Meas.Avg (dBµV/m)	Limit (dBµV/m)	Meas. - Lim. (dB)	Polarization / Comments	Correction (dB)
32962.00737	1	44.70	69.54	-24.84	Horizontal /	13.16
35234.9508	1	45.03	69.54	-24.51	Horizontal /	12.09

Meas. peak (2)

Frequency (MHz)	SR	Meas.Peak (dBµV/m)	Limit (dBµV/m)	Meas. - Lim. (dB)	Polarization / Comments	Correction (dB)
32962.00737	1	57.90	89.50	-31.60	Horizontal /	13.16
35234.9508	1	58.31	89.50	-31.19	Horizontal /	12.09

Note: No emissions were detected 26 GHz to 40 GHz.

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

List of absolute measurements and other principal items of test equipment.

Instrument	Manufacturer	Type No.	Serial/Asset No.	Calibration Period (months)	Calibration Due
PXA Signal Analyzer	Keysight	N9030A	MY53310519	24	4/26/2024
Coaxial Cable	Huber & Suhner	104PEA	SSG012041	N/A	N/A
Coaxial Cable	Huber & Suhner	106A	SSG013841	N/A	N/A
Pre-Amplifier	Hp	8447D	SSG013045	24	10/15/2022
Coaxial Cable	Huber & Suhner	106A	SSG012711	N/A	N/A
Bilog Antenna	Teseq	6111D	SSG013955	12	1/20/2023
EMI Receiver	Rohde & Schwarz	ESU40	SSG013672	24	1/14/2024
Coaxial Cable	Micro-Coax	UFA 210B-1-1500-504504	SSG012376	N/A	N/A
Coaxial Cable	Huber & Suhner	ST18/Nm/Nm/36	SSG012786	N/A	N/A
Pre-Amplifier	BNR	LNA	SSG012360	12	10/28/2022
Double Ridged Horn Antenna	ETS-Lindgren	3116	LAVE04210	24	11/5/2023
Coaxial Cable	Huber & Suhner	101 PEA, Sucoflex	SSG012290	N/A	N/A
Horn Antenna (18 - 40 GHz)	ETS-Lindgren	3160-09	LAVE04211	5/11/2022	5/11/2024
RF Filter: High Pass	Microwave Circuits inc.	H3G02G1	SSG012728	N/A	N/A
Attenuator	Narda	N/A	SSG013687	N/A	N/A
Thermometer	Vaisala	HMT330	SSG013228	24	6/15/2023
PSU	California Instruments	5001IX-CTS-411	LAVE04013	24	5/3/2024
Attenuator (10dB)	Mini-Circuits	BW-K10-2W44+	-	N/A	N/A
Emission software	Global EMC	0.1.95	58	N/A	N/A
Climate Chamber	Burnsco	RTC-37P-3-3	-07-07	N/A	N/A
N/A: No applicable O/P Mon – Output monitored with Calibrated Equipment					

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Discipline	Frequency / Parameter	MU
Conducted Maximum Peak Output Power	30 MHz to 20 GHz Amplitude	± 0.1 dB
Conducted Emissions	30 MHz to 20 GHz Amplitude	± 2.3 dB
Frequency Stability	30 MHz to 2 GHz	± 5.0 Hz
Occupied Bandwidth	Up to 20 MHz Bandwidth	± 1.1 Hz
Band Edge	30 MHz to 20 GHz Amplitude	± 2.3 dB

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

Testing Laboratory
Certificate #2955.19

This report relates only to the actual item/items tested.

This report does not imply product endorsement by any government, accreditation agency, or TÜV SÜD Canada Inc.

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