

Radio Test Report

Report No.: RJBHKO-WTW-P21090237-4

Test Model: NF-D1

Received Date: 2021/9/8

Test Date: 2021/10/19 ~ 2021/10/28

Issued Date: 2021/11/25

Applicant: Neatframe Limited

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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Release Control Record

Issue No.	Description	Date Issued
RJBHKO-WTW-P21090237-4	Original release.	2021/11/25

1 Certificate of Conformity

Product: Neat Bar Pro

Brand: neat.

Test Model: NF-D1

Sample Status: Engineering sample

Applicant: Neatframe Limited

Test Date: 2021/10/19 ~ 2021/10/28

Standards: ARIB STD-T73 (V1.2), MIC notice 88, Appendix 22-16
Certification Ordinance Article 2-1-8

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Phoenix Huang, **Date:** 2021/11/25
Phoenix Huang / Specialist

Approved by : Clark Lin, **Date:** 2021/11/25
Clark Lin / Technical Manager

2 Summary of Test Results

The EUT has been tested according to the following specifications:

Notice 88 Appendix 22 16th Reference	ARIB STD- T73 Ref.	Report Reference	Parameter	Test Results (Note)
General Provisions				
D	3.2 (3)	4.1	Frequency tolerance	C
I	3.2 (3)	4.1	Vibration test	C
J	3.2 (3)	4.1	Temperature and humidity test	C
D	3.2 (4)	4.2	Occupied bandwidth	C
E	3.2 (5)	4.3	Spurious emissions	C
Transmitting Equipment				
F	3.2 (1)	4.4	Antenna power	C
--	--	--	SAR	NA
Transmitting Antenna				
--	3.5 (1)	3.5	Type, configuration, etc. of transmitting antenna	C
--	3.5 (2)	3.5	Antenna Gain	C
--	--	3.5	Refer to all articles for transmitting antenna	C
Receiving Equipment				
G	3.3 (1)	4.5	Spurious emissions of receiver	C
Operating Frequency 24.05 to 24.25GHz				
--	3.6 (1)	3.4	High frequency / modulation section cannot be opened easily	C
--	3.1 (1)	3.1	Modulation method	C
--	3.1 (2)	3.1	Operating Frequency	C
--	3.2 (2)	4.4	Tolerance of Antenna Power	C
--	3.5 (2)	4.4	Absolute gain of transmitting antenna	C
Note: 1. C = Conform NC = Not Conform NT = Not Tested NA = Not Applicable 2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.				

2.1 Test Instruments

For spurious emissions test: (Below 1GHz)

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until	Calibration Authority	Calibration Method
PXA Signal Analyzer(3 Hz to 50 GHz) Keysight	N9030A	MY54490570	2021/6/16	2022/6/15	ETC	(c)
Software	ADT_Radiated_V7.6.15.9.5	NA	NA	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208411	NA	NA	NA	NA
ESG Vector signal generator Agilent	E4438C	MY45094468/005 506 602 UK6 UNJ	2020/11/18	2021/11/17	ETC	(c)
Preamplifier Agilent	8447D	2944A10663	2021/4/26	2022/4/25	BV CPS E&E	(d)
Trilog Broadband Antenna Schwarzbeck	VULB 9168	9168-162	2021/10/27	2022/10/26	BV CPS E&E	(d)

- Note: 1. The test was performed in RF Fully Chamber No. 1.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Calibration method :
- a) : Calibration conducted by the National Institute of Information and Communications Technology (NICT) or a designated calibration agency under Article 102-18 paragraph (1).
 - b) : Calibration conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992) Japan Calibration Service System.
 - c) : Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1).
 - d) : Calibration conducted by using other equipment that listed above from a) to c).
4. Tested Date: 2021/10/28

For spurious emissions test: (For 1GHz ~ 40GHz)

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until	Calibration Authority	Calibration Method
Spectrum Analyzer Keysight	N9030A	MY54490520	2021/8/10	2022/8/9	ETC	(c)
Software	ADT_Radiated_V7.6.15.9.5	NA	NA	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208542	NA	NA	NA	NA
ESG Vector signal generator Agilent	E4438C	MY45094468/005 506 602 UK6 UNJ	2020/11/18	2021/11/17	ETC	(c)
Pre-Amplifier Agilent 8449B (1 to 26.5GHz) Agilent	8449B	3008A01923	2021/10/6	2022/10/5	BV	(d)
Horn Antenna Schwarzbeck	BBHA 9120 D	9120D-1592	2020/11/22	2021/11/21	BV CPS E&E	(d)
Pre_Amplifier EMCI	EMC184045	980143	2021/1/5	2022/1/4	BV CPS E&E	(d)
Horn Antenna Schwarzbeck	BBHA 9170	BBHA9170519	2020/11/22	2021/11/21	BV CPS E&E	(d)

- Note: 1. The test was performed in RF Fully Chamber No. 2.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Calibration method :
- a) : Calibration conducted by the National Institute of Information and Communications Technology (NICT) or a designated calibration agency under Article 102-18 paragraph (1).
 - b) : Calibration conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992) Japan Calibration Service System.
 - c) : Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1).
 - d) : Calibration conducted by using other equipment that listed above from a) to c).
4. Tested Date: 2021/10/19 ~ 2021/10/25

For spurious emissions test: (Above 40GHz)

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until	Calibration Authority	Calibration Method
Spectrum Analyzer Keysight	N9030A	MY55330160	2021/2/5	2022/2/4	ETC	(c)
OXE89 Horn Antenna QuinStar	QWH-UCRR00	924200002	2021/1/20	2022/1/19	MWM	(c)
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA	NA	NA

- Note:
1. The test was performed in 966 Chamber No. 6.
 2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 3. Calibration method :
 - a) : Calibration conducted by the National Institute of Information and Communications Technology (NICT) or a designated calibration agency under Article 102-18 paragraph (1).
 - b) : Calibration conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992) Japan Calibration Service System.
 - c) : Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1).
 - d) : Calibration conducted by using other equipment that listed above from a) to c).
 4. Tested Date: 2021/10/25

For other test items:

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until	Calibration Authority	Calibration Method
Spectrum Analyzer R&S	FSV40	101516	2021/3/8	2022/3/7	ETC	(c)
ESG Vector signal generator Agilent	E4438C	MY45094468/005 506 602 UK6 UNJ	2020/11/18	2021/11/17	ETC	(c)
Power Meter Anritsu	ML2495A	1529002	2021/6/21	2022/6/20	ETC	(c)
Pulse Power Sensor Anritsu	MA2411B	1339443	2021/5/31	2022/5/30	ETC	(c)
DC POWER SUPPLY Topward	6603D	795558	Note 4	Note 4	BV	(d)
AC Power Source GOOD WILL	6905S	1991551	Note 4	Note 4	BV	(d)
True RMS Clamp Meter Fluke	325	31130711WS	2021/6/2	2022/6/1	ETC	(c)
Temperature & Humidity Chamber Giant Force	GTH-150-40-SP-AR	MAA0812-008	2021/1/14	2022/1/13	ETC	(c)
Vibration Test Equipment Vibration Source Technology	VS-100V	6293	2021/1/15	2022/1/14	Vibration Source Technology	(c)

Note: 1. The test was performed in Oven room 2.

2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

3. Calibration method :

a) : Calibration conducted by the National Institute of Information and Communications Technology (NICT) or a designated calibration agency under Article 102-18 paragraph (1).

b) : Calibration conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992) Japan Calibration Service System.

c) : Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1).

d) : Calibration conducted by using other equipment that listed above from a) to c).

4. The power supply no evaluation calibrated, which used the digital multimeter to verify before each testing.

5. Tested Date: 2021/10/19

2.2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in TR 100 028-1.

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Parameter	Uncertainty
Occupied Bandwidth	± 960 Hz
Spurious emissions	± 2.5 dB
Output power density	± 1.2 dB
Out of band radiated power	± 2.5 dB
Frequency Tolerance	± 960 Hz

2.3 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Neat Bar Pro
Brand	neat.
Test Model	NF-D1
Status of EUT	Engineering sample
Power Supply Rating	AC I/P: 100-240V, 50/60Hz, 1.2A
Modulation Type	CW
Operating Frequency	24.05 ~ 24.25 GHz
Number of Channel	1
Rated RF Output Power	1.9 mW
Conducted RF Output Power	1.841 mW
Radiated RF Output Power	18.41 mW
Antenna Type	Refer to section 3.5
Antenna Connector	Refer to section 3.5
Accessory Device	Neat pad <Brand: Neat / Model: A1 or A1C>
Cable Supplied	Shielded HDMI cable (2.0m) Shielded LAN cable (3.0m) Non-shielded AC 2-Pin cable (3.0m)

Note:

1. The EUT has below radios, as following table:

Radio 1	Radio 2	Radio 3
WLAN (2.4GHz + 5GHz)	Bluetooth	24GHz Radar

2. WLAN, Bluetooth and 24GHz Radar technologies cannot transmit at same time.

3. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

1 channel is provided in EUT for test:

Frequency (GHz)
24.06652

3.3 Test Conditions

Test Conditions		Voltage (Vac)
V_{normal}		100
$V_{\text{max.}}$	+10%	110 (Note)
$V_{\text{min.}}$	-10%	90 (Note)

3.4 Assembly

The EUT is constructed as a Neat Bar Pro. The housing consists of two parts, the parts was fixed together by special type screws. Separating the two parts was only possible by special tools.

3.5 Antenna Specifications

3.5.1 Antenna Gain

Brand	Model	Antenna Net Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connector Type
 RICHGREEN TEK Incorporation	R1124GFZ	10	24~24.25	Microstrip antenna (antenna array)	None

3.5.2 Antenna Pattern

Please refer to the attached file (Antenna pattern).

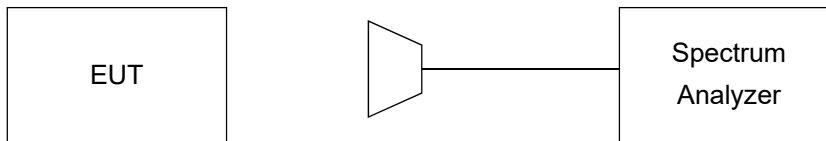
4 Test Results

4.1 Frequency Tolerance Measurement

4.1.1 Limits of Frequency Tolerance Measurement

Tolerance of frequency shall be within operating frequency.

4.1.2 Test Setup



4.1.3 Test Results

Normal Condition

Environmental Conditions	25 deg.C, 60% RH					
Frequency (GHz)	V _{normal}		V _{max.}		V _{min.}	
	Lower frequency (GHz)	Upper frequency (GHz)	Lower frequency (GHz)	Upper frequency (GHz)	Lower frequency (GHz)	Upper frequency (GHz)
24.06652	24.06587	24.06691	24.06586	24.06691	24.06586	24.06690

After the Vibration Test

Environmental Conditions	25 deg.C, 60% RH					
Frequency (GHz)	V _{normal}		V _{max.}		V _{min.}	
	Lower frequency (GHz)	Upper frequency (GHz)	Lower frequency (GHz)	Upper frequency (GHz)	Lower frequency (GHz)	Upper frequency (GHz)
24.06652	24.06588	24.06693	24.06587	24.06691	24.06586	24.06690

While the High Temperature Test

Environmental Conditions	35 deg.C, 60% RH					
Frequency (GHz)	V _{normal}		V _{max.}		V _{min.}	
	Lower frequency (GHz)	Upper frequency (GHz)	Lower frequency (GHz)	Upper frequency (GHz)	Lower frequency (GHz)	Upper frequency (GHz)
24.06652	24.06585	24.06687	24.06588	24.06693	24.06581	24.06685

While the Low Temperature Test

Environmental Conditions	0 deg.C, 60% RH					
Frequency (GHz)	V _{normal}		V _{max.}		V _{min.}	
	Lower frequency (GHz)	Upper frequency (GHz)	Lower frequency (GHz)	Upper frequency (GHz)	Lower frequency (GHz)	Upper frequency (GHz)
24.06652	24.06589	24.06693	24.06585	24.06690	24.06588	24.06693

While the High Humidity Test

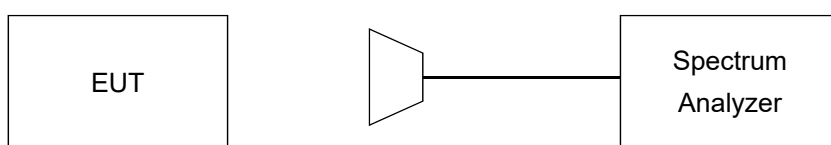
Environmental Conditions	35 deg.C, 95% RH					
Frequency (GHz)	V _{normal}		V _{max.}		V _{min.}	
	Lower frequency (GHz)	Upper frequency (GHz)	Lower frequency (GHz)	Upper frequency (GHz)	Lower frequency (GHz)	Upper frequency (GHz)
24.06652	24.06586	24.06691	24.06586	24.06690	24.06585	24.06687

4.2 Occupied Bandwidth Measurement (99% power bandwidth)

4.2.1 Limits of Occupied Bandwidth Measurement

Item	Limit
Occupied bandwidth	<200MHz

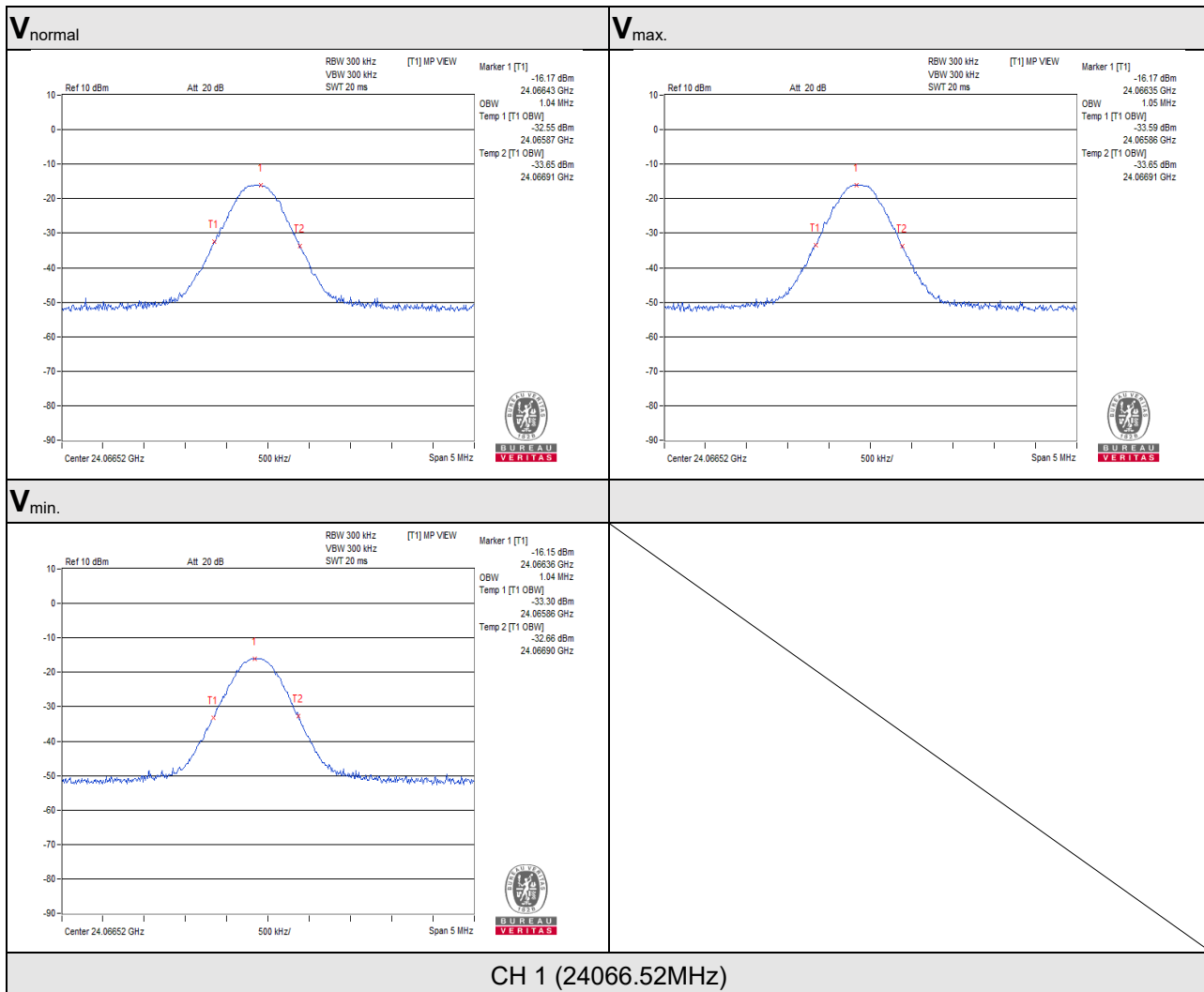
4.2.2 Test Setup



4.2.3 Test Results

Environmental Conditions	25 deg.C, 60% RH		
Frequency (MHz)	V_{normal}	$V_{max.}$	$V_{min.}$
	Occupied bandwidth (MHz)	Occupied bandwidth (MHz)	Occupied bandwidth (MHz)
24066.52	1.04	1.05	1.04

NOTE: For the test plots please refer to the below pages.



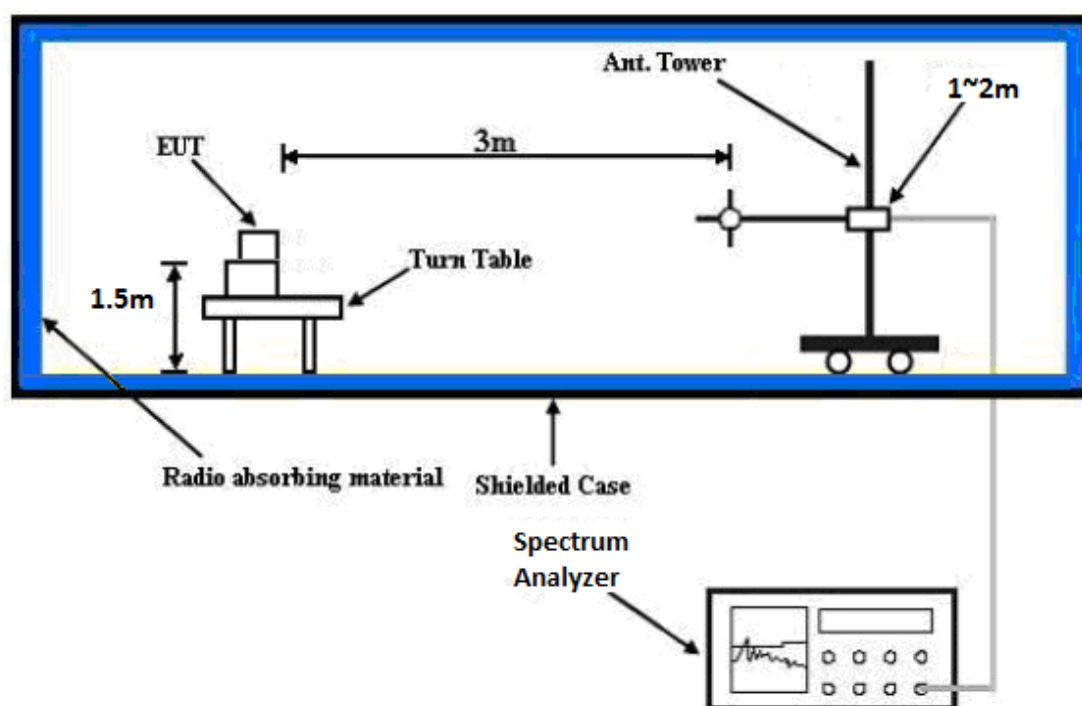
CH 1 (24066.52MHz)

4.3 Spurious Emissions for Transmitter Measurement

4.3.1 Limits of Spurious Emissions

Frequencies (MHz)	Limit
Operating frequency 24.05 to 24.25GHz	
30.0MHz to 1000.0MHz	$\leq 0.25 \text{ uW/100kHz}$
1000.0MHz to 24050.0MHz	$\leq 2.5 \text{ uW/MHz}$
24250.0MHz to 48500.0MHz	$\leq 2.5 \text{ uW/MHz}$

4.3.2 Test Setup

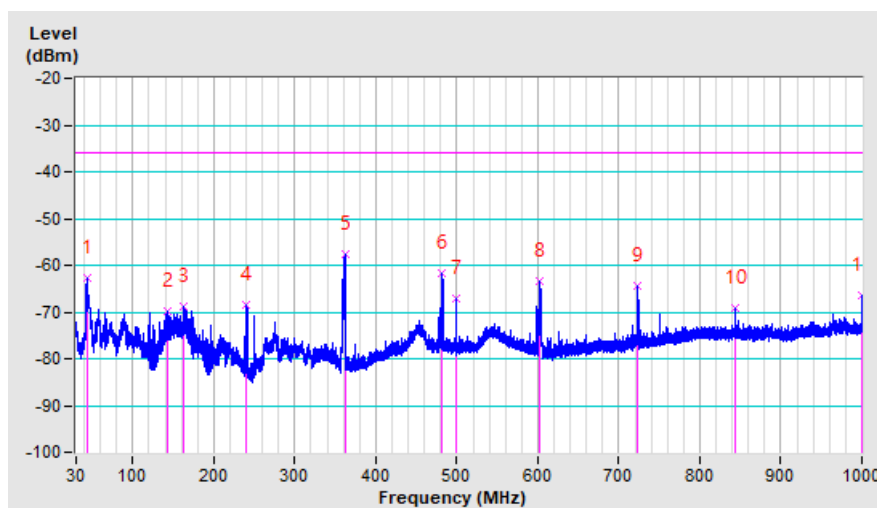


4.3.3 Test Results

Below 1GHz Data

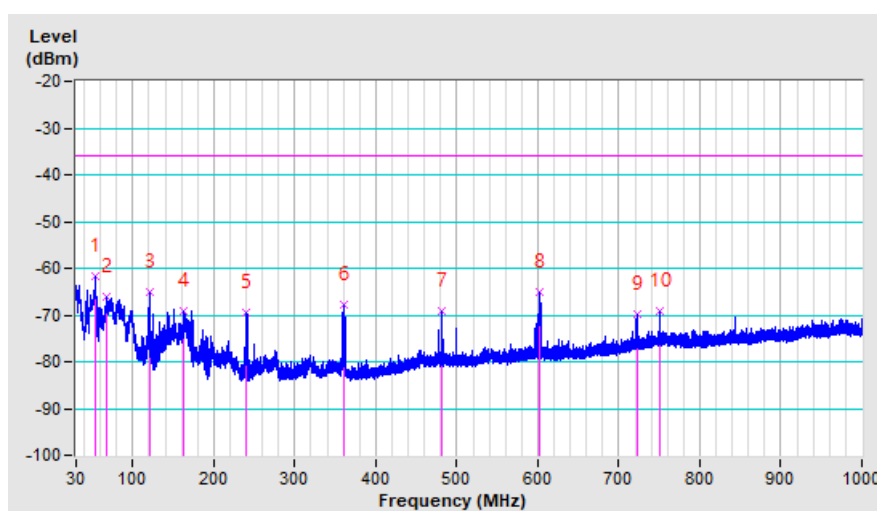
Spurious Emission Frequency Range	30MHz ~ 1GHz	Test Condition	V _{normal}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
43.15	H	-62.57	-36.00	-26.57
142.36	H	-69.73	-36.00	-33.73
161.86	H	-68.71	-36.00	-32.71
239.66	H	-68.53	-36.00	-32.53
361.82	H	-57.47	-36.00	-21.47
482.22	H	-61.59	-36.00	-25.59
499.97	H	-67.18	-36.00	-31.18
602.83	H	-63.33	-36.00	-27.33
723.54	H	-64.37	-36.00	-28.37
844.14	H	-69.31	-36.00	-33.31
999.95	H	-66.55	-36.00	-30.55



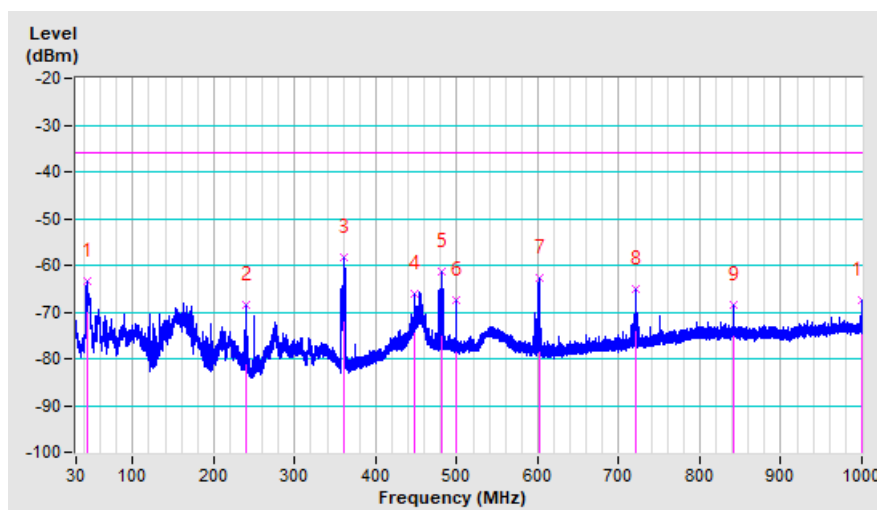
Spurious Emission Frequency Range	30MHz ~ 1GHz	Test Condition	V _{normal}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
54.00	V	-61.58	-36.00	-25.58
67.85	V	-66.12	-36.00	-30.12
120.40	V	-65.25	-36.00	-29.25
161.91	V	-69.27	-36.00	-33.27
240.71	V	-69.46	-36.00	-33.46
361.27	V	-67.75	-36.00	-31.75
481.82	V	-69.12	-36.00	-33.12
602.08	V	-64.98	-36.00	-28.98
722.44	V	-69.89	-36.00	-33.89
749.99	V	-69.12	-36.00	-33.12



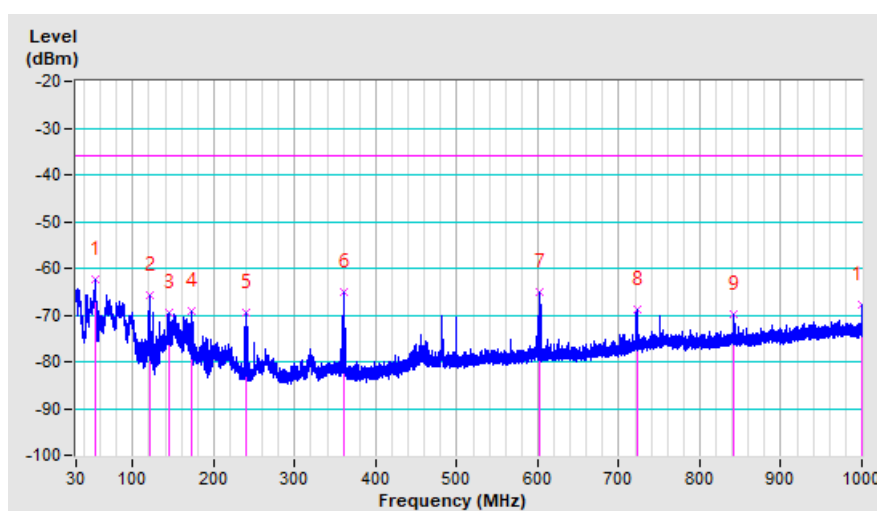
Spurious Emission Frequency Range	30MHz ~ 1GHz	Test Condition	V _{max}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
43.15	H	-63.51	-36.00	-27.51
240.46	H	-68.54	-36.00	-32.54
360.72	H	-58.34	-36.00	-22.34
448.37	H	-66.18	-36.00	-30.18
480.92	H	-61.50	-36.00	-25.50
499.97	H	-67.39	-36.00	-31.39
601.43	H	-62.84	-36.00	-26.84
721.24	H	-65.20	-36.00	-29.20
841.79	H	-68.45	-36.00	-32.45
1000.00	H	-67.58	-36.00	-31.58



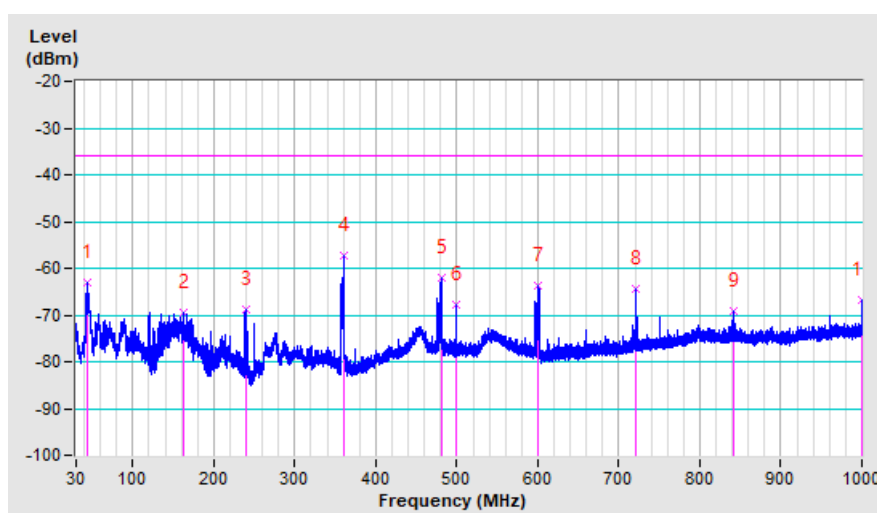
Spurious Emission Frequency Range	30MHz ~ 1GHz	Test Condition	V _{max}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
53.85	V	-62.42	-36.00	-26.42
120.30	V	-65.80	-36.00	-29.80
143.96	V	-69.36	-36.00	-33.36
173.46	V	-69.25	-36.00	-33.25
240.56	V	-69.40	-36.00	-33.40
360.92	V	-65.14	-36.00	-29.14
601.58	V	-65.19	-36.00	-29.19
721.99	V	-68.81	-36.00	-32.81
842.29	V	-69.77	-36.00	-33.77
1000.00	V	-67.68	-36.00	-31.68



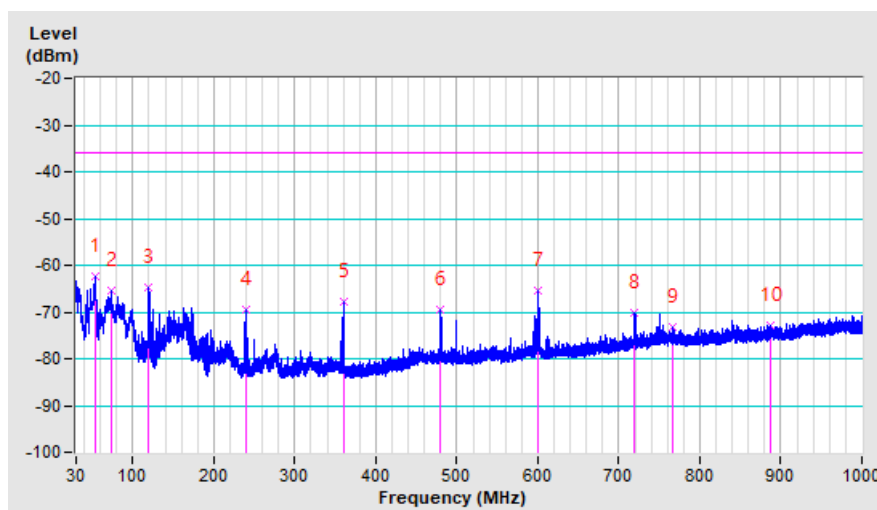
Spurious Emission Frequency Range	30MHz ~ 1GHz	Test Condition	V _{min}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
42.95	H	-63.09	-36.00	-27.09
161.86	H	-69.41	-36.00	-33.41
240.21	H	-68.84	-36.00	-32.84
360.37	H	-57.32	-36.00	-21.32
480.52	H	-62.15	-36.00	-26.15
500.02	H	-67.91	-36.00	-31.91
600.63	H	-63.75	-36.00	-27.75
720.94	H	-64.48	-36.00	-28.48
840.89	H	-69.20	-36.00	-33.20
1000.00	H	-66.80	-36.00	-30.80



Spurious Emission Frequency Range	30MHz ~ 1GHz	Test Condition	V _{min}
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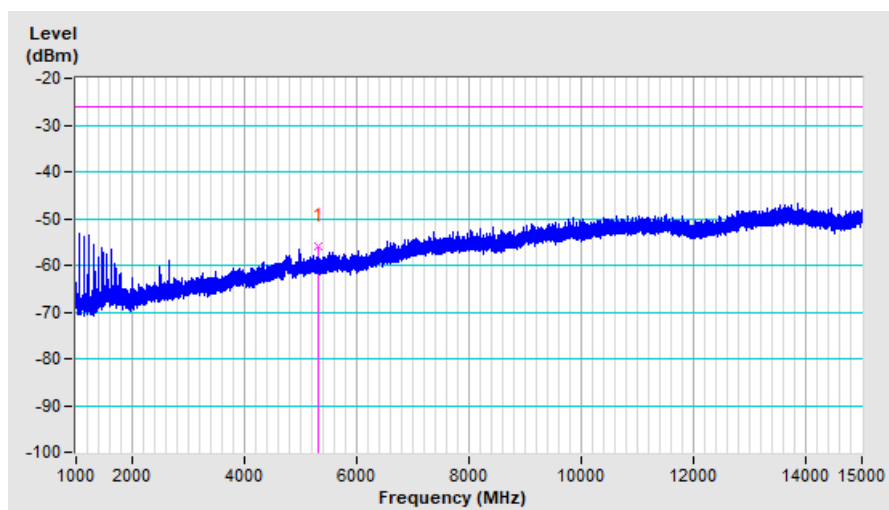
Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
53.85	V	-62.34	-36.00	-26.34
72.70	V	-65.57	-36.00	-29.57
119.95	V	-64.72	-36.00	-28.72
240.01	V	-69.61	-36.00	-33.61
360.07	V	-67.64	-36.00	-31.64
480.22	V	-69.55	-36.00	-33.55
600.33	V	-65.43	-36.00	-29.43
719.84	V	-70.02	-36.00	-34.02
767.24	V	-73.22	-36.00	-37.22
886.54	V	-72.76	-36.00	-36.76



Above 1GHz Data

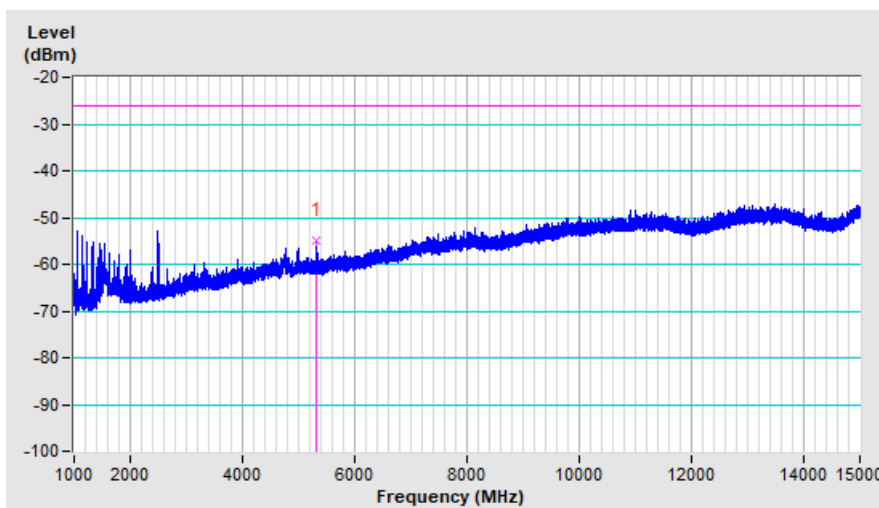
Spurious Emission Frequency Range	1GHz ~ 15GHz	Test Condition	V _{normal}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
5324.87	H	-56.04	-26.00	-30.04



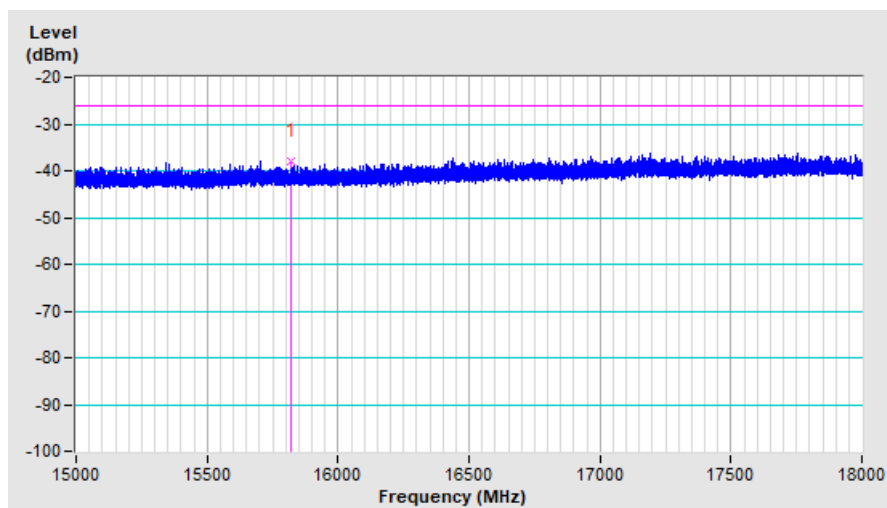
Spurious Emission Frequency Range	1GHz ~ 15GHz	Test Condition	V _{normal}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
5326.49	V	-54.87	-26.00	-28.87



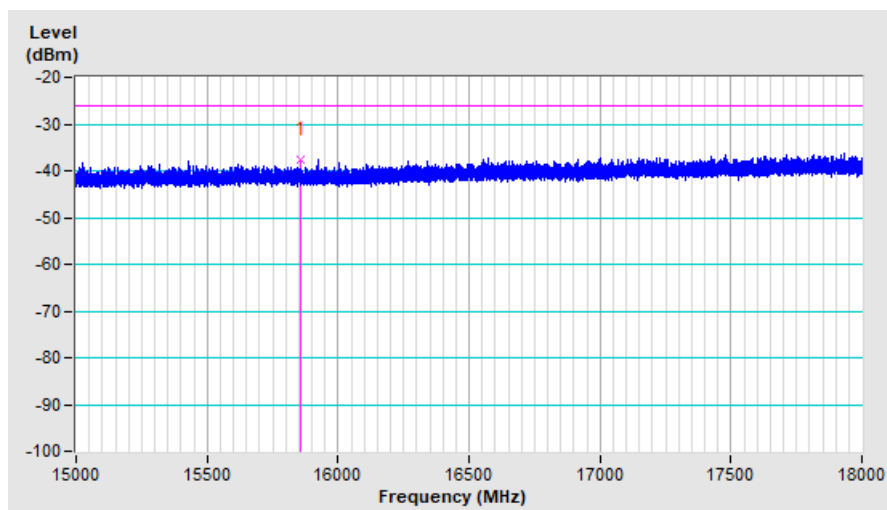
Spurious Emission Frequency Range	15GHz ~ 18GHz	Test Condition	V _{normal}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
15818.64	H	-37.95	-26.00	-11.95



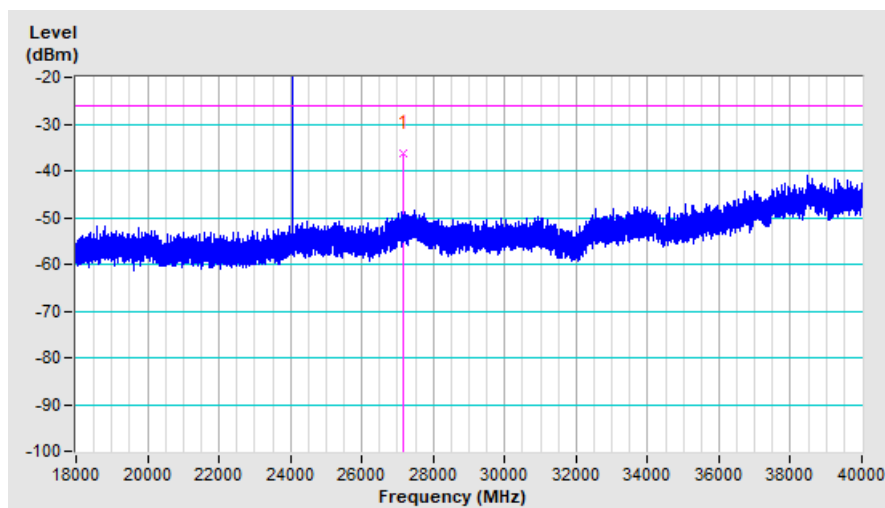
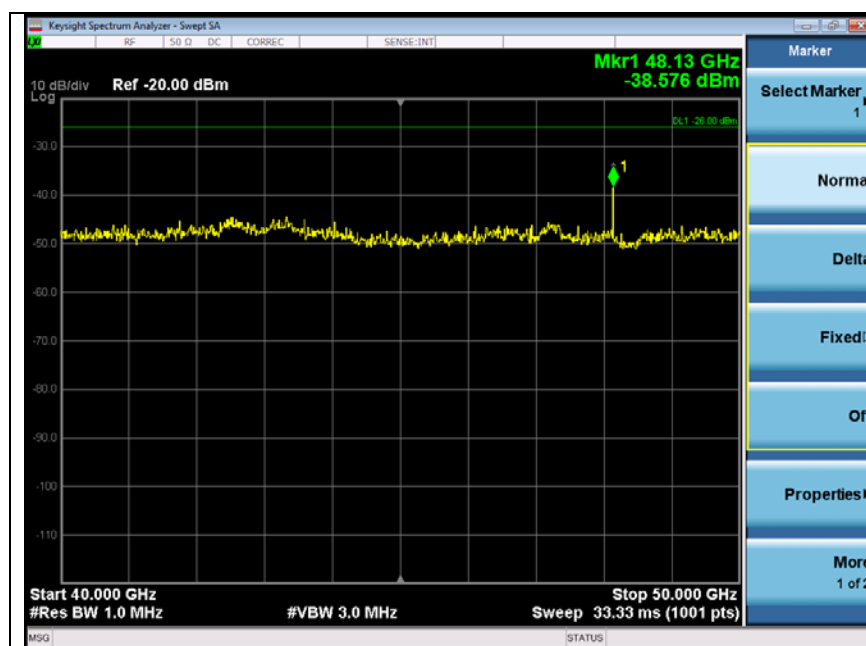
Spurious Emission Frequency Range	15GHz ~ 18GHz	Test Condition	V _{normal}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
15855.06	V	-37.61	-26.00	-11.61



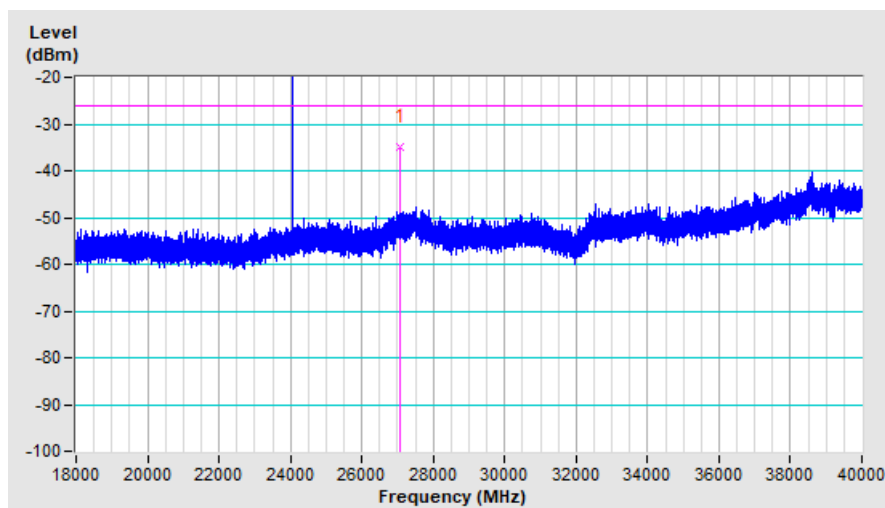
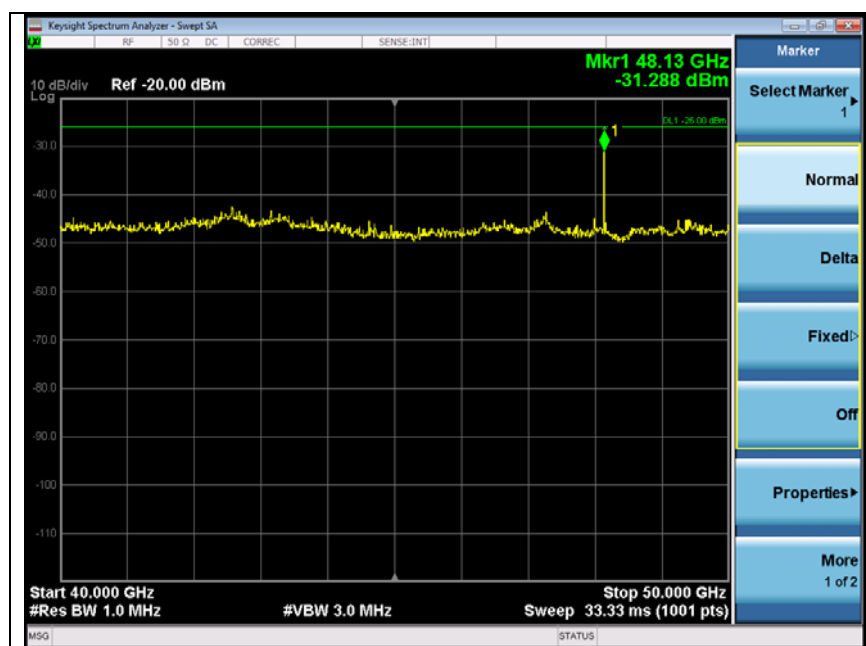
Spurious Emission Frequency Range	18GHz ~ 48.5GHz	Test Condition	V _{normal}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
27174.47	H	-36.26	-26.00	-10.26



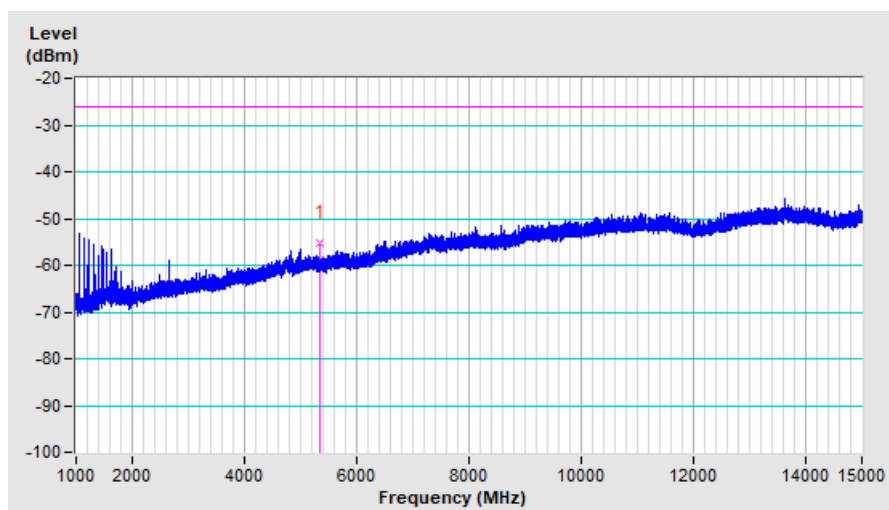
Spurious Emission Frequency Range	18GHz ~ 48.5GHz	Test Condition	V _{normal}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
27047.15	V	-35.05	-26.00	-9.05



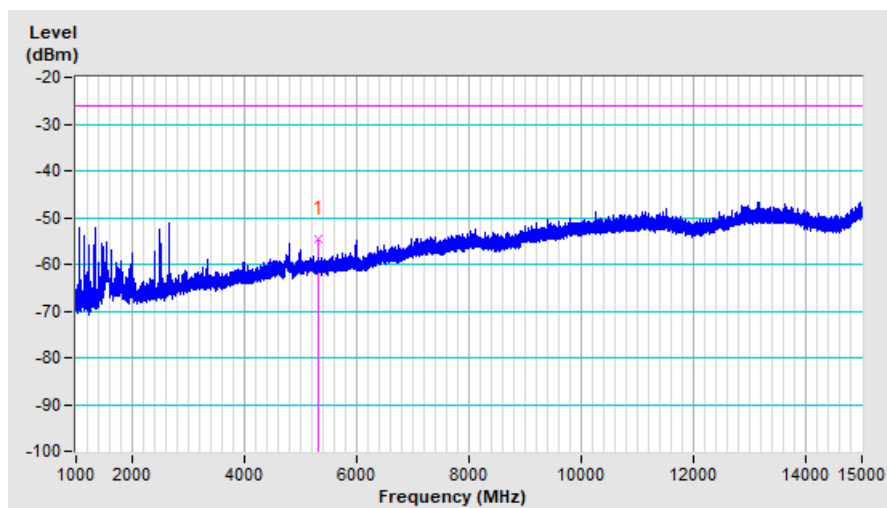
Spurious Emission Frequency Range	1GHz ~ 15GHz	Test Condition	V_{max}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
5329.14	H	-55.26	-26.00	-29.26



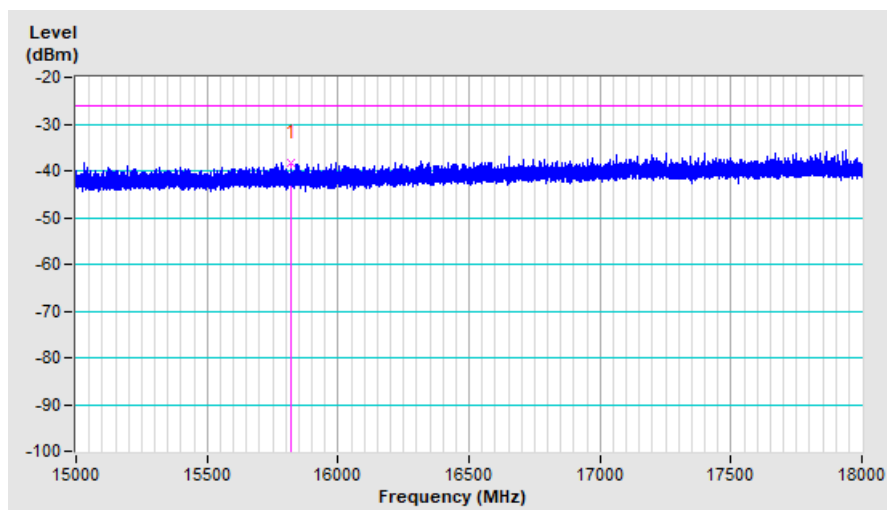
Spurious Emission Frequency Range	1GHz ~ 15GHz	Test Condition	V_{max}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
5328.28	V	-54.74	-26.00	-28.74



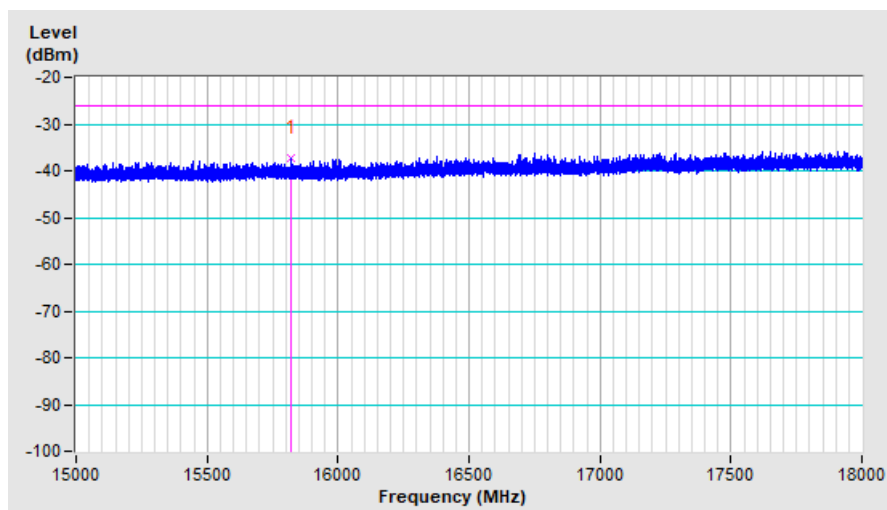
Spurious Emission Frequency Range	15GHz ~ 18GHz	Test Condition	V_{max}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
15822.98	H	-38.19	-26.00	-12.19



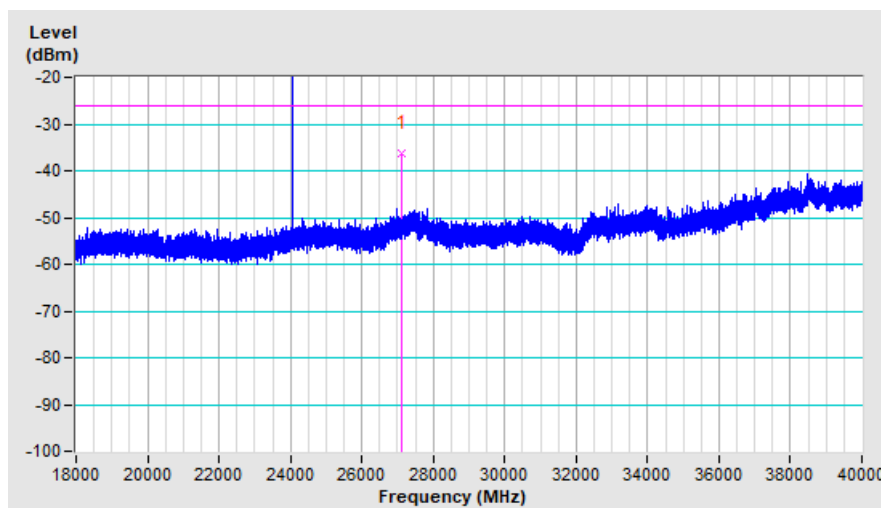
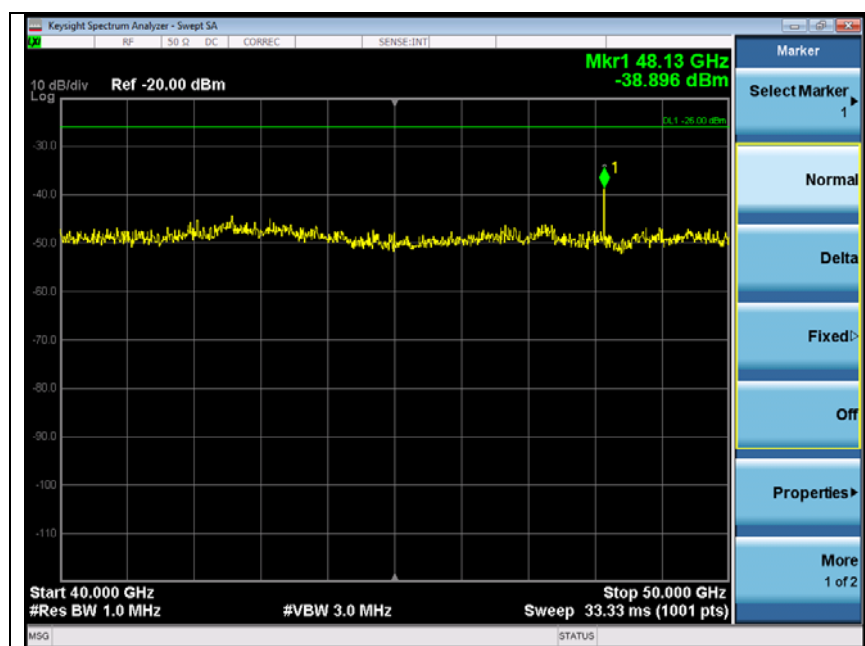
Spurious Emission Frequency Range	15GHz ~ 18GHz	Test Condition	V_{max}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
15821.49	V	-37.43	-26.00	-11.43



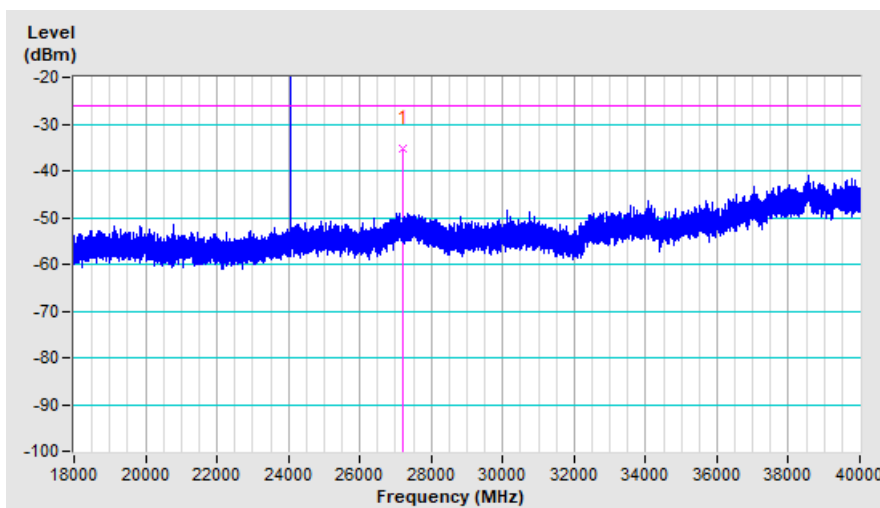
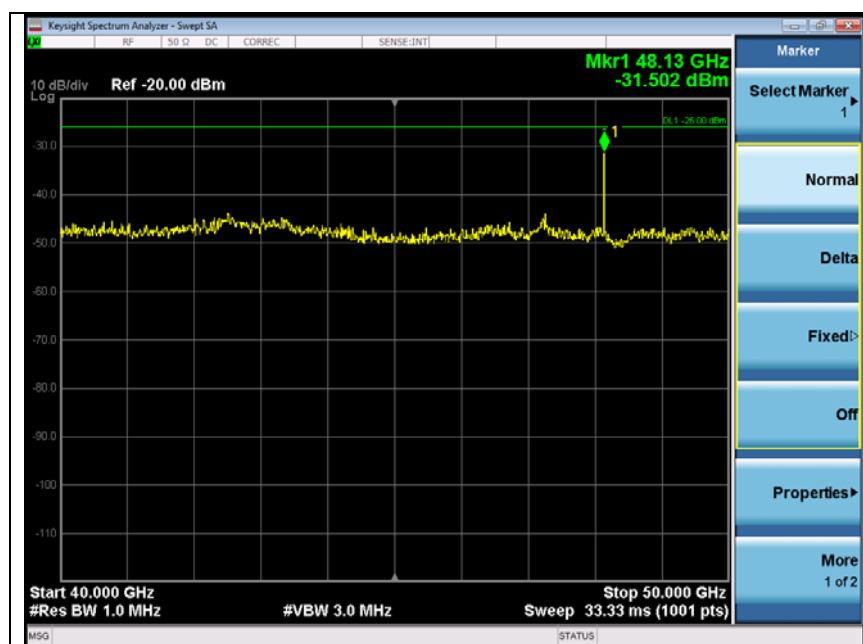
Spurious Emission Frequency Range	18GHz ~ 48.5GHz	Test Condition	V _{max}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
27116.43	H	-36.24	-26.00	-10.24



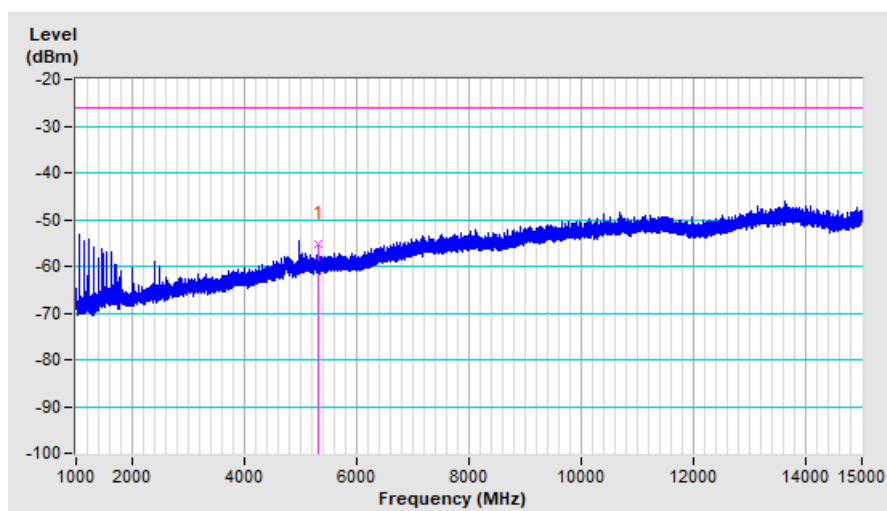
Spurious Emission Frequency Range	18GHz ~ 48.5GHz	Test Condition	V _{max}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
27215.66	V	-35.13	-26.00	-9.13



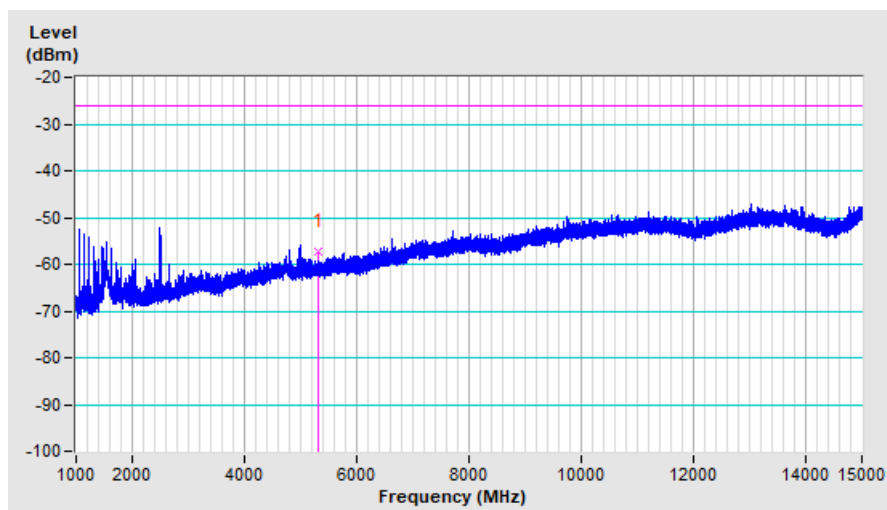
Spurious Emission Frequency Range	1GHz ~ 15GHz	Test Condition	V _{min}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
5326.64	H	-55.21	-26.00	-29.21



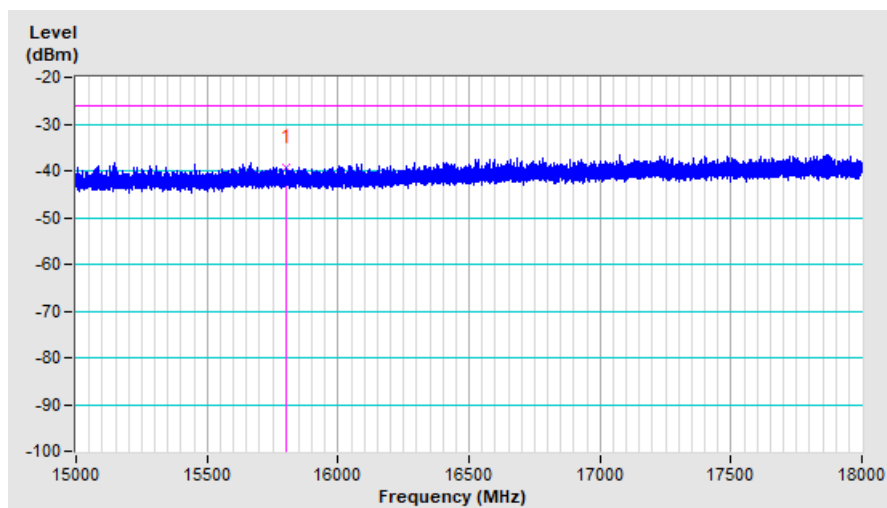
Spurious Emission Frequency Range	1GHz ~ 15GHz	Test Condition	V _{min}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
5325.61	V	-57.27	-26.00	-31.27



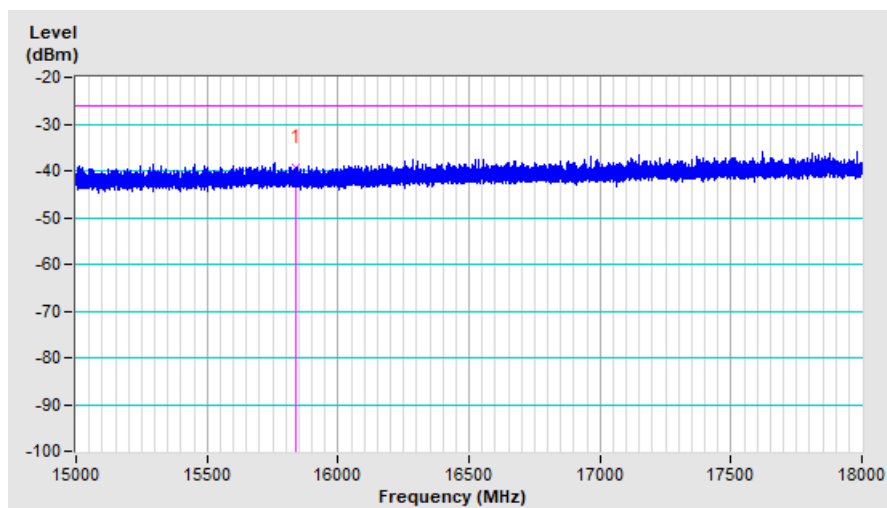
Spurious Emission Frequency Range	15GHz ~ 18GHz	Test Condition	V _{min}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
15803.62	H	-39.20	-26.00	-13.20



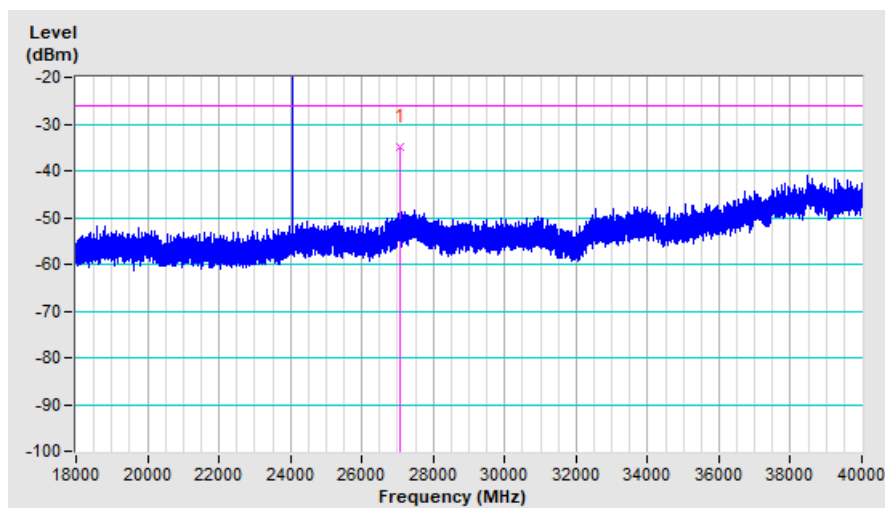
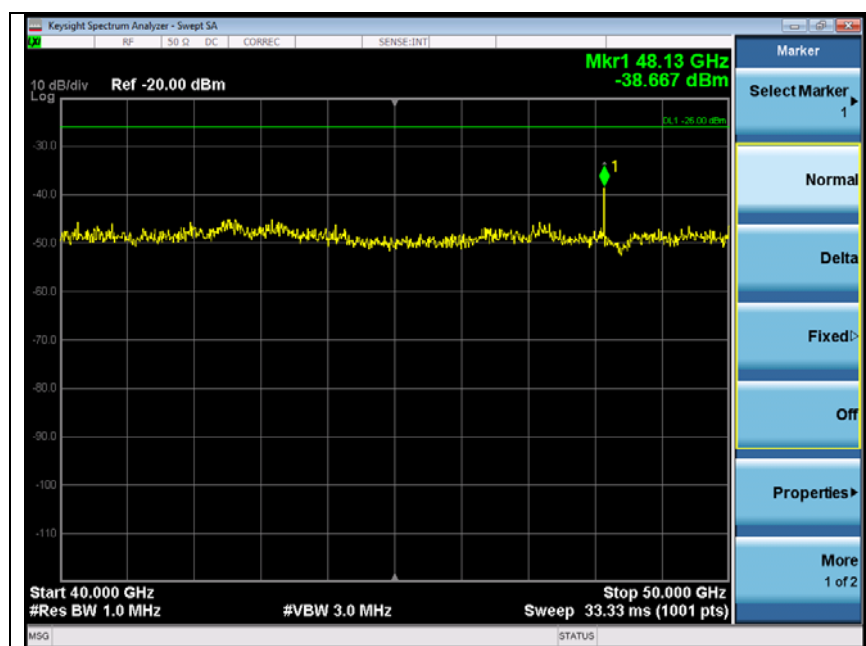
Spurious Emission Frequency Range	15GHz ~ 18GHz	Test Condition	V _{min}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
15841.40	V	-39.19	-26.00	-13.19



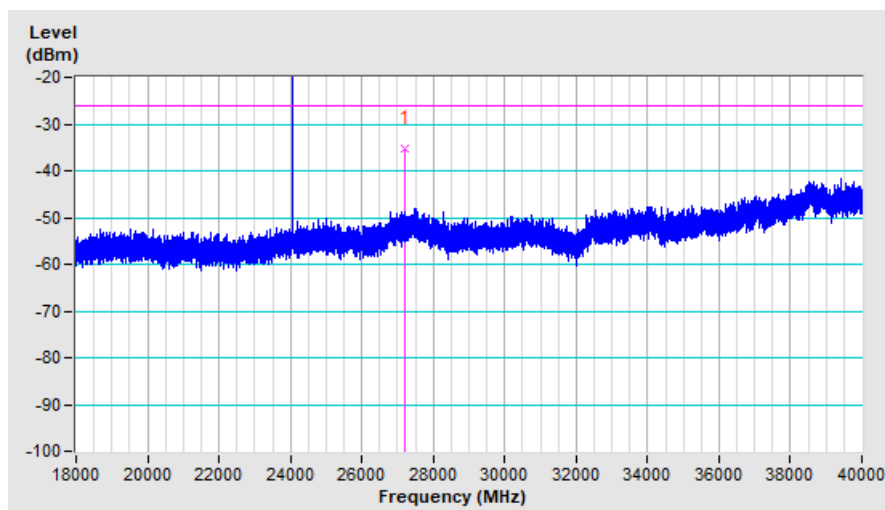
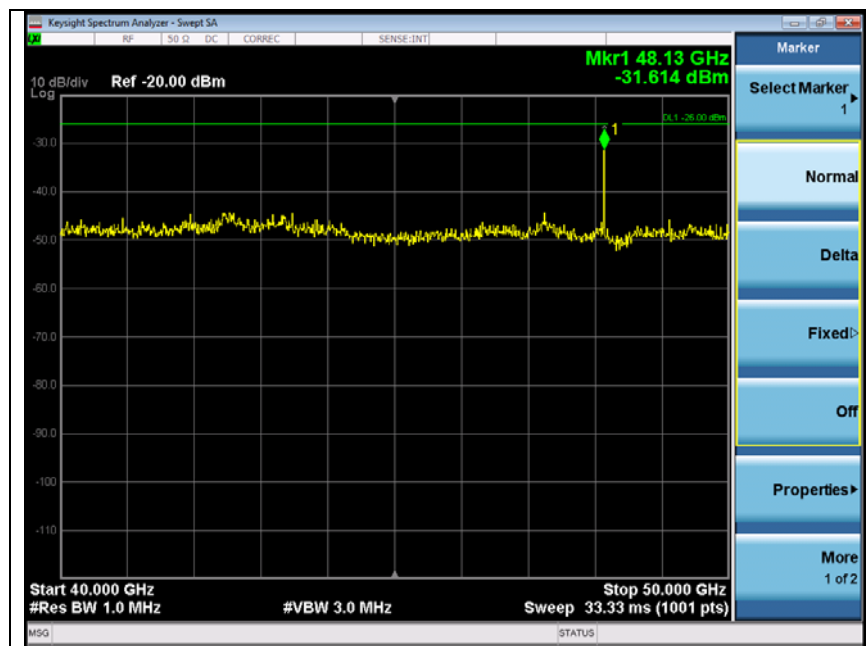
Spurious Emission Frequency Range	18GHz ~ 48.5GHz	Test Condition	V _{min}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
27073.36	H	-34.75	-26.00	-8.75



Spurious Emission Frequency Range	18GHz ~ 48.5GHz	Test Condition	V _{min}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
27188.51	V	-35.34	-26.00	-9.34



4.4 Antenna Power Measurement

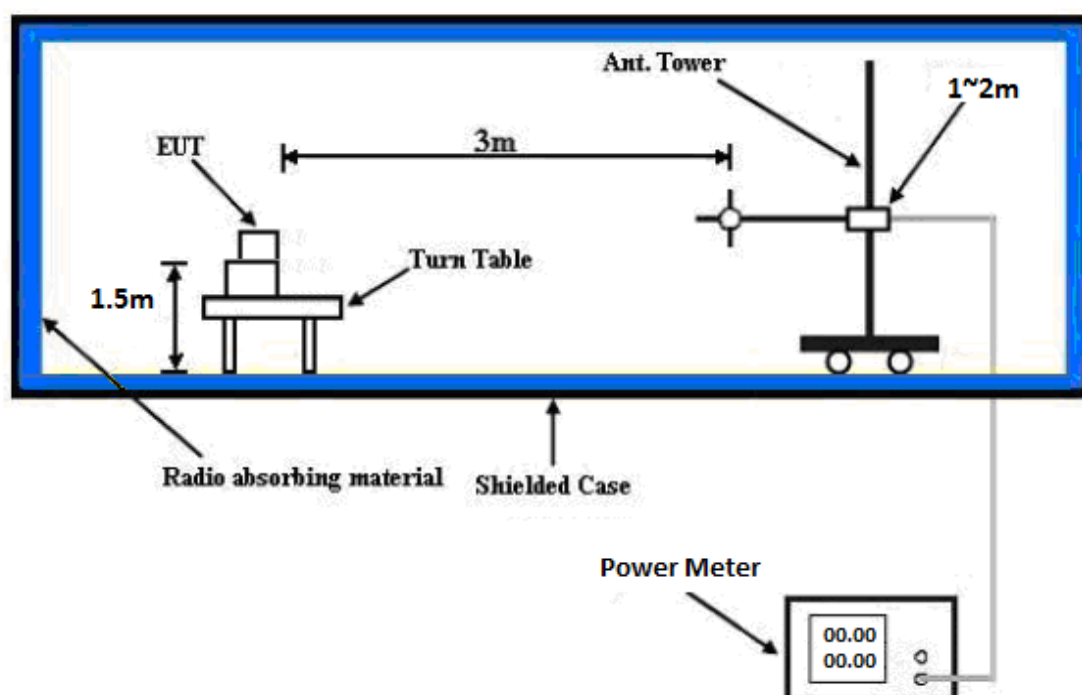
4.4.1 Limits of Antenna Power

Transmission Power limit: 20mW or less.

Tolerance of antenna power shall be +50% (upper value) and -50% (lower value).

Antenna gain less than 24dBi.

4.4.2 Test Setup



4.4.3 Test Results

Voltage (Vac)	Channel Number	Frequency (MHz)	Conducted RF Output Power (mW)	Radiated RF Output Power (mW)
100	1	24066.52	1.841	18.41
110			1.3	13
90			1.274	12.74
Max. Limit (mW):			20	-
Rated Power (mW):			1.9	-
Tolerance of Antenna Power (mW):			0.95 ~ 2.45	-
Max. EIRP Limit (mW):			-	5023.773

Note: 1. Antenna gain is 10 dBi.

2. The radiated RF output power density is a “calculated” value derived from the conducted value.

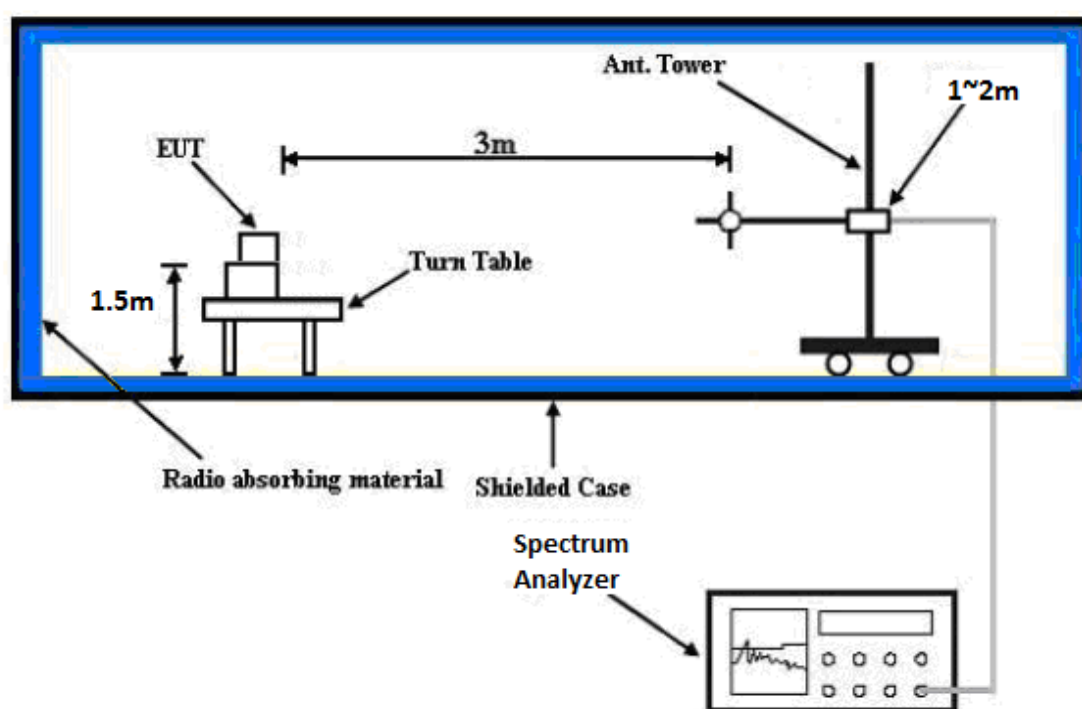
3. Formula: Radiated RF output power density = Conducted RF output power + Antenna gain

4.5 Spurious Emissions for Receiver

4.5.1 Limits of Spurious Emissions For Receiver

Frequencies (MHz)	Limit
Below 1GHz	$\leq 0.25 \text{ uW/100kHz}$
Above 1GHz	$\leq 2.5 \text{ uW/MHz}$

4.5.2 Test Setup

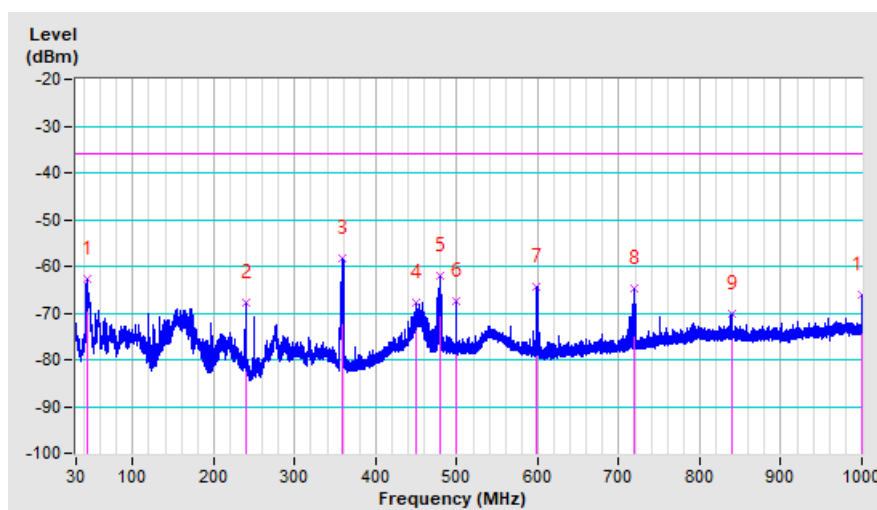


4.5.3 Test Result

Below 1GHz Data

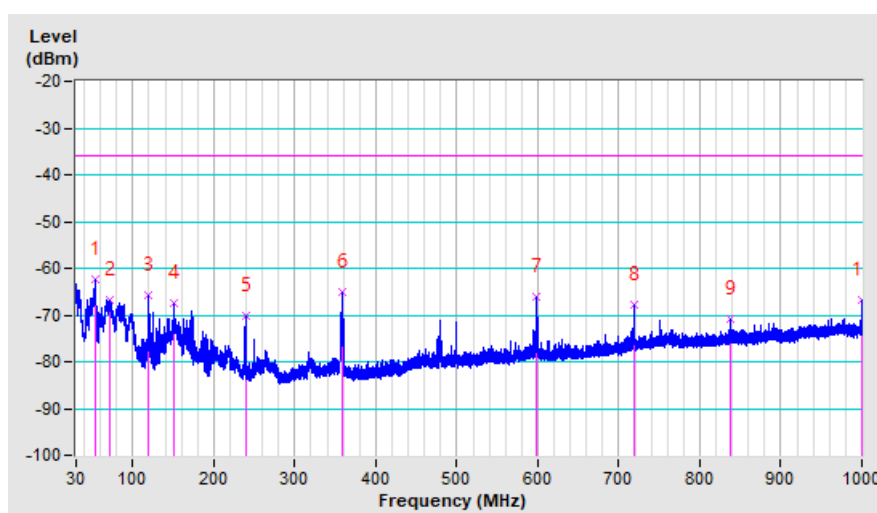
Spurious Emission Frequency Range	30MHz ~ 1GHz	Test Condition	V _{normal}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
43.10	H	-62.56	-36.00	-26.56
239.66	H	-67.84	-36.00	-31.84
359.47	H	-58.29	-36.00	-22.29
449.27	H	-67.88	-36.00	-31.88
479.37	H	-61.97	-36.00	-25.97
499.97	H	-67.31	-36.00	-31.31
599.08	H	-64.24	-36.00	-28.24
718.89	H	-64.81	-36.00	-28.81
838.94	H	-70.02	-36.00	-34.02
1000.00	H	-66.27	-36.00	-30.27



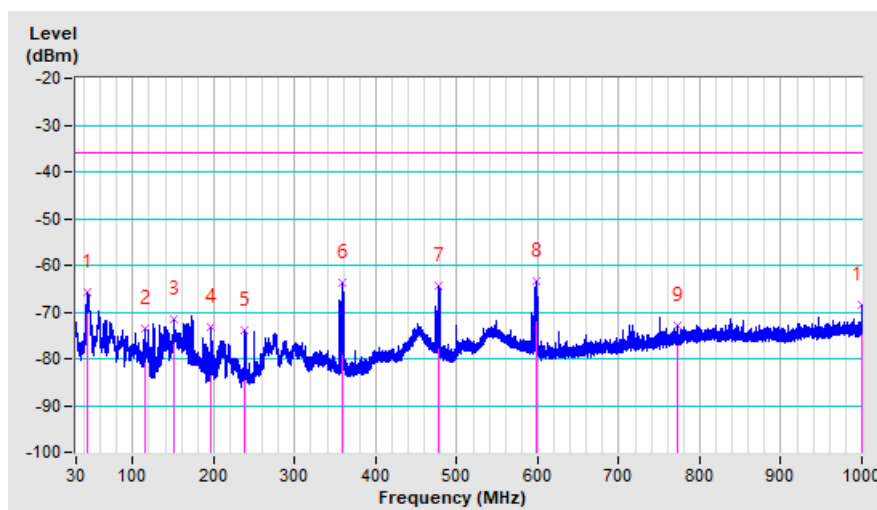
Spurious Emission Frequency Range	30MHz ~ 1GHz	Test Condition	V _{normal}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
53.55	V	-62.43	-36.00	-26.43
71.30	V	-66.91	-36.00	-30.91
119.80	V	-65.89	-36.00	-29.89
150.36	V	-67.49	-36.00	-31.49
239.46	V	-70.01	-36.00	-34.01
359.27	V	-65.00	-36.00	-29.00
598.78	V	-66.16	-36.00	-30.16
718.59	V	-67.96	-36.00	-31.96
838.34	V	-70.93	-36.00	-34.93
1000.00	V	-66.89	-36.00	-30.89



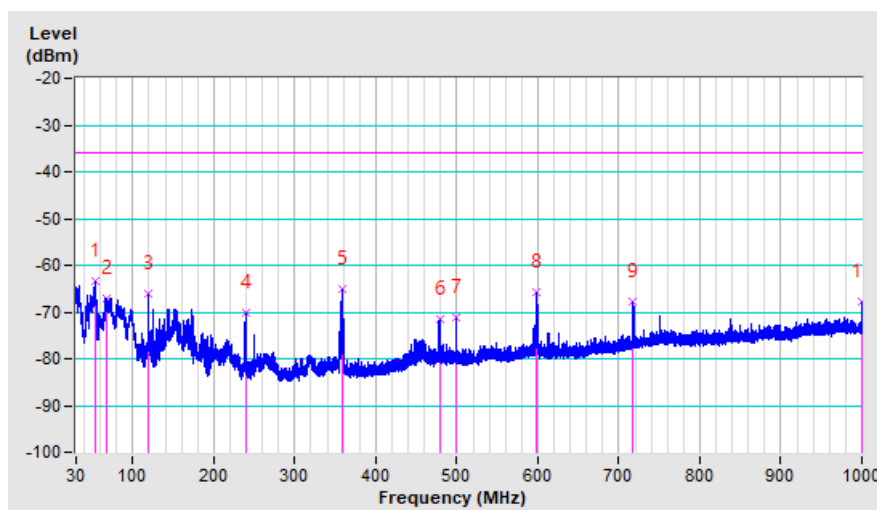
Spurious Emission Frequency Range	30MHz ~ 1GHz	Test Condition	V _{max}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
43.25	H	-65.81	-36.00	-29.81
115.65	H	-73.71	-36.00	-37.71
150.36	H	-71.69	-36.00	-35.69
196.61	H	-73.28	-36.00	-37.28
237.81	H	-73.79	-36.00	-37.79
358.62	H	-63.73	-36.00	-27.73
478.27	H	-64.34	-36.00	-28.34
598.03	H	-63.36	-36.00	-27.36
771.69	H	-72.96	-36.00	-36.96
1000.00	H	-68.35	-36.00	-32.35



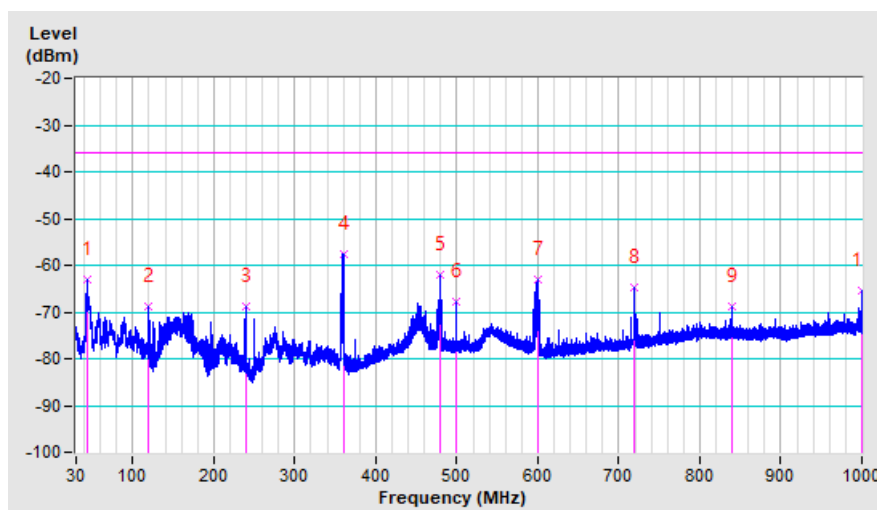
Spurious Emission Frequency Range	30MHz ~ 1GHz	Test Condition	V _{max}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
53.65	V	-63.52	-36.00	-27.52
68.00	V	-66.95	-36.00	-30.95
119.60	V	-66.27	-36.00	-30.27
239.21	V	-70.20	-36.00	-34.20
358.87	V	-65.11	-36.00	-29.11
478.47	V	-71.48	-36.00	-35.48
499.97	V	-71.29	-36.00	-35.29
598.13	V	-65.76	-36.00	-29.76
717.79	V	-67.76	-36.00	-31.76
1000.00	V	-67.96	-36.00	-31.96



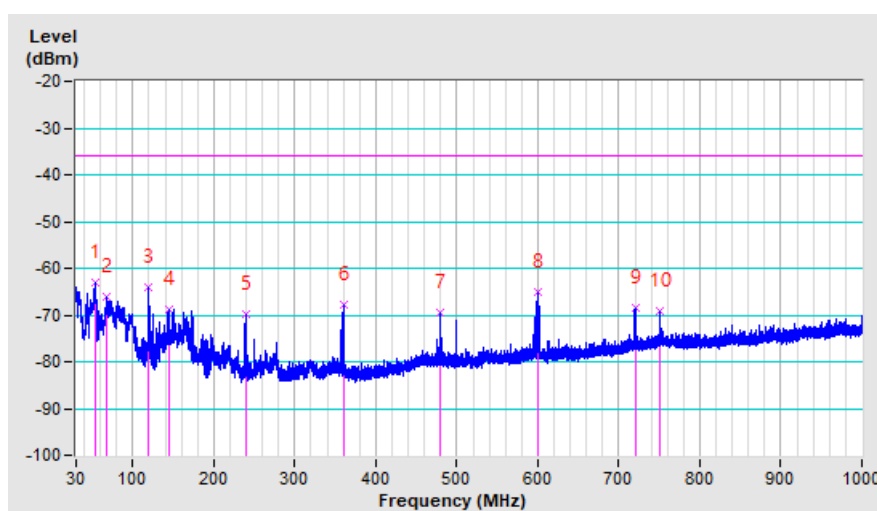
Spurious Emission Frequency Range	30MHz ~ 1GHz	Test Condition	V _{min}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
43.10	H	-62.97	-36.00	-26.97
119.85	H	-68.72	-36.00	-32.72
239.76	H	-68.91	-36.00	-32.91
359.67	H	-57.48	-36.00	-21.48
479.47	H	-61.92	-36.00	-25.92
499.97	H	-67.69	-36.00	-31.69
599.38	H	-63.14	-36.00	-27.14
719.34	H	-64.84	-36.00	-28.84
839.04	H	-68.85	-36.00	-32.85
999.95	H	-65.50	-36.00	-29.50



Spurious Emission Frequency Range	30MHz ~ 1GHz	Test Condition	V _{min}
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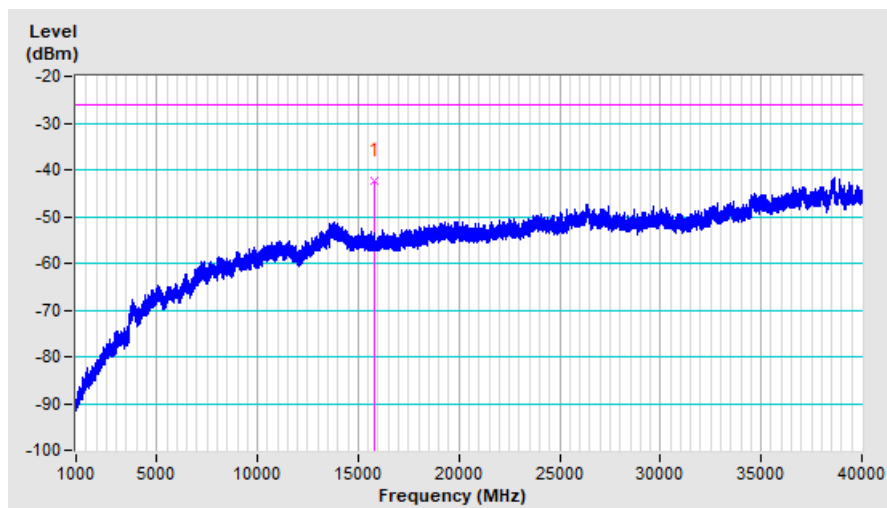
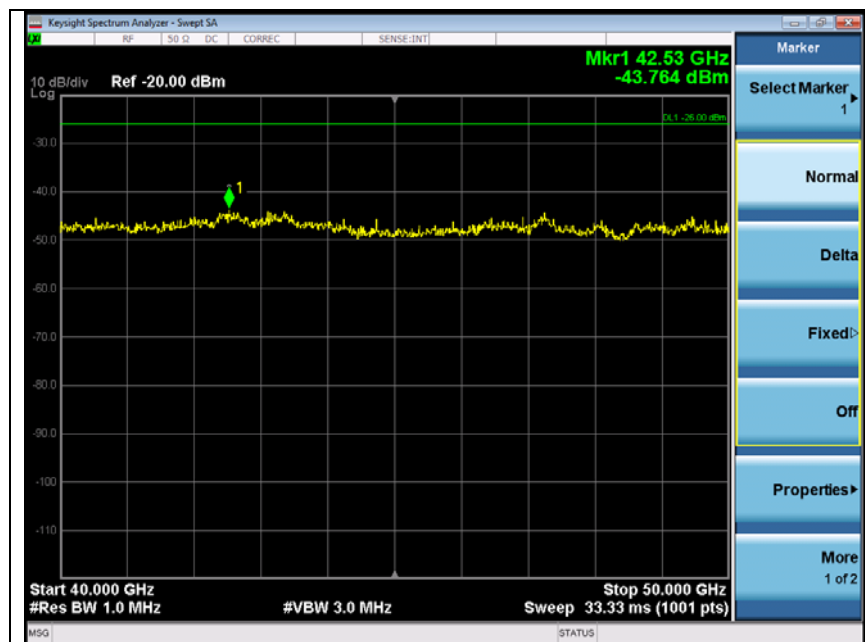
Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
53.55	V	-63.15	-36.00	-27.15
68.45	V	-66.11	-36.00	-30.11
119.90	V	-64.18	-36.00	-28.18
143.91	V	-68.72	-36.00	-32.72
239.86	V	-69.85	-36.00	-33.85
359.72	V	-67.84	-36.00	-31.84
479.47	V	-69.62	-36.00	-33.62
599.83	V	-65.15	-36.00	-29.15
719.99	V	-68.53	-36.00	-32.53
749.99	V	-69.27	-36.00	-33.27



Above 1GHz Data

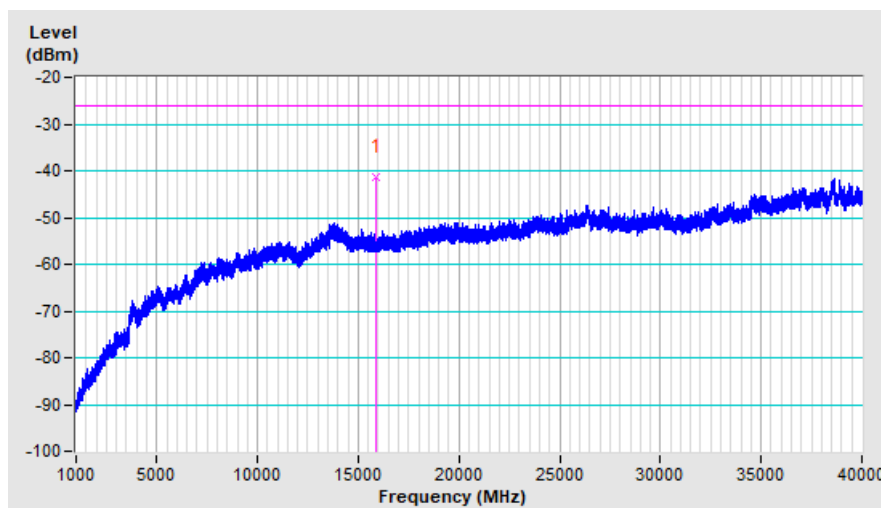
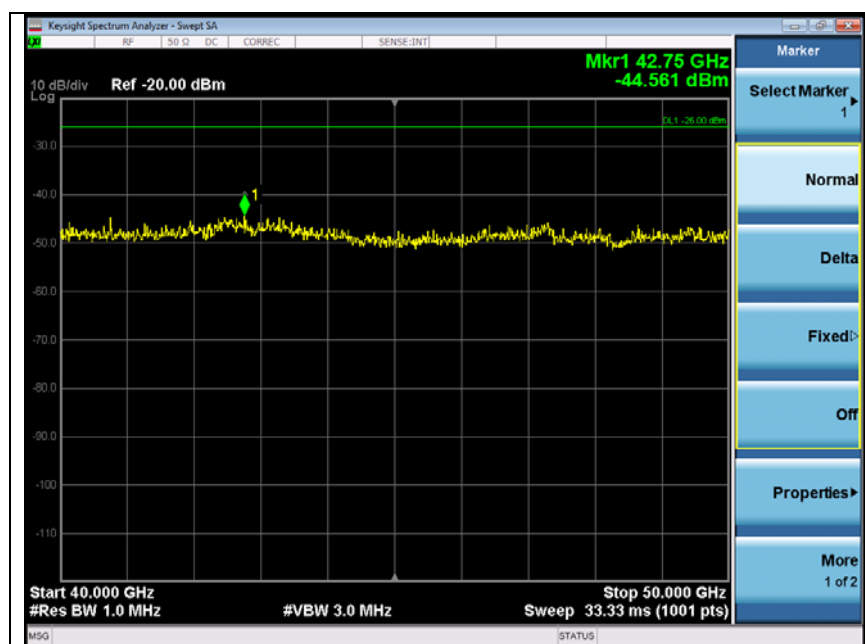
Spurious Emission Frequency Range	1GHz ~ 48.5GHz	Test Condition	V _{normal}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
15780.89	H	-42.25	-26.00	-16.25



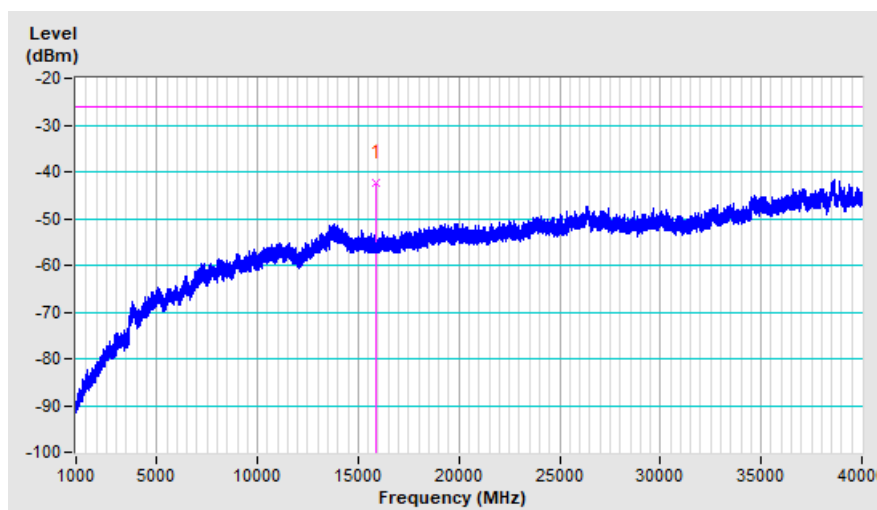
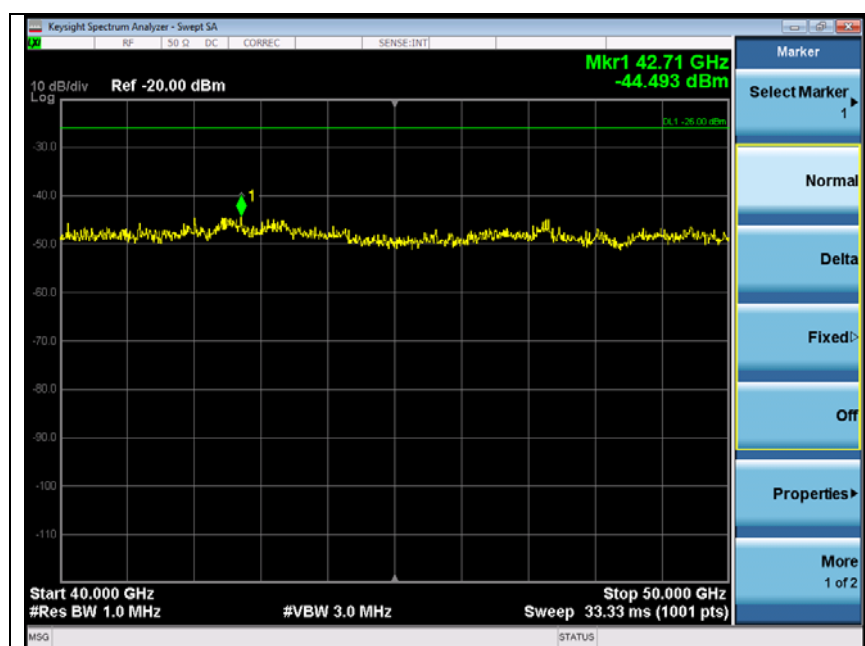
Spurious Emission Frequency Range	1GHz ~ 48.5GHz	Test Condition	V _{normal}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
15855.57	V	-41.28	-26.00	-15.28



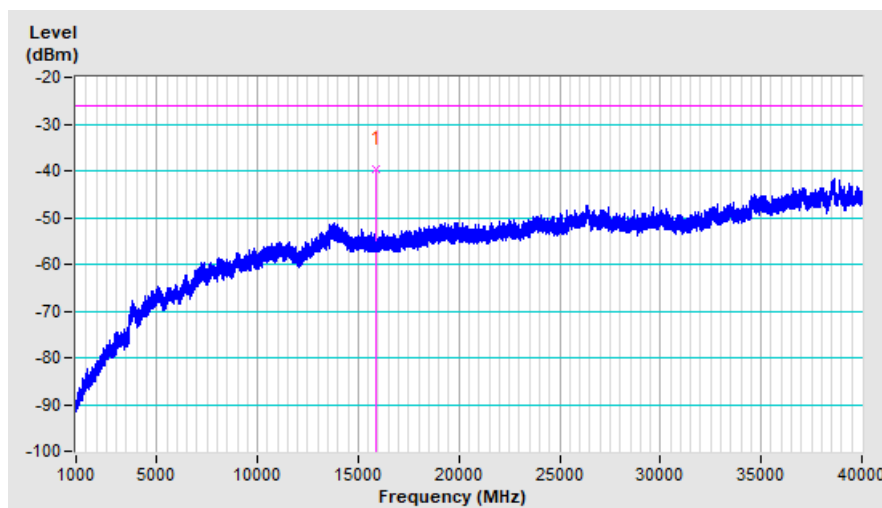
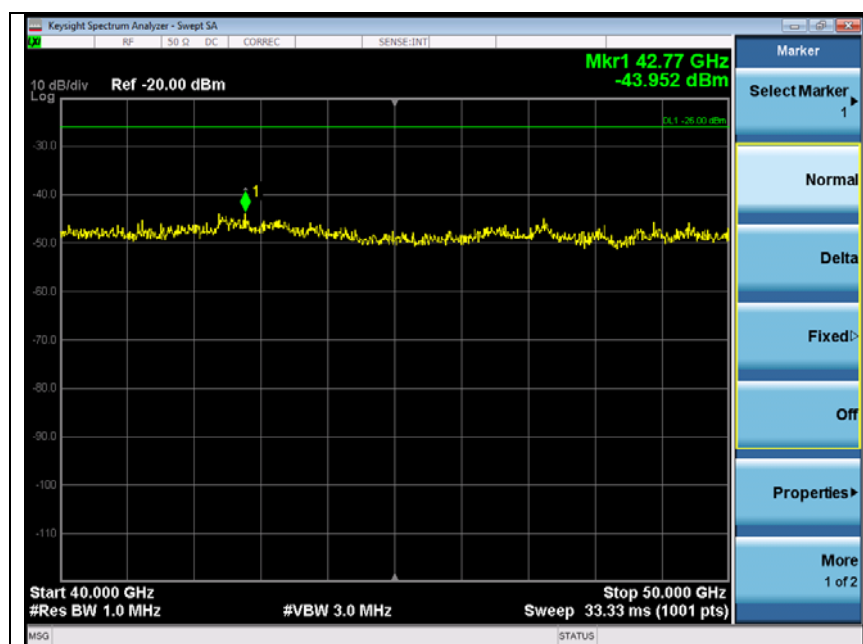
Spurious Emission Frequency Range	1GHz ~ 48.5GHz	Test Condition	V _{max}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
15867.83	H	-42.27	-26.00	-16.27



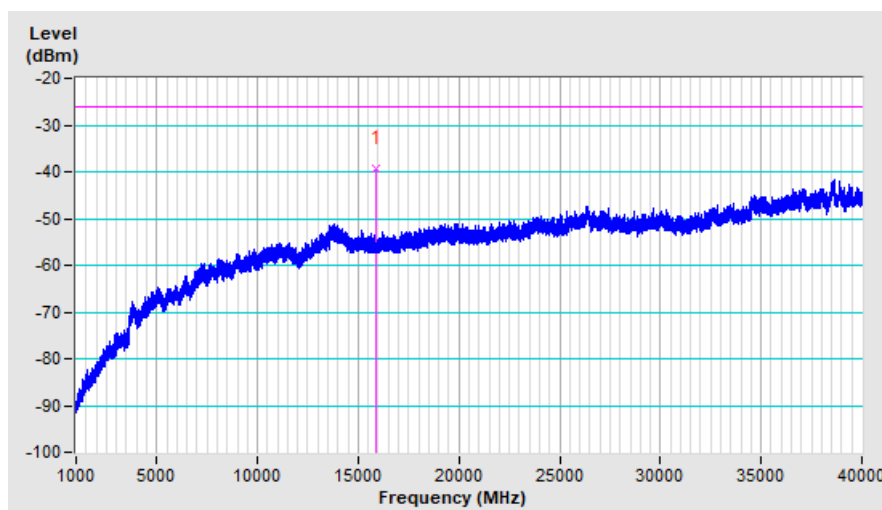
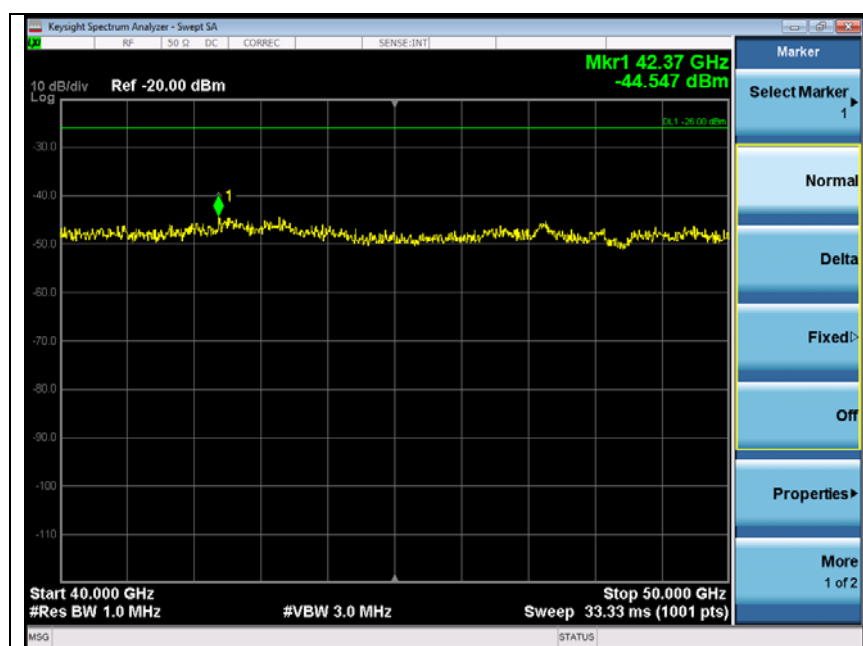
Spurious Emission Frequency Range	1GHz ~ 48.5GHz	Test Condition	V _{max}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
15866.68	V	-39.71	-26.00	-13.71



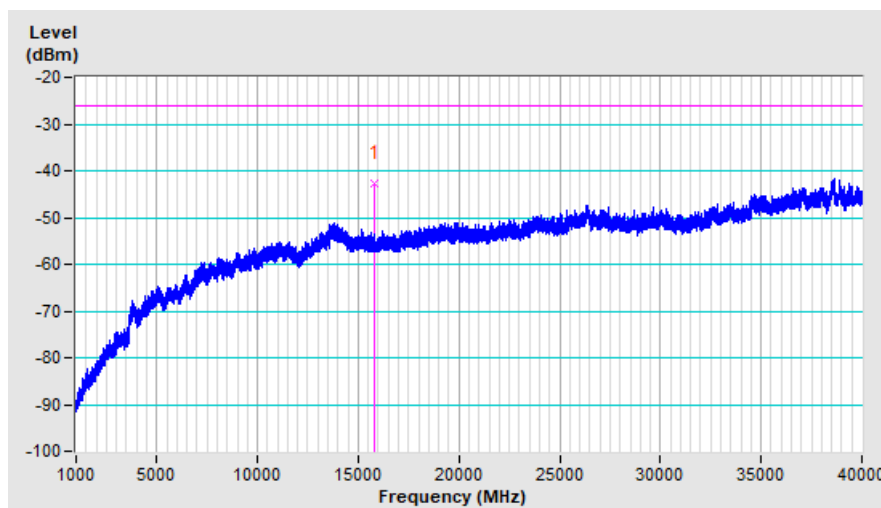
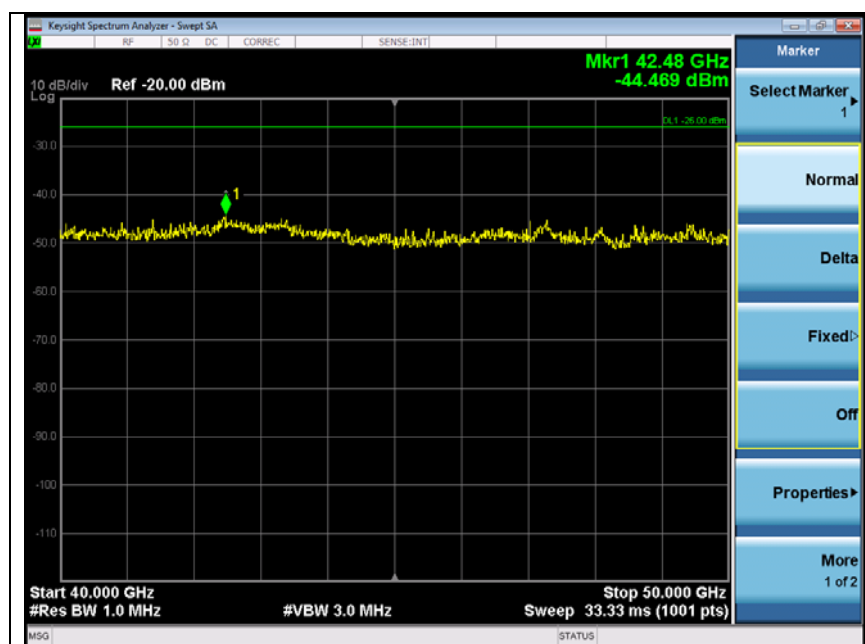
Spurious Emission Frequency Range	1GHz ~ 48.5GHz	Test Condition	V _{min}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
15846.77	H	-39.45	-26.00	-13.45



Spurious Emission Frequency Range	1GHz ~ 48.5GHz	Test Condition	V _{min}
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Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
15808.60	V	-42.61	-26.00	-16.61



5 Photographs of the Test Configuration



Appendix - Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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