FCC - TEST REPORT

Report Number	:	**64.790.19.04625.01**	Date of Issue:	July 15, 2020
Model	:	SMG		
Product Type	:	ELECTRIC BREAST PUMP		
Applicant	:	Guangdong Horigen Mother & Baby Products Co., Ltd.		
Address	:	No. 18, Pingnan Industrial Zone, Mianbei Street, Chaoyang District, 515100 Shantou, Guangdong, PEOPLE'S REPUBLIC OF CHINA		
Factory	:	Guangdong Horigen Mother & Baby Products Co., Ltd.		
Address	:	No. 18, Pingnan Industrial Zone, Mianbei Street, Chaoyang District,		
	:	515100 Shantou, Guangdong, PEOPLE'S REPUBLIC OF CHINA		
Test Result	:	■ **Positive** ☐ **Negative**		
Total pages including Appendices	:	**38**		

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2 Details about the Test Laboratory

Details about the Test Laboratory
Test Site 1

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch Building 12 & 13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District Shenzhen 518052 P.R. China
Telephone:	86 755 8828 6998
Fax:	86 755 8288 5299
FCC Registration No.:	514049

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3 Description of the Equipment Under Test

Product:	ELECTRIC BREAST PUMP
Model no.:	SMG
FCC ID:	2AWM2HNRSMG001
Options and accessories:	
Rating:	11.1VDC, 2000mAh (Li-ion cylindrical battery) Supply adapter: input: 100-240V~, 50/60Hz, output:15VDC, 1.6A
RF Transmission Frequency:	2402MHz-2480MHz
No. of Operated Channel:	40
Modulation:	GFSK
Antenna Type:	Integrated Antenna
Antenna Gain:	4.2dBi
Description of the EUT:	The Equipment Under Test (EUT) is electric breast pump with Bluetooth operated at 2.402-2.48GHz.

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2019 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB558074 D01 v05r02 DTS Measurement Guidance and ANSI C63.10 (2013).

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5 Summary of Test Results

Technical Requirements						
FCC Part 15 Subpart C						
Test Condition		Pages	Test Site	Test Result		
				Pass	Fail	N/A
§15.207	Conducted emission AC power port	10	Site 1	☒	☐	☐
§15.247 (b) (1)	Conducted peak output power	13	Site 1	☒	☐	☐
§15.247(a)(1)	20dB bandwidth	---	---	☐	☐	☒
§15.247(a)(1)	Carrier frequency separation	---	---	☐	☐	☒
§15.247(a)(1)(iii)	Number of hopping frequencies	---	---	☐	☐	☒
§15.247(a)(1)(iii)	Dwell Time	---	---	☐	☐	☒
§15.247(e)	Power spectral density	16	Site 1	☒	☐	☐
§15.247(a)(2)	6dB bandwidth and 99% Occupied Bandwidth	19	Site 1	☒	☐	☐
§15.247(d)	Spurious RF conducted emissions	23	Site 1	☒	☐	☐
§15.247(d)	Band edge	29	Site 1	☒	☐	☐
§15.247(d) & §15.209 & §15.205	Spurious radiated emissions for transmitter	31	Site 1	☒	☐	☐
§15.203	Antenna requirement	See note 2		☒	☐	☐

Note 1: N/A=Not Applicable.
Note 2: The EUT uses a Integrated antenna, which gain is 4.2dBi. In accordance to §15.203, it is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

This submittal(s) (test report) is intended for FCC ID: 2AWM2HNRSMG001 complies with Section 15.205,15.207 15.209, 15.247 of the FCC Part 15, Subpart C.
SMG is electric breast pump with Bluetooth. The TX and RX range is 2402MHz-2480MHz.

Note: The report is for BLE only

SUMMARY:

All tests according to the regulations cited on page 6

■ - Performed

☐ - **Not** Performed

The Equipment under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date:	January 20, 2020
Testing Start Date:	January 22, 2020
Testing End Date:	February 27, 2020

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Reviewed by:	Prepared by:	Test by:
Tony Liu	Kevin Ouyang	Louise Liu

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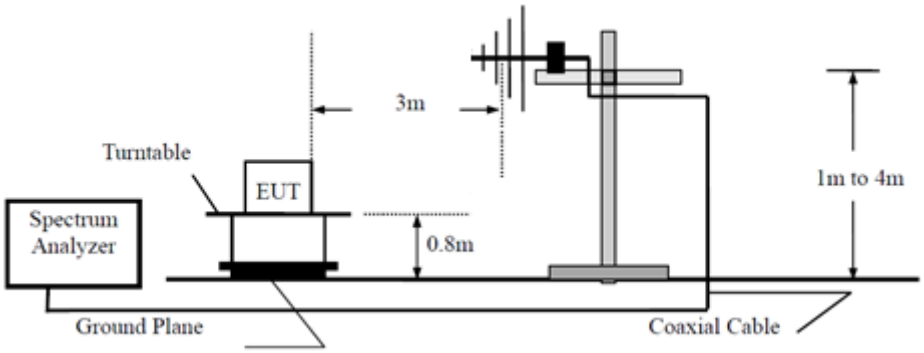
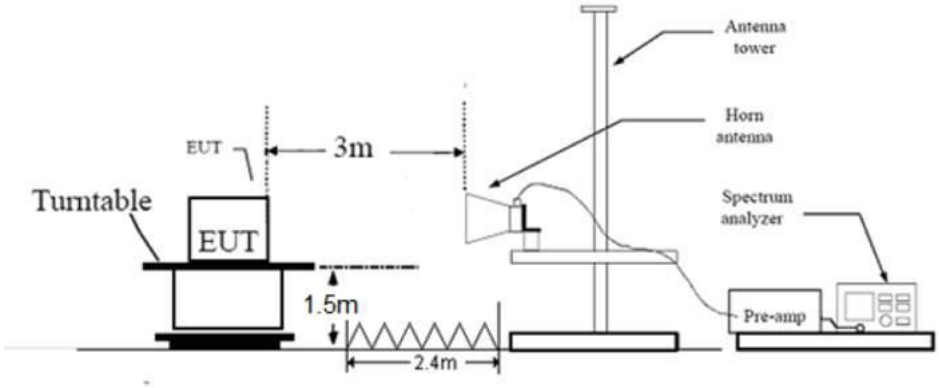
7 Test Setups

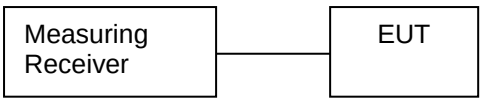
Radiated emission test setups
Below 1GHz



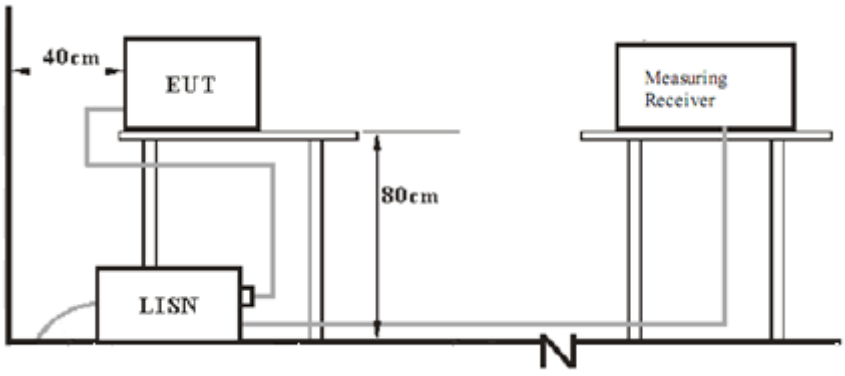
Above 1GHz



Conducted RF test setups



AC Power Line Conducted Emission test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Notebook	Lenovo	X220	---
Mobile Phone	Huawei	---	

Test software: nRFgo Studio Test Tool, which used to control the EUT in continues transmitting mode.

The system was configured to channel 0, 19, and 39 for the test.

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9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

Frequency MHz	QP Limit dBµV	AV Limit dBµV
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linea

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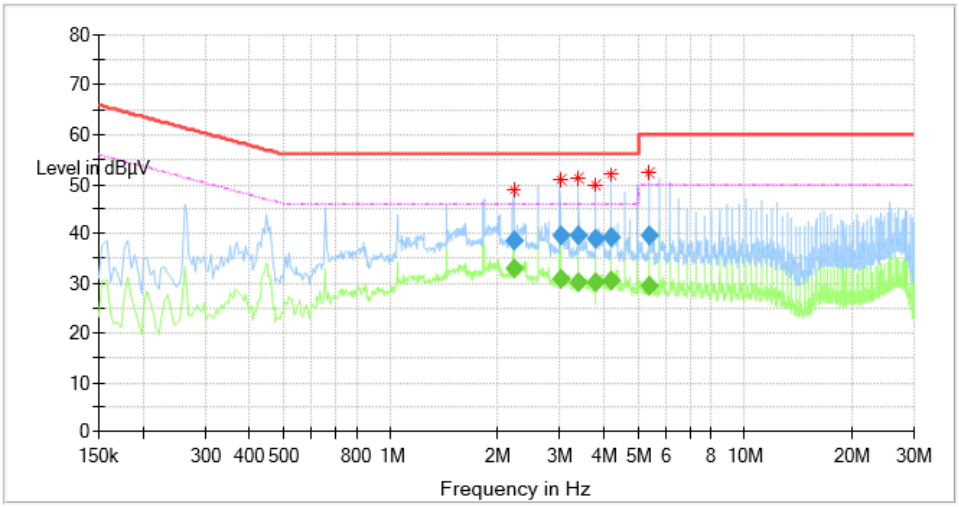
Product Type	:	Electric breast pump
M/N	:	SMG
Operating Condition	:	Charging+ BT Link
Test Specification	:	Line
Comment	:	120VAC (Supplied by adapter)



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
2.226500	---	32.90	46.00	13.10	L1	10.4
2.226500	38.58	---	56.00	17.42	L1	10.4
3.010500	---	30.87	46.00	15.13	L1	10.4
3.010500	39.50	---	56.00	16.50	L1	10.4
3.393500	---	30.30	46.00	15.70	L1	10.4
3.393500	39.76	---	56.00	16.24	L1	10.4
3.781500	---	30.35	46.00	15.65	L1	10.4
3.781500	39.04	---	56.00	16.96	L1	10.4
4.181500	---	30.36	46.00	15.64	L1	10.4
4.181500	39.16	---	56.00	16.84	L1	10.4
5.345500	---	29.61	50.00	20.39	L1	10.5
5.345500	39.72	---	60.00	20.28	L1	10.5

Remark：
Level=Reading Level + Correction Factor
Correction Factor=Cable Loss + LISN Factor
(The Reading Level is recorded by software which is not shown in the sheet)

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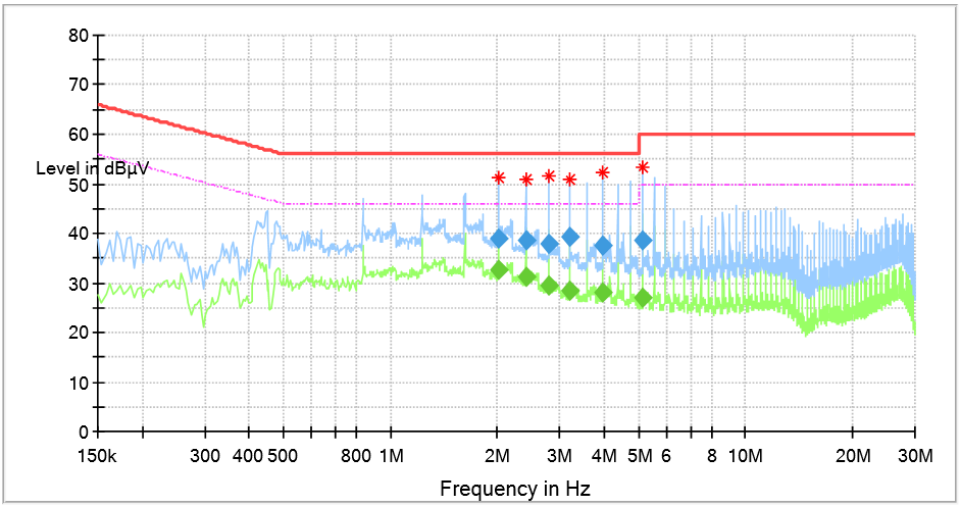
Product Type	:	Electric breast pump
M/N	:	SMG
Operating Condition	:	Charging+ BT Link
Test Specification	:	Neutral
Comment	:	120VAC (Supplied by adapter)



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
2.009500	---	32.72	46.00	13.28	N	10.4
2.009500	39.07	---	56.00	16.93	N	10.4
2.409500	---	31.35	46.00	14.65	N	10.4
2.409500	38.74	---	56.00	17.26	N	10.4
2.801500	---	29.62	46.00	16.38	N	10.4
2.801500	37.88	---	56.00	18.12	N	10.4
3.193500	---	28.28	46.00	17.72	N	10.4
3.193500	39.41	---	56.00	16.59	N	10.4
3.974500	---	28.19	46.00	17.81	N	10.5
3.974500	37.58	---	56.00	18.42	N	10.5
5.133500	---	27.02	50.00	22.98	N	10.6
5.133500	38.70	---	60.00	21.30	N	10.6

Remark：
Level=Reading Level + Correction Factor
Correction Factor=Cable Loss + LISN Factor
(The Reading Level is recorded by software which is not shown in the sheet)

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9.2 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
   RBW > the 6dB bandwidth of the emission being measured, VBW≥3RBW, Span≥3RBW
   Sweep = auto, Detector function = peak, Trace = max hold.
2. Add a correction factor to the display.
3. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

Limits

According to §15.247 (b) (1), conducted peak output power limit as below:

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

Test result as below table

Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	-2.72	Pass
Middle channel 2440MHz	-2.83	Pass
High channel 2480MHz	-2.05	Pass

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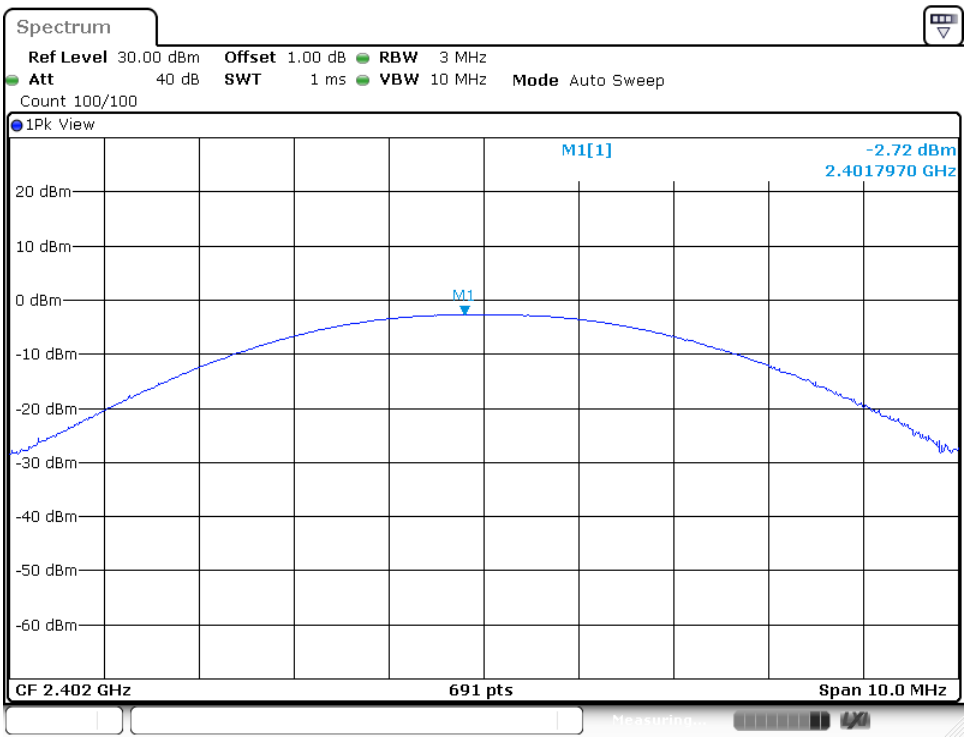
Low channel 2402MHz



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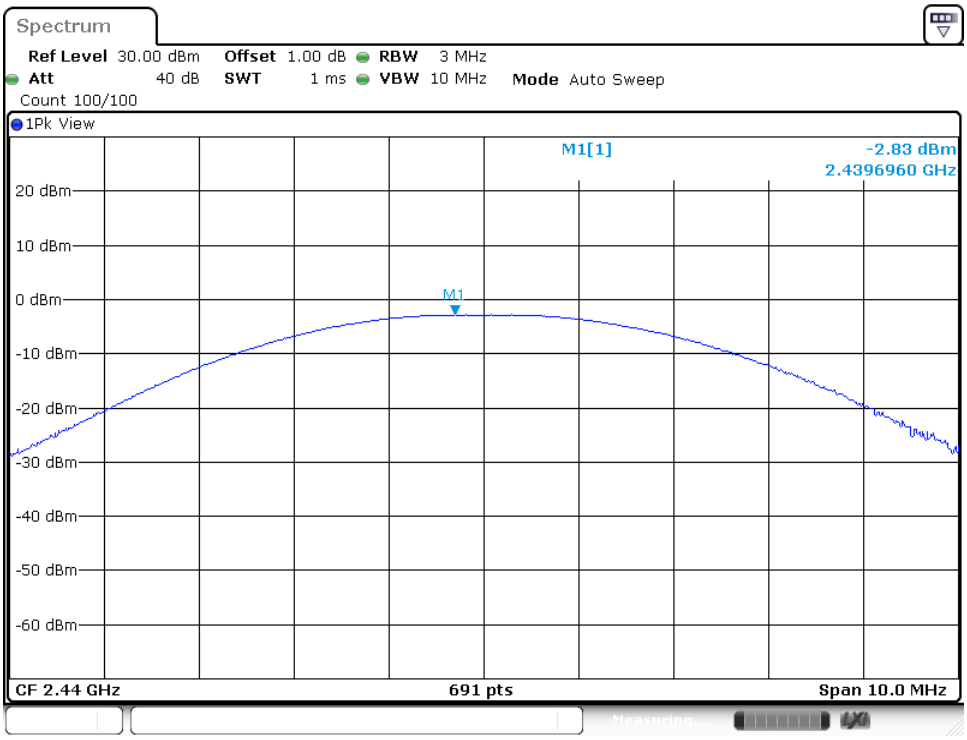
Middle channel 2440MHz



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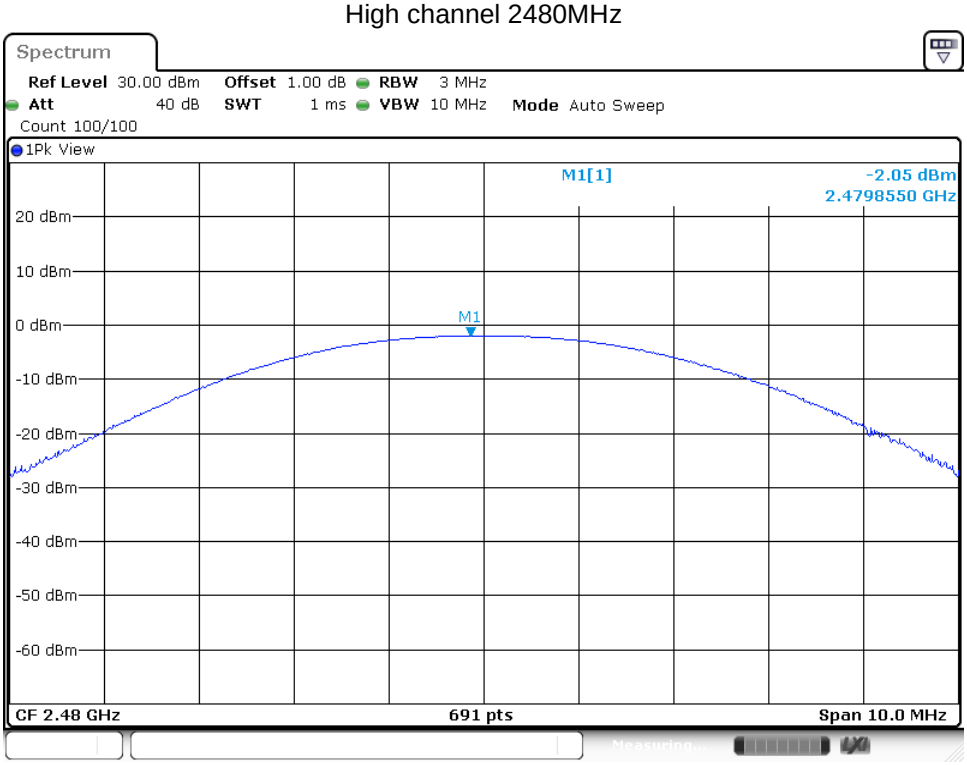
High channel 2480MHz



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9.3 Power spectral density

Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

1. Set analyzer center frequency to DTS channel center frequency. RBW=3kHz, VBW≥3RBW, Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
2. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
3. Repeat above procedures until other frequencies measured were completed.

Limit

Limit [dBm/3kHz]
≤8

Test result

Frequency **MHz**	Power spectral density **dBm/3kHz**	Result
Top channel 2402MHz	-16.44	Pass
Middle channel 2440MHz	-16.04	Pass
Bottom channel 2480MHz	-15.18	Pass

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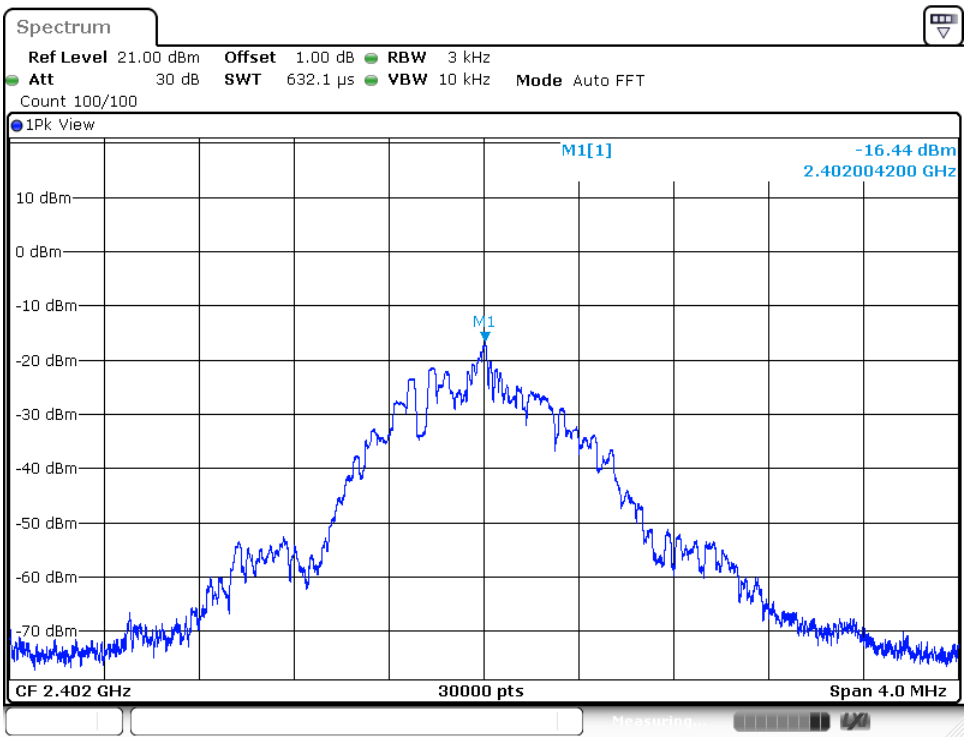
Low channel 2402MHz



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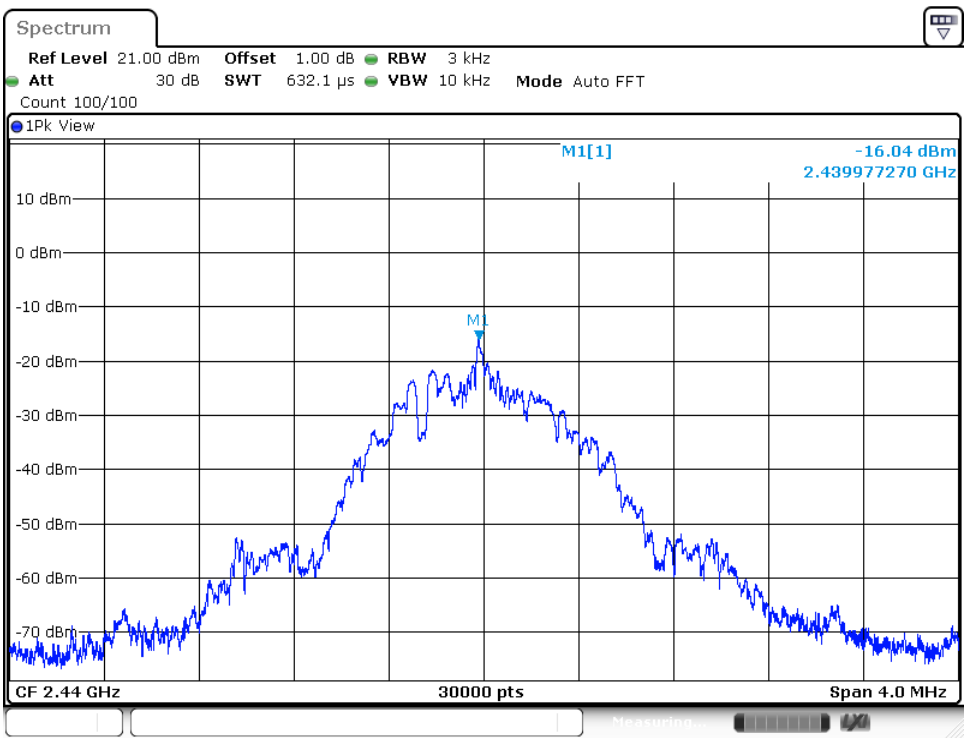
Middle channel 2440MHz



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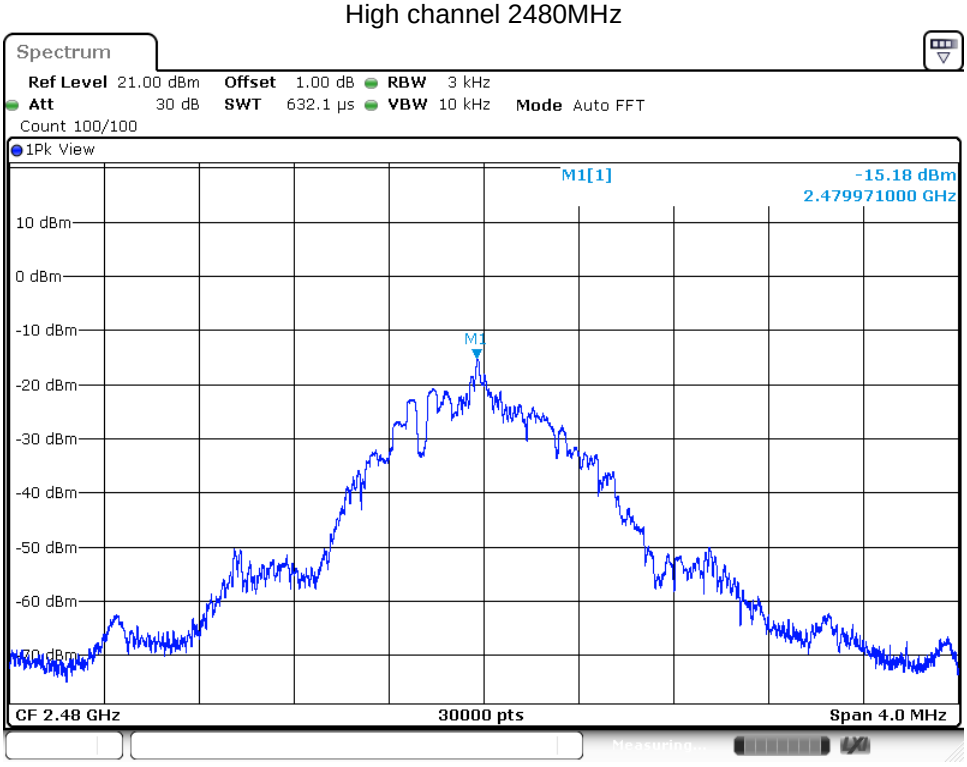
High channel 2480MHz



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9.4 6 dB Bandwidth and 99% Occupied Bandwidth

Test Method

1. Use the following spectrum analyzer settings:
RBW=100K, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

Limit [kHz]
≥500

Test result

Frequency MHz	6dB bandwidth kHz	99% bandwidth kHz	Result
Bottom channel 2402MHz	684	1057	Pass
Middle channel 2440MHz	700	1023	Pass
Top channel 2480MHz	692	1023	Pass

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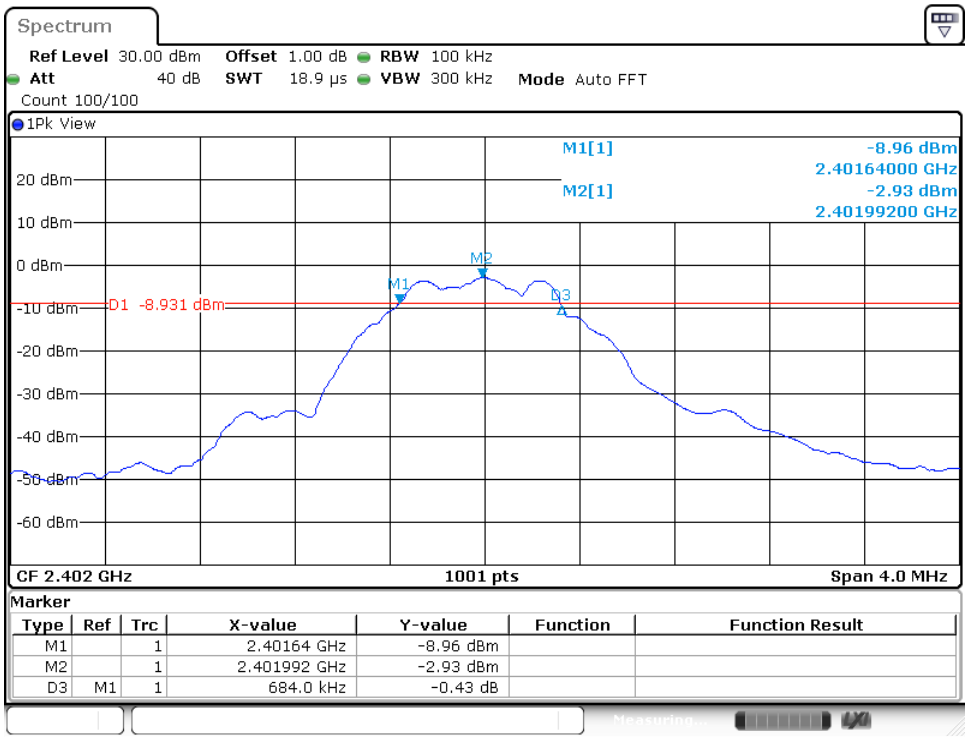
6 dB Bandwidth

Low channel 2402MHz



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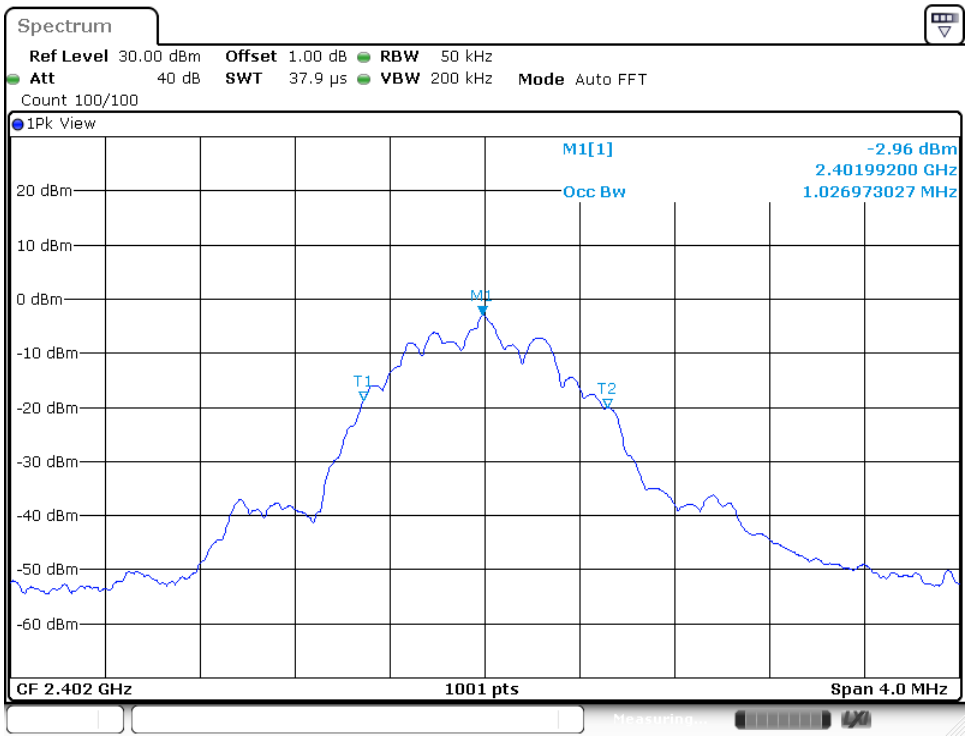

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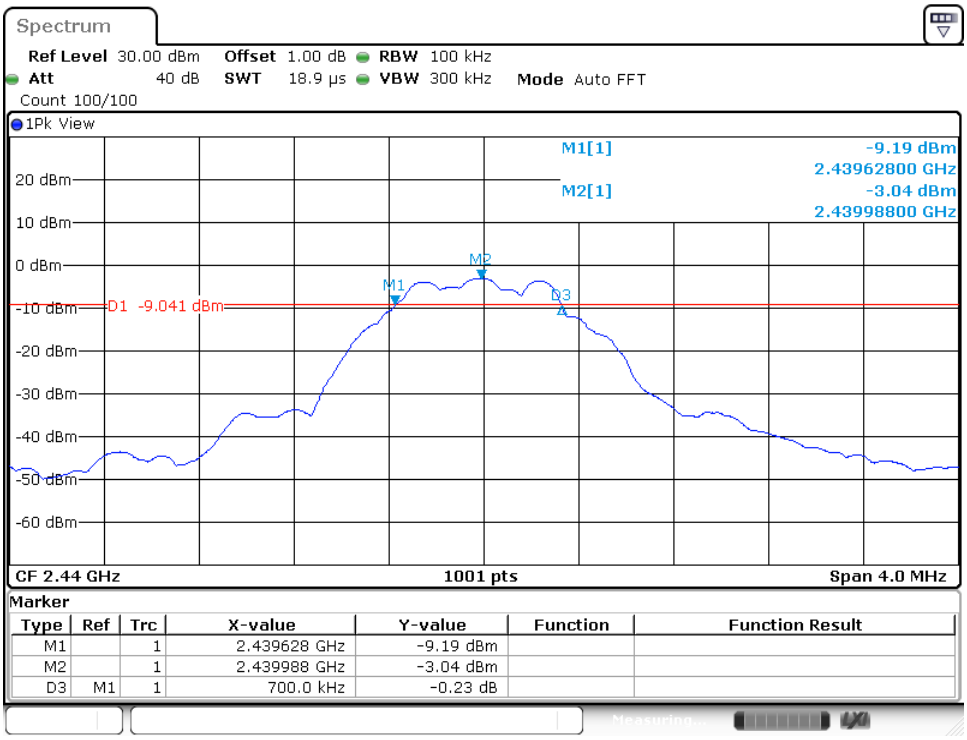
Middle channel 2440MHz



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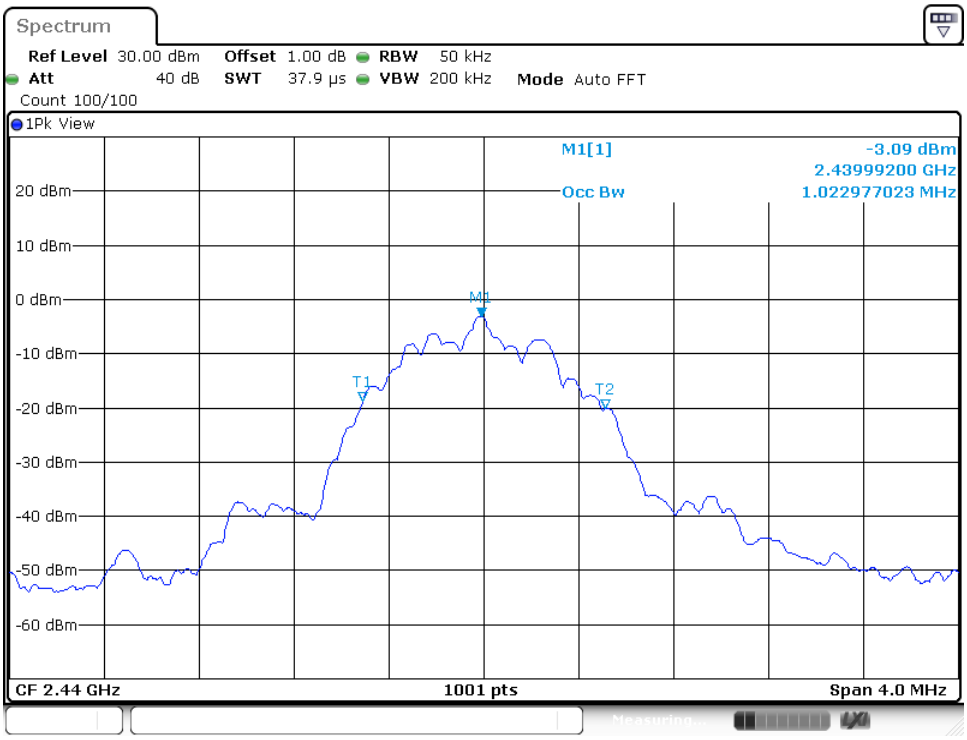

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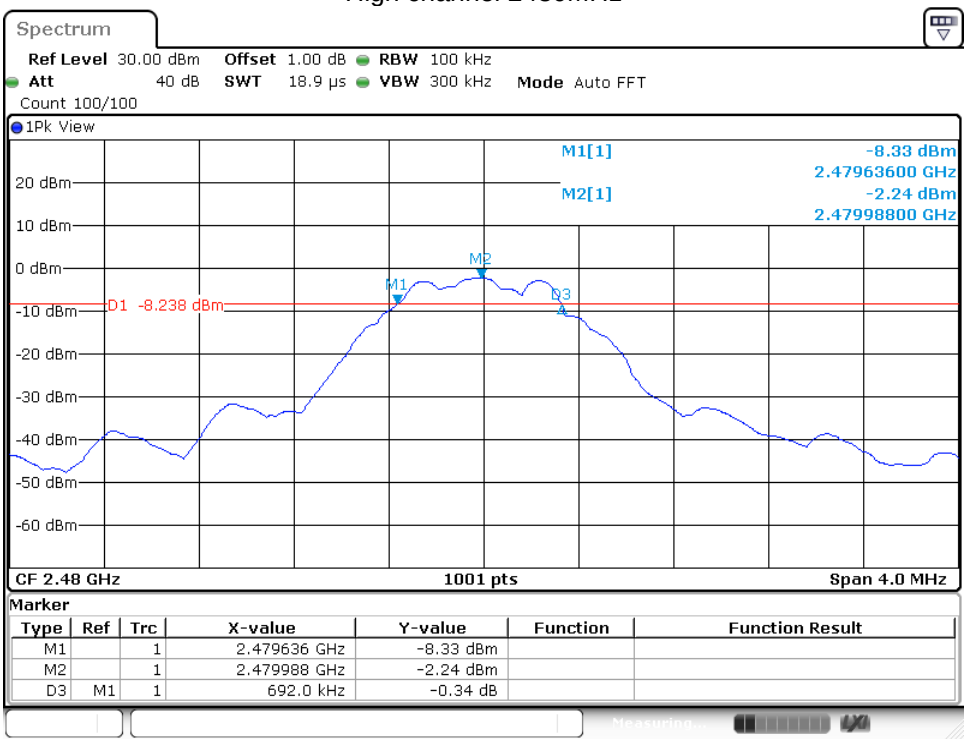
High channel 2480MHz



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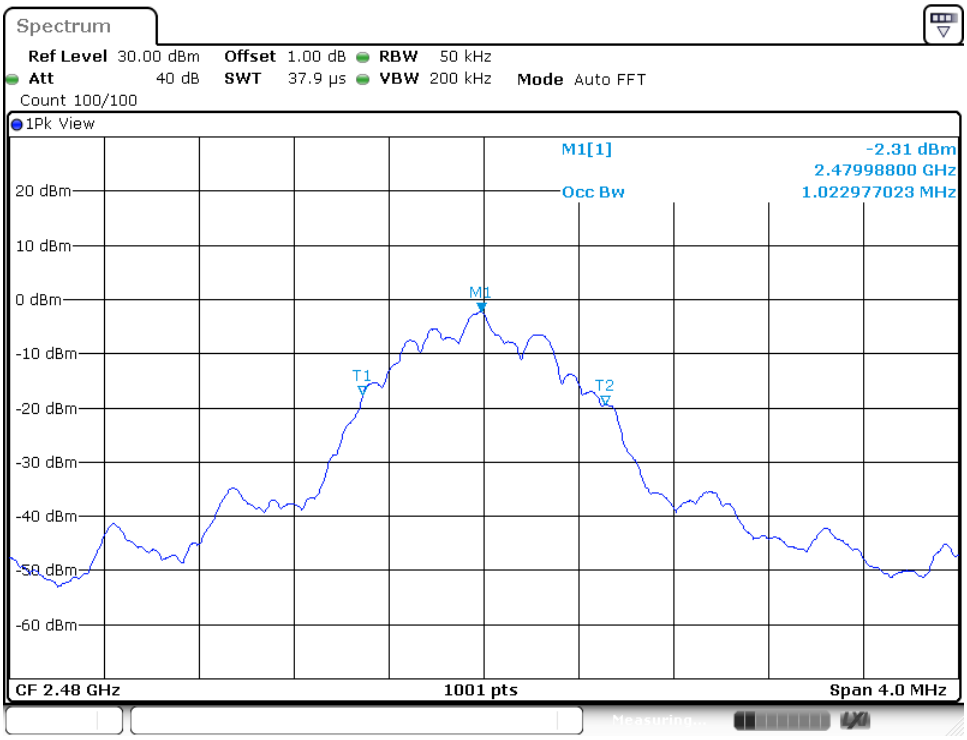

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9.5 Spurious RF conducted emissions

Test Method

1. Establish a reference level by using the following procedure:
   a. Set RBW=100 kHz. VBW≥3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
   b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
2. Use the maximum PSD level to establish the reference level.
   a. Set the center frequency and span to encompass frequency range to be measured.
   b. Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements, report the three highest emissions relative to the limit.
3. Repeat above procedures until other frequencies measured were completed.

Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

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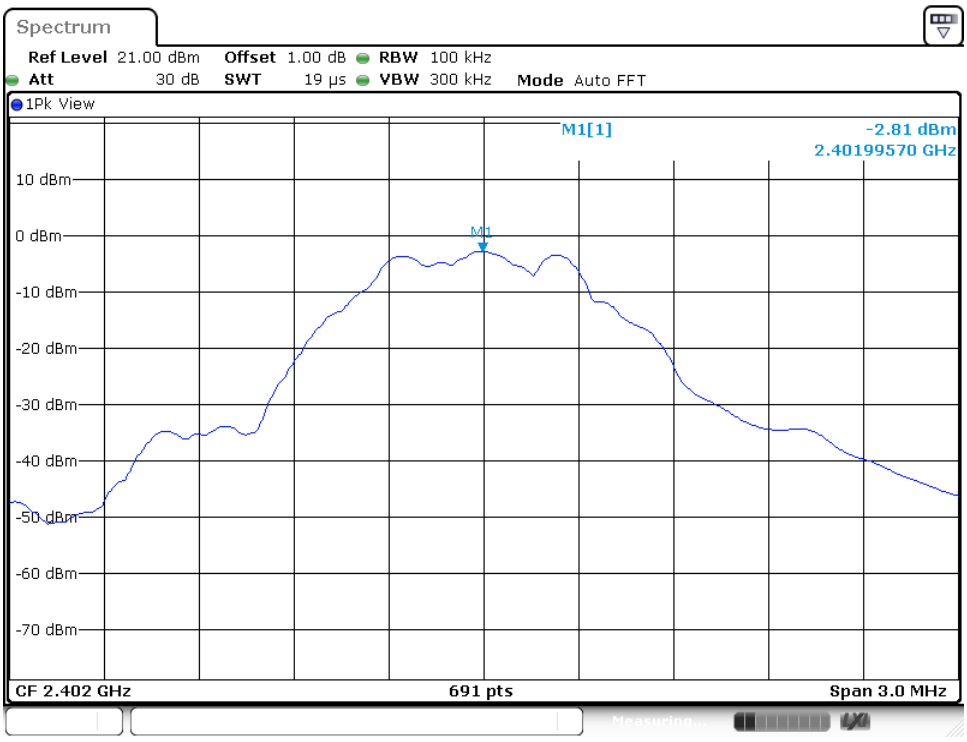
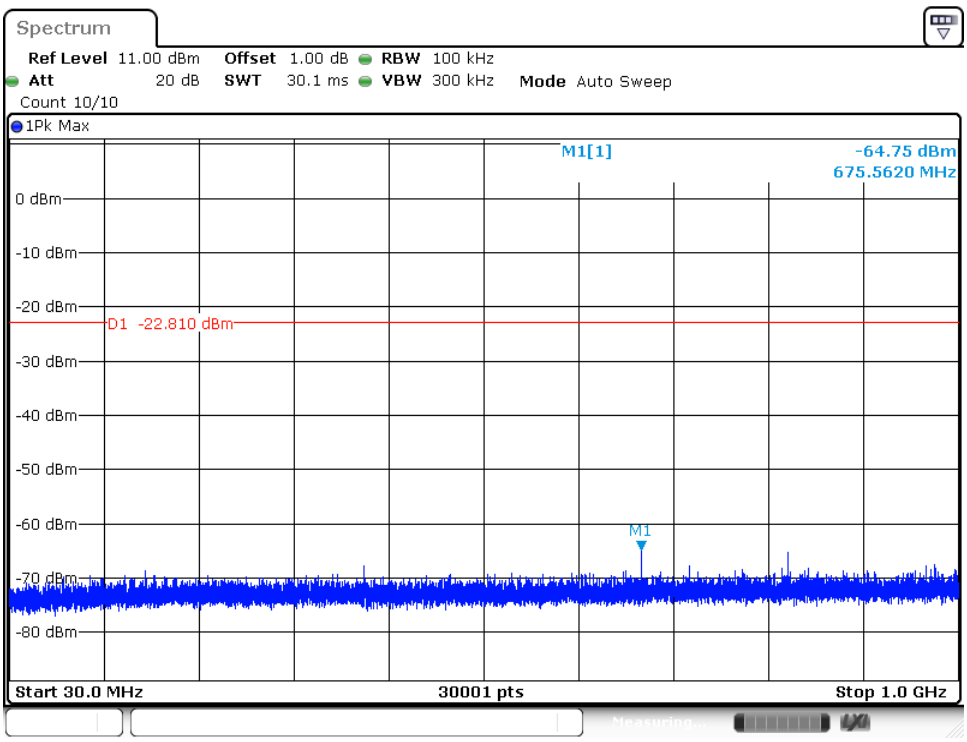
Spurious RF conducted emissions

2402MHz



Date: 22.JAN.2020 14:39:24



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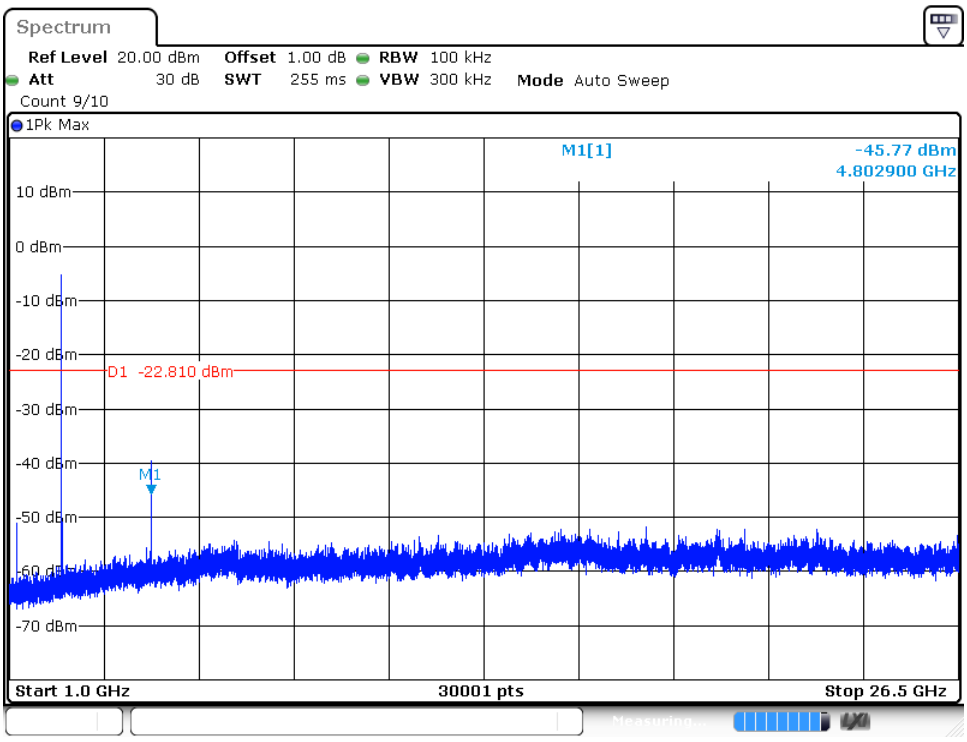
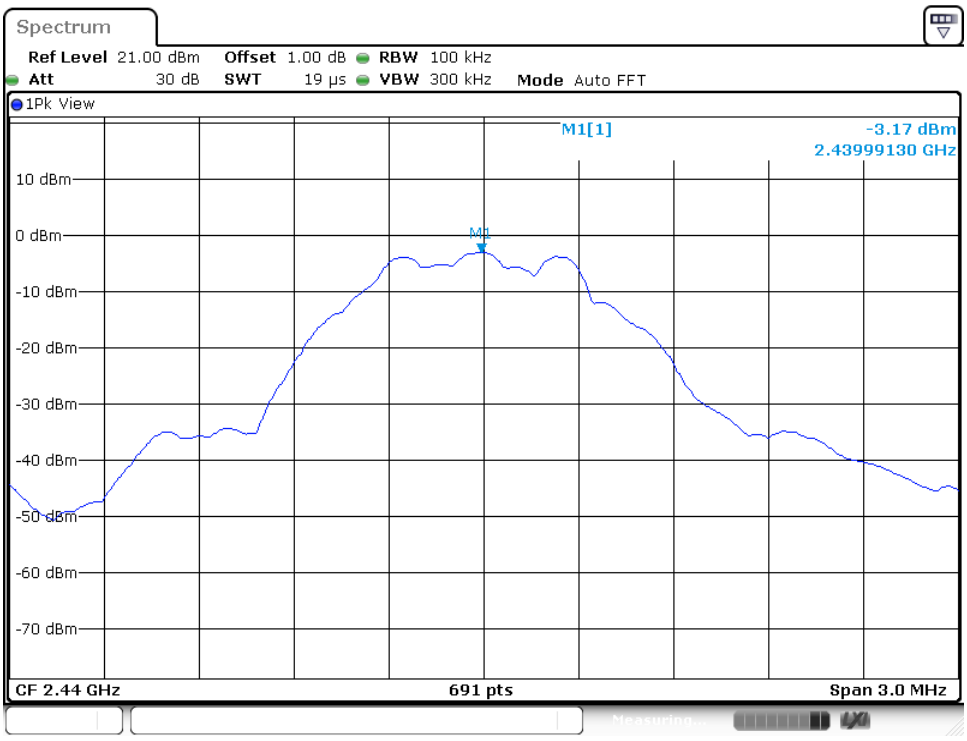


Date: 22.JAN.2020 14:39:45

Remark: The emissions exceed the limit, it is fundamental signals.

2440MHz



Date: 22.JAN.2020 14:41:08

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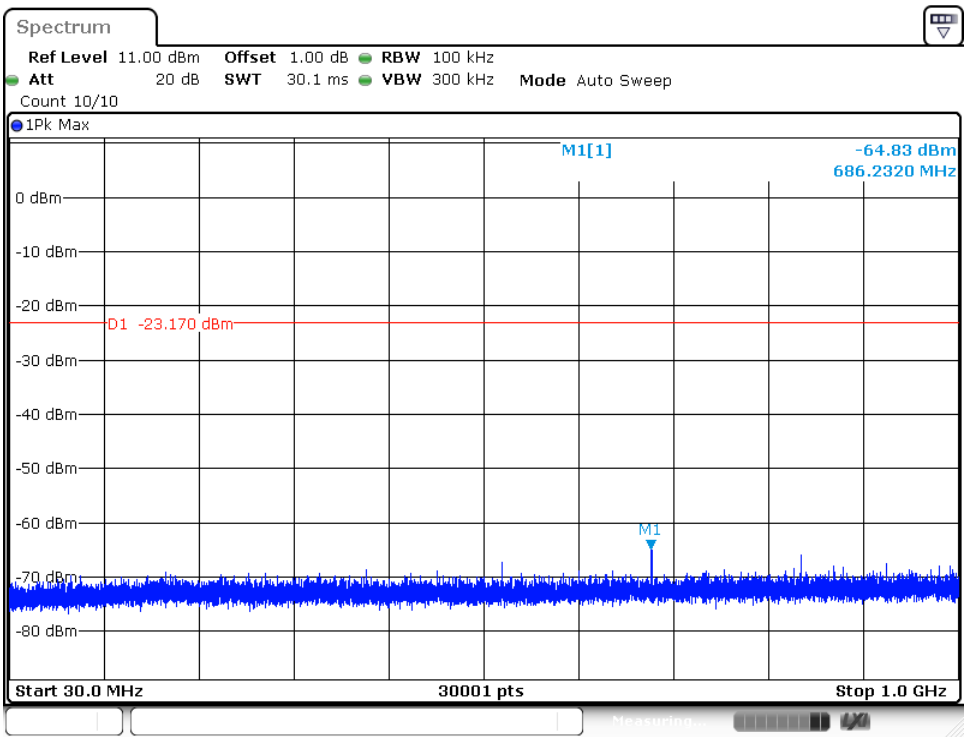
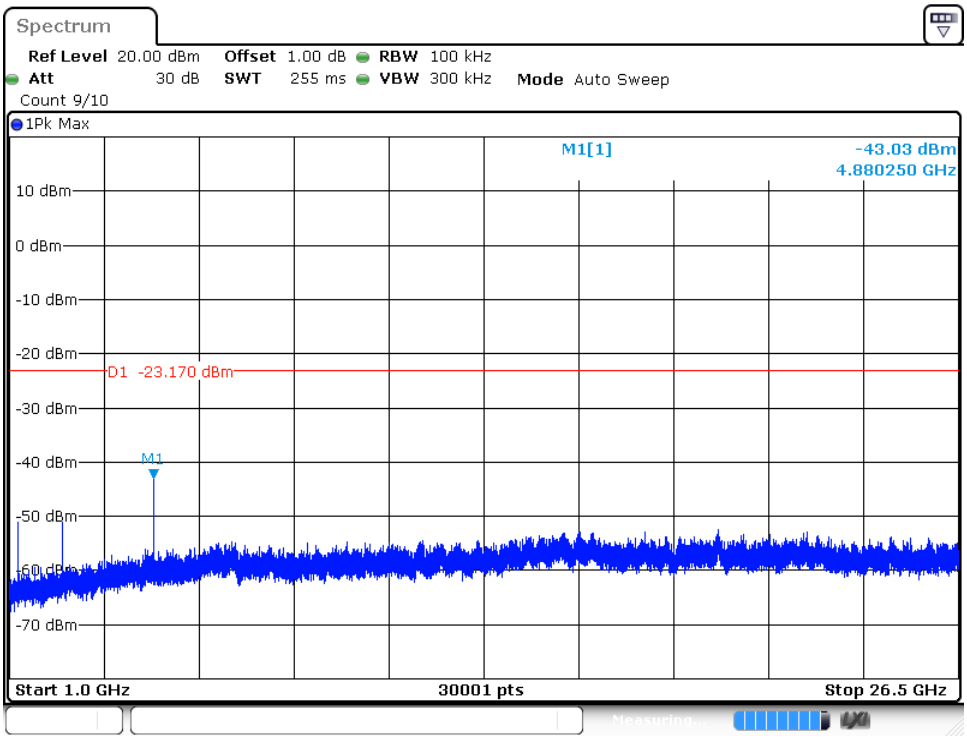


Date: 22.JAN.2020 14:41:17



Date: 22.JAN.2020 14:41:29

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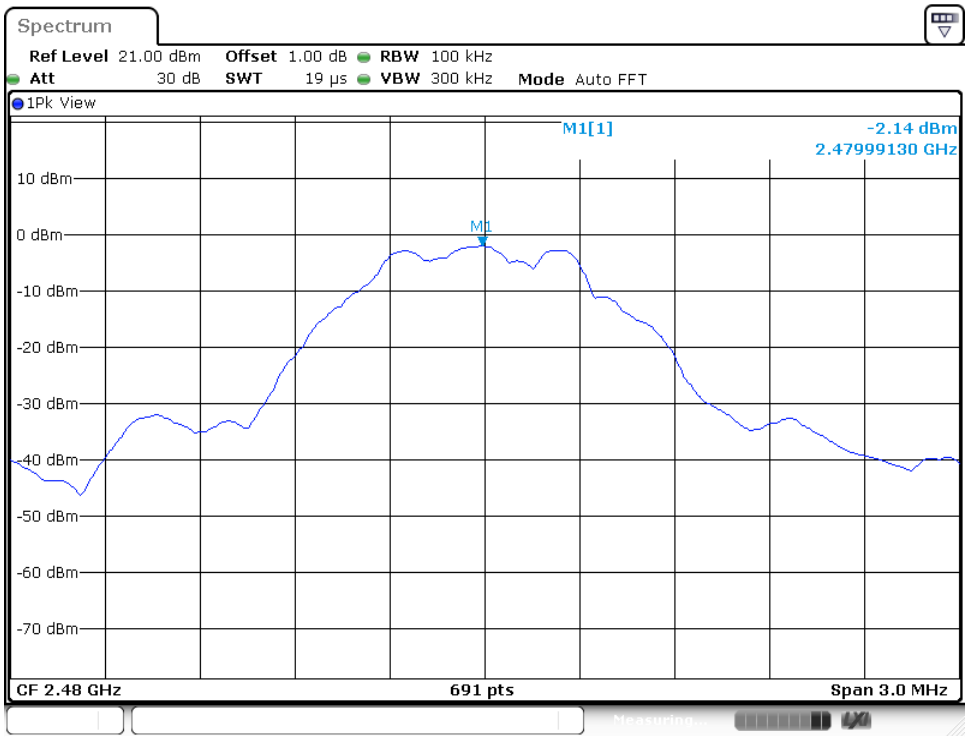
2480MHz



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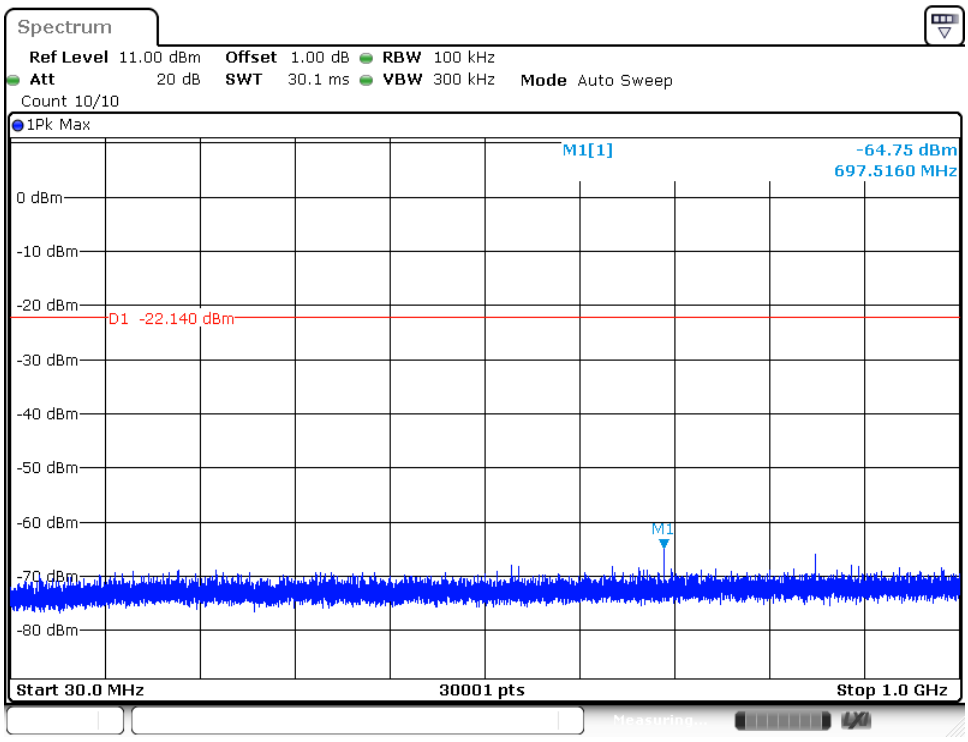

Date: 22.JAN.2020 14:43:29

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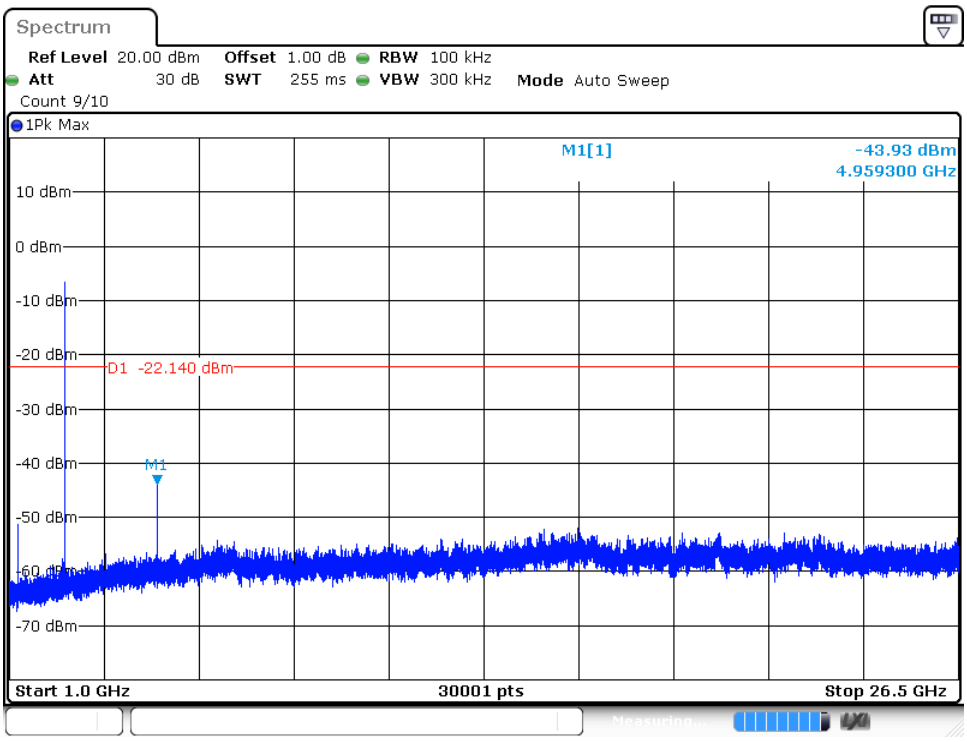

Remark: The emissions exceed the limit, it is fundamental signals.

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9.6 Band edge

Test Method

1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold.
2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
3 The level displayed must comply with the limit specified in this Section.

Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

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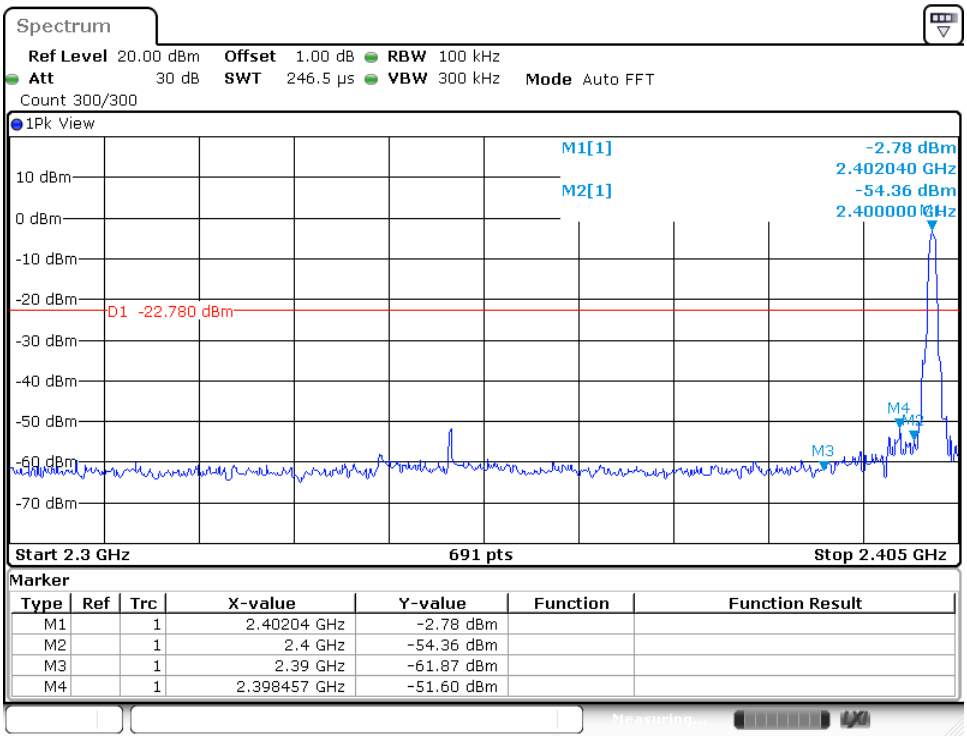
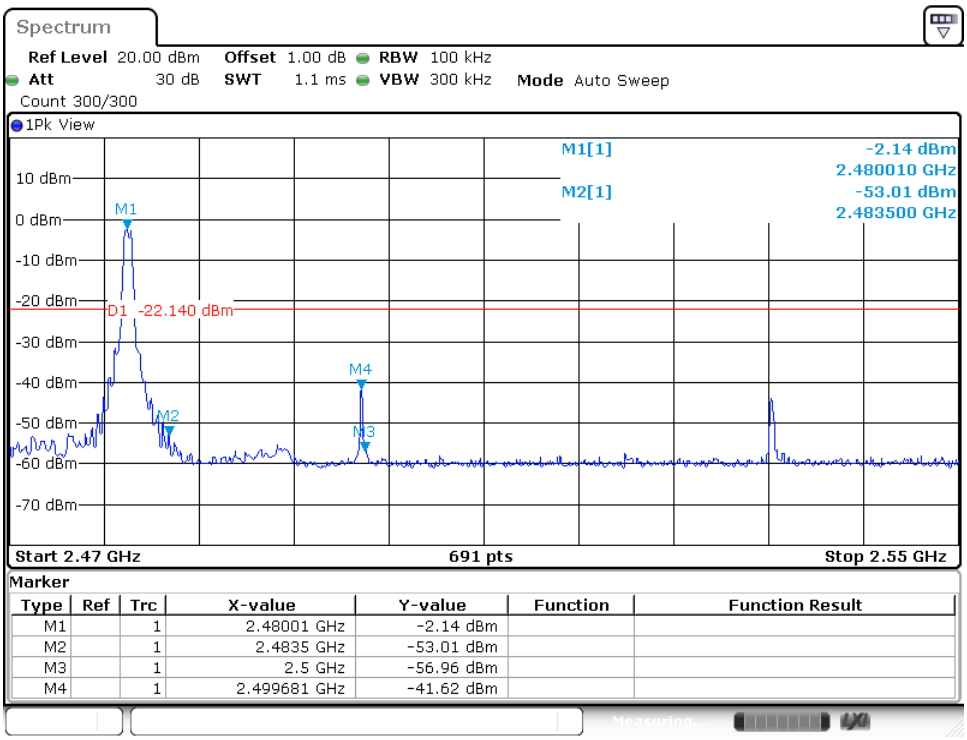
Band edge testing

2402MHz



Date: 22.JAN.2020 14:39:17

2480MHz



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9.7 Spurious radiated emissions for transmitter

Test Method

1: The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.

3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

5: Use the following spectrum analyzer settings According to C63.10:

For Below 1GHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 100 KHz to 120KHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Peak unwanted emissions Above 1GHz:

Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 1MHz, VBW≥RBW for peak measurement ,Sweep = auto, Detector function = peak, Trace = max hold.

Procedures for average unwanted emissions measurements above 1000 MHz

a) RBW = 1 MHz.

b) VBW \ [3 × RBW].

c) Detector = RMS (power averaging), if [span / (# of points in sweep)] \ RBW / 2. Satisfying this condition can require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, then the detector mode shall be set to peak.

d) Averaging type = power (i.e., rms) (As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.)

e) Sweep time = auto.

f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of 1 / D,where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 100 traces shall be averaged.)

g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:

1) If power averaging (rms) mode was used in the preceding step e), then the correction factor is [10 log (1 / D)], where D is the duty cycle. For example, if the transmit duty

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cycle was 50%, then 3 dB shall be added to the measured emission levels.
2) If linear voltage averaging mode was used in the preceding step e), then the correction factor is [20 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.
3) If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

Limit

The radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dBµV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

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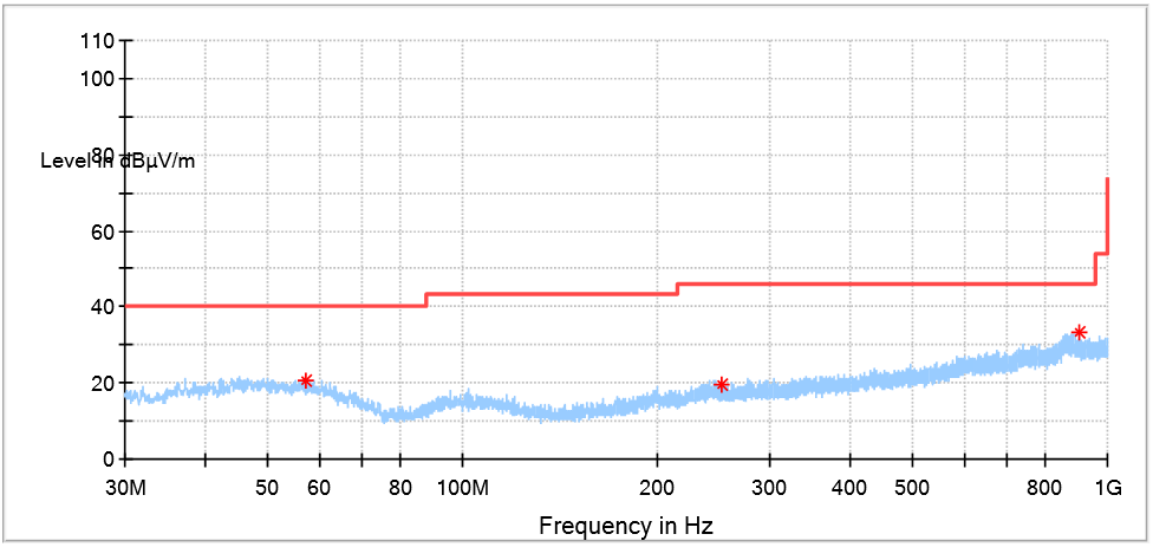
Spurious radiated emissions for transmitter

Transmitting spurious emission test result as below:

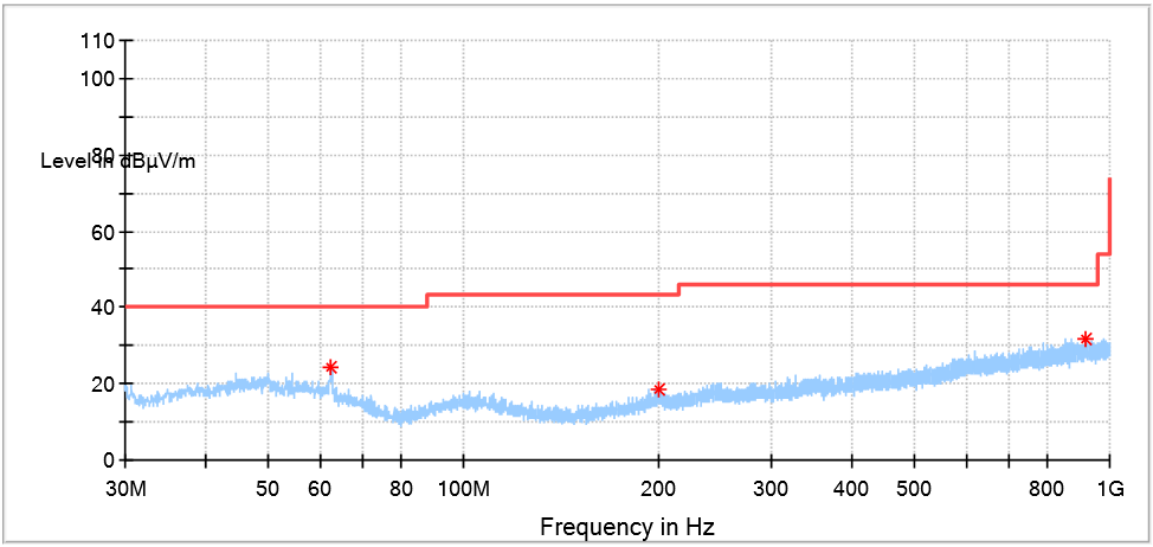
According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Below 1GHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV /m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
57.375556	20.38	40.00	19.62	154.0	H	183.0	-24.9
253.207778	19.72	46.00	26.28	154.0	H	227.0	-26.9
901.814444	33.09	46.00	12.91	154.0	H	156.0	-15.9

Below 1GHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV /m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
62.279444	24.28	40.00	15.72	154.0	V	106.0	-26.0
200.396667	18.44	43.50	25.06	154.0	V	36.0	-28.1
916.202778	31.59	46.00	14.41	154.0	V	84.0	-15.7

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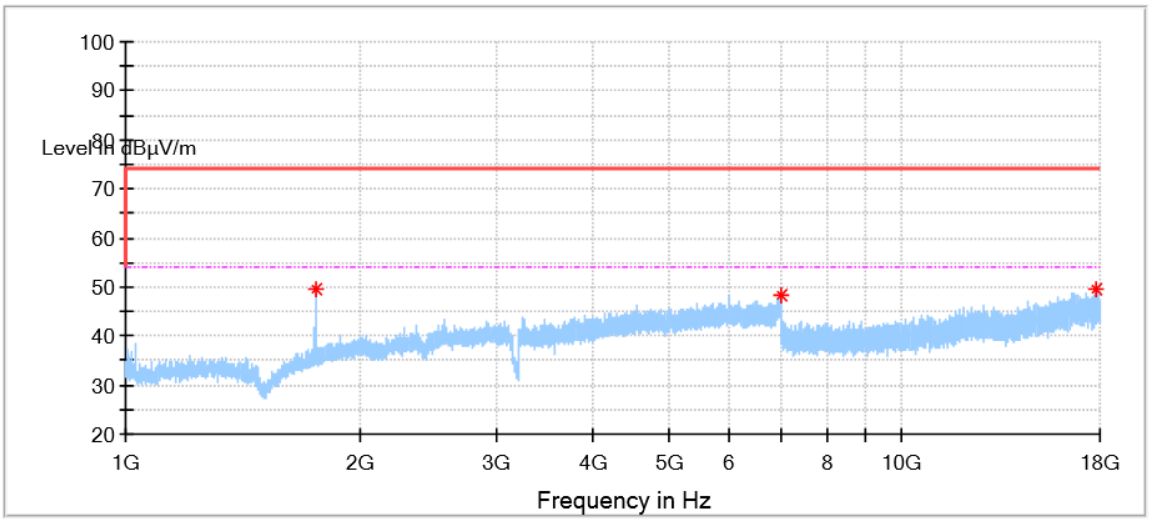
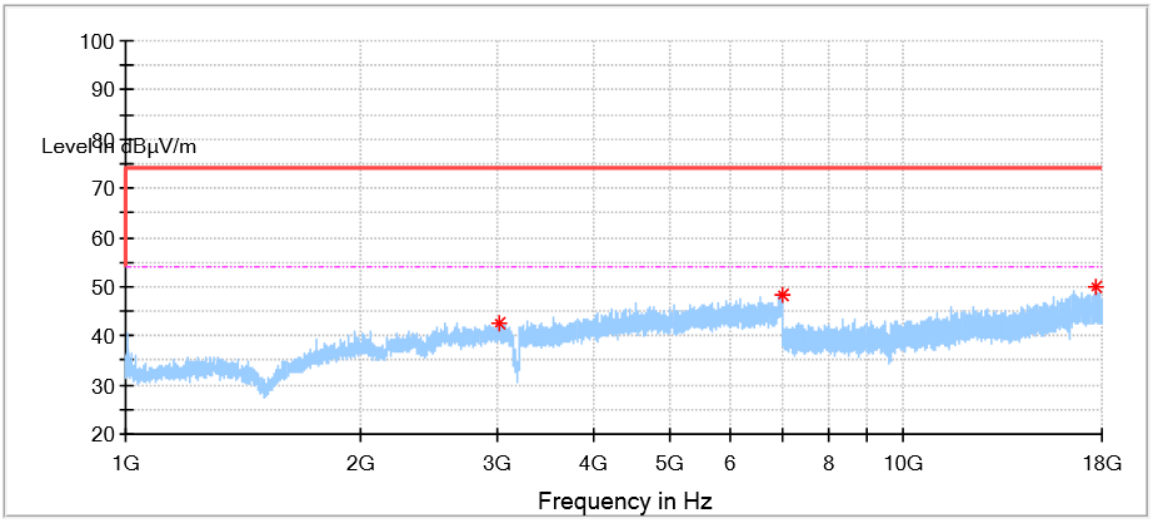
Above 1GHz
2402MHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1763.000000	49.51	74.00	24.49	150.0	H	49.0	-6.6
6993.000000	48.40	74.00	25.60	150.0	H	347.0	7.3
17832.500000	49.67	74.00	24.33	150.0	H	51.0	17.3



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3017.500000	42.76	74.00	31.24	150.0	V	347.0	-1.2
6975.500000	48.22	74.00	25.78	150.0	V	330.0	7.1
17724.000000	49.78	74.00	24.22	150.0	V	357.0	17.7

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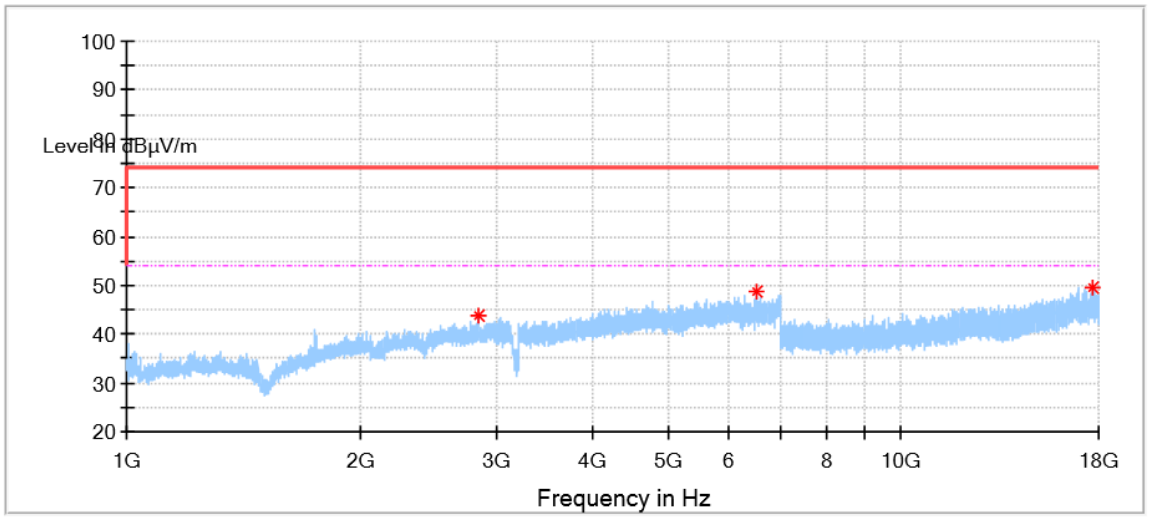
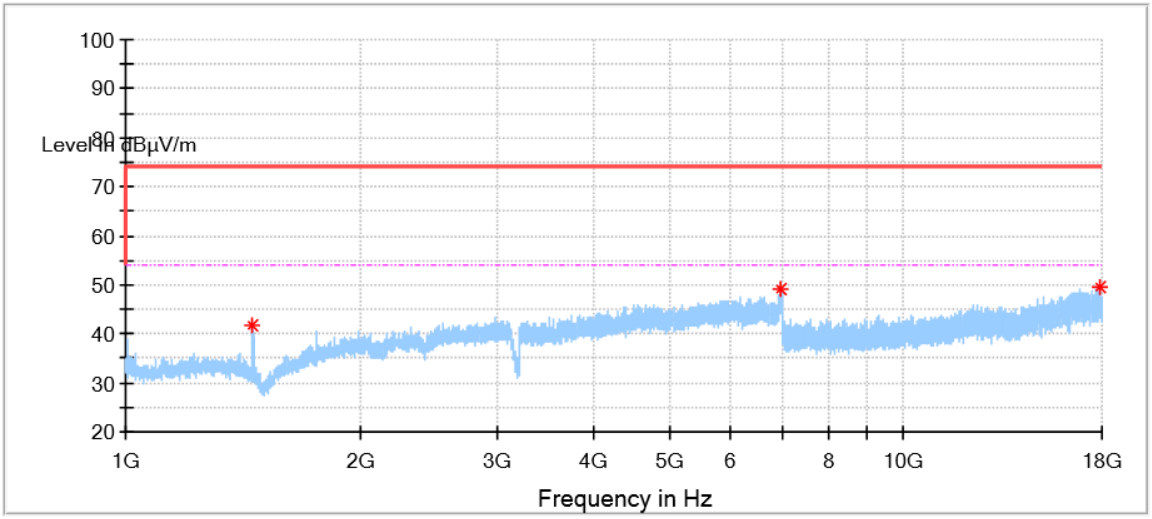
2440MHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2848.500000	43.86	74.00	30.14	150.0	H	342.0	-3.0
6510.500000	48.64	74.00	25.36	150.0	H	131.0	6.5
17701.500000	49.62	74.00	24.38	150.0	H	297.0	17.6



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1458.500000	41.85	74.00	32.15	150.0	V	88.0	-9.1
6966.500000	49.06	74.00	24.94	150.0	V	90.0	7.1
17871.500000	49.72	74.00	24.28	150.0	V	63.0	17.6

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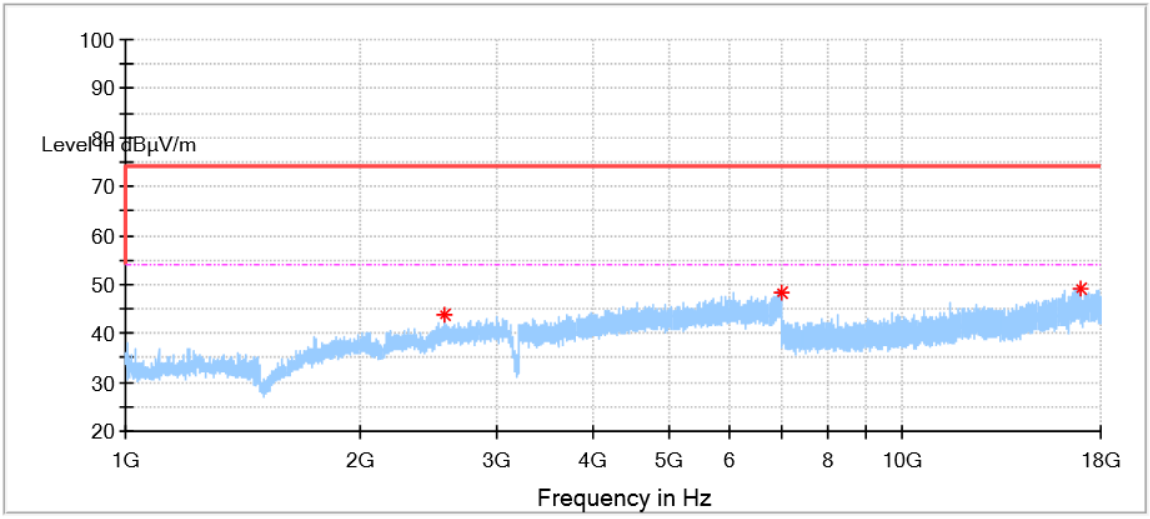
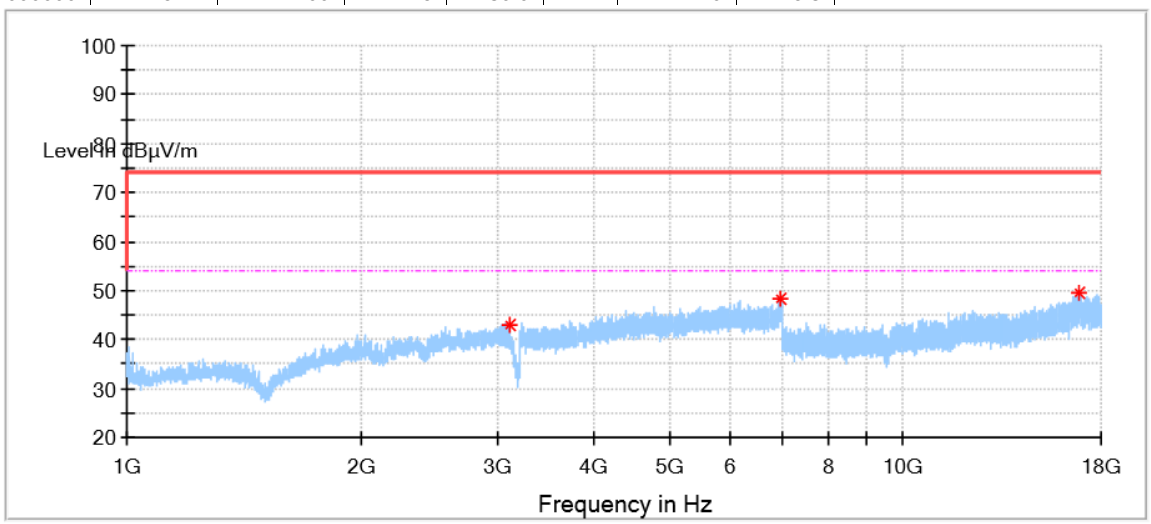
2480MHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2568.500000	43.88	74.00	30.12	150.0	H	71.0	-3.2
6978.500000	48.38	74.00	25.62	150.0	H	177.0	7.1
16933.000000	49.21	74.00	24.79	150.0	H	274.0	16.5



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3121.500000	42.97	74.00	31.03	150.0	V	178.0	-1.2
6940.000000	48.43	74.00	25.57	150.0	V	165.0	6.8
16871.000000	49.44	74.00	24.56	150.0	V	244.0	16.9

Remark:

(1) Data of measurement within frequency range 18Hz-26GHz are the noise floor or attenuated more than 10dB below the permissible limits or the field strength is too small to be measured.

(2) Data of measurement within this frequency range shown “--” in the table above means the reading of emissions are the noise floor or attenuated more than 10dB below the permissible limits or the field strength is too small to be measured.

(3) Level=Reading Level + Correction Factor
Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
Below 1GHz: Corrector factor = Antenna Factor + Cable Loss
(The Reading Level is recorded by software which is not shown in the sheet)

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10 Test Equipment List

List of Test Instruments

Radiated Spurious Emission Test

Description	Manufacturer	Model no.	Equipment ID	Serial no.	cal. due date
Signal Analyzer	Rohde & Schwarz	FSV40	68-4-74-14-003	101031	2020-6-28
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	68-4-80-14-003	708	2020-7-5
Horn Antenna	Rohde & Schwarz	HF907	68-4-80-14-004	102295	2020-7-5
Wideband Horn Antenna	Q-PAR	QWH-SL-18-40-K-SG	68-4-80-14-008	12827	2020-7-5
Loop Antenna	Rohde & Schwarz	HFH2-Z2	68-4-80-14-006	100398	2020-7-7
Pre-amplifier	Rohde & Schwarz	SCU 18	68-4-29-14-001	102230	2020-6-28
Pre-amplifier	Rohde & Schwarz	SCU 40A	68-4-29-14-002	100432	2020-7-16
Fully Anechoic Chamber	TDK	8X4X4	68-4-90-14-002	--	2020-7-7
Test software	Rohde & Schwarz	EMC32	68-4-90-14-002-A10	Version 9.15.00	N/A

Conducted Emission Test

Description	Manufacturer	Model no.	Equipment ID	Serial no.	cal. due date
EMI Test Receiver	Rohde & Schwarz	ESR 3	68-4-74-14-001	101782	2021-6-29
LISN	Rohde & Schwarz	ENV432	68-4-87-16-001	101318	2021-6-12
Attenuator	Shanghai Huaxiang	TS2-26-3	68-4-81-16-003	080928189	2021-6-21
Test software	Rohde & Schwarz	EMC32	68-4-90-14-003-A10	Version9.15.00	N/A
Shielding Room	TDK	CSR #1	68-4-90-19-004	----	2020-11-07

RF Test System

Description	Manufacturer	Model no.	Equipment ID	Serial no.	cal. due date
Signal Analyzer	Rohde & Schwarz	FSV40	68-4-74-14-004	101030	2020-6-28

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11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Conducted Emission 150kHz-30MHz	2.92 dB
Uncertainty for Radiated Spurious Emission 25MHz-3000MHz	Horizontal: 4.80dB; Vertical: 4.87dB;
Uncertainty for Radiated Spurious Emission 3000MHz-18000MHz	Horizontal: 4.59dB; Vertical: 4.58dB;
Uncertainty for Radiated Spurious Emission 18000MHz-40000MHz	Horizontal: 5.05dB; Vertical: 5.04dB;
Uncertainty for Conducted RF test with TS 8997	RF Power Conducted: 1.16dB Frequency test involved: 0.6×10^{-7} or 1%

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