FCC/IC- TEST REPORT

Report Number	:	**68.950.14.236.01**	Date of Issue:	Mar 05, 2015

Model	:	Silent 1220, Silent 1420, S1094
Product Type	:	SOUNDBAR
Applicant	:	Ningbo Somle Audio-Visual Technology Co.,Ltd
Address	:	No.39, Lane150, Beihai Road, Jiangbei, Ningbo, China

Test Result	:	■ **Positive**	☐ **Negative**
Total pages including Appendices	:	27	

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1 Table of Contents

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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
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P. R. China

Telephone: 86 755 8828 6998
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Test Site 2
Company name: Audix Technology (shenzhen) Co.,Ltd
Block Shenzhen, Science & Industry Park,
Nantou, Shenzhen,
Guangdong,
China

Telephone: 86 755 2663 9496
Fax: 86 755 2663 2877

3 Description of the Equipment under Test

Description of the Equipment Under Test

Product:	SOUNDBAR
Model no.:	Silent 1220, Silent 1420, S1094
FCC ID:	2ACPUS1420
IC :	12178A-SBS1420
Options and accessories:	NIL
Rating:	AC 100-240V, 50-60Hz
RF Transmission Frequency:	2402-2480MHz
No. of Operated Channel:	40
Modulation:	GFSK
Duty Cycle:	15.2%
Antenna Type:	PCB Antenna
Antenna Gain:	-0.61dBi
Description of the EUT:	The Equipment Under Test (EUT) is a SOUNDBAR operated at 2.4GHz

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2014 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
RSS-Gen Issue 4 November 2014	General Requirements for the Certification of Radio Apparatus
RSS-210 Issue 8 December 2010	RSS-210 — Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

All the test methods were according to KDB558074 D01 DTS Meas Guidance v03r02 and ANSI C63.10(2013).

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5 Summary of Test Results

Technical Requirements							
FCC Part 15 Subpart C, RSS-Gen, RSS-210							
Test Condition			Pages	Test Site	Test Result		
					Pass	Fail	N/A
§15.207	RSS-Gen A8.8	Conducted emission AC power port	10	---	☒	☐	☐
§15.247 (b) (1)	RSS-210 A8.4	Conducted peak output power	13	Site 2	☒	☐	☐
§15.247(a)(1)	RSS-210 A8.2(a)	20dB bandwidth	---	---	☐	☐	☒
§15.247(a)(1)	RSS-210 A8.1(a) & RSS-Gen 6.6	Carrier frequency separation	---	---	☐	☐	☒
§15.247(a)(1)(iii)	RSS-210 A8.1(b)	Number of hopping frequencies	---	---	☐	☐	☒
§15.247(a)(1)(iii)	RSS-210 A8.1(d)	Dwell Time	---	---	☐	☐	☒
§15.247(a)(2)	RSS-210 A8.1(c)	6dB bandwidth and 99% Occupied Bandwidth	14	Site 2	☒	☐	☐
§15.247(e)	RSS-210 A8.2(b)	Power spectral density	16	Site 2	☒	☐	☐
§15.247(d)	RSS-210 A8.5	Spurious RF conducted emissions	17	Site 2	☒	☐	☐
§15.247(d)	RSS-210 A8.5	Band edge	22	Site 2	☒	☐	☐
§15.247(d) & §15.209	RSS-210 2.5 & RSS-Gen 6.13	Spurious radiated emissions for transmitter	24	Site 2	☒	☐	☐
§15.203	RSS-Gen 8.3	Antenna requirement	See note 1		☒	☐	☐

Remark 1: N/A – Not Applicable.
Note 1: The EUT uses a PCB antenna, which gain is -0.61dBi. According to §15.203, it is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

<< Silent 1220 >> have the same electrical component and PCB layout with << Silent 1420 >> . The only difference is the colour and size.
Model No. << S1094 >> have the same electrical component and PCB layout with << Silent 1220 >> << Silent 1420 >> . The only difference is the colour, shape and size.
So tests are applied on Silent 1420, other models deem to fulfil the EMC requirement without further testing.
The EUT is a SOUNDBAR with Bluetooth function, the TX and RX frequency range is 2402MHz-2480MHz.
This submittal(s) (test report) is intended for FCC ID: 2ACPUS1420, IC: 12178A-SBS1420 complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules and RSS-210.
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SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment under Test

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

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

Sample Received Date: Oct 23, 2014

Testing Start Date: Oct 24, 2014

Testing End Date: Mar 04, 2015

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Reviewed by:	Prepared by:	Tested by:
Phoebe Hu	Calvin Weng	Leon Zhang
EMC Project Manager	EMC Project Engineer	EMC Test Engineer

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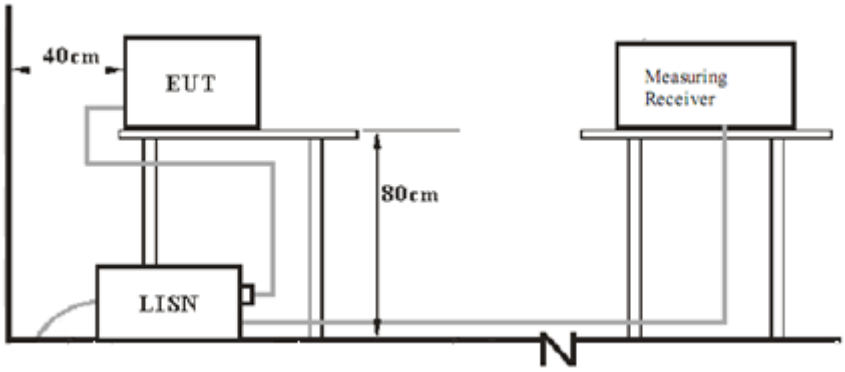
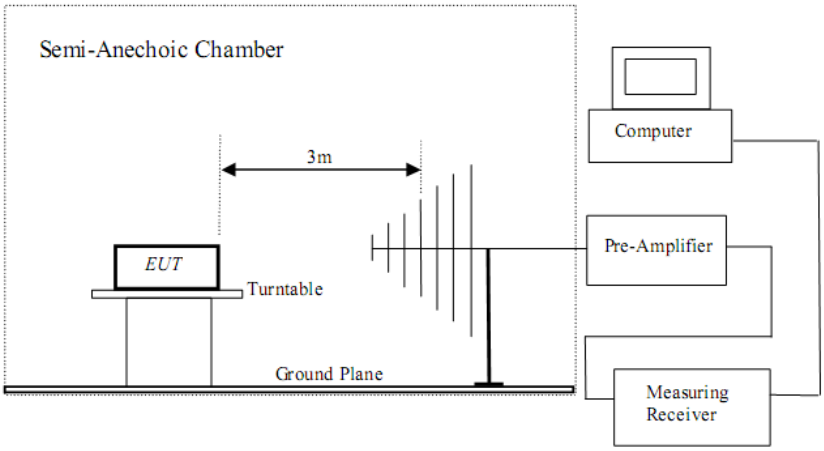
7 Test Setups

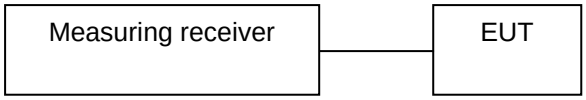
7.1 AC Power Line Conducted Emission test setups



7.2 Radiated test setups



7.3 Conducted RF test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
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Test software: Bluetest3.exe.

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

According to §15.207 and RSS-Gen A8.8, conducted emissions limit as below:

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 linearly with logarithm of the frequency

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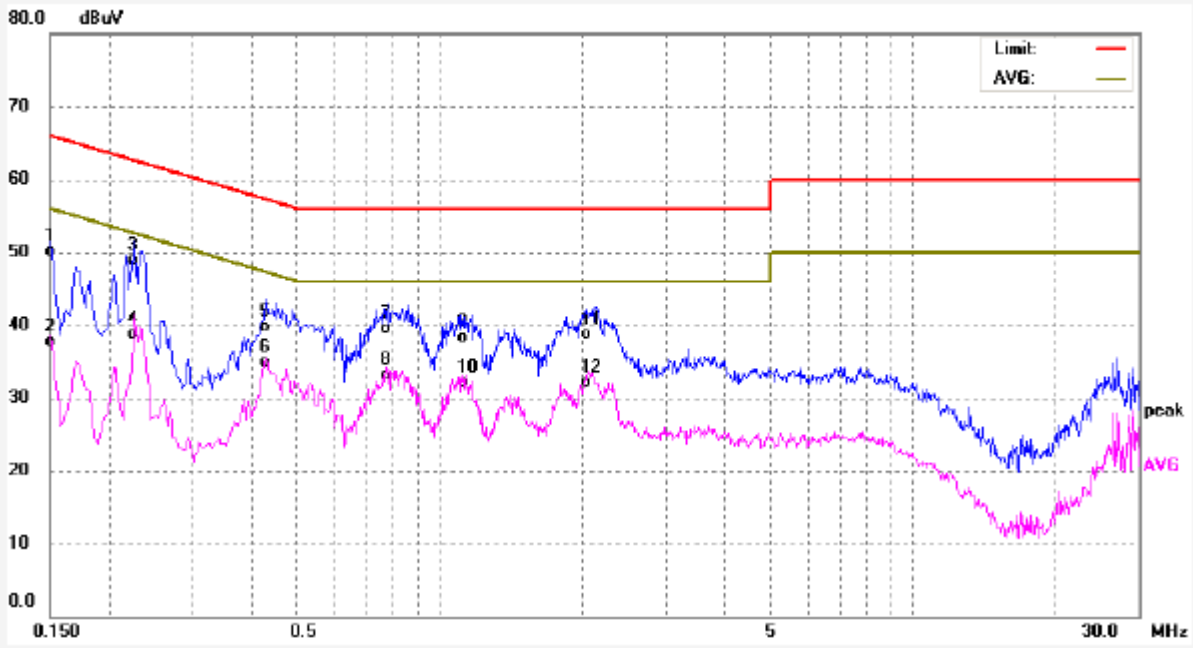
Product Type	:	SOUNDBAR
M/N	:	Silent 1420
Operating Condition	:	Transmitting
Test Specification	:	Line
Comment	:	AC 120V/60Hz



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	38.98	11.17	50.15	65.99	-15.84	QP	
2	0.1500	26.61	11.17	37.78	55.99	-18.21	AVG	
3	0.2260	37.65	11.30	48.95	62.59	-13.64	QP	
4	0.2260	27.50	11.30	38.80	52.59	-13.79	AVG	
5	0.4300	28.45	11.31	39.76	57.25	-17.49	QP	
6	0.4300	23.68	11.31	34.99	47.25	-12.26	AVG	
7	0.7780	28.29	11.30	39.59	56.00	-16.41	QP	
8	0.7780	21.83	11.30	33.13	46.00	-12.87	AVG	
9	1.1060	27.18	11.18	38.36	56.00	-17.64	QP	
10	1.1060	20.95	11.18	32.13	46.00	-13.87	AVG	
11	2.0340	27.59	11.20	38.79	56.00	-17.21	QP	
12	2.0340	20.83	11.20	32.03	46.00	-13.97	AVG	

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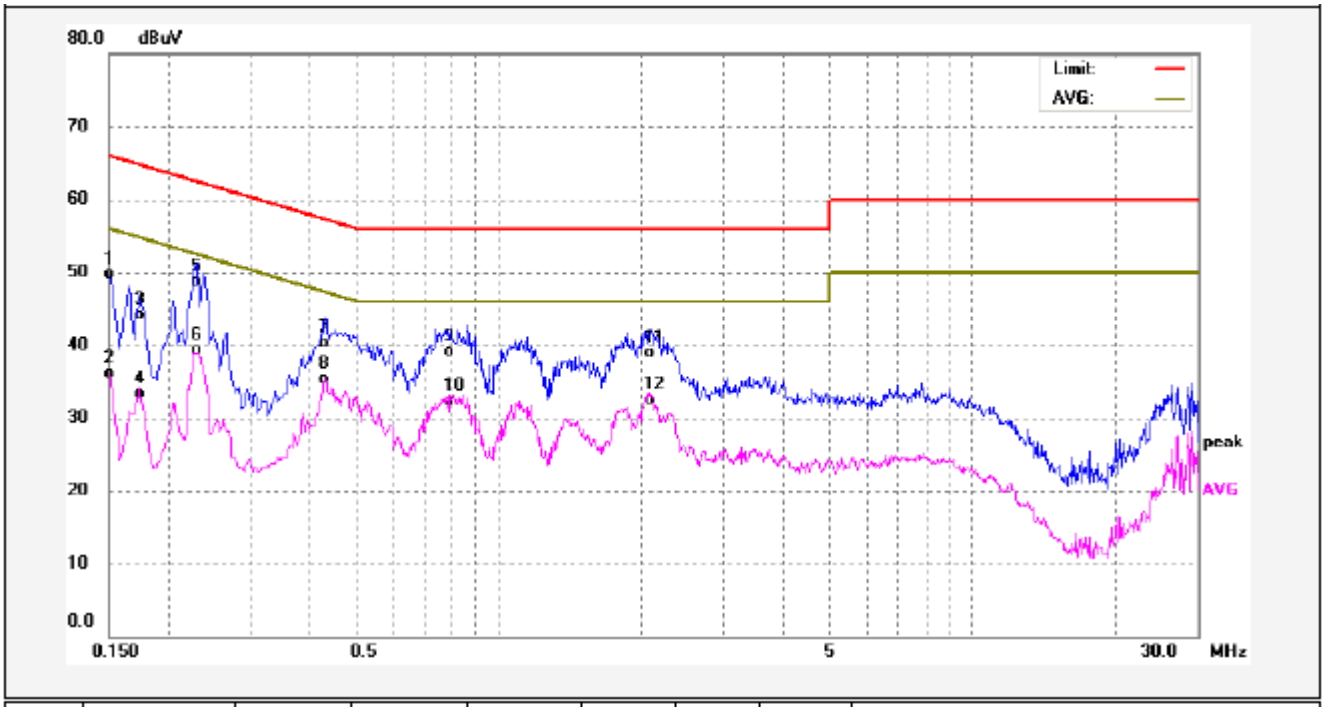
Product Type	:	SOUNDBAR
M/N	:	Silent 1420
Operating Condition	:	Transmitting
Test Specification	:	Neutral
Comment	:	AC 120V/60Hz



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	38.56	11.17	49.73	65.99	-16.26	QP	
2	0.1500	25.00	11.17	36.17	55.99	-19.82	AVG	
3	0.1740	32.81	11.23	44.04	64.76	-20.72	QP	
4	0.1740	22.01	11.23	33.24	54.76	-21.52	AVG	
5	0.2300	37.37	11.30	48.67	62.45	-13.78	QP	
6	0.2300	27.96	11.30	39.26	52.45	-13.19	AVG	
7	0.4300	28.92	11.31	40.23	57.25	-17.02	QP	
8	0.4300	23.93	11.31	35.24	47.25	-12.01	AVG	
9	0.7820	27.73	11.30	39.03	56.00	-16.97	QP	
10	0.7820	21.07	11.30	32.37	46.00	-13.63	AVG	
11	2.1099	27.77	11.20	38.97	56.00	-17.03	QP	
12	2.1099	21.26	11.20	32.46	46.00	-13.54	AVG	

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9.2 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
   RBW > the 6 dB 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	1.72	Pass
Middle channel 2440MHz	1.71	Pass
High channel 2480MHz	1.87	Pass

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9.3 6dB bandwidth and 99% Occupied Bandwidth

Test Method

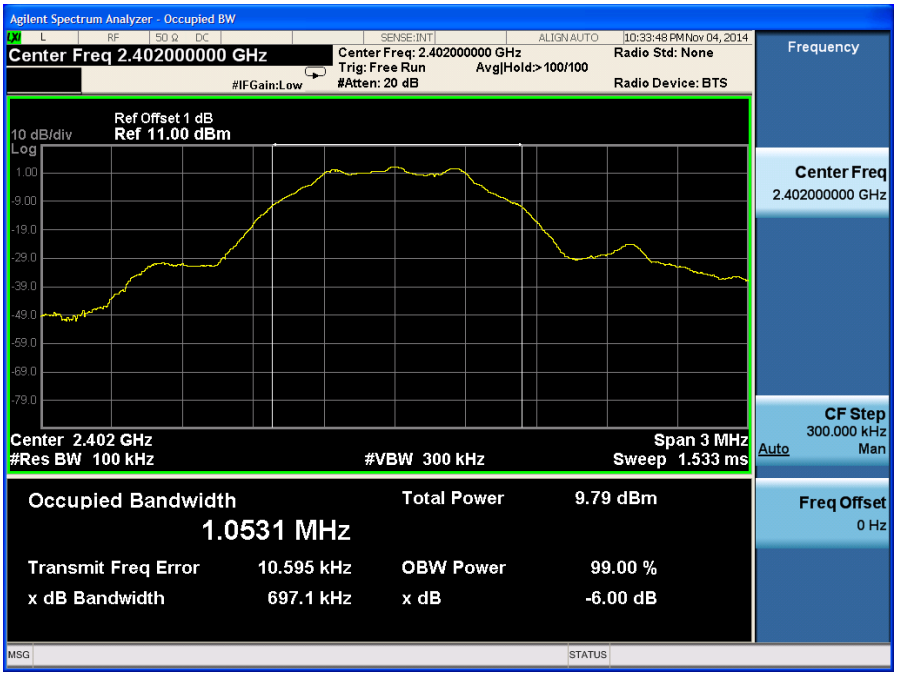
1. Use the following spectrum analyzer settings:
   RBW=100K, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth 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
Top channel 2402MHz	697.1	1053.1	Pass
Middle channel 2440MHz	691.2	1045.3	Pass
Bottom channel 2480MHz	698.0	1046.5	Pass



2402MHz

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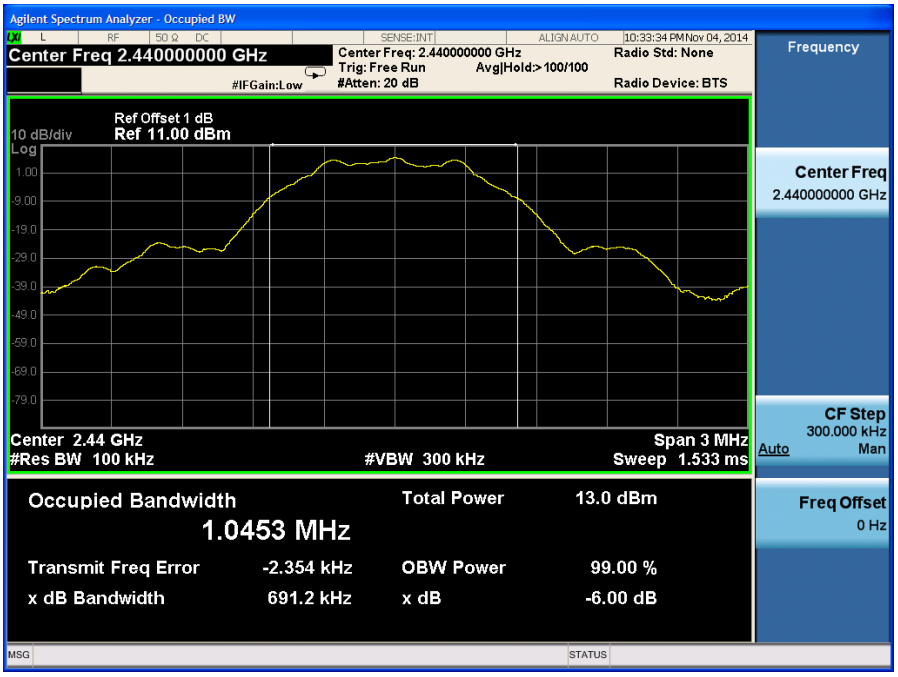
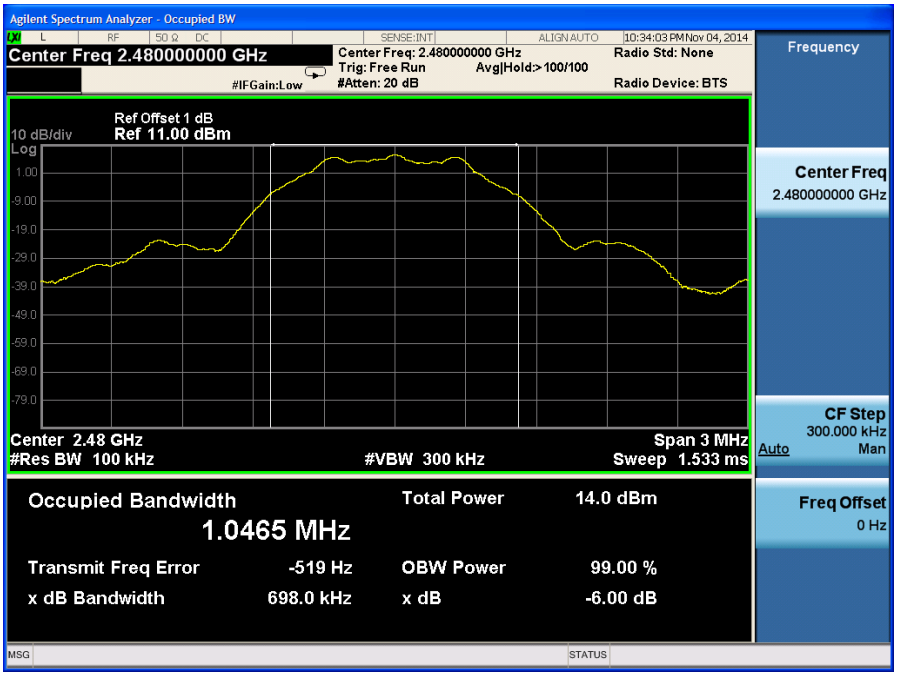


2440MHz



2480MHz

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9.4 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]
≤8

Test result

Frequency **MHz**	Power spectral density **dBm**	Result
Top channel 2402MHz	-12.53	Pass
Middle channel 2440MHz	-9.47	Pass
Bottom channel 2480MHz	-8.38	Pass

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9.5 Spurious RF conducted emissions

Test Method

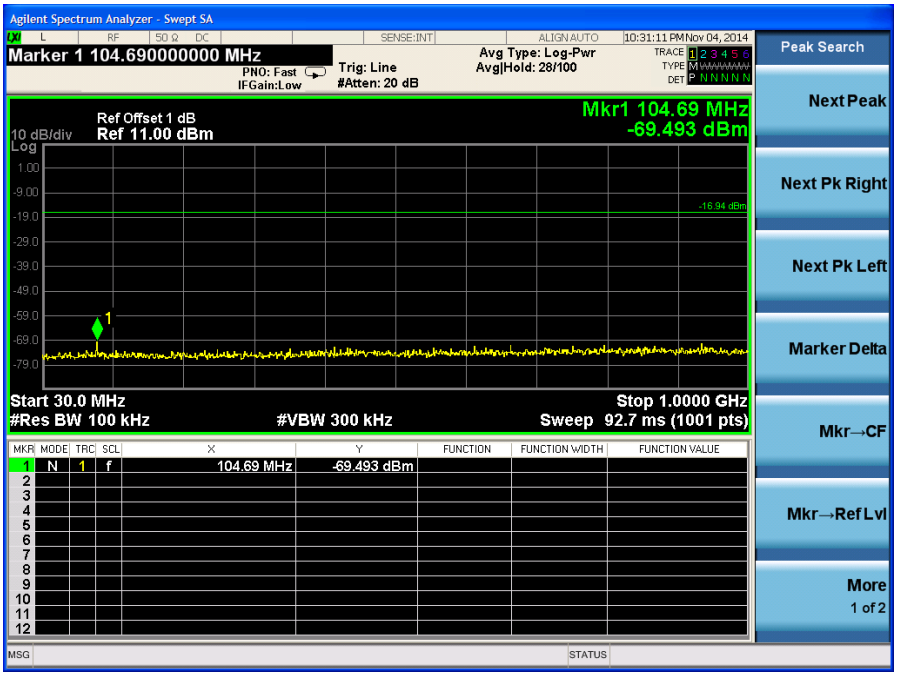
1. Establish a reference level by using the following procedure:
   a. Set RBW=100 kHz. VBW≥3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
   b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
2. Use the maximum PSD level to establish 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

Spurious RF conducted emissions

2402MHz



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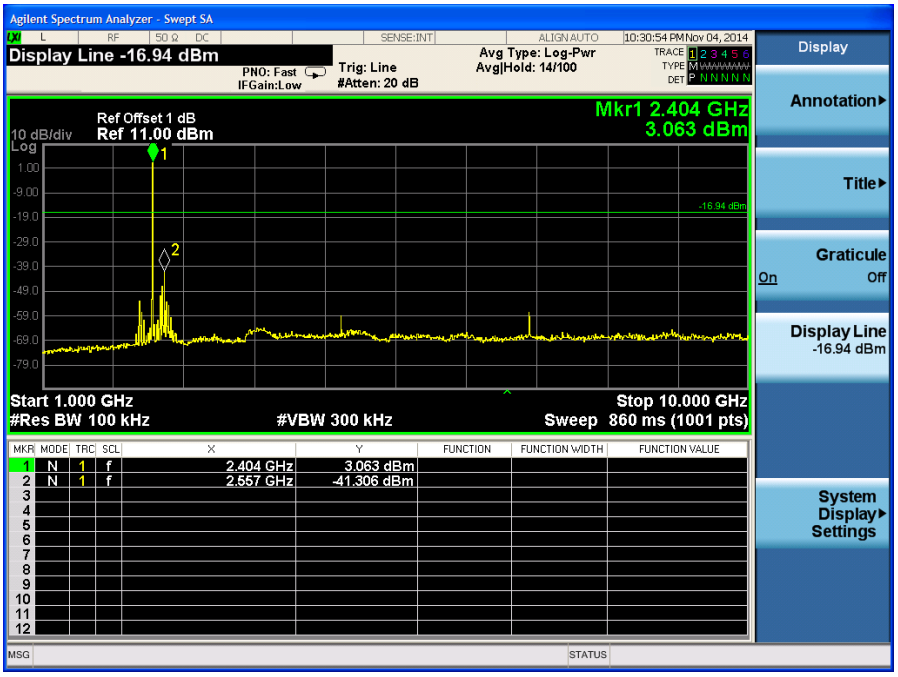

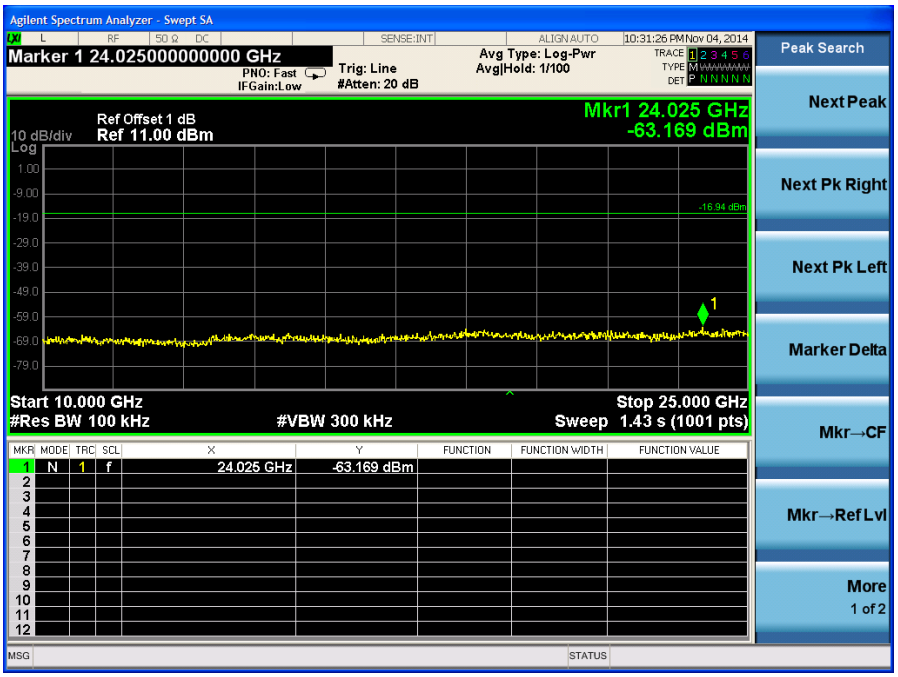

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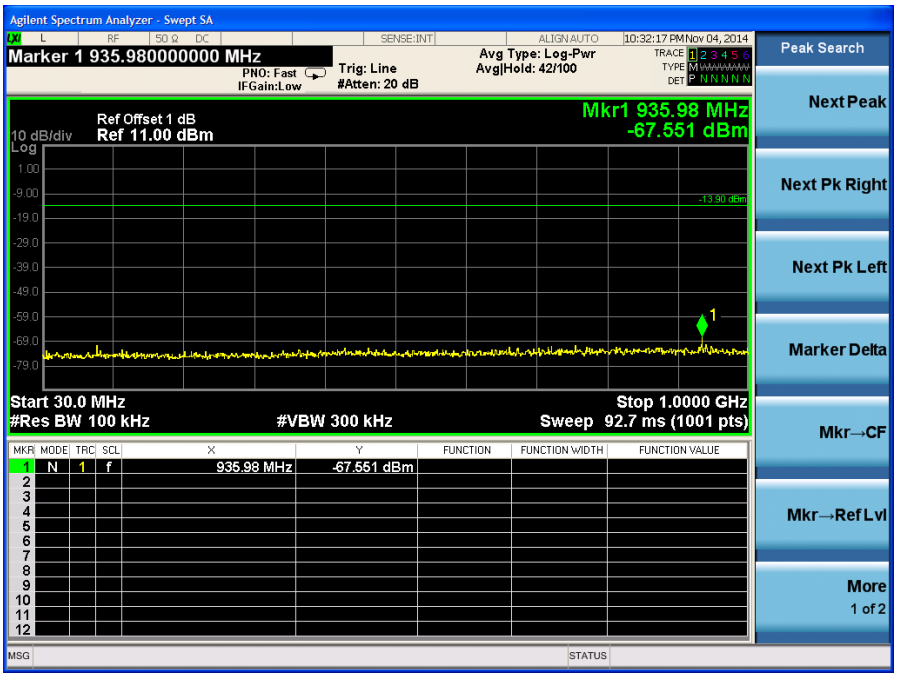
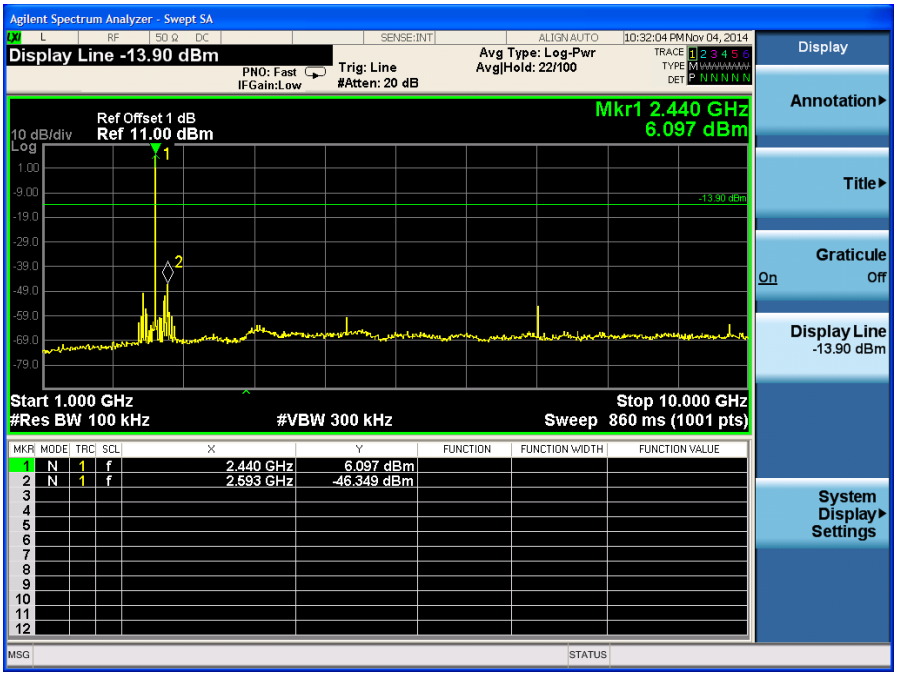
2440MHz





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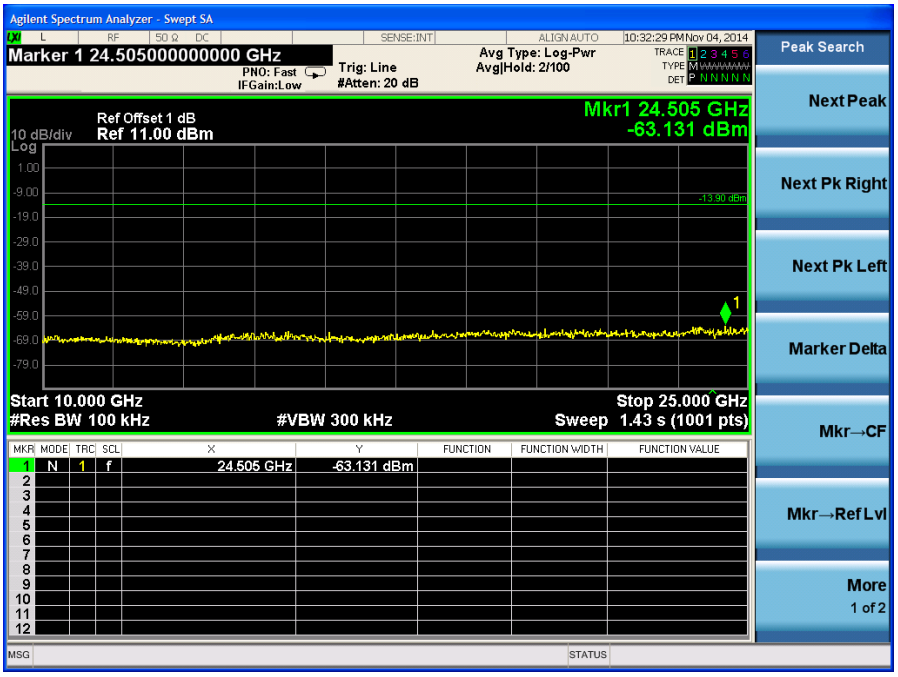
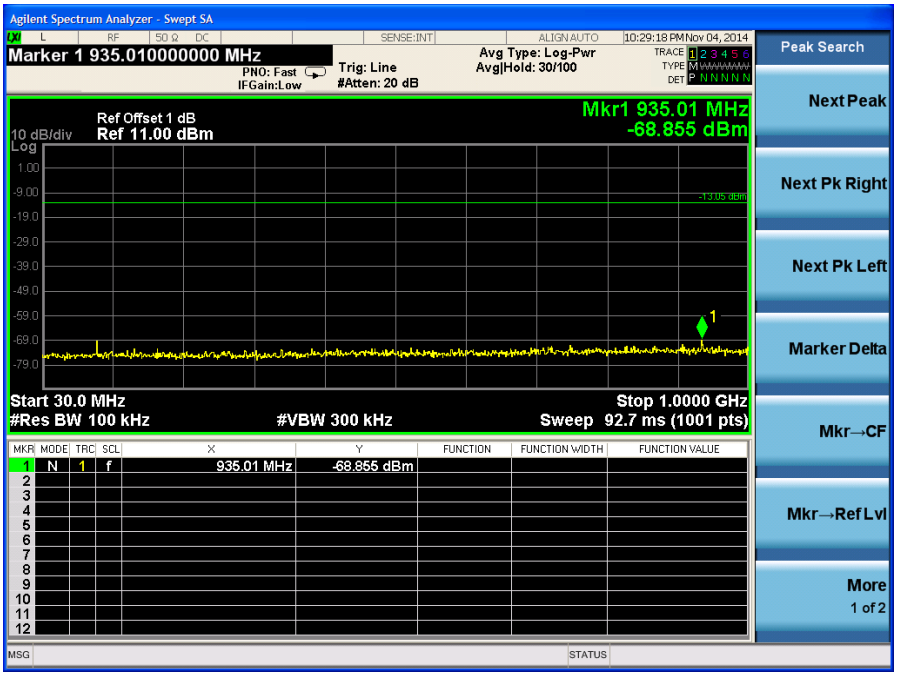


2480MHz



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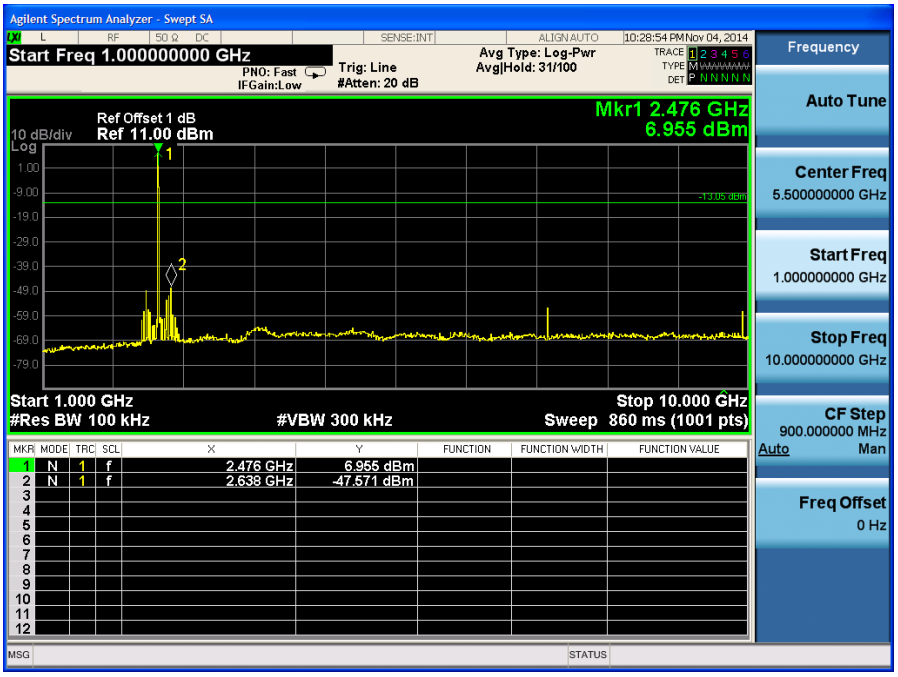

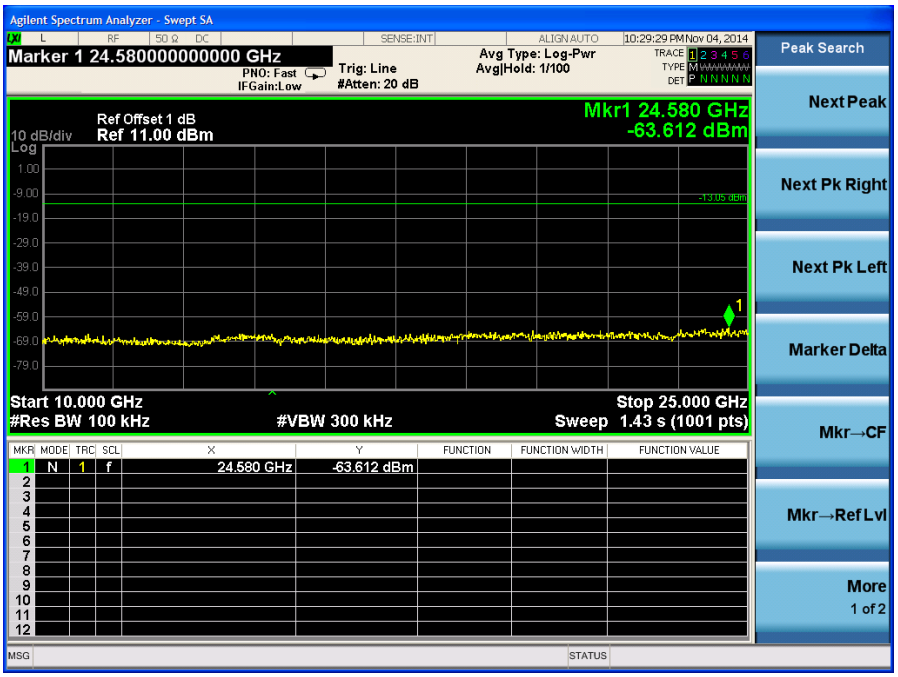

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9.6 Band edge

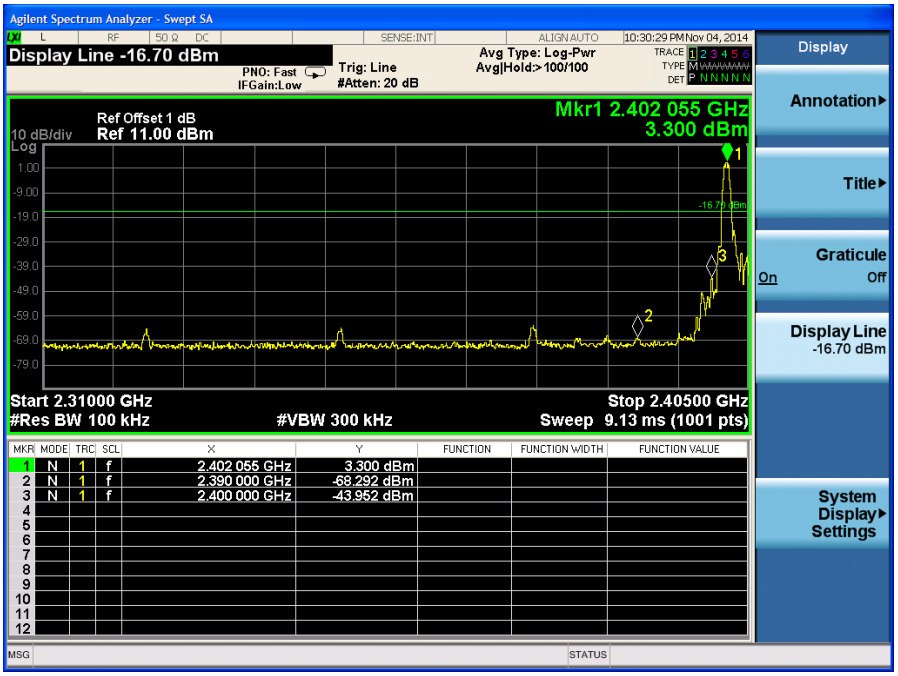
Test Method

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

Test result



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9.7 Spurious radiated emissions for transmitter

Test Method

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
3. Use the following spectrum analyzer settings:
   Span = wide enough to fully capture the emission being measured, RBW = 1 MHz for f ≥ 1GHz, 100 kHz for f < 1 GHz, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Follow the guidelines in ANSI C63.4-1992 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc.
   The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from 20log(duty cycle/100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Limit

According to part 15.247(d), 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

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.

Transmitting spurious emission test result as below:

2402MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBμV/m		dBμV/m	
505.3	36.17	Horizontal	46	QP	9.83	Pass
507.2	37.69	Vertical	46	QP	8.31	Pass
2402	81.36	Horizontal	-	PK	-	-
2402	85.58	Vertical	-	PK	-	-
*4804	53.60	Horizontal	74	PK	20.40	Pass
*4804	53.92	Vertical	74	PK	20.08	Pass

2440MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBμV/m		dBμV/m	
2440	84.31	Horizontal	-	PK	-	-
2440	87.42	Vertical	-	PK	-	-
*4880	52.19	Horizontal	74	PK	21.81	Pass
*4880	55.93	Vertical	74	PK	18.07	Pass

2480MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBμV/m		dBμV/m	
2480	88.08	Horizontal	-	PK	-	-
2480	88.34	Vertical	-	PK	-	-
*4960	53.73	Horizontal	74	PK	20.27	Pass
*4960	55.89	Vertical	74	PK	18.11	Pass

Remark:

(1) AV Emission Level= PK Emission Level+20log (dutycycle)
(2) Data of measurement within 30-1000MHz frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.
(3) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.

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10 Test Equipment List

List of Test Instruments

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE	
CE	Test Receiver	Rohde & Schwarz	ESHS10	838693/001	Nov.04, 15	☒
	L.I.S.N.#1	Rohde & Schwarz	ESH2-Z5	834066/011	Nov.04, 15	☒
	L.I.S.N.#3	Kyoritsu	KNW-242C	8-1920-1	May.07, 15	☐
	RF Cable	3D-2W	Fujikura	LISN Cable 1#	May.07, 15	☒
	Coaxial Switch	MP59B	Anritsu	M55367	May.07, 15	☒
	Passive Probe	ESH2-Z3	Rohde & Schwarz	299.7810.52	May.07, 15	☐
	Pulse Limiter	ESH3-Z2	Rohde & Schwarz	100341	May.07, 15	☐
C	Spectrum	Agilent	E4446A	US44300459	May.08, 15	☒
RE < 1 GHz	Test Receiver <1GHz	Rohde & Schwarz	ESVS10	834468/011	May.07, 15	☒
	Amplifier < 1 GHz	HP	8447D	2648A04738	May.07, 15	☒
	HF Cable	Hubersuhne	Sucoflex104	Room 2	May.08, 15	☒
	Bilog Antenna	Schaffner	CBL6111C	2598	Oct.25, 15	☒
RE > 1 GHz	Spectrum > 1GHz	Agilent	E4446A	US44300459	May.08, 15	☒
	Horn Antenna	EMCO	3115	9607-4877	Jun. 24, 15	☒
	Amp > 1 Ghz	HP	8449B	3008A08495	May.08, 15	☒
	HF Cable	Hubersuhne	Sucoflex104	Room1	May.08, 15	☒

C - Conducted RF tests

- Conducted peak output power
- 6dB bandwidth and 99% Occupied Bandwidth
- Power spectral density*
- Spurious RF conducted emissions
- Band edge

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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

Items	Extended Uncertainty
Radiated spurious emission	4.89dB (30MHz-1GHz) 4.93dB (1GHz -25GHz)
Conducted Emission	2.92dB (150kHz-30MHz)
Conducted spurious emission	2.04dB(30MHz-25GHz)
Bandwidth test	$1*10^{-9}$

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