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Prüfbericht - Nr.: *Test Report No.:*	**19660259 001**	**Seite 1 von 28** *Page 1 of 28*
Auftraggeber: *Client:*	**PH Technical Labs 2908, East Trinity Mills Rd, Carrollton, Texas-75006, USA**	
Gegenstand der Prüfung: *Test item:*	**H-Band**	
Bezeichnung: *Identification:*	**HBand-01**	**Serien-Nr.:** *Serial No.* **0301-000-000**
Wareneingangs-Nr.: *Receipt No.:*	**1803151413**	**Eingangsdatum:** *Date of receipt:* **29.06.2016**
Prüfort: *Testing location:*	**Refer Page 4 of 28 for test facilities**	
Prüfgrundlage: *Test specification:*	**FCC Part 15: Subpart C Section 15.247** **ANSI C63.10-2013**	
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The test items passed the test specification(s).*	
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland (India) Pvt. Ltd.** 82/A, 3rd Main, West Wing, Electronic City Phase 1 Hosur Road, Bangalore – 560 100. India **FCC Registration No.: 176555**	

geprüft */ tested by:*

Datum / Date	Name/Stellung / Name/Position	Unterschrift / Signature
04.09.2016	Raghavendra Katti, Engineer	Raghu.K

kontrolliert */ reviewed by:*

Datum / Date	Name/Stellung / Name/Position	Unterschrift / Signature
05.09.2016	Saibaba Siddapur, Assistant Manager	Saibaba

Sonstiges */Other Aspects:* **FCC ID :2AFJC-HBAND-01**

Abkürzungen:				*Abbreviations:*			
P(ass)	=	*entspricht Prüfgrundlage*		*P(ass)*	=	*passed*	
F(ail)	=	*entspricht nicht Prüfgrundlage*		*F(ail)*	=	*failed*	
N/A	=	*nicht anwendbar*		*N/A*	=	*not applicable*	
N/T	=	*nicht getestet*		*N/T*	=	*not tested*	

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.

This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.

Test Result Summary

Clause	Test Item	Result
Section 15.247 (b) (1)	Peak Output Power	Pass
Section 15.247 (a)(1)	20dB Bandwidth	Pass
Section 15.247 (a)(1)(ii)	Number of Hopping Channels	Pass
Section 15.247 (a)(1)	Carrier Frequency Separation	Pass
Section 15.247 (a)(1)(iii)	Time of Occupancy	Pass
Section 15.247 (d)	Band-edge compliance of RF Conducted Emissions	Pass
Section 15.209 &15.205	Spurious Radiated Emissions and Restricted bands of operation	Pass
Section 15.207	Conducted emission test on a.c Power line	Pass

Note: Conducted measurements are done according to the procedure given in KDB No. **DA 00-705** March 2000

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Appendix 1: Test Setup Photo

Appendix 2: EUT External Photo

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Appendix 6: Specification of EUT

Appendix 7: Schematic Diagrams

Appendix 8: Bill of Material

Appendix 9: User Manual

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List of Test and Measurement Instruments

Equipment	Manufacturer	Model Name	Serial Number	Calibration Due Date	Periodicity	Used for Test Items
EMI Test Receiver	Rohde & Schwarz	ESU 40	100288	23.11.2016	Yearly	Spurious Radiated Emissions
Broadband Antenna	Frankonia	ALX-4000	ALX-4000-806	10.06.2017	Yearly	
Active Loop Antenna	Frankonia	LAX-10	LAX-10-800	22.12.2016	Yearly	
Broadband Horn Antenna	Frankonia	HAX-18	HAX18-802	14.03.2017	Yearly	
Emission Horn Antenna	ETS Lindgren	116706	00107323	02.11.2016	Yearly	
Spectrum Analyser	Agilent Technologies	E4407B	US41192772	23.04.2017	Yearly	Antenna - Port Conducted Tests

Testing Facilities

TUV Rheinland (India) Private Limited
108 , Beside ISBR Business School,
Electronic city Phase I
Bangalore - 560 100.

General Product Information

Product Function and Intended Use

H-Band is a Bluetooth audio device similar in function to Bluetooth headset and one that is built into watch strap. It provides private call audio functionality where user cups his hand to ear. The audio is fired at the bottom of the palm to user's ear. In removable mode, the audio fob can be plugged to user's ear and used as a headset for calls and mono music.
The device is connected to phone via Bluetooth. The power button is used as multi-function button. The + and - buttons are used for call volume or music forward and reverse. The call is answered by flipping open the fob or power button press.

Ratings and System Details

Operating Frequency Range	2400MHz – 2483.50MHz	
No. of channel	79	
Channel Spacing	1MHz	
Modulation	1Mbps	GFSK
Transmitted Power	-2.86	
Number of antenna	One	
Antenna Gain and Antenna type	1.3 dBi and Metal strip antenna	
Supply Voltage to Product	4.2V DC Battery	
Dimension	8.9mm x 36.7mm x 17.2 mm.	
Environmental	80^{o}C & RH 80 %	

Test Conditions:

Supply Voltage: 4.2V DC from DC Source and Battery

Environmental conditions:

Temperature: +24.2 º C RH: 58%

Test Set-up and Operation Mode

Principle of Configuration Selection

Transmission was enabled with 100% duty cycle duty on low, mid and high channel & also in hopping mode for 1 Mbps data rate.

Test Operation and Test Software

Test software was used to enable the transmission with 100% duty cycle & Hopping Mode, Channel selection (Low, Middle & High).

Special Accessories and Auxiliary Equipment

- None

Countermeasures to achieve EMC Compliance

- Testing was conducted with the Power adaptor & data cable connected to the AC mains (5v supply for charging EUT).

Test Modes – Data Rates and Modulations

For Radiated spurious emissions, the tests were performed for all the channels and data rate is set to 1Mbps.

For antenna port conducted measurement test, power has set to 0dBm, and tested for all the 3 channels i.e. Low, Middle & High with respect to data rate 1Mbps.

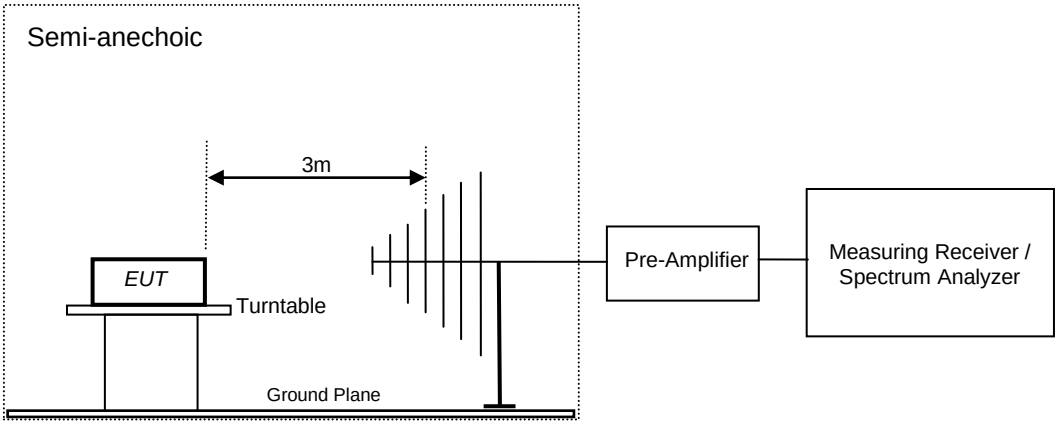
Note: Only Bluetooth (Basic Rate) supported in the product i.e. 1Mbps data rate.

Test Methodology

Radiated Emission Test

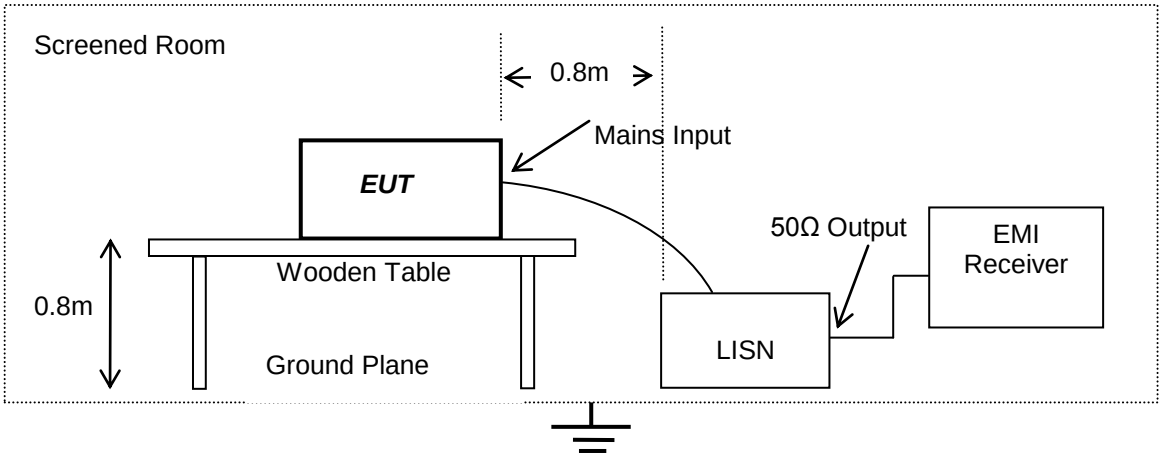
The radiated emission measurement was performed according to the procedures in ANSI C63.10 - 2013. The equipment under test (EUT) was placed at the middle of the 80 cm high turntable for below 1GHz and 1.5m high turntable for above 1GHz, and the EUT is 3 meters far from the measuring antenna. The turntable was rotated 360° for obtaining the maximum emission. The height of the measuring antennas was scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained. The measurement above 1000MHz was performed by horn antenna. The measurement below 30MHz was performed by loop antenna.

The EUT was rotated around the X-, Y-, and Z-Axis and the results from worst case axis are recorded.



Conducted Emission Test on A.C. mains line

The equipment under test (EUT) was placed on a wooden table 80cm above the ground plane, the LISN was place 80cm away from the EUT. The test was performed in accordance with ANSI C63.10 - 2013, with the following: an initial measurement was performed in peak and average detection mode on the live and neutral lines. The pre-scan was performed by peak detection on both live and neutral conductors. Any emissions recorded within 20dB of the relevant limit line were re-measured using quasi-peak and average detections, the 6 worst cases was recorded in the table of results.



Test Results

Peak Output Power **Section 15.247 (b) (1)**
Result **Pass**

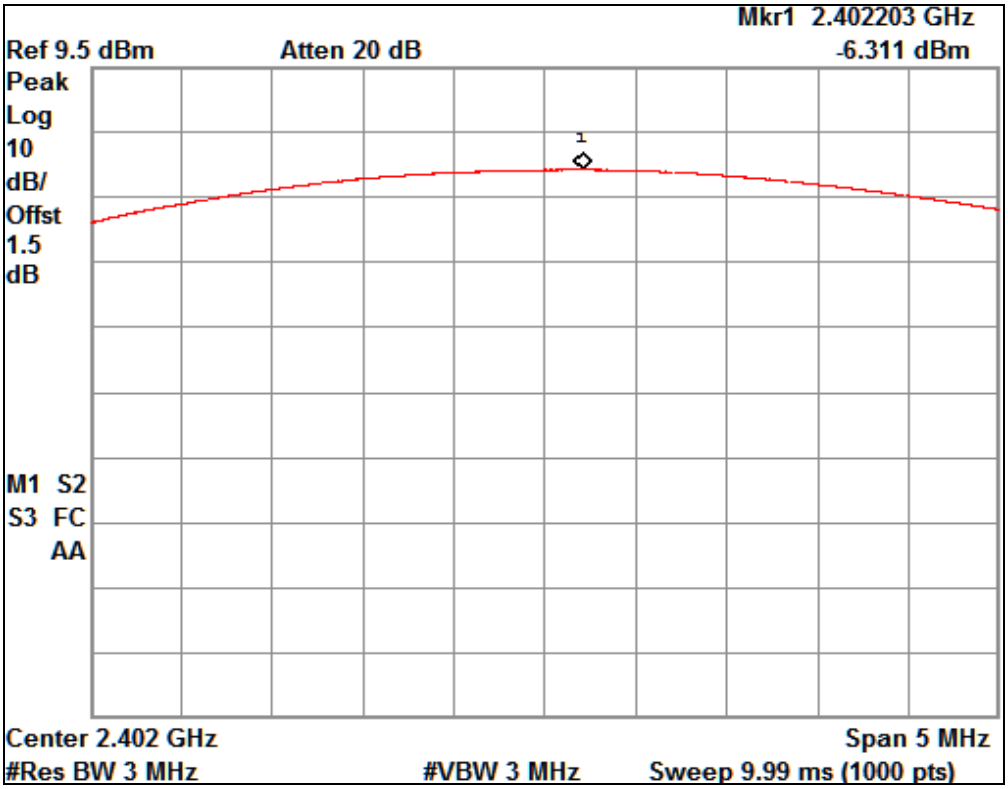
Test Specification	FCC Part 15C
Measurement Bandwidth (RBW)	3MHz
Detector	Peak
Requirement	<125 mW

Test Method:

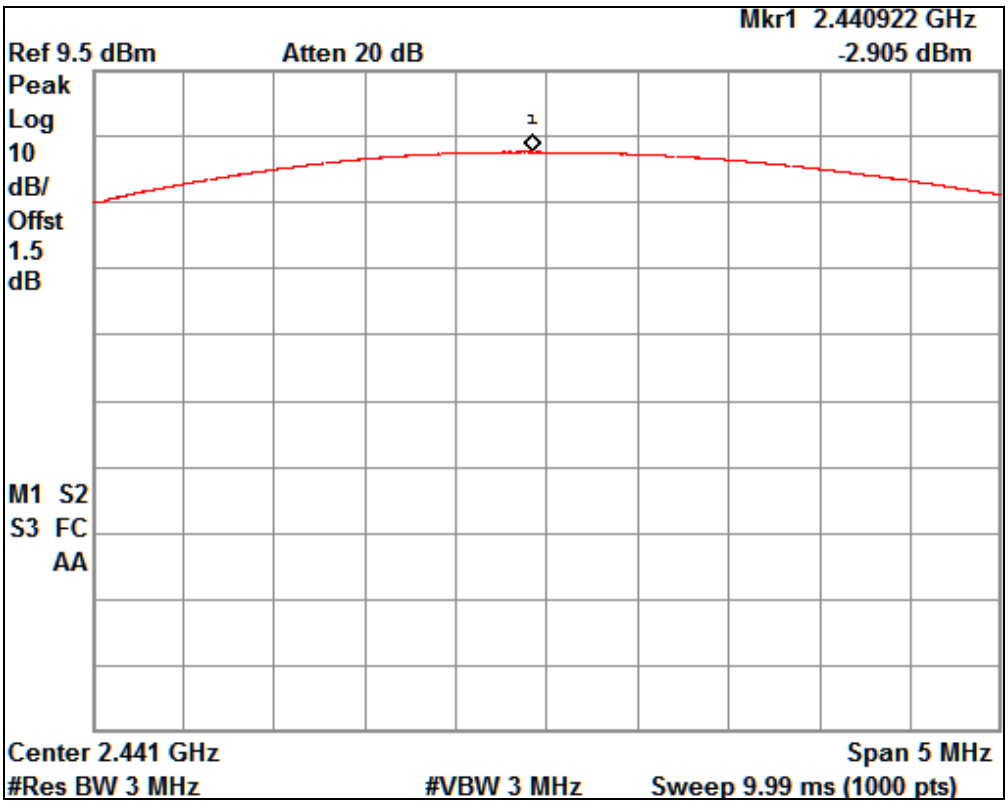
Test Result:

Modulation Type: GFSK

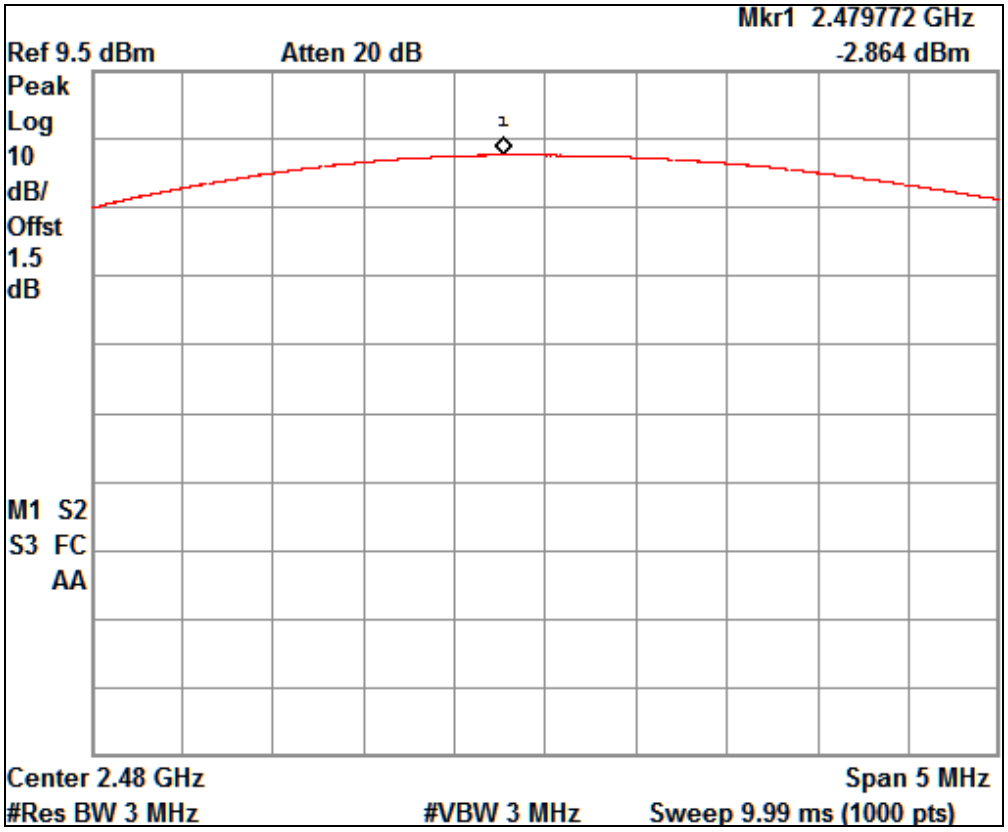
Channel	Frequency (MHz)	Output power (dBm)	Limit (dBm)
Low	2402	-6.31	20.96
Mid	2441	-2.90	20.96
High	2480	-2.86	20.96



Low Channel



Middle Channel

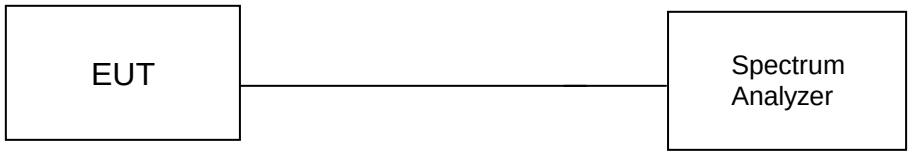


High Channel

20dB Bandwidth **Section 15.247 (a) (1)**
Result **Pass**

Test Specification	FCC Part 15C
Detector Function	Peak
Port of testing	Antenna port
Requirement	The bandwidth of a frequency hopping channel is the 20 dB emission bandwidth, measured with the hopping stopped. The system RF bandwidth is equal to the channel bandwidth multiplied by the number of channels in the hopset. The hopset shall be such that the near-term distribution of frequencies appears random, with sequential hops randomly distributed in both direction and magnitude of change in the hopset while the long-term distribution appears evenly distributed.

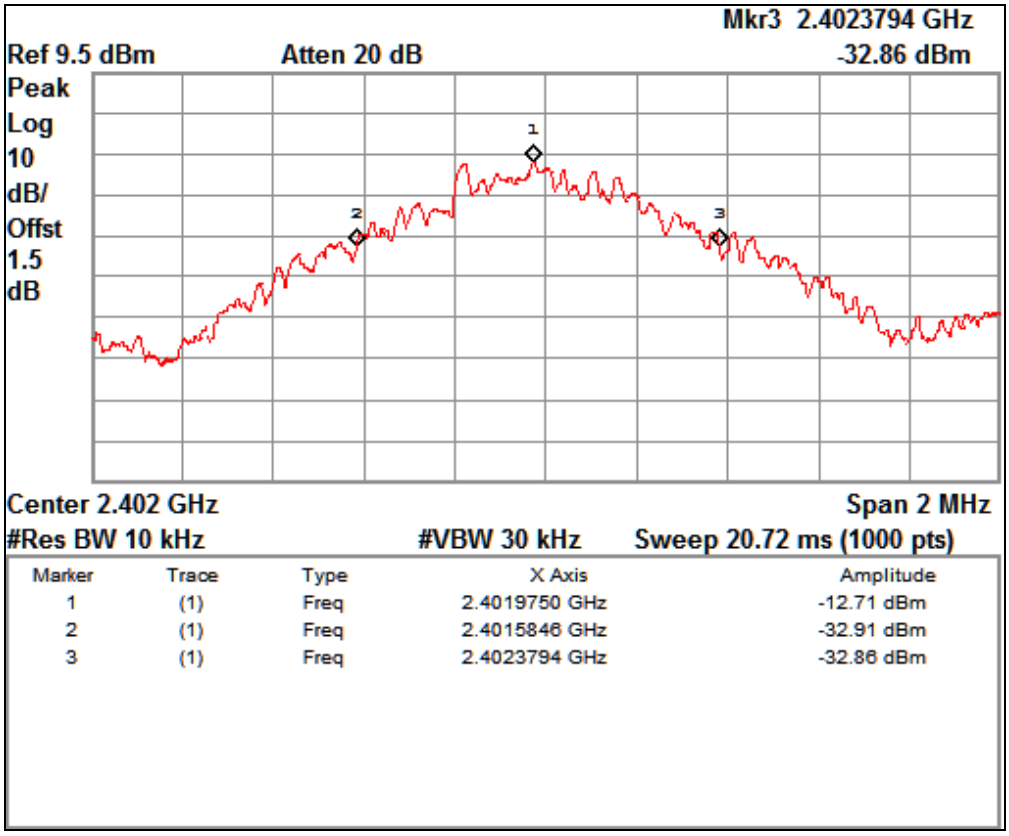
Test Method:



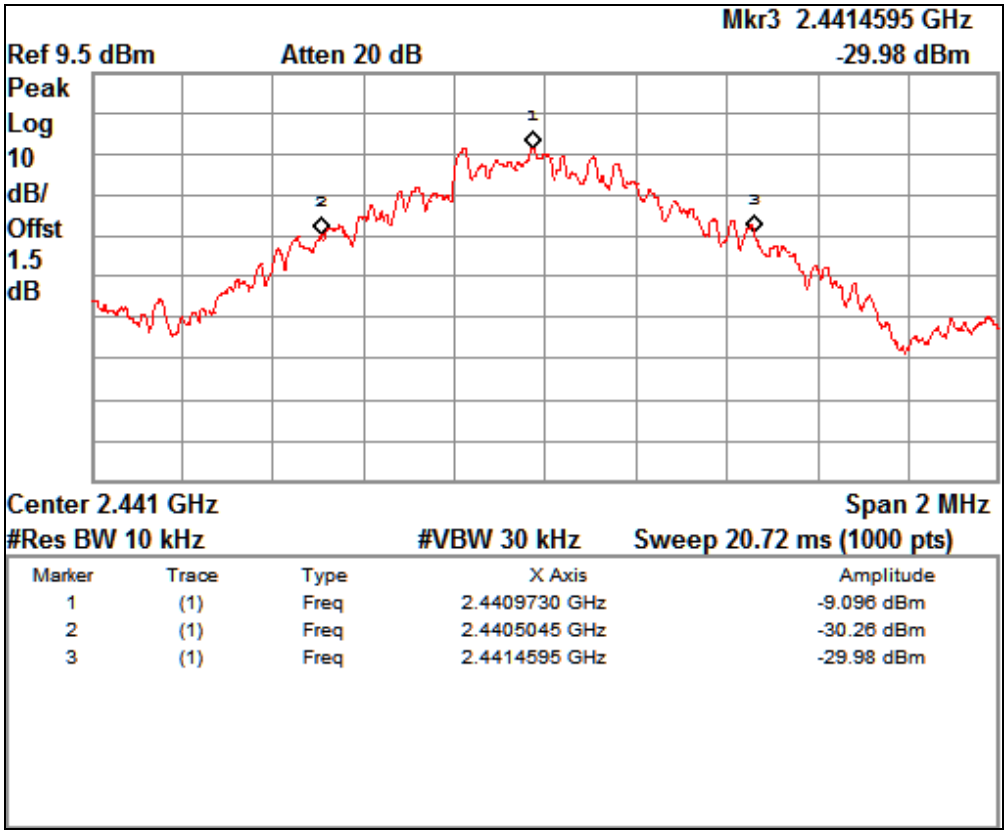
Test Result:

Modulation Type: GFSK

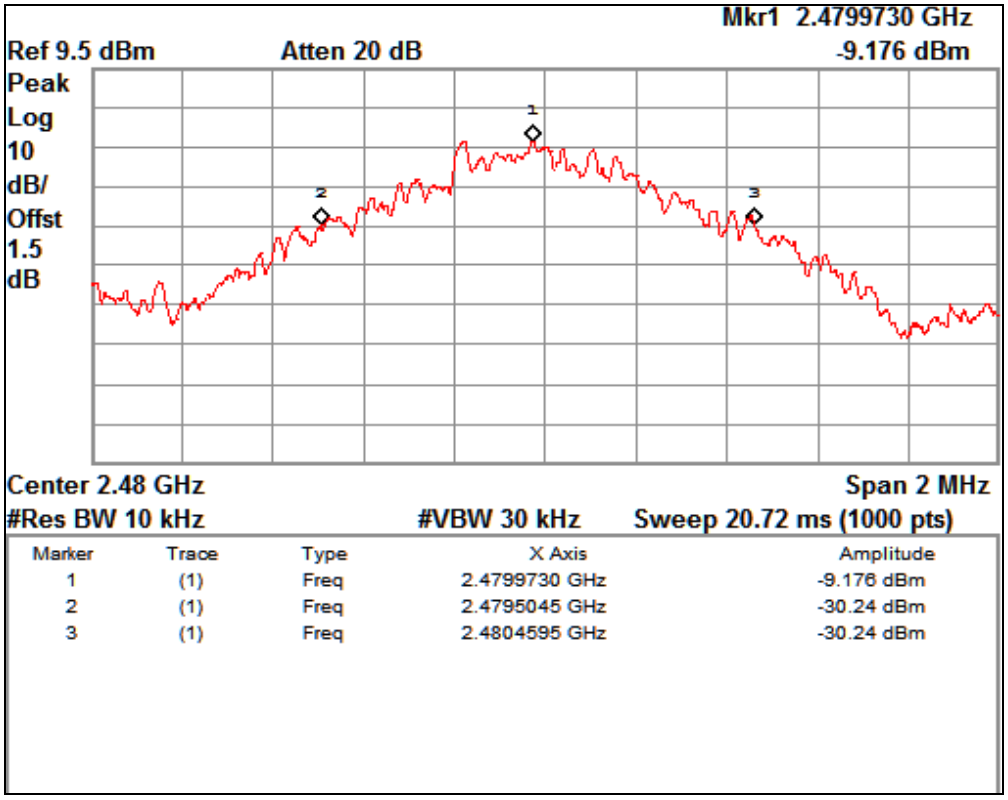
Channel	Channel Frequency (MHz)	Lower 20dB Frequency (MHz)	Higher 20dB Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
Low	2402	2401.5846	2402.3794	0.79	0.95
Mid	2441	2440.5045	2441.4595	0.95	0.95
High	2480	2479.5045	2480.4595	0.95	0.95



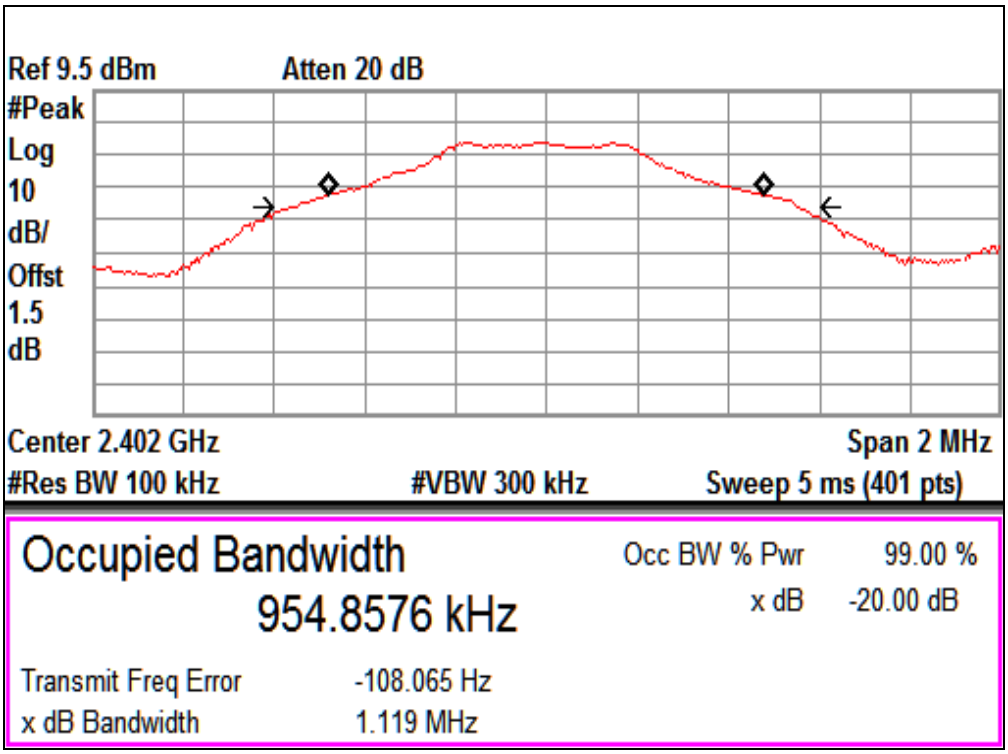
Channel Low: 20dB Bandwidth Measurement



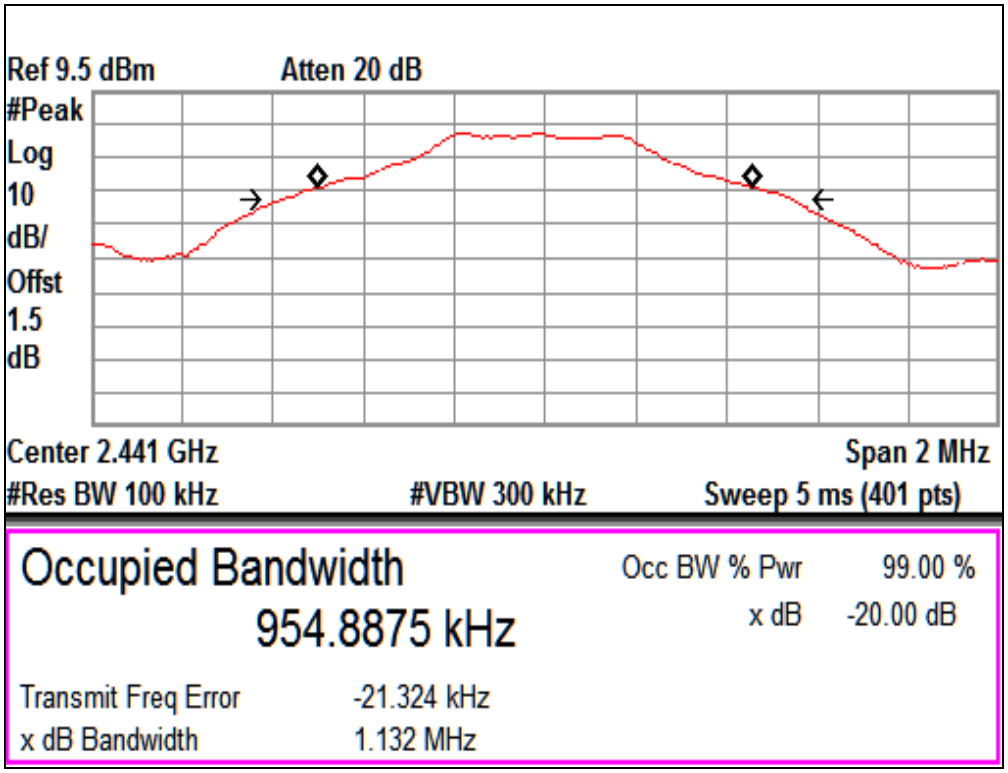
Channel Mid: 20dB Bandwidth Measurement



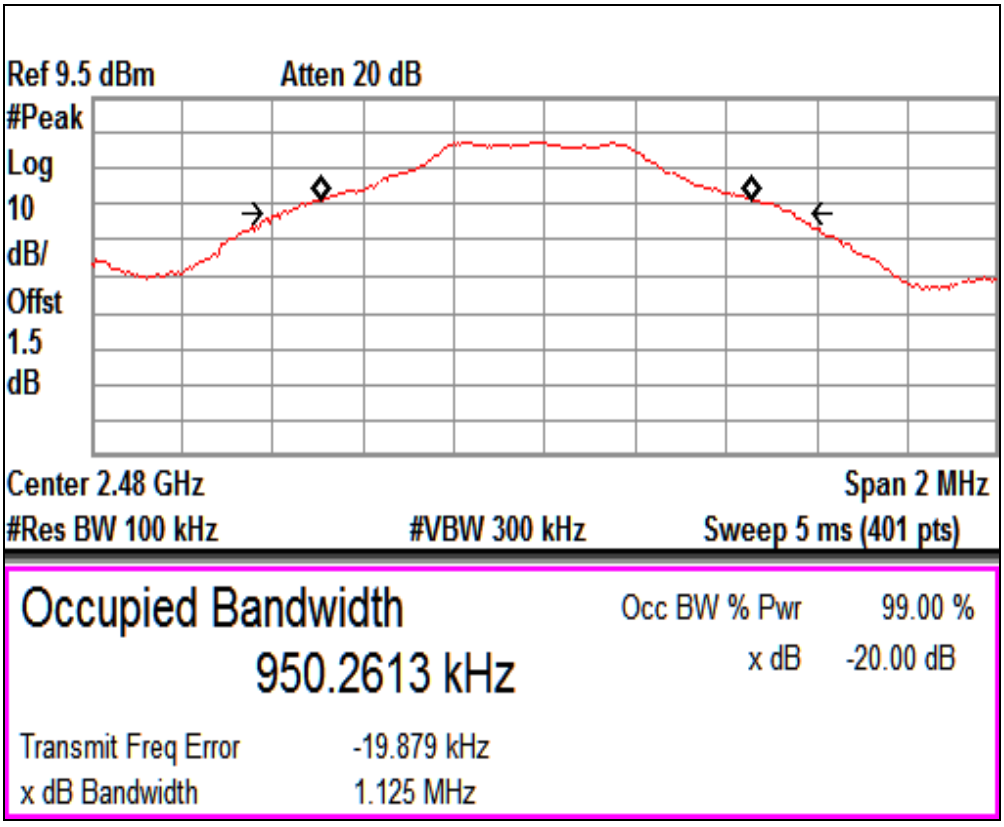
Channel High: 20dB Bandwidth Measurement



99% Occupied Bandwidth: Channel Low



99% Occupied Bandwidth: Channel Mid

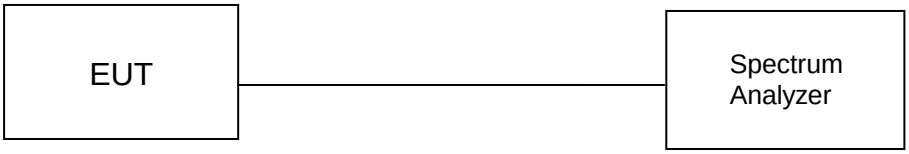


99% Occupied Bandwidth: Channel High

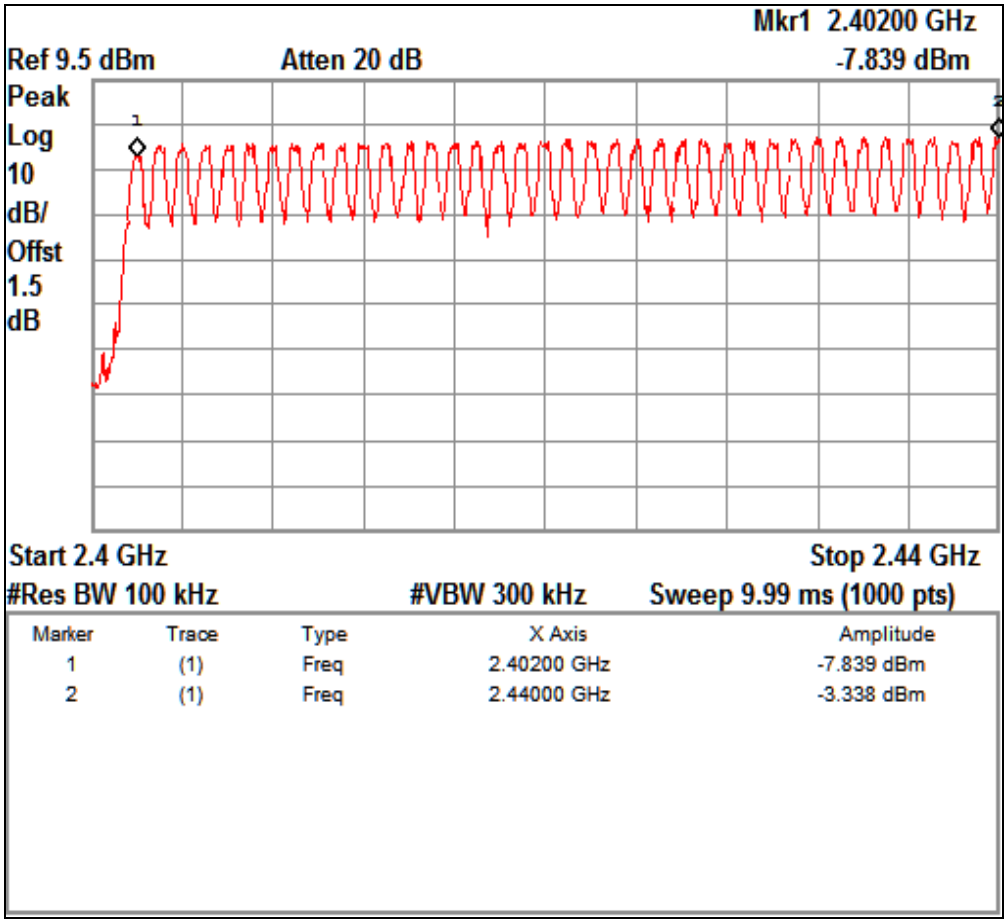
Number of Hopping Channels **Section (a) (1) (iii)**
Result **Pass**

Test Specification	FCC part 15C
Detector Function	Peak
Port of testing	Antenna port
Requirement	Frequency hopping systems operating in the band 2400-2483.5 MHz shall use at least 15 hopping channels

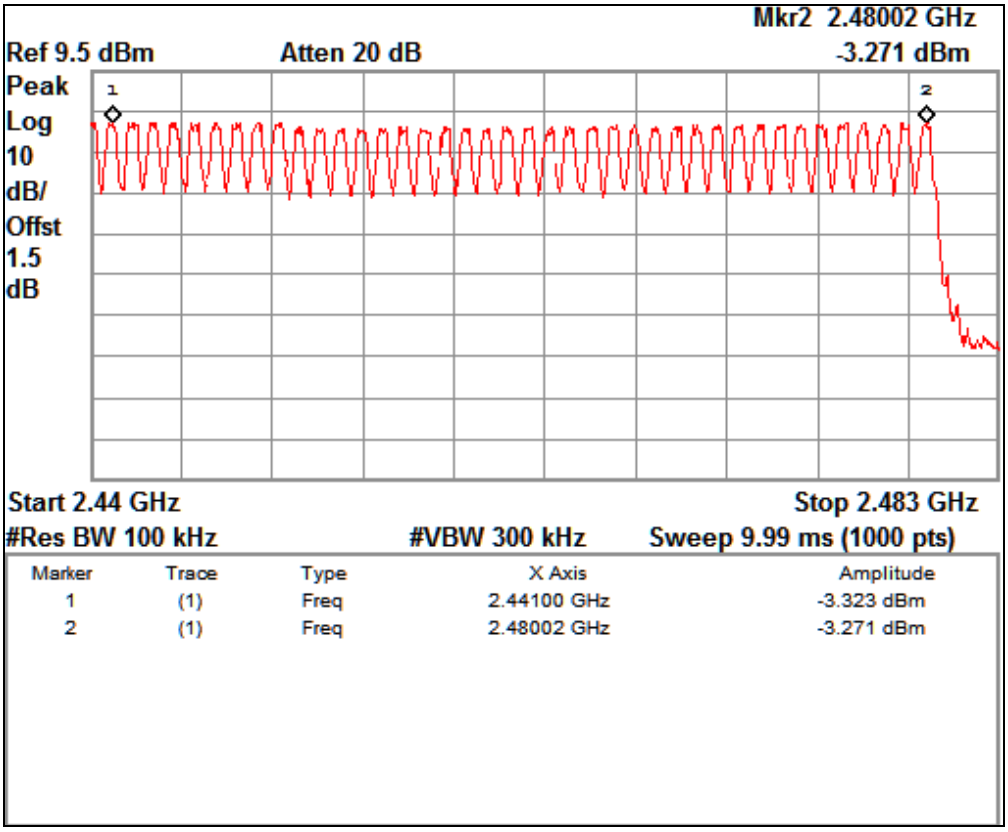
Test Method:



Test Result:



Number of Hopping Channels: 39



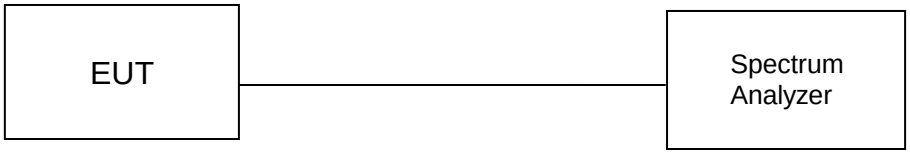
Number of Hopping Channels: 40

Total Number of hopping channels = 79 (39+40)

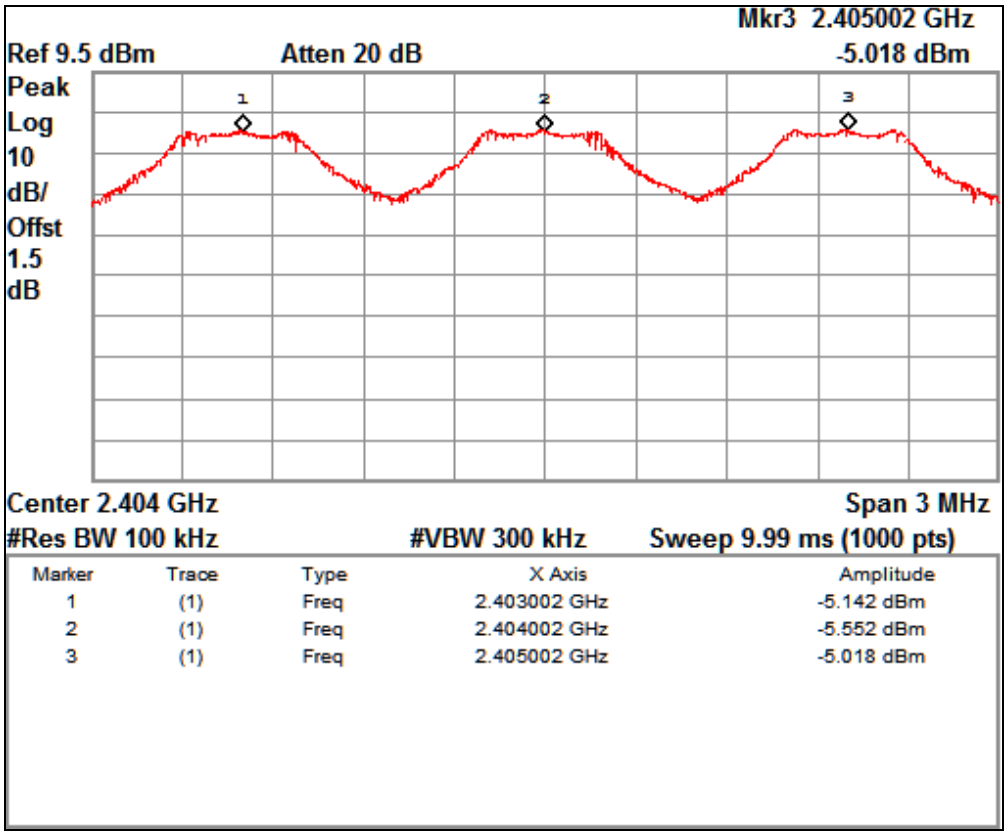
Carrier Frequency Separation **Section 15.247 (a) (1)**
Result **Pass**

Test Specification	FCC Part 15C
Detector Function	Peak
Port of testing	Antenna port
Requirement	Frequency hopping systems shall have hopping channel carrier frequency separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater

Test Method:



Test Result:

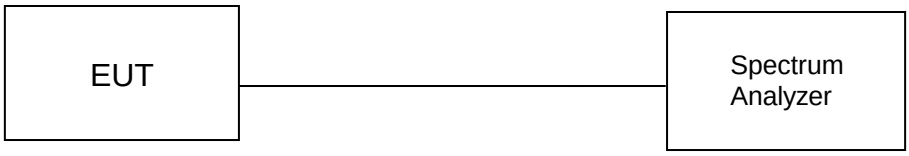


Channel Separation

Time of Occupancy (Dwell Time) **Section 15.247 (a)(1)(III)**
Result **Pass**

Test Specification	RSS-210 Issue 7, A8.1 (c)
Detector Function	Peak
Port of testing	Antenna port
Requirement	The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided that a minimum of 15 hopping channels are used.

Test Method:



Test Result:

Time slot		Time Slot (s)
DH	Measurement Value (sec)	
DH1	0.00400	0.128

Measurement Method

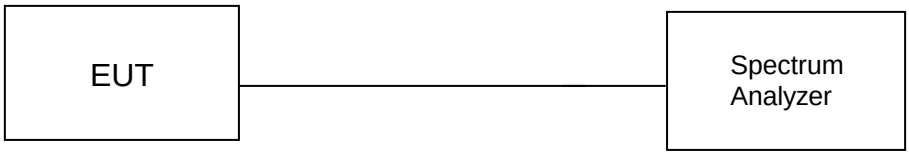
Period Time = 0.4(sec)*79 (hopping channel) = 31.6 s

DH Time slot = Measurement value (Sec)*(1600/ (2*79))*Period time

Band-edge Compliance of RF Conducted Emissions **Section 15.247 (d)**
Result **Pass**

Test Specification	FCC Part 15C
Detector Function	Peak
Port of testing	Antenna port
Requirement	In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

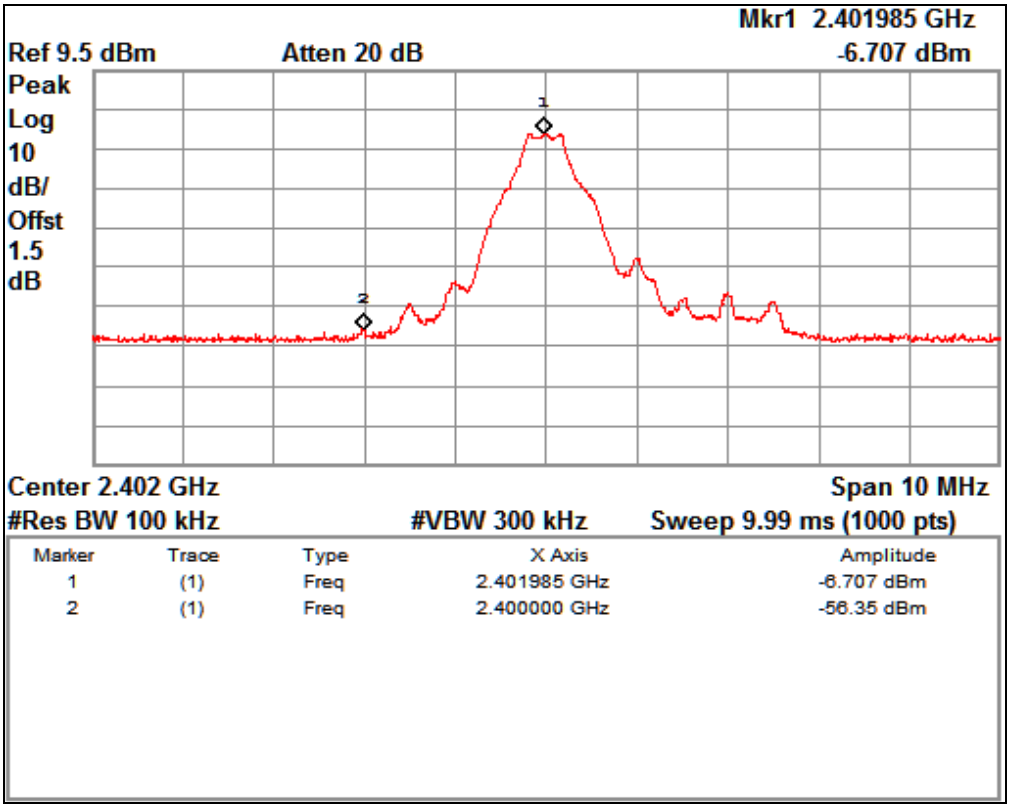
Test Method:



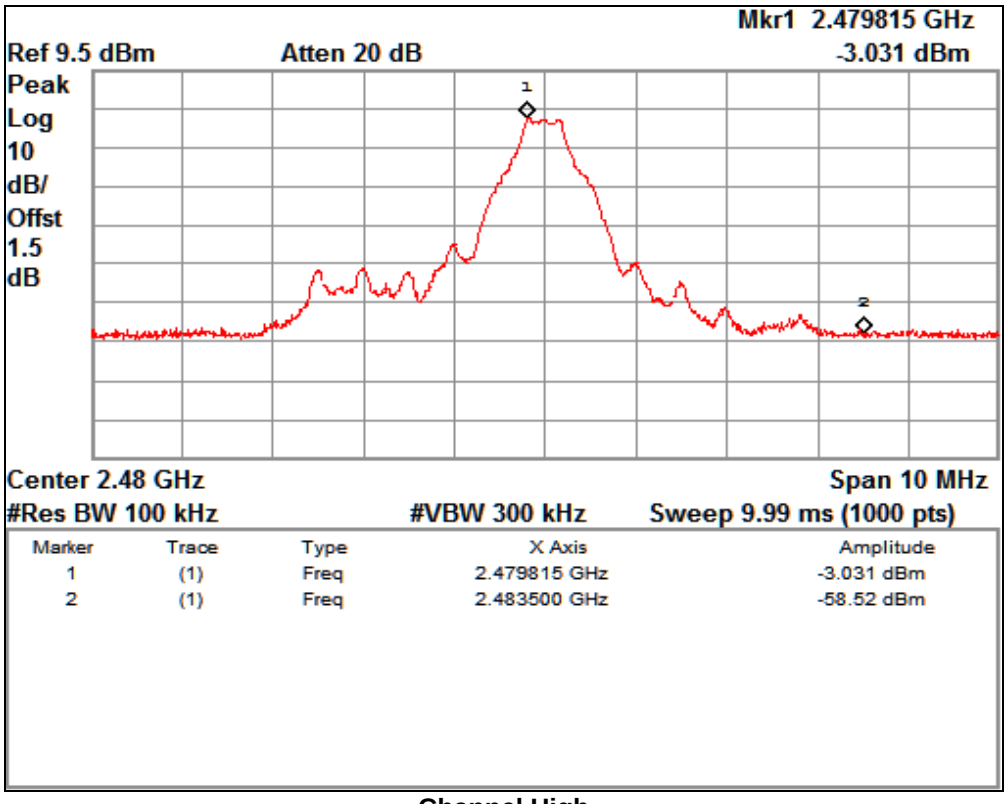
Modulation Type: GFSK

Test Result:

Channel	Fundamental Frequency (MHz)	Value at Band Edge		Limit (dBc)
		Frequency (MHz)	Value (dBc)	
Low	2402.00	2400.0	56.35	20
High	2480.00	2483.5	58.52	20

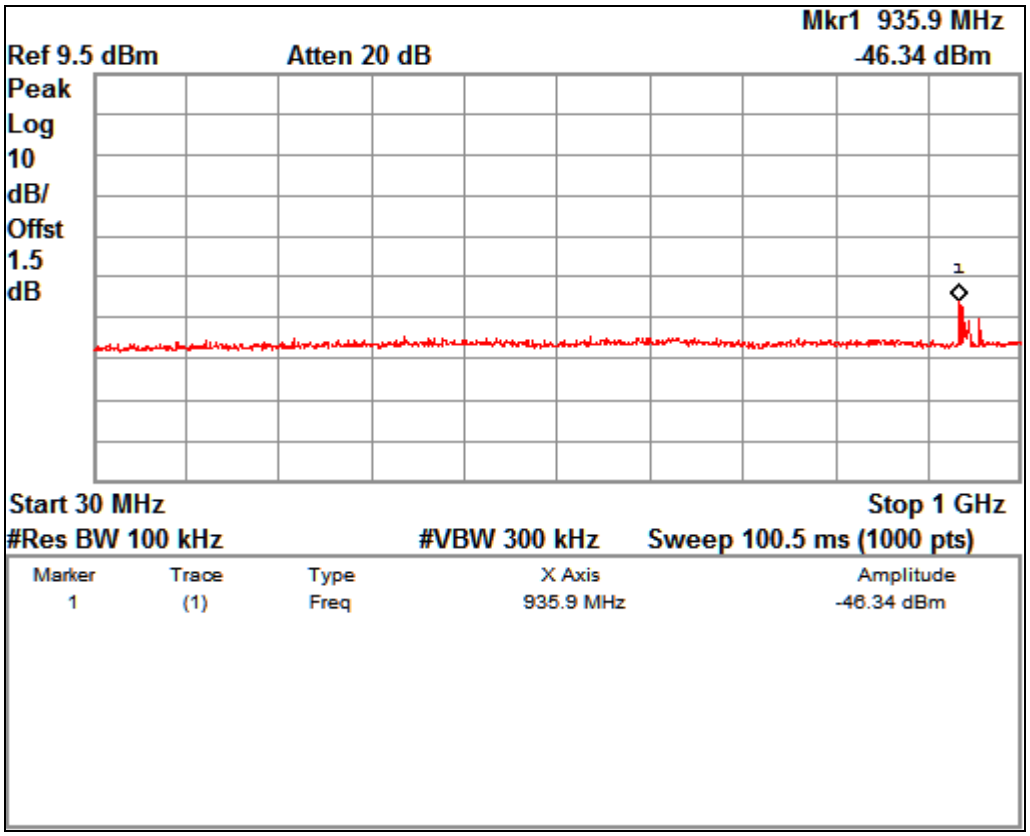


Channel Low

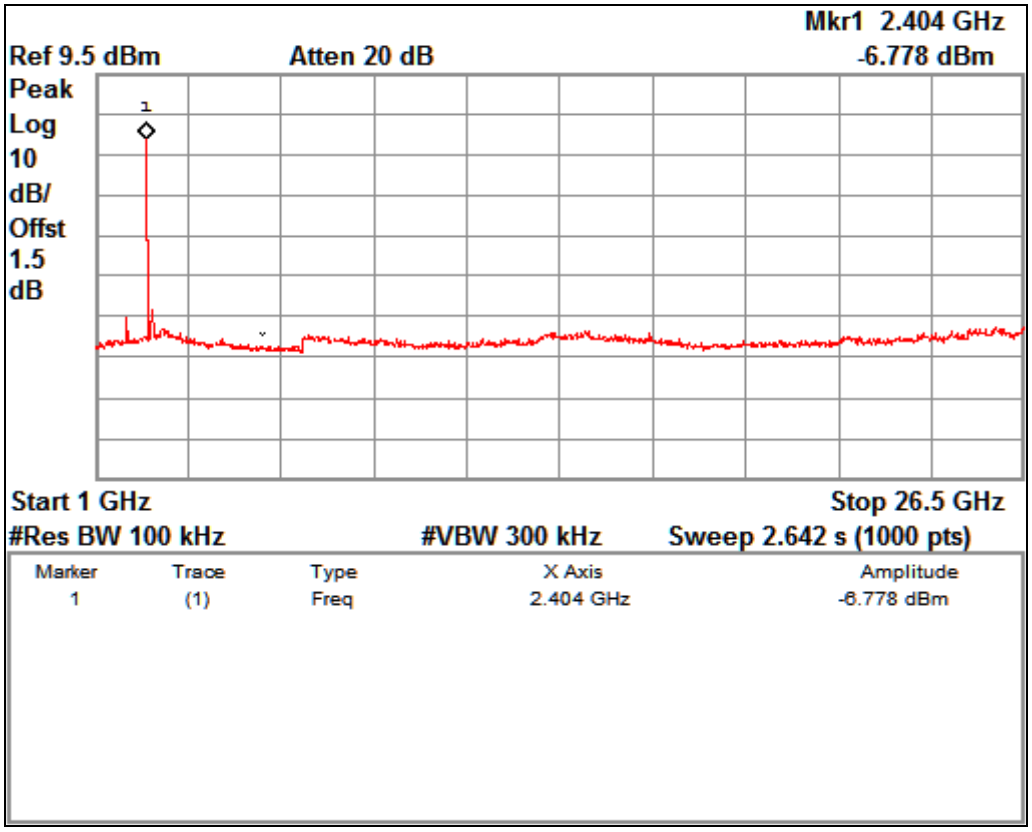


Channel High

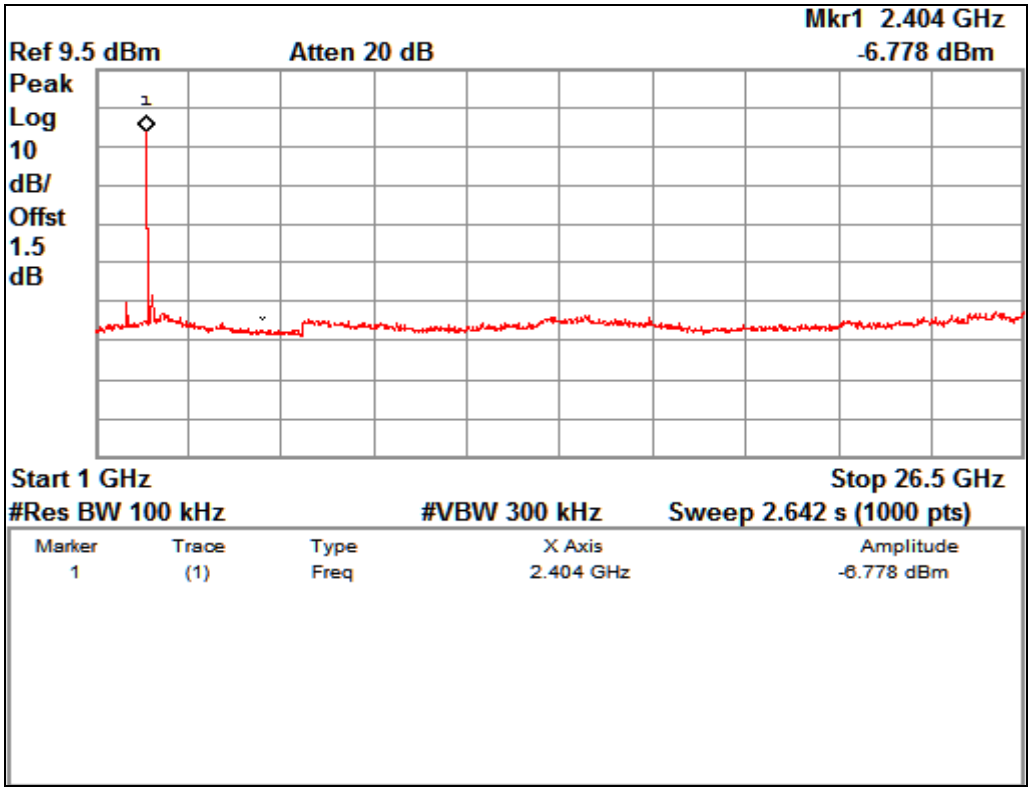
Conducted Spurious Emissions



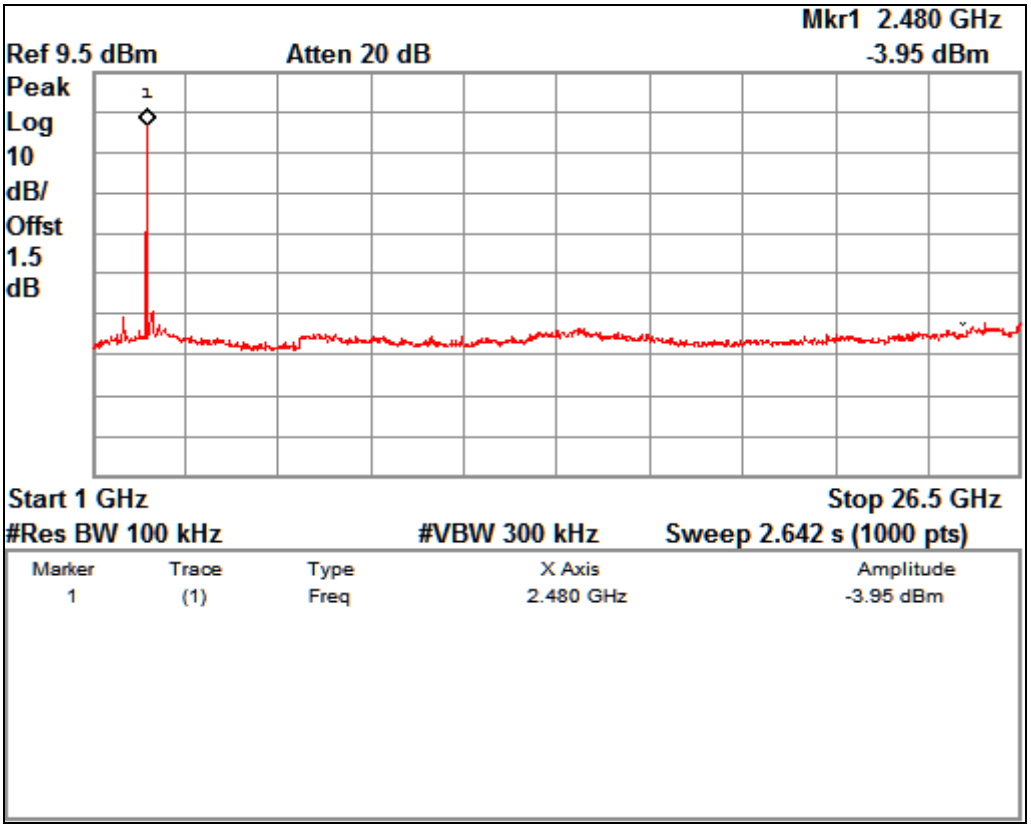
30MHz to 1GHz Spurious Emissions



Channel: Low **Modulation: GFSK**



Channel: Mid **Modulation: GFSK**



Channel: High **Modulation: GFSK**

Spurious Radiated Emissions & Restricted Bands of Operation **Section 15.209 & 15.205**
Result **Pass**

Test Specification	FCC Part 15C
Test Method	ANSI C63.10-2013
Measurement Location	Semi Anechoic Chamber
Measuring Frequency Range	9kHz to 40GHz (Up to 10th harmonic of the highest fundamental frequency)
Measuring Distance	3m
Detection	QP for frequency below 1GHz,Peak, Average for frequency above 1GHz
Requirement	As per the limits mentioned in the bellow table

Limit for Radiated Emission of Section 15.209:

Frequency (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Distance of Measurement (m)
0.009 – 0.490	2400/F(kHz)	48.50 – 13.80	300*
0.490 – 1.705	24000/F(kHz)	33.80 – 23.00	30*
1.705 -30	30	29.54	30*
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Remark: * the limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300 meter, 30 meter and 30 meter range respectively, which corresponds to 88, 50 – 53.80, 53.80 – 43.00 and 49.5dBµV/m at 3m range by extrapolation calculation and the measurement of loop antenna.

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

Test results:

No emissions were found in the range 9 kHz to 1GHz.

Test results for frequencies in the range 1 GHz 26.5 GHz

Data Rate: 1Mbps					
Channel	**Polarization**	**Frequency (MHz)**	**Power (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**
Low	Vertical	2390(Pk)	40.51	74	-33.49
		2390(Av)	27.33	54	-26.67
		2402(Pk)	85.16	*	-
		2402(Av)	76.53	*	-
		4804(Pk)	51.97	74	-22.03
		4804(Av)	39.61	54	-14.39
	Horizontal	2390(Pk)	40.01	74	-33.99
		2390(Av)	29.08	54	-24.92
		2402(Pk)	93.36	*	-
		2402(Av)	84.82	*	-
		4804(Pk)	53.66	74	-20.34
		4804(Av)	41.00	54	-13.00
Mid	Vertical	2441(Pk)	80.31	*	-
		2441(Av)	71.80	*	-
		4882(Pk)	51.00	74	-23.00
		4882(Av)	38.51	54	-15.49
	Horizontal	2441(Pk)	94.49	*	-
		2441(Av)	86.03	*	-
		4882(Pk)	53.93	74	-20.07
		4882(Av)	41.89	54	-12.11
High	Vertical	2483.5(Pk)	39.49	74	-34.51
		2483.5(Av)	27.04	54	-26.96
		2480(Pk)	77.30	*	-
		2480(Av)	68.42	*	-
		4960(Pk)	50.40	74	-23.6
		4960(Av)	38.23	54	-15.77
	Horizontal	2483.5(Pk)	41.36	74	18.34
		2483.5(Av)	27.94	54	29.73
		2480(Pk)	92.34	*	-
		2480(Av)	83.73	*	-
		4960(Pk)	53.13	74	-20.87
		4960(Av)	40.24	54	-13.76

"* >Fundamental Frequency
Pk -> Peak Detector
Av ->Average Detector

Conducted Emission Test on A.C. Power Line **Section 15.207**

Result **Pass**

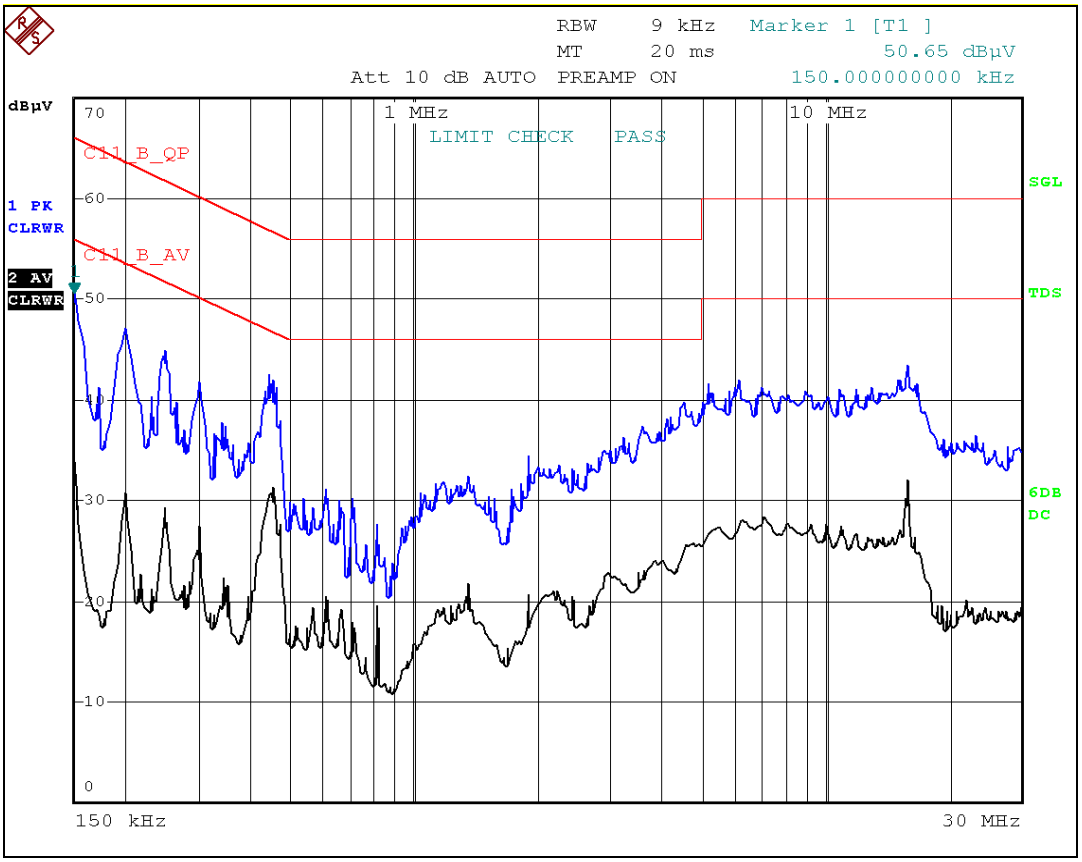
Test Specification	:	FCC Part 15 Section 15.207
Test Method	:	ANSI C63.10-2013
Testing Location	:	Screened room
Measurement Bandwidth	:	9kHz
Frequency Range	:	150kHz – 30MHz
Supply Voltage	:	110VAC,60Hz

Limit of section 15.207

Frequency of emission (MHz)	QP Limit (dBµV)	AV Limit (dBµV/m)
0.15 – 0.5	66 – 56*	56 – 46*
0.5 – 5	56	46
5 – 30	60	50

* Decreases with the logarithm of the frequency

Test Result:



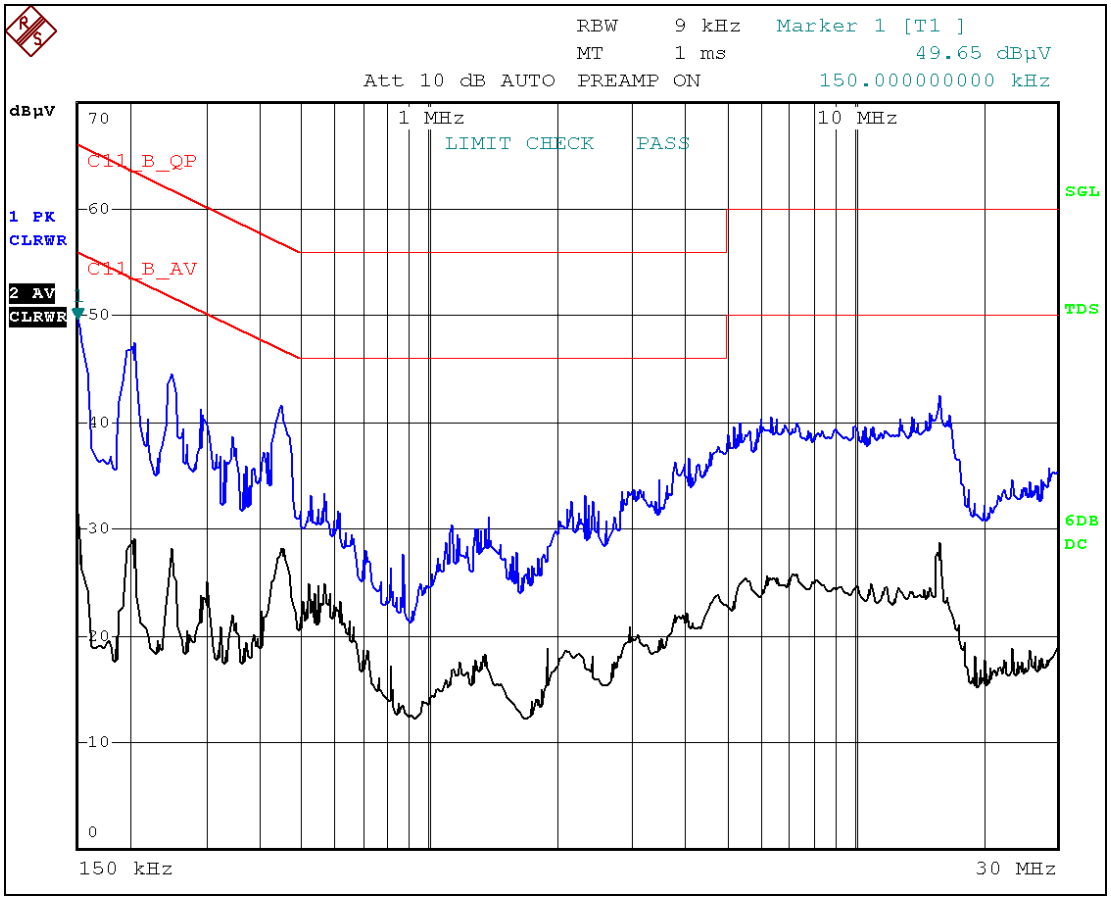
Line Graph

EDIT PEAK LIST (Final Measurement Results)

Trace1:	C11_B_QP
Trace2:	C11_B_AV
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
2 Average	454 kHz	30.77	-16.02
1 Quasi Peak	150 kHz	48.15	-17.84
1 Quasi Peak	442 kHz	38.93	-18.08
1 Quasi Peak	198 kHz	44.71	-18.98
2 Average	15.866 MHz	29.81	-20.18
1 Quasi Peak	246 kHz	41.02	-20.86
2 Average	198 kHz	31.40	-22.28
2 Average	246 kHz	29.25	-22.63
1 Quasi Peak	298 kHz	37.41	-22.88
2 Average	150 kHz	32.68	-23.31
2 Average	298 kHz	26.32	-23.97
1 Quasi Peak	15.918 MHz	35.85	-24.14
2 Average	1.358 MHz	21.28	-24.71
2 Average	814 kHz	19.76	-26.23
1 Quasi Peak	1.358 MHz	28.15	-27.84
1 Quasi Peak	710 kHz	24.02	-31.97

Line: Table



Neutral: Graph

EDIT PEAK LIST (Final Measurement Results)

Trace1:	C11_B_QP
Trace2:	C11_B_AV
Trace3:	---

TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1 Quasi Peak	150 kHz	47.81	-18.18
2 Average	454 kHz	28.00	-18.80
1 Quasi Peak	446 kHz	36.68	-20.26
1 Quasi Peak	246 kHz	41.40	-20.48
1 Quasi Peak	202 kHz	41.83	-21.69
1 Quasi Peak	15.814 MHz	37.96	-22.03
2 Average	15.914 MHz	27.45	-22.55
2 Average	150 kHz	31.66	-24.33
2 Average	246 kHz	27.31	-24.57
1 Quasi Peak	342 kHz	33.19	-25.95
2 Average	298 kHz	24.27	-26.02
2 Average	202 kHz	26.65	-26.87
2 Average	1.358 MHz	17.28	-28.71
1 Quasi Peak	1.378 MHz	23.65	-32.34

Neutral: Table

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