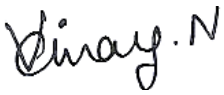
Produkte
Products

Prüfbericht - Nr.: *Test Report No.:*	**02423092 001**	**Seite 1 von 24** *Page 1 of 24*
Auftraggeber: *Client:*	**Atmel Norway AS** **Vestre Rosten 79** **7075 Tiller** **Norway**	
Gegenstand der Prüfung: *Test item:*	**Zigbit 900 MHz Balanced Output**	
Bezeichnung: *Identification:*	**ATZB-900-B0**	**Serien-Nr.:** *Serial No.* **Engineering Sample**
Wareneingangs-Nr.: *Receipt No.:*	**1403014281**	**Eingangsdatum:** *Date of receipt:* **06.04.2011**
Prüfort: *Testing location:*	**Refer Page 4 of 24 for test facilities**	
Prüfgrundlage: *Test specification:*	**FCC 15, Subpart C**	
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The tests item passed the test specification(s).*	
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland (India) Pvt. Ltd.** Alpha Tower, Sigma Soft Tech Park, # 7, Whitefield Main Road, Varthur Kodi, Bangalore – 560066, India	

geprüft / *tested by:*

Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*
20.04.2011	Vinay.N Test Engineer	

kontrolliert / *reviewed by:*

Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*
21.04.2011	Varma Kalyan Manager	

Sonstiges / *Other Aspects:* **FCC ID : VW4A090666**

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***

Test Result Summary

Clause	Test Item	Result
15.247(b) (3)	Conducted Peak RF Output Power	Pass
15.247 (a) (2)	6dB Bandwidth	Pass
15.247 (e)	Power Spectral Density	Pass
15.247 (d)	Band-edge Compliance	Pass
15.209	Spurious Radiated Emissions	Pass

Content

List of Test and Measurement Instruments 4

General Product Information 5

Product Function and Intended Use 5
Ratings and System Details 5

Operation Descriptions 6

Test Set-up and Operation Mode 7

Principle of Configuration Selection 7
Test Operation and Test Software 7
Special Accessories and Auxiliary Equipment 7
Countermeasures to achieve EMC Compliance 7

Test Methodology 8

Radiated Emission Test 8

Test Results 9

Conducted Peak Output Power — Section 15.247(b)(3) 9
6 dB Bandwidth — Section 15.247(a)(2) 12
Power Spectral Density — Section 15.247(e) 16
Band-edge Compliance — Section 15.247 (d) 19
Spurious Radiated Emissions — Section 15.209 23

Appendix 1: Test Setup Photos

Appendix 2: EUT External Photos

Appendix 3: EUT Internal Photos

Appendix 4: Label Diagram

Appendix 5: Block Diagram

Appendix 6: Specification of EUT

Appendix 7: Schematic Diagrams

Appendix 8: Bill of Material

Appendix 9: User Manual

Appendix 10: Maximum Permissible Exposure Information

List of Test and Measurement Instruments

Wipro Technologies, Bangalore

List of Test and Measurements

Equipment	Manufacturer	Type	S/N	Calibration Due Date
EMI Test Receiver	Rohde & Schwarz	ESIB40	100306	24.03.2012
Hybrid Log Periodic Antenna	TDK	HLP3003C	130334	21.03.2012
Broadband Horn Antenna	Schwarzbeck Mess-Electronik	BBHA9170	9170-344	21.03.2012
Double Ridged Horn Antenna	Schwarzbeck Mess-Electronik	BBHA9120D	9120D-687	21.03.2012
Pre-Amplifier	TDK-RFSolution	PA-02	100008	15.02.2012

Testing Facilities

1) Wipro Technologies
Survey No. 70, 77, 78 / 8A, Dodda Kannelli,
Sarjapur Road, Bangalore – 560 035
India

General Product Information

Product Function and Intended Use

900 MHz. Balanced Output ATZB-900-B0 Zigbit is an ultra-compact, low-power, high-sensitivity 900 MHz. IEEE 802. 15.4 / Zigbee OEM Module based on innovative Atmel's mixed-signal hardware platform designed for wireless sensing, control and data acquisition applications.

Ratings and System Details

Operating Frequency	902 - 928 MHz
No. of channel	10
Channel Spacing	2 MHz
Transmitted Power	+10 dBm
Modulation	DSSS [O-QPSK]
Data Rate	250kbps
Antenna Type	Whip
Number of antenna	One
Antenna Gain	0 dBi
Supply Voltage	Power from USB adaptor
Dimensions	18.8mm x 13.5mm x 2.8mm
Environmental	Operating temperature: -20°C to 70°C Humidity : Not more than 80%

Test Conditions:

5 V DC (from USB)

Environmental conditions:

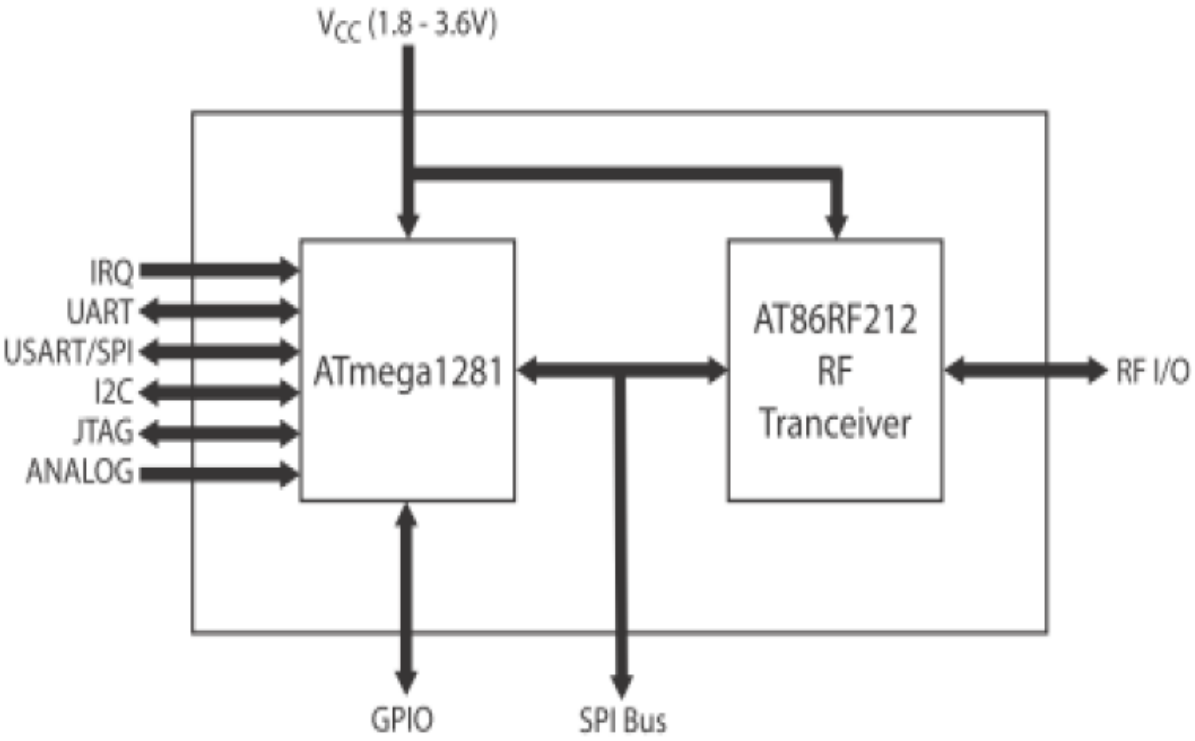
Temperature: +23 º C **RH:** 62%

Operation Descriptions

Depending on end-user requirements, The ATZB-900-B0 ZigBit can operate as self-contained sensor node, where it would function as a single MCU with radio or it can be paired with a host processor driving module over a serial interface.

The product has a Microcontroller and Radio Transceiver, interfaced to each other using a serial interface. The serial commands from Microcontroller controls the radio and runs software the allows the product to be the part of Zigbee compliant Network

Block Diagram:



Test Set-up and Operation Mode

Principle of Configuration Selection

The test was performed under continuous transmission to obtain the maximum emissions.

Test Operation and Test Software

Hyper terminal in the computer used to enable the continuous transmission and changing channels (low/mid/high) on the EUT for the tests in this report.

Special Accessories and Auxiliary Equipment

The EUT was tested together with the following additional accessory:

- Notebook computer used to power the device through USB cable, set the test configuration (channel and power level)

Countermeasures to achieve EMC Compliance

- None

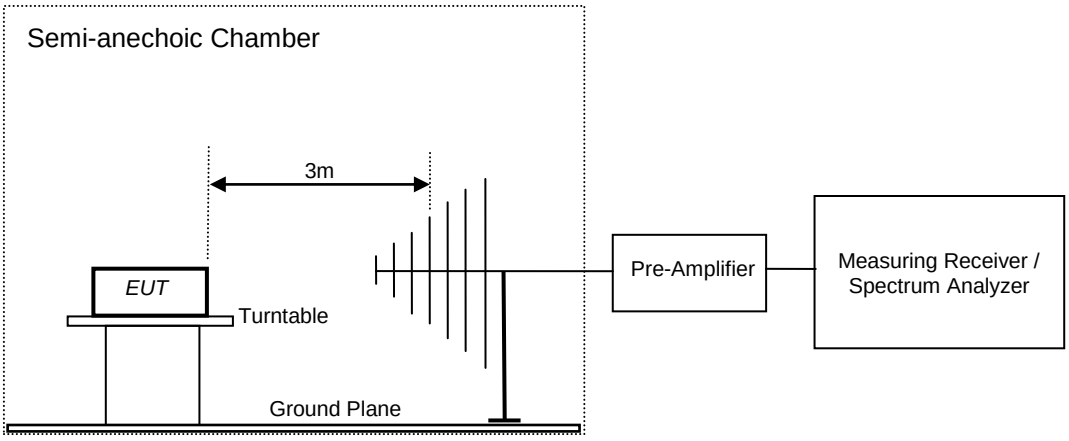
Table of carrier frequencies

Frequency Band	Channel No.	Frequency (MHz)
902-928 MHz	1	906
	2	908
	3	910
	4	912
	5	914
	6	916
	7	918
	8	920
	9	922
	10	924

Test Methodology

Radiated Emission Test

The radiated emission measurement was performed according to the procedures in ANSI C63.4-2003. The equipment under test (EUT) was placed at the middle of the 80 cm high turntable, 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.



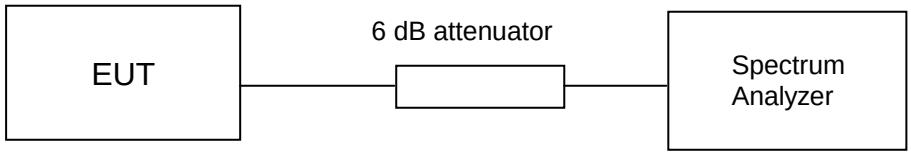
Test Results

Conducted Peak Output Power **Section 15.247(b)(3)**

Result **Pass**

Test Specification	FCC 15.247 (b)(3)
Measurement Bandwidth (RBW)	3MHz
Detector	Peak
Requirement	<1 watt (30dBm) for Digital Transmission System

Test Method:

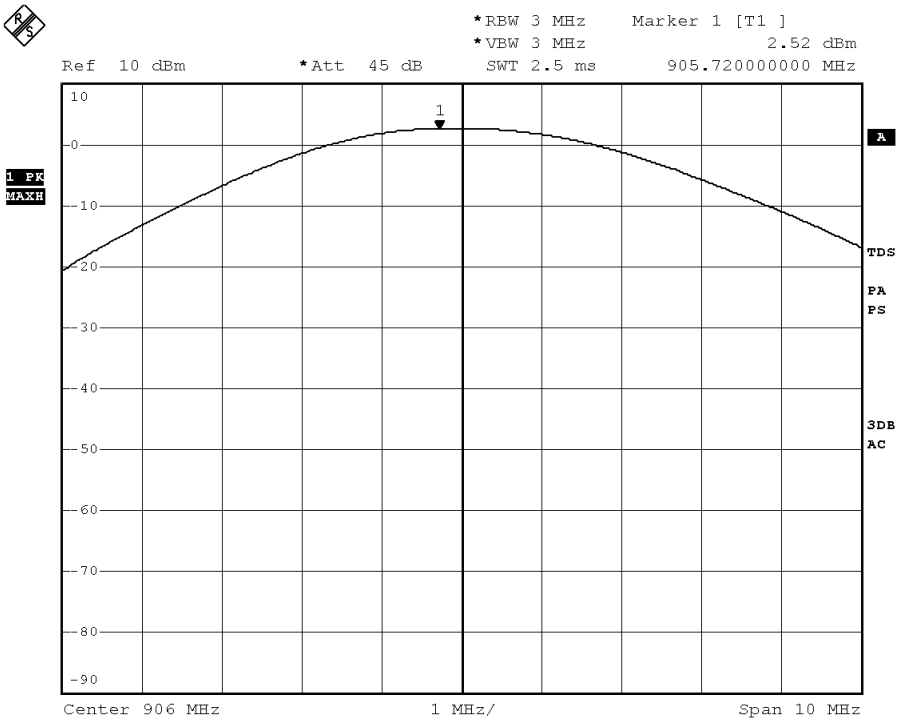


Test Results:

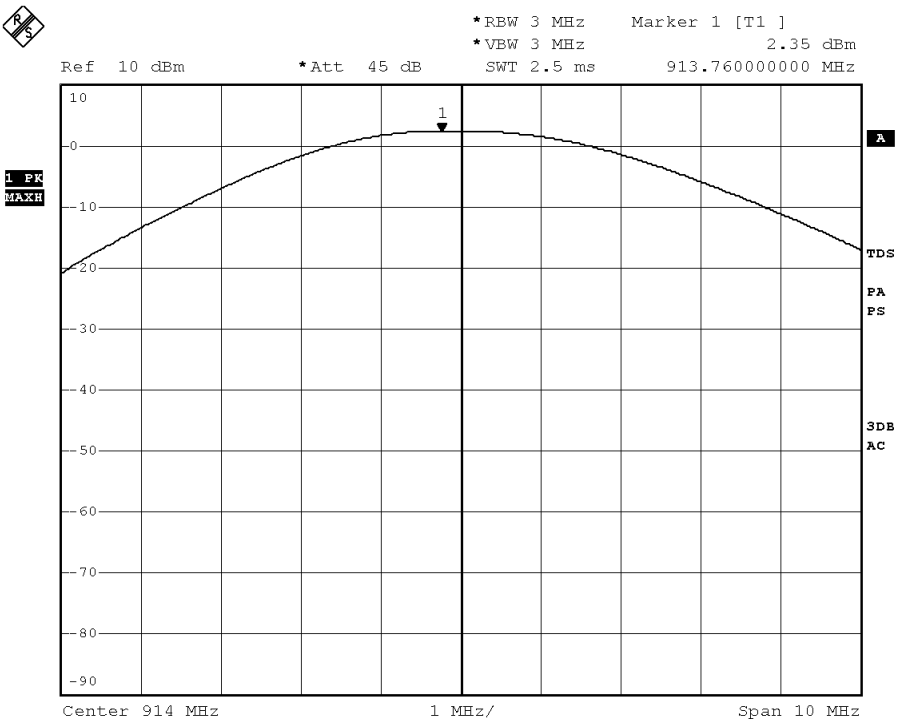
Cable Loss: 0.68 dB

Attenuator: 6 dB

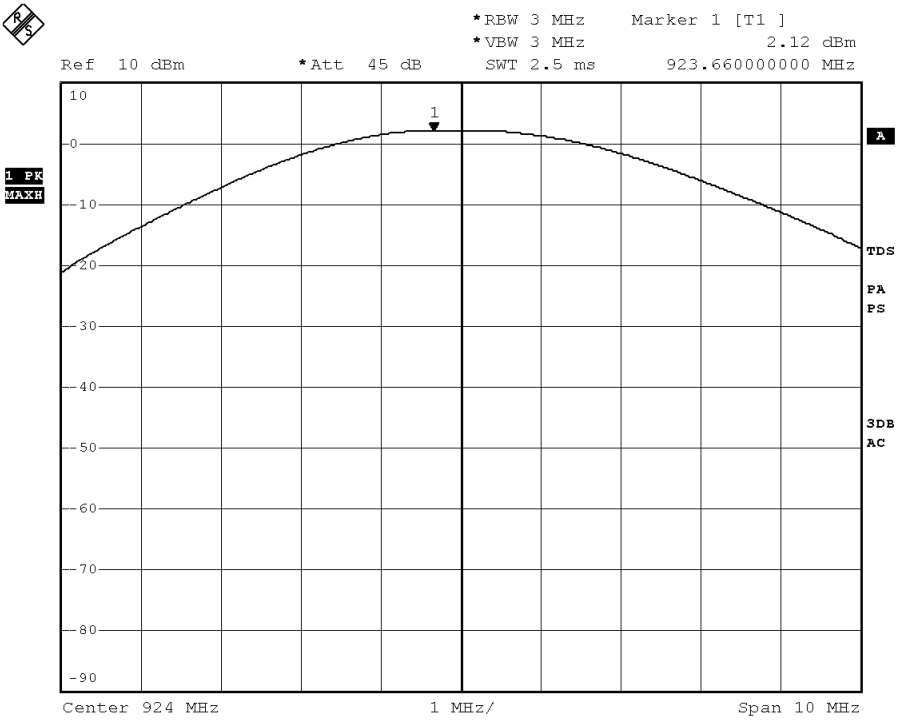
Channel Frequency (MHz)	Measured RF Output power (dBm)	Total Output power (dBm)	Limit (dBm)
906.00	2.52	9.20	30
914.00	2.35	9.03	30
924.00	2.12	8.80	30



Channel Frequency: 906 MHz



Channel Frequency: 914 MHz



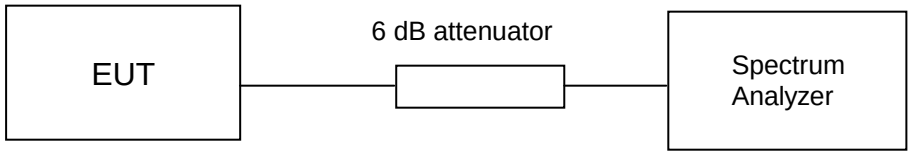
Channel Frequency: 924 MHz

6 dB Bandwidth **Section 15.247(a)(2)**

Result **Pass**

Test Specification	FCC Part 15 Section 15.247 (a) (2)
Detector Function	Peak
Requirement	The minimum 6 dB bandwidth shall be at least 500 kHz.

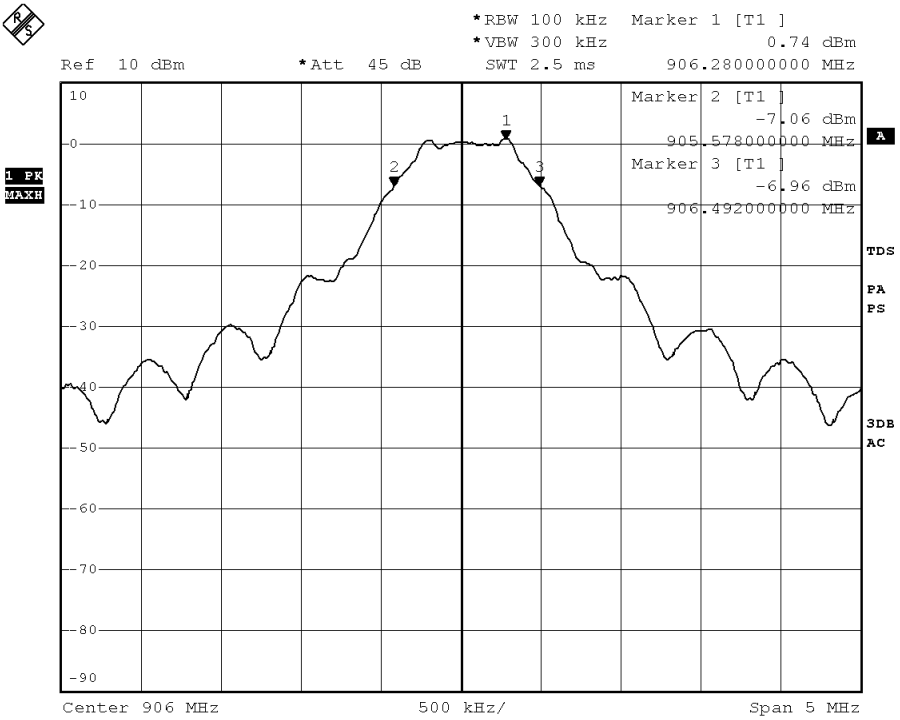
Test Method:



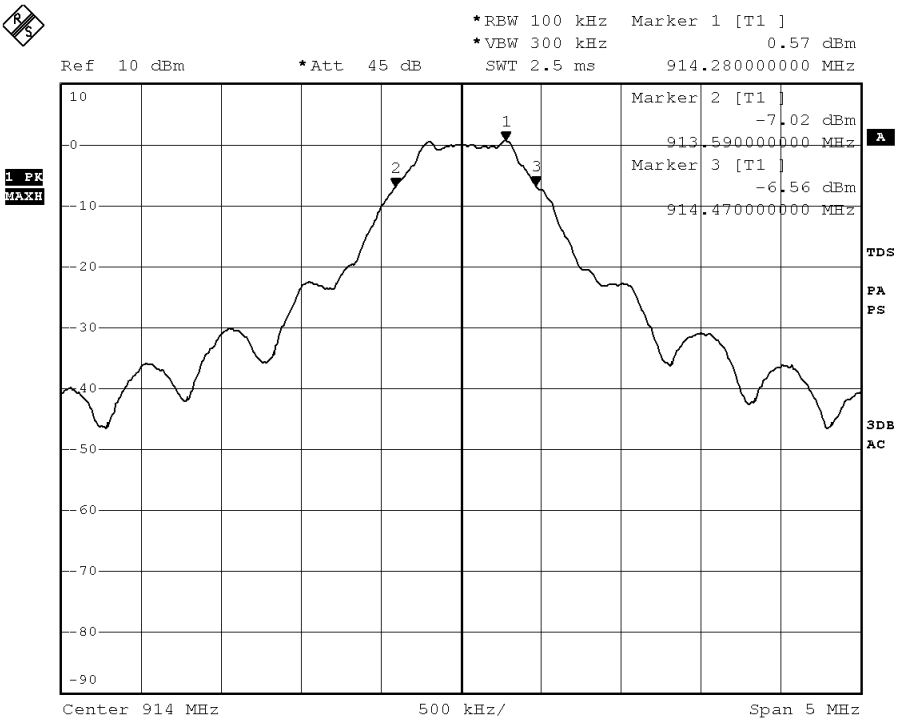
Test Result:

Cable Loss: 0.68dB

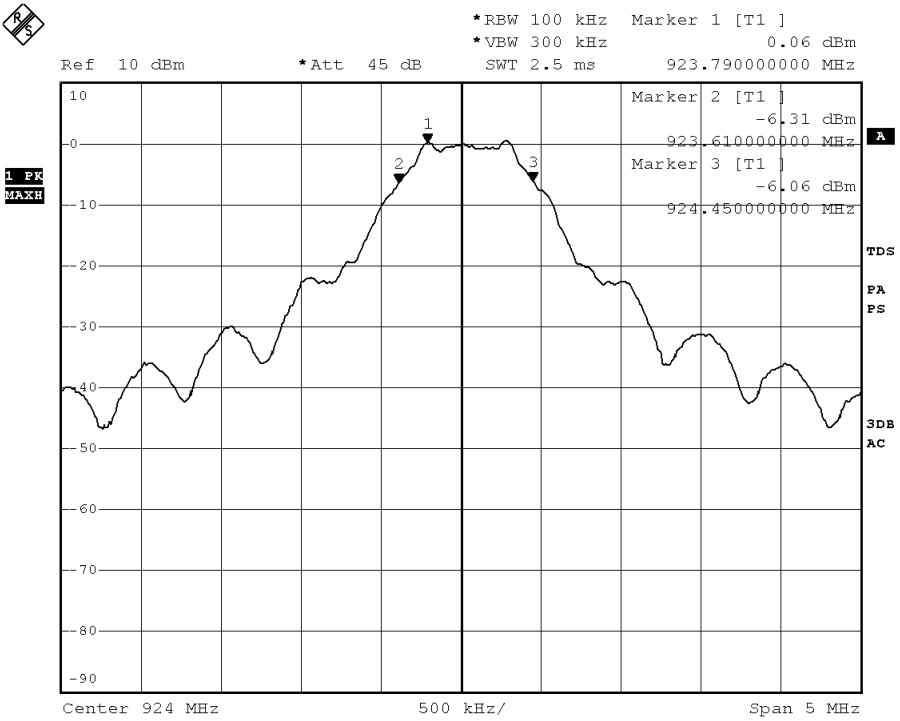
Channel Frequency (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	6 dB Bandwidth (KHz)	99% OBW (MHz)
906.00	905.57	906.49	920	1.32
914.00	913.59	914.47	880	1.29
924.00	923.61	924.45	840	1.32



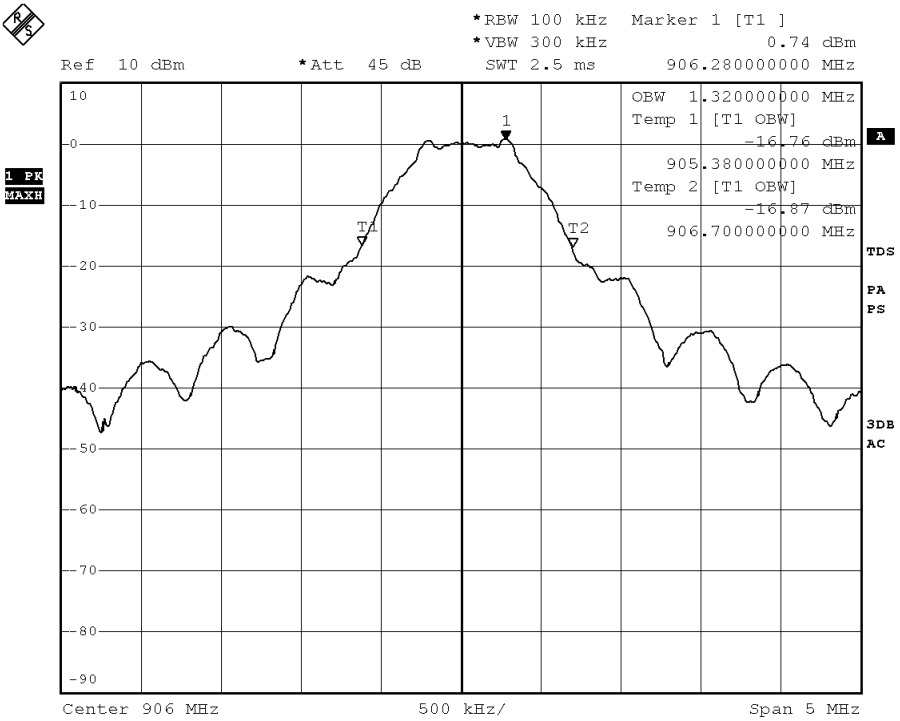
Channel Frequency 906 MHz



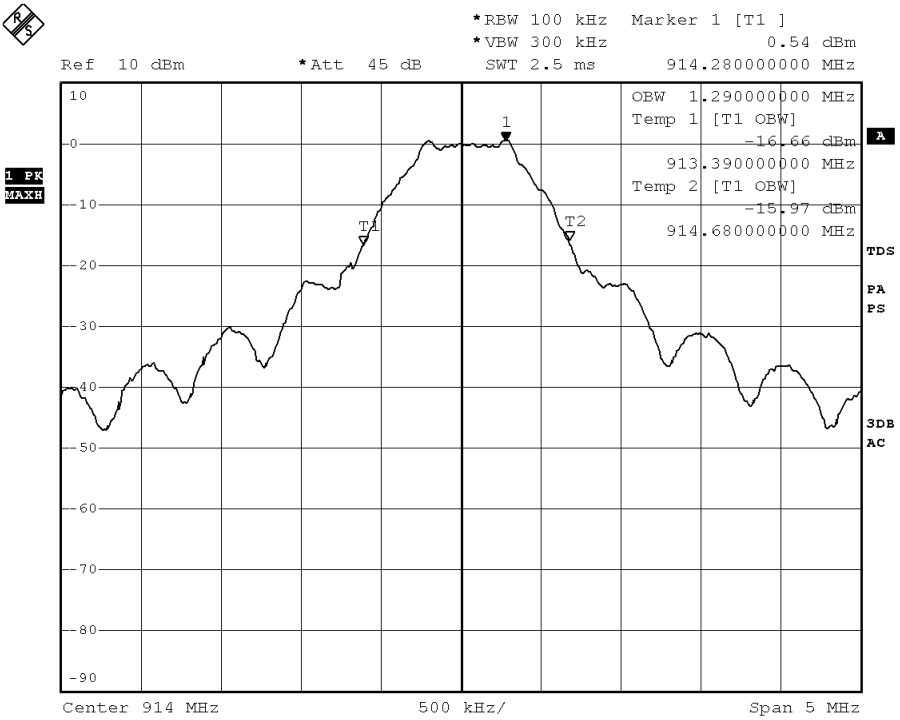
Channel Frequency 914 MHz



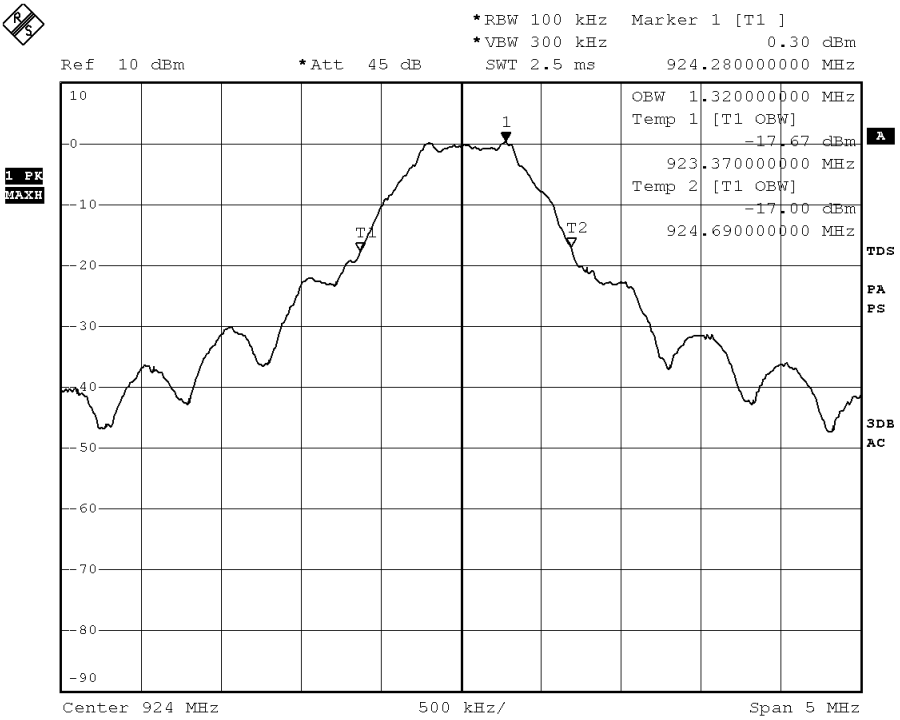
Channel Frequency 924 MHz



99% Occupied Bandwidth: Channel Low



99% Occupied Bandwidth: Channel Mid



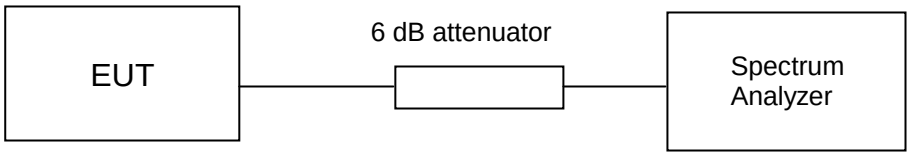
99% Occupied Bandwidth: Channel High

Power Spectral Density **Section 15.247(e)**

Result **Pass**

Test Specification	FCC Part 15 Section 15.247 (e)
Detector Function	Peak
Requirement	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Method:

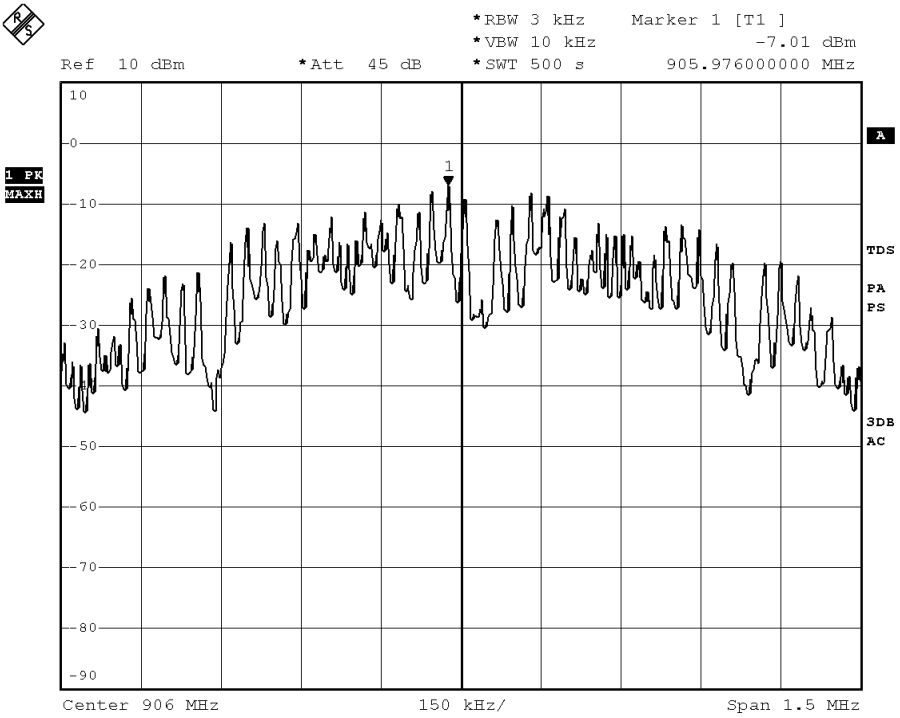


Test Results:

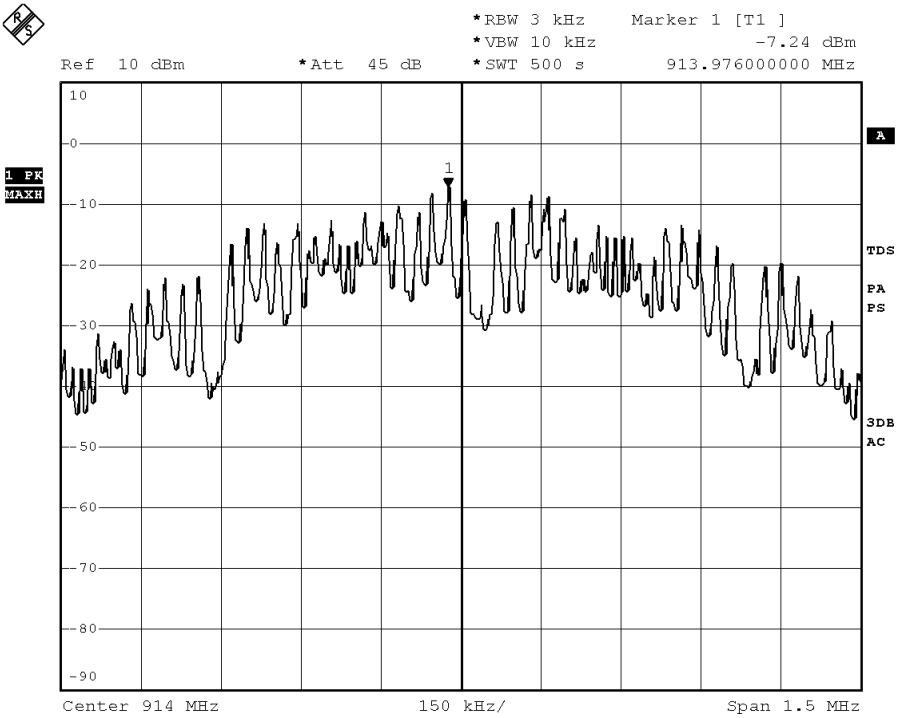
Cable Loss: 0.68dB

Attenuator: 6dB

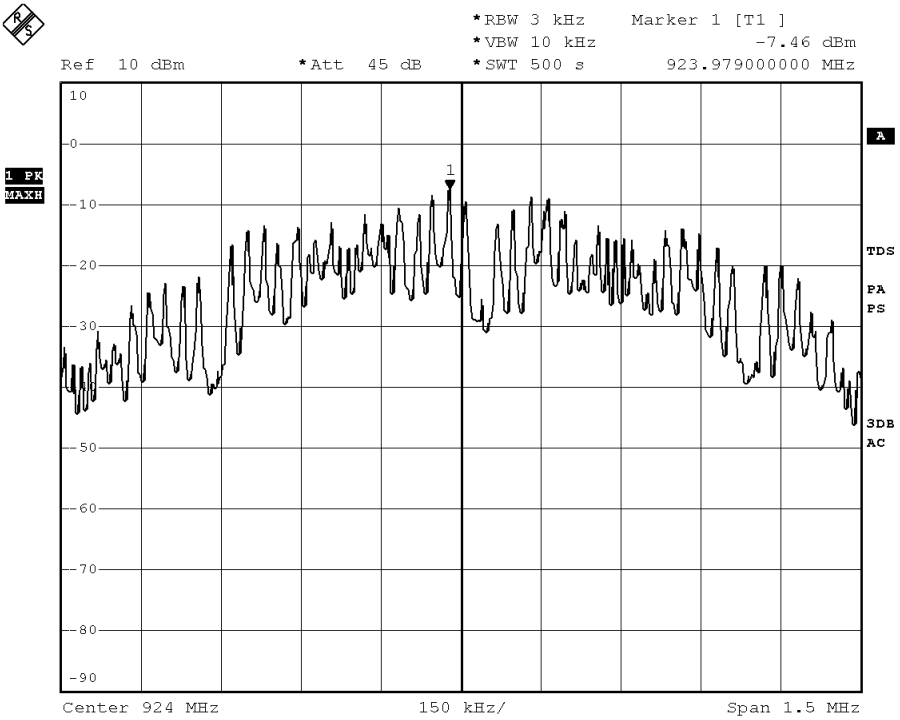
Channel Frequency (MHz)	Measured RF Output power (dBm)	PSD (dBm)	Limit (dBm)
906.00	-7.01	-0.33	08.00
914.00	-7.24	-0.56	08.00
924.00	-7.46	-0.78	08.00



Channel Frequency 906 MHz



Channel Frequency 914 MHz



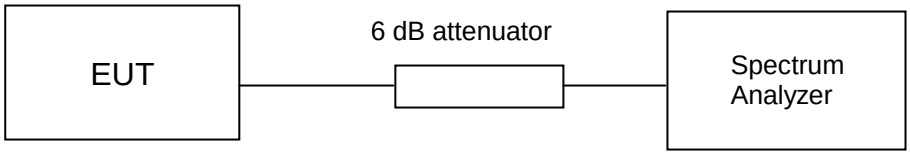
Channel Frequency 924 MHz

Band-edge Compliance **Section 15.247 (d)**

Result **Pass**

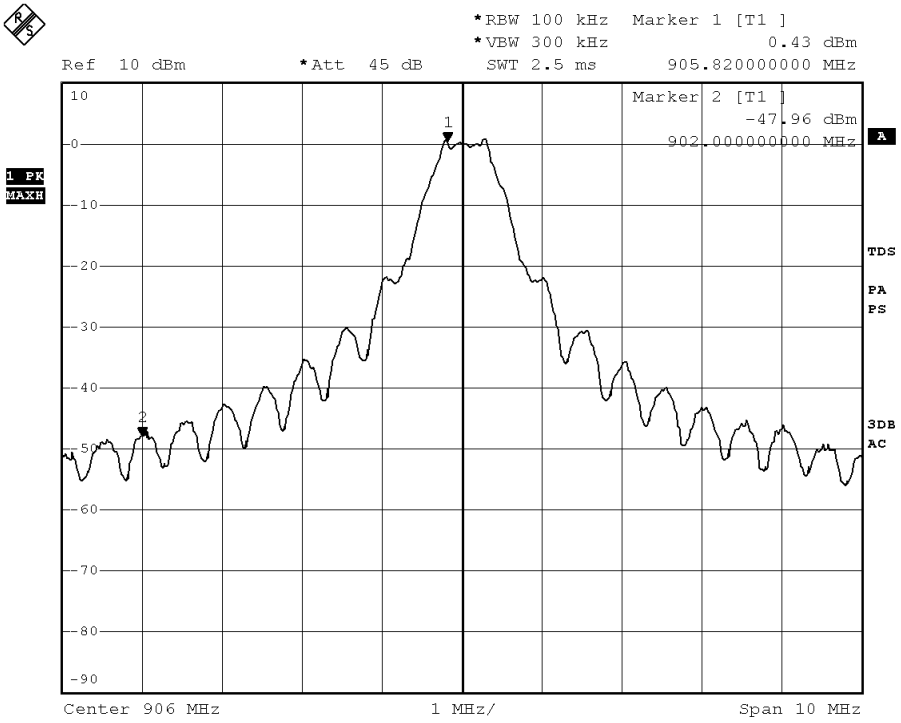
Test Specification	FCC Part 15, Subpart C
Detector Function	Peak
Requirement	In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 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:

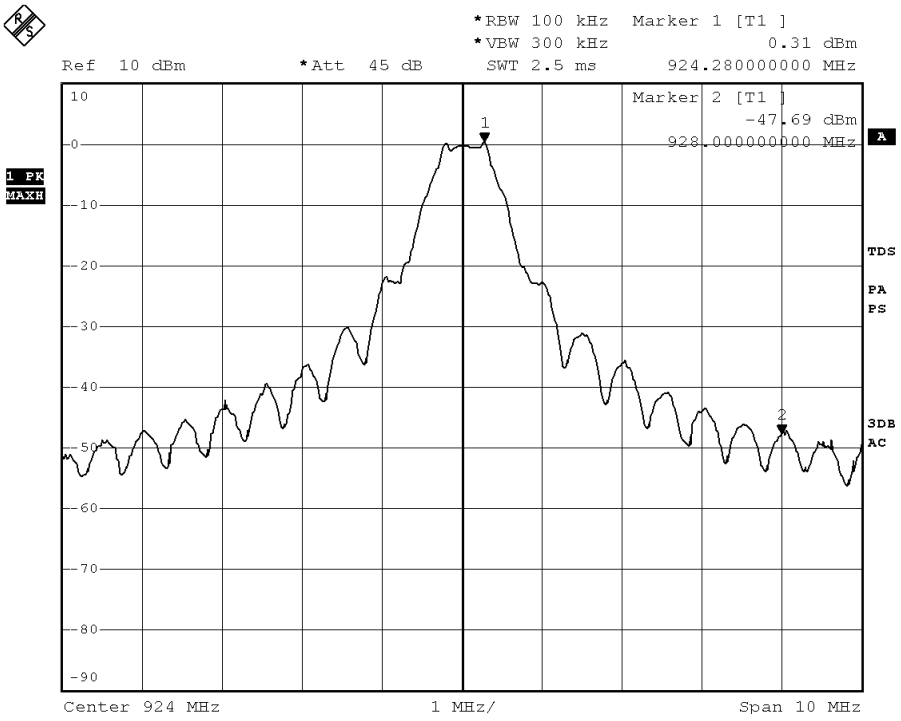


Test Result:

Fundamental Frequency (MHz)	Value at Band Edge		Limit (dB)
	Frequency (MHz)	Value (dB)	
906.00	902.00	-47.96	-20
924.00	928.00	-47.69	-20

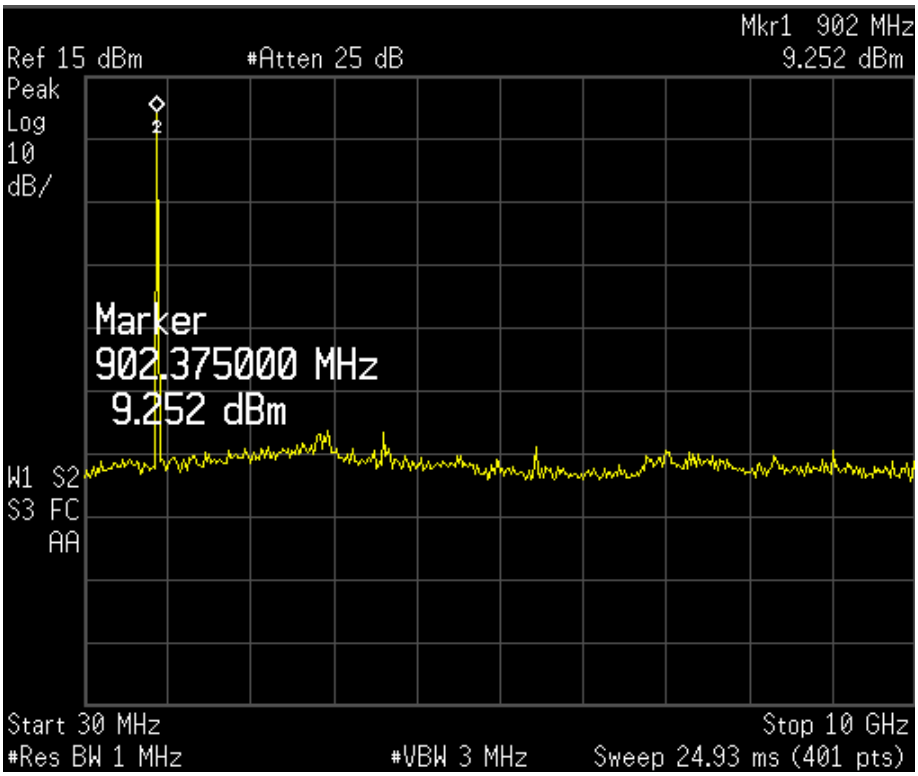


Channel Frequency 906 MHz

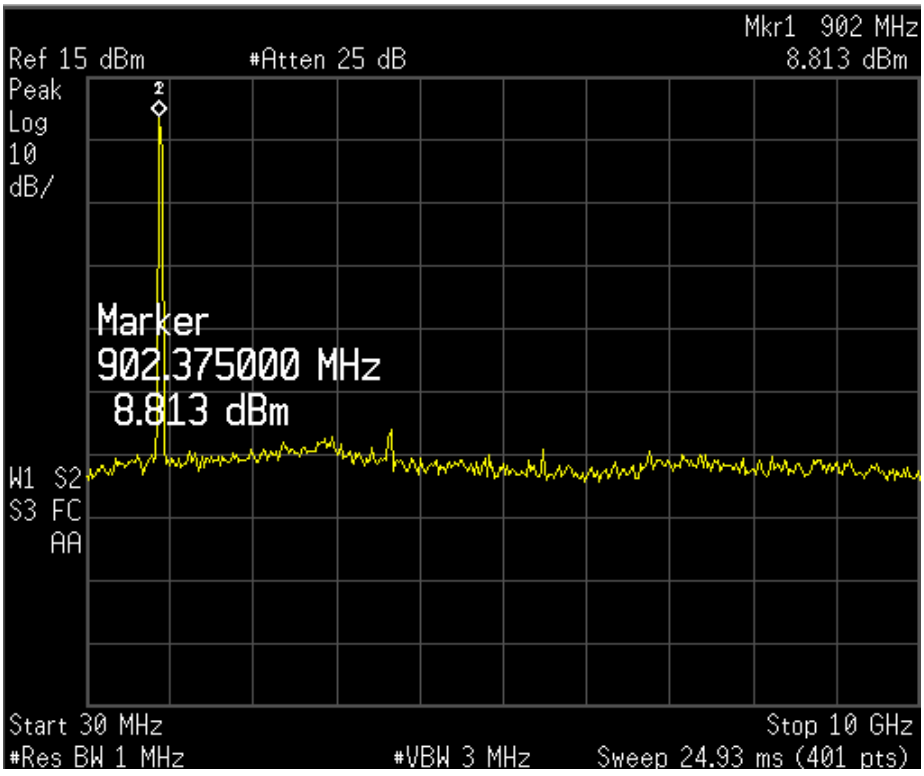


Channel Frequency 928 MHz

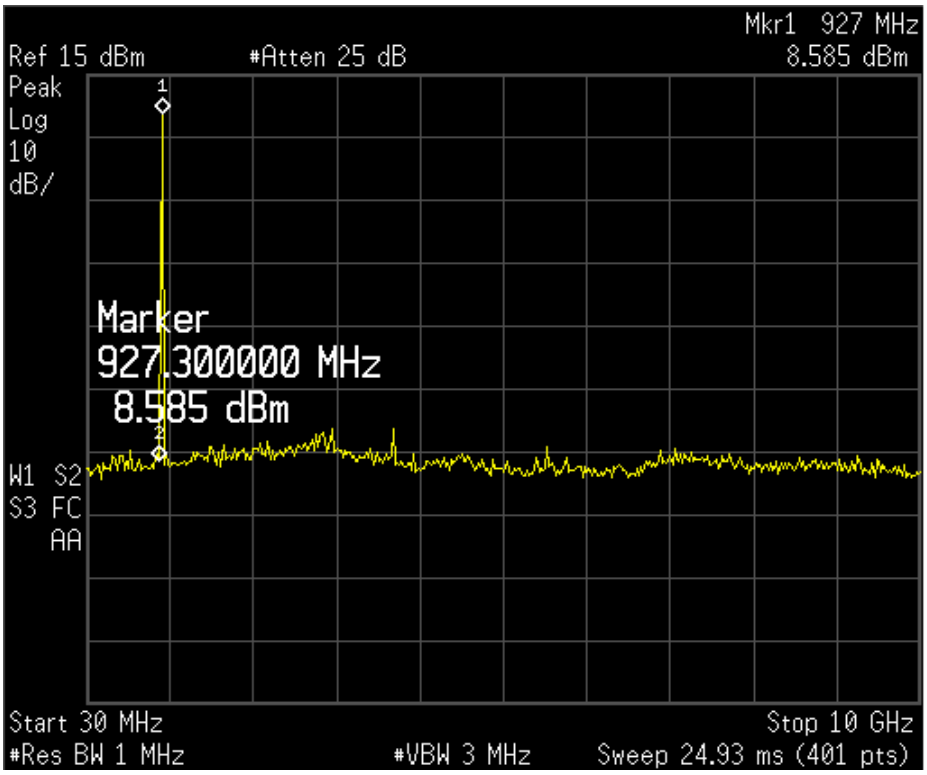
Conducted Spurious Emission



Channel Frequency Low



Channel Frequency Mid



Channel Frequency High

Spurious Radiated Emissions **Section 15.209**

Result **Pass**

Test Specification	FCC 15.209
Test Method	ANSI C63.4-2003
Measurement Location	Semi Anechoic Chamber
Supply Voltage	5V DC (USB Supply)
Measuring Frequency Range	9kHz to 10 GHz(Up to 10th harmonic of the highest fundamental frequency)
Measuring Distance	3m
Detection	QP for frequency below 1GHz, 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 are 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.

Note:

High Pass Filter is used during the measurement of Harmonics

Test Results

Channel	Antenna Polarization	Spurious Emission (MHz)	Field strength (dBµV/m)	Limit (dBm)	Margin (dbm)
Low	H	154.25	19.58	43.50	-23.92
		906.05	91.06	*	-
	V	72.51	28.56	40.00	-11.44
		183.42	32.41	43.50	-11.09
		906.15	93.93	*	-
Mid	H	154.65	17.85	43.50	-25.65
		914.10	90.56	*	-
	V	72.14	25.65	40.00	-14.35
		183.65	29.65	43.50	-13.85
		192.44	31.25	43.50	
		913.86	91.86	*	-
High	H	154.25	19.58	43.50	-23.92
		924.00	89.64	*	-
	V	71.85	26.56	40.00	-13.44
		184.60	26.79	43.50	-16.71
		924.00	90.75	*	-

*** →Fundamental frequency**