EMC TEST REPORT	
TEST REPORT NUMBER	DBN 1613TEL660-A
TEST REPORT DATE	23-Jun-2016
TEST REPORT VERSION	1.0
MANUFACTURER	Cambium Networks
PRODUCT NAME	ePMP2000
PRODUCT MODEL	C050900P031A
CONDITION OF EUT WHEN RECEIVED	Good and in proper working condition
ISSUED TO	Cambium Networks, 3800 Golf Road, Suite 360, Rolling Meadows, IL, USA 60008
ISSUED BY	**TARANG Lab** Wipro Technologies, SJP2, Survey#70,77,78/8A, Dodda Kanelli, Sarjapur road, Bangalore. Karnataka. India - 560 035 Tel: +91-80-30292929 Fax: +91-80-30298200 Email: tarang.planet@wipro.com Web: www.wipro.com

AMENDMENT HISTORY

Amendment Number	Amendment Date	Author of Amendment	Previous Report Version	Previous Report Date
Amendment Details				

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1 TEST REPORT SUMMARY

Applicant	Cambium Networks
Manufacturer	Cambium Networks
Product Name	ePMP2000
Product Model	C050900P031A
Product Serial Number	000456D1846A
Date of Test	18th Mar 2016 to 26th Apr 2016
Venue of Test	Tarang Lab

Applicable Standard	Description	Results
47 CFR Part 15 Feb 2016	Duty Cycle(X) and Transmission Duration(T)	NA
	§15.407 (a) (2)- 26 dB Bandwidth measurement	NA
	99 % Occupied Channel Bandwidth	NA
	§15.407 (a) (2)- Maximum Conducted Output Power	PASS
	§15.407 (a) (2)- Power Spectral Density	PASS
	§15.407 b (2) –Transmitter Unwanted Emission (Conducted)	PASS
	§15.407 b (2) - Band edge Measurements	PASS

ePMP2000 was tested by Tarang Lab as per the standards that are listed in the table above. Based on the observations during the test and interpretations by Tarang lab, results have been indicated. The test results produced in this report shall apply only to the above sample that has been tested under the specific conditions and modes of testing as described in the report. Other similar equipment may not necessarily reproduce same result due to production tolerances and measurement uncertainties. Any measurement uncertainties listed in this report are for information purpose only.

The results shall stand invalid, in case there are any modifications / additions / removals to the hardware or software or end use atmosphere to the product tested. This report shall not be modified or in any way revised unless it is expressly permitted and endorsed by Tarang lab, through a duly authorized representative. Particulars on Manufacturer / Supplier / Product configuration / performance criteria, given in this report, are based on the information given by the customer, along with test request. Tarang does not assume any responsibility for the correctness of such information for the above mentioned equipment under test.

Customer acknowledges that this is a test report and not a certificate to gain market access for the product. To gain market access, Customer needs appropriate clearance from the Government or authorized agency for the target market. For markets that allow self-declaration, customer needs to follow the procedure defined by the target market.

Prepared by	Reviewed by	Approved by
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EMI/EMC Test Engineer	**Lead EMI/EMC Test Engineer**	**Technical Manager**

2 GENERAL INFORMATION

2.1 ACCREDITATION DETAILS

Following are the accreditation and listing details for Tarang.

Accreditation / Listing body	Registration / Company / Certificate Number
NABL, India	Certificate No: T-1533, T-1534 http://www.nabl-india.org/
FCC (Federal Communications Commission)	Registration Number: 799247 http://www.fcc.gov/
IC (Industry Canada)	Company Number: 9023A-1 http://www.ic.gc.ca

2.2 MEASUREMENT UNCERTAINTY

NA

3 INSTRUMENTATION AND CALIBRATION

3.1 TEST AND MEASURING EQUIPMENT

The list of following measuring equipment used for this testing conforms to the applicable standards. Performance of all test and measuring equipment including any accessories are checked periodically to ensure accuracy.

3.2 EQUIPMENTS USED

Name of Equipment	Manufacturer	Model No	Serial No	Calibration Due
Spectrum Analyzer	Keysight Technologies	N9020A	MY54420183	05th Jul 2016
X series USB Peak and Average Power sensor	Keysight Technologies	U2021XA	MY55050001	05th Jul 2016
X series USB Peak and Average Power sensor	Keysight Technologies	U2021XA	MY55050002	05th Jul 2016
EMI Test Receiver	R&S	ESIB40	100306	21st Jan 2017 & 04th Jul 2016

Table 1: List of equipment used for Conducted RF Test

4 PRODUCT INFORMATION

4.1 DESCRIPTION OF THE PRODUCT

EUT is a point to point & point to multipoint fixed outdoor Transceiver with the following defined channels.

40 MHz channel for 17 dBi antenna	**10 MHz channel for 17 dBi antenna**
Low – 5280 MHz	Low – 5265 MHz
Mid - 5300 MHz	Mid – 5300 MHz
High - 5320 MHz	High – 5335 MHz

Product	ePMP2000
Model Number	C050900P031A
Serial Number	000456D1846A
Product Category / Type of Equipment	ITE
EUT Operating Voltage	120 V AC
EUT Operating frequency range	60 Hz
Max EUT Operating Current	< 1 A

Table 2: EUT details

Cable No.	**Cable Name**	**Cable Length**	**Power / Interconnection cable**	**Shielded / Unshielded**
Cable - 1	Power cable	0.8 meter	Power	Unshielded
Cable - 2	Ethernet Cable	1.5 meter	Interconnection	Unshielded
Cable - 3	Ethernet Cable	3.0 meter	Interconnection	Unshielded

Table 3: List of cables

4.2 SOFTWARE AND FIRMWARE DETAILS

Atheros Radio Test 2 (ART2-GUI) Version 2.3

5 TEST DETAILS

5.1 PRODUCT AND TEST SETUP

5.1.1 PRODUCT CONFIGURATION

The EUT was powered through AC power supply (120 V AC / 60 Hz). The EUT was connected to Ethernet switch by using RJ45 cable. Figure 1 shows the product configuration during the tests. POE module was used during the test to power ON the EUT.

The 5.2 GHz ePMP Integrated Radio was configured with test software and configured to have the following settings during the course of testing:

- 40 MHz modulation bandwidth for low, mid & high channels
    - Rate - HT40,
    - 54 Mbps OFDM, MCS15 / 270 Mbps
    - Tx Power is 11 dBm Tx99 for 17 dBi antenna configuration-Low channel
    - Tx Power is 11 dBm Tx99 for 17 dBi antenna configuration-Mid channel
    - Tx Power is 11.5 dBm Tx99 for 17 dBi antenna configuration-High channel

- 10 MHz modulation bandwidth for low, mid & high channels
    - Rate – Legacy,
    - 54 Mbps OFDM, MCS15 / 130 Mbps
    - Tx Power is 9 dBm Tx99 for 17 dBi antenna configuration-Low channel
    - Tx Power is 10 dBm Tx99 for 17 dBi antenna configuration-Mid channel
    - Tx Power is 10 dBm Tx99 for 17 dBi antenna configuration-High channel

The unit was continuously monitored for transmission using an auxiliary antenna during the radiated tests.

5.1.2 TEST SETUP DETAILS

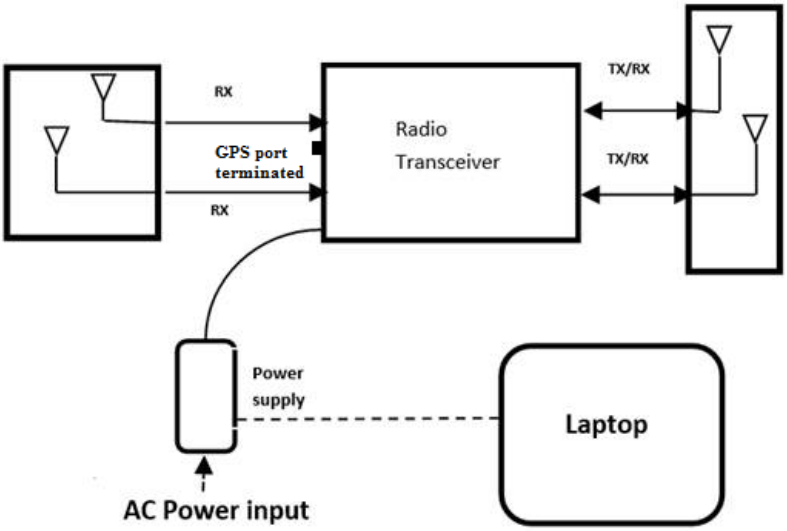

Figure 1: Block diagram of the EUT test setup

5.1.3 ACCESSORIES

Name of the Equipment	Manufacturer	Model Number	Serial Number
17 dBi Antenna Beam steer- Rx	Cambium Networks	C050900D020A	NA
17 dBi Antenna sector- Tx	Cambium Networks	C050900D021A	NA
Power Supply	Cambium Networks	NET P30 56	031-326-6719
Switching Power Supply Gigabit Compatible	Cambium Networks	NET-P30-56	N000000L034A

5.2 APPLICABLE TESTS

Applicable Standard	Description	Test level / Test Voltage	Applicability
47 CFR Part 15 Subpart E Feb 2016	Duty Cycle(X) and Transmission Duration(T)	NA	Antenna port
	26 dB Bandwidth Measurement	NA	Antenna port
	99% Occupied Channel Bandwidth	NA	Antenna port
	Maximum Conducted Output Power	≤ 250 mW	Antenna port
	Power Spectral Density	≤ 11 dBm in 1 MHz bandwidth	Antenna port
	Transmitter Unwanted Emissions (Conducted)	9 kHz - 40 GHz	Antenna port
	Band Edge Measurements	≤ -27 dBm / MHz	Antenna port

5.3 TEST RESULT

5.3.1 DUTY CYCLE (X) AND TRANSMISSION DURATION (T)

5.3.1.1 TEST SPECIFICATION

Test Standard	47 CFR Part 15 Subpart E Feb 2016
Test Procedure	789033 D2 General U-NII Test Procedures New Rule v01r01
Frequency Range	5250-5350 MHz
Resolution Bandwidth	3 MHz
Video Bandwidth	50 MHz
Sweep Time	Auto
Attenuation	Auto
Test Mode	Conducted
Detector	RMS
Input Voltage	120 V AC
Input Frequency	60 Hz
Temperature	21.0 °C
Humidity	54.0 %
Tested By	Suresh.G.N
Test Date	18th Mar 2016

5.3.1.2 LIMITS

NA

5.3.1.3 TEST SETUP

Figure 2: Typical test setup for Conducted RF Test

5.3.1.4 TEST PROCEDURE

The Conducted test was performed using the Spectrum analyzer. Measurements were done as per section II B of **"789033 D2 General U-NII Test Procedures New Rule V01r01".** The RF output of the EUT was connected to the input port of Spectrum analyzer using an attenuator. The graph and data captured from spectrum analyzer and recorded.

5.3.1.5 MEASUREMENT GRAPHS / DATA

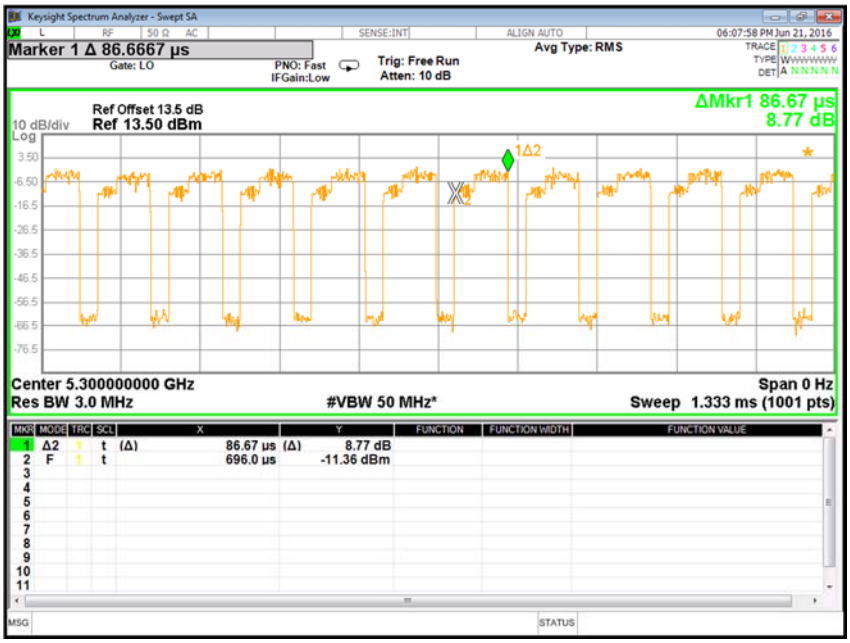

Figure 3: Measured ON time

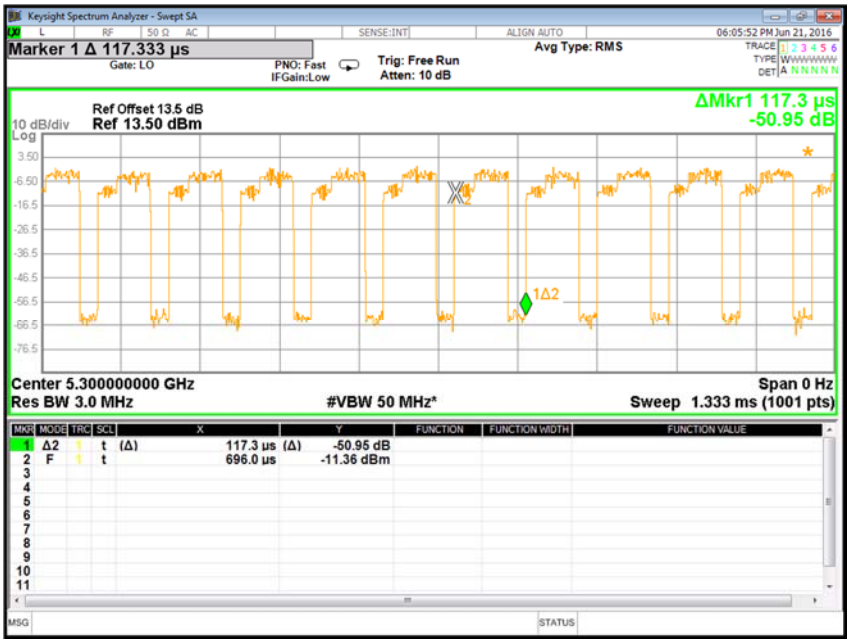

Figure 4: Measured Transmission Period (T)

5.3.1.6 RESULT

The Duty cycle and Transmission duration data were recorded.

Mode	ON time (µsec)	T (µsec)	Duty Cycle X (Linear)	Duty Cycle (%)	50/T Minimum RBW and VBW (kHz)
Tx ON	86.67	117.3	0.7389	73.89%	426.25

*Note: Duty cycle = (ON time / Period)*100*

5.3.2 26 DB BANDWIDTH MEASUREMENT

5.3.2.1 TEST SPECIFICATION

Test Standard	47 CFR Part 15 Subpart E Feb 2016
Test Procedure	789033 D2 General U-NII Test Procedures New Rule V01r01
Frequency Range	5250-5350 MHz
Resolution Bandwidth	100 kHz, 390 kHz
Video Bandwidth	300 kHz, 1.2 MHz
Sweep Time	Auto
Attenuation	Auto
Test Mode	Conducted
Detector	Peak
Input Voltage	120 V AC
Input Frequency	60 Hz
Temperature	23.0 °C
Humidity	55.0 %
Tested By	Suresh.G.N
Test Date	18th Mar 2016

5.3.2.2 LIMITS

Standard	Reference section	Frequency range	Limit
47 CFR Part 15 Subpart E Feb 2016	§15.407 (a) (2)	5250 MHz - 5350 MHz	NA

5.3.2.3 TEST SETUP

Figure 5: Typical test setup for Conducted RF Test

5.3.2.3.1 TEST PROCEDURE

The Conducted test was performed using the Spectrum analyzer. Measurements were done as per the **"789033 D2 General U-NII Test Procedures New Rule V01r01".** The RF output of the EUT was connected to the input port of Spectrum analyzer using an attenuator. The graph and data captured from spectrum analyzer and recorded.

5.3.2.4 MEASUREMENT GRAPHS / DATA

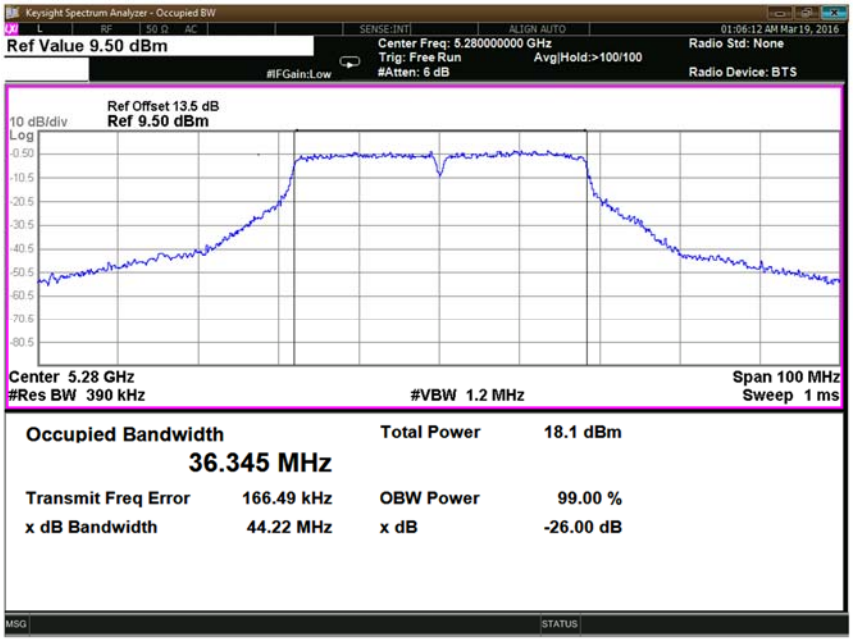

Figure 6: 40 MHz, 17 dBi, Low channel: 26 dB bandwidth measured at Ch.0 – 5280 MHz

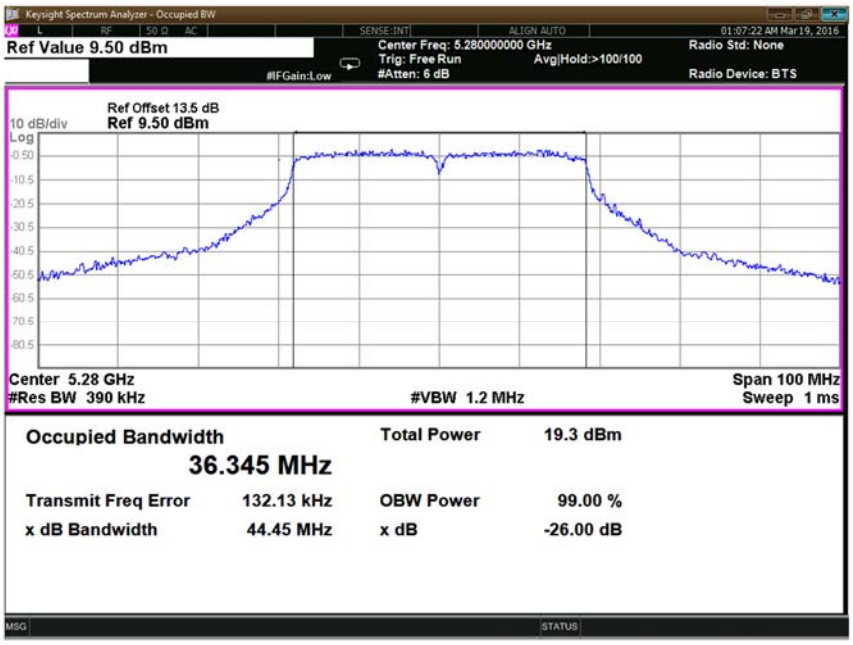

Figure 7: 40 MHz, 17 dBi, Low channel: 26 dB bandwidth measured at Ch.1– 5280 MHz

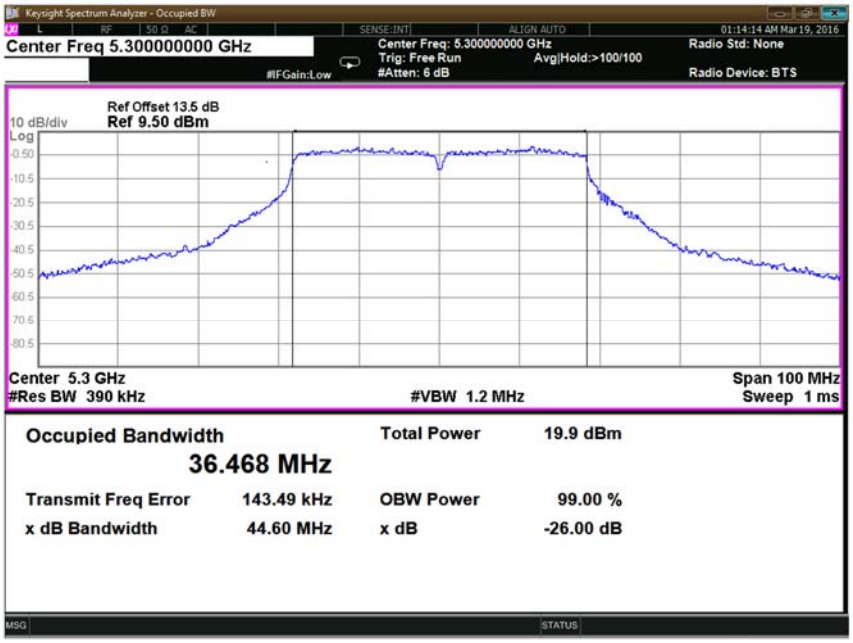

Figure 8: 40 MHz, 17 dBi, Mid channel: 26 dB bandwidth measured at Ch.0 - 5300 MHz

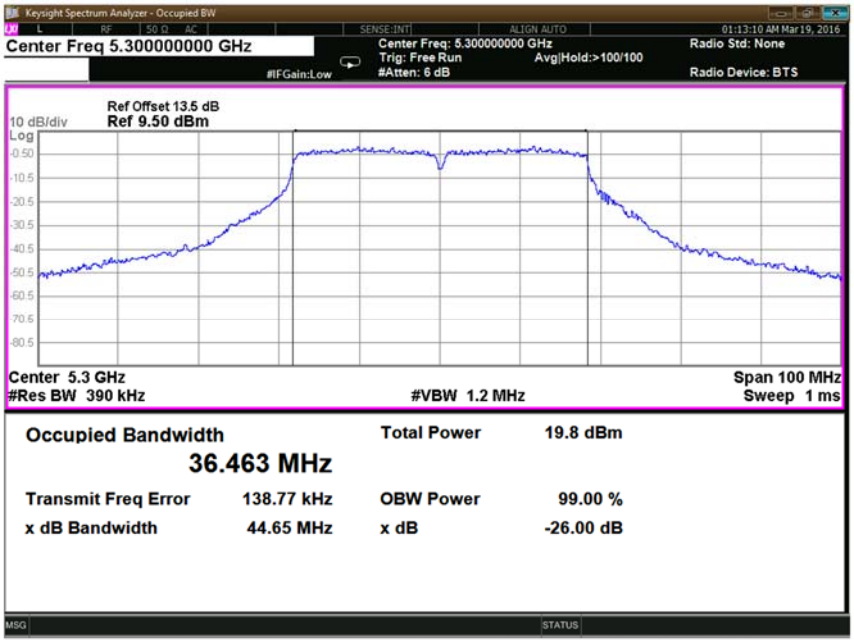

Figure 9: 40 MHz, 17 dBi, Mid channel: 26 dB bandwidth measured at Ch.1 - 5300 MHz

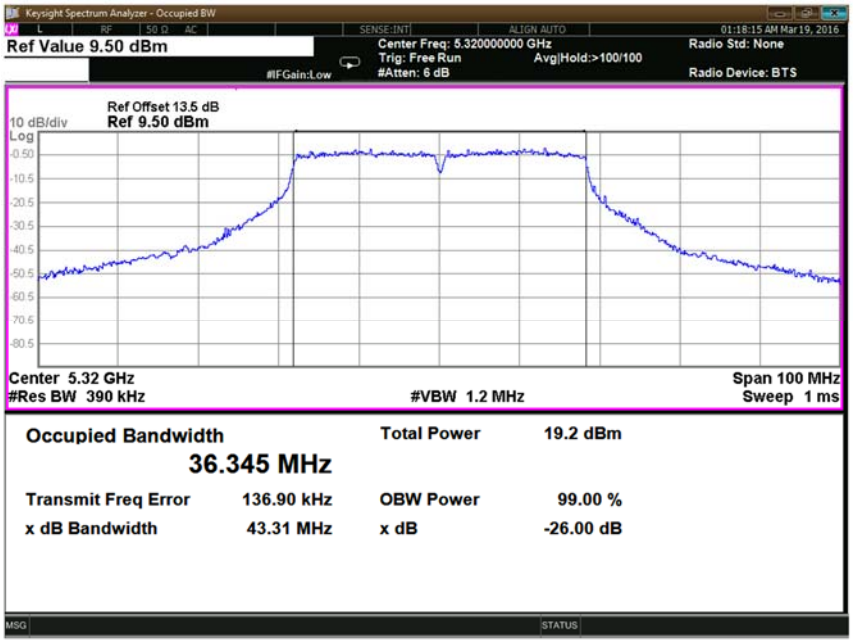

Figure 10: 40 MHz, 17 dBi, High channel: 26 dB bandwidth measured at Ch.0 - 5320 MHz

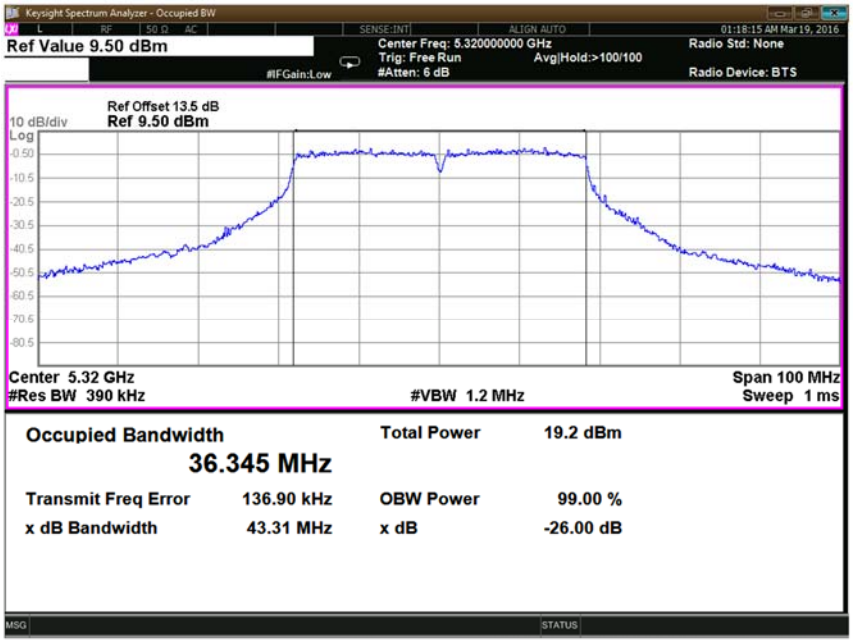

Figure 11: 40 MHz, 17 dBi, High channel: 26 dB bandwidth: measured at Ch.1 - 5320 MHz

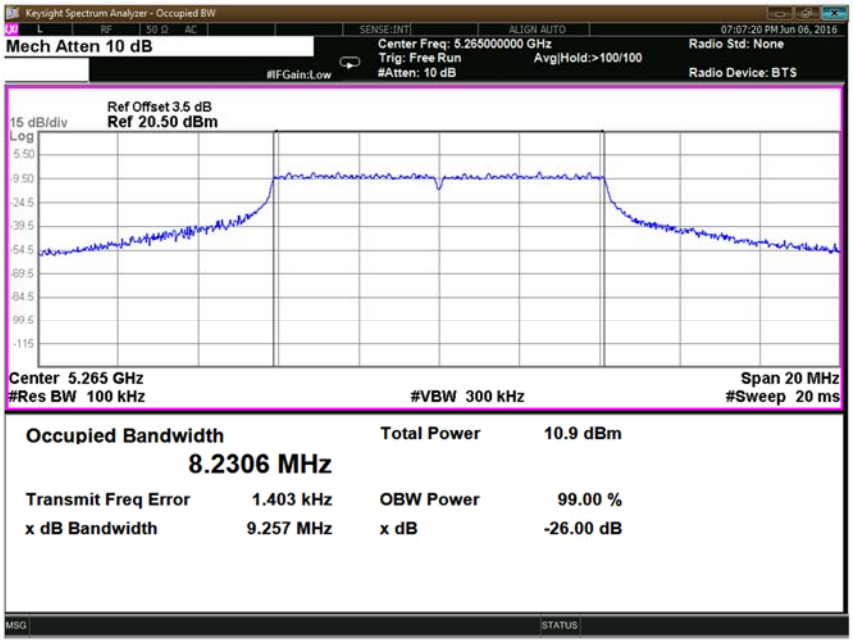

Figure 12: 10 MHz, 17 dBi, Low channel: 26 dB bandwidth measured at Ch.0 - 5265 MHz

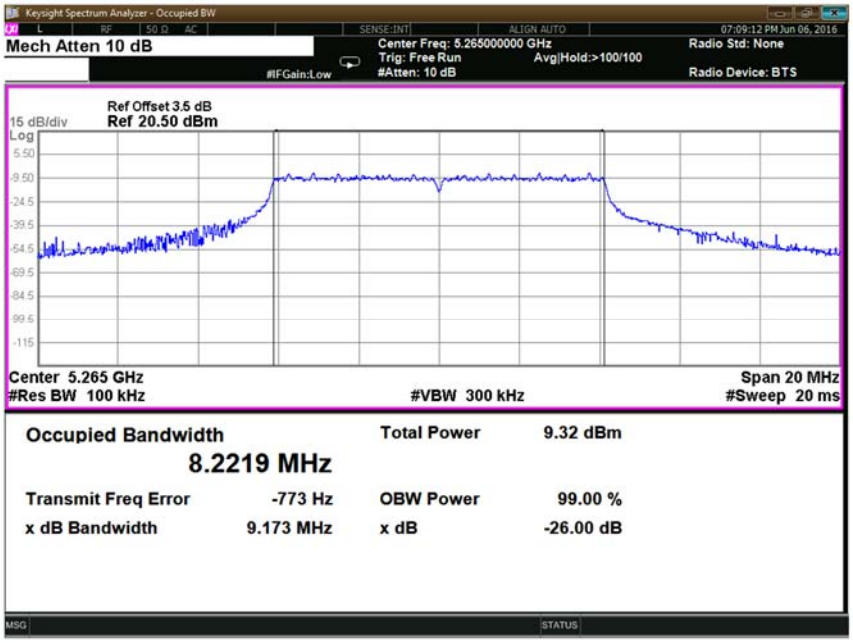

Figure 13: 10 MHz, 17 dBi, Low channel: 26 dB bandwidth measured at Ch.1 - 5265 MHz

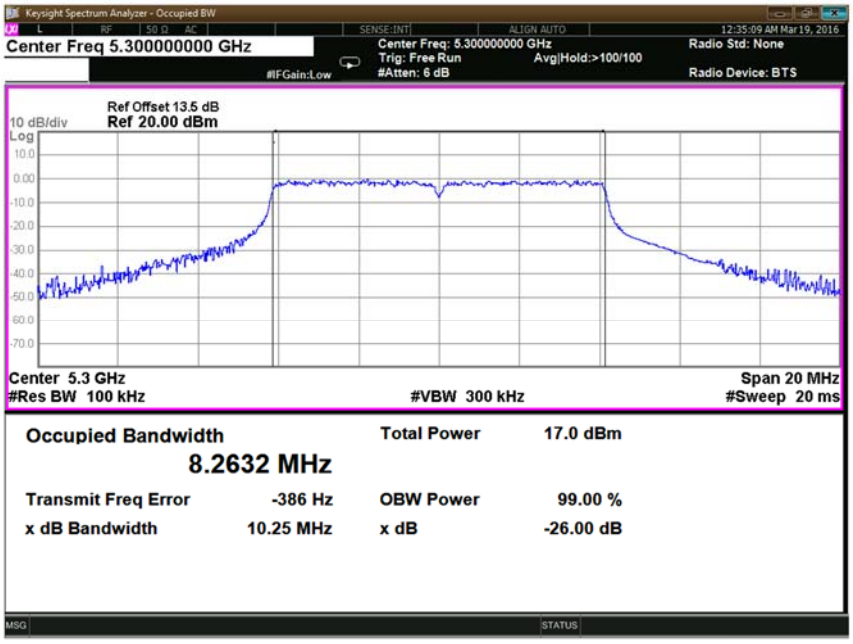

Figure 14: 10 MHz, 17 dBi, Mid channel: 26 dB bandwidth measured at Ch.0 - 5300 MHz

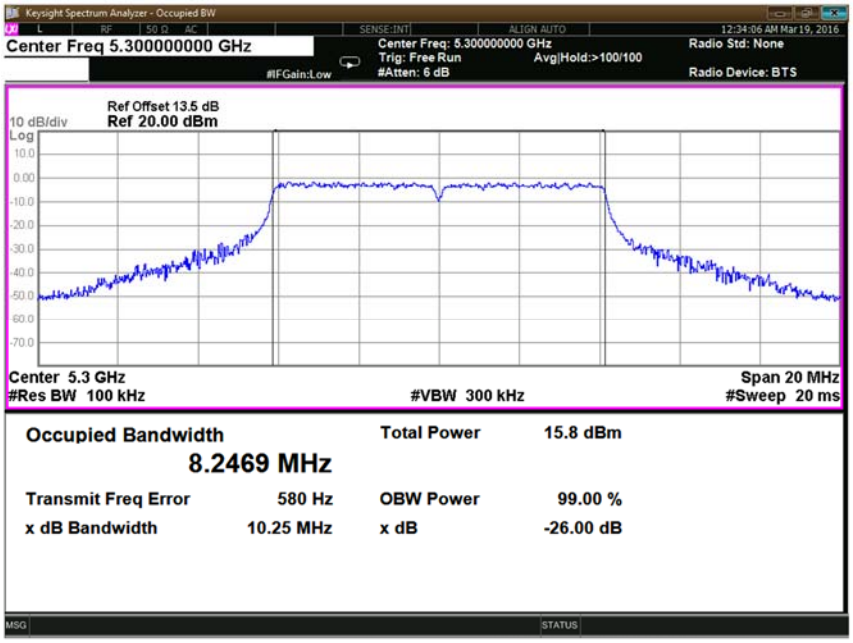

Figure 15: 10 MHz, 17 dBi, Mid channel: 26 dB bandwidth measured at Ch.1 - 5300 MHz

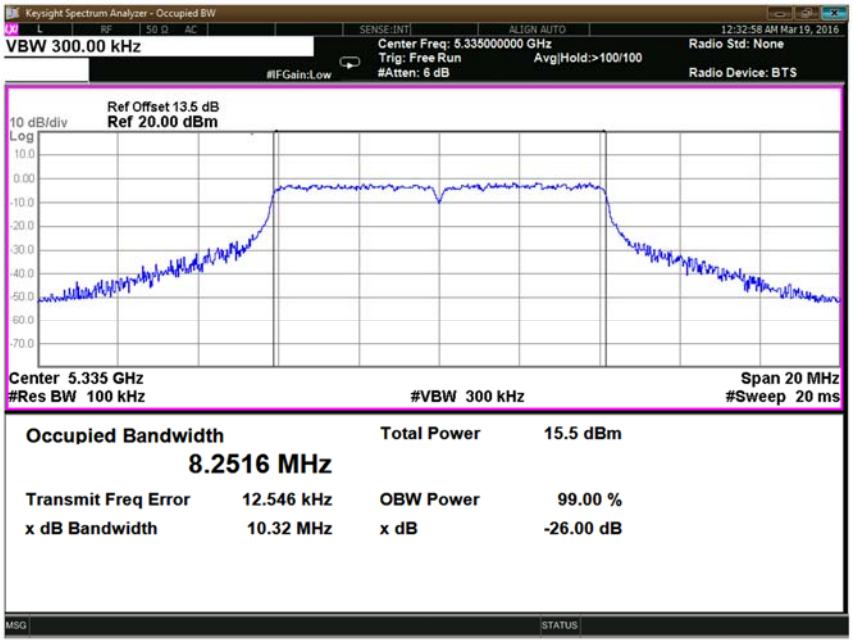

Figure 16: 10 MHz, 17 dBi, High channel: 26 dB bandwidth measured at Ch.0 - 5335 MHz

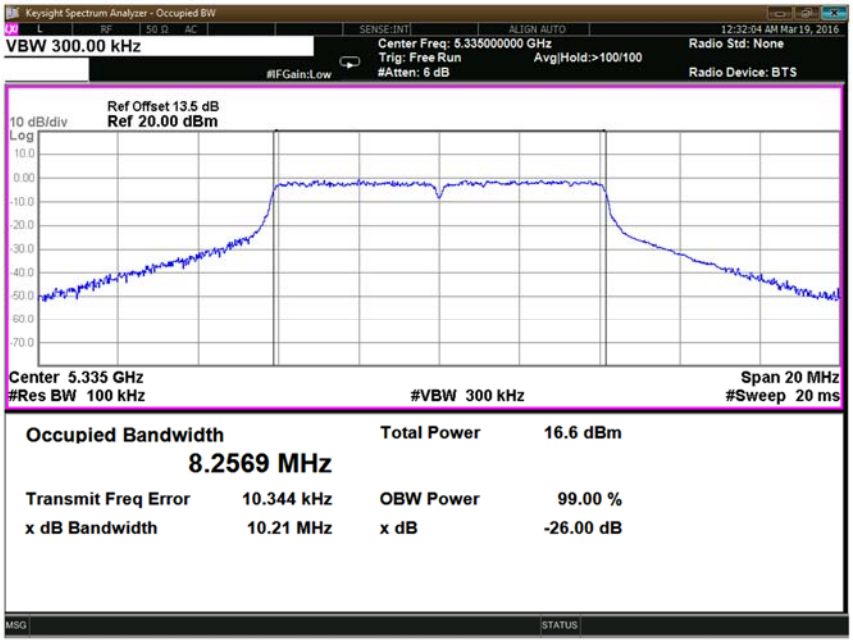

Figure 17: 10 MHz, 17 dBi, High channel: 26 dB bandwidth measured at Ch.1 - 5335 MHz

5.3.2.5 RESULT

The 26 dB Emission bandwidth is measured for all channels in both 40 MHz & 10 MHz modulation bandwidth. Refer below table for consolidated data.

Configuration	Modulation Bandwidth (MHz)	Antenna path	Channel Frequency (MHz)	Recorded value (MHz)
17 dBi	40	Ch. 0	5280	44.22
	40	Ch. 0	5300	44.6
	40	Ch. 0	5320	43.31
	40	Ch. 1	5280	44.45
	40	Ch. 1	5300	44.65
	40	Ch. 1	5320	43.31
	10	Ch. 0	5265	9.257
	10	Ch. 0	5300	10.25
	10	Ch. 0	5335	8.251
	10	Ch. 1	5265	9.173
	10	Ch. 1	5300	10.25
	10	Ch. 1	5335	8.256

Table 4: Result for 26 dB bandwidth in both 40 MHz and 10 MHz modulation bandwidth

5.3.3 99 % OCCUPIED CHANNEL BANDWIDTH

5.3.3.1 TEST SPECIFICATION

Test Standard	47 CFR Part 15 Subpart E Feb 2016
Test Procedure	789033 D2 General U-NII Test Procedures New Rule V01r01
Frequency Range	5250-5350 MHz
Resolution Bandwidth	1 MHz
Video Bandwidth	3 MHz
Sweep Time	Auto
Attenuation	Auto
Test Mode	Conducted
Detector	Peak
Input Voltage	120 V AC
Input Frequency	60 Hz
Temperature	23.0 °C
Humidity	55.0 %
Tested By	Suresh.G.N
Test Date	18th Mar 2016

5.3.3.2 LIMITS

Standard	Reference section	Frequency range	Limit
47 CFR Part 15 Subpart E Feb 2016	NA	5250 MHz - 5350 MHz	NA

5.3.3.3 TEST SETUP

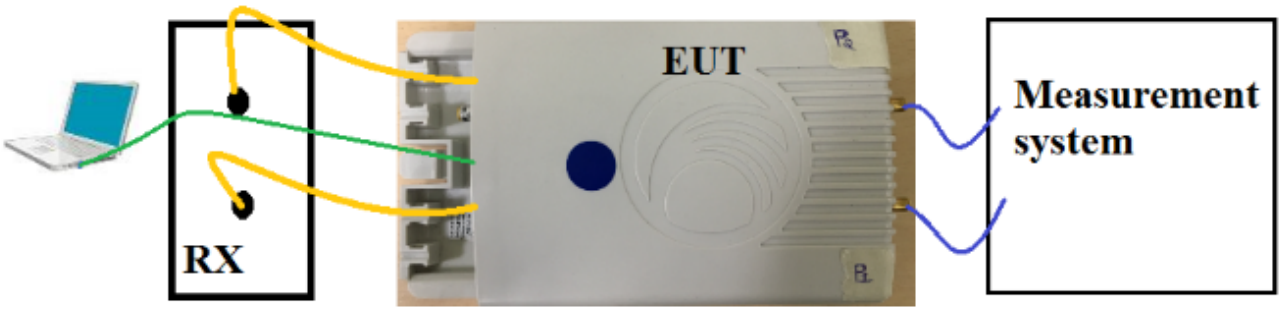

Figure 18 Typical test setup for Conducted RF Test

5.3.3.4 TEST PROCEDURE

The Conducted test was performed using the Spectrum analyzer. Measurements were done as per the **"789033 D2 General U-NII Test Procedures New Rule V01r01".** The RF output of the EUT was connected to the input port of Spectrum analyzer using an attenuator. The graph and data captured from spectrum analyzer and recorded.

5.3.3.5 MEASUREMENT GRAPHS / DATA

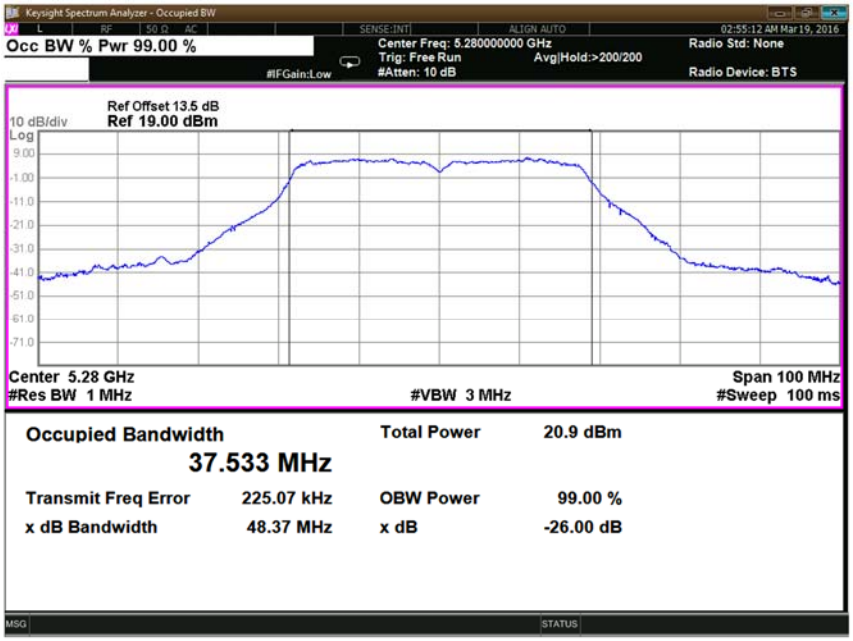

Figure 19: 40 MHz, 17 dBi, Low channel: 99% OBW measured at Ch.0 – 5280 MHz

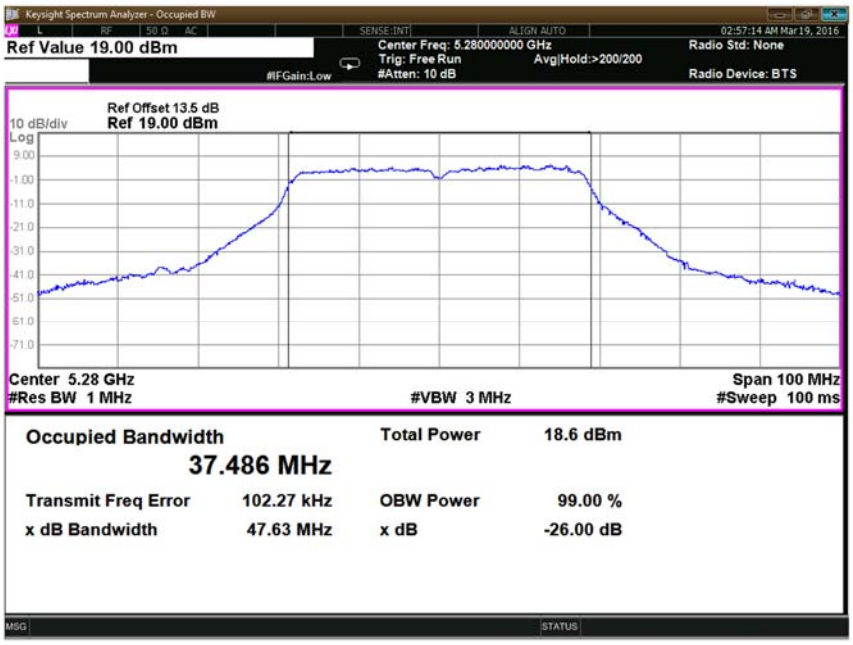

Figure 20: 40 MHz, 17 dBi, Low channel: 99% OBW measured at Ch.1 – 5280 MHz

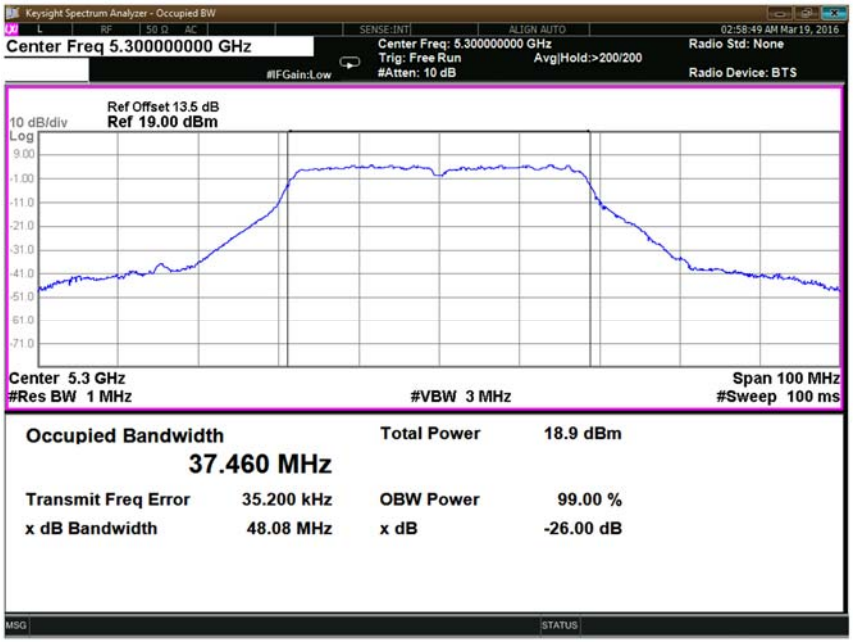

Figure 21: 40 MHz, 17 dBi, Mid channel: 99% OBW measured at Ch.0 – 5300 MHz

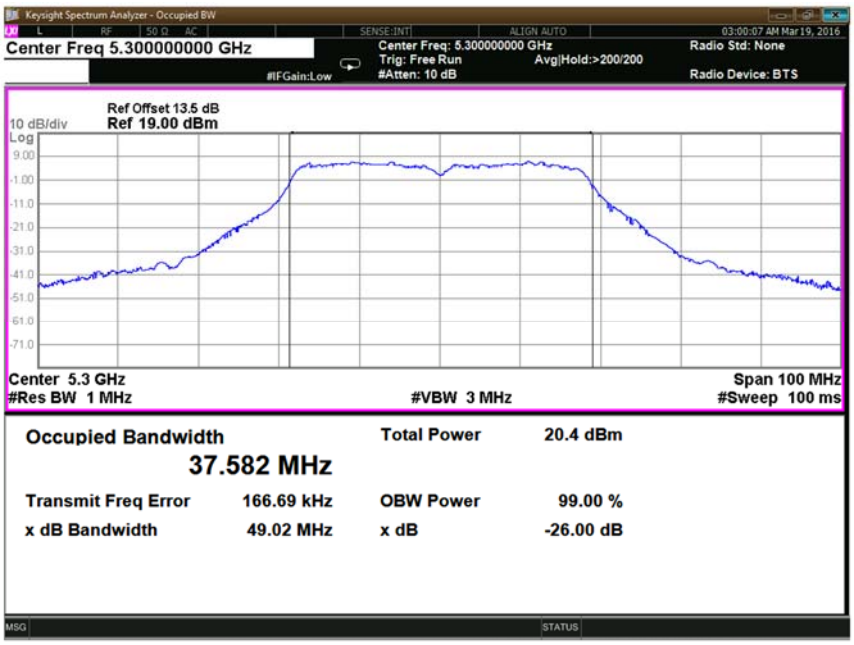

Figure 22: 40 MHz, 17 dBi, Mid channel: 99% OBW measured at Ch.1 – 5300 MHz

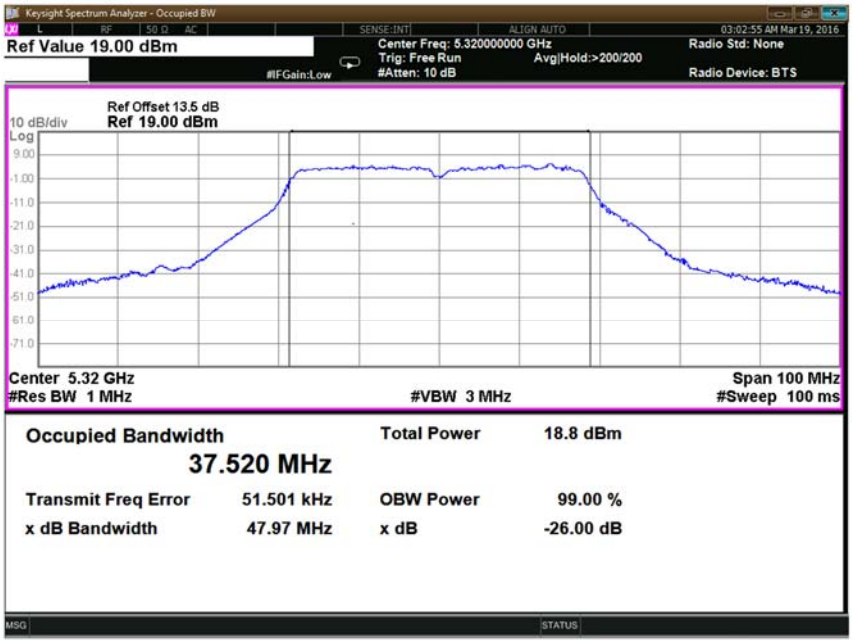

Figure 23: 40 MHz, 17 dBi, High channel: 99% OBW measured at Ch.0 – 5320 MHz

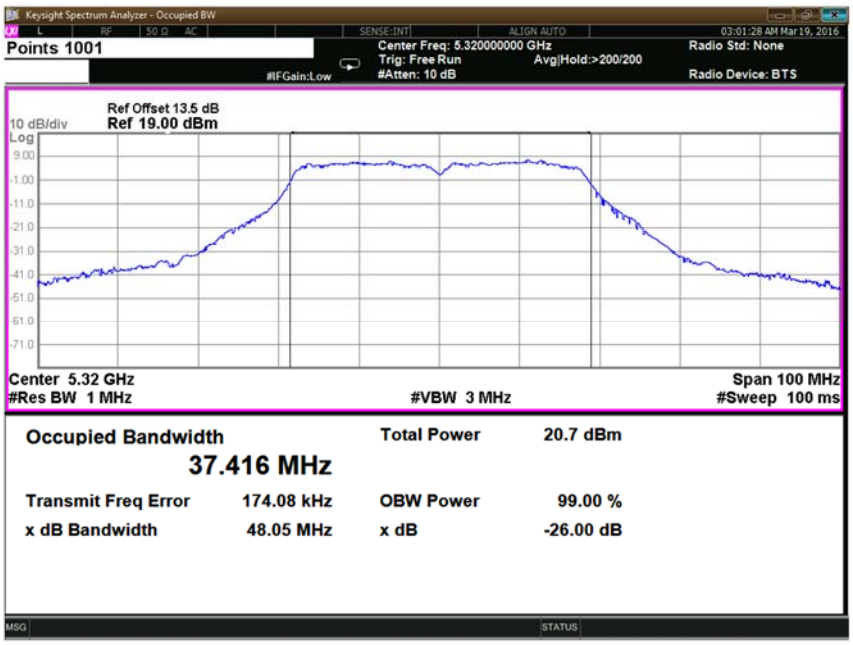

Figure 24: 40 MHz, 17 dBi, High channel: 99% OBW measured at Ch.1 – 5320 MHz

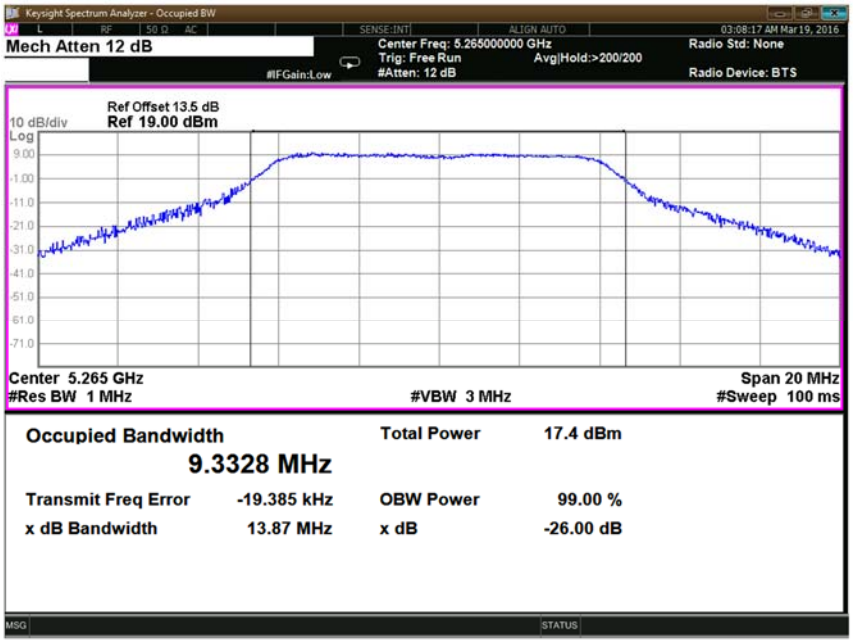

Figure 25: 10 MHz, 17 dBi, Low channel: 99% OBW measured at Ch.0 – 5265 MHz

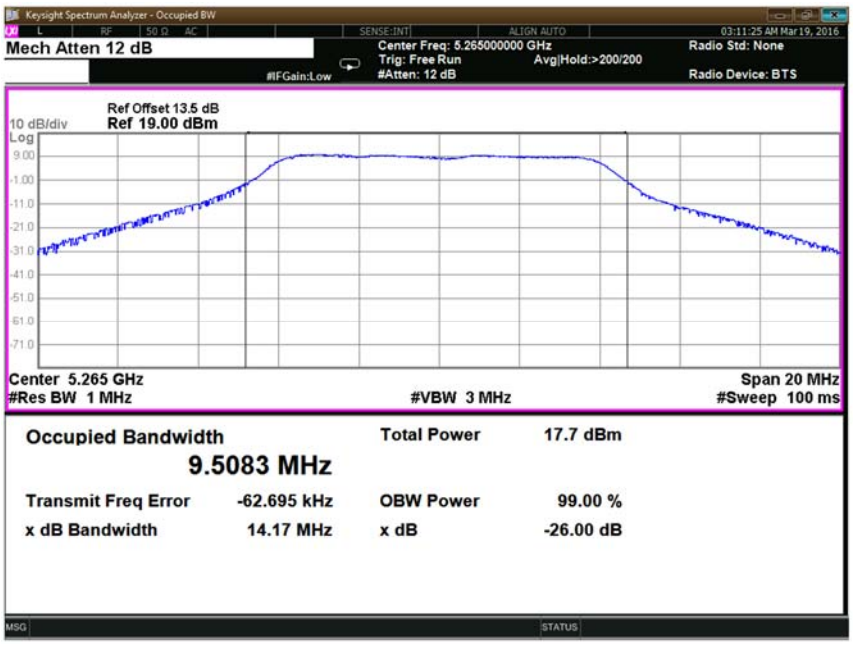

Figure 26: 10 MHz, 17 dBi, Low channel: 99% OBW measured at Ch.1 – 5265 MHz

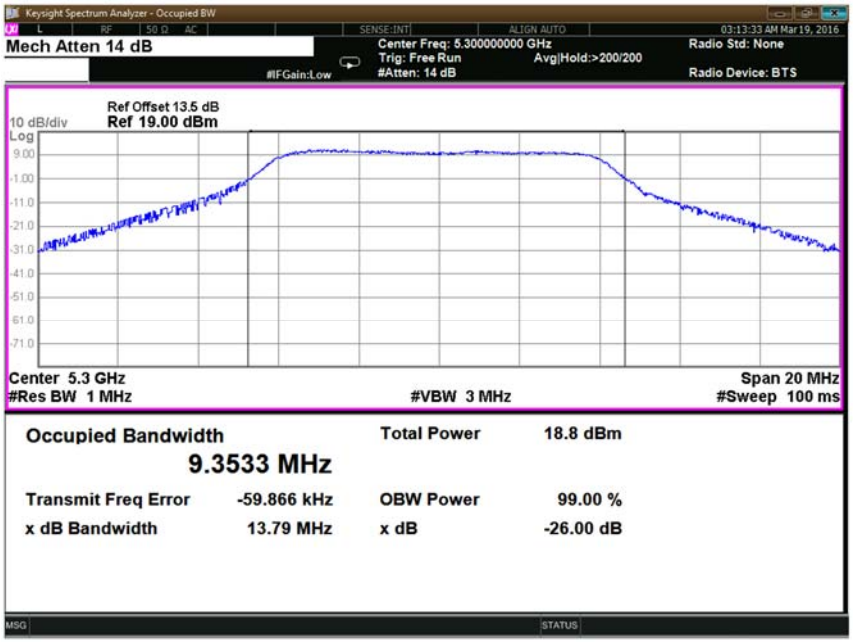

Figure 27: 10 MHz, 17 dBi, Mid channel: 99% OBW measured at Ch.0 – 5300 MHz

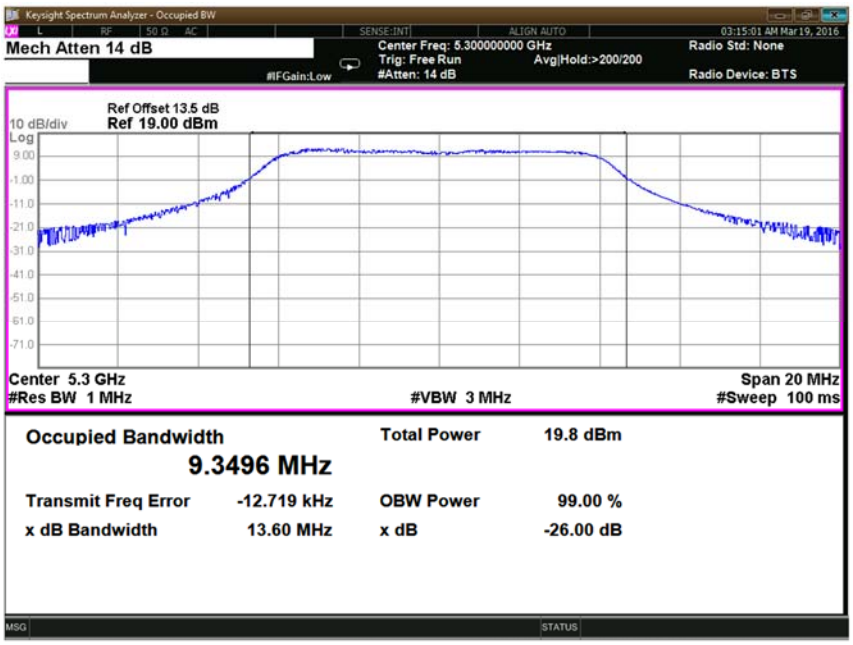

Figure 28: 10 MHz, 17 dBi, Mid channel: 99% OBW measured at Ch.1 – 5300 MHz

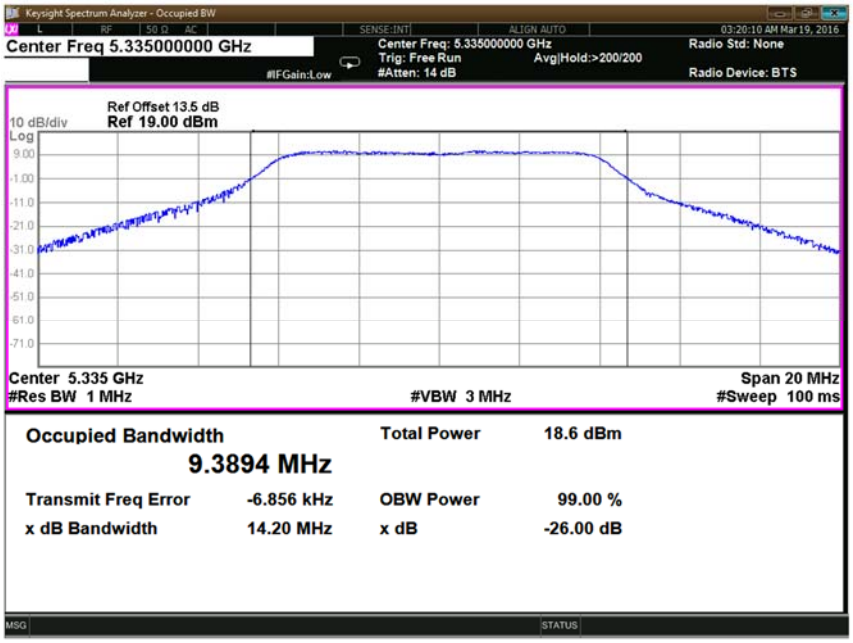

Figure 29: 10 MHz, 17 dBi, High channel: 99% OBW measured at Ch.0 – 5335 MHz

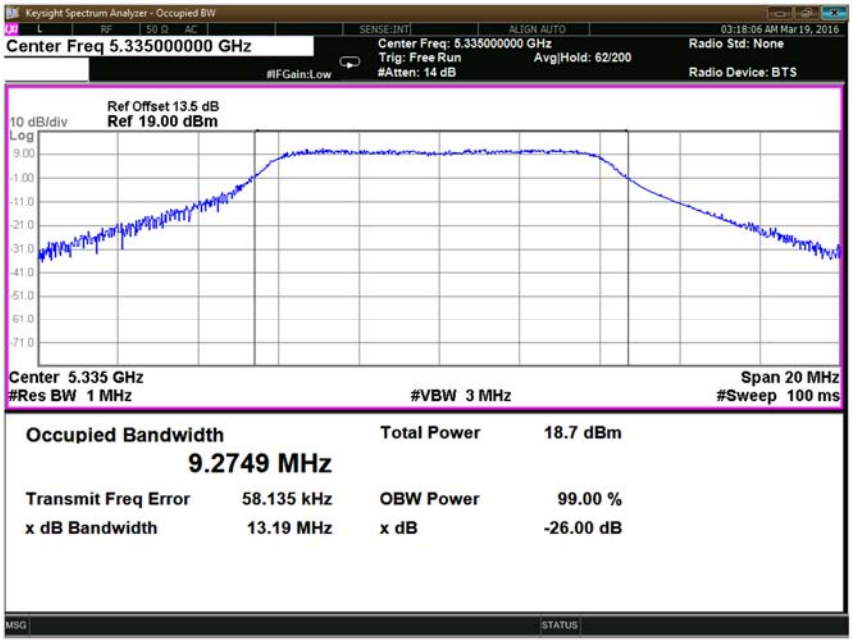

Figure 30: 10 MHz, 17 dBi, High channel: 99% OBW measured at Ch.1 – 5335 MHz

5.3.3.6 RESULT

The 99% Occupied Channel Bandwidth for all channels in both 40 MHz & 10 MHz Modulation Bandwidths has been measured and tabulated in below table.

Configuration	Modulation Bandwidth (MHz)	Antenna path	Channel Frequency (MHz)	Recorded value (MHz)
17 dBi Antenna Condition	40	Ch. 0	5280	37.533
	40	Ch. 0	5300	37.46
	40	Ch. 0	5320	37.52
	40	Ch. 1	5280	37.486
	40	Ch. 1	5300	37.582
	40	Ch. 1	5320	37.41
	10	Ch. 0	5265	9.3328
	10	Ch. 0	5300	9.3533
	10	Ch. 0	5335	9.3894
	10	Ch. 1	5265	9.5083
	10	Ch. 1	5300	9.3496
	10	Ch. 1	5335	9.2749

Table 5 Result for 99% Occupied bandwidth in both 40 MHz and 10 MHz modulation bandwidth

5.3.4 MAXIMUM CONDUCTED OUTPUT POWER

5.3.4.1 TEST SPECIFICATION

Test Standard	47 CFR Part 15 Subpart E Feb 2016
Test Procedure	789033 D2 General U-NII Test Procedures New Rule v01r01
Test Mode	Conducted
Frequency Range	5250-5350 MHz
Detector	Average
Input Voltage	120 V AC
Input Frequency	60 Hz
Temperature	23.0 °C
Humidity	55.0 %
Tested By	Suresh GN
Test Date	18th Mar 2016

5.3.4.2 LIMITS

Standard	Reference section	Frequency range	Limit
47 CFR Part 15 Subpart E Feb 2016	§15.407 (a) (2)	5250 MHz - 5350 MHz	max conducted Tx power ≤ 23.97 dBm (250 mW) max Limit (for 17 dBi antenna): ≤ 12.97 dBm

5.3.4.3 TEST SETUP

Figure 31: Typical test setup for Conducted RF Test

5.3.4.4 TEST PROCEDURE

The Conducted test was performed using the power meter. Measurements were done as per Section II E 3.b (Method PM-G) of KDB **"789033 DO2 General UNII Test Procedures New Rules v01r01".** The RF output of the EUT was connected to the input port of Power meter using an attenuator. The graph and data captured from power meter and compared with the limits specified in the standard.

5.3.4.5 MEASUREMENT GRAPHS / DATA

Figure 32: 40 MHz, 17 dBi, Low channel: Maximum conducted output power measured at Ch.0 & Ch.1 – 5280 MHz

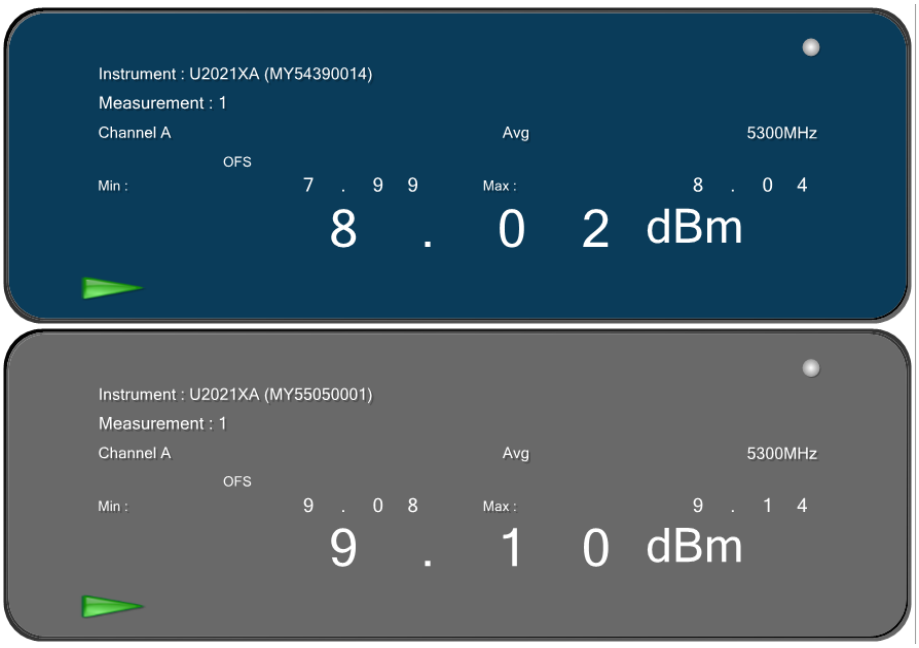

Figure 33: 40 MHz, 17 dBi, Mid channel: Maximum conducted output power measured at Ch.0 & Ch.1 – 5300 MHz

Figure 34: 40 MHz, 17 dBi, High channel: Maximum conducted output power measured at Ch.0 & Ch.1 – 5320 MHz

Figure 35: 10 MHz, 17 dBi, Low channel: Maximum conducted output power measured at Ch.0 & Ch.1 – 5265 MHz

Figure 36: 10 MHz, 17 dBi, Mid channel: Maximum conducted output power measured at Ch.0 & Ch.1 – 5300 MHz

Figure 37: 10 MHz, 17 dBi, High channel: Maximum conducted output power measured at Ch.0 & Ch.1 – 5335 MHz

5.3.4.6 RESULT

Maximum Conducted Output Power for all channels in both 40 MHz & 10 MHz modulation bandwidth is within the specified limits. Refer below table for consolidated data.

Modulation Bandwidth (MHz)	Antenna path	Channel Frequency (MHz)	Recorded value (dBm)
40	Ch. 0	5280	8.67
40	Ch. 1	5280	9.64
40	Ch. 0	5300	8.02
40	Ch. 1	5300	9.10
40	Ch. 0	5320	8.35
40	Ch. 1	5320	9.12
10	Ch. 0	5265	6.30
10	Ch. 1	5265	7.38
10	Ch. 0	5300	8.22
10	Ch. 1	5300	8.67
10	Ch. 0	5335	7.85
10	Ch. 1	5335	8.62

Table 6: Maximum conducted output power for 17 dBi configuration

Modulation Bandwidth (MHz)	Antenna path	Channel Frequency (MHz)	Consolidated Power (dBm)	Limit (dBm)	Result
40	Ch. 0 & Ch. 1	5280	12.20	12.97	PASS
40	Ch. 0 & Ch. 1	5300	11.58	12.97	PASS
40	Ch. 0 & Ch. 1	5320	11.76	12.97	PASS
10	Ch. 0 & Ch. 1	5265	9.912	12.97	PASS
10	Ch. 0 & Ch. 1	5300	11.46	12.97	PASS
10	Ch. 0 & Ch. 1	5335	11.27	12.97	PASS

Table 7: Consolidated values across channels and final power for 17 dBi configuration

The recorded power in dBm was converted into Watt, and then added and convert the result back to dBm
*dBm to mW =log(mW)*10*
mW to dBm = 10^(dBm/10)

5.3.5 POWER SPECTRAL DENSITY

5.3.5.1 TEST SPECIFICATION

Test Standard	47 CFR, Part 15, Subpart E Feb 2016
Test Procedure	789033 D2 General U-NII Test Procedures New Rule V01r01
Frequency Range	5250-5350 MHz
Resolution Bandwidth	1 MHz
Video Bandwidth	3 MHz
Sweep Time	1 ms
Attenuation	Auto
Test Mode	Conducted
Detector	Average
Input Voltage	120 V AC
Input Frequency	60 Hz
Temperature	23.0 °C
Humidity	54.0 %
Tested By	Suresh.G.N
Test Date	25th Apr 2016

5.3.5.2 LIMITS

Standard	Reference section	Frequency range	Limit
47 CFR Part 15 Subpart E Feb 2016	§15.407 (a) (2)	5250 MHz - 5350 MHz	≤ 11 dBm in any 1MHz band Limit (for 17 dBi antenna configuration) : ≤ 0 dBm

5.3.5.3 TEST SETUP

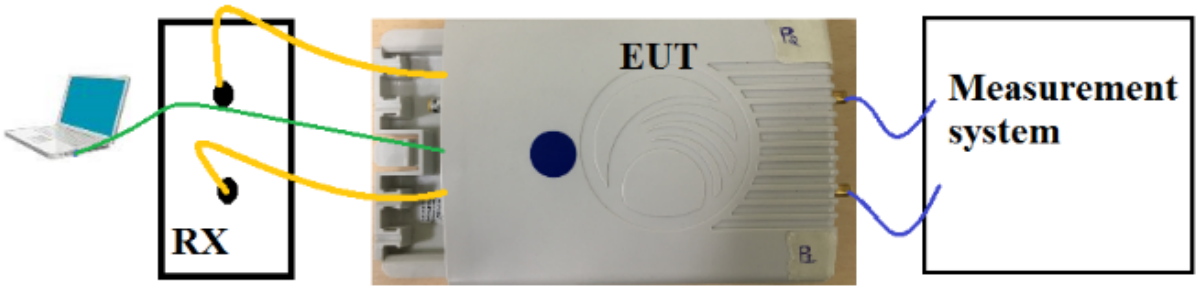

Figure 38: Typical test setup for Conducted Test

5.3.5.4 TEST PROCEDURE

The Conducted test was performed using the Spectrum analyzer. Measurements were done as per Section II F (PSD) of KDB **'789033 D02 General UNII Test Procedures New Rules v01r01".** The RF output of the EUT was connected to the input port of Spectrum analyzer using an attenuator. The graph and data captured from spectrum analyzer and compared with the limits specified in the standard.

5.3.5.5 MEASUREMENT GRAPHS / DATA

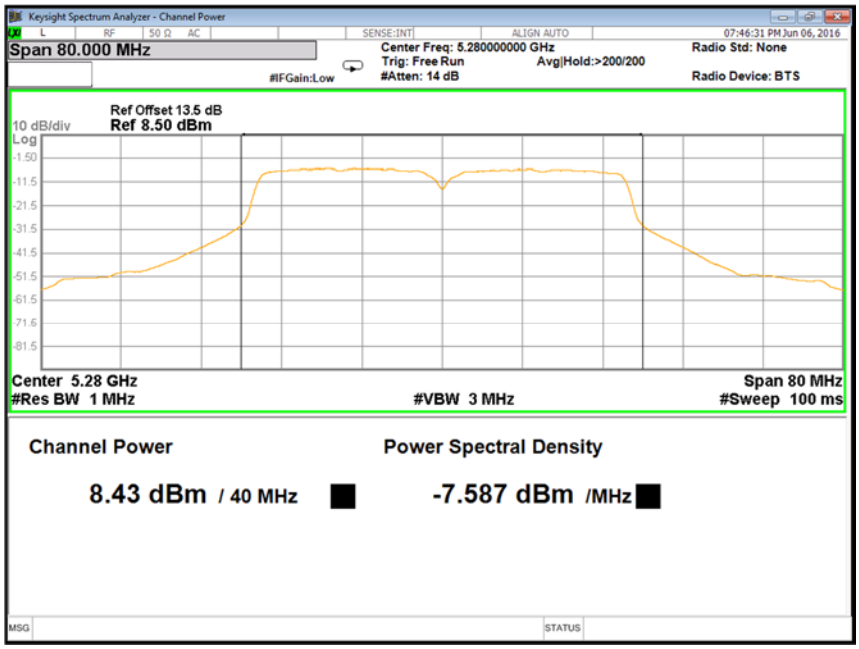

Figure 39: 40 MHz, 17 dBi, Low channel: Power spectral density measured at Ch. 0 – 5280 MHz

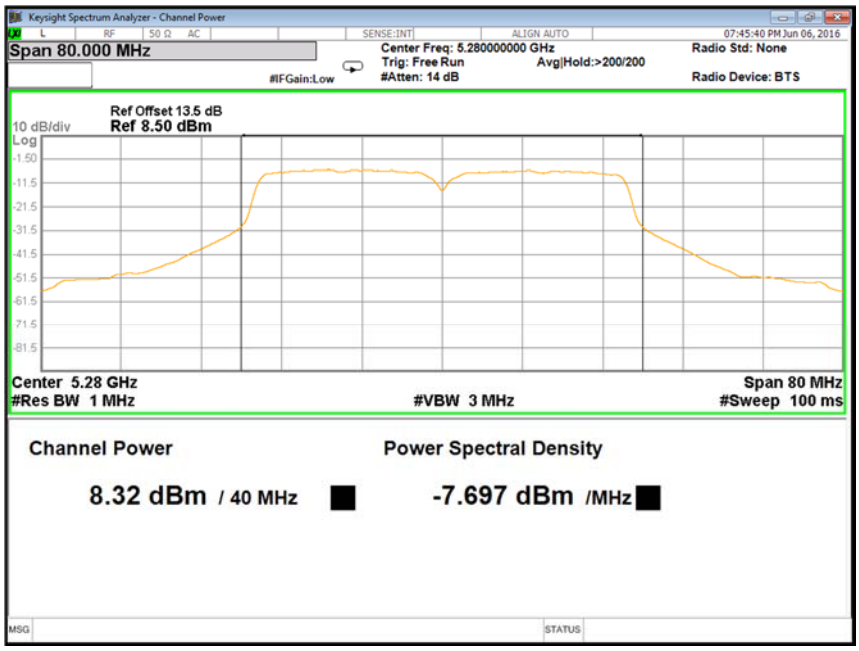

Figure 40: 40 MHz, 17 dBi, Low channel: Power spectral density measured at Ch. 1 – 5280 MHz

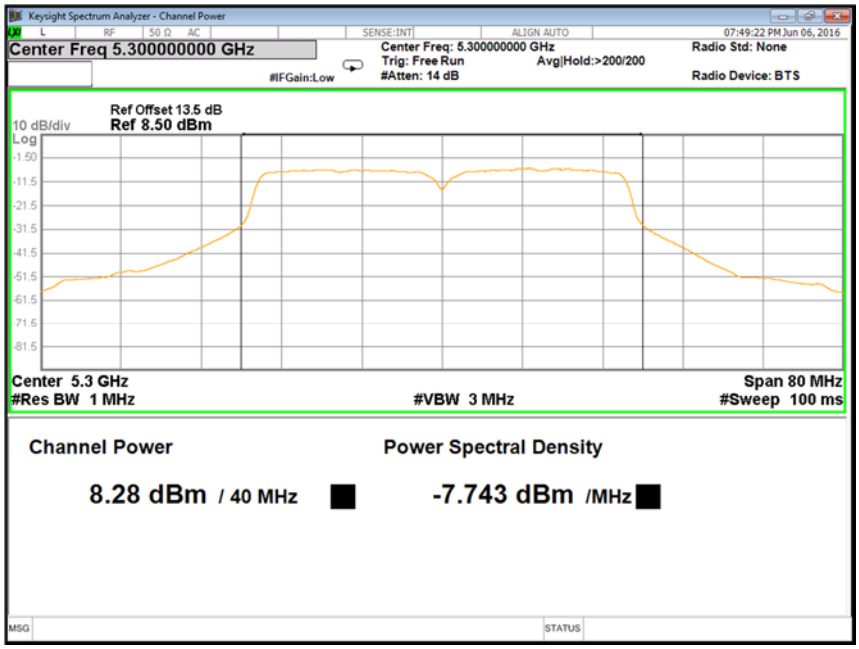

Figure 41: 40 MHz, 17 dBi, Mid channel: Power spectral density measured at Ch. 0 – 5300 MHz

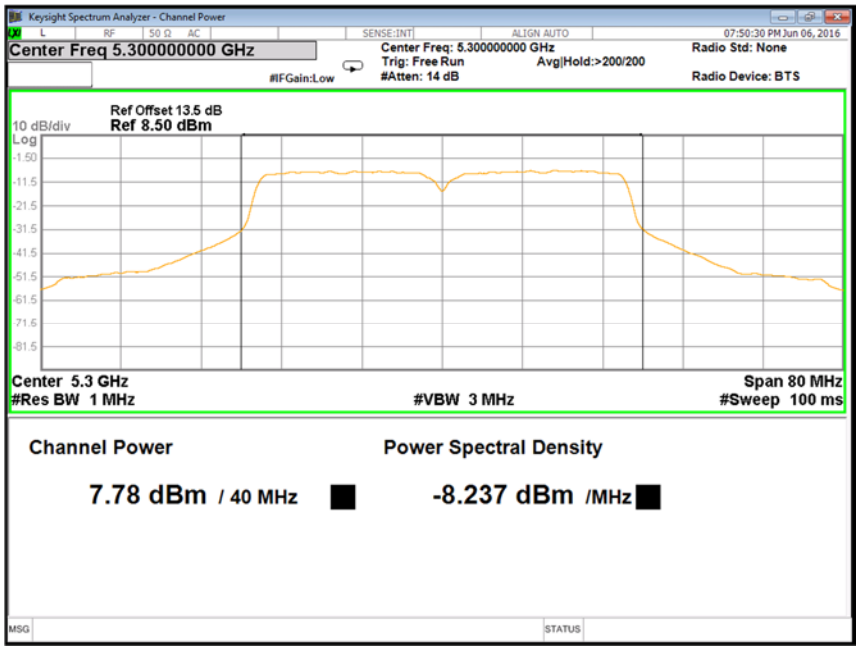

Figure 42: 40 MHz, 17 dBi, Mid channel: Power spectral density measured at Ch. 1 – 5300 MHz

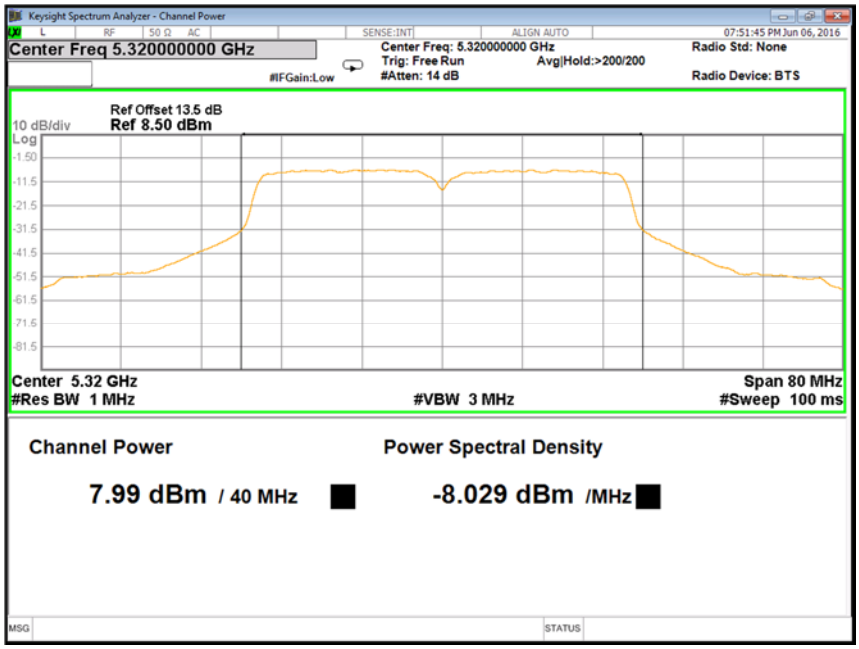

Figure 43: 40 MHz, 17 dBi, High channel: Power spectral density measured at Ch. 0 – 5320 MHz

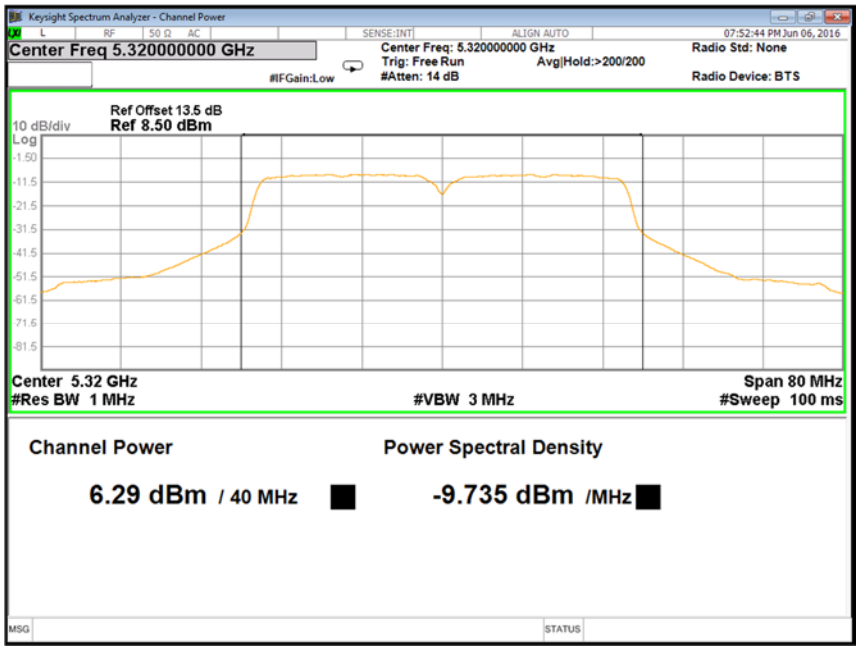

Figure 44: 40 MHz, 17 dBi, High channel: Power spectral density measured at Ch. 1 – 5320 MHz

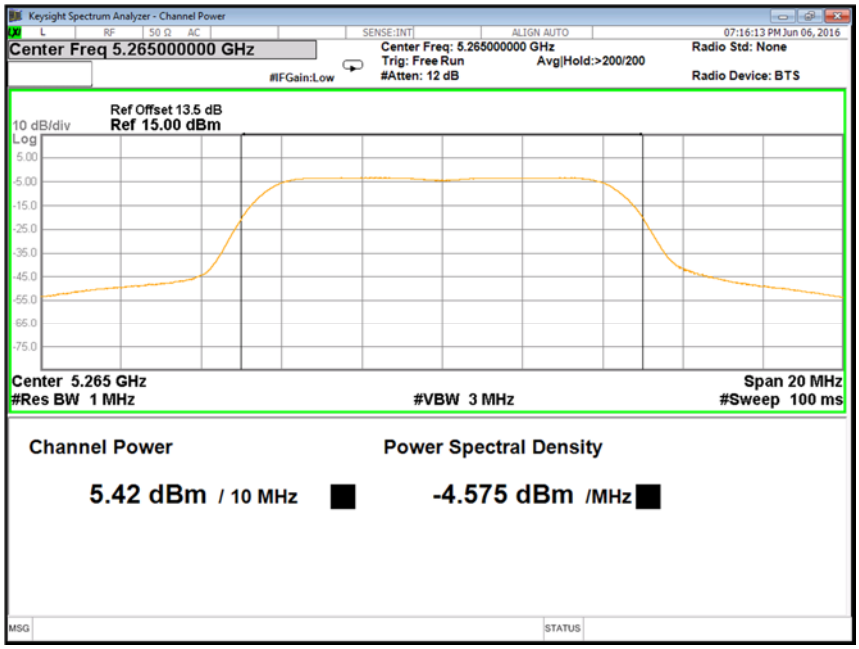

Figure 45: 10 MHz, 17 dBi, Low channel: Power spectral density measured at Ch. 0 – 5265 MHz

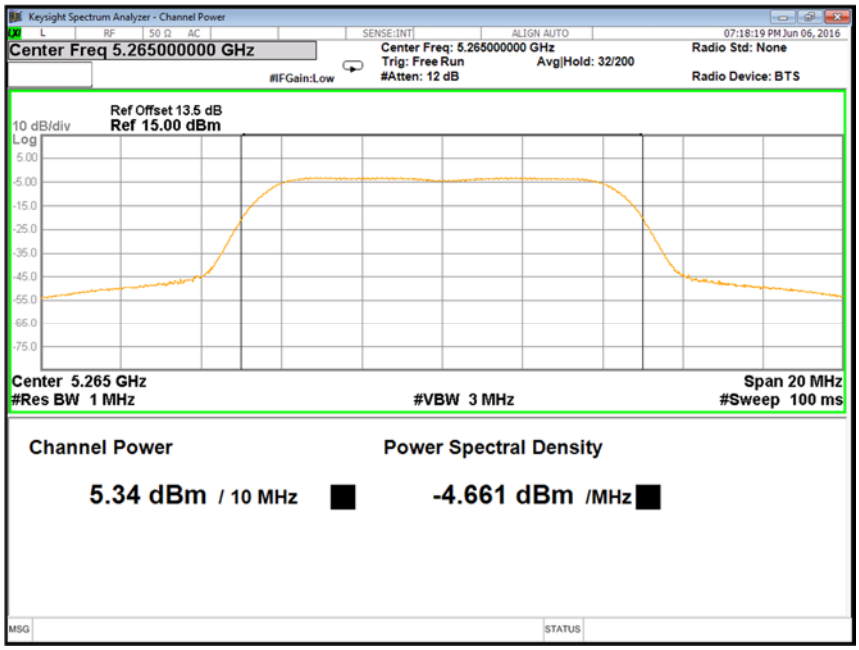

Figure 46: 10 MHz, 17 dBi, Low channel: Power spectral density measured at Ch. 1 – 5265 MHz

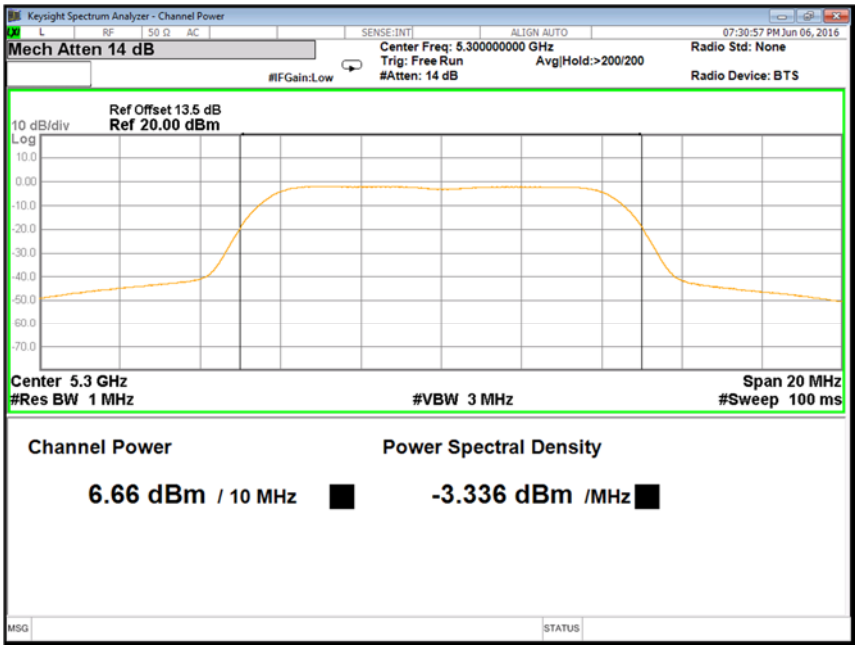

Figure 47: 10 MHz, 17 dBi, Mid channel: Power spectral density measured at Ch. 0– 5300 MHz

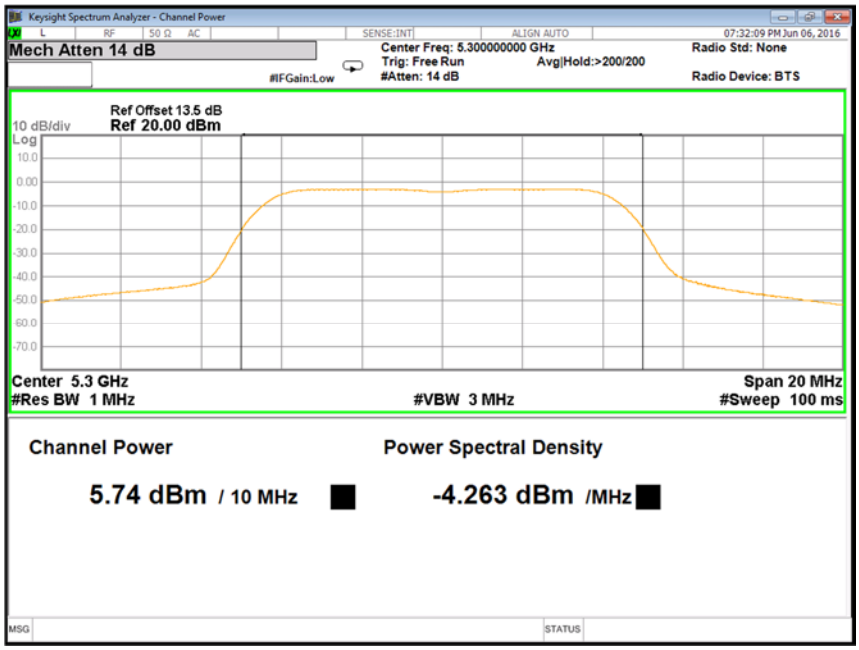

Figure 48: 10 MHz, 17 dBi, Mid channel: Power spectral density measured at Ch. 1 – 5300 MHz

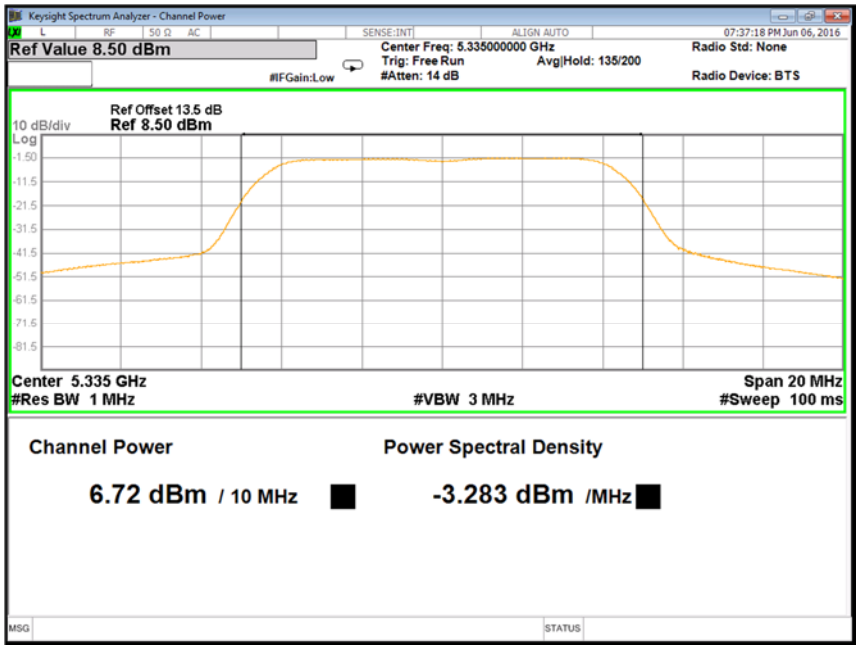

Figure 49: 10 MHz, 17 dBi, High channel: Power spectral density measured at Ch. 0 – 5335 MHz

Figure 50: 10 MHz, 17 dBi, High channel: Power spectral density measured at Ch. 1 – 5335 MHz

5.3.5.6 RESULT

Power Spectral Density for all channels in both 40 MHz & 10 MHz Modulation Bandwidths is within the Specified limit. Refer below table for consolidated result.

Modulation Bandwidth (MHz)	Antenna path	Channel Frequency (MHz)	Recorded value (dBm/MHz)	Limit (dBm/MHz)	Result
40	Ch. 0	5280	-7.587	-3	Pass
40	Ch. 0	5300	-7.743	-3	Pass
40	Ch. 0	5320	-8.029	-3	Pass
40	Ch. 1	5280	-7.697	-3	Pass
40	Ch. 1	5300	-8.237	-3	Pass
40	Ch. 1	5320	-9.735	-3	Pass
10	Ch. 0	5265	-4.575	-3	Pass
10	Ch. 0	5300	-3.336	-3	Pass
10	Ch. 0	5335	-3.283	-3	Pass
10	Ch. 1	5265	-4.661	-3	Pass
10	Ch. 1	5300	-4.263	-3	Pass
10	Ch. 1	5335	-3.515	-3	Pass

Table 8: Result of PSD for 17 dBi configuration for both 40 MHz and 10 MHz modulation bandwidth

5.3.6 TRANSMITTER UNWANTED EMISSIONS (CONDUCTED)

5.3.6.1 TEST SPECIFICATION

Test Standard	47 CFR, Part 15, Subpart E Feb 2016			
Test Procedure	ANSI C63.10-2013			
Frequency Range	9 kHz - 150 kHz	150 kHz - 30 MHz	30 MHz - 1 GHz	1 GHz – 40 GHz
Resolution Bandwidth	200 Hz	9 kHz	120 kHz	1 MHz
Video Bandwidth	1 kHz	30 kHz	300 kHz	3 MHz
Sweep Time	Auto	Auto	Auto	Auto
Detector	Peak	Peak	Peak	Peak & Average
Attenuation	Auto			
Test Mode	Conducted			
Input Voltage	120 V AC			
Input Frequency	60 Hz			
Temperature	23.0 °C			
Humidity	54.0 %			
Tested By	Suresh .G.N			
Test Date	26th Apr 2016			

5.3.6.2 LIMITS

Standard	Reference section	Frequency range	Limit EIRP (dBm/MHz)
47 CFR, Part 15 Feb 2016	§15.407 b (2)	Outside 5250 - 5350 MHz	-27

Table 9: Tx Unwanted emission Limit

Standard	Reference section	Frequency range	Limit (dBµV/m)
47 CFR, Part 15 Feb 2016	§15.209	9 kHz - 490 kHz 490 kHz - 1.705 MHz 1.705 MHz - 30 MHz	128.5194 - 93.8003* 73.8003 - 62.9697* 69.5429

Table 10: General Field strength limit below 30 MHz

*Note: * Decreases with the logarithm of the frequency*

Standard	Reference section	Frequency range	Limit (dBµV/m) as per Section 5.209
47 CFR, Part 15 Feb 2016	§15.209	30 MHz - 88 MHz 88 MHz - 216 MHz 216 MHz - 960 MHz 960 MHz - 40 GHz	40 43.52 46.02 53.98

Table 11: General Field strength limit above 30 MHz

Above table specifies limit with Average detector above 1 GHz. 73.98 dBµV/m is considered as the limit when Peak detector is employed for the measurements above 1 GHz.

5.3.6.3 TEST SETUP

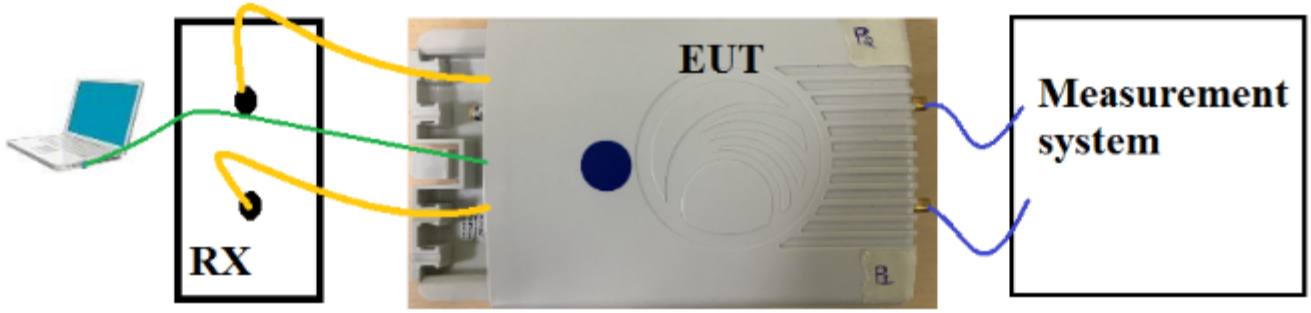

Figure 51: Typical test setup for Conducted Test

5.3.6.4 TEST PROCEDURE

The Conducted test was performed using the Spectrum analyzer/EMI receiver. Measurements were done as per Section II G.0 of KDB **"789033 DO2 General UNII Test Procedure New Rules v01r01".** The RF output of the EUT was connected to the input port of Spectrum analyzer/EMI receiver using an attenuator. The graph and data captured from spectrum analyzer and performed required calculations to attain the Electric Field value and compared with the limits specified in the standard.

In the frequency range 9 kHz to 1 GHz, the measurement was performed with peak detector. In the frequency range 1 GHz to 40 GHz, measurement was performed employing both peak & average detector as specified in the standard. Detectors were selected based on FCC KDB document.

Peak search option was used to capture the frequency with maximum amplitude in the respective bands and final calculations have been performed on these frequencies to show compliance with the limits specified.

5.3.6.5 MEASUREMENT GRAPHS / DATA

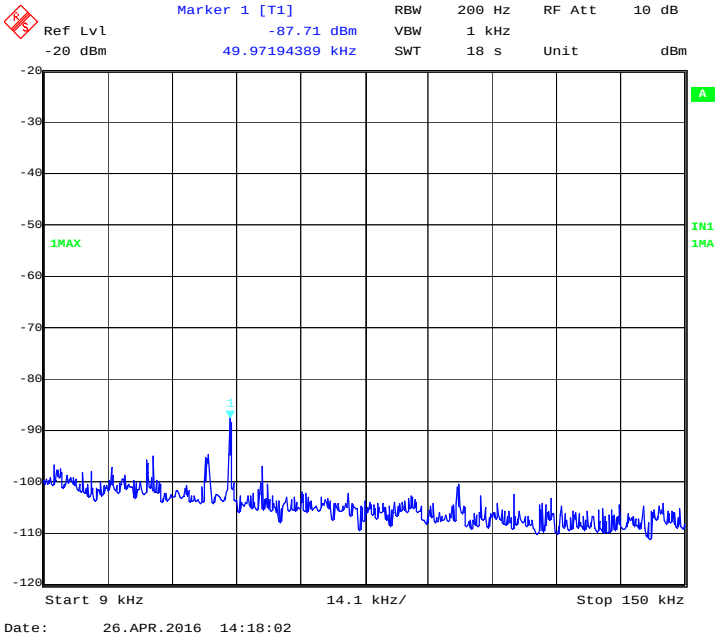

Figure 52: 40 MHz, 17 dBi, Low channel: Peak emission from 9 kHz to 150 kHz at Ch. 0 – 5280 MHz

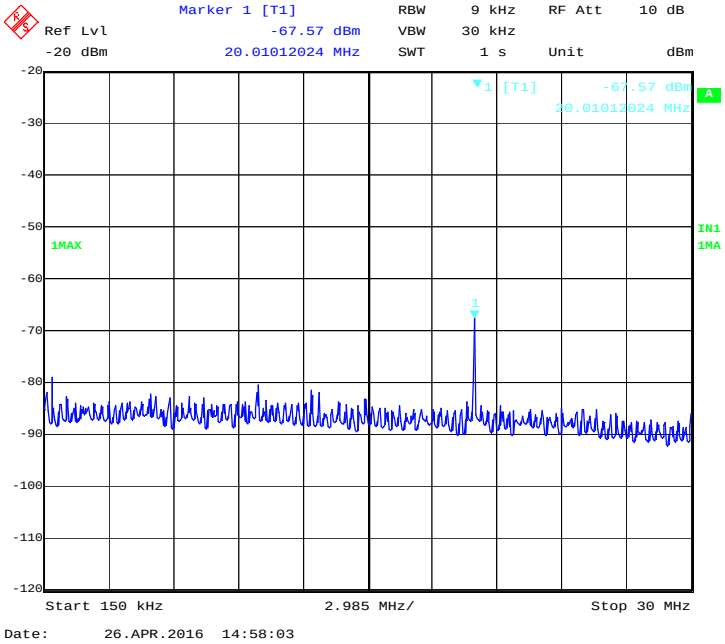

Figure 53: 40 MHz, 17 dBi, Low channel: Peak emission from 150 kHz to 30 MHz at Ch. 0 –5280 MHz

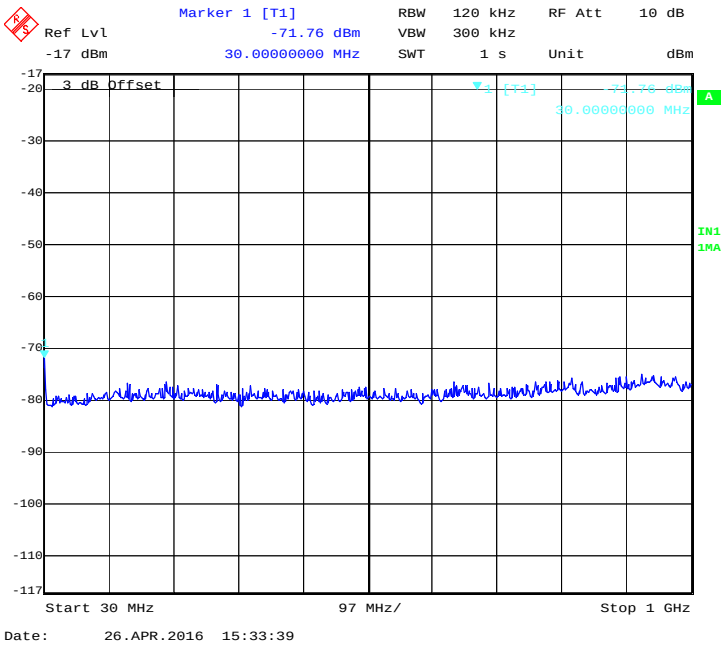

Figure 54: 40 MHz, 17 dBi, Low channel: Peak emission from 30 MHz to 1 GHz at Ch. 0 –5280 MHz

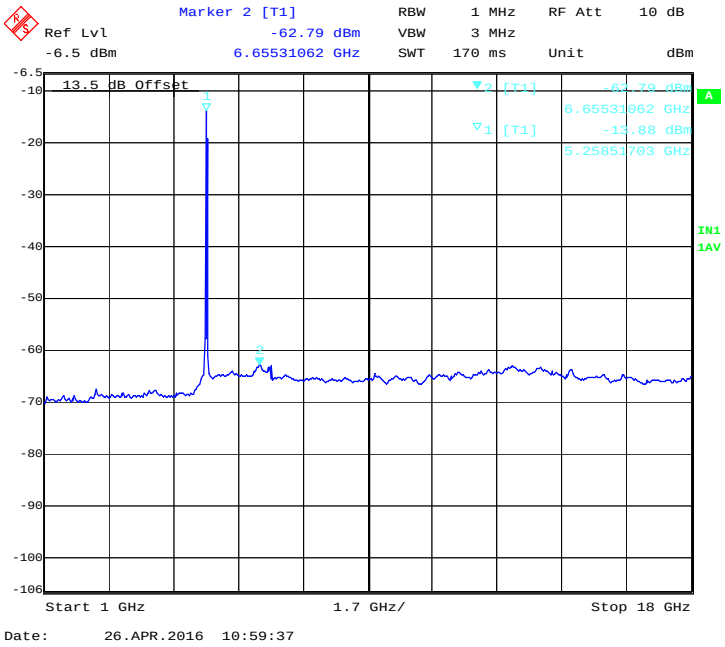

Figure 55: 40 MHz, 17 dBi, Low channel: Average emission from 1 GHz to 18 GHz at Ch. 0 –5280 MHz

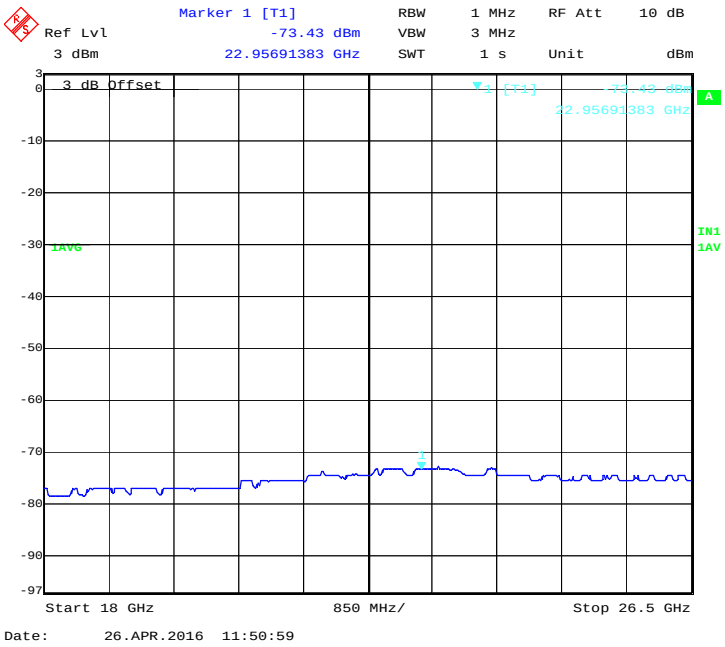

Figure 56: 40 MHz, 17 dBi, Low channel: Average emission from 18 GHz to 26.5 GHz at Ch. 0 –5280 MHz

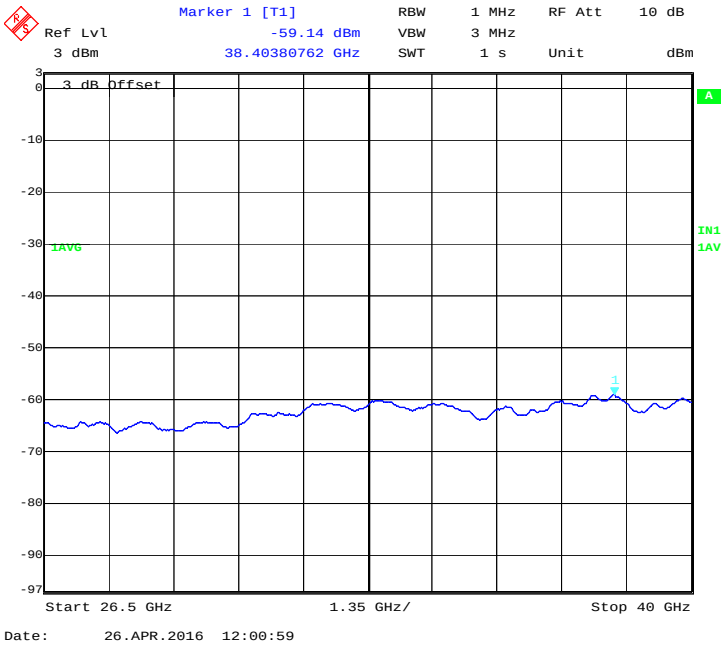

Figure 57: 40 MHz, 17 dBi, Low channel: Average emission from 26.5 GHz to 40 GHz at Ch. 0 –5280 MHz

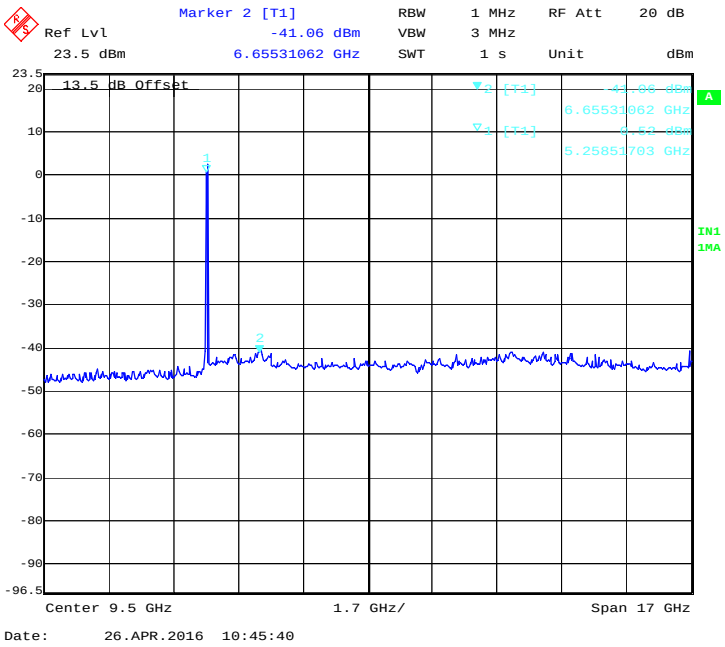

Figure 58: 40 MHz, 17 dBi, Low channel: Peak emission from 1 GHz to 18 GHz at Ch. 0 –5280 MHz

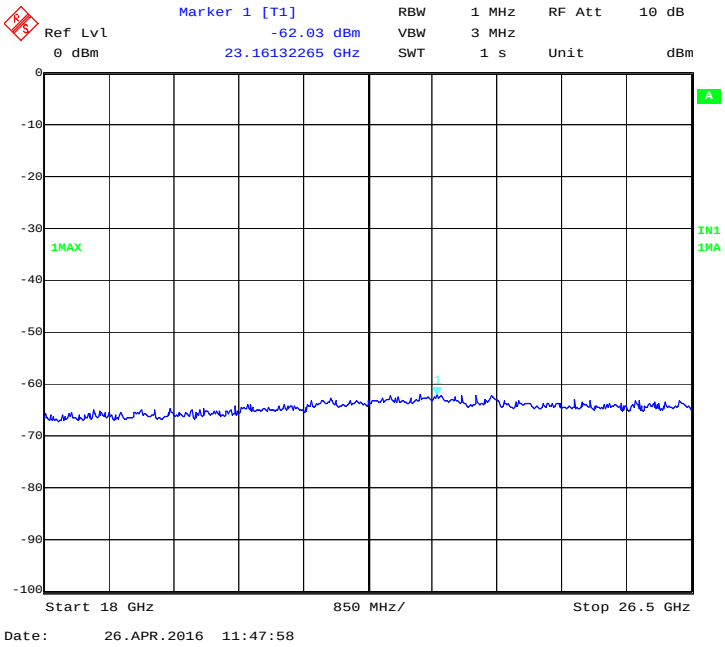

Figure 59: 40 MHz, 17 dBi, Low channel: Peak emission from 18 GHz to 26.5 GHz at Ch. 0 –5280 MHz

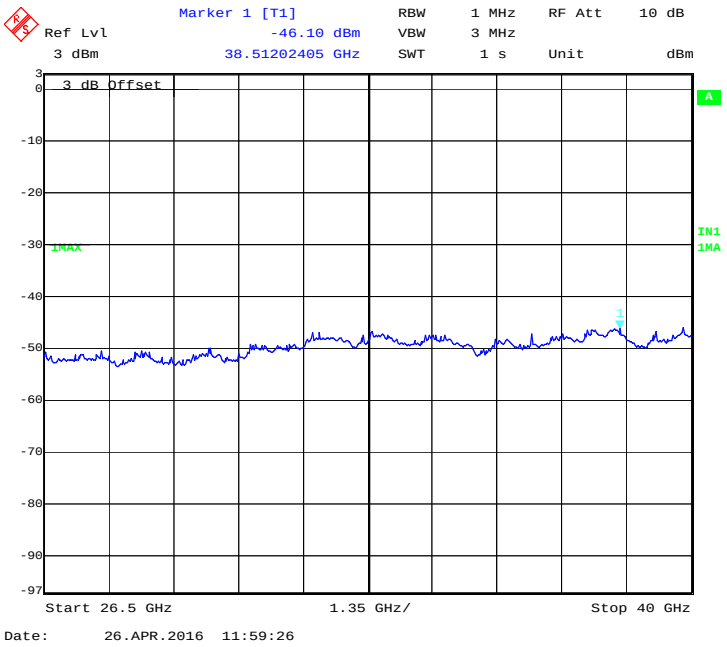

Figure 60: 40 MHz, 17 dBi, Low channel: Peak emission from 26.5 GHz to 40 GHz at Ch. 0 –5280 MHz

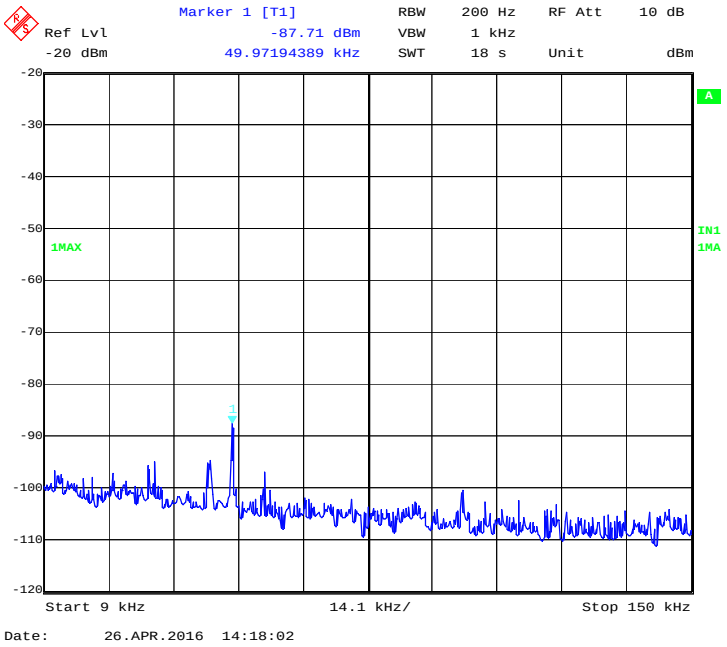

Figure 61: 40 MHz, 17 dBi, Low channel: Peak emission from 9 kHz to 150 kHz at Ch. 1 –5280 MHz

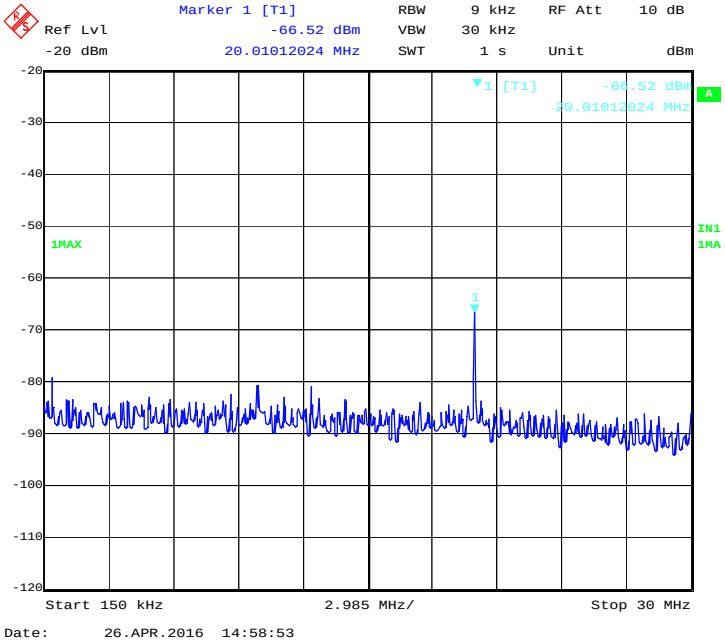

Figure 62: 40 MHz, 17 dBi, Low channel: Peak emission from 150 kHz to 30 MHz at Ch. 1 –5280 MHz

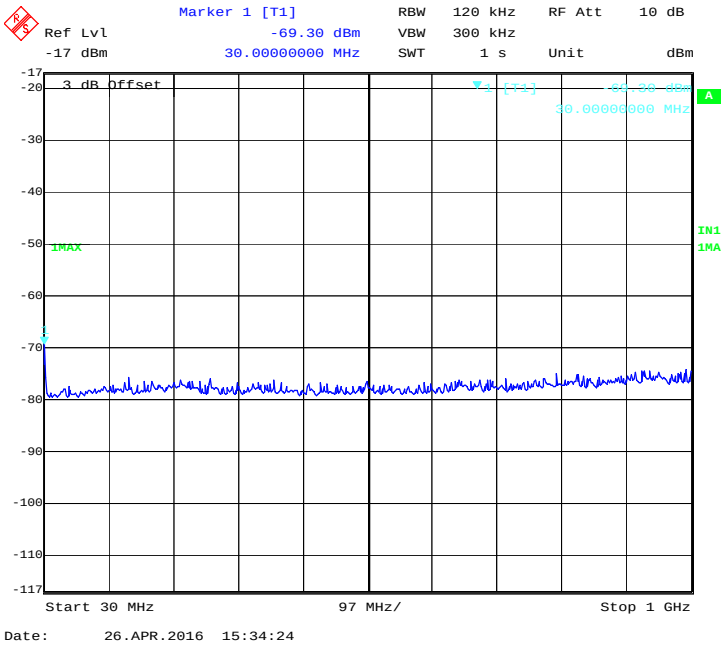

Figure 63: 40 MHz, 17 dBi, Low channel: Peak emission from 30 MHz to 1 GHz at Ch. 1 –5280 MHz

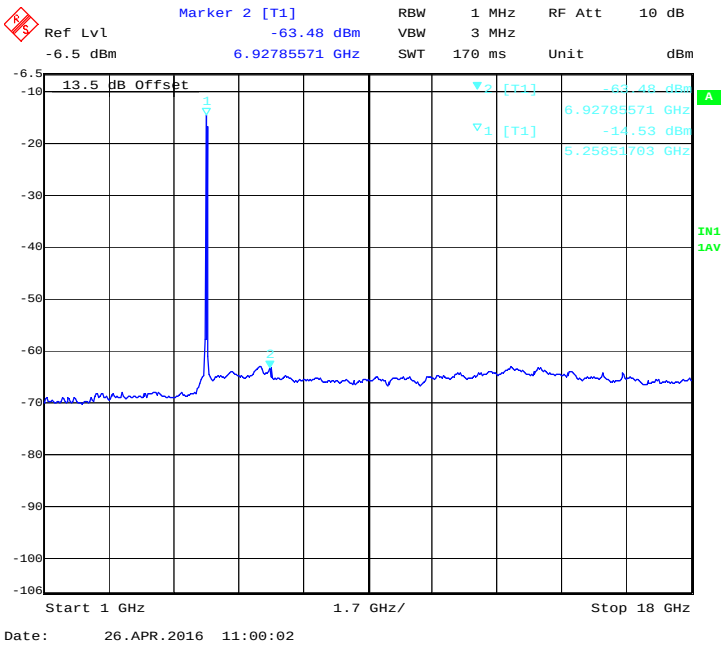

Figure 64: 40 MHz, 17 dBi, Low channel: Average emission from 1 GHz to 18 GHz at Ch. 1 –5280 MHz

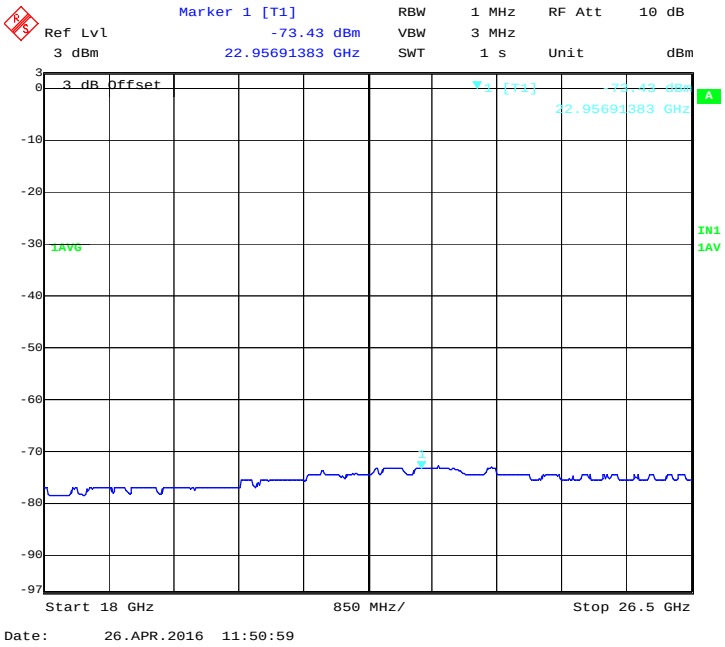

Figure 65: 40 MHz, 17 dBi, Low channel: Average emission from 18 GHz to 26.5 GHz at Ch. 1 –5280 MHz

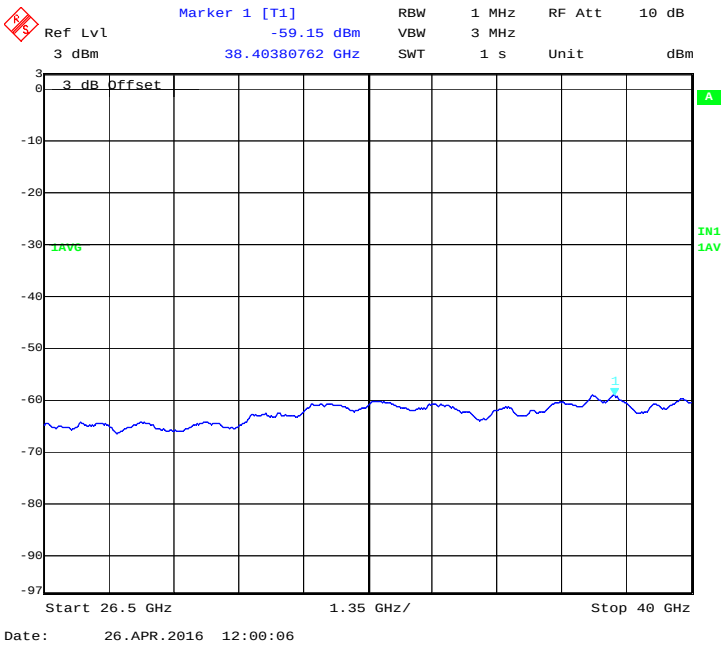

Figure 66: 40 MHz, 17 dBi, Low channel: Average emission from 26.5 GHz to 40 GHz at Ch. 1 –5280 MHz

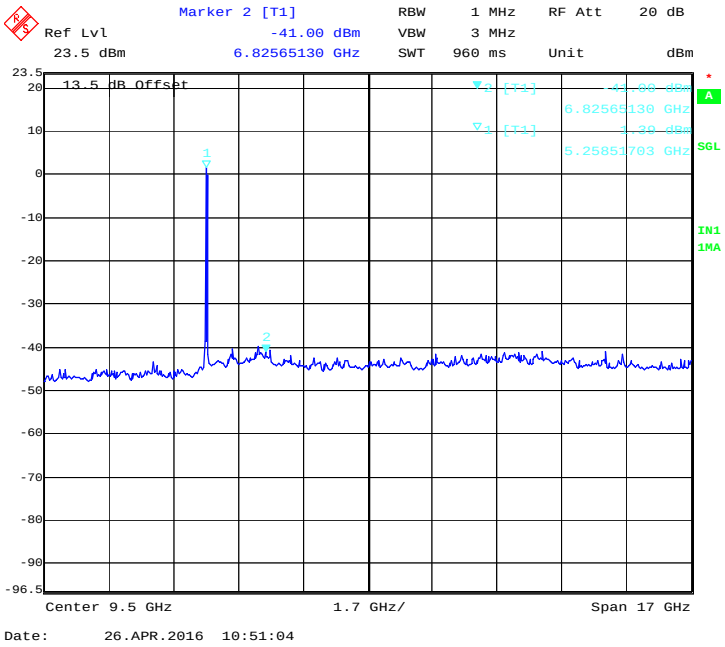

Figure 67: 40 MHz, 17 dBi, Low channel: Peak emission from 1 GHz to 18 GHz at Ch. 1 –5280 MHz

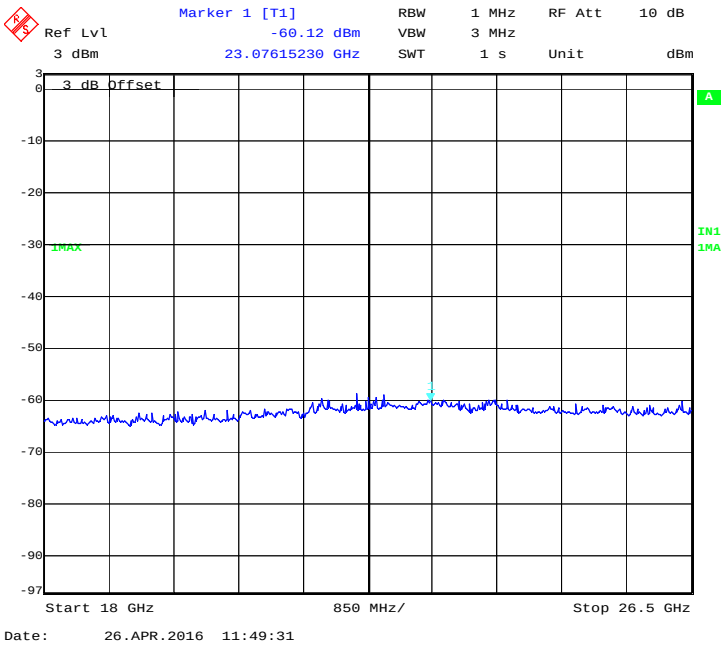

Figure 68: 40 MHz, 17 dBi, Low channel: Peak emission from 18 GHz to 26.5 GHz at Ch. 1 –5280 MHz

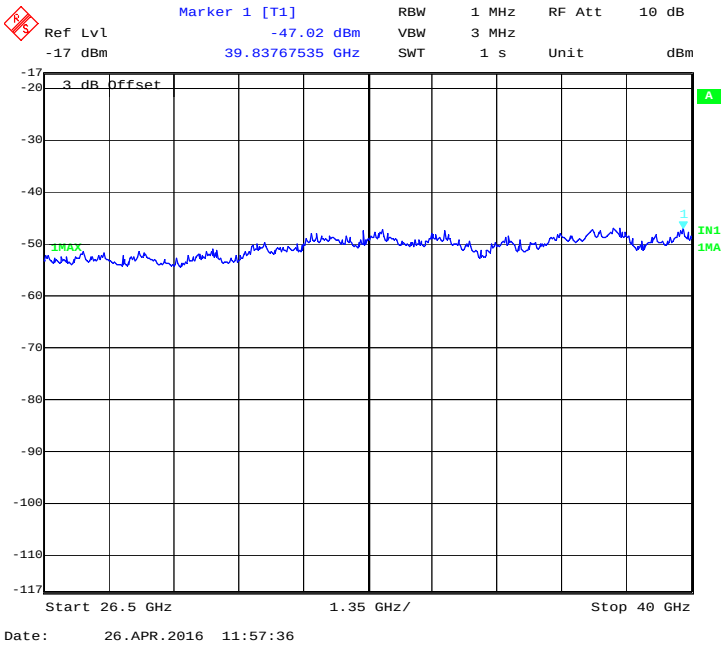

Figure 69: 40 MHz, 17 dBi, Low channel: Peak emission from 26.5 GHz to 40 GHz at Ch. 1 –5280 MHz

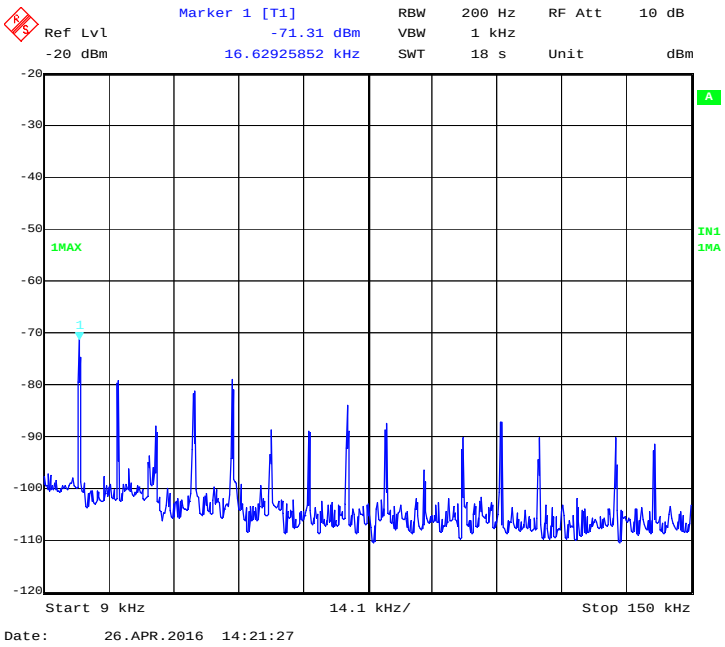

Figure 70: 40 MHz, 17 dBi, Mid channel: Peak emission from 9 kHz to 150 kHz at Ch. 0 –5300 MHz

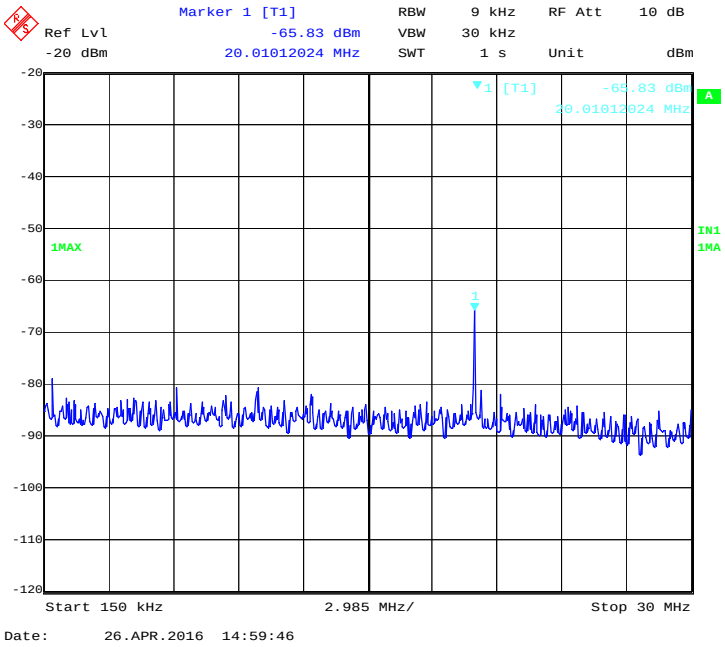

Figure 71: 40 MHz, 17 dBi, Mid channel: Peak emission from 150 kHz to 30 MHz at Ch. 0 –5300 MHz

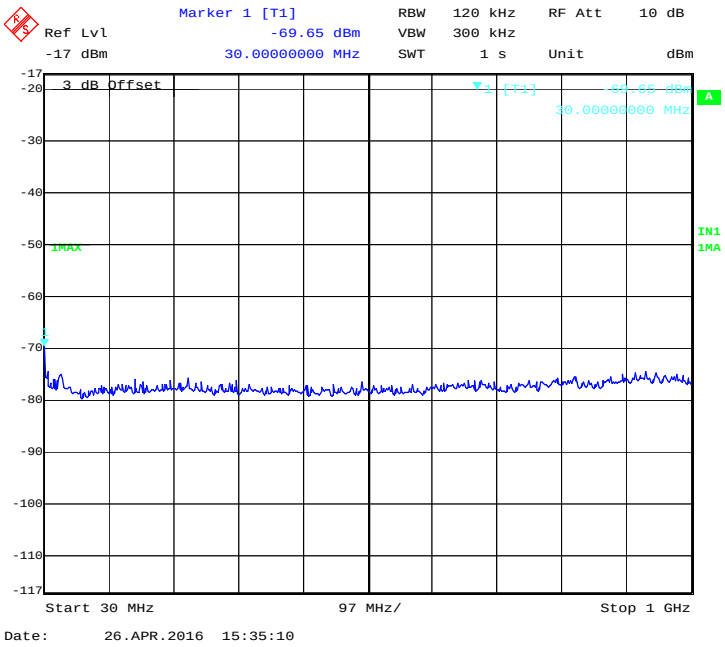

Figure 72: 40 MHz, 17 dBi, Mid channel: Peak emission from 30 MHz to 1 GHz at Ch. 0 –5300 MHz

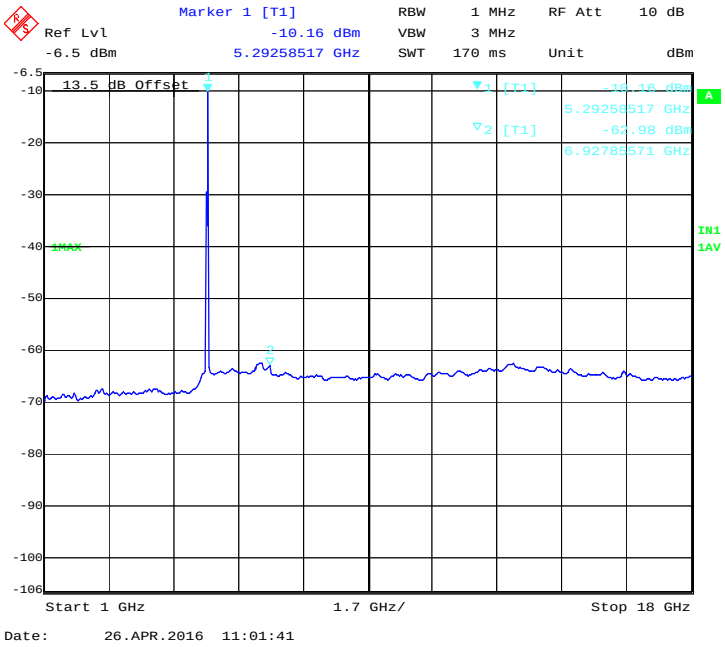

Figure 73: 40 MHz, 17 dBi, Mid channel: Average emission from 1 GHz to 18 GHz at Ch. 0 –5300 MHz

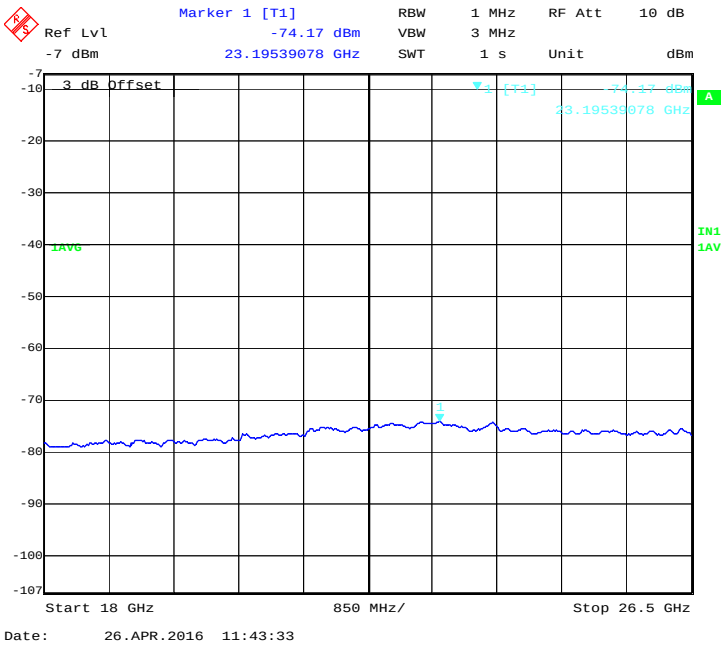

Figure 74: 40 MHz, 17 dBi, Mid channel: Average emission from 18 GHz to 26.5 GHz at Ch. 0 –5300 MHz

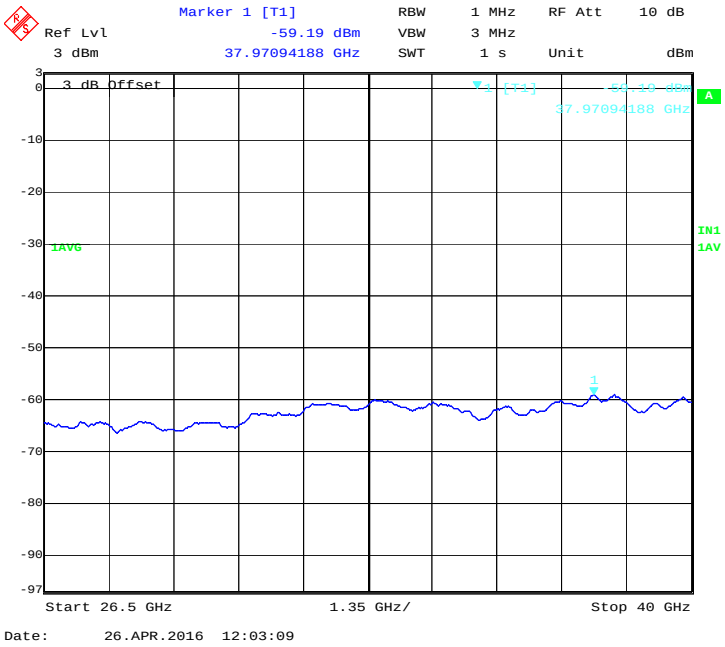

Figure 75: 40 MHz, 17 dBi, Mid channel: Average emission from 26.5 GHz to 40 GHz at Ch. 0 –5300 MHz