EMC
TEST REPORT

Report No.: TS11090097-EME
Model No.: MB100
Issued Date: Nov. 25, 2011

Applicant:	**ALATECH Technology Limited Co.** **39F., No. 758, Jungming S.RD. Taichung, Taiwan**
Test Method/ Standard:	**47 CFR FCC Part 15.249 & ANSI C63.4 2003**
Test By:	**Intertek Testing Services Taiwan Ltd.** **No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li,** **Shiang-Shan District, Hsinchu City, Taiwan**

The test report was prepared by: Sign on File
Jill Chen / Assistant

These measurements were taken by: Sign on File
Terry Hsu / Engineer

The test report was reviewed by: Jimmy Yang

Name Jimmy Yang
Title Engineer

Table of Contents

Summary of Tests

Test	Reference	Results
Radiated Emission test	15.249(c), 15.209	Pass
Emission on the Band Edge	15.249(d)	Pass
Conducted Emission of AC Power	15.207	Pass
Calculation of Average Factor	15.35	Pass
20dB Bandwidth	15.215(c)	Pass

1. General information

1.1 Identification of the EUT

Product:	MP3 Player
Model No.:	MB100
FCC ID.:	YQOMB100
Frequency Range:	2401 MHz, 2450 MHz, 2480 MHz
Channel Number:	3 channels
Frequency of Each Channel:	2401 MHz, 2450 MHz, 2480 MHz
Type of Modulation:	GFSK
Rated Power:	1. DC 5 V from Notebook PC 2. DC 3.7 V from battery
Power Cord:	N/A
Data Cable:	N/A
Sample Received:	Sep. 21, 2011
Test Date(s):	Sep. 22, 2011 ~ Nov. 25, 2011
Note 1:	This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
Note 2:	When determining the test conclusion, the Measurement Uncertainty of test has been considered.

1.2 Additional information about the EUT

The EUT is MP3 Player, and was defined as information technology equipment.

For more detail features, please refer to User's manual as file name “Installation guide.pdf”

1.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Type : PCB printed antenna
Connector Type : N/A

1.4 Peripherals equipment

Peripherals	Brand	Model No.	Serial No.
Notebook PC	DELL	Latitude D610	4YWZK1S

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Paragraph 15.249 for non-spread spectrum devices.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band was all meet limit requirement, thus we evaluate the EUT pass the specified test.

2.2 Operation mode

The EUT was continuously transmitted in TX mode during the test.

For the signal from handset is maximized through rotation and placement in the three orthogonal axes.

X axis

Y axis

Z axis

After verifying three axes, we found the maximum electromagnetic field was occurred at Y axis. The final test data was executed under this configuration.

The EUT configuration please refer to the “Spurious set-up photo.pdf”.

2.3 Test equipment

Equipment	Brand	Frequency range	Model No.	Last Cal.	Cal. interval
EMI Test Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS30	2011/6/29	1 year
EMI Test Receiver	Rohde & Schwarz	9kHz~3GHz	ESCI	2010/12/3	1 year
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP30	2011/6/29	1 year
Spectrum Analyzer	Rohde & Schwarz	20Hz~40GHz	FSEK30	2011/1/18	1 year
Horn Antenna	SCHWARZBECK	1GHz~18GHz	BBHA9120D	2010/8/31	2 years
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9168	2011/7/26	2 years
Turn Table	HDGmbH	N/A	DS 420S	N/A	N/A
Antenna Tower	HDGmbH	N/A	MA 240	N/A	N/A
Pre-Amplifier	MITEQ	100MHz~26.5GHz	AFS44-00102650 --42-10P-44	2011/10/27	2 years
LISN	Rohde & Schwarz	9KHz~30MHz	ESH3-Z5	2011/10/24	1 year
Power Meter	Anritsu	ML2495A	0844001	2011/10/13	1 year
Power Senor	Anritsu	MA2411B	0738452	2011/10/13	1 year

Note: The above equipments are within the valid calibration period.

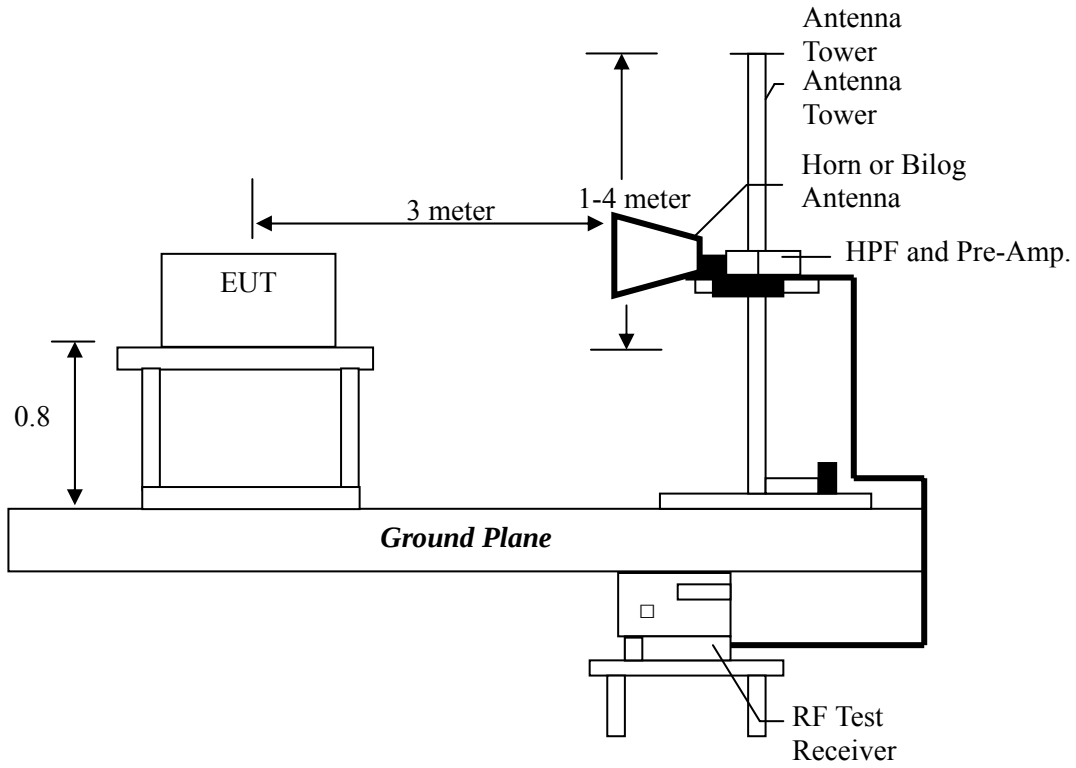
3. Radiated emission test FCC 15.249 (C)

3.1 Operating environment

Temperature:	22	℃
Relative Humidity:	56	%
Atmospheric Pressure	1008	hPa

3.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emissions were invested cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraphs), the Peak reading (1MHz RBW/VBW) recorded also on the report.
The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The EUT configuration please refer to the “Spurious set-up photo.pdf”.

3.3 Emission limit

3.3.1 Fundamental and harmonics emission limits

Frequency (MHz)	Field Strength of Fundamental		Field Strength of Harmonics	
	(mV/m@3m)	(dBuV/m@3m)	(uV/m@3m)	(dBuV/m@3m)
2400-2483.5	50	94	500	54

3.3.2 General radiated emission limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

Frequency MHz	15.209 Limits (dBμV/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:
1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Measurement uncertainty was calculated in accordance with TR 100 028-1.

Parameter	Uncertainty
Radiated Emission	± 5.10 dB
Conducted Emission	± 2.786 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

3.4 Radiated spurious emission test data

3.4.1 Measurement results: frequencies equal to or less than 1 GHz

The test was performed on EUT under Tx mode. Low, middle and high channels were verified. The worst case occurred Tx at low channel.

EUT : MB100
Test Unit : MP3 Player
Test Condition : Tx at low channel

Polarization (circle)	Frequency (MHz)	Detector	Corr. Factor (dB/m)	Reading (dBuV)	Calculated dBuV/m	Limit (dBuV/m)	Margin (dB)
Vertical	49.40	QP	12.84	8.36	21.20	40.00	-18.80
Vertical	150.28	QP	15.83	6.58	22.41	43.50	-21.09
Vertical	412.18	QP	16.47	9.68	26.15	46.00	-19.85
Vertical	509.18	QP	18.56	9.16	27.71	46.00	-18.29
Vertical	756.53	QP	22.81	10.14	32.95	46.00	-13.05
Vertical	846.74	QP	23.62	10.75	34.37	46.00	-11.63
Horizontal	45.52	QP	14.33	7.32	21.64	40.00	-18.36
Horizontal	157.07	QP	13.60	8.15	21.75	43.50	-21.75
Horizontal	305.48	QP	14.32	9.35	23.66	46.00	-22.34
Horizontal	405.39	QP	16.81	9.32	26.13	46.00	-19.87
Horizontal	704.15	QP	22.44	12.22	34.66	46.00	-11.34
Horizontal	934.04	QP	25.33	9.46	34.79	46.00	-11.21

Remark:
1. Corr. Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Corr. Factor

3.4.2 Measurement results: frequency above 1GHz

EUT : MB100
Test Condition : Tx at low channel

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4802	PK	V	35.1	38.54	49.96	-	53.40	74	-20.60
4802	AV	V	35.1	38.54	49.96	-58.998	-5.60	54	-59.60
4802	PK	H	35.1	38.54	45.25	-	48.69	74	-25.31
4802	AV	H	35.1	38.54	45.25	-58.998	-10.31	54	-64.31

Remark:
1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. According to 15.31 (o), the amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported.
4. Average value = peak value + average factor

EUT : MB100
Test Condition : Tx at middle channel

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4900	PK	V	35.1	38.54	52.14	-	55.58	74	-18.42
4900	AV	V	35.1	38.54	52.14	-58.998	-3.42	54	-57.42
4900	PK	H	35.1	38.54	44.55	-	47.99	74	-26.01
4900	AV	H	35.1	38.54	44.55	-58.998	-11.01	54	-65.01

Remark:
1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. According to 15.31 (o), the amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported.
4. Average value = peak value + average factor

EUT : MB100
Test Condition : Tx at high channel

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4960	PK	V	35.1	38.54	46.68	-	50.12	74	-23.88
4960	AV	V	35.1	38.54	46.68	-58.998	-8.88	54	-62.88
4960	PK	H	35.1	38.54	45.62	-	49.06	74	-24.94
4960	AV	H	35.1	38.54	45.62	-58.998	-9.94	54	-63.94

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1 GHz to 25 GHz. According to 15.31 (o), the amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported.
4. Average value = peak value + average factor

3.4.3 Measurement results: Fundamental and harmonics emission

EUT : MB100
Test Condition : Tx at low channel

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
2401	PK	H	32.81	53.98	-	86.79	113.9794	-27.19
2401	AV	H	32.81	53.98	-58.998	27.79	93.9794	-66.19

Remark:
1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor
3. Average value = peak value + average factor

EUT : MB100
Test Condition : Tx at middle channel

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
2450	PK	H	33.00	53.09	-	86.09	113.9794	-27.89
2450	AV	H	33.00	53.09	-58.998	27.09	93.9794	-66.89

Remark:
1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor
3. Average value = peak value + average factor

EUT : MB100
Test Condition : Tx at high channel

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Average Factor (dB)	Corrected Reading (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
2480	PK	H	33.12	52.17	-	85.29	113.9794	-28.69
2480	AV	H	33.12	52.17	-58.998	26.29	93.9794	-67.69

Remark:
1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor
3. Average value = peak value + average factor

4. Radiated emission on the band edge FCC 15.249(d)

Method of Measurement:

The frequency range from 30 MHz to 1000 MHz using Bilog Antenna.
The frequency range over 1 GHz using Horn Antenna.

Radiated emissions were invested cover the frequency range from 30 MHz to 1000 MHz using a receiver RBW of 120 kHz record QP reading, and the frequency over 1 GHz using a spectrum analyzer RBW of 1 MHz and 10 Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1 MHz RBW/VBW) recorded also on the report.

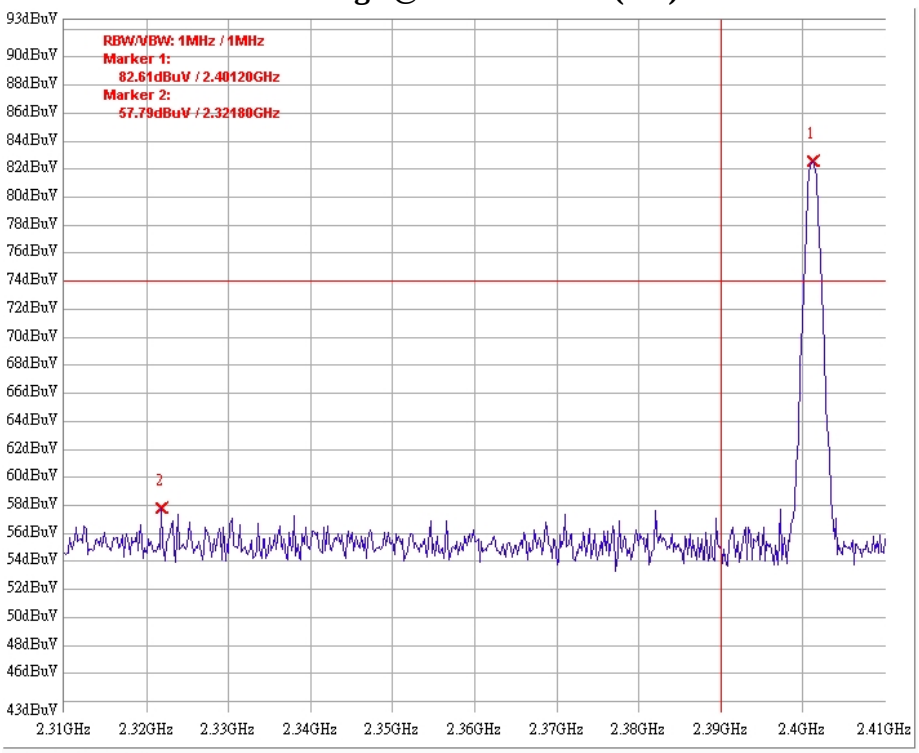
4.1 Measurement results

Test Unit : MP3 Player

Channel	Measurement Freq.Band (MHz)	Detector	Average Factor (dB)	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
1 (lowest)	2310-2390	PK	-	57.79	74	-16.21
1 (lowest)	2310-2390	AV	-58.998	-1.208	54	-55.208
3 (highest)	2483.5-2500	PK	-	57.84	74	-16.16
3 (highest)	2483.5-2500	AV	-58.998	-1.158	54	-55.158

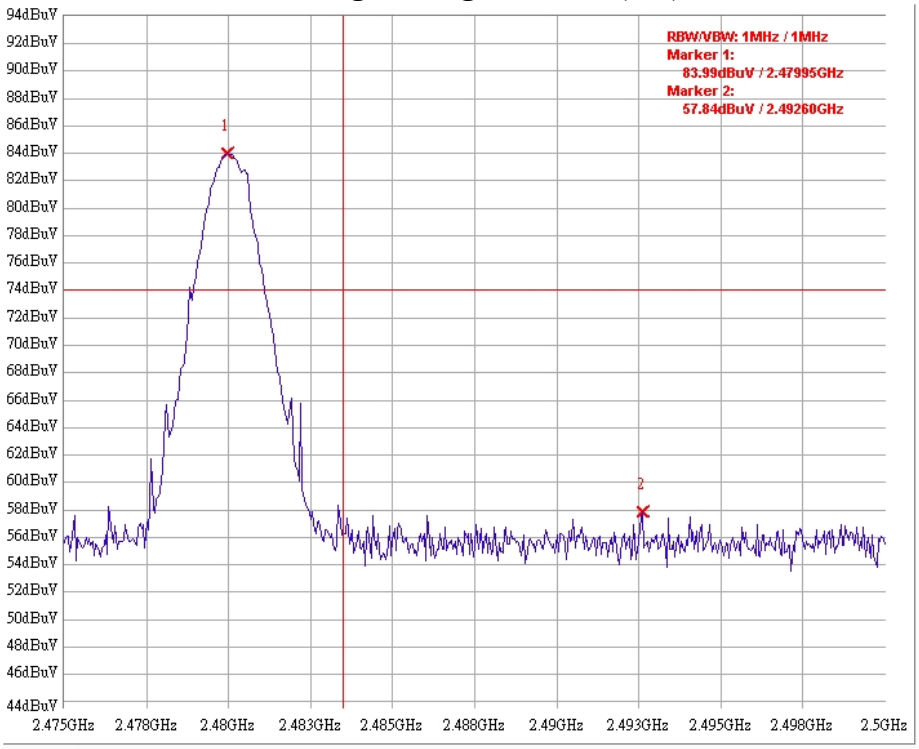
Please see the plots below.

Band edge @ Low channel (PK)



Brand / Model : 英達
Remark : ch1 y-axis PK swt:2.5ms
Tested by : Terry

Band edge @ High channel (PK)



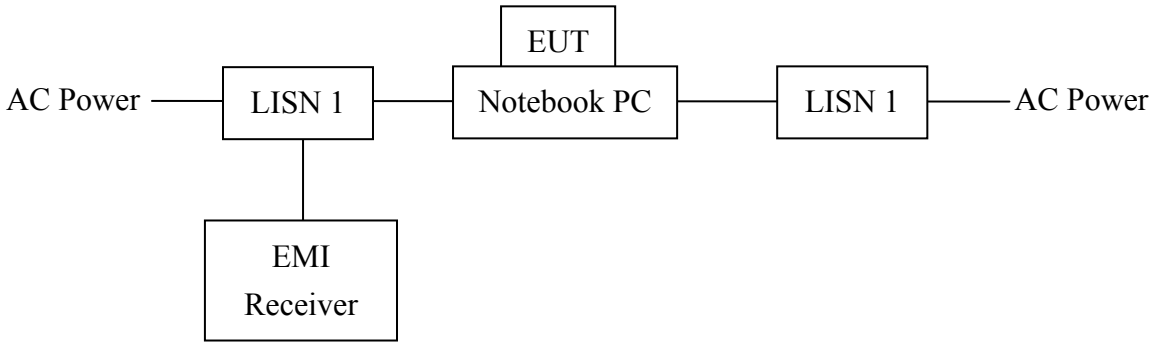
Brand / Model : 英達
Remark : ch3 y-axis PK swt:2.5ms
Tested by : Terry

5. Conducted emission test FCC 15.207

5.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure	1008	hPa

5.2 Test setup & procedure



The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.
Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/1992 on conducted measurement.
The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9kHz.

The EUT configuration please refer to the "Conducted set-up photo.pdf".

5.3 Emission limit

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

*Decreases with the logarithm of the frequency.

5.4 Uncertainty of Conducted Emission

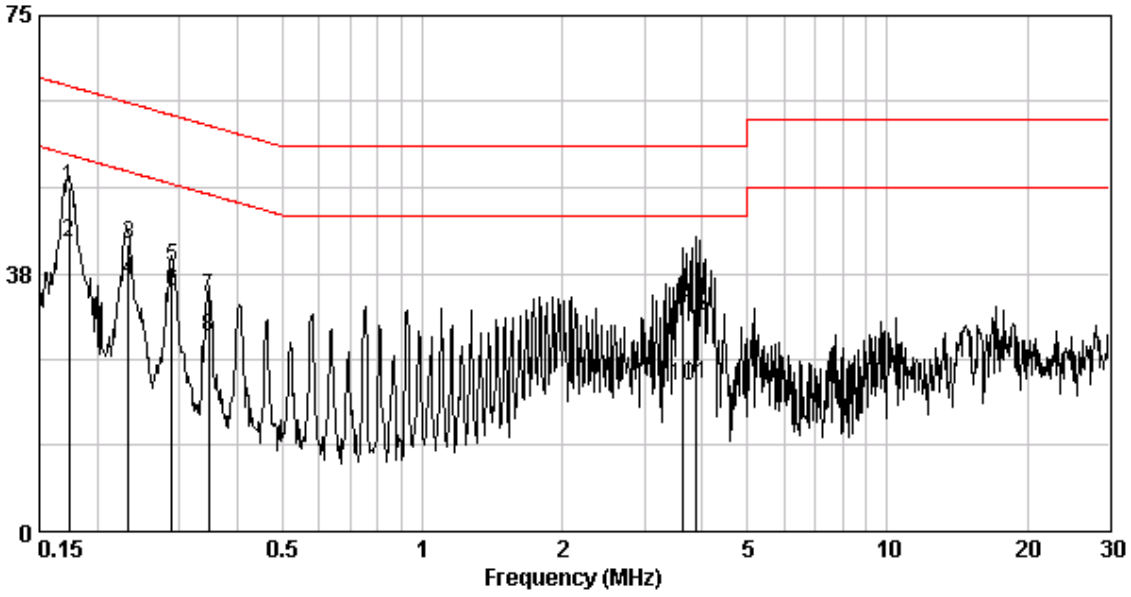
Expanded uncertainty (k=2) of conducted emission measurement is ± 2.786 dB.

5.5 Conducted emission data FCC 15.207

Phase: Line
Model No.: MB100
Test Condition: Tx mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Margin (dB) Av
0.174	0.04	50.00	64.77	42.00	54.77	-14.77	-12.77
0.233	0.04	41.85	62.35	36.66	52.35	-20.49	-15.68
0.289	0.05	38.41	60.54	34.76	50.54	-22.13	-15.78
0.346	0.05	34.17	59.05	28.22	49.05	-24.88	-20.83
3.642	0.10	33.72	56.00	21.20	46.00	-22.28	-24.80
3.881	0.10	31.28	56.00	21.39	46.00	-24.72	-24.61

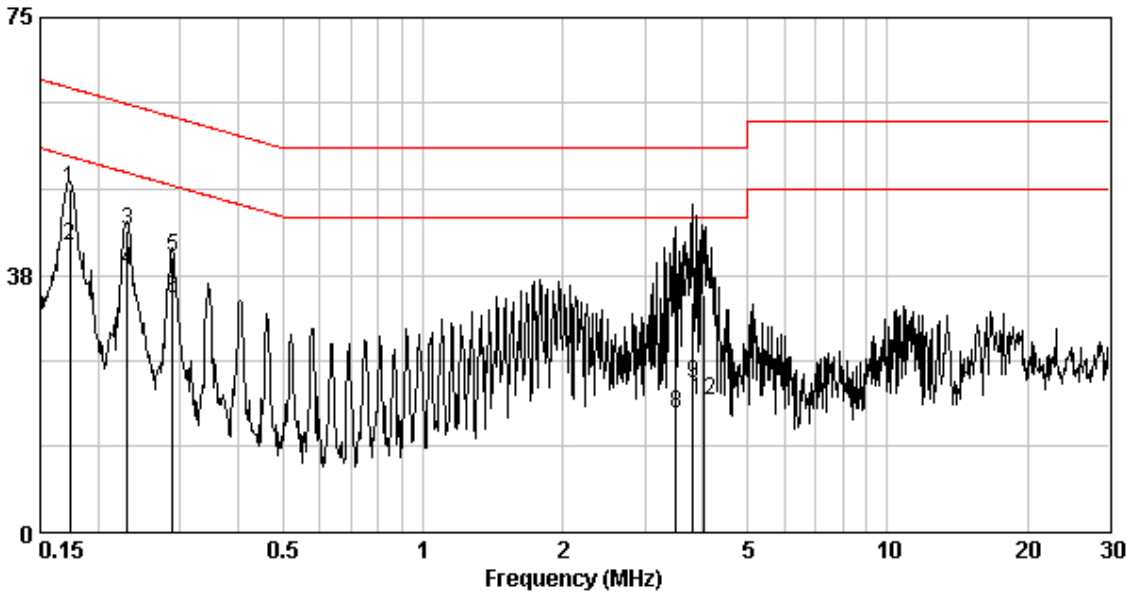
Remark:
1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



Phase: Neutral
Model No.: MB100
Test Condition: Tx mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Margin (dB) Av
0.174	0.04	50.00	64.77	41.63	54.77	-14.77	-13.14
0.232	0.04	44.04	62.39	38.17	52.39	-18.35	-14.22
0.289	0.05	40.16	60.54	33.94	50.54	-20.38	-16.60
3.509	0.10	32.74	56.00	17.26	46.00	-23.26	-28.74
3.820	0.10	33.53	56.00	21.77	46.00	-22.47	-24.23
4.006	0.10	34.72	56.00	19.22	46.00	-21.28	-26.78

Remark:
1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



6. Calculation of Average Factor

The specification for output field strengths in accordance with the FCC rules specify measurements with an average detector. During testing, a spectrum analyzer incorporating a peak detector was used. Therefore, a reduction factor can be applied to the resultant peak signal level and compared to the limit for measurement instrumentation incorporating an average detector.

The time period over which the duty cycle is measured in 100 ms or the repetition cycle, whichever is a shorter time frame. The duty cycle is measured by placing the spectrum analyzer in zero span mode.

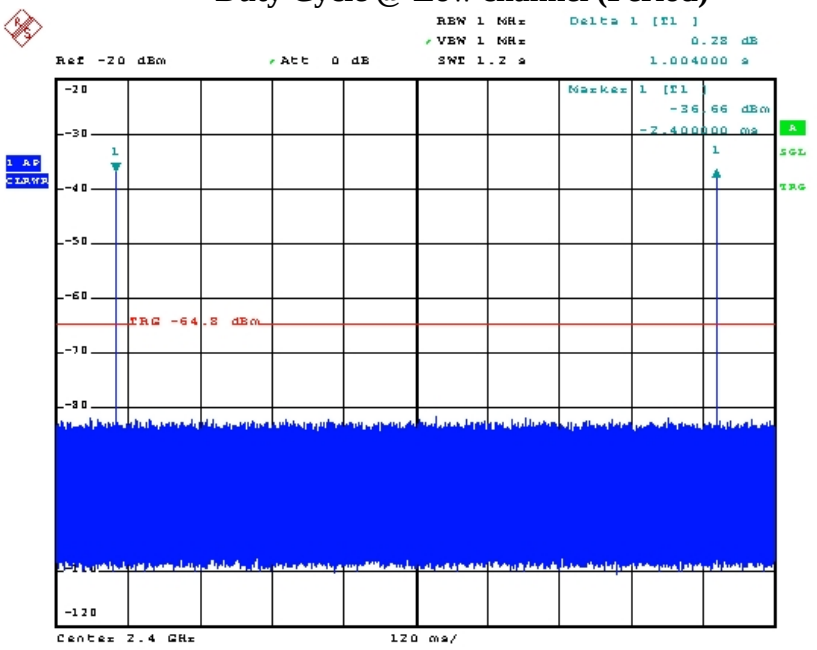
The duty cycles of handset and base unit are exactly the same.

Duty cycle correction factor in dB = 20 log (on-time/100ms) or 20 log (on-time/period) #If period is less than 100ms

Therefore, duty cycle correction factor = 20 log 10 (0.112/100) = -58.998 dB

Please see the plot below.

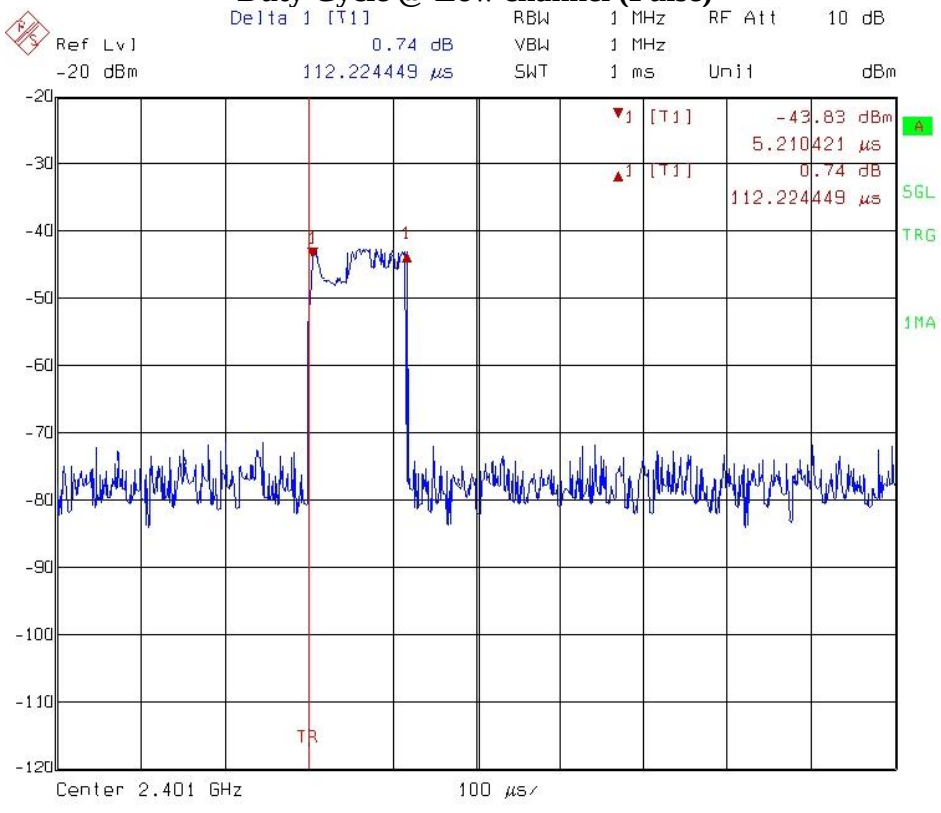
Duty Cycle @ Low channel (Period)



2nd comment ...

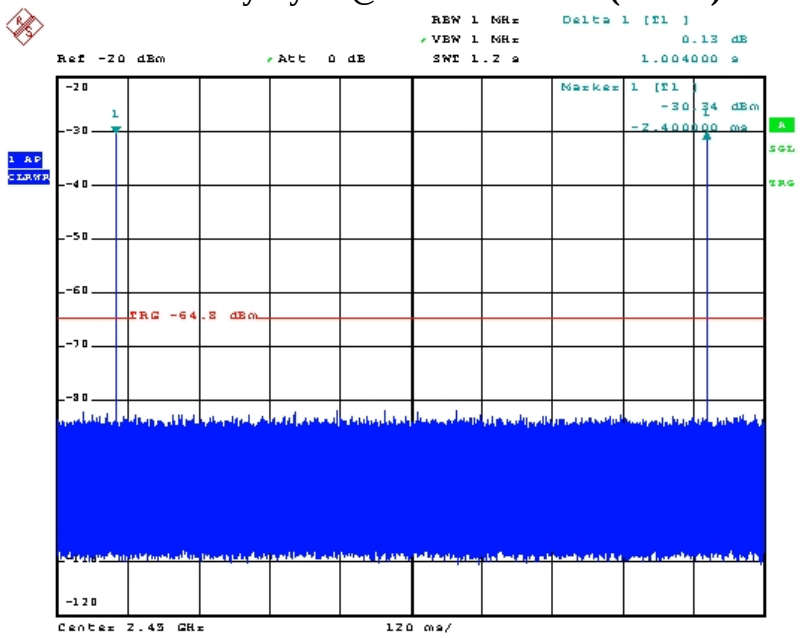
Date: 22.NOV.2011 09:47:55

Duty Cycle @ Low channel (Pulse)



Date: 25.NOV.2011 11:22:59

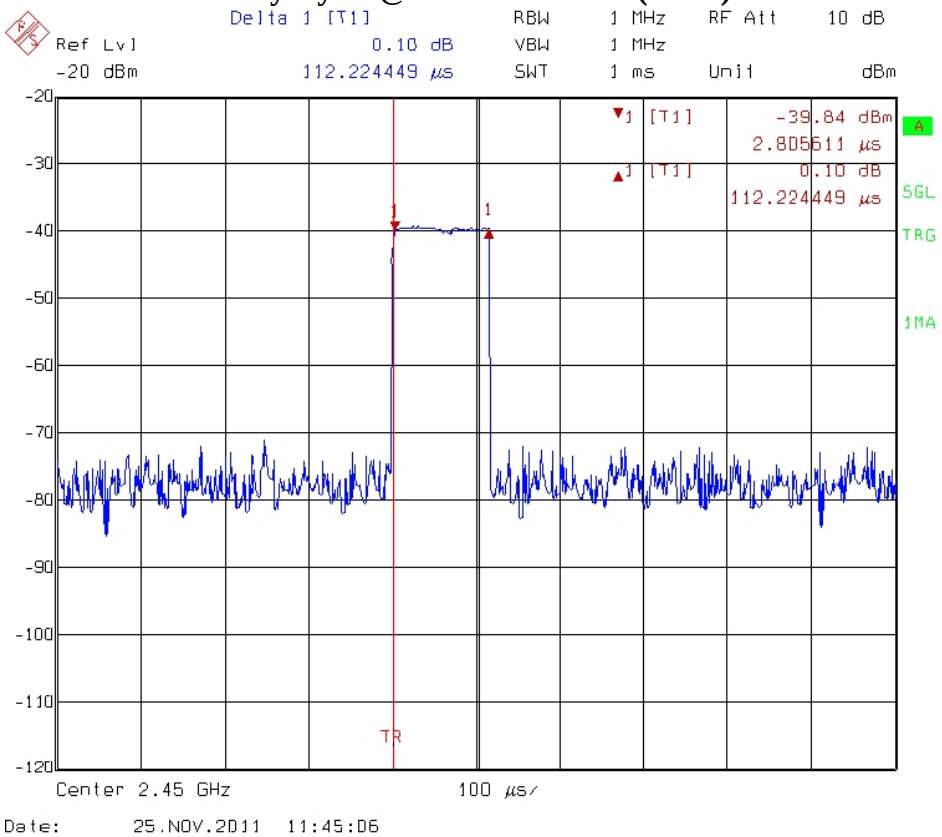
Duty Cycle @ Middle channel (Period)



2nd comment ...

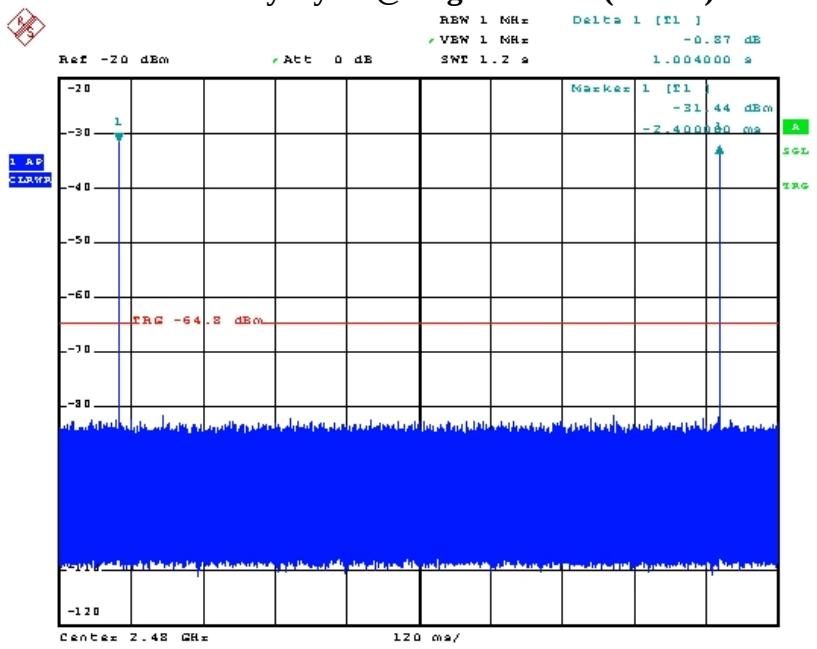
Date: 22.NOV.2011 09:36:39

Duty Cycle @ Middle channel (Pulse)



Date: 25.NOV.2011 11:45:06

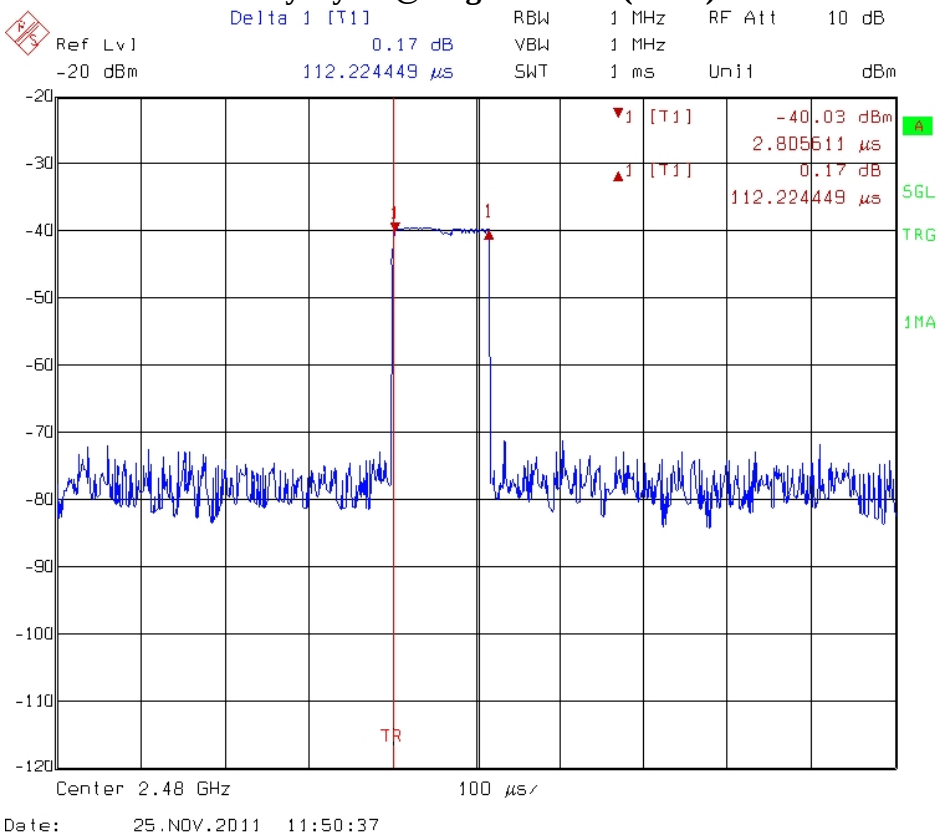
Duty Cycle @ High channel (Period)



2nd comment ...

Date: 22.NOV.2011 09:39:59

Duty Cycle @ High channel (Pulse)



Date: 25.NOV.2011 11:50:37

7. 20dB Bandwidth test

7.1 Operating environment

Temperature:	22	℃
Relative Humidity:	56	%
Atmospheric Pressure:	1008	hPa

7.2 Test setup & procedure

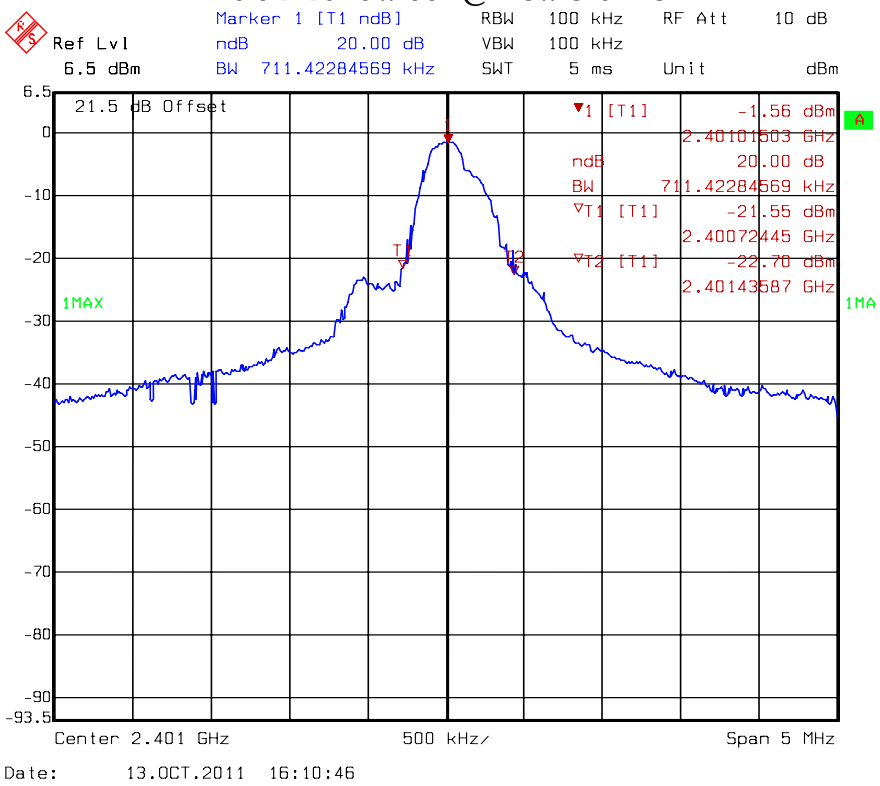
The 20dB bandwidth was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at 100 kHz, the video bandwidth≧RBW, and the SPAN may equal to approximately 2 to 3 times the 20dB bandwidth. The test was performed at 3 channels (lowest, middle and highest channel). The maximum 20dB modulation bandwidth is in the following Table.

7.3 Measured data of modulated bandwidth test results

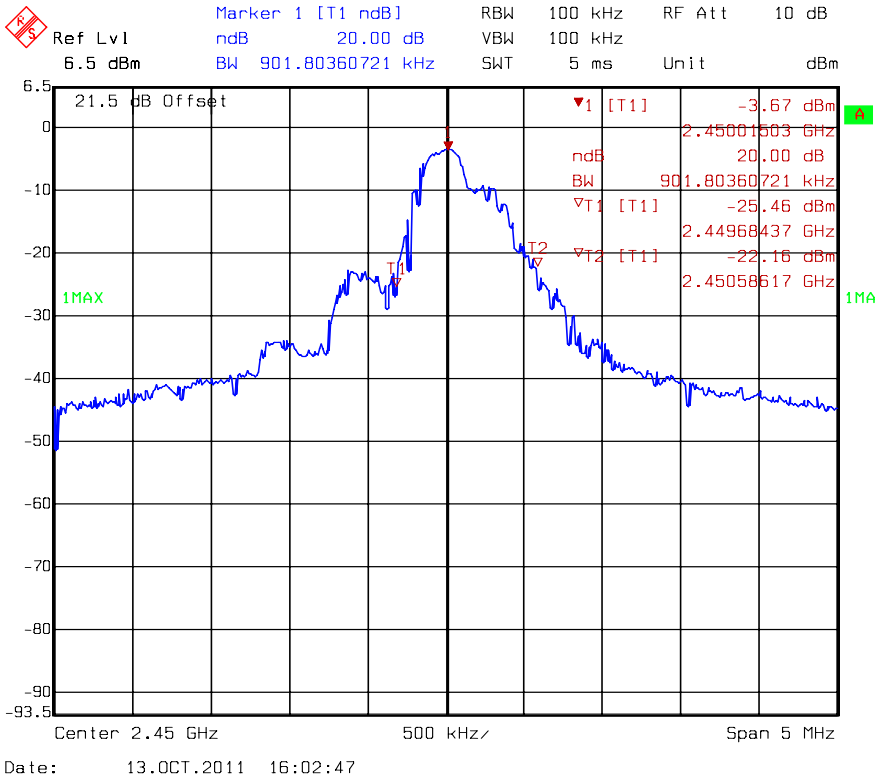
Channel	Frequency (MHz)	Bandwidth (MHz)
low	2401	0.711
middle	2450	0.902
high	2480	0.882

Please see the plot below.

20 dB Bandwidth @ Low channel



20 dB Bandwidth @ Middle channel



20 dB Bandwidth @ High channel