FCC CERTIFICATION
On Behalf of
Thakral Electronics

FM Transmitter
Model No.: YIA-FMT02

FCC ID: UAQFMT02

Prepared for	:	Thakral Electronics
Address	:	15/F., Hong Kong Pacific Centre, 28 Hankow Road, Tsim Sha Tsui, Kowloon, Hongkong
Prepared by	:	ACCURATE TECHNOLOGY CO. LTD
Address	:	F1, Bldg. A, Changyuan New Material Port, Keyuan Rd. Science & Industry Park, Nanshan, Shenzhen, Guangdong P.R. China Tel: (0755) 26503290 Fax: (0755) 26503396

Report Number	:	ATE20060912
Date of Test	:	May 25, 2006
Date of Report	:	May 29, 2006

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Test Report Certification

Applicant	:	Thakral Electronics
Manufacturer	:	Micro Electronics Ltd.
EUT Description	:	FM Transmitter
		(A) MODEL NO.: YIA-FMT02
		(B) SERIAL NO.: N/A
		(C) POWER SUPPLY: 3.3V DC

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.239: 2004
& ANSI C63.4: 2003

The device described above is tested by ACCURATE TECHNOLOGY CO. LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section15.239 limits. The measurement results are contained in this test report and ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO. LTD.

Date of Test : May 25, 2006

Prepared by :

(Engineer)

Reviewer :

(Quality Manager)

Approved & Authorized Signer :

(Manager)

1. GENERAL INFORMATION

1.1.Description of Device (EUT)

EUT	:	FM Transmitter
Model Number	:	YIA-FMT02
Power Supply	:	3.3V DC (Power supplied by i-Pod)
Occupant Frequency		88M-108MHz
i-Pod		Manufacturer: Apple M/N: A1059 S/N: JQ5309CJPS9
Applicant	:	Thakral Electronics
Address	:	15/F., Hong Kong Pacific Centre, 28 Hankow Road, Tsim Sha Tsui, Kowloon, Hongkong
Manufacturer	:	Micro Electronics Ltd.
Address	:	7/F., Enterprise Square Three, 39 Wang Chiu Road, Kowloon Bay, Hongkong
Date of sample received	:	May 22, 2006
Date of Test	:	May 25, 2006

1.2.Description of Test Facility

EMC Lab	:	Accredited by TUV Rheinland Shenzhen, May 10, 2004 Accredited by FCC, May 10, 2004 The Certificate Registration Number is 253065 Accredited by Industry Canada, May 18, 2004 The Certificate Registration Number is IC 5077
Name of Firm	:	ACCURATE TECHNOLOGY CO. LTD
Site Location	:	F1, Bldg. A, Changyuan New Material Port, Keyuan Rd. Science & Industry Park, Nanshan, Shenzhen, Guangdong P.R. China

1.3.Measurement Uncertainty

Conducted emission expanded uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty	=	4.12dB, k=2

2. MEASURING DEVICE AND TEST EQUIPMENT

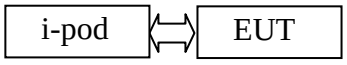
Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	03.31.2007
EMI Test Receiver	Rohde&Schwarz	ESI26	838786/013	01.02.2007
Bilog Antenna	Schwarzbeck	VULB9163	9163-194	03.31.2007
Bilog Antenna	Chase	CBL6112B	2591	03.31.2007
Horn Antenna	Rohde&Schwarz	HF906	100013	01.02.2007
Spectrum Analyzer	Anritsu	MS2651B	6200238856	03.31.2007
Pre-Amplifier	Agilent	8447D	2944A10619	03.31.2007
Audio Generator	GW	GAG-810	0913317	01.02.2007

3. RADIATED EMISSION FOR FCC PART 15 SECTION 15.239(C)

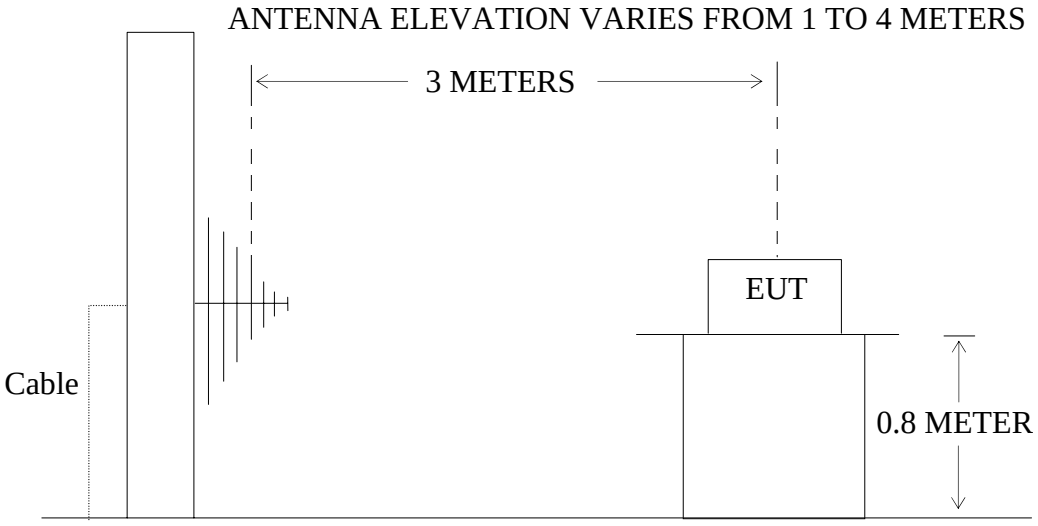
3.1.Block Diagram of Test Setup

3.1.1.Block diagram of connection between the EUT and simulators



(EUT: FM Transmitter)

3.1.2.Anechoic Chamber Test Setup Diagram



(EUT: FM Transmitter)

3.2.The Emission Limit for section 15.239(c)

3.2.1 The field strength of any emissions radiated on any frequency outside of the specified 200kHz band shall not exceed the general radiated emission limits in section 15.209

Radiation Emission Measurement Limits According to Section 15.209

Frequency (MHz)	Limit,		
	Field Strength of Quasi-peak Value (microvolts/m)	Field Strength of Quasi-peak Value (dBμV/m)	The final measurement in band 9-90kHz, 110-490kHz and above 1000MHz is performed with
30 - 88	100	40	

88 - 216	150	43.5	Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.
216 - 960	200	46	
Above 960	500	54	

3.3.Configuration of EUT on Measurement

The following equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

3.3.1.FM Transmitter(EUT)

Model Number : YIA-FMT02
Serial Number : N/A
Manufacturer : Micro Electronics Ltd.

3.4.Operating Condition of EUT

3.4.1.Setup the EUT and simulator as shown as Section 3.1.

3.4.2.Turn on the power of all equipment.

Let the EUT work in TX modes (On with 1kHz signal) measure it. The transmit frequency are 88.1-107.9MHz.We are select 88.1M, 98.1M, 107.9MHz TX frequency to transmitted.

3.5.Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated emission measurement.
The bandwidth of test receiver (R&S ESI26) is set at 120KHz in 30-1000MHz; Set at 1MHz in above 1000MHz.
The frequency range from 30MHz to 1100MHz is checked.\
The final measurement in band 9-90kHz, 110-490kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.

3.6. The Field Strength of Radiation Emission Measurement Results

PASS.

The frequency range 30MHz to 1100MHz is investigated.

Date of Test:	May 25, 2006	Temperature:	22°C
EUT:	FM Transmitter	Humidity:	50%
Model No.:	YIA-FMT02	Power Supply:	3.3V DC
Test Mode:	TX 88.1MHz	Test Engineer:	Andy

Polarization	Frequency (MHz)	Reading(dBμV/m) QP	Factor Corr.(dB)	Result(dBμV/m) QP	Limits(dBμV/m) QP	Margin(dBμV/m) QP
Horizontal	176.230	16.8	8.8	25.6	43.5	17.9
Horizontal	264.270	16.7	9.6	26.3	46.0	19.7
Horizontal	352.420	13.1	13.1	26.2	46.0	19.8
Horizontal	440.570	19.4	14.5	33.9	46.0	12.1
Horizontal	528.650	25.7	15.8	41.5	46.0	4.5
Horizontal	616.710	17.9	17.3	35.2	46.0	10.8
Vertical	176.210	8.1	8.8	16.9	43.5	26.6
Vertical	352.440	8.6	13.1	21.7	46.0	24.3
Vertical	440.560	13.2	14.5	27.7	46.0	18.3
Vertical	528.662	13.2	15.8	29.0	46.0	17.0
Vertical	616.725	16.4	17.3	33.7	46.0	12.3

The spectral diagrams in appendix I display the measurement of un-weighted peak values.

The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss – Amplifier Gain

Date of Test:	May 25, 2006	Temperature:	22°C
EUT:	FM Transmitter	Humidity:	50%
Model No.:	YIA-FMT02	Power Supply:	3.3V DC
Test Mode:	TX 98.1MHz	Test Engineer:	Andy

Polarization	Frequency (MHz)	Reading(dBμV/m) QP	Factor Corr.(dB)	Result(dBμV/m) QP	Limits(dBμV/m) QP	Margin(dBμV/m) QP
Horizontal	196.200	15.0	9.8	24.8	43.5	18.7
Horizontal	294.310	14.0	11.7	25.7	46.0	20.3
Horizontal	392.430	15.4	13.8	29.2	46.0	16.8
Horizontal	490.520	25.8	15.1	40.9	46.0	5.1
Horizontal	588.630	18.1	17.0	35.1	46.0	10.9
Vertical	196.202	1.5	9.8	11.3	43.5	32.2
Vertical	294.330	5.5	11.7	17.2	46.0	28.8
Vertical	392.442	7.7	13.8	21.5	46.0	24.5
Vertical	490.513	10.9	15.1	26.0	46.0	20.0
Vertical	588.635	14.0	17.0	31.0	46.0	15.0

The spectral diagrams in appendix I display the measurement of un-weighted peak values.

The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss – Amplifier Gain

Date of Test:	May 25, 2006	Temperature:	22°C
EUT:	FM Transmitter	Humidity:	50%
Model No.:	YIA-FMT02	Power Supply:	3.3V DC
Test Mode:	TX 107.9MHz	Test Engineer:	Andy

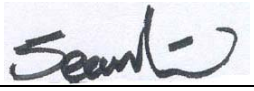
Polarization	Frequency (MHz)	Reading(dBμV/m) QP	Factor Corr.(dB)	Result(dBμV/m) QP	Limits(dBμV/m) QP	Margin(dBμV/m) QP
Horizontal	215.812	17.5	9.5	27.0	43.5	16.5
Horizontal	323.696	22.5	12.6	35.1	46.0	10.9
Horizontal	431.668	22.7	14.3	37.0	46.0	9.0
Horizontal	539.522	23.1	16.0	39.1	46.0	6.9
Horizontal	647.446	19.7	17.5	37.2	46.0	8.8
Vertical	215.820	6.7	9.5	16.2	43.5	27.3
Vertical	323.702	7.9	12.6	20.5	46.0	25.5
Vertical	431.700	9.4	14.3	23.7	46.0	22.3
Vertical	539.521	15.7	16.0	31.7	46.0	14.3
Vertical	647.445	13.2	17.5	30.7	54.0	15.3

The spectral diagrams in appendix I display the measurement of un-weighted peak values.

The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

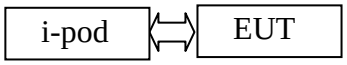
Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss – Amplifier Gain

Reviewer **:** 

4. FUNDAMENTAL RADIATED EMISSION FOR FCC PART 15 SECTION 15.239(B)

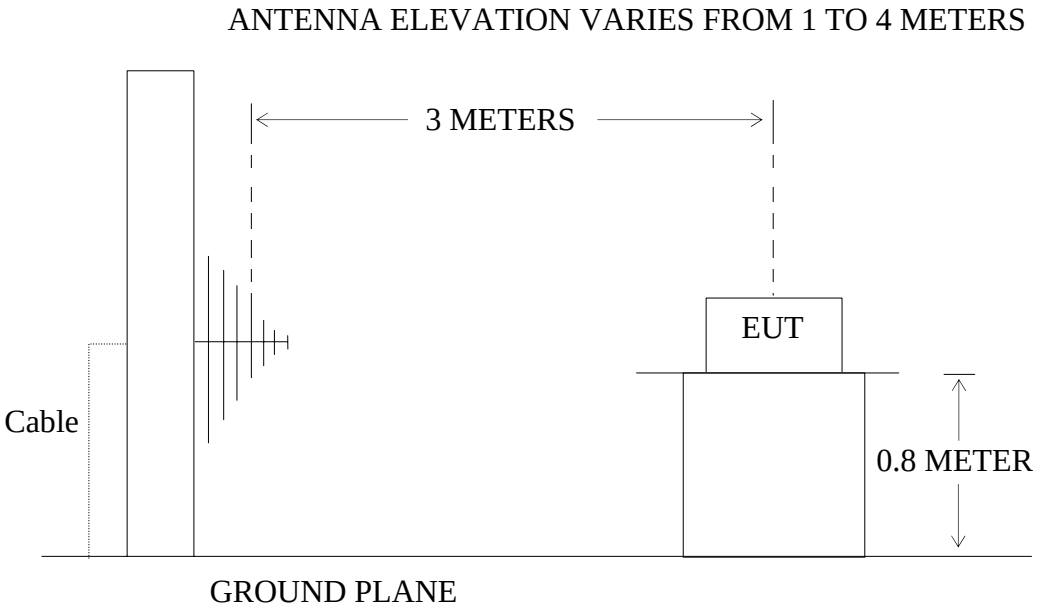
4.1.Block Diagram of Test Setup

4.1.1.Block diagram of connection between the EUT and simulators



(EUT: FM Transmitter)

4.1.2.Anechoic Chamber Test Setup Diagram



(EUT: FM Transmitter)

4.2.The Emission Limit For Section 15.239(b)

4.2.1 The field strength of any emission within the permitted 200kHz band shall not exceed 250microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in section 15.35 for limiting peak emissions apply.

4.3.EUT Configuration on Measurement

The following equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

4.3.1.FM Transmitter (EUT)

Model Number	:	YIA-FMT02
Serial Number	:	N/A
Manufacturer	:	Micro Electronics Ltd.

4.4.Operating Condition of EUT

4.4.1.Setup the EUT and simulator as shown as Section 4.1.

4.4.2.Turn on the power of all equipment.

Let the EUT work in TX modes (On with 1kHz signal) measure it. The transmit frequency are 88.1-107.9MHz.We are select 88.1M, 98.1M, 107.9MHz TX frequency to transmitted.

4.5.Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated emission measurement.

4.6. The Emission Measurement Result

PASS.

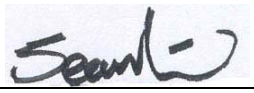
Date of Test:	May 25, 2006	Temperature:	22°C
EUT:	FM Transmitter	Humidity:	50%
Model No.:	YIA-FMT02	Power Supply:	3.3V DC
Test Mode:	TX	Test Engineer:	Andy

Fundamental Radiated Emissions

Test conditions		Fundamental Frequency	
		88.1MHz	
T_{nom}(22°C)	Unit	(dBμV/m)/ (μ V/m) AV	(dBμV/m)/(μ V/m) PEAK
	Horizontal	41.8/123	45.5/188
	Vertical	33.7/48	36.4/66
limit		48/250	68/2500
Note: Measurement was performed with modulated signal with average detector and peak detector.			

Test conditions		Fundamental Frequency	
		98.1MHz	
T_{nom}(22°C)	Unit	(dBμV/m)/ (μ V/m) AV	(dBμV/m)/(μ V/m) PEAK
	Horizontal	34.9/56	38.5/84
	Vertical	24.6/17	28.1/25
limit		48/250	68/2500
Note: Measurement was performed with modulated signal with average detector and peak detector.			

Test conditions		Fundamental Frequency	
		107.9MHz	
T_{nom}(22°C)	Unit	(dBμV/m)/ (μ V/m) AV	(dBμV/m)/(μ V/m) PEAK
	Horizontal	25.6/19	29.1/29
	Vertical	19.8/10	23.2/14
limit		48/250	68/2500
Note: Measurement was performed with modulated signal with average detector and peak detector.			

Reviewer **:** 

5. OCCUPIED BANDWIDTH FOR FCC PART 15 SECTION 15.239(A)

5.1. The Requirement For Section 15.239(a)

5.1.1. Emission from the device shall be confined within a band 200kHz wide centered on the operating frequency. The 200kHz band shall lie wholly within the frequency range of 88-108MHz.

5.2. EUT Configuration on Measurement

The following equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

5.2.1. FM Transmitter (EUT)

Model Number	:	YIA-FMT02
Serial Number	:	N/A
Manufacturer	:	Micro Electronics Ltd.

5.3. Operating Condition of EUT

5.3.1. Setup the EUT and simulator as shown as Section 4.1.

5.3.2. Turn on the power of all equipment.

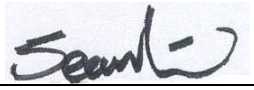
Let the EUT work in TX modes (On with 1kHz signal) measure it. The transmit frequency are 88.1-107.9MHz.We are select 88.1M, 98.1M, 107.9MHz TX frequency to transmitted.

5.4. Test Procedure

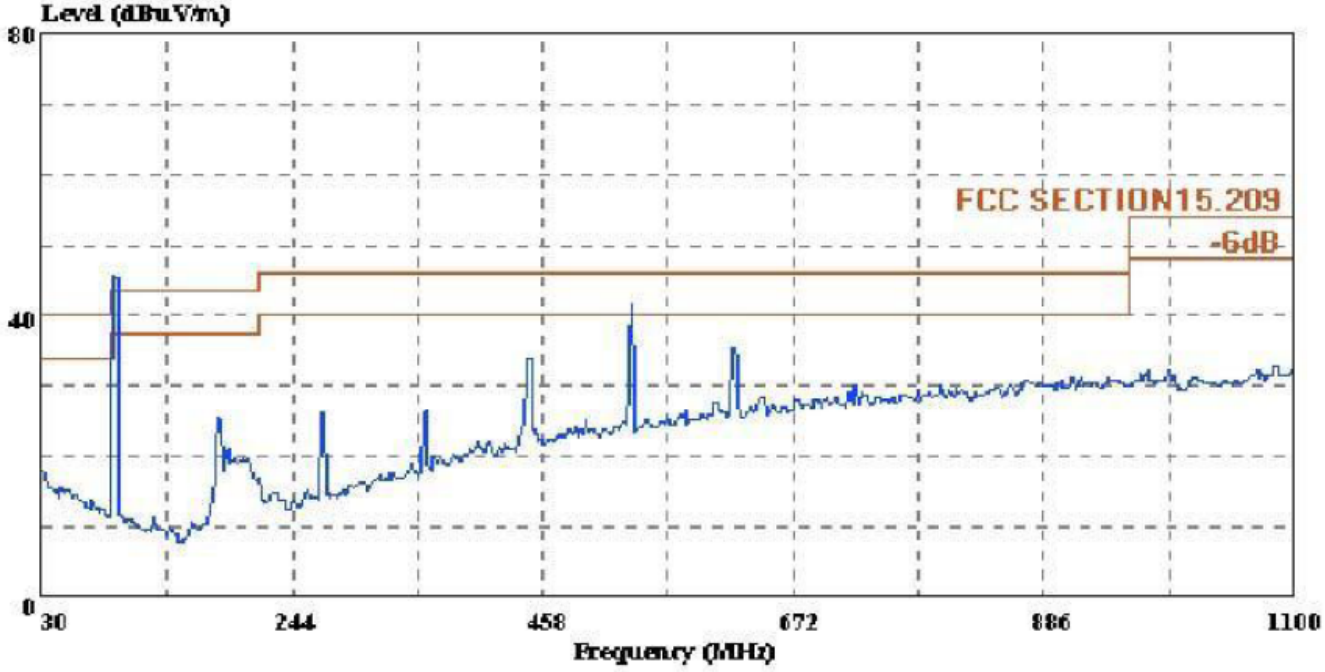
The zero level was set without modulation. A small sample of the transmitter output was fed into the spectrum analyzer and above photo was taken. The vertical scale is set to 10dB per division; the horizontal scale is set to 20kHz per division.

5.5.Test Result

The EUT does meet the FCC requirement.

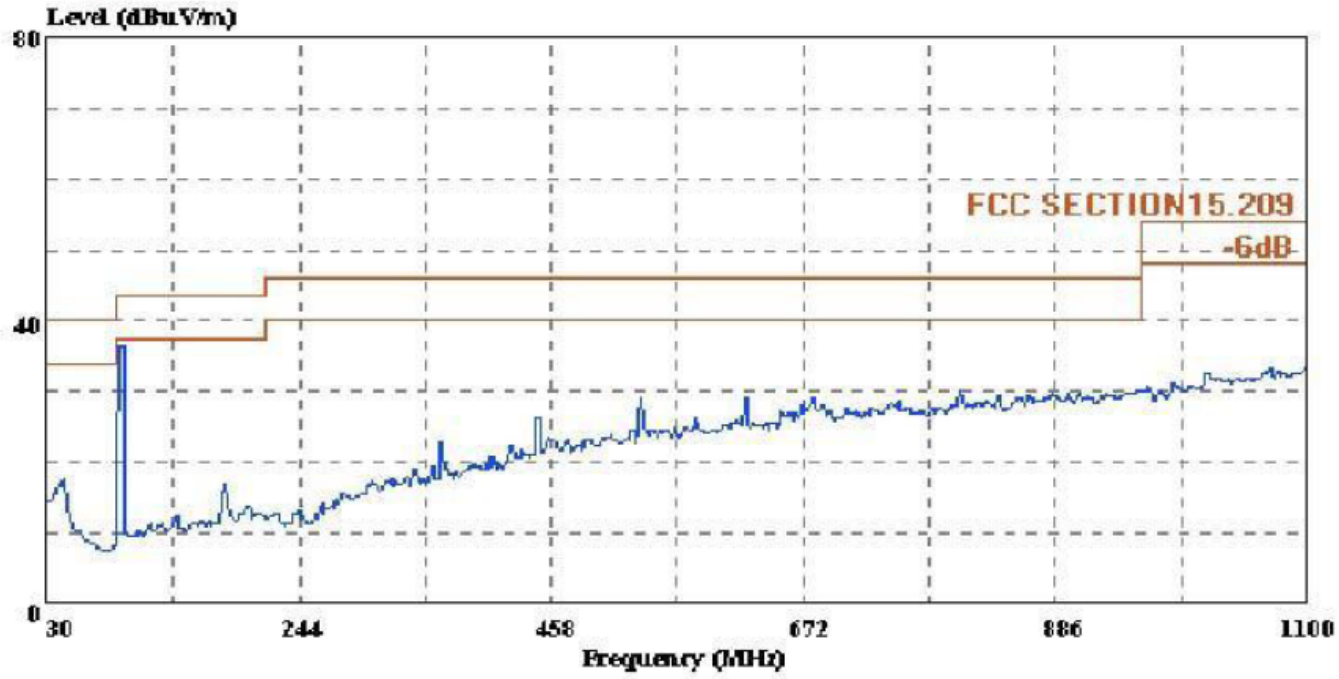
Reviewer **:** 

APPENDIX I
(Test Curves)



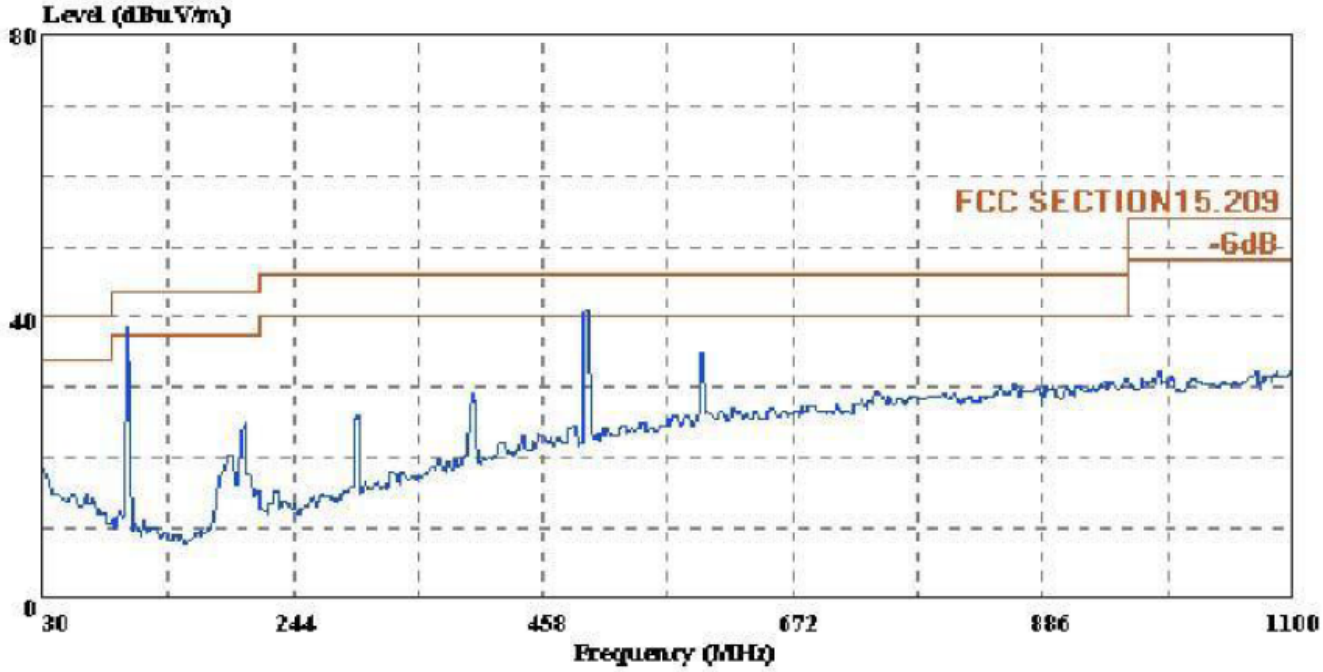
Trace: Ref Trace:

Condition: FCC SECTION15.209 3m HORIZONTAL
eut : FM Transmitter M/N:YIA-FMT02
power: DC 3.3V
memo : FM 88.1MHz
manuf: Thakral



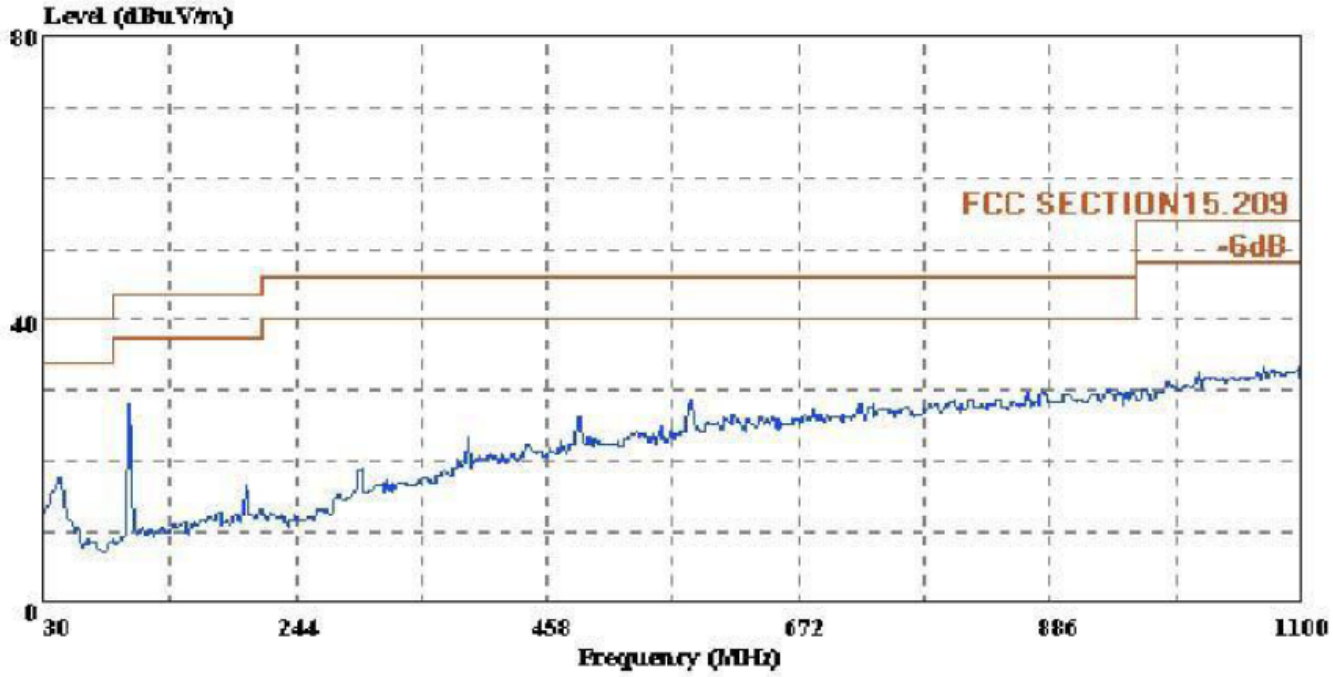
Trace: Ref Trace:

Condition: FCC SECTION15.209 3m VERTICAL
eut : FM Transmitter M/N:YIA-FMT02
power: DC 3.3V
memo : FM 88.1MHz
manuf: Thakral



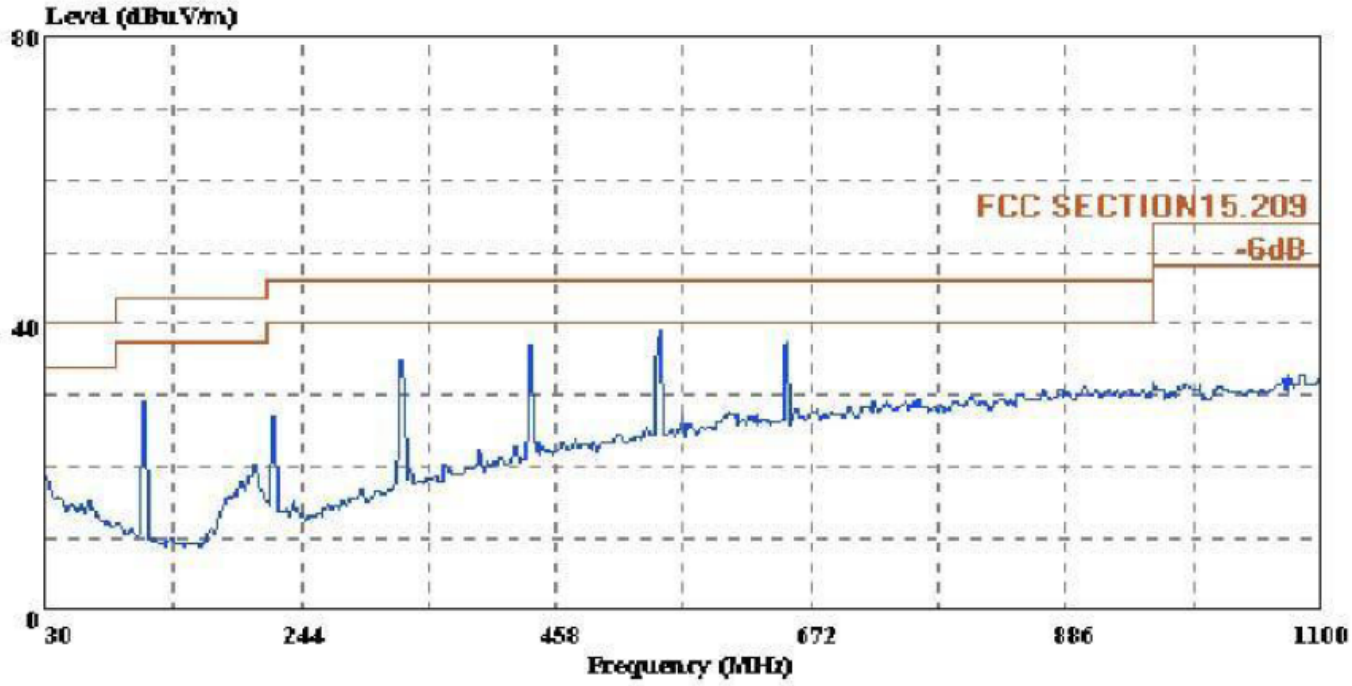
Trace: Ref Trace:

Condition: FCC SECTION15.209 3m HORIZONTAL
eut : FM Transmitter M/N:YIA-FMT02
power: DC 3.3V
memo : FM 98.1MHz
manuf: Thakral



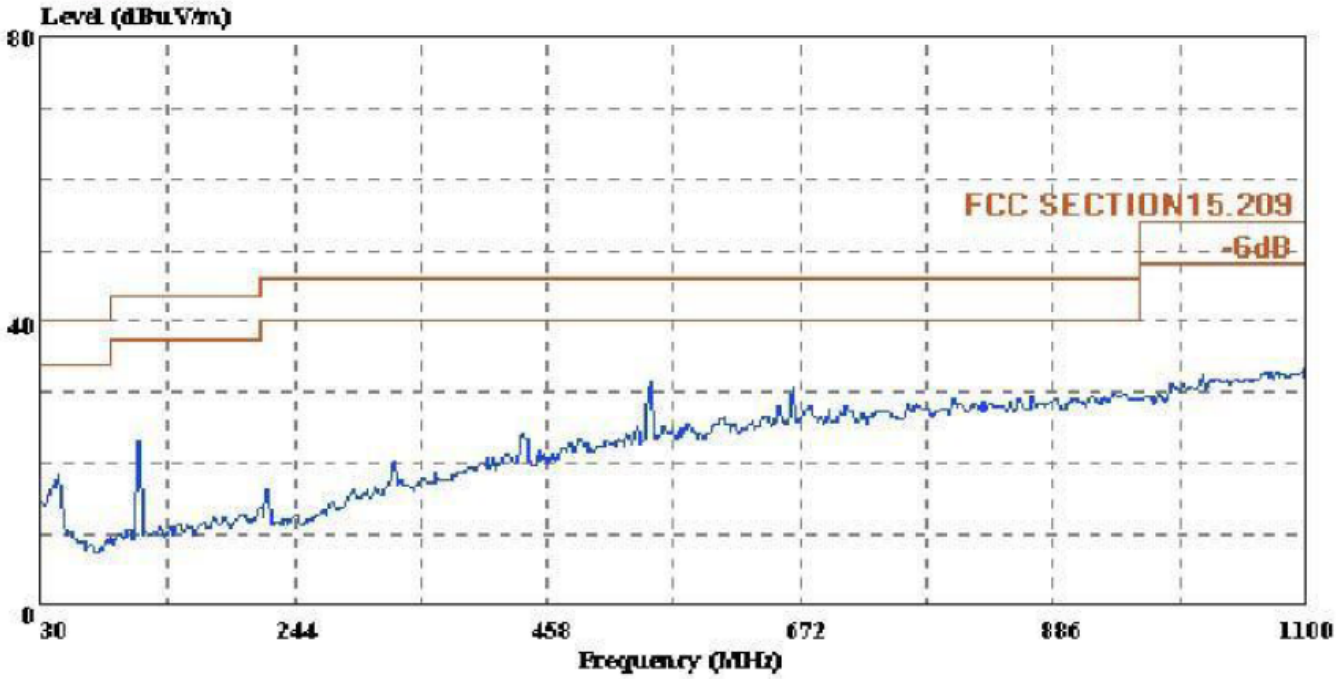
Trace: Ref Trace:

Condition: FCC SECTION15.209 3m VERTICAL
eut : FM Transmitter M/N:YIA-FMT02
power: DC 3.3V
memo : FM 98.1MHz
manuf: Thakral



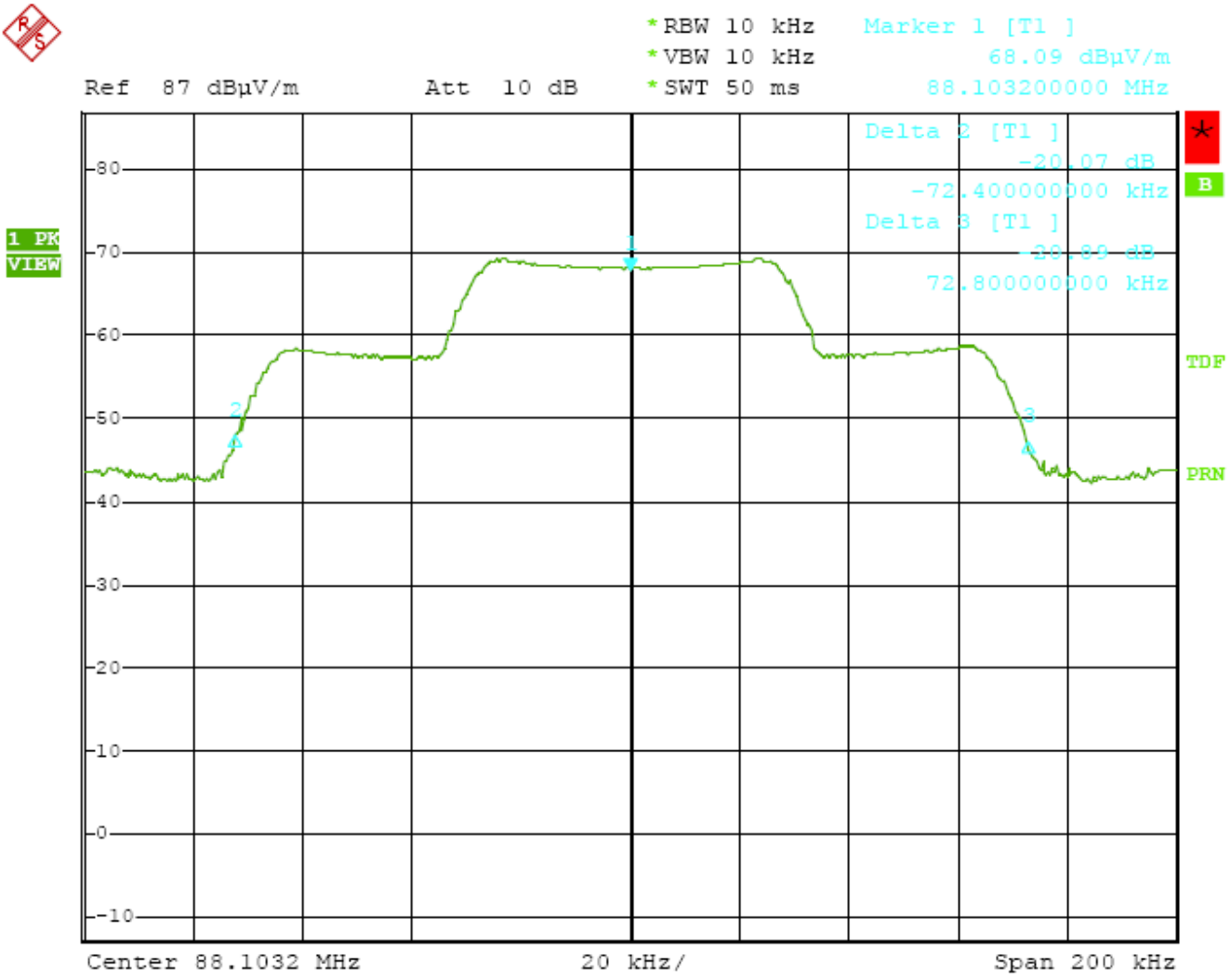
Trace: Ref Trace:

Condition: FCC SECTION15.209 3m HORIZONTAL
eut : FM Transmitter M/N:YIA-FMT02
power: DC 3.3V
memo : FM 107.9MHz
manuf: Thakral



Trace: Ref Trace:

Condition: FCC SECTION15.209 3m VERTICAL
eut : FM Transmitter M/N:YIA-FMT02
power: DC 3.3V
memo : FM 107.9MHz
manuf: Thakral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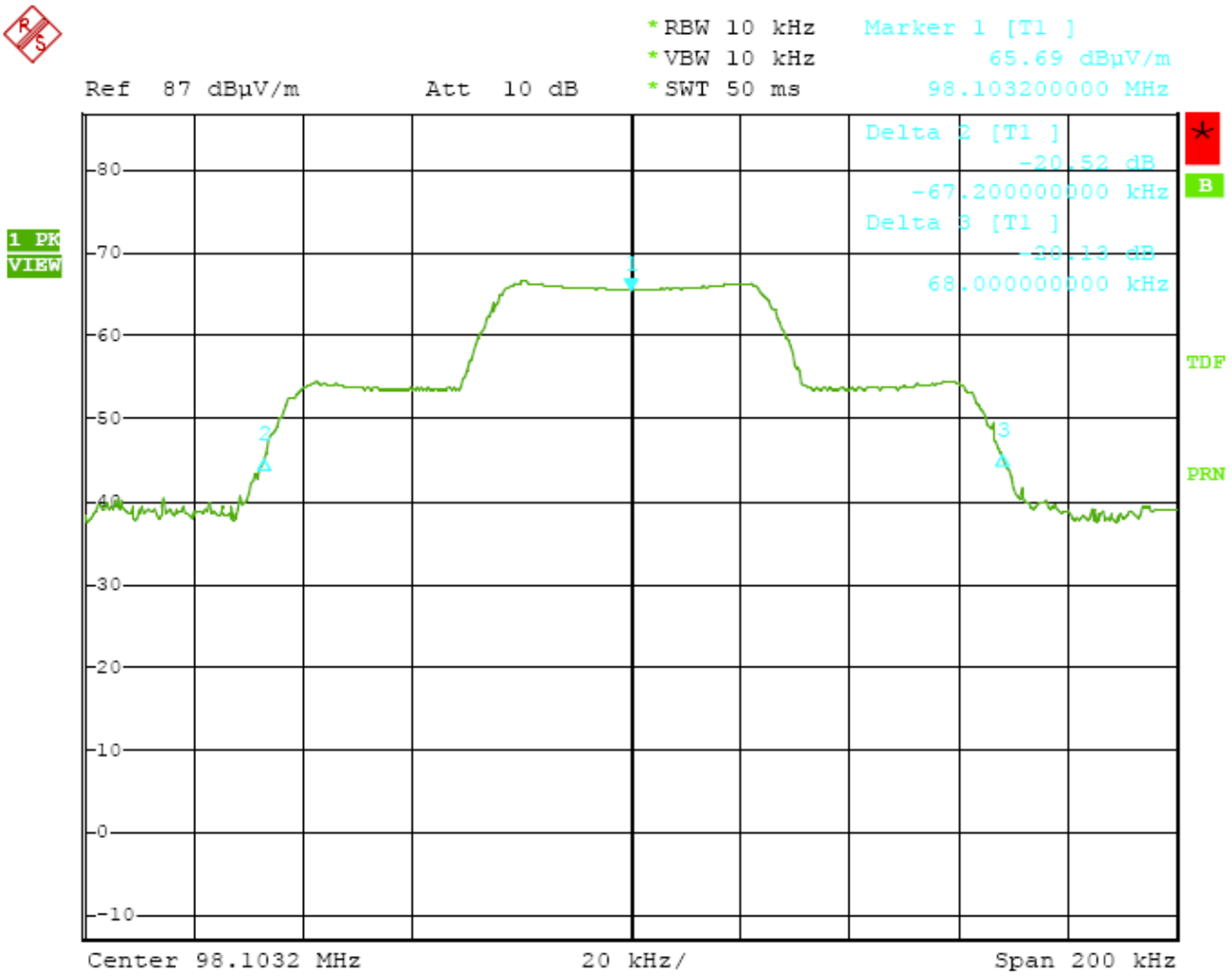
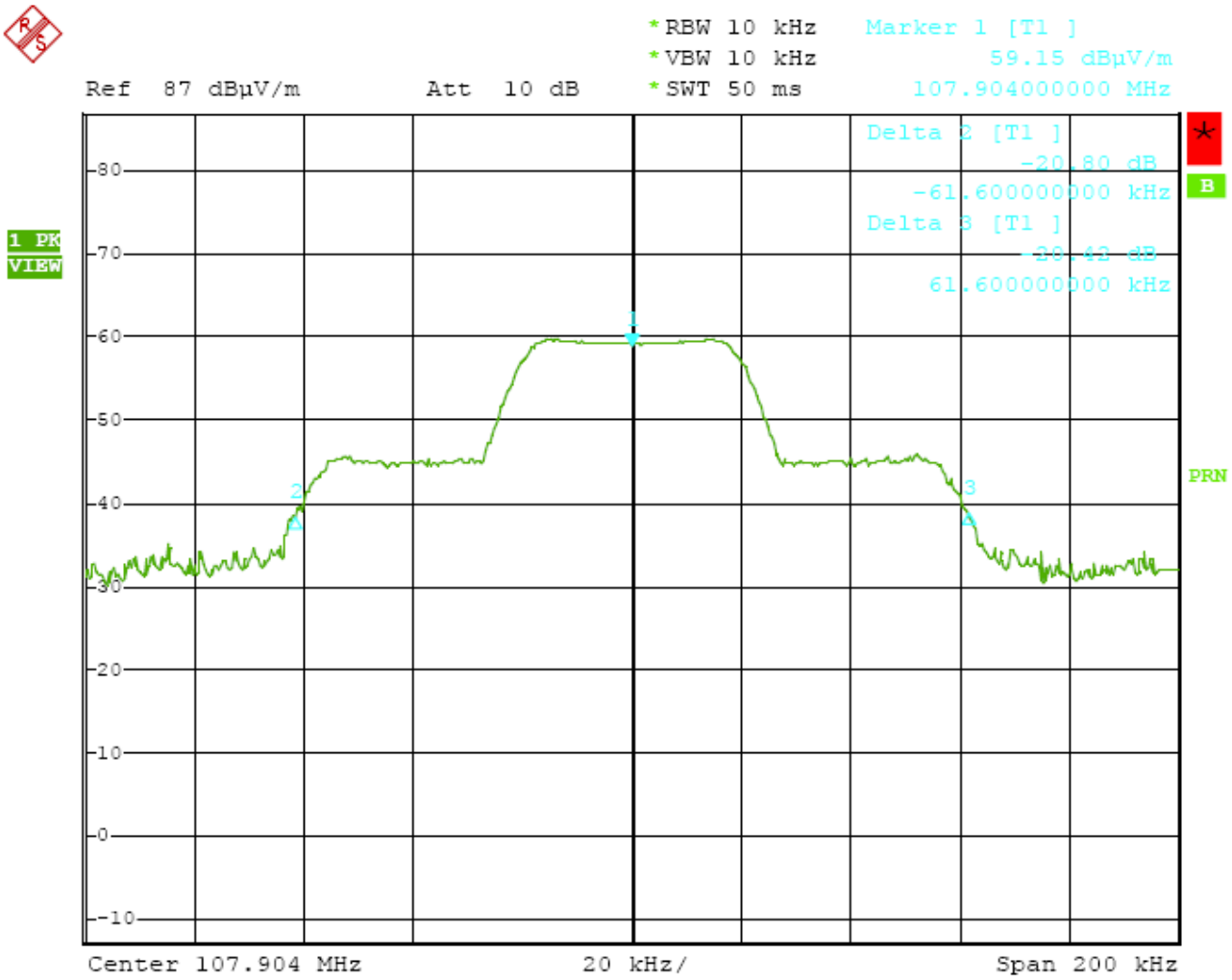
*VBW 10 kHz
*SWT 50 ms
Marker 1 [T1]
68.09 dBµV/m
88.103200000 MHz
Ref 87 dBµV/m
Att 10 dB
Delta 2 [T1]
-20.07 dB
-72.400000000 kHz
Delta 3 [T1]
-20.80 dB
72.800000000 kHz
1 PK
VIEW
B
TDF
PRN
80
70
60
50
40
30
20
10
0
-10
Center 88.1032 MHz
20 kHz/
Span 200 kHz


*RBW 10 kHz
*VBW 10 kHz
*SWT 50 ms
Marker 1 [T1]
65.69 dBµV/m
98.103200000 MHz
Ref 87 dBµV/m
Att 10 dB
Delta 2 [T1]
-20.52 dB
-67.200000000 kHz
Delta 3 [T1]
-20.13 dB
68.000000000 kHz
1 PK
VIEW
B
TDF
PRN
80
70
60
50
40
30
20
10
0
-10
Center 98.1032 MHz
20 kHz/
Span 200 kHz


*RBW 10 kHz
*VBW 10 kHz
*SWT 50 ms
Marker 1 [T1]
59.15 dBµV/m
107.904000000 MHz
Ref 87 dBµV/m
Att 10 dB
Delta 2 [T1]
-20.80 dB
-61.600000000 kHz
Delta 3 [T1]
-20.42 dB
61.600000000 kHz
1 PK
VIEW
B
PRN
80
70
60
50
40
30
20
10
0
-10
Center 107.904 MHz
20 kHz/
Span 200 kHz