FCC CERTIFICATION
On Behalf of
Thakral Electronics

FM Transmitter
Model No.: YIA-FMT03

FCC ID: UAQFMT03

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	:	ATE20060913
Date of Test	:	May 25, 2006
Date of Report	:	May 29, 2006

TABLE OF CONTENTS

Description Page

Test Report Certification

Applicant	:	Thakral Electronics
Manufacturer	:	Micro Electronics Ltd.
EUT Description	:	FM Transmitter
		(A) MODEL NO.: YIA-FMT03
		(B) SERIAL NO.: N/A
		(C) POWER SUPPLY: 3.3V DC

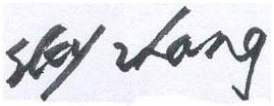
Measurement Procedure Used:

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

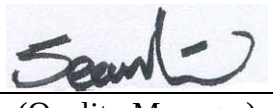
The device described above is tested by ACCURATE TECHNOLOGY CO. LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section15.239 limits. The measurement results are contained in this test report and ACCURATE TECHNOLOGY 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-FMT03
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

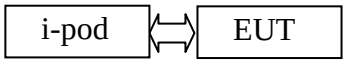
Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	04.01.2007
EMI Test Receiver	Rohde&Schwarz	ESI26	838786/013	04.01.2007
Bilog Antenna	Schwarzbeck	VULB9163	9163-194	04.01.2007
Bilog Antenna	Chase	CBL6112B	2591	04.01.2007
Horn Antenna	Rohde&Schwarz	HF906	100013	04.01.2007
Spectrum Analyzer	Anritsu	MS2651B	6200238856	04.01.2007
Pre-Amplifier	Agilent	8447D	2944A10619	04.01.2007
Signal Generator	GW	GAG-810	0913317	04.01.2007

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

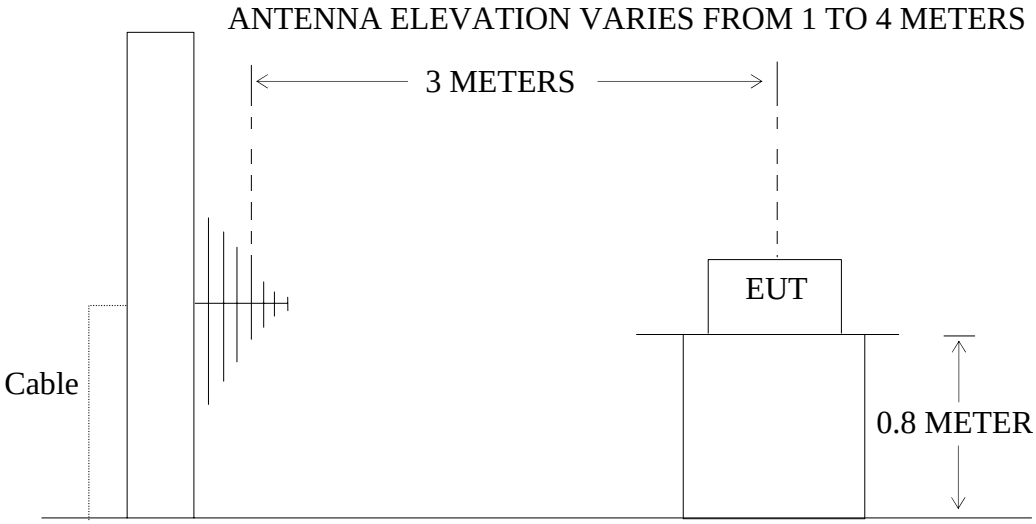
3.1.Block Diagram of Test Setup

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-FMT03
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-FMT03	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	176.212	29.5	8.8	38.3	43.5	5.2
Horizontal	264.328	24.4	9.6	34.0	46.0	12.0
Horizontal	352.420	19.5	13.1	32.6	46.0	13.4
Horizontal	440.516	15.7	14.5	30.2	46.0	15.8
Horizontal	528.616	17.0	15.8	32.8	46.0	13.2
Horizontal	616.728	18.1	17.3	35.4	46.0	10.6
Horizontal	704.812	18.3	17.8	36.1	46.0	9.9
Vertical	176.226	18.7	8.8	27.5	43.5	16.0
Vertical	264.324	15.2	9.6	24.8	46.0	21.2
Vertical	352.424	9.0	13.1	22.1	46.0	23.9
Vertical	440.512	10.2	14.5	24.7	46.0	21.3
Vertical	528.612	11.1	15.8	26.9	46.0	19.1

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-FMT03	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	196.228	27.5	9.8	37.3	43.5	6.2
Horizontal	294.322	25.3	11.7	37.0	46.0	9.0
Horizontal	392.436	19.0	13.8	32.8	46.0	13.2
Horizontal	490.528	21.1	15.1	36.2	46.0	9.8
Horizontal	588.608	19.7	17.0	36.7	46.0	9.3
Horizontal	686.720	19.4	17.7	37.1	46.0	8.9
Horizontal	784.816	16.7	18.0	34.7	46.0	11.3
Vertical	196.215	17.5	9.8	27.3	43.5	16.2
Vertical	294.304	14.2	11.7	25.9	46.0	20.1
Vertical	490.512	12.9	15.1	28.0	46.0	18.0

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-FMT03	Power Supply:	3.3V DC
Test Mode:	TX 107.9MHz	Test Engineer:	Andy

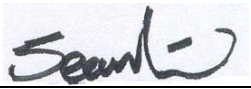
Polarization	Frequency (MHz)	Reading(dBμV/m) QP	Factor Corr.(dB)	Result(dBμV/m) QP	Limits(dBμV/m) QP	Margin(dBμV/m) QP
Horizontal	215.840	28.2	9.5	37.7	43.5	5.8
Horizontal	323.732	29.7	12.6	42.3	46.0	3.7
Horizontal	431.628	21.8	14.3	36.1	46.0	9.9
Horizontal	539.520	18.4	16.0	34.4	46.0	11.6
Horizontal	647.436	17.9	17.5	35.4	46.0	10.6
Horizontal	755.318	14.9	17.9	32.8	46.0	13.2
Vertical	215.824	17.2	9.5	26.7	43.5	16.8
Vertical	323.740	17.2	12.6	29.8	46.0	16.2
Vertical	431.616	16.4	14.3	30.7	46.0	15.3
Vertical	539.520	16.5	16.0	32.5	46.0	13.5

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

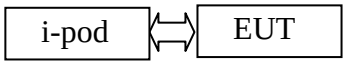
Where Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss – Amplifier Gain

Reviewer **:** 

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

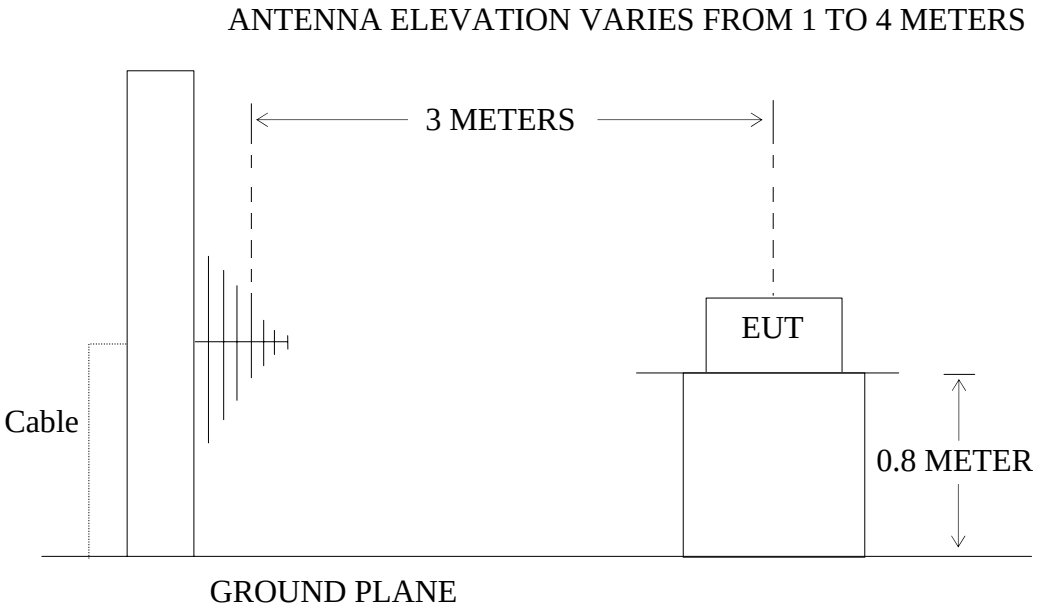
4.1.Block Diagram of Test Setup

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-FMT03
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.

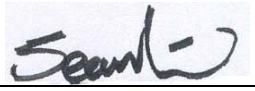
Date of Test:	May 25, 2006	Temperature:	22°C
EUT:	FM Transmitter	Humidity:	50%
Model No.:	YIA-FMT03	Power Supply:	3.3V DC
Test Mode:	TX	Test Engineer:	Andy

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	39.3/92	42.8/138
	Vertical	31.2/36	34.6/54
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	38.4/83	41.8/123
	Vertical	31.0/35	34.3/52
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	39.2/91	42.5/133
	Vertical	33.9/50	37.1/72
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-FMT03
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.

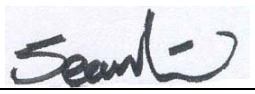
Let the EUT work in TX modes (On with 1kHz signal) measure it. The transmit frequency are 88.1-107.9MHz.We are select 88.1M, 98.1M, 107.9MHz TX frequency to transmitted.

5.4.Test Procedure

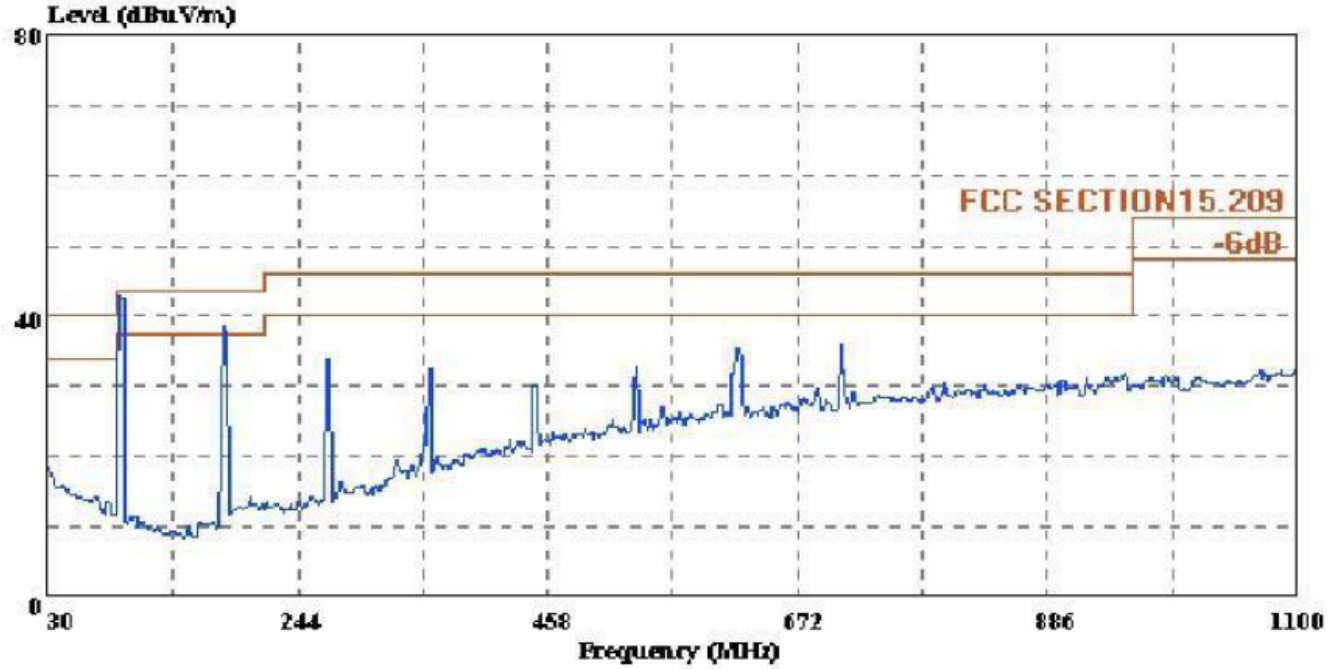
The zero level was set without modulation. A small sample of the transmitter output was fed into the spectrum analyzer and above photo was taken. The vertical scale is set to 10dB per division; the horizontal scale is set to 20kHz per division.

5.5. Test Result

The EUT does meet the FCC requirement.

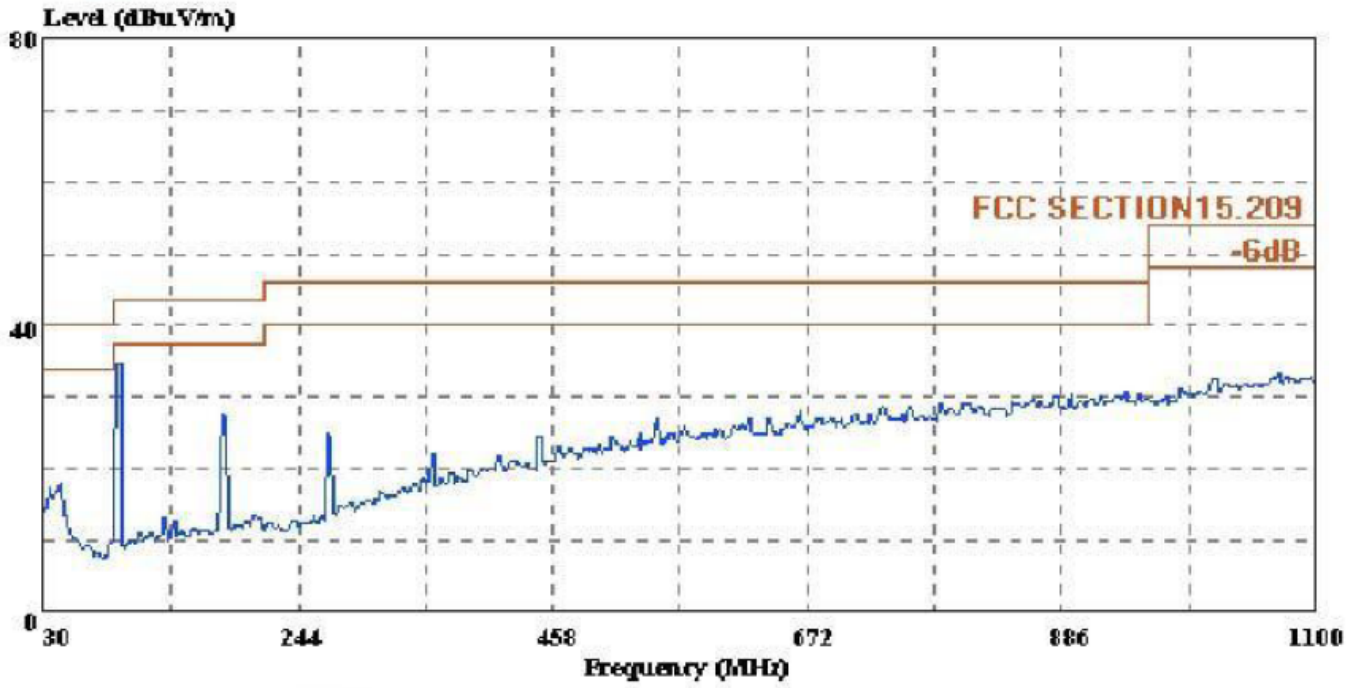
Reviewer **:** 

APPENDIX I
(Test Curves)



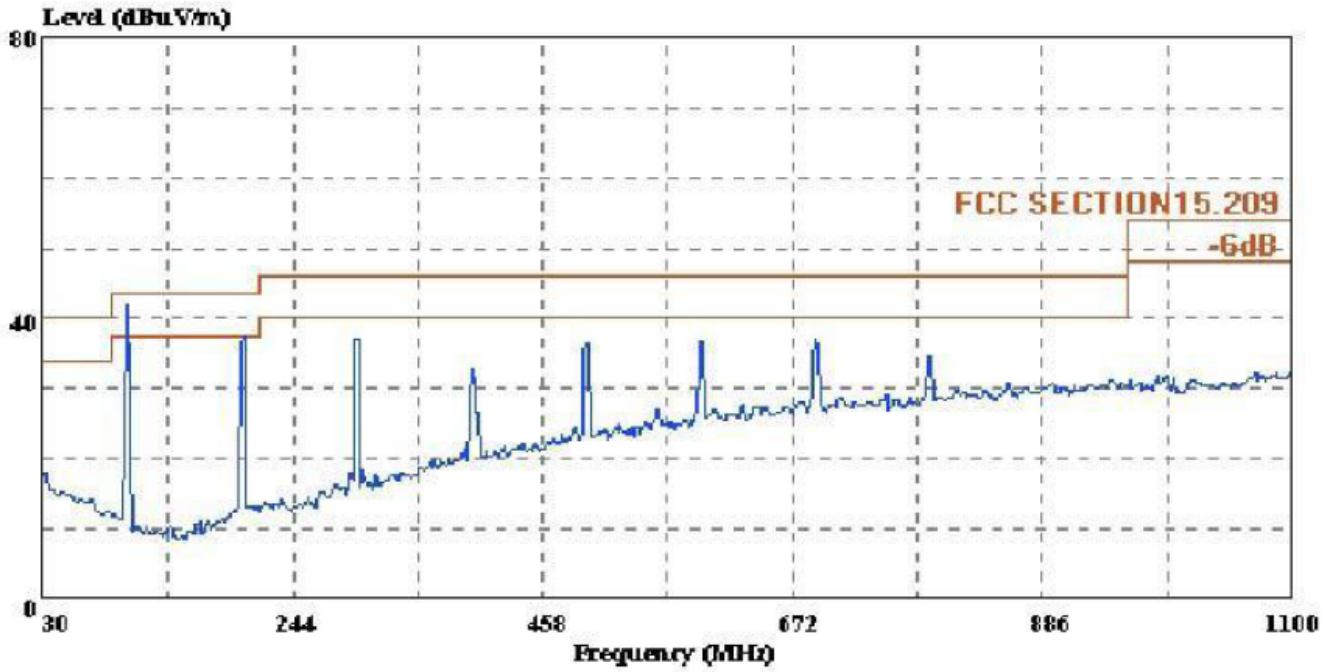
Trace: Ref Trace:

Condition: FCC SECTION15.209 3m HORIZONTAL
eut : FM Transmitter M/N:YIA-FMT03
power: DC 3.3V
memo : FM 88.1MHz
manuf: Thakral



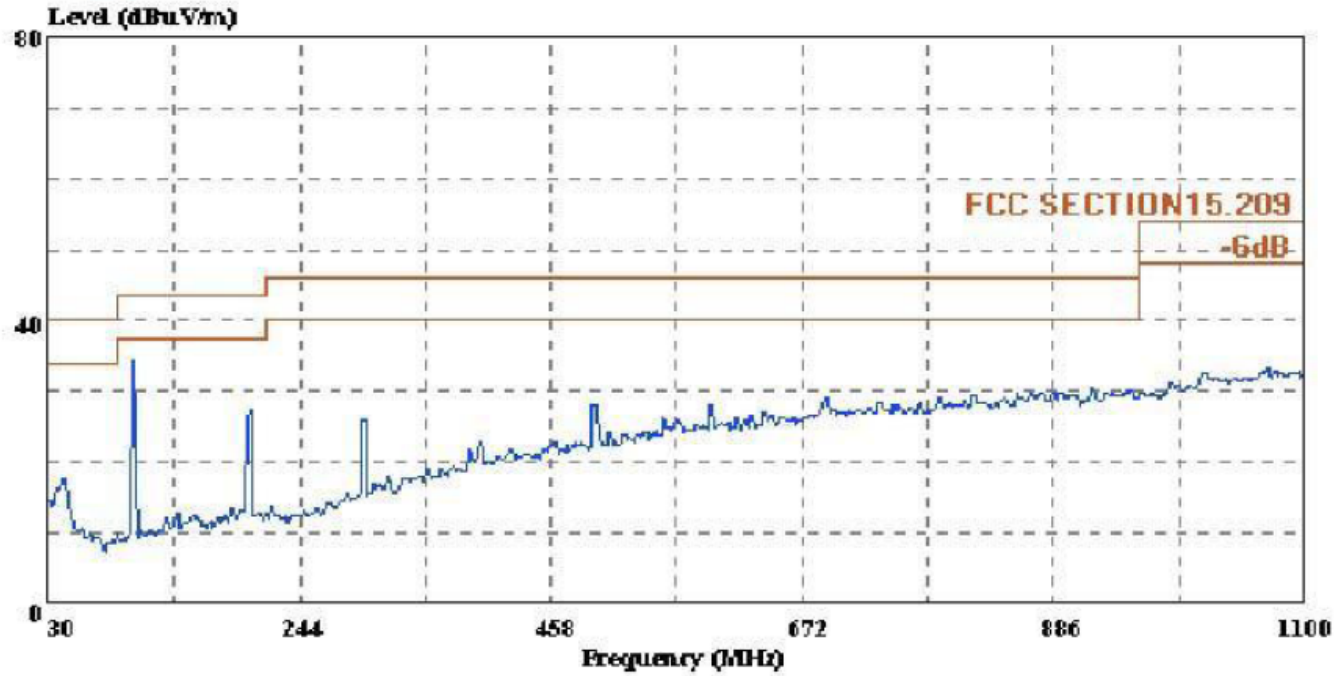
Trace: Ref Trace:

Condition: FCC SECTION15.209 3m VERTICAL
eut : FM Transmitter M/N:YIA-FMT03
power: DC 3.3V
memo : FM 88.1MHz
manuf: Thakral



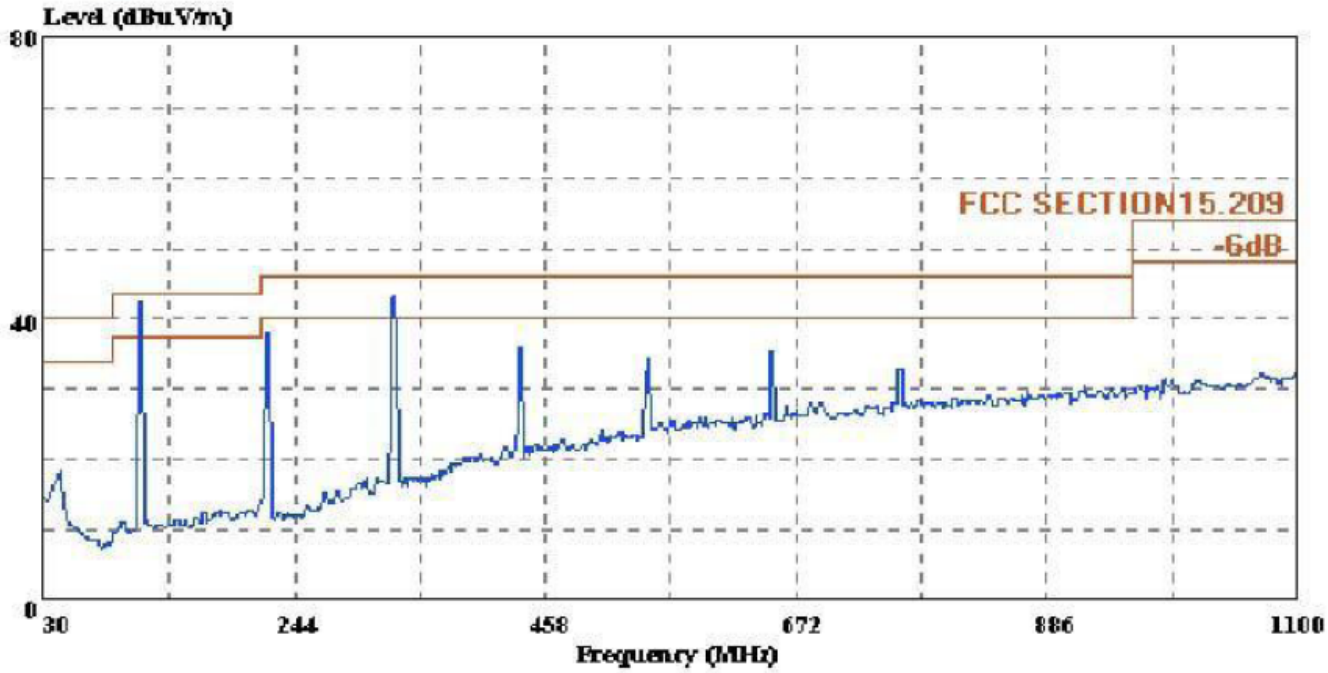
Trace: Ref Trace:

Condition: FCC SECTION15.209 3m HORIZONTAL
eut : FM Transmitter M/N:YIA-FMT03
power: DC 3.3V
memo : FM 98.1MHz
manuf: Thakral



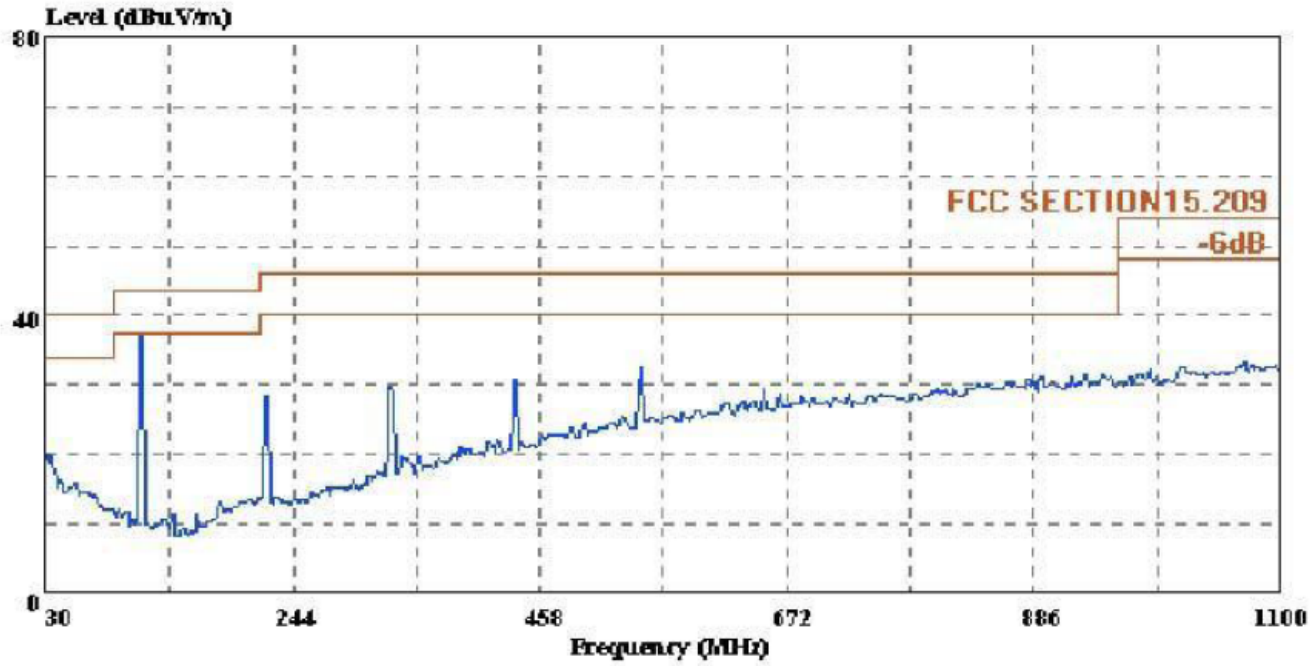
Trace: Ref Trace:

Condition: FCC SECTION15.209 3m VERTICAL
eut : FM Transmitter M/N:YIA-FMT03
power: DC 3.3V
memo : FM 98.1MHz
manuf: Thakral



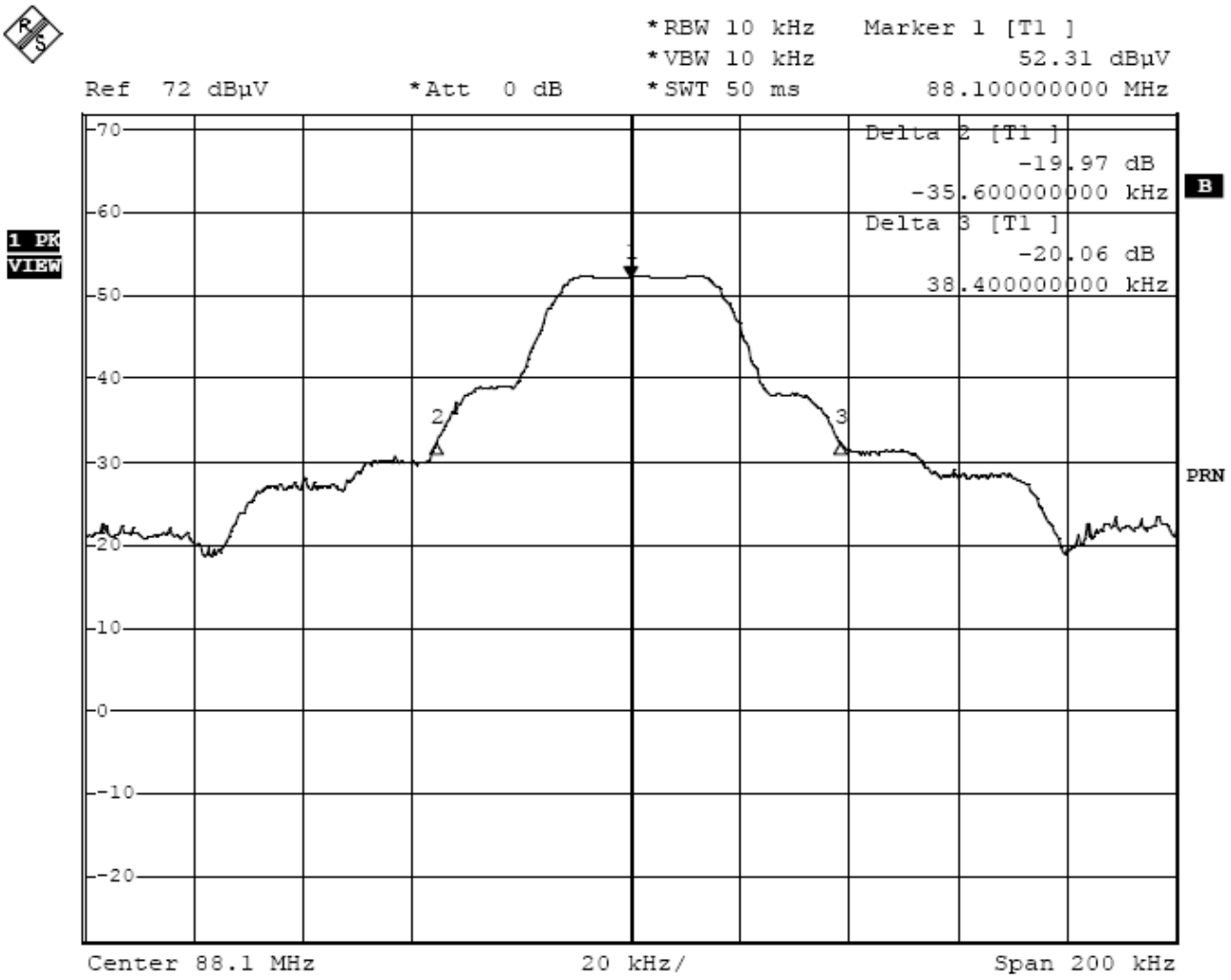
Trace: Ref Trace:

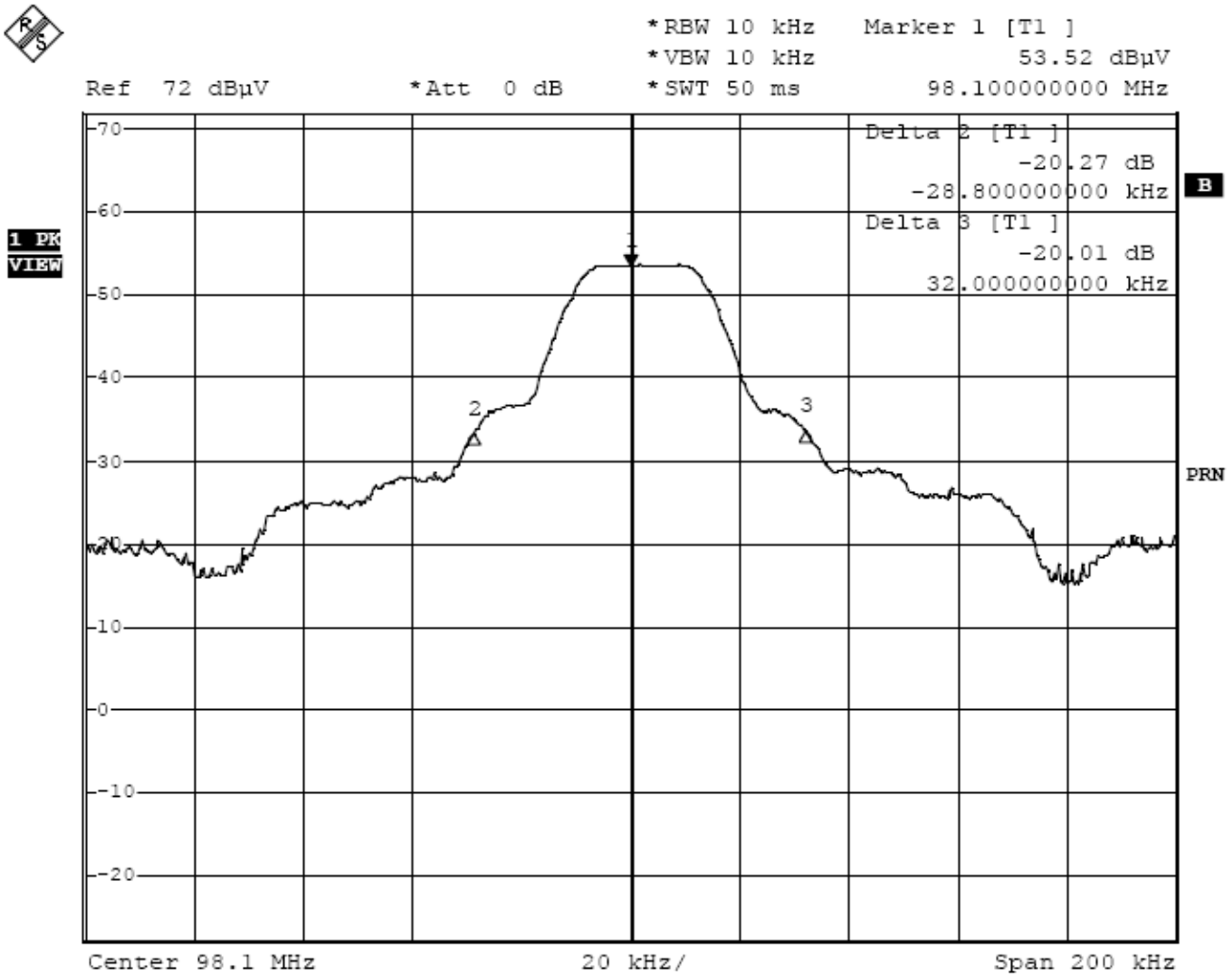
Condition: FCC SECTION15.209 3m HORIZONTAL
eut : FM Transmitter M/N:YIA-FMT03
power: DC 3.3V
memo : FM 107.9MHz
manuf: Thakral

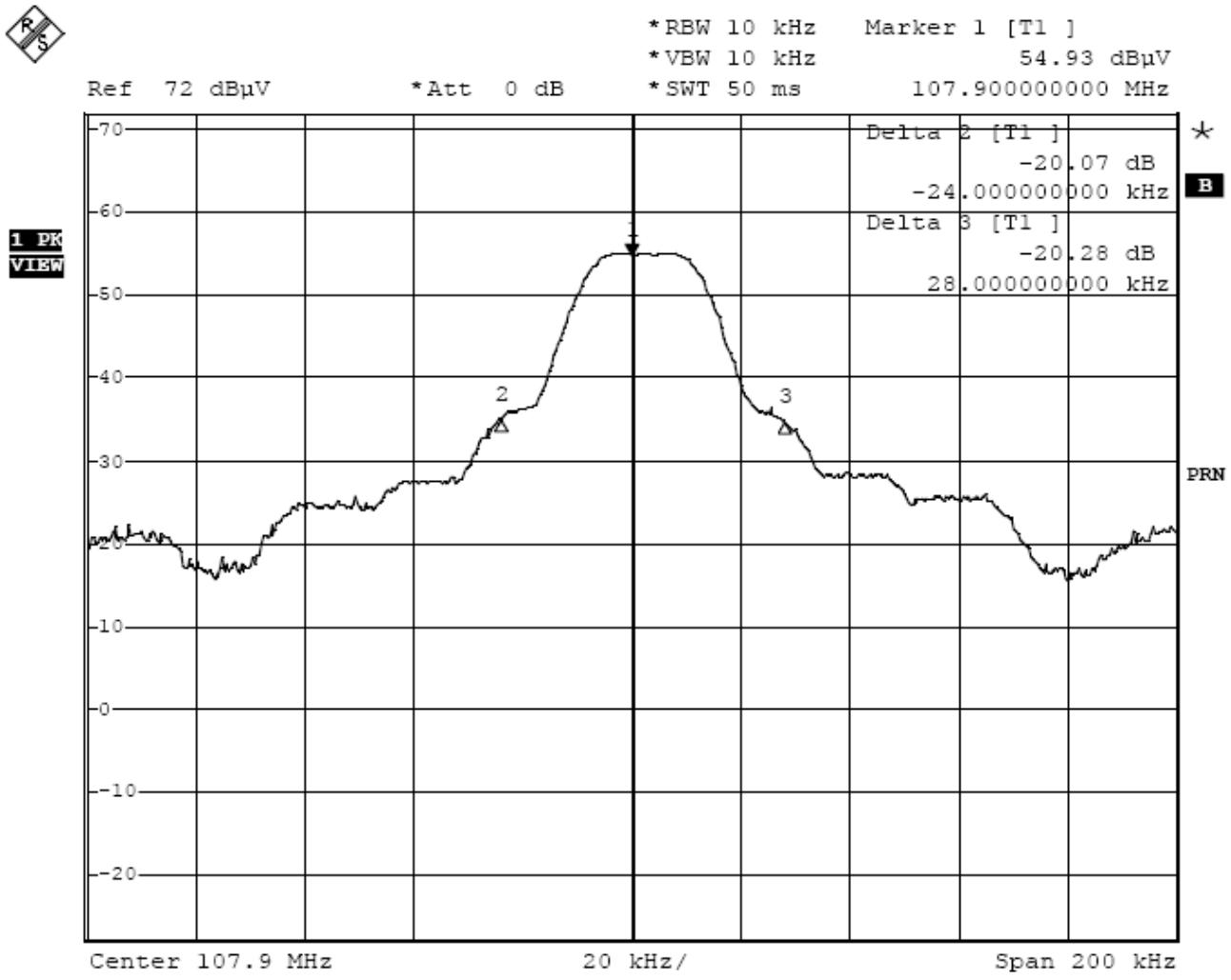


Trace: Ref Trace:

Condition: FCC SECTION15.209 3m VERTICAL
eut : FM Transmitter M/N:YIA-FMT03
power: DC 3.3V
memo : FM 107.9MHz
manuf: Thakral


*RBW 10 kHz
*VBW 10 kHz
*SWT 50 ms
Marker 1 [T1]
52.31 dBµV
88.100000000 MHz
Ref 72 dBµV
*Att 0 dB
Delta 2 [T1]
-19.97 dB
-35.600000000 kHz
Delta 3 [T1]
-20.06 dB
38.400000000 kHz
1 PK
VIEW
B
PRN
70
60
50
40
30
20
10
0
-10
-20
Center 88.1 MHz
20 kHz/
Span 200 kHz


*RBW 10 kHz
*VBW 10 kHz
*SWT 50 ms
Marker 1 [T1]
53.52 dBµV
98.100000000 MHz
Ref 72 dBµV
*Att 0 dB
Delta 2 [T1]
-20.27 dB
-28.800000000 kHz
Delta 3 [T1]
-20.01 dB
32.000000000 kHz
1 PK
VIEW
B
PRN
70
60
50
40
30
20
10
0
-10
-20
Center 98.1 MHz
20 kHz/
Span 200 kHz


*RBW 10 kHz
*VBW 10 kHz
*SWT 50 ms
Marker 1 [T1]
54.93 dBµV
107.900000000 MHz
Ref 72 dBµV
*Att 0 dB
Delta 2 [T1]
-20.07 dB
-24.000000000 kHz
Delta 3 [T1]
-20.28 dB
28.000000000 kHz
1 PK
VIEW
B
PRN
70
60
50
40
30
10
0
-10
-20
Center 107.9 MHz
20 kHz/
Span 200 kHz