Test Report

Product Name	Portable Data Collection Terminal
Model No	MM3
FCC ID.	U7X-MM3

Applicant	M3 Mobile Co., Ltd.
Address	DongWon B/D, 725-30, Yeoksam-dong, Gangnam-gu, Seoul, 135-080, Korea

Date of Receipt	July 30, 2009
Issue Date	Sep. 14, 2009
Report No.	098068S-CUSTOM-A
Report Version	V1.0

Test Report Certification

Issue Date: Sep. 14, 2009
Report No.: 098068S-CUSTOM-A

Accredited by NIST (NVLAP)
NVLAP Lab Code: 200533-0

Product Name	Portable Data Collection Terminal
Applicant	M3 Mobile Co., Ltd.
Address	DongWon B/D, 725-30, Yeoksam-dong, Gangnam-gu, Seoul, 135-080, Korea
Manufacturer	M3 Mobile Co., Ltd.
Model No.	MM3
EUT Rated Voltage	AC 120V/60Hz
EUT Test Voltage	AC 120V/60Hz
Trade Name	Hand Held Terminal
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2008 ANSI C63.4: 2003 NVLAP Lab Code: 200533-0
Test Result	Complied

The test results relate only to the samples tested.
The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.
This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

(Vincent Lin)
Approval

(Tom Hsieh)
Test Engineer

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1. Radiated Emission

1.1. Test Equipment

The following test equipment are used during the radiated emission test:

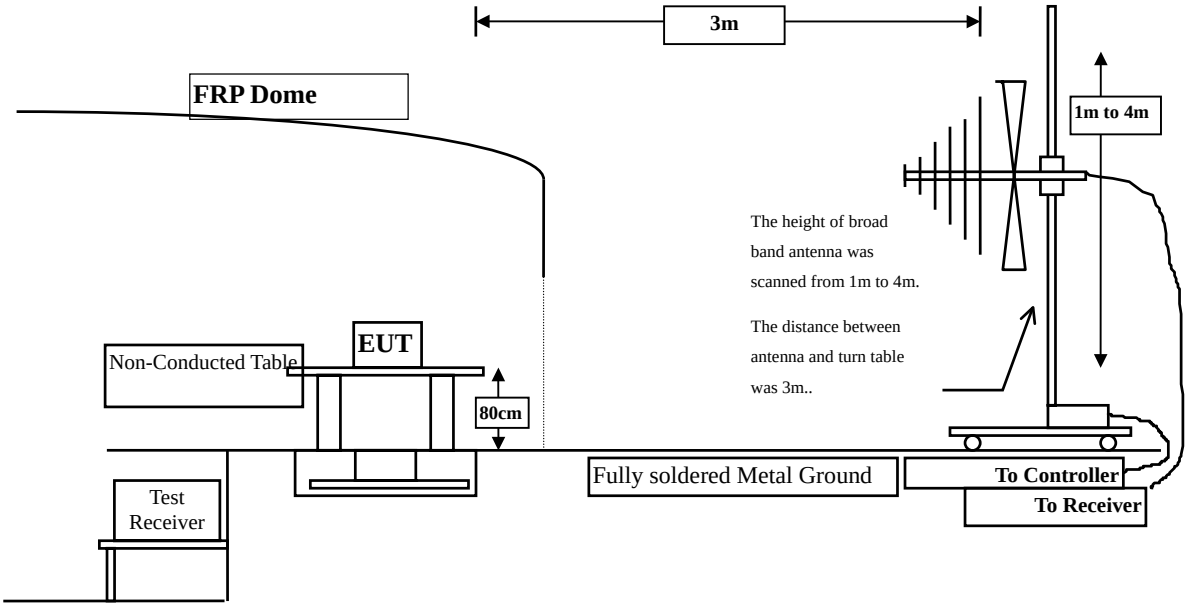
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2009
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2009
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2009
	X	Pre-Amplifier	AGILENT	8447D/2944A09549	Sep., 2009
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2009
	X	Spectrum Analyzer	R & S	FSP40 / 100170	Nov, 2008
	X	Spectrum Analyzer	Advantest	R3162/91700283	Oct., 2008
	X	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2009
	X	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

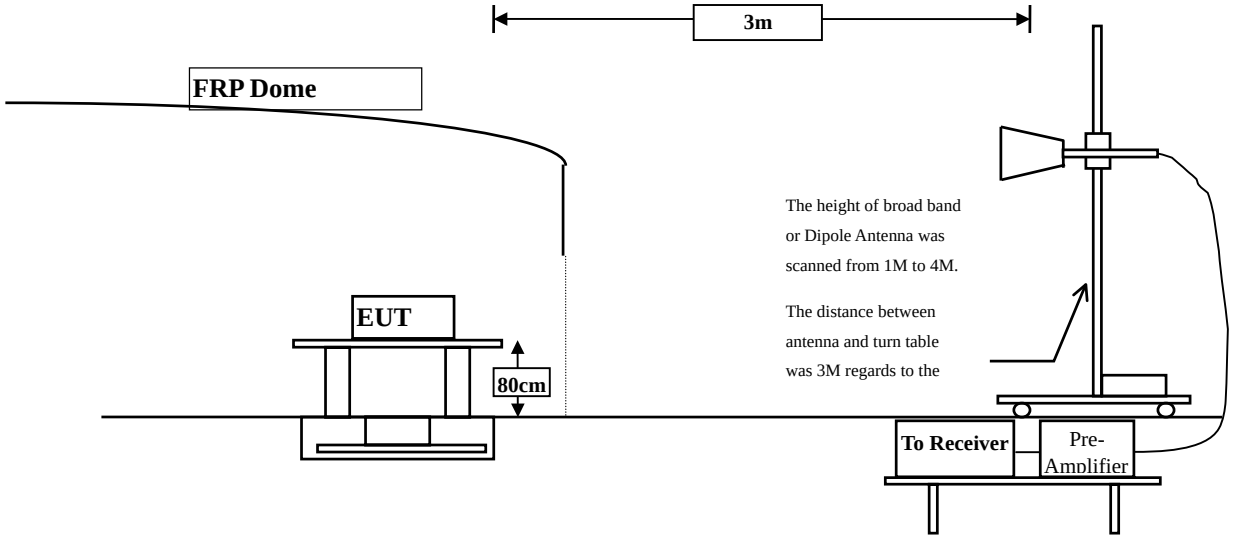
2. The test instruments marked with "X" are used to measure the final test results.

1.2. Test Setup

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



1.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks: E field strength (dBuV/m) = 20 log E field strength (uV/m)

1.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.
The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.
The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2003 on radiated measurement.
The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.
Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.
The measurement is divided into the Preliminary Measurement and the Final Measurement.
The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB beamwidth of the antenna.
The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.
The frequency range from 30MHz to 10th harminics is checked.

1.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

1.6. Test Result of Radiated Emission

Product : Portable Data Collection Terminal
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS Mode 1: Transmitter
Test Mode : Mode 1: Transmitter - 802.11a 6Mbps (5745 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11490.000	-3.019	63.310	60.291	-13.709	74.000
17235.000	2.303	47.150	49.453	-24.547	74.000
Average Detector:					
11490.000	-3.019	48.600	45.581	-8.419	54.000
Vertical					
Peak Detector:					
11490.000	-4.029	63.330	59.301	-14.699	74.000
17235.000	2.768	45.980	48.748	-25.252	74.000
Average Detector:					
11490.000	-4.029	49.550	45.521	-8.479	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Portable Data Collection Terminal
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter - 802.11a 6Mbps (5785 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11570.000	-3.151	64.490	61.339	-12.661	74.000
17355.000	3.877	46.510	50.387	-23.613	74.000
Average Detector:					
11570.000	-3.151	49.890	46.739	-7.261	54.000
Vertical					
Peak Detector:					
11570.000	-4.371	63.180	58.809	-15.191	74.000
17355.000	3.212	45.200	48.412	-25.588	74.000
Average Detector:					
11570.000	-4.371	49.700	45.329	-8.671	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Portable Data Collection Terminal
Test Item : Harmonic Radiated Emission Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter - 802.11a 6Mbps (5825 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
11610.000	-3.236	63.020	59.784	-14.216	74.000
17415.000	4.535	45.890	50.425	-23.575	74.000
Average Detector:					
11610.000	-3.236	47.970	44.734	-9.266	54.000
Vertical					
Peak Detector:					
11610.000	-4.496	62.040	57.544	-16.456	74.000
17415.000	3.270	44.650	47.920	-26.080	74.000
Average Detector:					
11610.000	-4.496	45.990	41.494	-12.506	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

2. Peak Power Output

2.1. Test Equipment

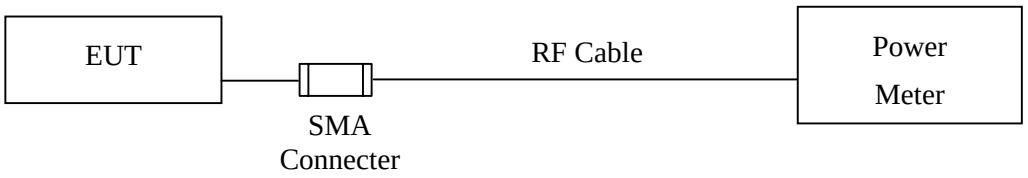
The following test equipments are used during the radiated emission tests:

Equipment		Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2009
X	Power Sensor	Anritsu	MA2491A/034457	May, 2009

Note: 1. All instruments are calibrated every one year.
2. The test instruments marked by "X" are used to measure the final test results.

2.2. Test Setup

Conducted Measurement



2.3. Limits

The maximum peak power shall be less 1 Watt.

2.4. Test Procedure

The EUT was tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

2.5. Uncertainty

± 1.27 dB

2.6. Test Result of Peak Power Output

Product : Portable Data Collection Terminal
Test Item : Peak Power Output Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter - 802.11a 6Mbps

Cable loss=1dB		Peak Power Output (dBm)								
Channel No.	Frequency (MHz)	Data Rate (Mbps)								Required Limit
		6	9	12	18	24	36	48	54	
149	5745	17.22	--	--	--	--	--	--	--	1Watt= 30 dBm
157	5785	16.58	16.32	16.5	16.22	15.98	15.69	16.05	16.22	1Watt= 30 dBm
165	5825	16.13	--	--	--	--	--	--	--	1Watt= 30 dBm

Note: Peak Power Output Value =Reading value on peak power meter + cable loss

3. RF antenna conducted test

3.1. Test Equipment

The following test equipments are used during the radiated emission tests:

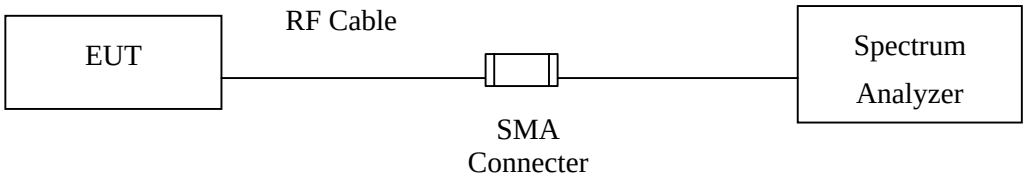
Equipment		Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	R&S	FSP40 / 100170	Nov, 2008
	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2009
	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2009

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

2. The test instruments marked with "X" are used to measure the final test results.

3.2. Test Setup

RF antenna Conducted Measurement:



3.3. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

3.4. Test Procedure

The EUT was tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW> RBW, scan up through 10th harmonic.

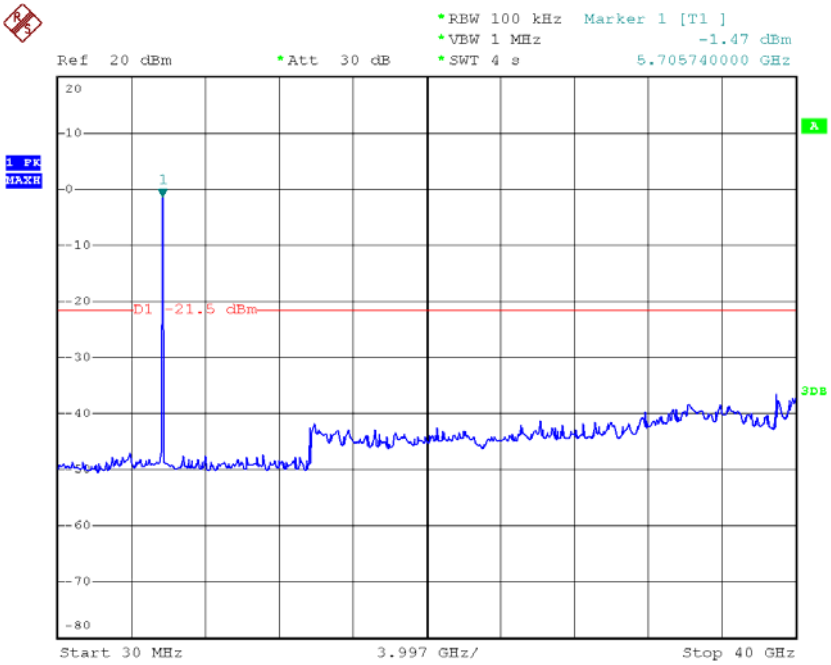
3.5. Uncertainty

The measurement uncertainty
Conducted is defined as ± 1.27dB

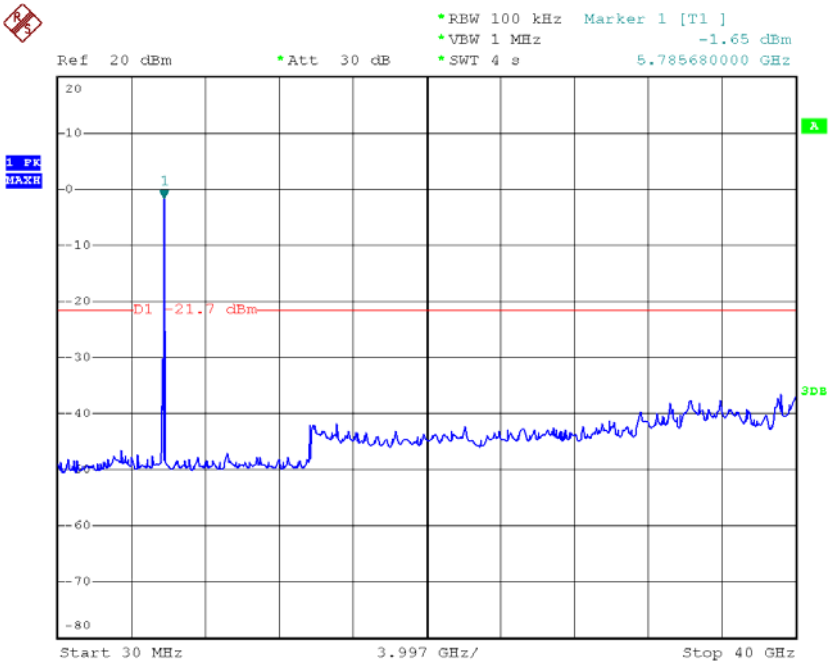
3.6. Test Result of RF antenna conducted test

Product : Portable Data Collection Terminal
Test Item : RF Antenna Conducted Spurious
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter - 802.11a 6Mbps

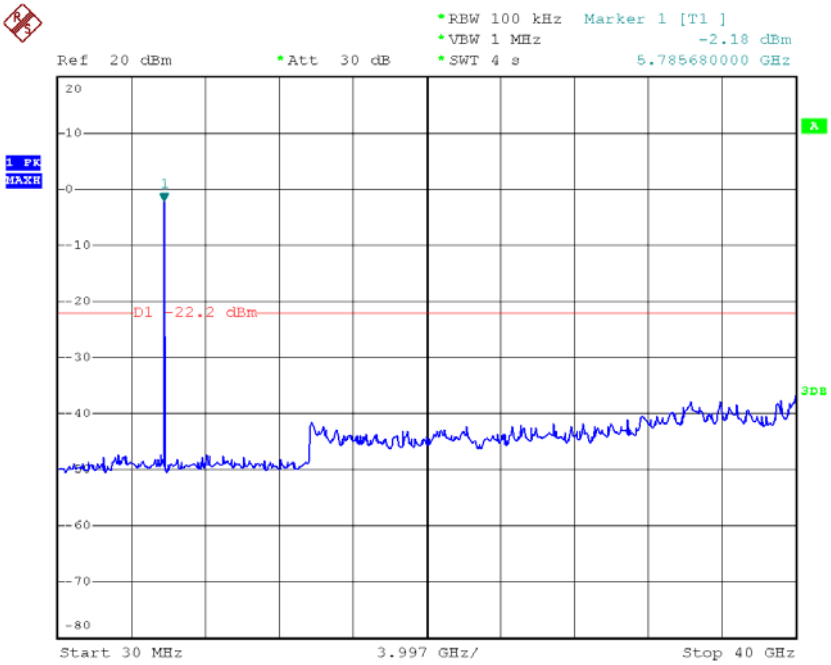
Channel 149 (5745MHz) 30MHz -40GHz



Channel 157 (5785MHz) 30MHz -40GHz



Channel 165 (5825MHz) 30MHz -40GHz



4. Occupied Bandwidth

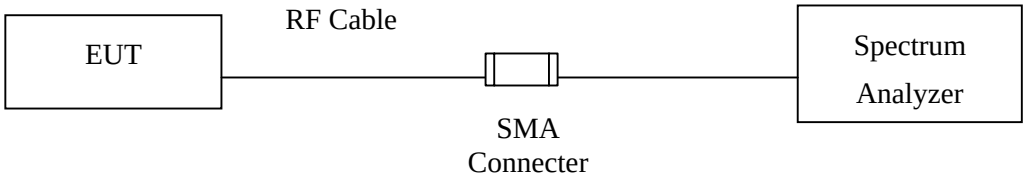
4.1. Test Equipment

The following test equipments are used during the radiated emission tests:

Equipment		Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr, 2009

Note: 1. All instruments are calibrated every one year.
2. The test instruments marked by "X" are used to measure the final test results.

4.2. Test Setup



4.3. Limits

The minimum bandwidth shall be at least 500 kHz.

4.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.
Set RBW = 100 kHz, Span greater than RBW.

4.5. Uncertainty

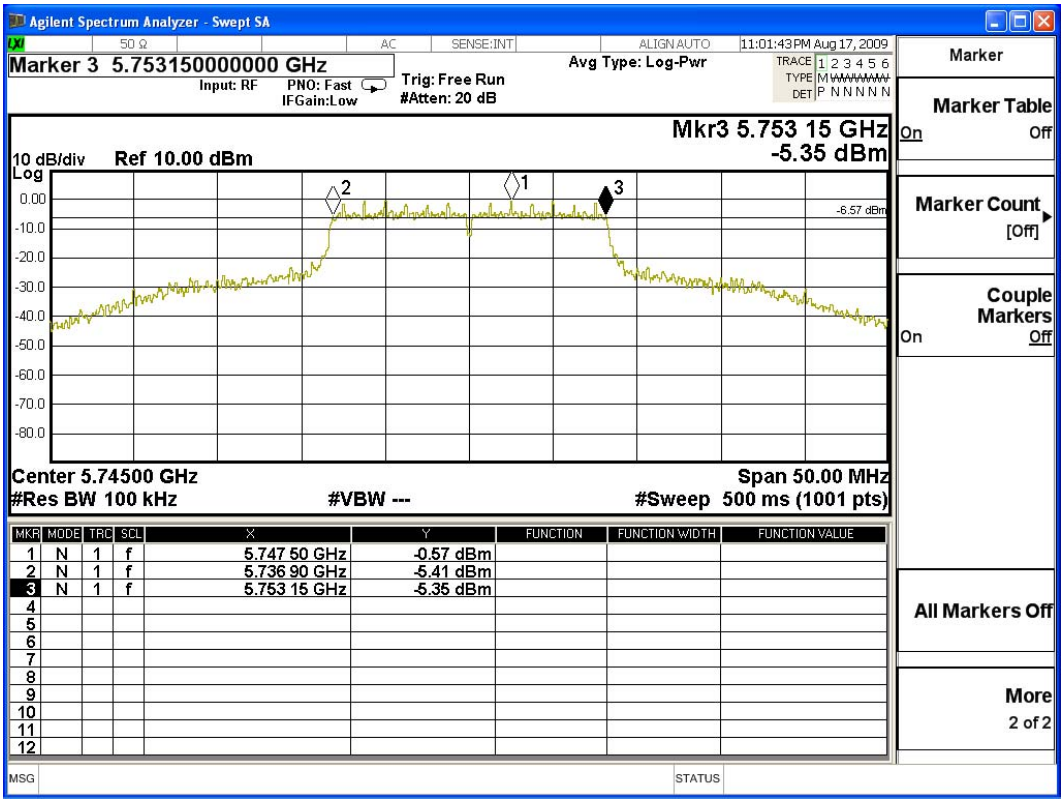
± 150Hz

4.6. Test Result of Occupied Bandwidth

Product : Portable Data Collection Terminal
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter - 802.11a 6Mbps (5745MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149 (6Mbps)	5745.00	16260	>500	Pass

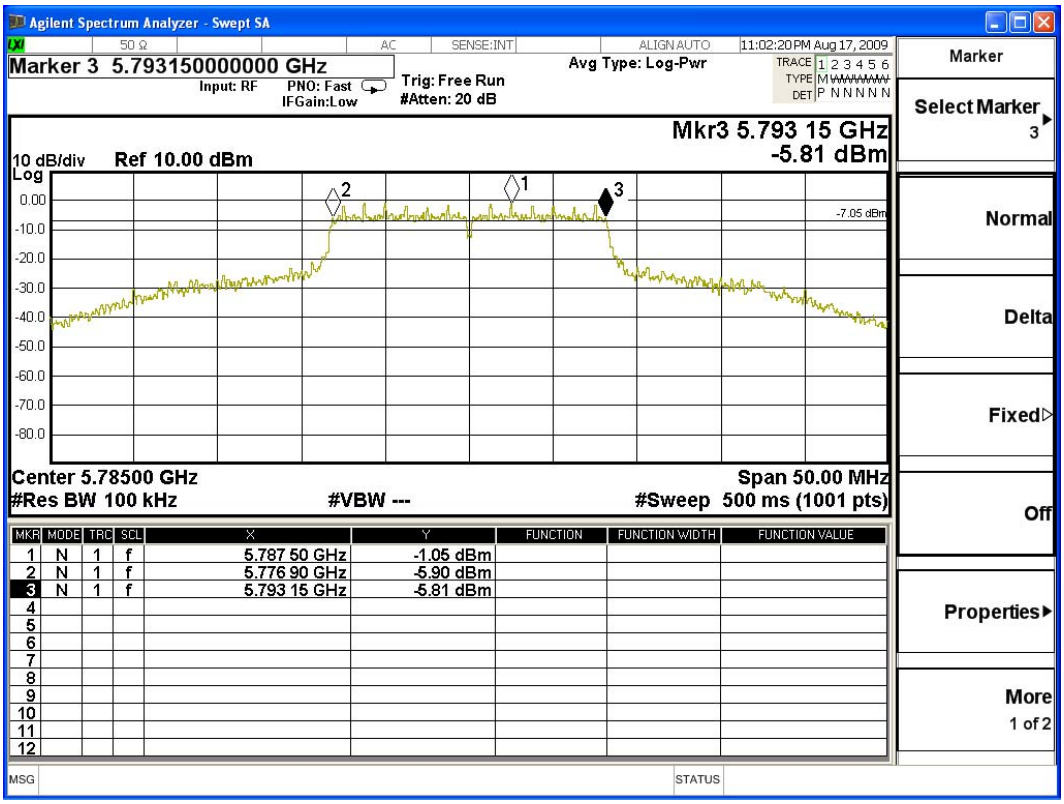
Figure Channel 149:



Product : Portable Data Collection Terminal
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter - 802.11a 6Mbps (5785MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
157 (6Mbps)	5785.00	16250	>500	Pass

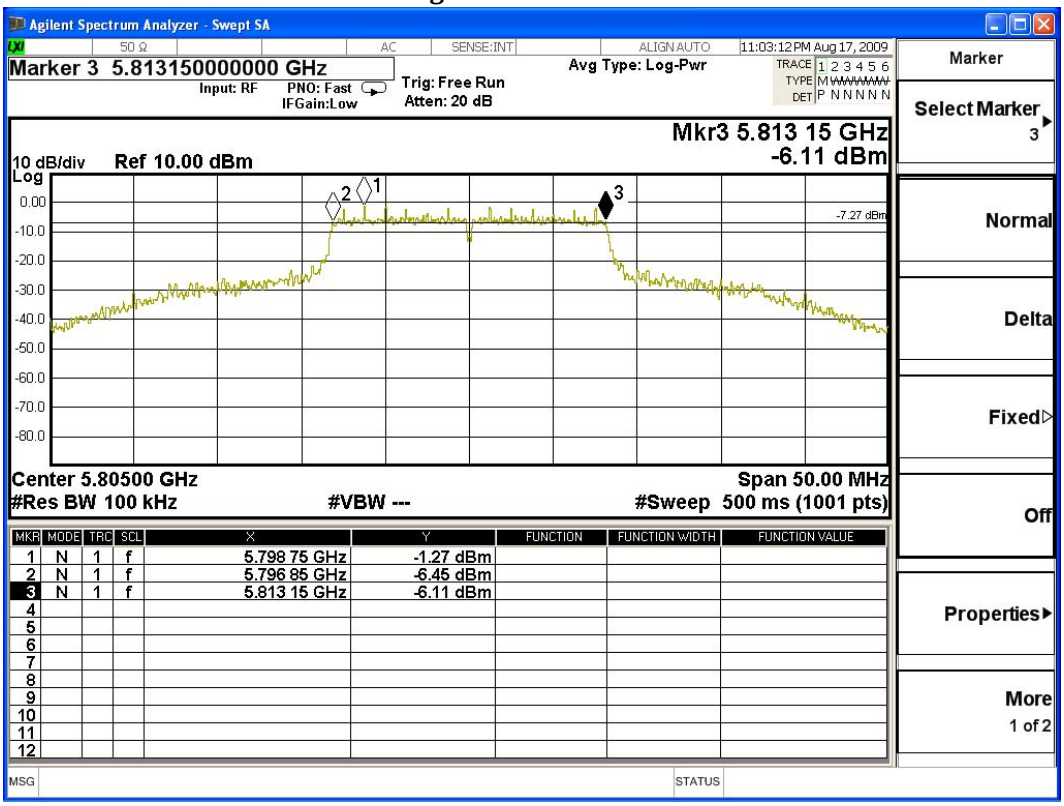
Figure Channel 157:



Product : Portable Data Collection Terminal
Test Item : Occupied Bandwidth Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter - 802.11a 6Mbps (5825MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
165 (6Mbps)	5825.00	16300	>500	Pass

Figure Channel 165:



5. Power Density

5.1. Test Equipment

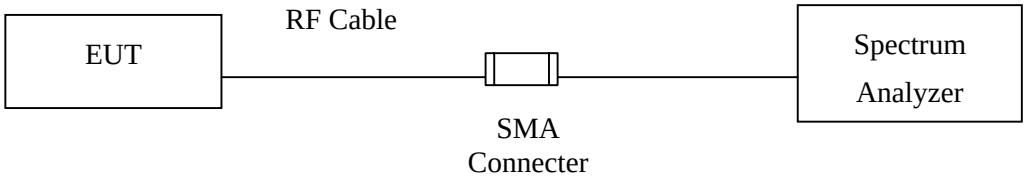
The following test equipments are used during the radiated emission tests:

Equipment		Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr, 2009

Note: 1. All equipments are calibrated every one year.

2. The test instruments marked by "X" are used to measure the final test results.

5.2. Test Setup



5.3. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

5.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003; tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW= 3 kHz, VBW=10KHz, Sweep time=(SPAN/3KHz), detector=Peak detector

5.5. Uncertainty

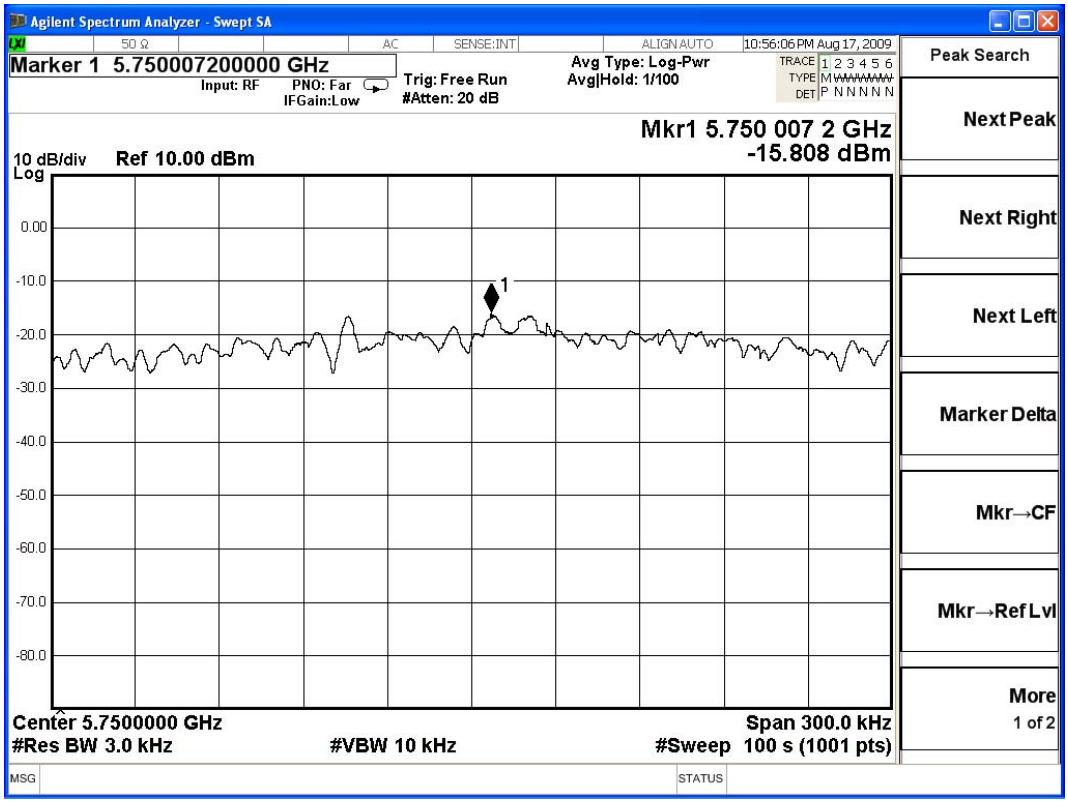
± 1.27 dB

5.6. Test Result of Power Density

Product : Portable Data Collection Terminal
Test Item : Power Density Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter - 802.11a 6Mbps (5745MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
149 (6Mbps)	5745.000	-15.808	< 8dBm	Pass

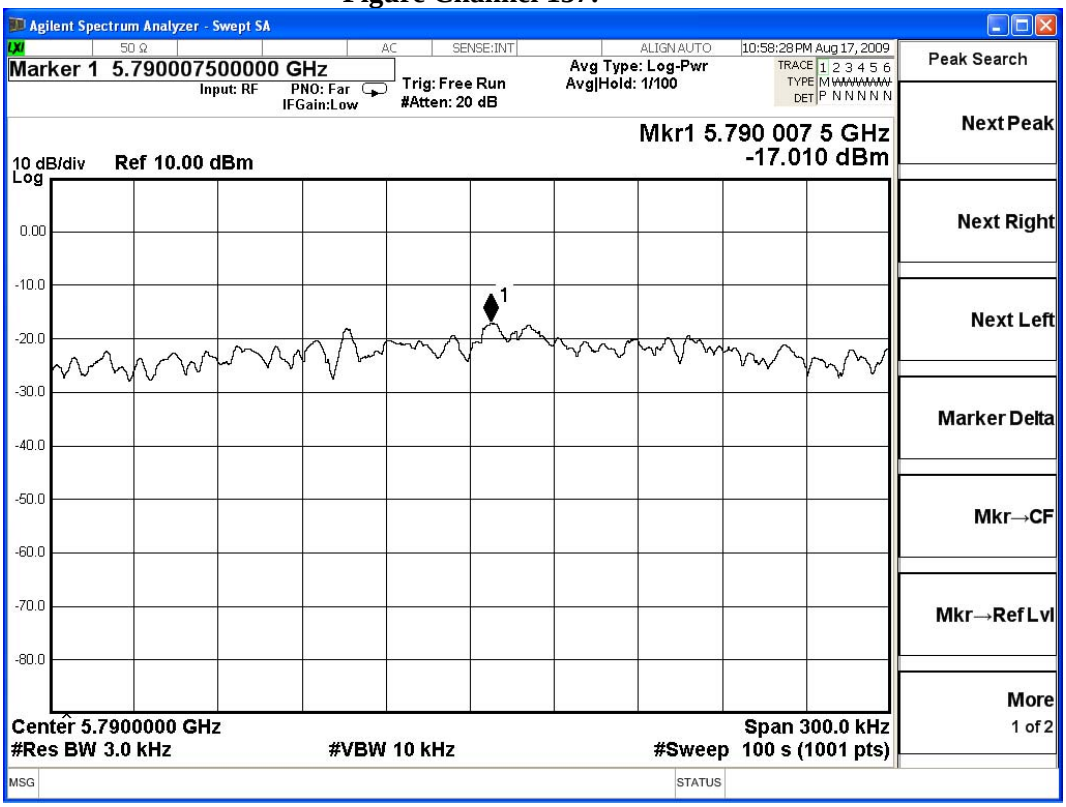
Figure Channel 149:



Product : Portable Data Collection Terminal
Test Item : Power Density Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter - 802.11a 6Mbps (5785MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
157(6Mbps)	5785.000	-17.010	< 8dBm	Pass

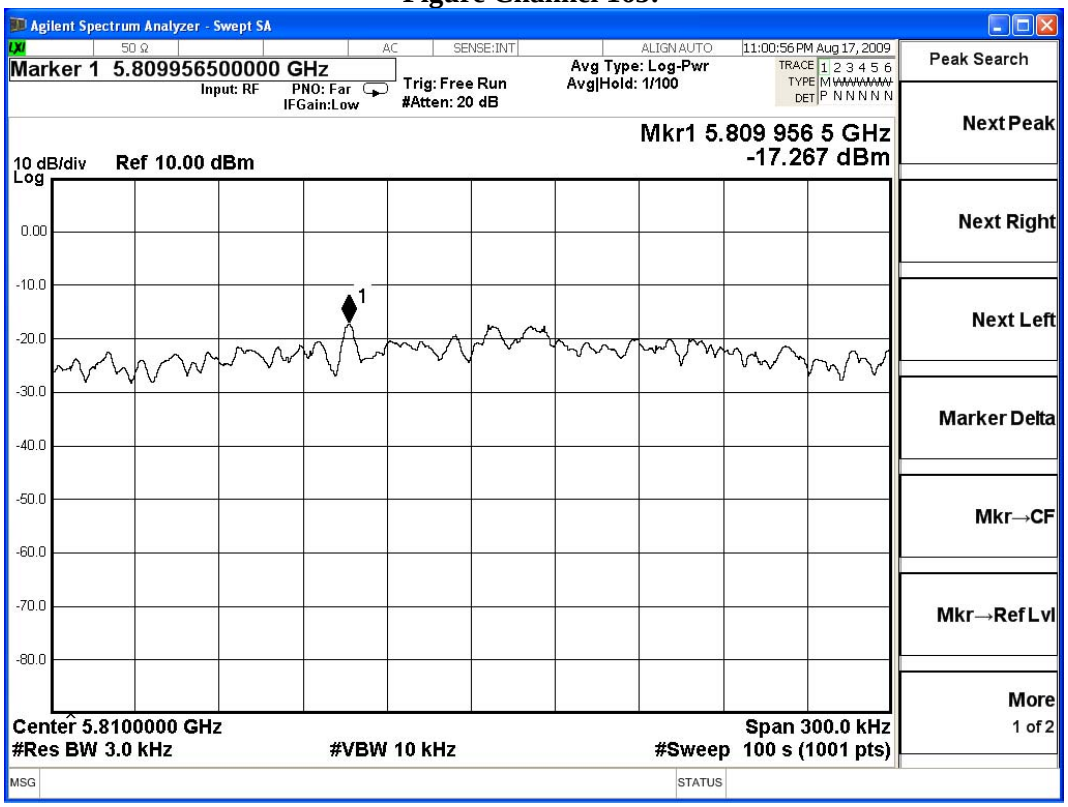
Figure Channel 157:



Product : Portable Data Collection Terminal
Test Item : Power Density Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter - 802.11a 6Mbps (5825MHz)

Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
165 (6Mbps)	5825.000	-17.267	< 8dBm	Pass

Figure Channel 165:



6. EUT Test Setup Photographs

Description： Front View of Radiated Test (Horn)

Description： Front View of Radiated Test (Horn)

Description： Front View of Radiated Test (Horn)

Description： Front View of Radiated Test (Horn)