Date: 2009-10-05
No.: 60.870.9.014.02F

TEST REPORT

Applicant:	Chaney Instrument Co. Room 1102-3, Enterprise Square One, Tower 3, No 9, Sheung Yuet Road, Kowloon Bay, Kowloon, Hong Kong	
Description of Samples:	Model name:	Professional Wireless Weather Station with Wind Sensor & Atomic Clock (RHT)
	Brand name:	ACURITE
	Model no.:	00595-TX2
	FCCID:	RNE00595XTX2
Date Samples Received:	2009-09-17	
Date Tested:	2009-09-18 to 2009-09-22	
Investigation Requested:	FCC Part 15 Subpart C, Section 15.231	
Conclusions:	The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.	
Remarks:	----	

Checked by:

Prudence Poon
Project Manager
Telecom department

Approved by:-

Victor Kwan
Manager
Telecom department

TÜV SÜD Hong Kong Ltd.
3/F, West Wing, Phase 2, 10 Science Park West Avenue, Shatin, Hong Kong.

CONTENT:

1.0 General Details

1.1 Test Laboratory

Hong Kong Productivity Council
HKPC Building, 78 Tat Chee Avenue, Kowloon Tong,
Hong Kong

Registration Number: 90656

1.2 Applicant Details

Applicant

Primex Asia Limited
Room 1102-3, Enterprise Square One, Tower 3,
No 9, Sheung Yuet Road, Kowloon Bay,
Kowloon, Hong Kong

Manufacturer

HONG JI ELECTRONICS FTY
NO.41, QINGSHUI ROAD, LONGXI VILLAGE,
LONGGANG TOWN, LONGGANG DIST.,
SHENZHEN 518116 CHINA

1.3 Equipment Under Test [EUT]

Description of EUT

Model Name:	Professional Wireless Weather Station with Wind Sensor & Atomic Clock (RHT)
Brand Name:	ACURITE
Model Number:	00595-TX2
FCCID:	RNE00595XTX2
Rating:	3.0Vd.c. (2 x " AA" size batteries)
Antenna Type:	Integral
Operated Frequency:	433.980MHz
No. of Channel:	1
Accessories and Auxiliary Equipment:	None
EUT Exercising Software:	None

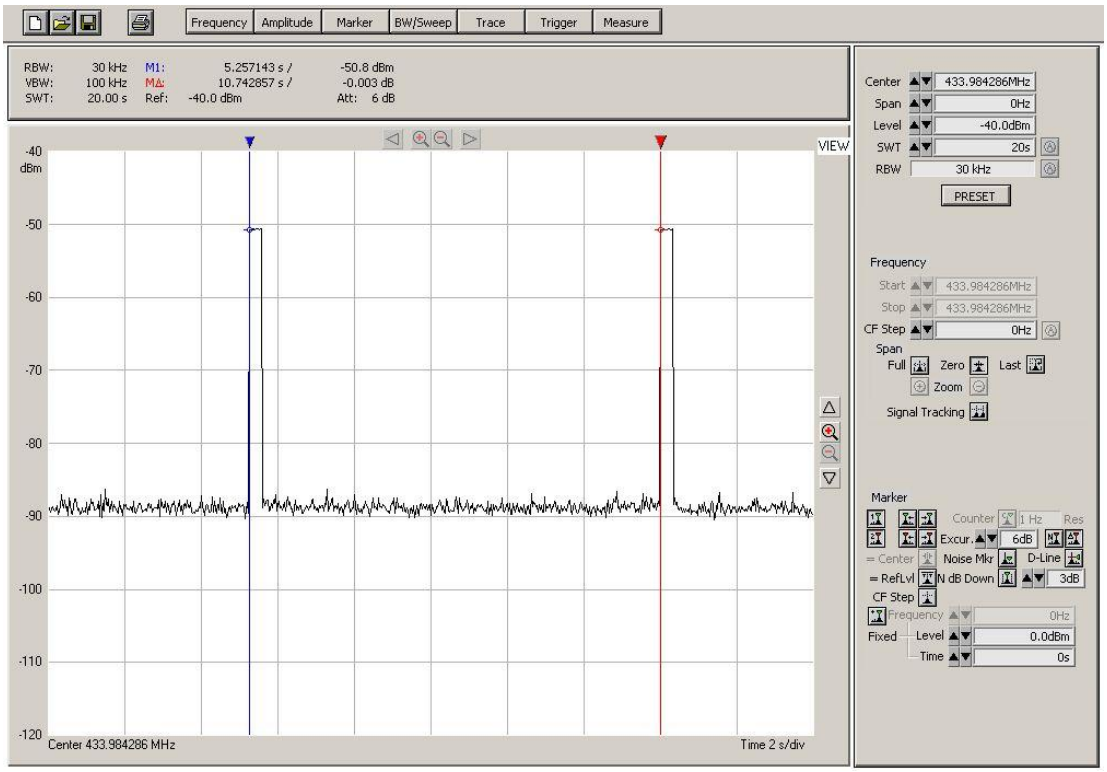
General Operation of EUT

The Equipment Under Test (EUT) is a transmitter operated at 433.980MHz to detect the indoor and outdoor temperature and humidity and transmit this information to its associated receiver.

Periodic Operation of EUT

The transmitter transmits signal for every 10.74 seconds, that mean the silence period must not less than 10.74 seconds. Each data packet is continuously transmitting for approximate 314ms in one transmission, it activated automatically shall cease transmission within 1 seconds after activation.

So the EUT is deemed to fulfill FCC section 15.231(e).
According to section 15.231(e), the EUT shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.



1.4 Related Submittal(s) Grants

This is a single application for certification of the transmitter.

2.0 Technical Details

2.1 Investigations Requested

Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2008 and ANSI C63.4: 2003 for FCC Verification.

2.2 Test Standards and Results Summary Tables

EMISSION Results Summary						
Test Condition	Test Requirement	Test Method	Class / Severity	Test Result		
				Pass	Failed	N/A
Radiated Emission of Carrier Frequency	FCC 47CFR 15.231	ANSI C63.4:2003	N/A	☒	☐	☐
Radiated Emission, 30MHz to 4.5GHz	FCC 47CFR 15.231	ANSI C63.4:2003	Class B	☒	☐	☐
Conducted Emission on AC, 0.15MHz to 30MHz	FCC 47CFR 15.207	ANSI C63.4:2003	Class B	☐	☐	☒
Bandwidth Measurement	FCC 47CFR 15.231	ANSI C63.4:2003	N/A	☒	☐	☐

Note: N/A - Not Applicable

3.0 Test Methodology

3.1 Radiated Emission

The sample was placed 0.8m above the ground plane on a standard emission test site *. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

*On a standard emission test site with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 90656.

3.2 Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

FS = R + System Factor
System Factor = AF + CF + FA – PA

Where FS = Net Field Strength in dBuV/m at 3 meters.
R = Reading of Spectrum Analyzer / Test Receiver in dBuV.
AF = Antenna Factor in dB.
CF = Cable Attenuation Factor in dB.
FA = Filter Attenuation Factor in dB.
PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

3.3 Conducted Emissions

The EUT was placed on a non-metallic table 0.8m above the horizontal metal reference place and 0.4m from a vertical ground plane which is connected to the horizontal metal ground plane. Meanwhile, the AC main of EUT was connected to the distance of 0.8m line impedance stabilization network (LISN) during measurement.

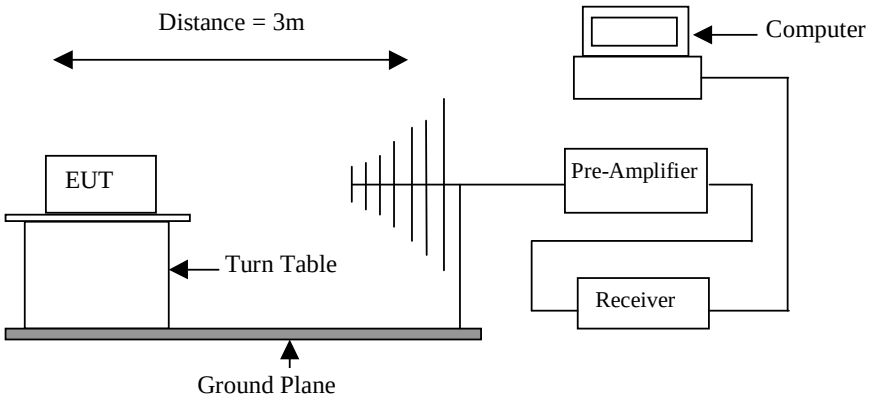
Initial measurements were performed in quasi-peak and average detection modes by the test receiver, any emissions recorded within 30dB of the relevant limit lines were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

4.0 Test Results

4.1 Radiated Emission of Fundamental Frequency

Test Requirement:	FCC part 15 section 15.231(e)
Test Method:	ANSI C63.4:2003
Test Date:	2009-09-18
Mode of Operation:	Transmitting mode.
Detector Function:	Peak
Measurement BW:	100 kHz

Test Setup:



Results: PASS

Radiated Emissions									
Value	Emissions Frequency **MHz**	E-Field Polarity	Reading **dBµV/m**	System Factor **dB**	Field Strength at 3m **dBµV/m**	Average Factor **dB**	Net Field Strength at 3m **dBµV/m**	Limit **dBµV/m**	Delta to Limit **dBµV/m**
PK	434.000	V	48.47	17.63	66.10	0.00	66.10	92.87	-26.77
AV	434.000	V	48.47	17.63	66.10	-5.42	60.68	72.87	-12.19
PK	434.000	H	36.57	17.63	54.20	0.00	54.20	92.87	-38.67
AV	434.000	H	36.57	17.63	54.20	-5.42	48.78	72.87	-24.09

Remark:
-Calculated measurement uncertainty: ±5.0dB
-Refer to section 4.5 for average factor calculation.

Limits for Fundamental Frequency: [Section 15.231(e)]:

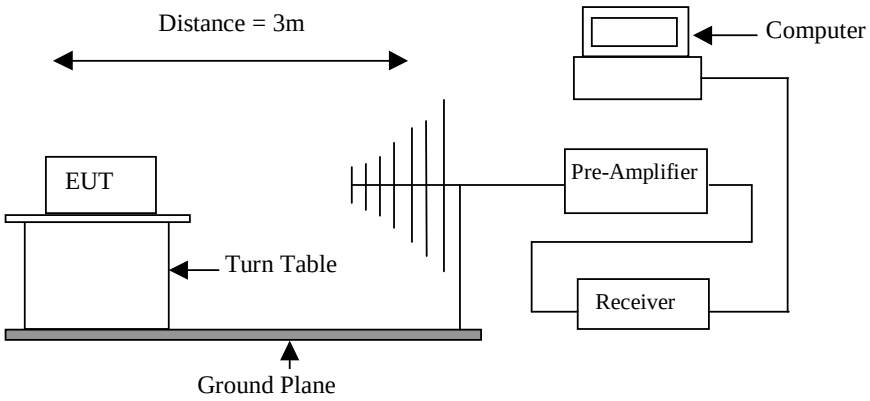
Fundamental Frequency [MHz]	Field Strength of Fundamental [µV/m]	Field Strength of Fundamental [dBµV/m]
434.000	4400.0145	72.87

Compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR peak detector.

4.2 Spurious Radiated Emission

Test Requirement:	FCC part 15 section 15.231(e)
Test Method:	ANSI C63.4:2003
Test Date:	2009-09-18
Mode of Operation:	Transmitting mode.
Detector Function:	Peak
Measurement BW:	100 kHz

Test Setup:



Results: PASS

Radiated Emissions

Value	Emissions Frequency **MHz**	E-Field Polarity	Reading **dBµV/m**	System Factor **dB**	Field strength at 3m **dBµV/m**	Average Factor **dB**	Net Field Strength at 3m **dBµV/m**	Limit **dBµV/m**	Delta to Limit **dBµV/m**
AV	868.00	V	9.69	24.01	33.70	-5.42	28.28	52.87	-24.59
AV	1272.40	V	35.68	-7.88	27.80	-5.42	22.38	52.87	-30.49
AV	*4179.20	V	32.76	1.84	34.60	-5.42	29.18	52.87	-23.69
AV	868.00	H	9.79	24.01	33.80	-5.42	28.38	52.87	-24.49
AV	1245.20	H	34.68	-7.88	26.80	-5.42	21.38	52.87	-31.49
AV	*4094.00	H	31.85	2.05	33.90	-5.42	28.48	52.87	-24.39

Note: No further spurious emissions found between 30 MHz and lowest internal used/generated frequency.

Remark (*) : Radiated emissions which fall in the restricted bands as defined in Section 15.205(a).

Remark:
-Calculated measurement uncertainty: ±5.0dB.
-Refer to section 4.5 for average factor calculation.

Limits for Radiated Emission [Section 15.231(e)]:

Fundamental Frequency [MHz]	Field Strength of Spurious Emission [μV/m]	Field Strength of Spurious Emission [dBμV/m]
434.000	440.00145	52.87

Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in section 15.209, whichever permits a higher field strength.

Limit for Radiated Emission Falling in Restricted Bands [Section 15.209]:

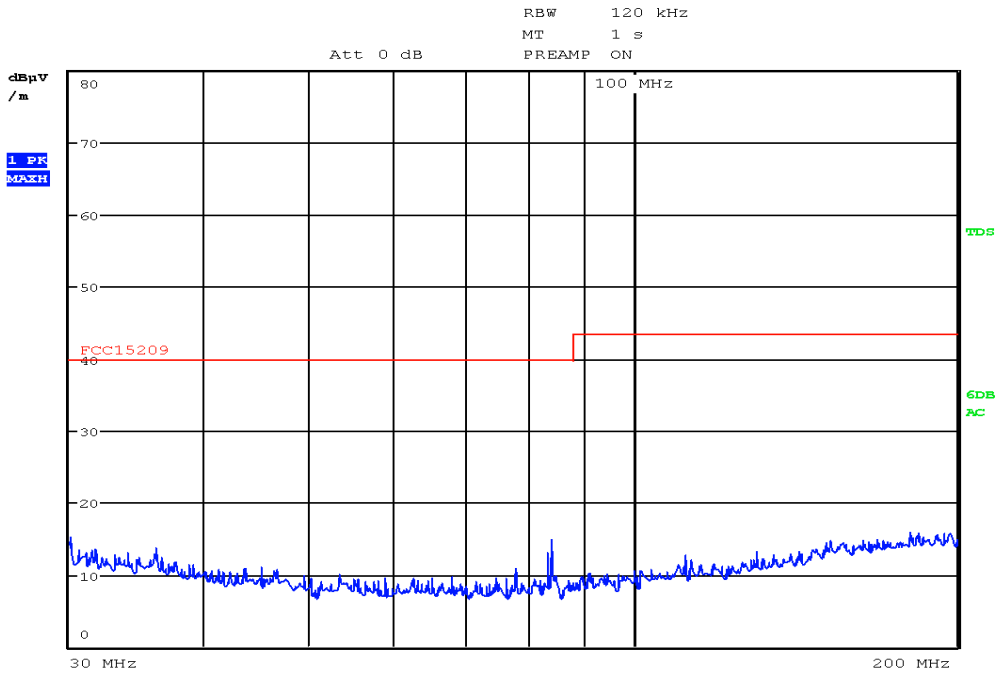
Frequency (MHz)	Field Strength [μV/m]	Field Strength [dBμV/m]
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

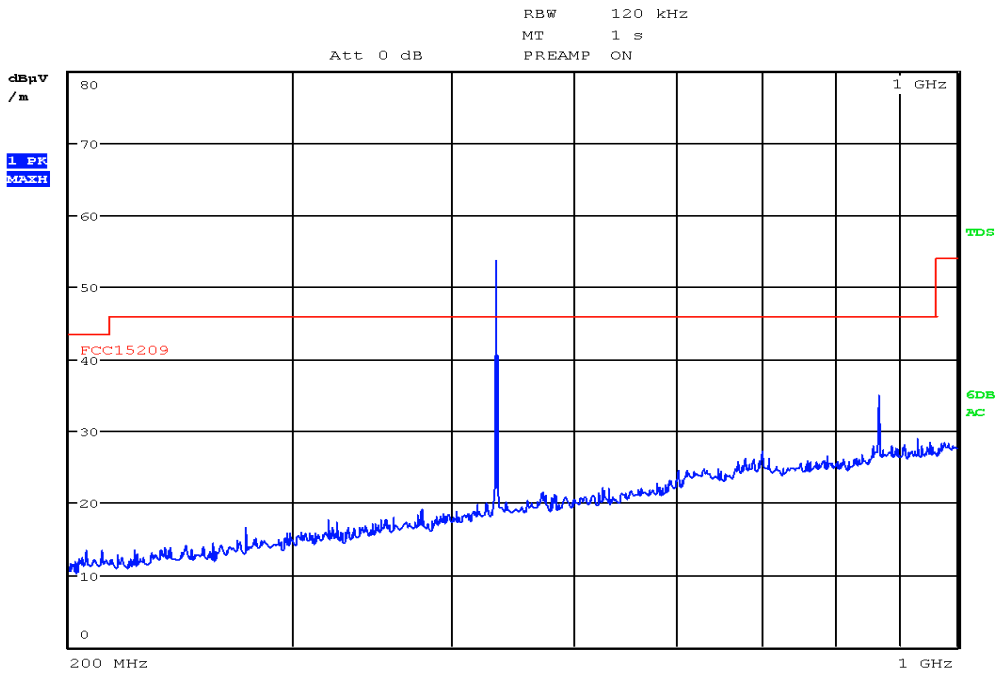
Radiated emissions, which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209.

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

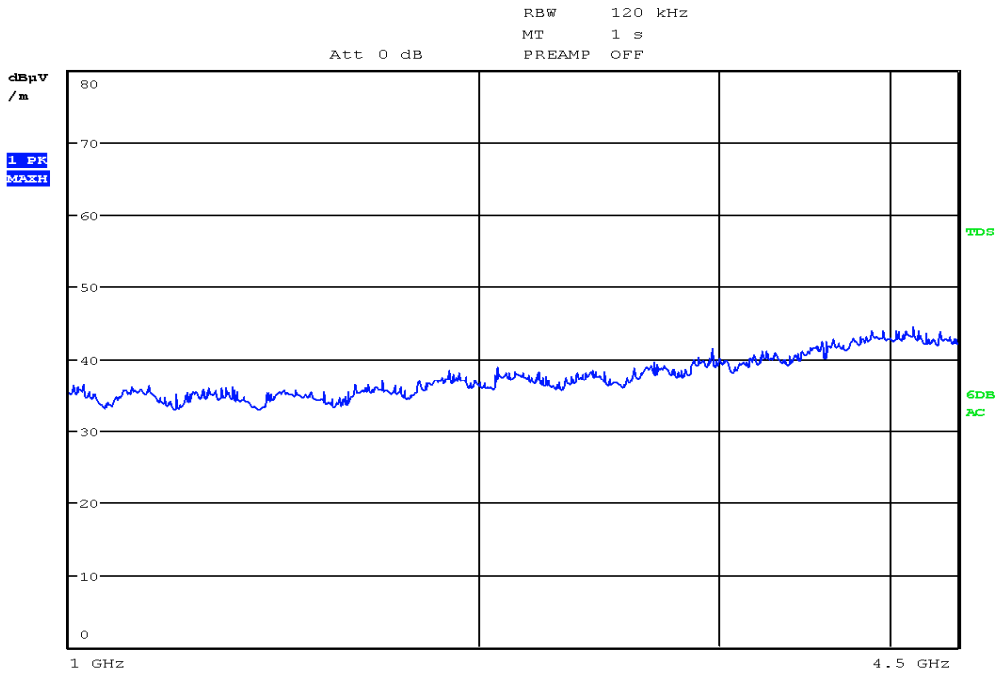
- Result data graph is attached at the next pages for reference.

Vertical

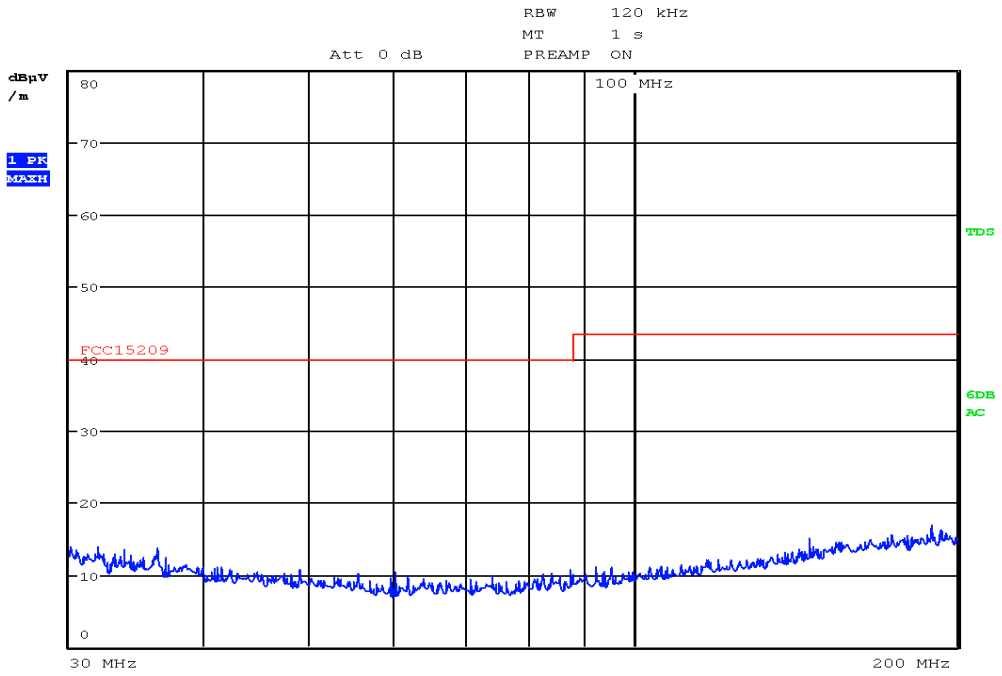

RBW 120 kHz
MT 1 s
Att 0 dB
PREAMP ON
dBµV/m
1 PK MAXH
100 MHz
TDS
FCC15209
6DB AC
30 MHz
200 MHz

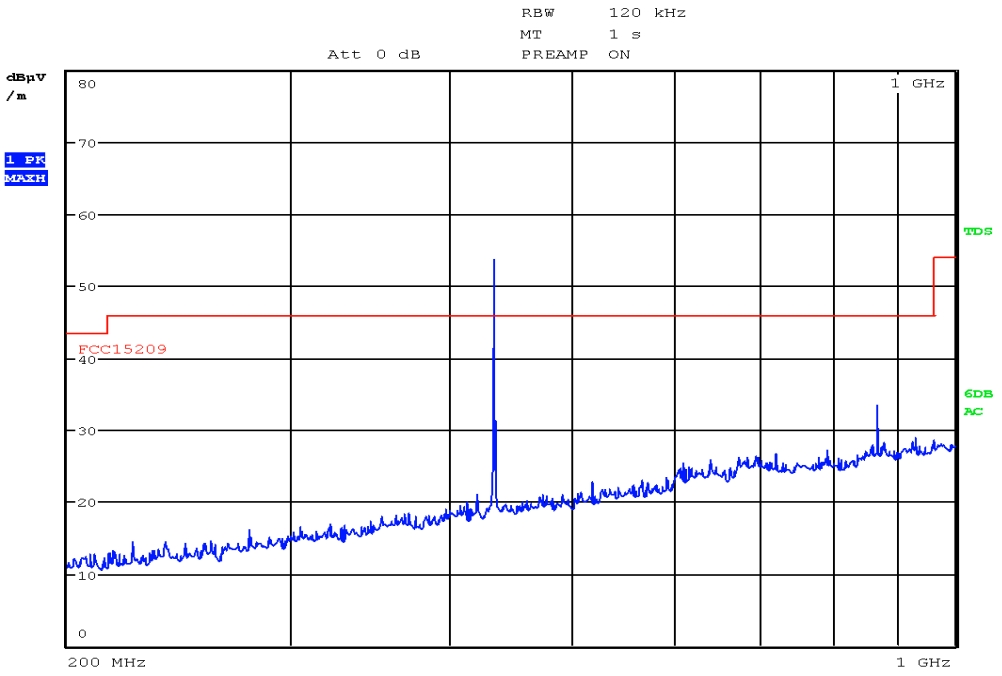

RBW 120 kHz
MT 1 s
Att 0 dB
PREAMP ON
dBµV/m
1 PK MAXH
1 GHz
TDS
FCC15209
6DB AC
200 MHz
1 GHz

Vertical

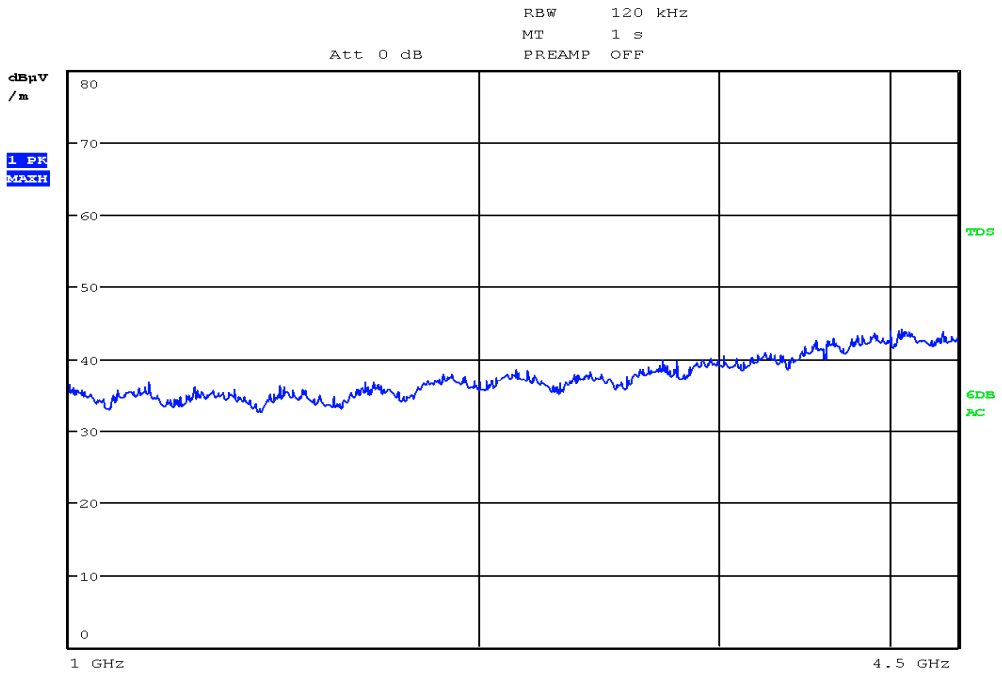

RBW 120 kHz
MT 1 s
Att 0 dB
PREAMP OFF
dBµV /m
1 PK MAXH
80
70
60
50
40
30
20
10
0
TDS
6DB AC
1 GHz
4.5 GHz

Horizontal


RBW 120 kHz
MT 1 s
Att 0 dB
PREAMP ON
dBµV /m
1 PK MAXH
80
70
60
50
40
30
20
10
0
100 MHz
TDS
FCC15209
6DB AC
30 MHz
200 MHz


RBW 120 kHz
MT 1 s
Att 0 dB
PREAMP ON
dBµV /m
1 PK MAXH
80
70
60
50
40
30
20
10
0
1 GHz
TDS
FCC15209
6DB AC
200 MHz
1 GHz

Horizontal


RBW 120 kHz
MT 1 s
Att 0 dB
PREAMP OFF
dBµV
/m
1 PK
MAXH
80
70
60
50
40
30
20
10
0
TDS
6DB
AC
1 GHz
4.5 GHz

4.3 Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC part 15 Section 15.207 Class B
Test Method:	ANSI C63.4:2003
Test Date:	---
Mode of Operation:	---

Results: N/A

Note : This testing is not applicable for the battery operated EUT.

Limits for Conducted Emission [Section 15.207]:

Frequency Range [MHz]	Quasi-Peak Limit [dBμV]	Average Limit [dBμV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Remarks:
Calculated measurement uncertainty: ±2.8dB

4.4 Bandwidth Measurement

Test Requirement:	FCC part 15 section 15.231 (c)
Test Method:	ANSI C63.4:2003
Test Date:	2009-09-18
Mode of Operation:	Transmitting mode.
Detector Function:	Peak

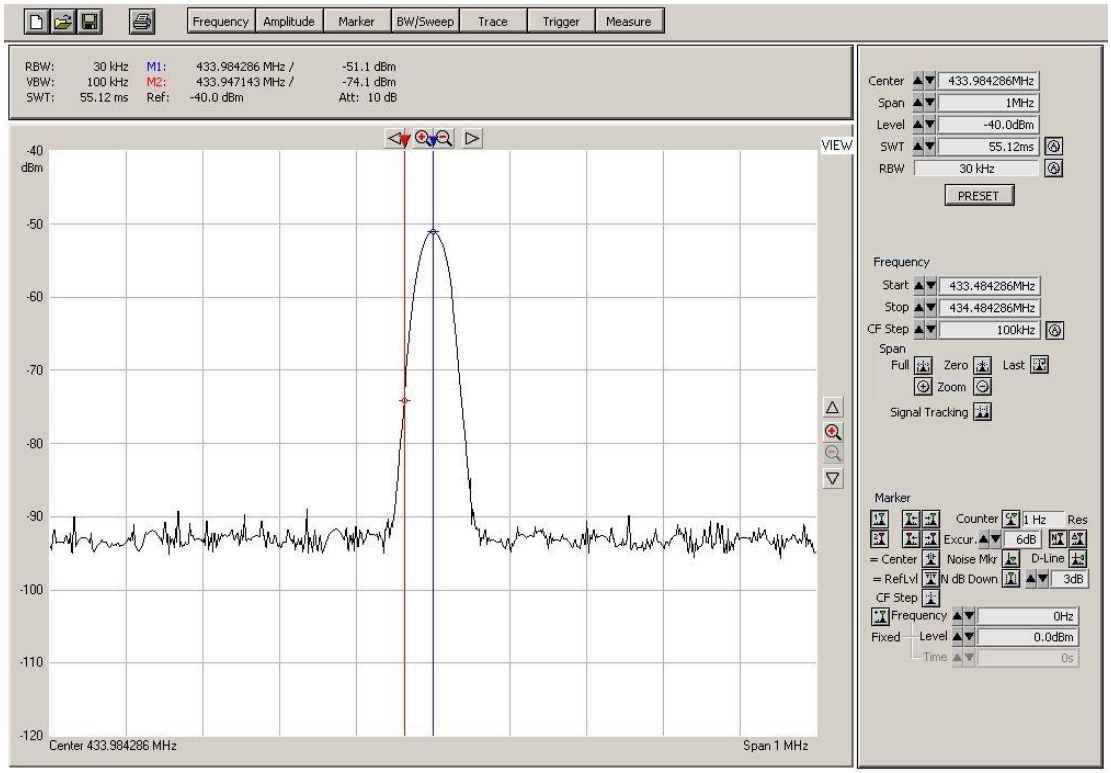
Results: PASS

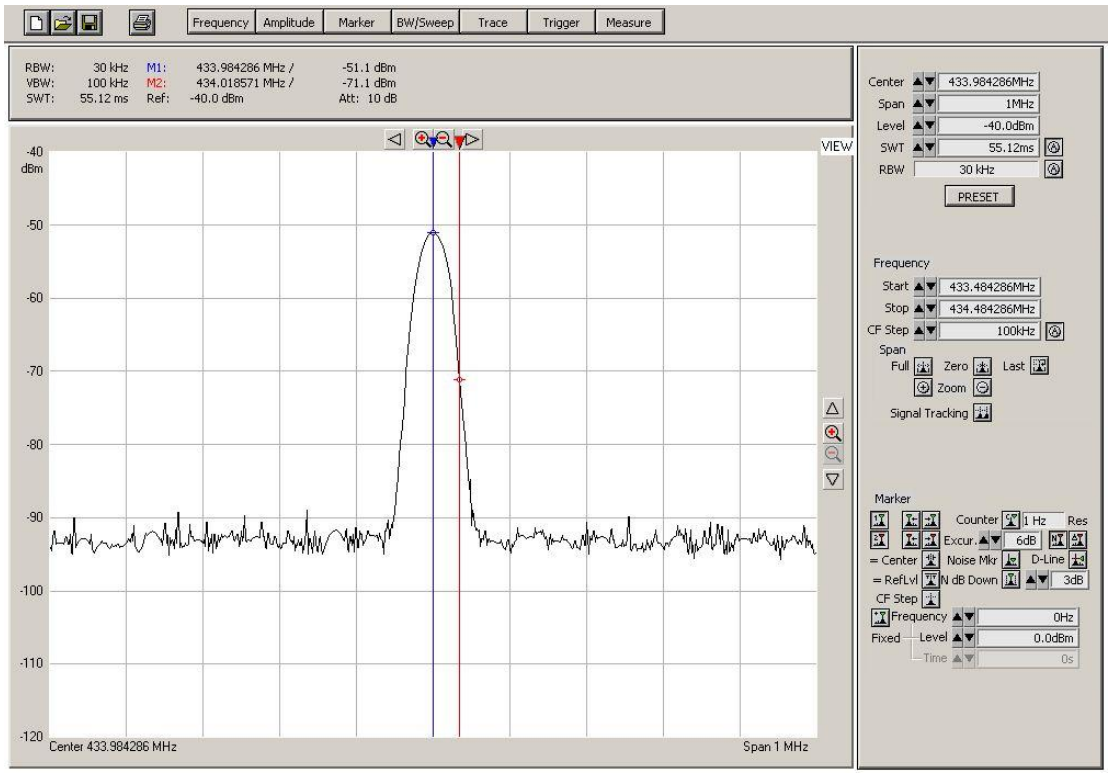
Refer to the data graph, the 20dB points at lower edge and at higher edge are 433.947MHz and 434.018MHz, so that is 37.143kHz and 34.285kHz respectively apart from the centre modulated carrier, the bandwidth of the emission is 0.016% of the centre frequency. Therefore, the EUT meets the requirement of section 15.231(c).

Limit for Bandwidth [Section 15.231 (c)]

The bandwidth of the emission shall be no wider than 0.25% if the center frequency for devices operating above 70MHz and below 900MHz.

Test Result: Result data graph is shown at the next pages for reference.


Frequency
Amplitude
Marker
BW/Sweep
Trace
Trigger
Measure
RBW: 30 kHz
VBW: 100 kHz
SWT: 55.12 ms
M1: 433.984286 MHz / -51.1 dBm
M2: 433.947143 MHz / -74.1 dBm
Ref: -40.0 dBm
Att: 10 dB
VIEW
-40 dBm
-50
-60
-70
-80
-90
-100
-110
-120
Center 433.984286 MHz
Span 1 MHz
Center 433.984286MHz
Span 1MHz
Level -40.0dBm
SWT 55.12ms
RBW 30 kHz
PRESET
Frequency
Start 433.484286MHz
Stop 434.484286MHz
CF Step 100kHz
Span
Full
Zero
Last
Zoom
Signal Tracking
Marker
Counter 1 Hz Res
Excur. 6dB
= Center
Noise Mkr
D-Line
= RefLvl
N dB Down 3dB
CF Step
Frequency 0Hz
Fixed
Level 0.0dBm
Time 0s


Frequency
Amplitude
Marker
BW/Sweep
Trace
Trigger
Measure
RBW: 30 kHz
VBW: 100 kHz
SWT: 55.12 ms
M1: 433.984286 MHz / -51.1 dBm
M2: 434.018571 MHz / -71.1 dBm
Ref: -40.0 dBm
Att: 10 dB
VIEW
-40 dBm
-50
-60
-70
-80
-90
-100
-110
-120
Center 433.984286 MHz
Span 1 MHz
Center 433.984286MHz
Span 1MHz
Level -40.0dBm
SWT 55.12ms
RBW 30 kHz
PRESET
Frequency
Start 433.484286MHz
Stop 434.484286MHz
CF Step 100kHz
Span
Full
Zero
Last
Zoom
Signal Tracking
Marker
Counter 1 Hz Res
Excur. 6dB
= Center
Noise Mkr
D-Line
= RefLvl
N dB Down 3dB
CF Step
Frequency 0Hz
Fixed
Level 0.0dBm
Time 0s

4.5 Average Factor

Average factor in dB = 20 log (duty cycle)

When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long The specification for output field strengths in accordance with the FCC rules specify measurements with an average detector.

The duty cycle is the total signal on time per one transmission.

The duration of one cycle = 314.286ms

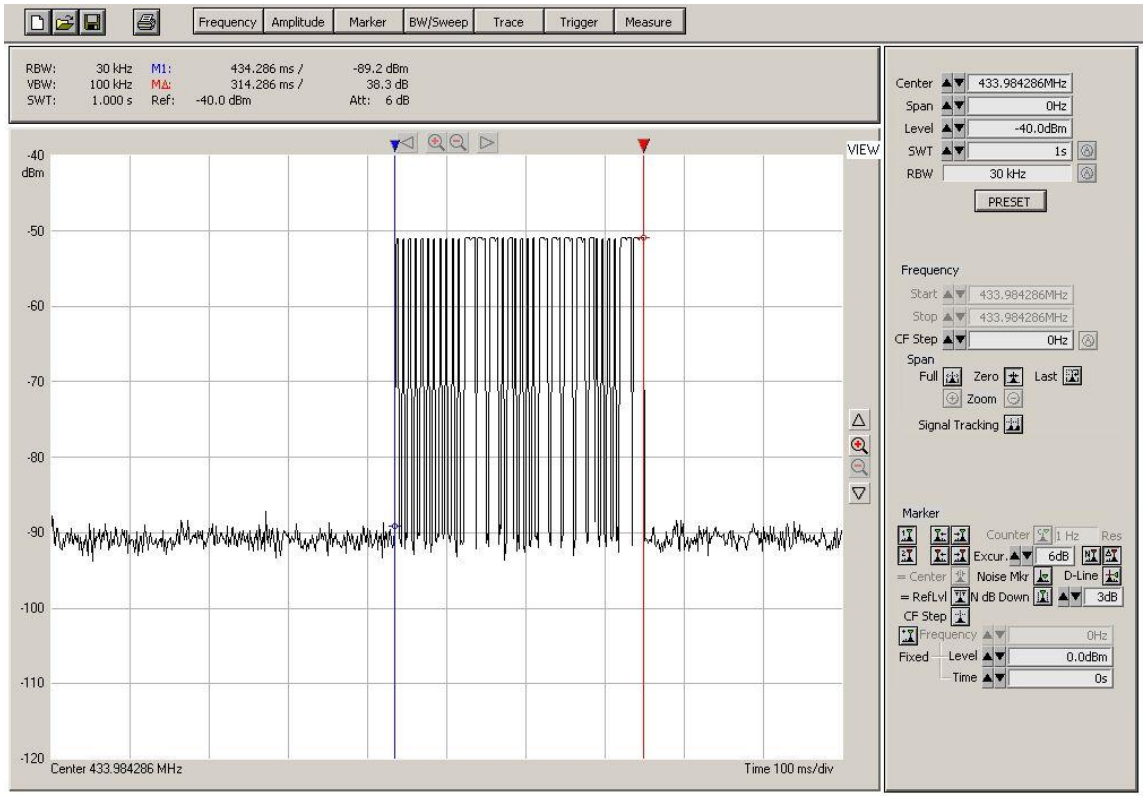
Effective period of the cycle per 100ms = (7 x 6ms +6 x 1.929ms) / 100ms

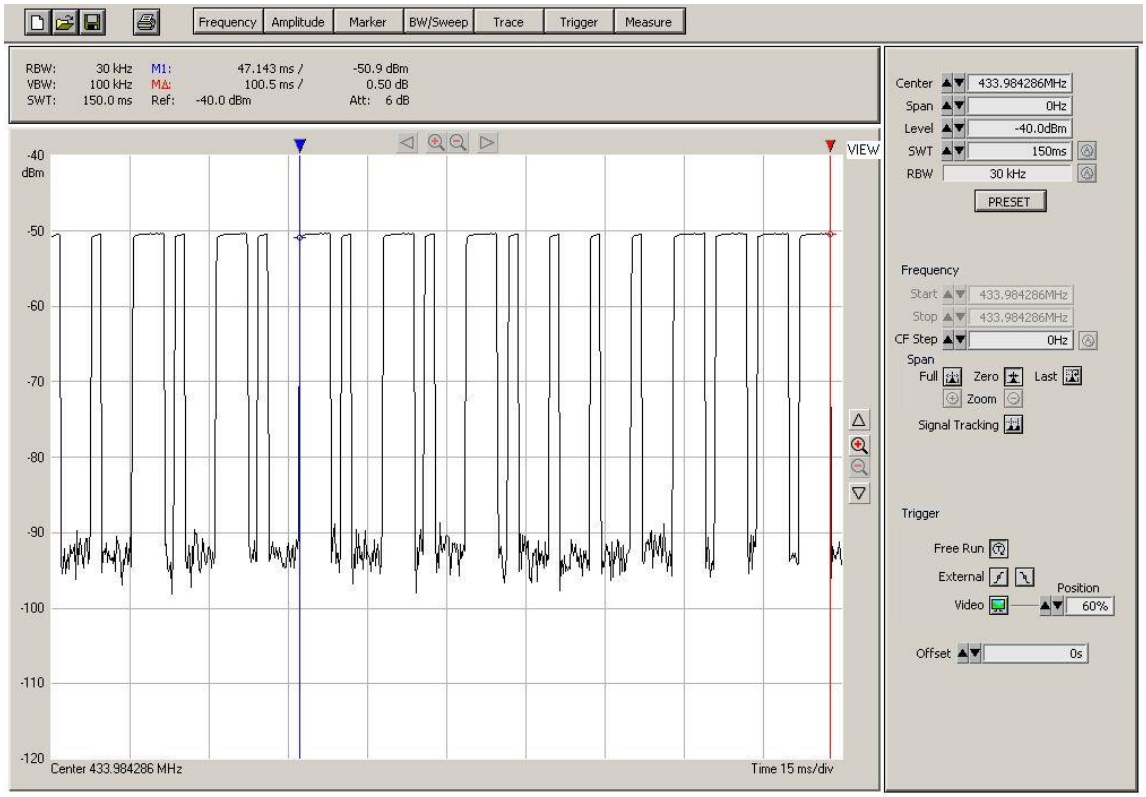
= 53.574ms / 100ms

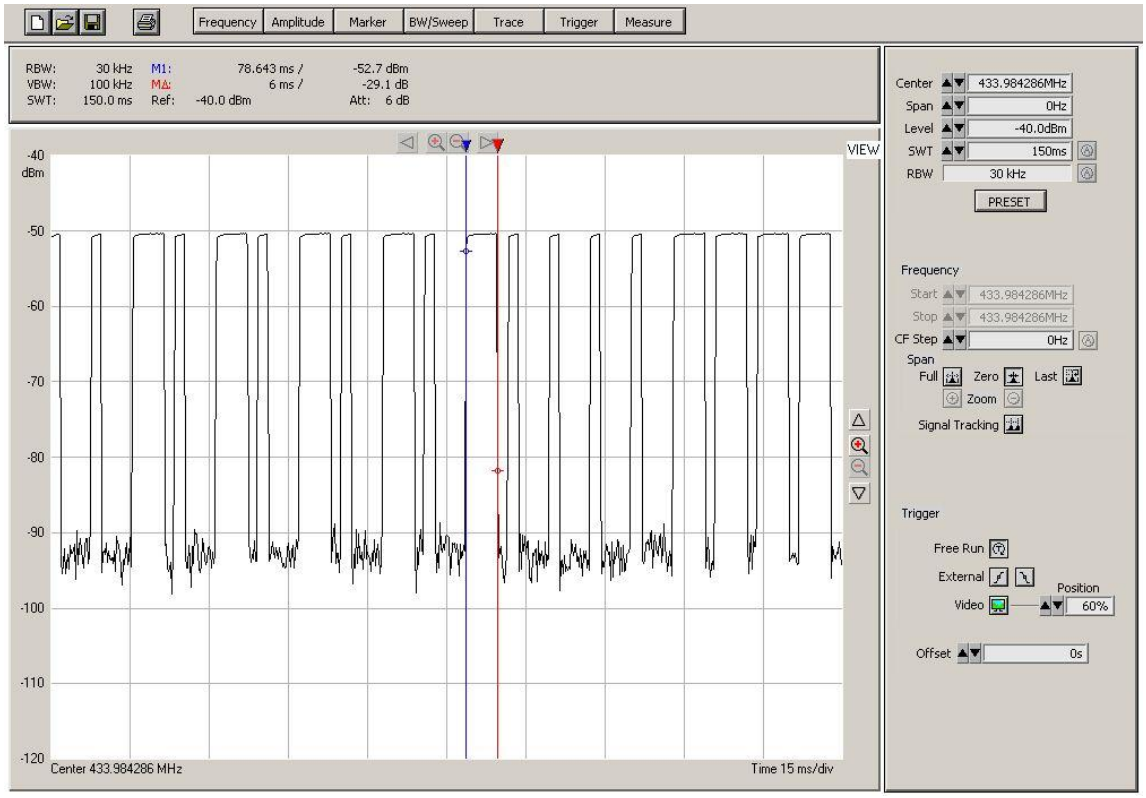
Duty cycle = 0.53574

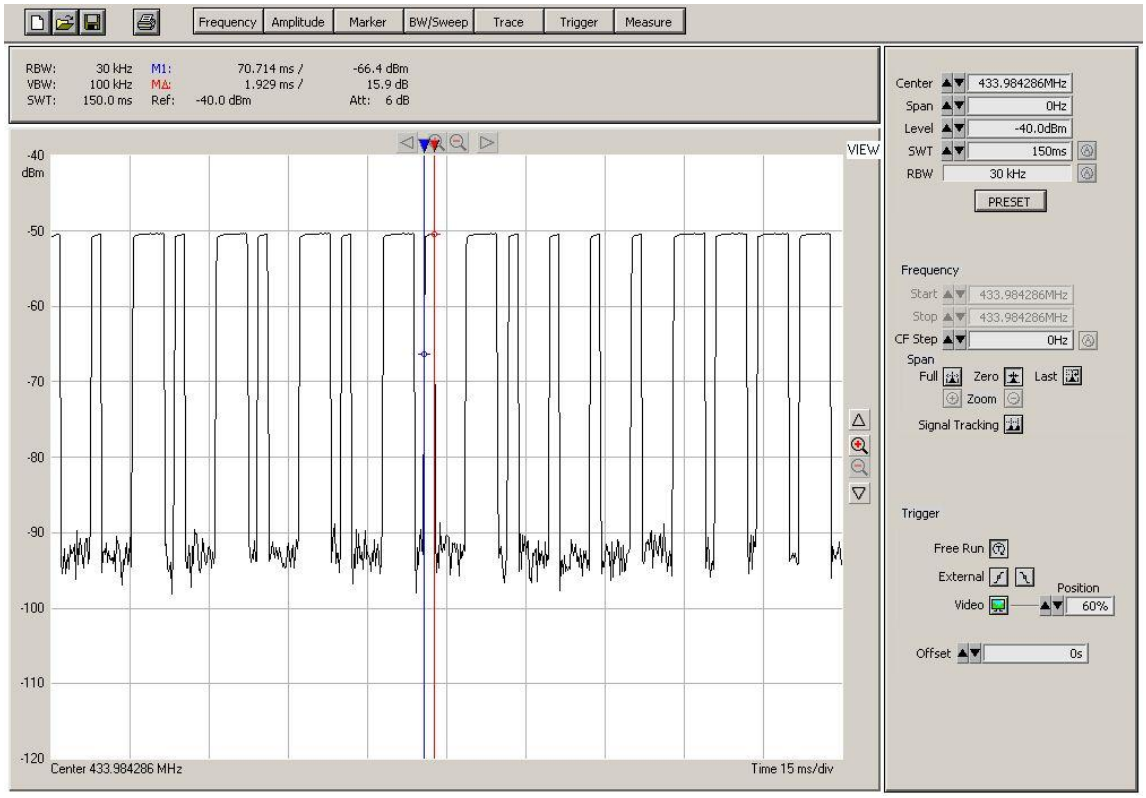
Therefore, the averaging factor is 20 log (0.53574)
= -5.42dB

Refer to the following graph for the detail.


Frequency
Amplitude
Marker
BW/Sweep
Trace
Trigger
Measure
RBW: 30 kHz
VBW: 100 kHz
SWT: 1.000 s
M1: 434.286 ms / -89.2 dBm
M2: 314.286 ms / 38.3 dB
Ref: -40.0 dBm
Att: 6 dB
VIEW
-40 dBm
-50
-60
-70
-80
-90
-100
-110
-120
Center 433.984286 MHz
Time 100 ms/div
Center 433.984286MHz
Span 0Hz
Level -40.0dBm
SWT 1s
RBW 30 kHz
PRESET
Frequency
Start 433.984286MHz
Stop 433.984286MHz
CF Step 0Hz
Span
Full
Zero
Last
Zoom
Signal Tracking
Marker
Counter
1 Hz
Res
Excur.
6dB
= Center
Noise Mkr
D-Line
= RefLvl
N dB Down
3dB
CF Step
Frequency
0Hz
Fixed
Level
0.0dBm
Time
0s


Frequency
Amplitude
Marker
BW/Sweep
Trace
Trigger
Measure
RBW: 30 kHz
VBW: 100 kHz
SWT: 150.0 ms
M1: 47.143 ms / -50.9 dBm
M2: 100.5 ms / 0.50 dB
Ref: -40.0 dBm
Att: 6 dB
VIEW
-40 dBm
-50
-60
-70
-80
-90
-100
-110
-120
Center 433.984286 MHz
Time 15 ms/div
Center 433.984286MHz
Span 0Hz
Level -40.0dBm
SWT 150ms
RBW 30 kHz
PRESET
Frequency
Start 433.984286MHz
Stop 433.984286MHz
CF Step 0Hz
Span
Full
Zero
Last
Zoom
Signal Tracking
Trigger
Free Run
External
Video
Position
60%
Offset
0s


Frequency
Amplitude
Marker
BW/Sweep
Trace
Trigger
Measure
RBW: 30 kHz
VBW: 100 kHz
SWT: 150.0 ms
M1: 78.643 ms / -52.7 dBm
M2: 6 ms / -29.1 dB
Ref: -40.0 dBm
Att: 6 dB
VIEW
-40 dBm
-50
-60
-70
-80
-90
-100
-110
-120
Center 433.984286 MHz
Time 15 ms/div
Center 433.984286MHz
Span 0Hz
Level -40.0dBm
SWT 150ms
RBW 30 kHz
PRESET
Frequency
Start 433.984286MHz
Stop 433.984286MHz
CF Step 0Hz
Span
Full
Zero
Last
Zoom
Signal Tracking
Trigger
Free Run
External
Video
Position
60%
Offset 0s


Frequency
Amplitude
Marker
BW/Sweep
Trace
Trigger
Measure
RBW: 30 kHz
VBW: 100 kHz
SWT: 150.0 ms
M1: 70.714 ms / -66.4 dBm
M2: 1.929 ms / 15.9 dB
Ref: -40.0 dBm
Att: 6 dB
VIEW
-40 dBm
-50
-60
-70
-80
-90
-100
-110
-120
Center 433.984286 MHz
Time 15 ms/div
Center 433.984286MHz
Span 0Hz
Level -40.0dBm
SWT 150ms
RBW 30 kHz
PRESET
Frequency
Start 433.984286MHz
Stop 433.984286MHz
CF Step 0Hz
Span
Full
Zero
Last
Zoom
Signal Tracking
Trigger
Free Run
External
Video
Position
60%
Offset 0s

5.0 List of Measurement Equipment

Radiated Emission and Bandwidth Measurement

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	CAL DUE
EMC209	Semi-anechoic Chamber	Frankonia	N/A	N/A	28-Mar-09	28-Mar-10
EMC017	Test Receiver	R & S	ESU26	100050	06-Aug-09	06-Aug-10
EMC040	Bi-conical Antenna	R & S	HK116	841489/016	08-Mar-08	08-Mar-10
EMC045	Log Periodic Antenna	R & S	HL223	841516/020	03-Mar-08	03-Mar-10
EMC184	Horn Antenna	EMCO	3115	9002-3347	02-Mar-08	02-Mar-10
EMC138	Loop Antenna	Chase	LLA6142	1019	07-May-09	07-May-10
EMC406	Coaxial Cable 50ohm	Rosenberger	RTK081-05S-10m	LA2-001-10M/002	15-May-09	15-May-10
60/2-74-05-042	Spectrum Analyser	R & S	FS 300	101335	04-Apr-09	04-Apr-11

Remarks:
CM Corrective Maintenance
N/A Not Applicable or Not Available
TBD To Be Determined