Report No: GZ12021268-1

TEST REPORT

Applicant Name & Address	:	BRK Brands Inc 3901 Liberty Street Road Aurora Illinois United States 60504-8122
Sample Description		
Product	:	WIRELESS TEMPERATURE SENSOR
FCC ID	:	M7U-FAL-TEM
Model No.	:	OLTEMP
Electrical Rating	:	3V DC (2 x AAA battery)
Frequency	:	908 – 919 MHz
Date Received	:	28 Feb.,2012
Date Test Conducted	:	15 Feb.,2012 – 12 Mar.,2012
Test standards	:	**FCC Part 15: 2010**
Test Result	:	Pass
Conclusion	:	The submitted samples complied with the above rules/standards.
Remark	:	None.

**********End of Page**********

Prepared and Checked By:

Helen Ma

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Approved By:

Signature

Carrie Chen
Technical Supervisor
Intertek Guangzhou
20 July 2012 ***Date***

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CONTENT

1. General Description

1.1 Product Description

The equipment under test (EUT) is a transmitter at 908-919MHz, this device senses temperature changes ranging between 14° F to 112° F, when the temperature are out of range, the device sends an e-mail to the Wireless System Gateway.

The EUT is powered by 2*1.5V/AAA battery.

We test the sample to determine if it was in compliance with the relevant FCC standards. We found that the unit met the requirements of FCC part 15.249 when tested as received. The worst case's test data was presented in this test report.

1.2 Related Submittal (s) / Grants

N/A.

1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). Radiated emission measurement was performed in semi-anechoic chamber room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "Justification Section" of this Application.

1.4 Test Facility

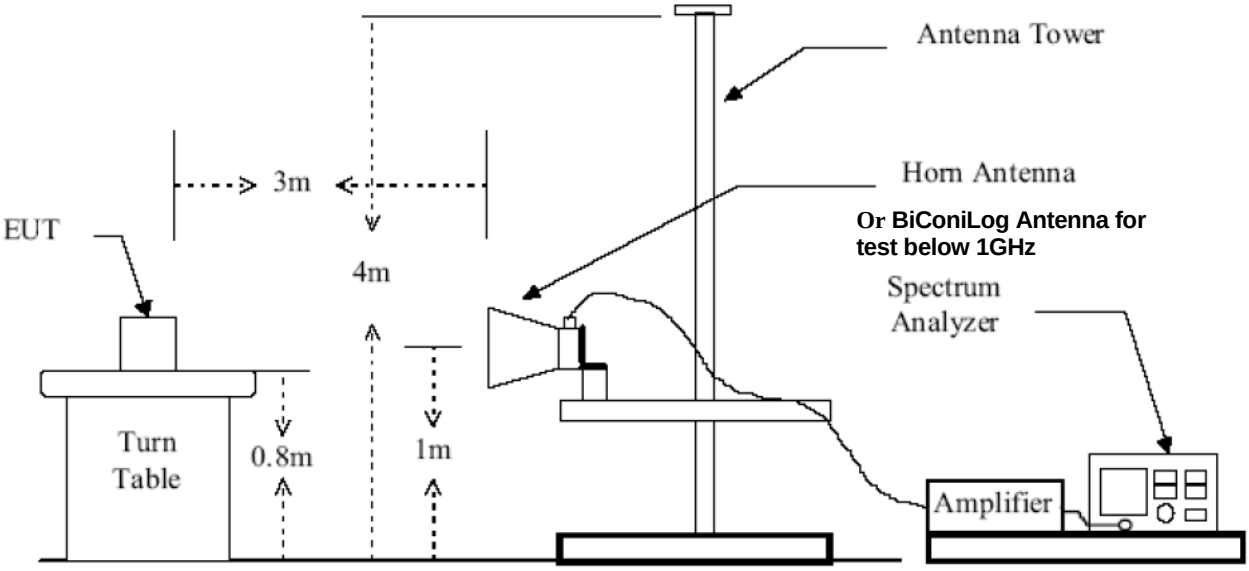
The Radiated Emission test is performed at:
Compliance Certification Services (Shenzhen) Inc. located at No.10-1Mingkeda Logistics Park, No.18Huanguan South RD. Guanlan Town, Baoan District Shenzhen China. This test facility and site measurement data have been fully placed on file with the FCC, test firm registration number is 441872.

Test Equipment List

:

Serial No.	Equipment	Manufacturer	Model No.	Cal. Date	Due Date
D286	Horn Antenna	SCHWARZBECK	BBHA9120D	19-Mar-11	19-Mar-12
US44300399	PSA Series Spectrum Analyzer	Agilent	E4446A	19-Mar-11	19-Mar-12
5082	Bilog Antenna	SCHAFFNER	CBL6143	03-Jun-11	03-Jun-12
1411843	Amplifier	MITEQ	AM-1604-3000	18-Mar-11	18-Mar-12

Test setup figure



Test setup figure

1.5 Measurement Uncertainty

Radiated Emission: 3.79dB in the frequency range of 30MHz-200MHz, 3.62dB in the frequency range of 200MHz-1000MHz, 5.04dB in the frequency above 1GHz at a level of confidence of 95%.
When determining the test conclusion, the Measurement Uncertainty of test has been considered.

2. System Test Configuration

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2009).

The EUT was powered by 2*1.5V/AAA battery in the testing.

Type of modulation: FSK modulation, and only the worst data was reported in this report.

For maximizing emissions, the unit was placed in the center of the turntable, and the turntable was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Chapter 3.

2.2 EUT Exercising Software

There was no special software to exercise the device.

2.3 Special Accessories

No special accessories used.

2.4 Equipment Modification

Any modifications installed previous to testing by BRK Brands Inc will be incorporated in each production model sold/leased in the United States. No modifications were installed by Intertek Testing Services Shenzhen Ltd. Guangzhou Branch.

2.5 Support Equipment List and Description

N/A

3. Summary of Test Results

FCC Rules	Description of Test	Result
15.203	Antenna Requirement	Pass
15.207	Disturbance Voltage at the Mains Terminals	N/A
15.249	Radiated Emission	Pass
15.249	Band Edges Measurement	Pass

Remark: 1. The symbol “N/A” in above table means Not Applicable
2. When determining the test results, measurement uncertainty of tests has been considered.

3.1 Antenna Requirement

The EUT Antenna Type: external dedicated antenna.

3.2 Conducted Emission

The EUT is battery operating device, the conducted emission is unnecessary.

3.3 Radiated Emission

Data is included worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

3.3.1 Radiated Emission Limits

According to FCC 15.249, operating within the bands 902-928 MHz, the field strength of emissions from intentional radiators operated within this frequency bands shall comply with the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 – 928	50	500

3.3.2 Test Setup

Reference 1.4

3.3.3 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD + AV
→ FS = RA + Correct Factor + AV

Where FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor in –dB
Correct Factor = AF + CF – AG + PD

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD + AV

Assume a receiver reading of 62.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 62.0 dBµV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB
AV = -10 dB

Correct Factor = 7.4 + 1.6 – 29.0 + 0 = -20 dB

FS = 62 + (-20) + (-10) = 32 dBµV/m

Level in µV/m = Common Antilogarithm [(32 dBµV/m)/20] = 39.8 µV/m

3.3.4 Radiated Emission Test Data

Test mode: transmitting.

Table - 1

Radiated Emissions

(908MHz)

(Below 1GHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Correction Factor (dB)	Net at 3m (dBµV/m)	QP Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	744.567	33.6	-10.9	22.7	46.0	-23.3
Horizontal	856.117	43.3	-9.4	33.9	46.0	-12.1
Horizontal	907.850	76.4	-9.1	67.3	94.0	-26.7
Vertical	791.450	32.9	-10.3	22.6	46.0	-23.4
Vertical	870.667	33.0	-9.4	23.6	46.0	-22.4
Vertical	907.850	65.4	-9.1	56.3	94.0	-37.7

(Above 1GHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Correction Factor (dB)	Net at 3m (dBµV/m)	AV Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	1810.000	52.4	-10.1	42.3	54.0	-11.7
Horizontal	2980.000	46.5	-6.1	40.4	54.0	-13.6
Horizontal	3610.000	46.5	-3.8	42.7	54.0	-11.3
Vertical	2050.000	47.1	-9.3	37.8	54.0	-16.2
Vertical	2965.000	46.4	-6.2	40.2	54.0	-13.8
Vertical	3580.000	45.7	-3.9	41.8	54.0	-12.2

Notes: 1. Peak Detector was used unless otherwise stated.

2. All measurements were made at 3 meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. The tests were performed on the product with 100% duty cycle.

Table - 2

Radiated Emissions

(914MHz)

(Below 1GHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Correction Factor (dB)	Net at 3m (dBµV/m)	QP Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	741.333	33.8	-10.8	23.0	46.0	-23.0
Horizontal	862.583	41.3	-9.3	32.0	46.0	-14.0
Horizontal	914.317	71.9	-9.1	62.8	94.0	-31.2
Vertical	713.850	33.8	-11.5	22.3	46.0	-23.7
Vertical	772.050	34.3	-10.5	23.8	46.0	-22.2
Vertical	914.317	64.0	-9.1	54.9	94.0	-39.1

(Above 1GHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Correction Factor (dB)	Net at 3m (dBµV/m)	AV Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	1825.000	51.7	-10.1	41.6	54.0	-12.4
Horizontal	2710.000	47.0	-7.9	39.1	54.0	-14.9
Horizontal	3625.000	45.7	-3.8	41.9	54.0	-12.1
Vertical	2230.000	47.9	-9.5	38.4	54.0	-15.6
Vertical	3010.000	46.6	-5.9	40.7	54.0	-13.3
Vertical	3505.000	47.1	-4.4	42.7	54.0	-11.3

Notes: 1. Peak Detector was used unless otherwise stated.

2. All measurements were made at 3 meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. The tests were performed on the product with 100% duty cycle.

Table - 3

Radiated Emissions

(919MHz)

(Below 1GHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Correction Factor (dB)	Net at 3m (dBµV/m)	QP Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	802.767	33.4	-10.3	23.1	46.0	-22.9
Horizontal	867.433	42.8	-9.4	33.4	46.0	-12.6
Horizontal	919.167	72.5	-9.2	63.3	94.0	-30.7
Vertical	590.983	34.3	-12.4	21.9	46.0	-24.1
Vertical	741.333	32.9	-10.8	22.1	46.0	-23.9
Vertical	919.167	64.3	-9.2	55.1	94.0	-38.9

(Above 1GHz)

Polarization	Frequency (MHz)	Reading (dBµV)	Correction Factor (dB)	Net at 3m (dBµV/m)	AV Limit at 3m (dBµV/m)	Margin (dB)
Horizontal	1840.000	52.7	-10.0	42.7	54.0	-11.3
Horizontal	2995.000	47.1	-6.0	41.1	54.0	-12.9
Horizontal	4435.000	46.0	-2.2	43.8	54.0	-10.2
Vertical	1495.000	48.9	-10.3	38.6	54.0	-15.4
Vertical	2290.000	48.2	-9.6	38.6	54.0	-15.4
Vertical	2995.000	47.3	-6.0	41.3	54.0	-12.7

Notes: 1. Peak Detector was used unless otherwise stated.

2. All measurements were made at 3 meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. The tests were performed on the product with 100% duty cycle.

3.3.5 Test Result

The data on the above test result table lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

According 15.249, the worst case radiated emission at 4435.000 MHz
Judgement: Passed by 10.2dB

3.4 Bandedges Measurement

3.4.1 Limited of the bandedges measurement

Sec15.249:
(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

(e) As shown in Section 15.35(b), for frequencies above 1000 MHz, the above field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b) of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

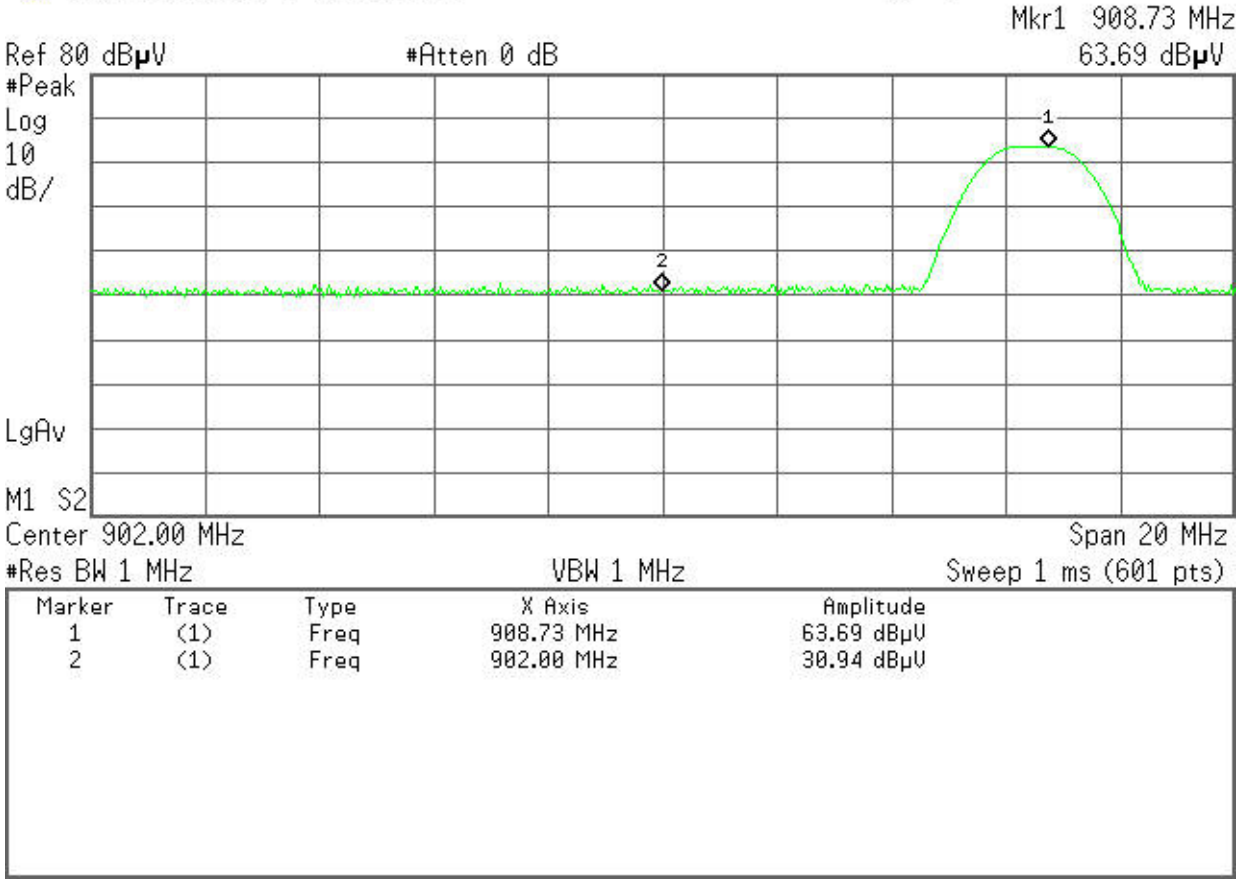
Sec15.215:
(c) Intentional radiators operating under the alternative provisions to the general emission limites, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20dB bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

3.4.2 Test Setup

Refer to 1.4

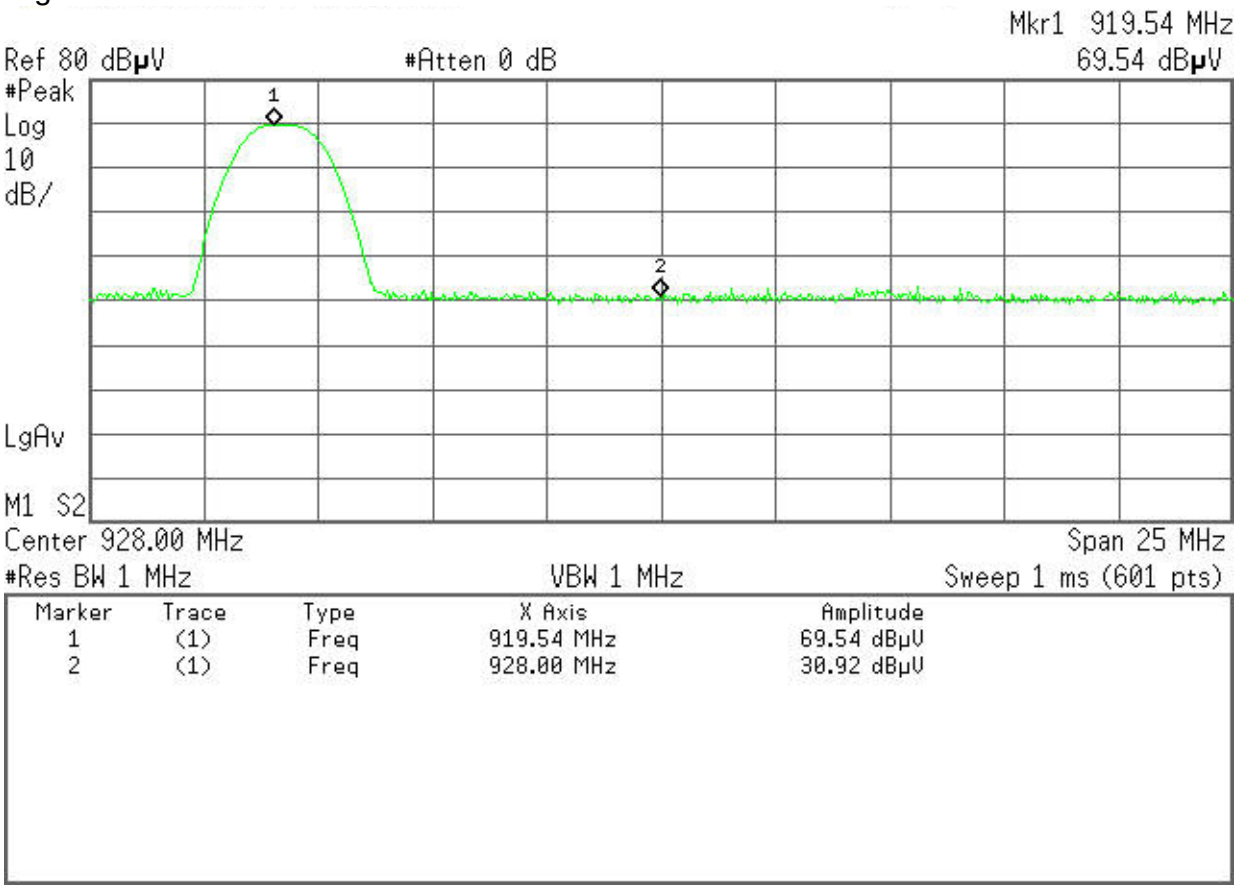
3.4.3 Test Plot

Frequency Bands
Operating mode: Transmitting
Low channel: 908MHz



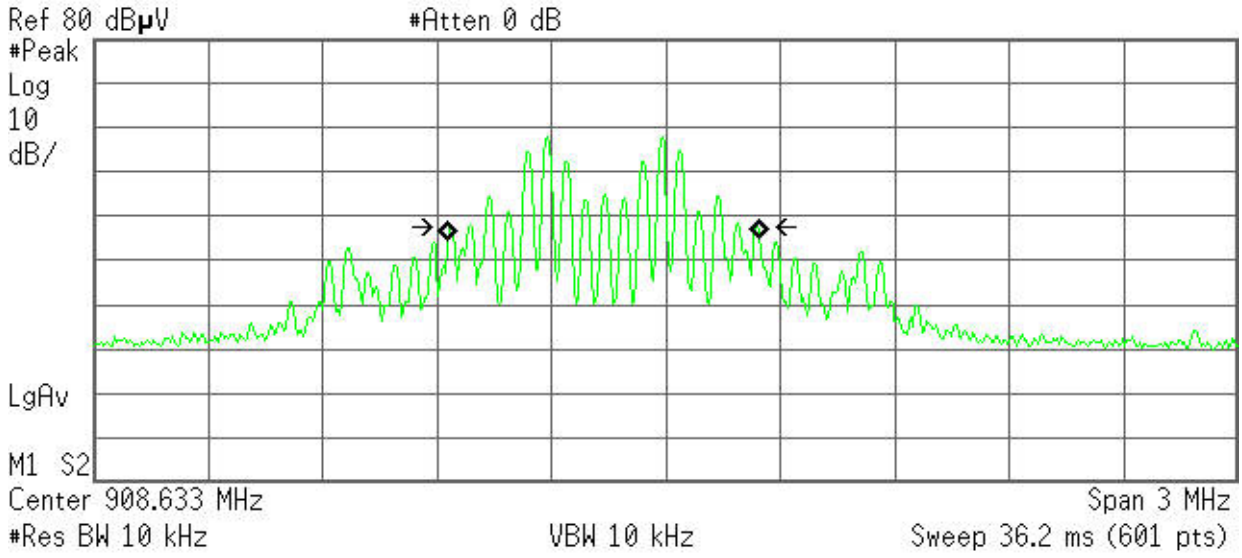
delta from the bandedge plot = 63.69 – 30.94 = 32.75dB

High channel:919MHz



delta from the bandedge plot = 69.54 – 30.92 = 38.62dB

Modulation Bandwidth
Operating mode: Transmitting
Low channel: 908MHz

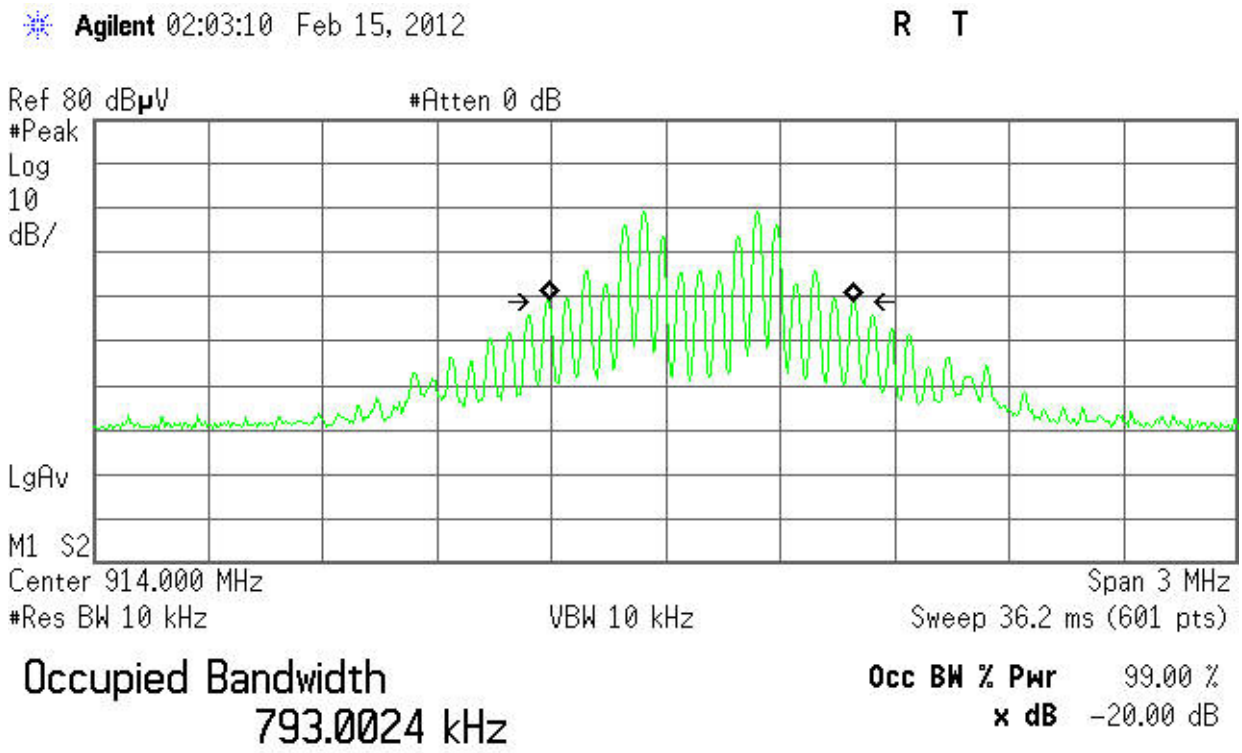


Occupied Bandwidth
815.6871 kHz

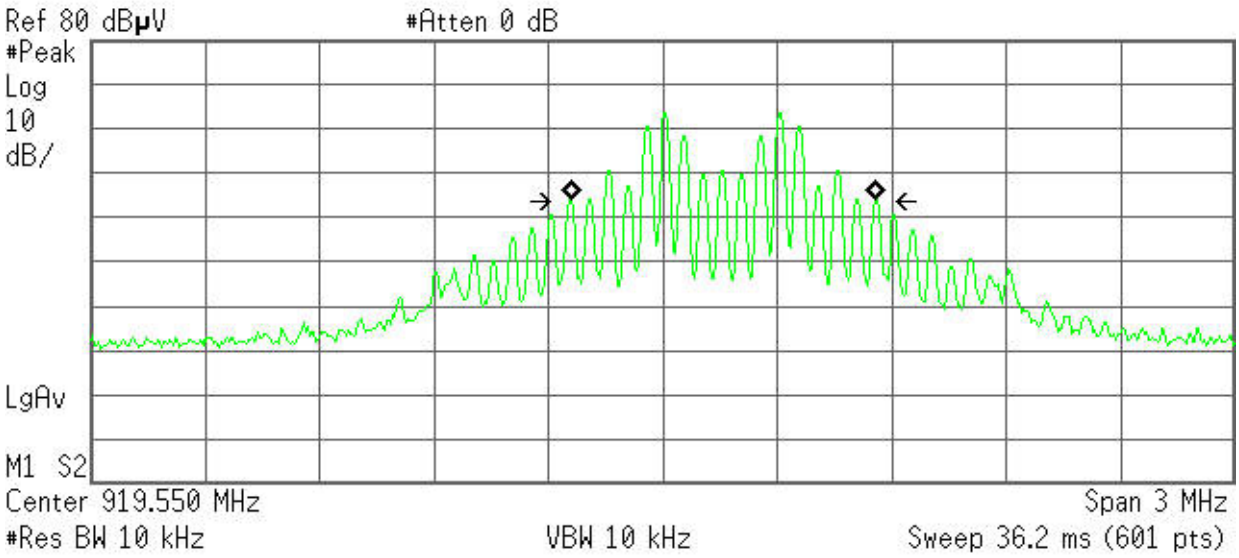
Occ BW % Pwr 99.00 %
x dB -20.00 dB

Transmit Freq Error -161.361 kHz
x dB Bandwidth 803.197 kHz

Middle channel: 914MHz



High channel: 919MHz



3.4.4 Test Result

From the plot, the field strength of any emissions outside of the specified frequency band are attenuated to the general radiated emission limits in section 15.209. It fulfils the requirement of 15.249(d).

Peak Measurement

Bandedge compliance is determined by applying marker-delta method, i.e (Bandedge Plot).

(i) Lower bandedge:

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the bandedge plot

= 76.4dBµv/m – 32.8dB
= 43.6dBµv/m

(ii) Upper bandedge:

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the bandedge plot

= 72.5dBµv/m – 38.6dB
= 33.9dBµv/m

The Peak resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 46 dBµv/m (QP Limit).

3.4.5 Transmitter Duty Cycle Calculation FCC Rule 15.35(b, c)

Average detector was used during Radiated Emission test, duty cycle was not used.

4. Appendix III - Document List

Exhibit type	File Description	Filename
Application Form	Application Form	M7U-FAL-TEM_Application Form.pdf
Authorization Letter	M7U-FAL-TEM_Authorization Letter	M7U-FAL-TEM_Authorization Letter.pdf
Block diagram	Block diagram	M7U-FAL-TEM_Block Diagram.pdf
Schematics	Schematics	M7U-FAL-TEM_Schematics.pdf
Operational Description	Operational Description	M7U-FAL-TEM_Operational Description.pdf
Test report	Test report	M7U-FAL-TEM_Test Report.pdf
User Manual	User Manual	M7U-FAL-TEM_User Manual.pdf
Internal Photos	Internal Photos	M7U-FAL-TEM_Internal Photos.pdf
External Photos	External Photos	M7U-FAL-TEM_External Photos.pdf
Test Photos	Test Photos	M7U-FAL-TEM_Test Photos.pdf
Label & Location	Label & Location	M7U-FAL-TEM_Label & Location.pdf

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