



Test Report

Product Name	Mini-Magnetic sensor
Model No.	HSM02-0
FCC ID.	ZGXHSM02

Applicant	Chromagic Technologies Corporation
Address	5 of 2nd Fl., No.611, Sec.1, Wanshou Rd., Kwei Shan, Taoyuan Hsien 333, Taiwan.

Date of Receipt	Nov. 01, 2011
Issued Date	Nov. 25, 2011
Report No.	11B088R-RFUSP30V01
Report Version	V1.0

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

Test Report Certification

Issued Date: Nov. 25, 2011

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Product Name	Mini-Magnetic sensor
Applicant	Chromagic Technologies Corporation
Address	5 of 2nd Fl., No.611, Sec.1, Wanshou Rd., Kwei Shan, Taoyuan Hsien 333, Taiwan.
Manufacturer	Chromagic Technologies Corporation
Model No.	HSM02-0
FCC ID.	ZGXHSM02
EUT Rated Voltage	DC 3V(Power by Battery)
EUT Test Voltage	DC 3V(Power by Battery)
Trade Name	Chromagic Technologies Corporation
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2010 ANSI C63.4: 2009
Test Result	Complied



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Documented By :

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(Adm. Specialist / Joanne Lin)



Tested By :

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(Engineer / Vincent Chu)

Approved By :

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(Manager / Vincent Lin)



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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Mini-Magnetic sensor
Trade Name	Chromagic Technologies Corporation
FCC ID.	ZGXHSM02
Model No.	HSM02-0
Frequency Range	908.42MHz
Type of Modulation	FSK
Number of Channels	1
Channel Control	Auto
Antenna Type	Monopole

Center Frequency of Each Channel:

Channel Frequency
Channel 1: 908.42MHz

Note:

1. The EUT is a Mini-Magnetic sensor with a built-in Z-Wave transceiver.
2. These tests are conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.249.
3. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

EMI Test Mode	Mode 1: Transmit
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1.2. Operation Description

The EUT is a Mini-Magnetic sensor with a built-in Z-Wave transceiver. The EUT operation frequency is 908.42MHz. The signals modulated by FSK are transmitted from the Monopole Antenna of the EUT.

The Door/Window Detector is a Z-WaveTM enabled device and is fully compatible with any Z-WaveTM enabled network. Z-WaveTM enabled devices displaying the Z-WaveTM logo can also be used with it regardless of the manufacturer, and ours can also be used in other manufacturer's Z-WaveTM enabled networks. Inclusion of this Door/Window Detector on other manufacturer's Wireless Controller menu allows remote turn-on of connected modules and their connected lighting when the Detector is triggered.

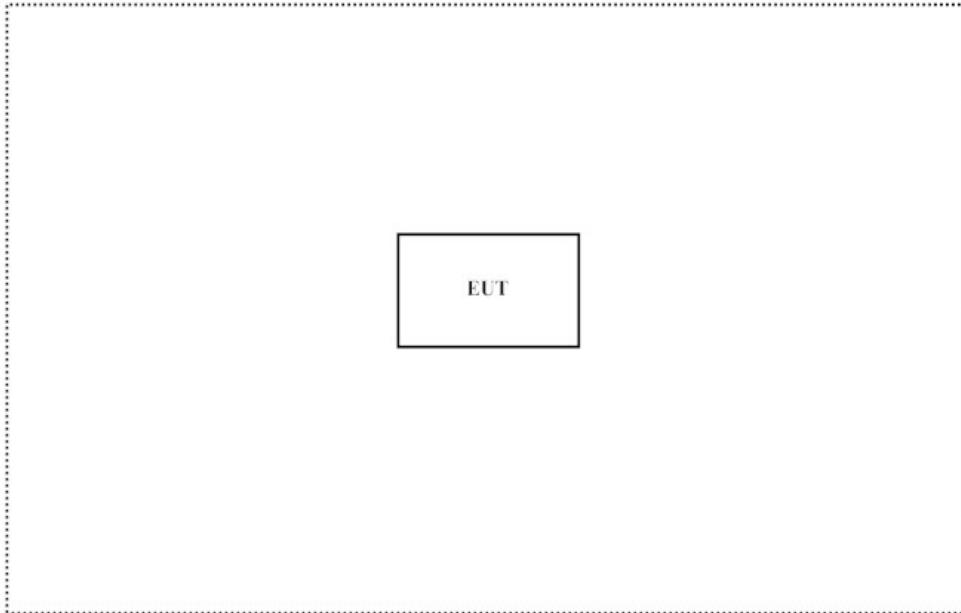
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	Power Cord
N/A	N/A	N/A	N/A	N/A

Signal Cable Type	Signal cable Description
N/A	N/A

1.4. Configuration of Test System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in section 1.4.
- (2) Inserts the battery, start continuous transmit
- (3) Verify that the EUT works correctly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site : <http://tw.quietek.com/modules/myalbum/>
The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : <http://www.quietek.com/>

Site Description: File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Registration Number: 92195



Site Name: Quietek Corporation

Site Address: No.5-22, Ruishukeng,
Linkou Dist. New Taipei City 24451,
Taiwan, R.O.C.
TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : service@quietek.com

FCC Accreditation Number: TW1014



2. Conducted Emission

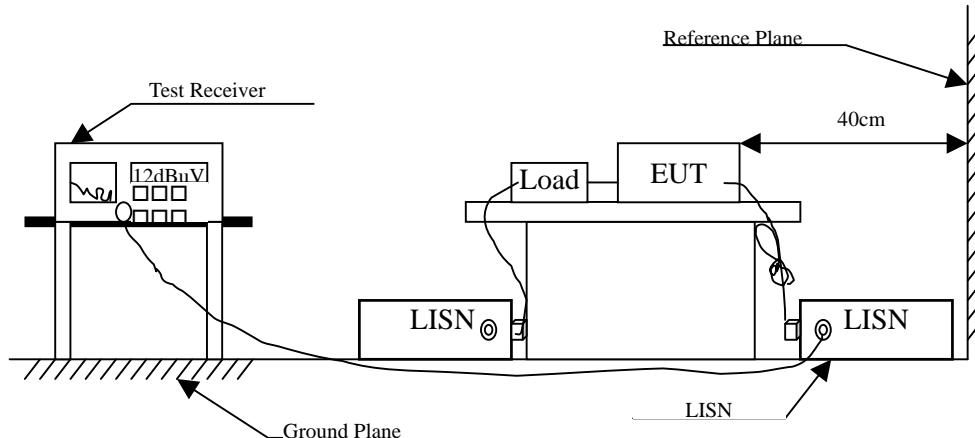
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2011	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2011	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2011	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2011	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2011	
	No.1 Shielded Room				

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked by “X” are used to measure the final test results.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2009 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Owing to the EUT use battery supply voltage, this test item is not performed.

3. Radiated Emission

3.1. Test Equipment

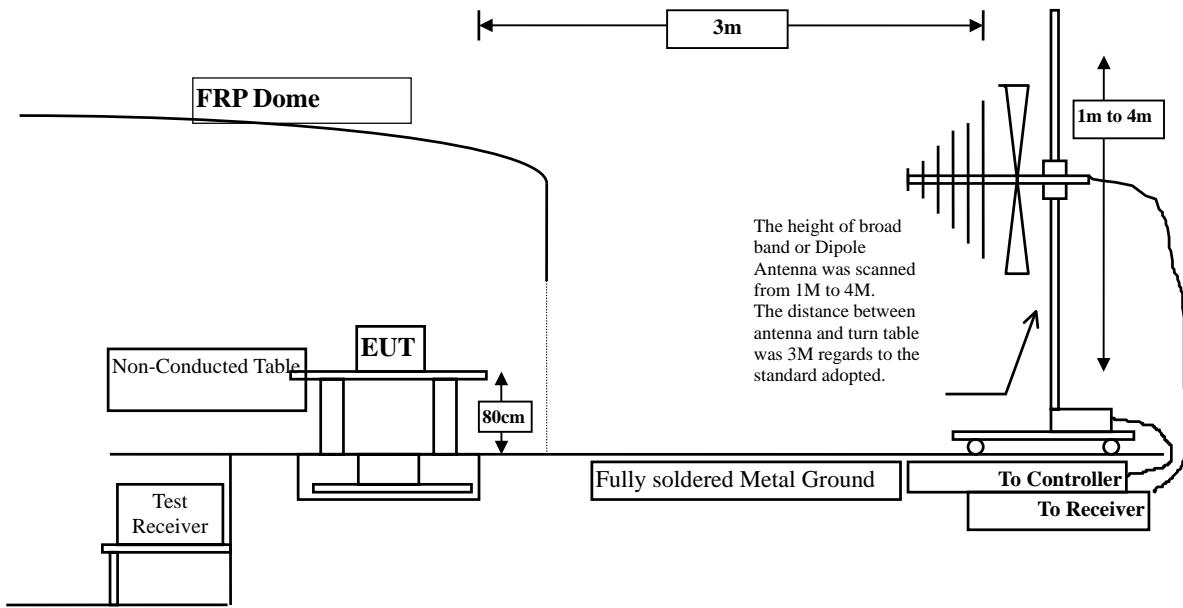
The following test equipment are used during the radiated emission test:

Test Site	Equipment		Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2011
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2011
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2011
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2011
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2011
	X	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/925975	Mar, 2011
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2011
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2011
	X	Coaxial Cable	QuiTek	QTK-CABLE/ CAB5	Feb., 2011
	X	Controller	QuiTek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

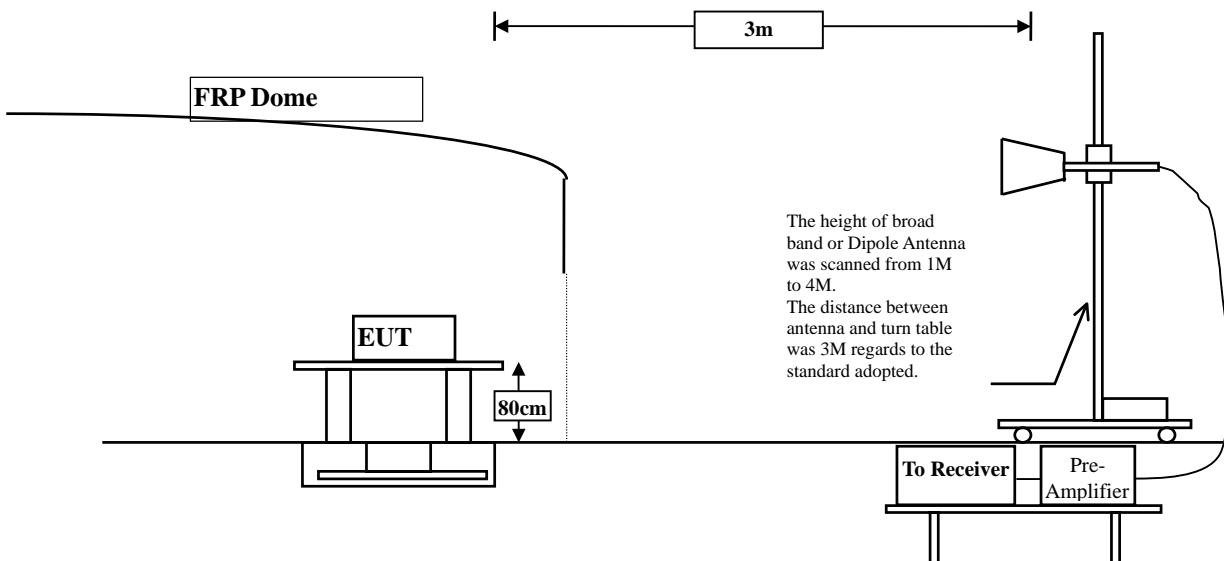
Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with “X” are used to measure the final test results.

3.2. Test Setup

Below 1GHz



Above 1GHz



3.3. Limits

➤ Fundamental and Harmonics Emission Limits

FCC Part 15 Subpart C Paragraph 15.249 Limits				
Frequency MHz	Field Strength of Fundamental		Field Strength of Harmonics	
	(mV/m @3m)	(dBuV/m @3m)	(uV/m @3m)	(dBuV/m @3m)
902-928	50	94	500	54
2400-2483.5	50	94	500	54
5725-5875	50	94	500	54

Remarks : 1. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)

2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB 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 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 : 1. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)

2. In the Above Table, the tighter limit applies at the band edges.

3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 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 can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4: 2009 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 bandwidth of the antenna.

The worst radiated emission is measured on the Final Measurement.

The measurement frequency range from 30MHz - 10th Harmonic of fundamental was investigated.

3.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

3.6. Test Result of Radiated Emission

Product : Mini-Magnetic sensor
 Test Item : Fundamental Radiated Emission
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (X- Axis)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
908.420	28.155	53.600	81.755	-32.245	114.000
Vertical					
Peak Detector:					
908.420	28.155	61.200	89.355	-24.645	114.000

Note:

1. Measurement Level = Reading Level + Correct Factor.
2. Correct Factor = Antenna Factor + Cable Loss – PreAMP.
3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Average Detector:

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					

Average Detector:

--

Vertical Average Detector:

--

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : Mini-Magnetic sensor
 Test Item : Fundamental Radiated Emission
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (Y- Axis)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
908.420	28.155	61.900	90.055	-23.945	114.000
Vertical					
Peak Detector:					
908.420	28.155	51.300	79.455	-34.545	114.000

Note:

1. Measurement Level = Reading Level + Correct Factor.
2. Correct Factor = Antenna Factor + Cable Loss – PreAMP.
3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Average Detector:

Frequency	Peak Measurement	Duty Cycle Correct Factor	Measurement Level	Margin	Limit
MHz	dBuV/m	dB	dBuV/m	dB	dBuV/m
Horizontal					
Average Detector:					
--	--	--	--	--	--
Vertical					
Average Detector:					
--	--	--	--	--	--

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : Mini-Magnetic sensor
 Test Item : Fundamental Radiated Emission
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (Z- Axis)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
908.420	28.155	63.800	91.955	-22.045	114.000
Vertical					
Peak Detector:					
908.420	28.155	53.880	82.035	-31.965	114.000

Note:

1. Measurement Level = Reading Level + Correct Factor.
2. Correct Factor = Antenna Factor + Cable Loss – PreAMP.
3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Average Detector:

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Average Detector:					

--

Vertical
Average Detector:

--

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : Mini-Magnetic sensor
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
1816.800	-4.390	39.330	34.940	-39.060	74.000
2725.200	-1.076	37.770	36.694	-37.306	74.000
3633.600	-0.394	40.020	39.626	-34.374	74.000
4542.000	1.902	38.380	40.281	-33.719	74.000

Average
Detector:

--

Vertical

Peak Detector:

1816.800	-2.612	39.330	36.717	-37.283	74.000
2725.200	-1.228	37.700	36.471	-37.529	74.000
3633.600	0.379	40.750	41.129	-32.871	74.000
4542.000	5.407	37.910	43.317	-30.683	74.000

Average
Detector:

--

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. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Mini-Magnetic sensor
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
					dBuV/m
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
262.800	-5.013	24.185	19.172	-26.828	46.000
371.440	-1.097	24.298	23.201	-22.799	46.000
460.680	1.589	22.927	24.516	-21.484	46.000
573.200	2.537	26.418	28.955	-17.045	46.000
644.980	1.552	25.663	27.215	-18.785	46.000
745.860	3.308	26.705	30.013	-15.987	46.000
Vertical					
286.080	-8.097	25.982	17.885	-28.115	46.000
371.440	-2.737	26.744	24.007	-21.993	46.000
458.740	-3.887	24.374	20.487	-25.513	46.000
524.700	-0.379	24.380	24.001	-21.999	46.000
685.720	2.319	22.201	24.519	-21.481	46.000
806.000	3.908	22.336	26.244	-19.756	46.000

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. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

4. Band Edge

4.1. Test Equipment

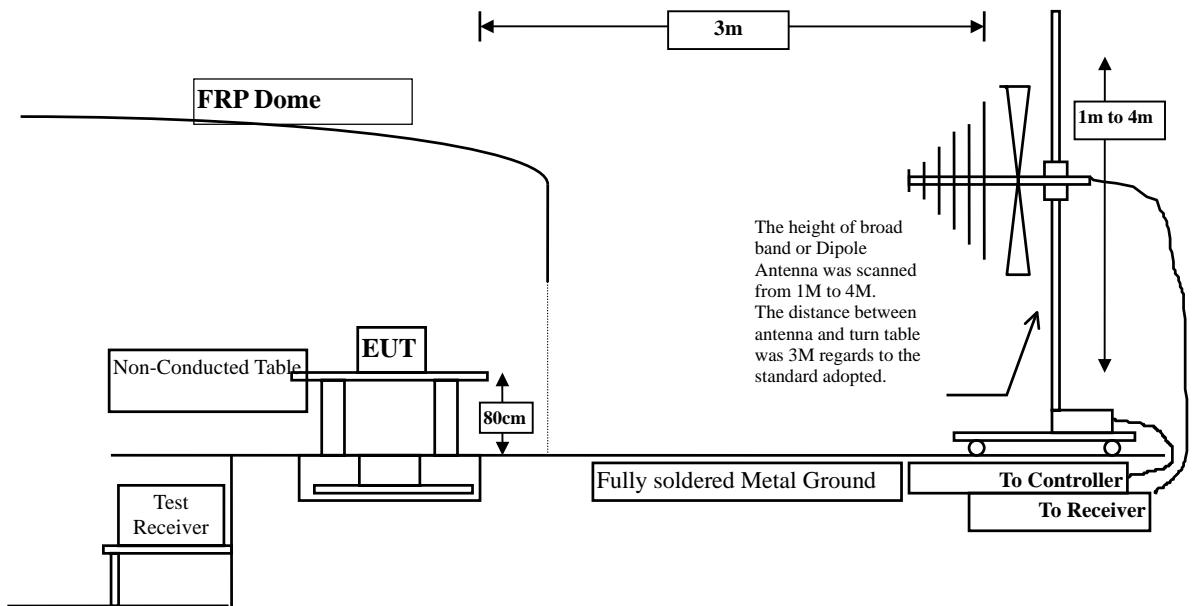
The following test equipments are used during the band edge tests:

Test Site	Equipment		Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2011
		Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2011
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2011
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2011
		Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2011
		Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/925975	Mar, 2011
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2011
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2011
	X	Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2011
	X	Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

Note:

1. All equipments are calibrated every one year.
2. The test equipments marked by “X” are used to measure the final test results.

4.2. Test Setup



4.3. Limit

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)).

4.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 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 can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4:2009 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter (R&S Test Receiver ESCS 30)is 120 kHz, above 1GHz are 1 MHz.

4.5. Uncertainty

Radiated is \pm 3.9 dB.

4.6. Test Result of Band Edge

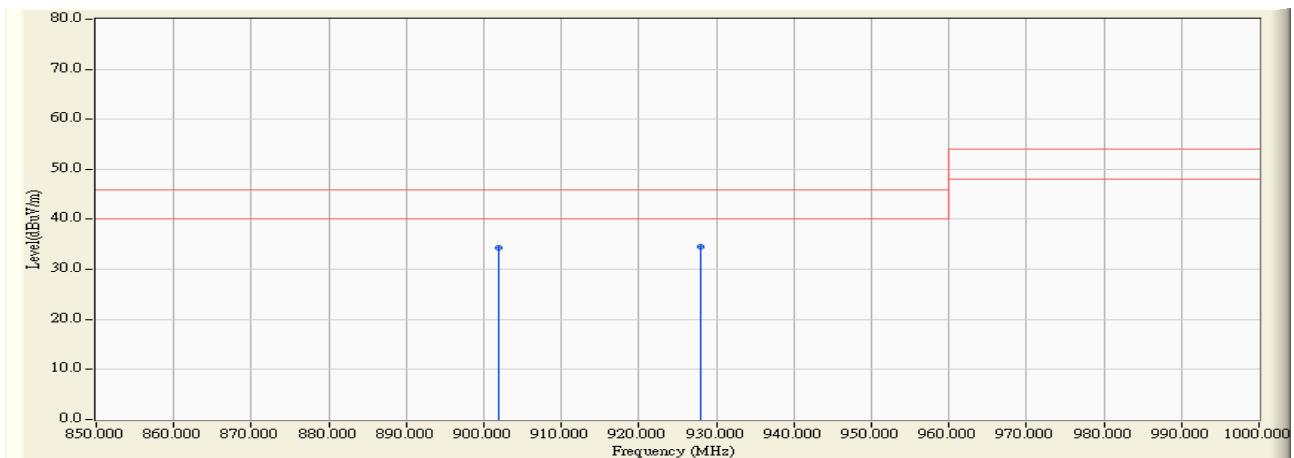
Product : Mini-Magnetic sensor
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Quasi-Peak Limit (dBuV/m)	Result
01(Quasi-Peak)	902.000	4.210	30.087	34.296	46.000	Pass
01(Quasi-Peak)	928.000	4.728	29.719	34.447	46.000	Pass

Figure Channel 01:

Horizontal (Quasi-Peak)



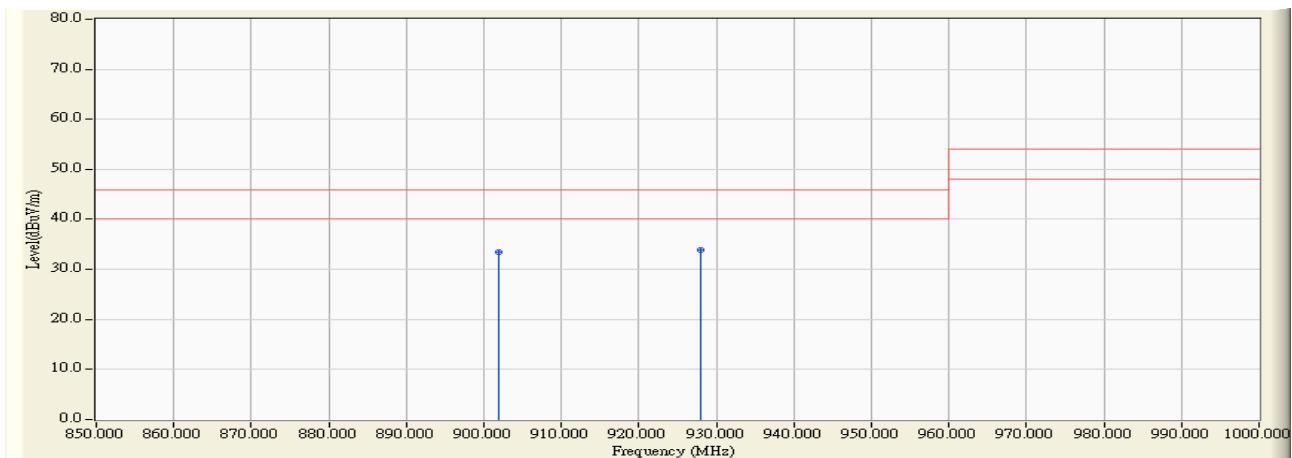
Note:

1. Quasi-Peak measurements: RBW=100kHz, VBW=1MHz, Sweep: Auto.
2. “*”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : Mini-Magnetic sensor
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Quasi-Peak Limit (dBuV/m)	Result
01(Quasi-Peak)	902.000	5.360	28.136	33.496	46.000	Pass
01(Quasi-Peak)	928.000	5.708	28.239	33.947	46.000	Pass

Figure Channel 01:
Vertical (Quasi-Peak)


Note:

1. Quasi-Peak measurements: RBW=100kHz, VBW=1MHz, Sweep: Auto.
2. “*”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

5. EMI Reduction Method During Compliance Testing

No modification was made during testing.