Test Report

Product Name	In-Wall Switch Module
Model No.	HAN02-0
FCC ID.	ZGXHAN02

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

Date of Receipt	Oct. 28, 2011
Issued Date	Nov. 11, 2011
Report No.	11B052R-RFUSP30V01
Report Version	V1.0

Test Report Certification

Issued Date: Nov. 11, 2011
Report No. : 11B052R-RFUSP30V01

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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.	HAN02-0
FCC ID.	ZGXHAN02
EUT Rated Voltage	AC 100-120V/60Hz
EUT Test Voltage	AC 120V/60Hz
Trade Name	Chromagic Technologies Corporation
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2010 ANSI C63.4: 2009
Test Result	Complied

NVLAP Lab Code: 200533-0

The Test Results relate only to the samples tested.
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(Manager / Vincent Lin)

Testing Laboratory
0914

TABLE OF CONTENTS

Description		Page
1.	**GENERAL INFORMATION**	**4**
1.1.	EUT Description	4
1.2.	Operation Description	4
1.3.	Tested System Details	6
1.4.	Configuration of Test System	6
1.5.	EUT Exercise Software	6
1.6.	Test Facility	7
2.	**Conducted Emission**	**8**
2.1.	Test Equipment	8
2.2.	Test Setup	8
2.3.	Limits	9
2.4.	Test Procedure	9
2.5.	Uncertainty	9
2.6.	Test Result of Conducted Emission	10
3.	**Radiated Emission**	**12**
3.1.	Test Equipment	12
3.2.	Test Setup	13
3.3.	Limits	14
3.4.	Test Procedure	15
3.5.	Uncertainty	15
3.6.	Test Result of Radiated Emission	16
4.	**Band Edge**	**19**
4.1.	Test Equipment	19
4.2.	Test Setup	20
4.3.	Limit	20
4.4.	Test Procedure	21
4.5.	Uncertainty	21
4.6.	Test Result of Band Edge	22
5.	**Duty Cycle**	**24**
5.1.	Test Equipment	24
5.2.	Test Setup	24
5.3.	Uncertainty	24
5.4.	Test Result of Duty Cycle	25
6.	**EMI Reduction Method During Compliance Testing**	**26**

Attachment 1: EUT Test Photographs
Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	In-Wall Switch Module
Trade Name	Chromagic Technologies Corporation
FCC ID.	ZGXHAN02
Model No.	HAN02-0
Frequency Range	908.42MHz
Type of Modulation	FSK
Number of Channels	1
Channel Control	Auto
Antenna Type	Monopole
Antenna Gain	Refer to the table “Antenna List”

Center Frequency of Each Channel:

Channel	Frequency
Channel 1:	908.42MHz

Note:

1. The EUT is a In-Wall Switch Module 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

1.2. Operation Description

The EUT is a In-Wall Switch Module 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.

This in-wall switch module is a transceiver which is a Z-WaveTM enabled device and is fully ompatible 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.Remote On/Off control of the connected load is possible with other manufacturer's Wireless Controller.

This in-wall switch module is able to detect overload wattage of connected non-dimmable lights or appliances. When detecting overload state, the module will be disabled and its On/Off button will be lockout of which LED will flash quickly.However, disconnect and re-connect the wiring of the module will reset its overload condition to normal status.

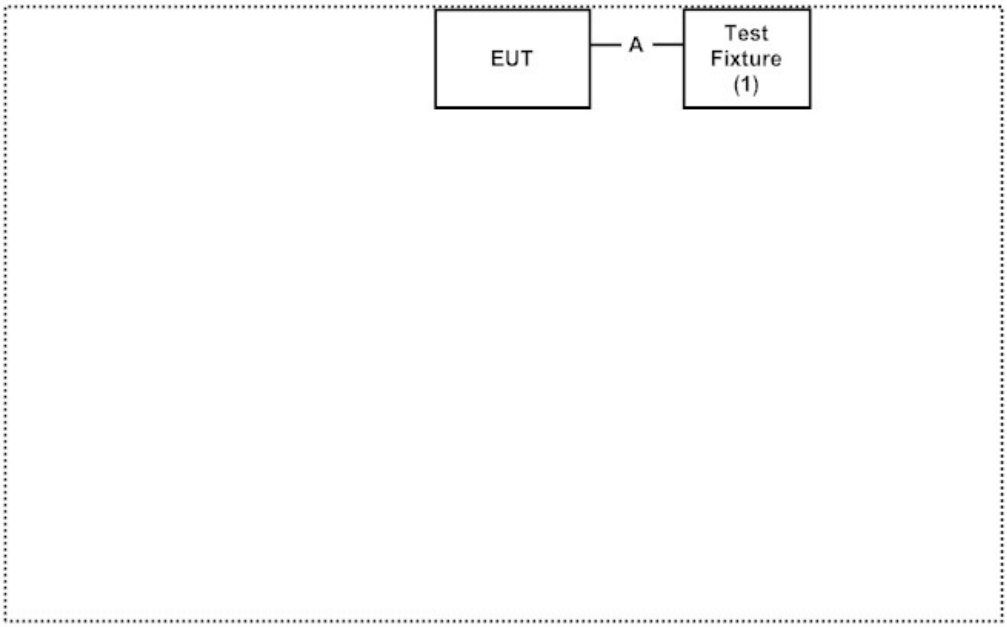
1.3. Tested System Details

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
(1)	Test Fixture	N/A	N/A	N/A	N/A

Signal Cable Type		Signal cable Description
A.	Power cable	Non-Shielded, 0.1m, two PCS.

1.4. Configuration of Test System



1.5. EUT Exercise Software

(1) Setup the EUT as shown in section 1.4.
(2) Plug-in the power cable and power on the EUT.
(3) Starts the continuous transmit.
(4) 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/

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FCC Accreditation Number: TW1014

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2. Conducted Emission

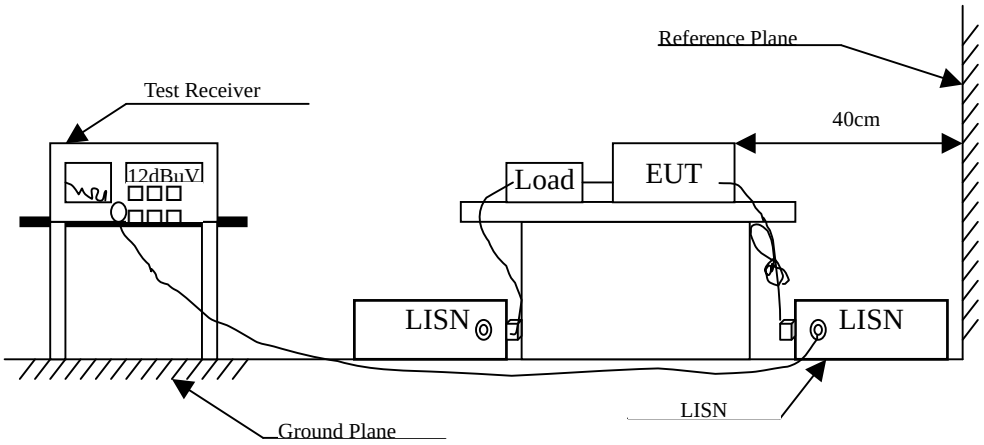
2.1. Test Equipment

	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

Product : In-Wall Switch Module
Test Item : Conducted Emission Test
Power Line : Line 1
Test Mode : Mode 1: Transmit

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
Line 1					
Quasi-Peak					
0.193	9.701	38.020	47.721	-17.050	64.771
0.279	9.657	35.500	45.157	-17.157	62.314
0.388	9.650	31.980	41.630	-17.570	59.200
0.627	9.650	23.840	33.490	-22.510	56.000
1.701	9.700	24.800	34.500	-21.500	56.000
13.728	9.870	9.840	19.710	-40.290	60.000
Average					
0.193	9.701	22.660	32.361	-22.410	54.771
0.279	9.657	22.340	31.997	-20.317	52.314
0.388	9.650	21.120	30.770	-18.430	49.200
0.627	9.650	12.500	22.150	-23.850	46.000
1.701	9.700	18.040	27.740	-18.260	46.000
13.728	9.870	4.860	14.730	-35.270	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : In-Wall Switch Module
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 1: Transmit

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
Line 2					
Quasi-Peak					
0.212	9.688	38.620	48.308	-15.921	64.229
0.271	9.659	36.200	45.859	-16.684	62.543
0.373	9.650	33.000	42.650	-16.979	59.629
0.642	9.650	23.380	33.030	-22.970	56.000
1.580	9.690	24.000	33.690	-22.310	56.000
11.591	9.900	13.740	23.640	-36.360	60.000
Average					
0.212	9.688	23.370	33.058	-21.171	54.229
0.271	9.659	22.120	31.779	-20.764	52.543
0.373	9.650	20.870	30.520	-19.109	49.629
0.642	9.650	11.660	21.310	-24.690	46.000
1.580	9.690	17.490	27.180	-18.820	46.000
11.591	9.900	8.830	18.730	-31.270	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ “ means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

3. Radiated Emission

3.1. Test Equipment

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

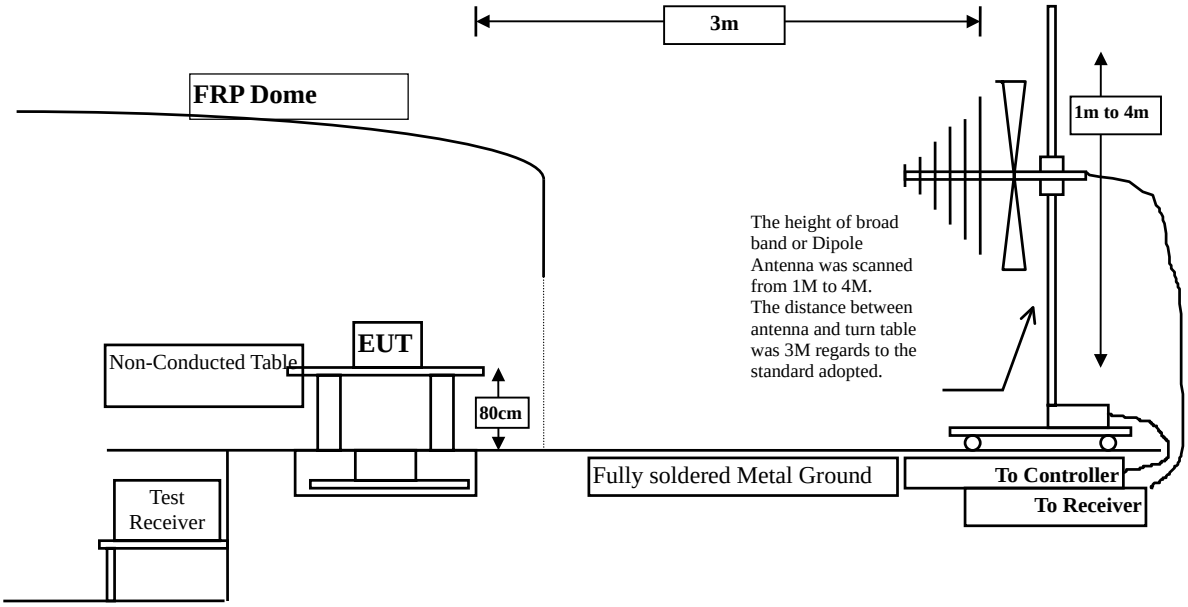
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2011
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2011
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2011
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2011
	X	Pre-Amplifier	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	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 with traceable calibrations. Each calibration is traceable to the national or international standards.

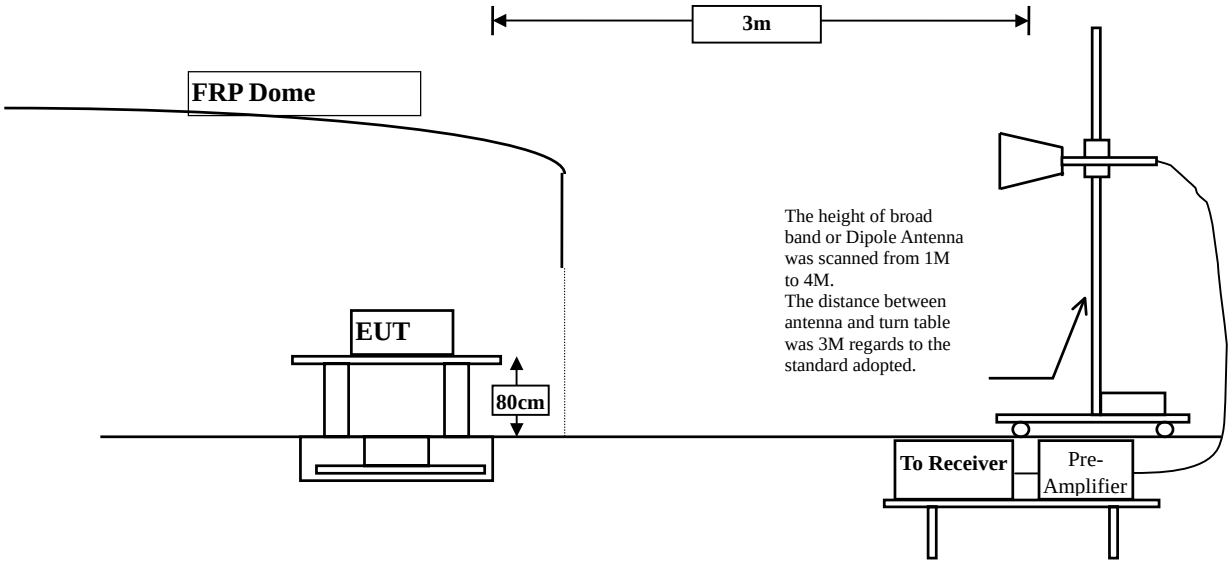
2. The test instruments marked with “X” are used to measure the final test results.

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 form 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 : In-Wall Switch Module
Test Item : Fundamental Radiated Emission
Test Site : No.3OATS
Test Mode : Mode 1: Transmit (Z- Axis)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal Peak Detector:					
908.420	5.990	93.020	99.010	-14.990	114.000
Vertical Peak Detector:					
908.420	2.503	84.620	87.123	-26.877	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:					
908.42	99.01	-20.915	78.095	-15.905	94.000
Vertical Average Detector:					
908.42	87.123	-20.915	66.208	-27.792	94.000

Note:

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

Product : In-Wall Switch Module
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:					
1816.840	-4.390	41.750	37.360	-36.640	74.000
2725.260	-1.075	37.720	36.644	-37.356	74.000
3633.680	-0.395	40.810	40.415	-33.585	74.000
4542.100	1.901	37.790	39.692	-34.308	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
1816.840	-2.613	43.930	41.317	-32.683	74.000
2725.260	-1.228	37.710	36.482	-37.518	74.000
3633.680	0.379	40.140	40.519	-33.481	74.000
4542.100	5.407	37.730	43.137	-30.863	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 : In-Wall Switch Module
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
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
39.700	-3.616	32.930	29.314	-10.686	40.000
270.560	-5.007	29.635	24.628	-21.372	46.000
447.100	-2.726	40.636	37.910	-8.090	46.000
513.060	1.550	38.678	40.228	-5.772	46.000
672.140	2.291	32.258	34.549	-11.451	46.000
850.620	5.982	29.345	35.327	-10.673	46.000
Vertical					
109.540	-0.418	29.421	29.003	-14.497	43.500
385.020	-2.820	30.398	27.578	-18.422	46.000
540.220	0.121	29.677	29.798	-16.202	46.000
691.540	2.421	29.046	31.467	-14.533	46.000
827.340	3.162	28.324	31.486	-14.514	46.000
968.960	8.191	29.211	37.402	-16.598	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. 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

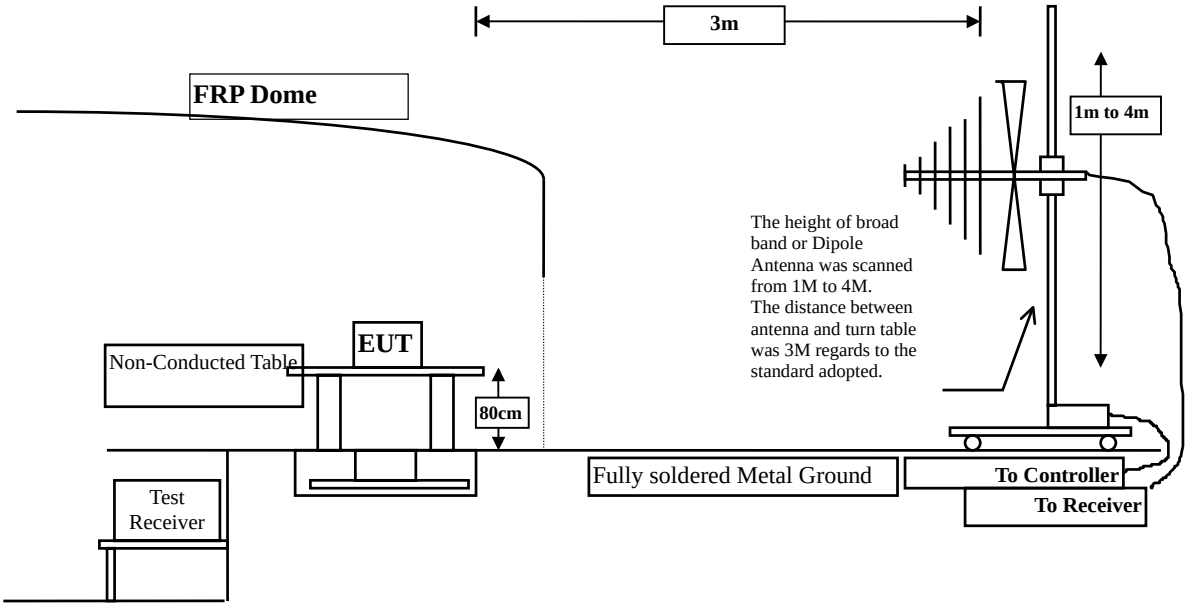
The following test equipments are used during the band edge tests:

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
		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 ± 3.9 dB.

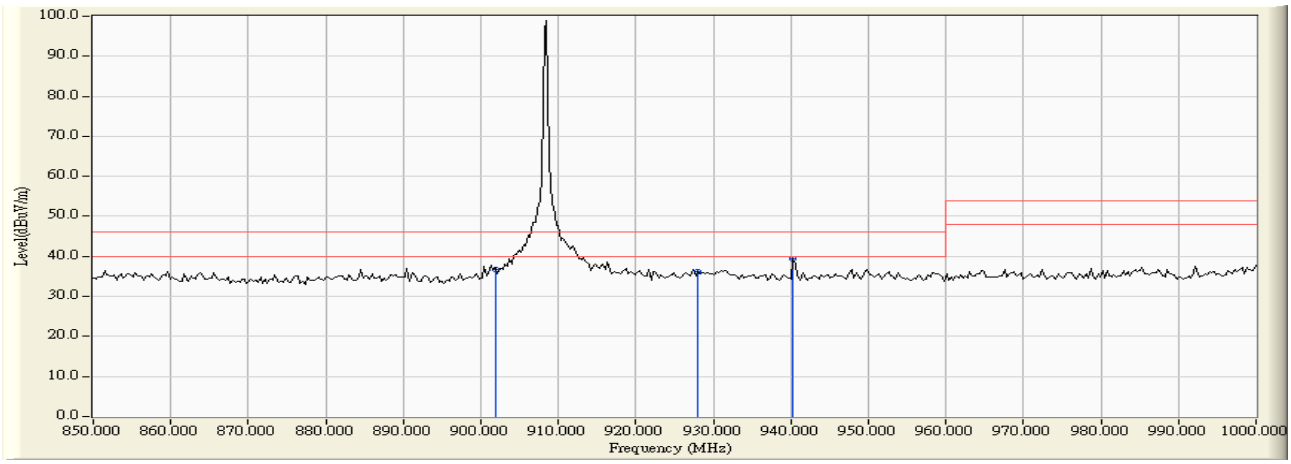
4.6. Test Result of Band Edge

Product : In-Wall Switch Module
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	5.628	30.995	36.623	46.020	Pass
01(Quasi-Peak)	928.000	6.848	29.260	36.107	46.020	Pass
01(Quasi-Peak)	940.300	6.401	32.965	39.366	46.020	Pass

Figure Channel 01: Horizontal (Quasi-Peak)



Note:

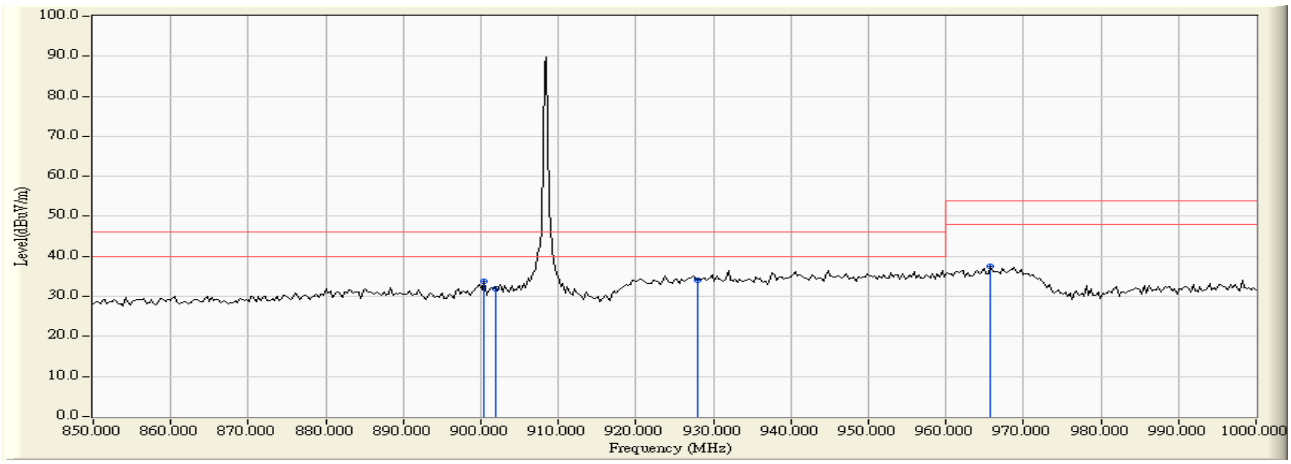
1. Quasi-Peak measurements: RBW=100kHz,VBW=1MHz,Sweep: Auto.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : In-Wall Switch Module
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)	900.400	3.374	30.492	33.866	46.020	Pass
01(Quasi-Peak)	902.000	3.155	28.866	32.020	46.020	Pass
01(Quasi-Peak)	928.000	6.160	27.781	33.941	46.020	Pass
01(Quasi-Peak)	965.800	7.982	29.561	37.543	54.000	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. Duty Cycle

5.1. Test Equipment

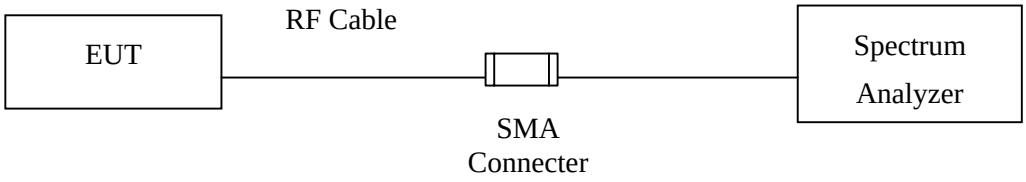
The following test equipments are used during the band edge tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2011
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2011
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2011

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

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

5.2. Test Setup

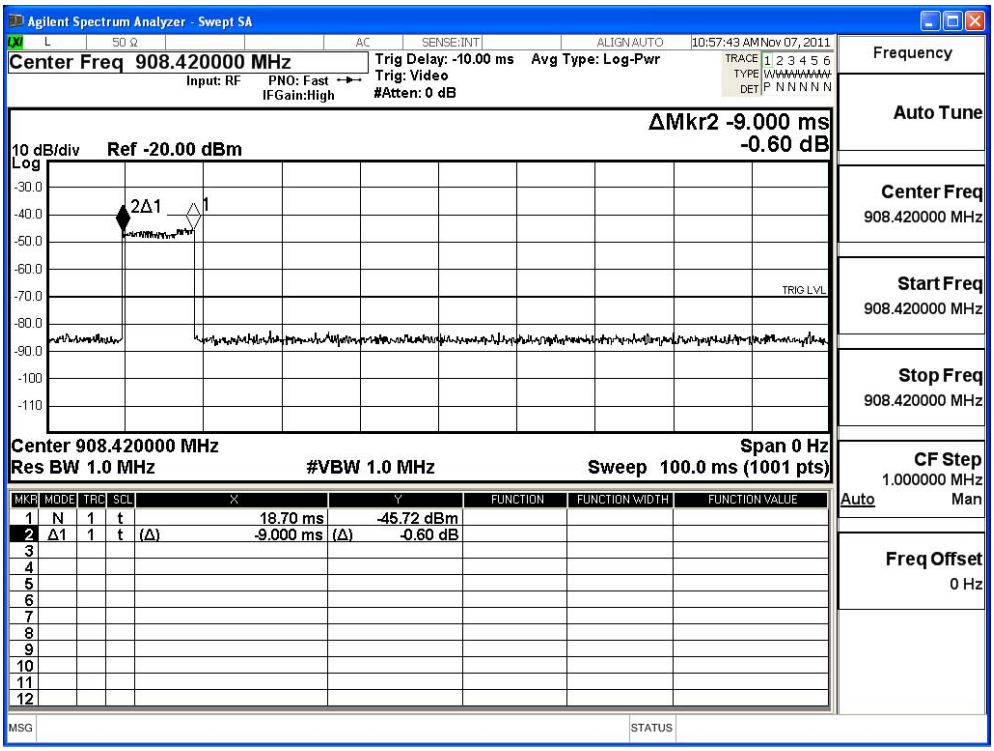


5.3. Uncertainty

± 150Hz

5.4. Test Result of Duty Cycle

Product : In-Wall Switch Module
Test Item : Duty Cycle Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit



Time on of 100ms= 9.000 ms

Duty Cycle= 9ms / 100ms= 0.09

Duty Cycle correction factor= 20 LOG 0.09= -20.915 dB

Duty Cycle correction factor	**-20.915**	**dB**

6. EMI Reduction Method During Compliance Testing

No modification was made during testing.