Excellence in Compliance Testing

Certification Test Report

Frequency Hopping Spread Spectrum Transmitter

FCC ID: SJS-380153VHP
IC: 5379A-380153VHP

FCC Rule Part: 15.247
IC Radio Standards Specification: RSS-210

ACS Report Number: 07-0290 - 15C

Manufacturer: MARS Company
Model: 380135VHP, 380129VHP

Test Begin Date: September 12, 2007
Test End Date: September 27, 2007

Report Issue Date: December 17, 2007

FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612-0

This report is not be used to claim certification, approval, or endorsement by NVLAP, NIST or any government agency.

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This report contains 24 pages

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Additional Exhibits Included In Filing

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Product Labeling
RF Exposure – MPE Calculations
Installation/Users Guide
Theory of Operation
BOM (Parts List)
System Block Diagram
Schematics

1.0 GENERAL

1.1 Purpose
The purpose of this report is to demonstrate compliance with Part 15, Subpart C of the FCC's Code of Federal Regulations and Industry Canada's Radio Standards Specification RSS-210.

1.2 Product Description

1.2.1 General
The MARS Smart Transmitter 380135VHP (Wall Mount) and 380129VHP (Pit Mount) units are intended to be used to transmit meter-reading data from a utility meter to a data-collecting device. The device operates in a 'regular transmit' mode. The utility meter is interrogated every 15 minutes to 1 hour, and the reading taken is transmitted as described in 2 above.

The unit will transmit up-to 1watt of RF power into the Antenna. The Antenna is integral to the packaging and comprises a quarter-wave-monopole with a very small ground plane regarded as having a negligible effect.

The two model variants, 380135VHP (Wall Mount) and 380129VHP (Pit Mount), are electrically identical and differ only external appearance and design.

Manufacturer Information:
MARS Company
3925 SW 13th Stl
Ocala, FL 34477-2887

Serial Numbers:
F4 (Wall mount)
F5 (Pit Mount)

Test Sample Condition:
The EUT samples were received in working order with no visible defects.

Detailed photographs of the EUT are filed separately with this filing.

1.2.2 Intended Use
The units are intended to be used to transmit meter-reading data from a utility meter to a data-collecting device.

1.3 Test Methodology and Considerations
To facilitate RF conducted measurements, a temporary RF connector was utilized. The test sample for RF conducted measurements was modified, by the applicant, with a temporary SMA connector. This sample was only used for RF conducted measurements and separate samples provided for radiated measurements.

Each model variant was tested separately for radiated emissions and all data is presented in this report.

2.0 TEST FACILITIES

2.1 Location

The radiated and conducted emissions test sites are located at the following address:

Advanced Compliance Solutions
5015 B.U. Bowman Drive
Buford, GA 30518
Phone: (770) 831-8048
Fax: (770) 831-8598

2.2 Laboratory Accreditations/Recognitions/Certifications

The Semi-Anechoic Chamber Test Site, Open Area Test Site (OATS) and Conducted Emissions Site have been fully described, submitted to, and accepted by the FCC, Industry Canada and the Japanese Voluntary Control Council for Interference by information technology equipment. In addition, ACS is compliant to ISO 17025 as certified by the National Institute of Standards and Technology under their National Voluntary Laboratory Accreditation Program. The following certification numbers have been issued in recognition of these accreditations and certifications:

FCC Registration Number: 894540
Industry Canada Lab Code: IC 4175
VCCI Member Number: 1831

- VCCI OATS Registration Number R-1526
- VCCI Conducted Emissions Site Registration Number: C-1608

NVLAP Lab Code: 200612-0

2.3 Radiated Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site

The Semi-Anechoic Chamber Test Site consists of a 20' x 30' x 18' shielded enclosure. The chamber is lined with Toyo Ferrite Grid Absorber, model number FFG-1000. The ferrite tile grid is 101 x 101 x 19mm thick and weighs approximately 550 grams. These tiles are mounted on steel panels and installed directly on the inner walls of the chamber.

The turntable is 150cm in diameter and is located 160cm from the back wall of the chamber. The chamber is grounded via 1 - 8' copper ground rod, installed at the center of the back wall, it is bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is all steel, flush mounted table installed in an all steel frame. The table is remotely operated from inside the control room located 25' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Behind the turntable is a 3' x 6' x 4' deep shielded pit used for support equipment if necessary. The pit is equipped with 1 - 4" PVC chases from the turntable to the pit that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit.

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3-1 below:

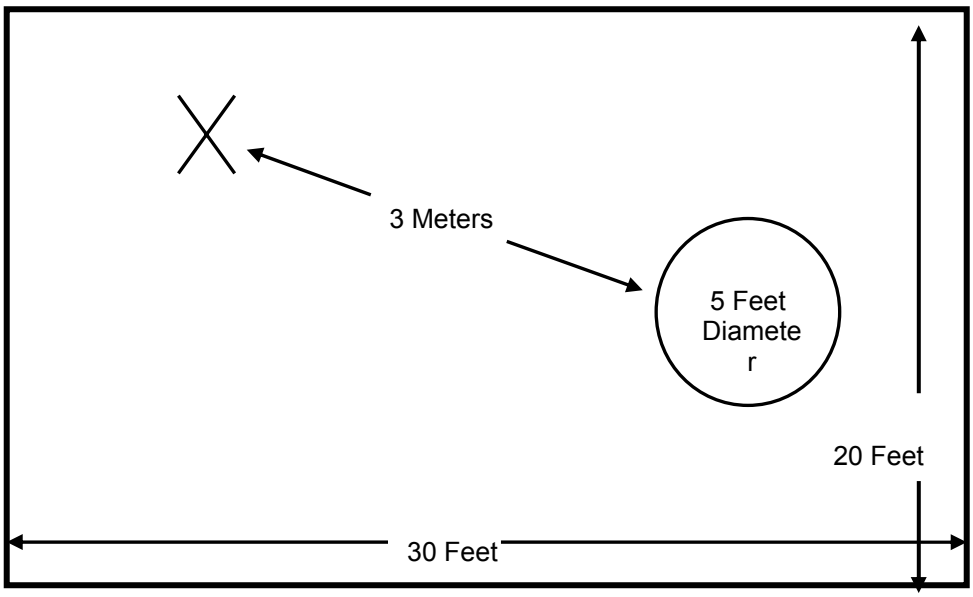

Figure 2.3-1: Semi-Anechoic Chamber Test Site

2.3.2 Open Area Tests Site (OATS)

The open area test site consists of a 40' x 66' concrete pad covered with a perforated electro-plated galvanized sheet metal. The perforations in the sheet metal are 1/8" holes that are staggered every 3/16". The individual sheets are placed to overlap each other by 1/4" and are riveted together to provide a continuous seam. Rivets are spaced every 3" in a 3 x 20 meter perimeter around the antenna mast and EUT area. Rivets in the remaining area are spaced as necessary to properly secure the ground plane and maintain the electrical continuity.

The entire ground plane extends 12' beyond the turntable edge and 16' beyond the antenna mast when set to a 10 meter measurement distance. The ground plane is grounded via 4 - 8' copper ground rods, each installed at a corner of the ground plane and bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is an all aluminum 10' flush mounted table installed in an all aluminum frame. The table is remotely operated from inside the control room located 40' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Adjacent to the turntable is a 7' x 7' square and 4' deep concrete pit used for support equipment if necessary. The pit is equipped with 5 - 4" PVC chases from the pit to the control room that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit. The pit is covered with 2 sheets of 1/4" diamond style re-enforced steel sheets. The sheets are painted to match the perforated steel ground plane; however the underside edges have been masked off to maintain the electrical continuity of the ground plane. All reflecting objects are located outside of the ellipse defined in ANSI C63.4.

A diagram of the Open Area Test Site is shown in Figure 2.3-2 below:

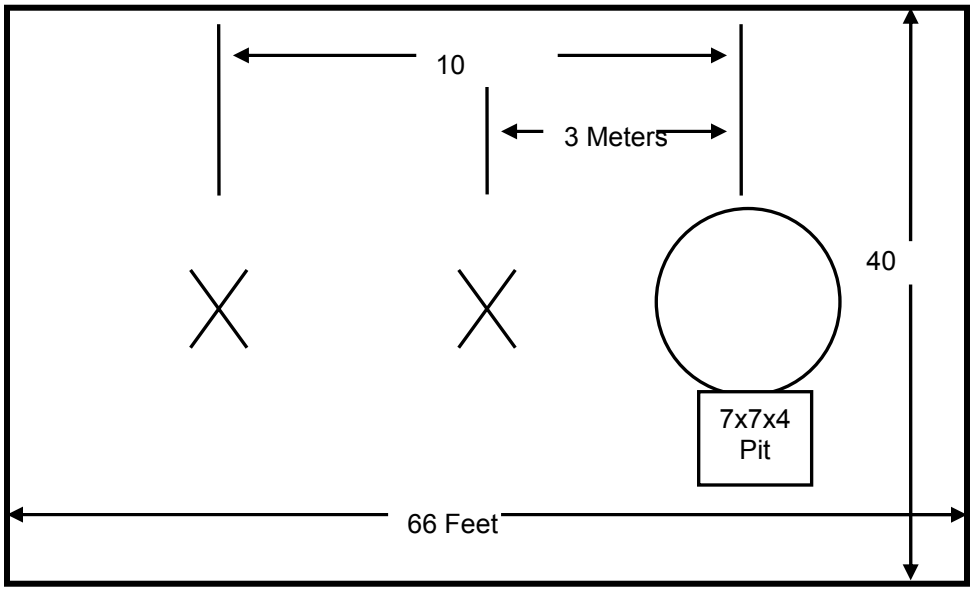

Figure 2.3-2: Open Area Test Site

2.4 Conducted Emissions Test Site Description

The AC mains conducted EMI site is located in the main EMC lab. It consists of an 8' x 8' solid aluminum horizontal group reference plane (GRP) bonded every 3" to an 8' X 8' vertical ground plane.

The site is of sufficient size to test table top and floor standing equipment in accordance with section 6.1.4 of ANSI C63.4.

A diagram of the room is shown below in figure 4.1.3-1:

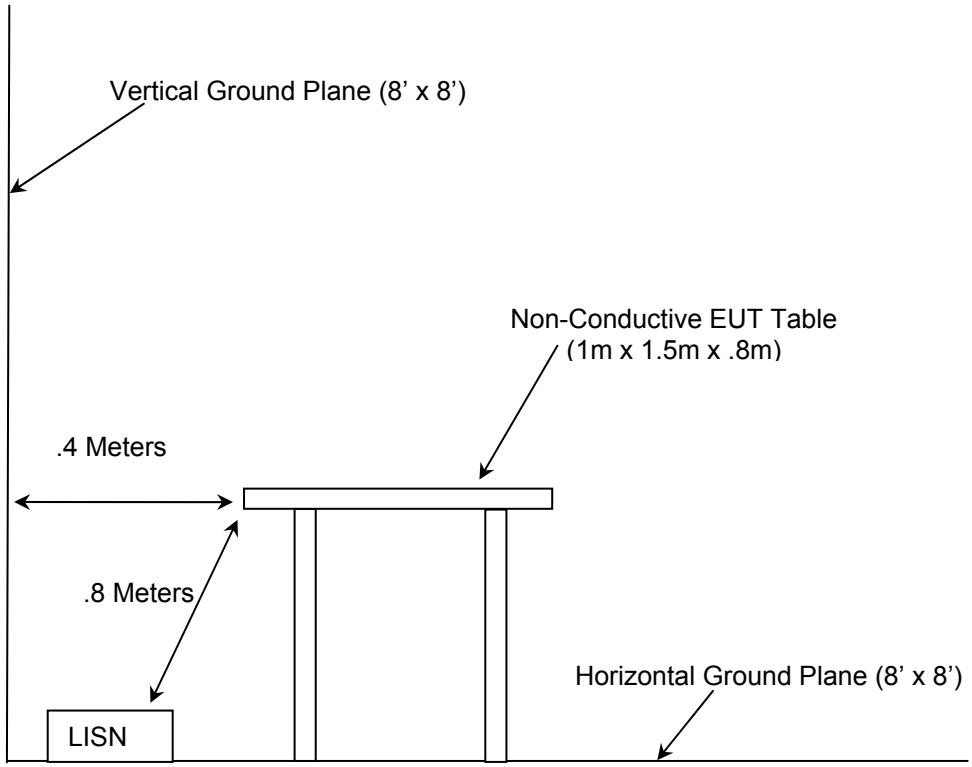

Figure 2.4-1: AC Mains Conducted EMI Site

3.0 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ANSI C63.4-2003: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9KHz to 40GHz
- US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2006
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2006
- FCC OET Bulletin 65 Appendix C - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, 2001
- FCC Public Notice DA 00-705 - Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems, March 30, 2000
- Industry Canada Radio Standards Specification: RSS-210 - Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Issue 7, June 2007

4.0 LIST OF TEST EQUIPMENT

All test equipment used for regulatory testing is calibrated yearly or according to manufacturer's specifications.

Table 4.0-1: Test Equipment

Equipment Calibration Information					
Asset ID	**Manufacturer**	**Model Number**	**Serial Number**	**Equipment Type**	**Cal Due**
22	Agilent	8449B	3008A00526	Amplifiers	04/10/08
25	Chase	CBL6111	1043	Antennas	06/06/08
30	Spectrum Technologies	DRH-0118	970102	Antennas	05/10/08
167	ACS	Chamber EMI Cable Set	RG6	167	01/05/08
290	Florida RF Cables	SMSE-200-72.0-SMRE	None	Cables	05/15/08
291	Florida RF Cables	SMRE-200W-12.0-SMRE	None	Cables	05/15/08
292	Florida RF Cables	SMR-290AW-480.0-SMR	None	Cables	05/24/08
337	Microwave Circuits	H1G513G1	282706	Filters	10/03/07
283	Rohde & Schwarz	FSP40	1000033	Spectrum Analyzers	11/09/08
2	Rohde & Schwarz	ESMI-Receiver	839587/003	Spectrum Analyzers	03/05/08
1	Rohde & Schwarz	ESMI - Display	833771/007	Spectrum Analyzers	03/05/08
73	Agilent	8447D	2727A05624	Amplifiers	05/09/08

5.0 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Equipment Type	Manufacturer	Model Number	Serial Number	FCC ID
Test Mode Programmer	MARS	N/A	N/A	N/A

6.0 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

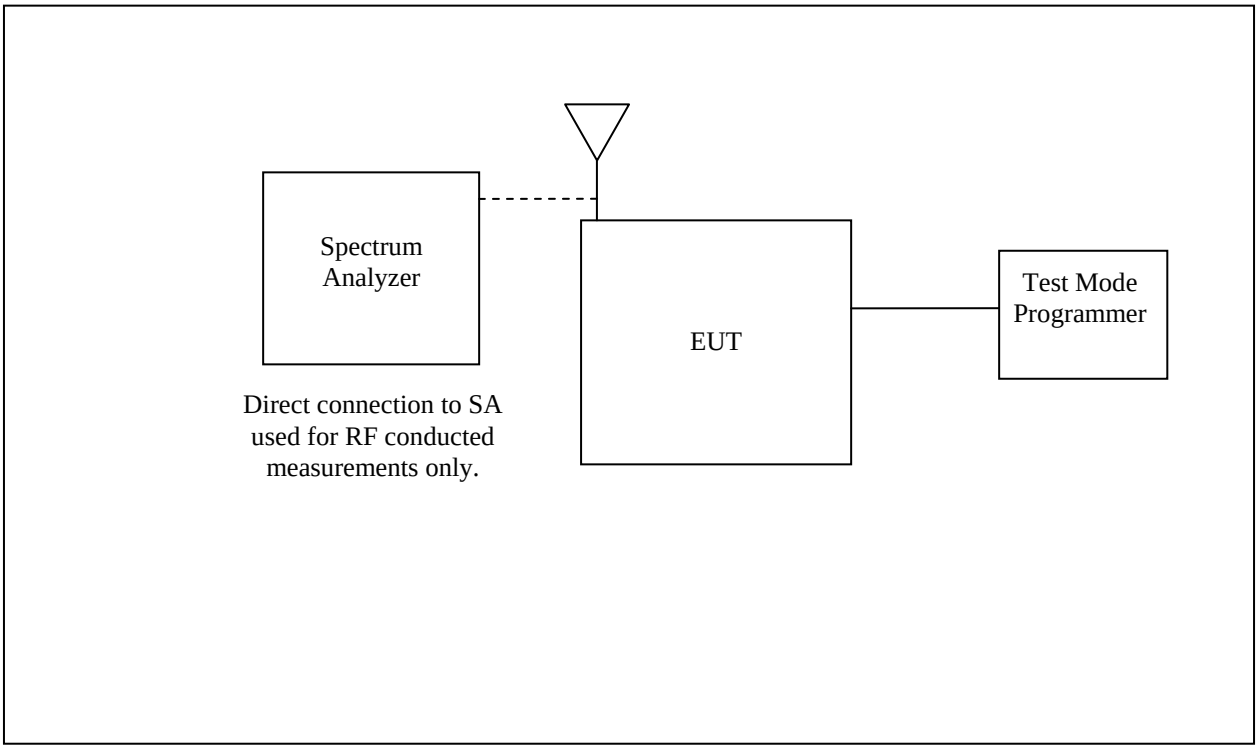

Figure 6-1: EUT Test Setup

*See Test Setup photographs for additional detail.

7.0 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

7.1 Antenna Requirement – Part 15.203

The device is professionally installed therefore ensuring no antenna other than that furnished by the responsible party shall be used with the device. The antenna is an internal ¼ wave whip antenna with 2dBi gain.

7.2 Power Line Conducted Emissions

7.2.1 Test Methodology

The 380135VHP and 380129VHP are battery powered therefore Power Line Conducted Emissions were not performed.

7.3 Radiated Emissions (Unintentional Radiation)

7.3.1 Test Methodology

Radiated emission tests were performed over the frequency range of 30MHz to 1 GHz. Measurements of the radiated field strength were made at a distance of 3m from the boundary of the equipment under test (EUT) and the receiving antenna. The antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies from 30MHz to 1000MHz, radiated measurements were made with a Quasi-peak detector and the spectrum analyzer's resolution bandwidth set to 120 KHz.

All variations in available antennas and installation configurations were evaluated with the worst case data presented below.

7.3.2 Test Results

Results of the test are given in Table 7.3-1 below:

Table 7.3-1: Radiated Emissions Tabulated Data

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
31.07	---------	21.36	H	-7.24	---------	14.12	--------	40.0	---------	25.88
42.93	---------	20.75	H	-13.07	---------	7.68	--------	40.0	---------	32.32
83.88	---------	21.41	V	-17.27	---------	4.14	--------	40.0	---------	35.86
114.06	---------	21.20	H	-13.86	---------	7.34	--------	46.0	---------	38.66
133.46	---------	21.33	V	-12.80	---------	8.53	--------	46.0	---------	37.47
215.37	---------	23.26	H	-14.40	---------	8.86	--------	46.0	---------	37.14
342.55	---------	22.22	V	-9.52	---------	12.70	--------	46.0	---------	33.30
483.74	---------	23.34	H	-5.93	---------	17.41	--------	46.0	---------	28.59
595.83	---------	31.61	V	-3.64	---------	27.97	--------	46.0	---------	18.03
950.42	---------	21.74	V	2.92	---------	24.66	--------	46.0	---------	21.34

* Note: All emissions above **950.42** MHz were attenuated below the permissible limit.

7.4 Peak Output Power

7.4.1 Test Methodology (Conducted Method)

The 20dB bandwidth of the EUT was within the resolution bandwidth of spectrum analyzer, therefore the power measurement was made using the spectrum analyzer method. The resolution and video bandwidth were set to > 20 dB bandwidth of the emission measured. The device employs >50 channels therefore the power is limited to 1 Watt.

7.4.2 Test Results

Results are shown in table 7.4-1 and the worst case was plotted and shown in figure 7.4-1 to 7.4-3 below:

Table 7.4-1: RF Output Power

Frequency [MHz]	Level [dBm]
905	29.85
915	29.62
925	29.52

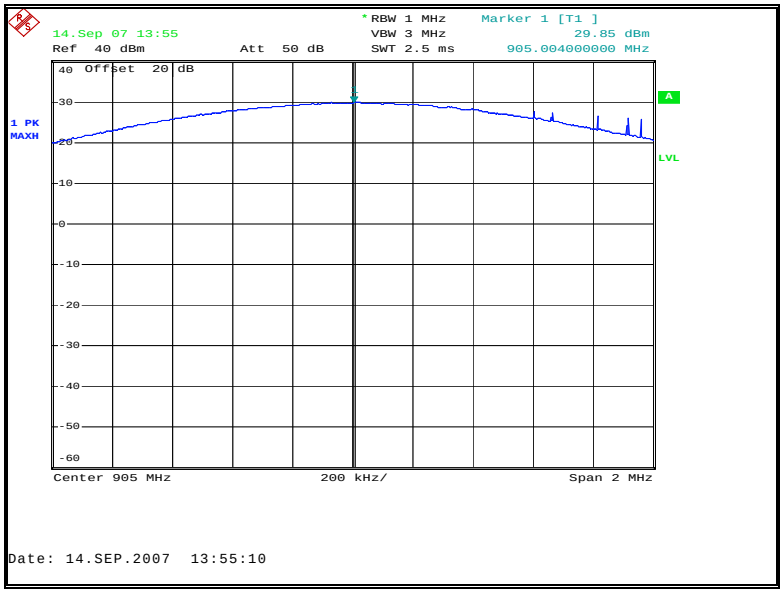

Figure 7.4-1: Output power – Low Channel

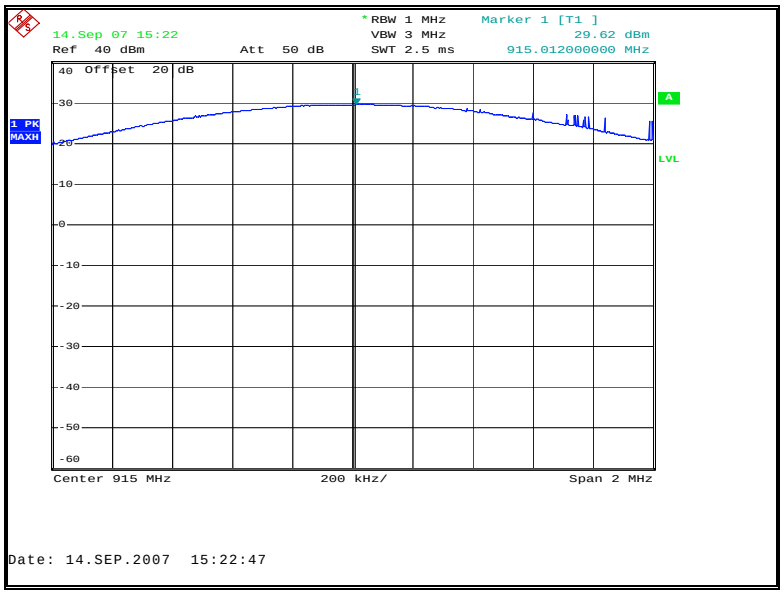

Figure 7.4-2: Output power – Mid Channel

Figure 7.4-3: Output power – High Channel

7.5 Channel Usage Requirements

7.5.1 Carrier Frequency Separation

7.5.1.1 Test Methodology

The span of the spectrum analyzer was set wide enough to capture two adjacent peaks and the RBW and VBW were set to ≥ 1% of the span.

7.5.1.2 Test Results

The maximum 20dB bandwidth of the hopping channel was measured to be 91.8kHz (See figure 7.5.4-1 to 7.5.4-3 below). The adjacent channel separation was measured to be 200kHz. Results are shown in figure 7.5.1-1 below:

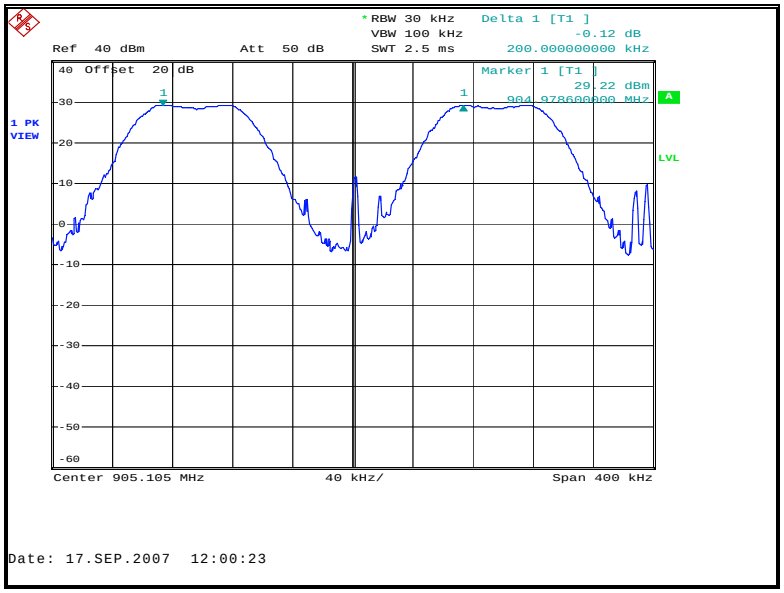

Figure 7.5.1-1: Carrier Frequency Separation

7.5.2 Number of Hopping Channels

The 20dB bandwidth of the device is less than 250 kHz and the device employs 50 hopping channels per sequence as required. The device employs two different hopping sequences each 10 MHz wide. #1 is from 905-915 MHz and #2 is from 915-925 MHz. The plots of the hopping channels are shown in Figure 7.5.2-1 and 7.5.2-2 below:

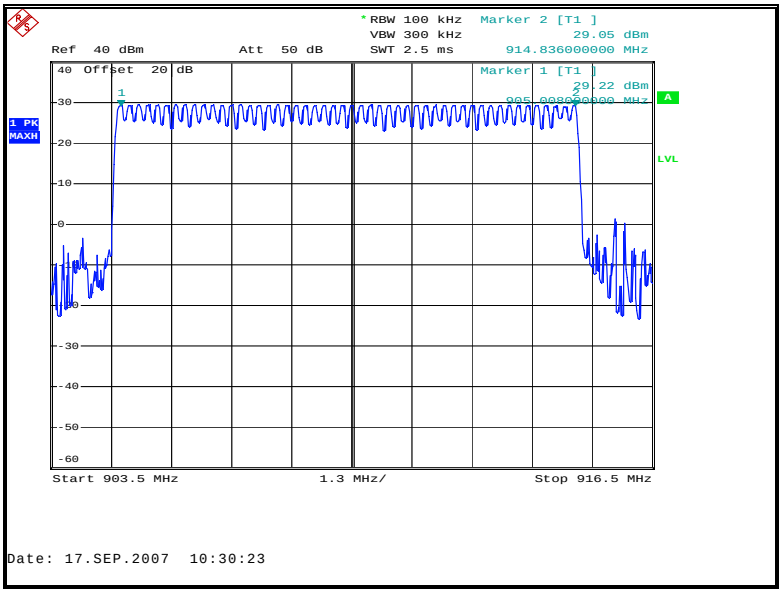

Figure 7.5.2-1: Number of Hopping Channels – Sequence #1

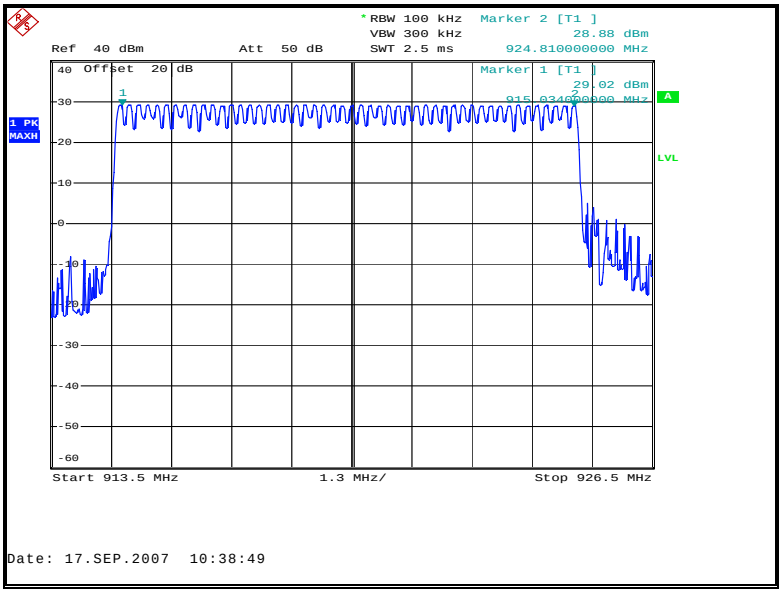

Figure 7.5.2-2: Number of Hopping Channels – Sequence #2

7.5.3 Channel Dwell Time

7.5.3.1 Test Methodology

The emission measured centered on the analyzer and the span set to 0 Hz. The RBW was set to 1 MHz and the VBW to 3 MHz. Sweep time was set to 10 ms to capture the burst duration of the emission. The marker –delta function of the analyzer was employed to measure the burst duration.

7.5.3.2 Test Results

The maximum duration of the RF transmission is declared by the manufacturer to be 7.5 ms. There is a minimum 30 to 40 second rest period in which the device hops to another channel according to the pseudorandom frequency table before transmitting another 7.5ms burst. Therefore the average time of occupancy on any channel in a 20 second period is 7.5ms. A single transmission is shown in figure 7.5.3-1 below:

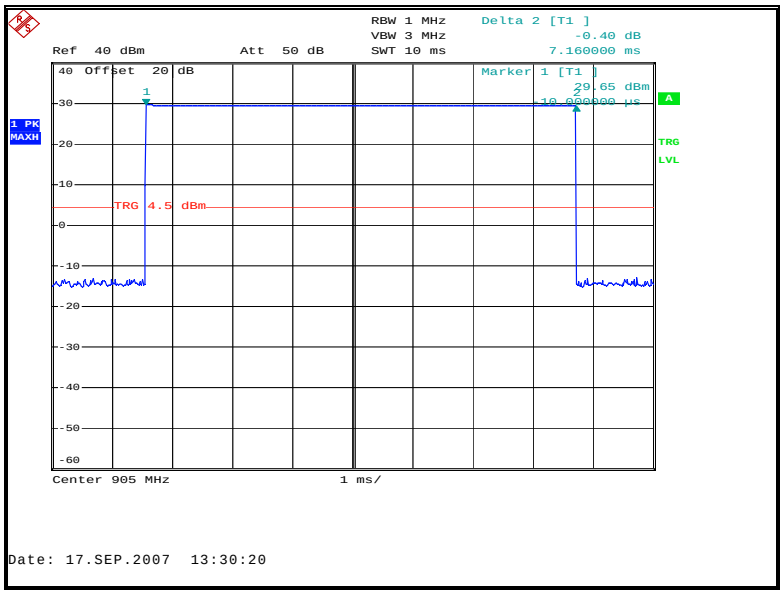

Figure 7.5.3-1: Channel Dwell Time

7.5.4 20dB Bandwidth

7.5.4.1 Test Methodology

The spectrum analyzer span was set to 2 to 3 times the estimated 20 dB bandwidth of the emission. The RBW was to ≥ 1% of the estimated 20 dB bandwidth. The trace was set to max hold with a peak detector active. The Delta function of the analyzer was utilized to determine the 20 dB bandwidth of the emission. The span and RBW were examined and re-adjusted if necessary to meet the requirements of 2 to 3 times the 20 bandwidth for the span and ≥ 1% of the 20 dB bandwidth for the RBW.

7.5.4.2 Test Results

The maximum 20dB bandwidth was found to be approximately 91.8kHz. Results are shown below in Table 7.5.4-1 and Figures 7.5.4-1 through 7.5.4-3.

Table 7.5.4-1

Frequency (MHz)	20dB Bandwidth (kHz)
905	90.6
915	91.8
925	91.2

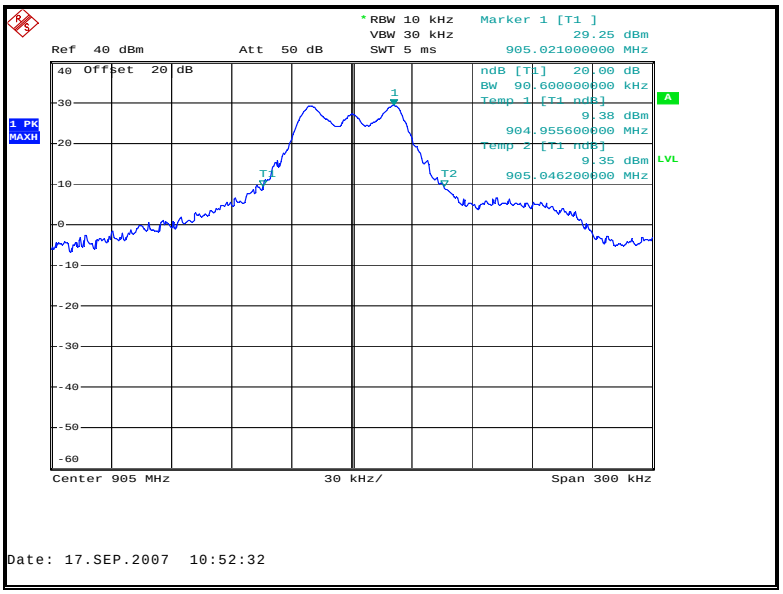

Figure 7.5.4-1: 20dB Bandwidth Low Channel

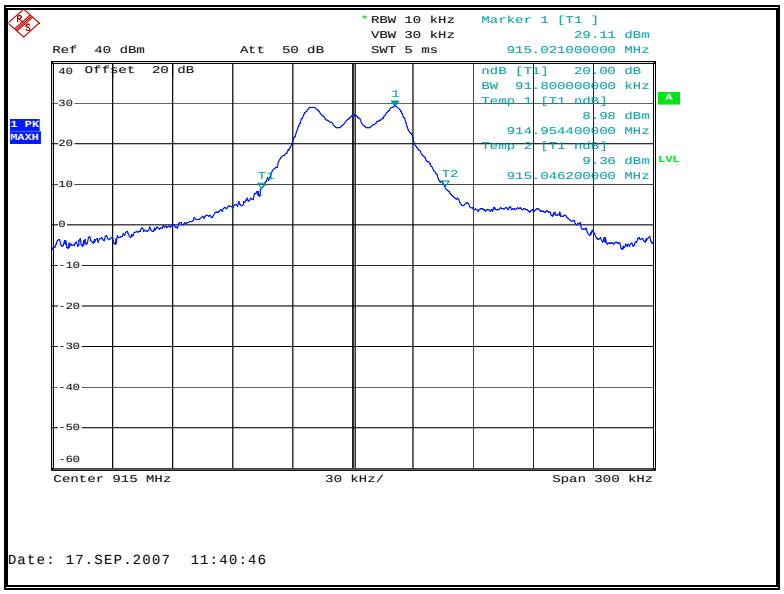

Figure 7.5.4-2: 20dB Bandwidth Mid Channel

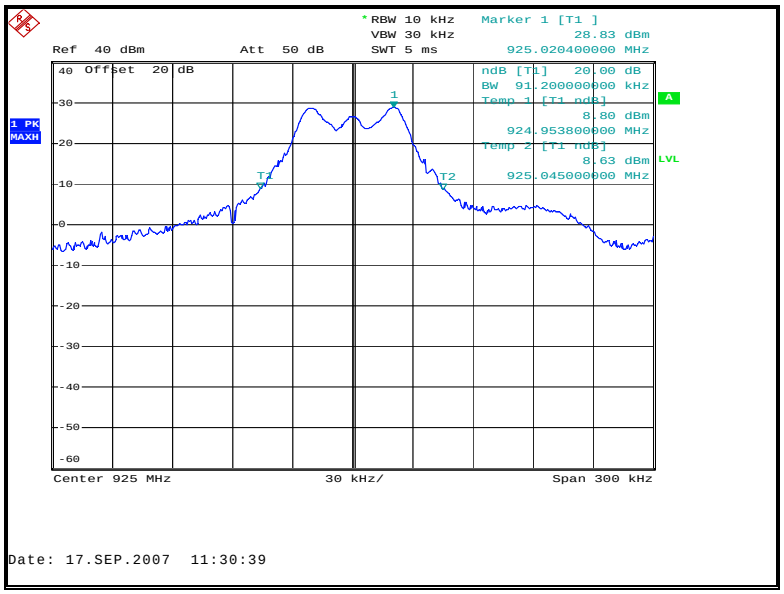

Figure 7.5.4-3: 20dB Bandwidth High Channel

7.6 Band-Edge Compliance and Spurious Emissions

7.6.1 Band-Edge Compliance of RF Conducted Emissions

7.6.1.1 Test Methodology

The EUT was investigated at the lowest and highest channel available to determine band-edge compliance. For each measurement the spectrum analyzer's RBW was set to 100 kHz, which is ≥ 1% of the span, and the VBW was set to 300kHz.

7.6.1.2 Test Results

In a 100 kHz bandwidth at the lower and upper band-edge, the radio frequency power that was produced by the EUT is at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired power. Band-edge compliance is displayed in Figures 7.6.1-1 and 7.6.2-2.

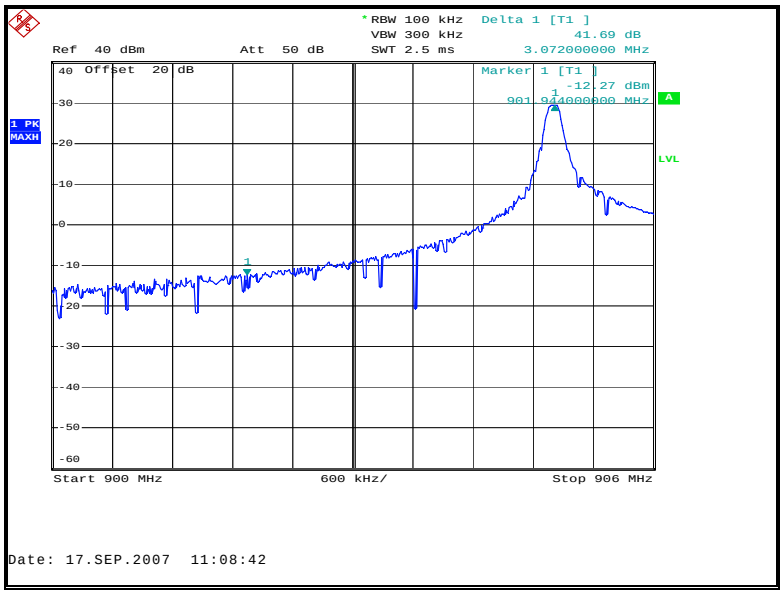

Figure 7.6.1-1: Lower Band-edge

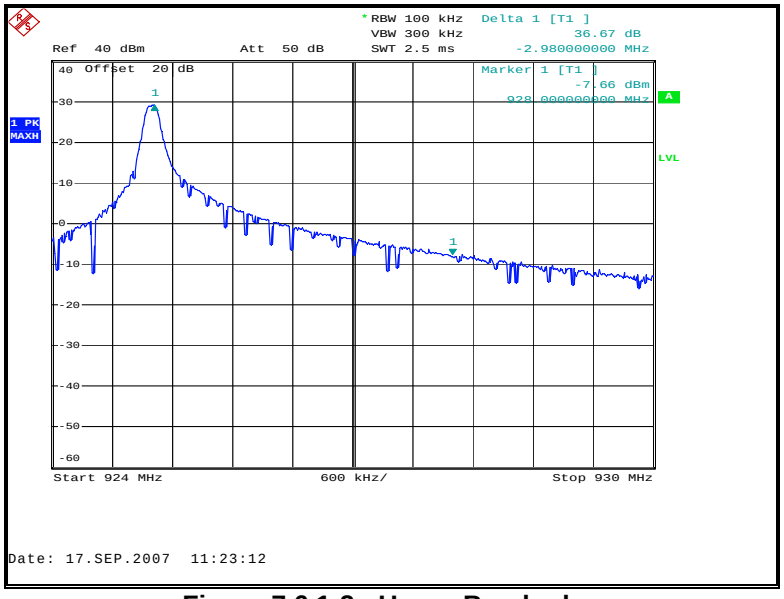

Figure 7.6.1-2: Upper Band-edge

7.6.2 RF Conducted Spurious Emissions

7.6.2.1 Test Methodology

The EUT was investigated for conducted spurious emissions from 30MHz to 10GHz, 10 times the highest fundamental frequency. Measurements were made at the low, center and high channels of the EUT. For each measurement, the spectrum analyzer's RBW was set to 100kHz. A peak detector function was used with the trace set to max hold.

7.6.2.1 Test Results

All emission found were greater than 20dB down from the fundamental carrier. Results are shown below in Figure 7.6.2-1 through 7.6.2-6.

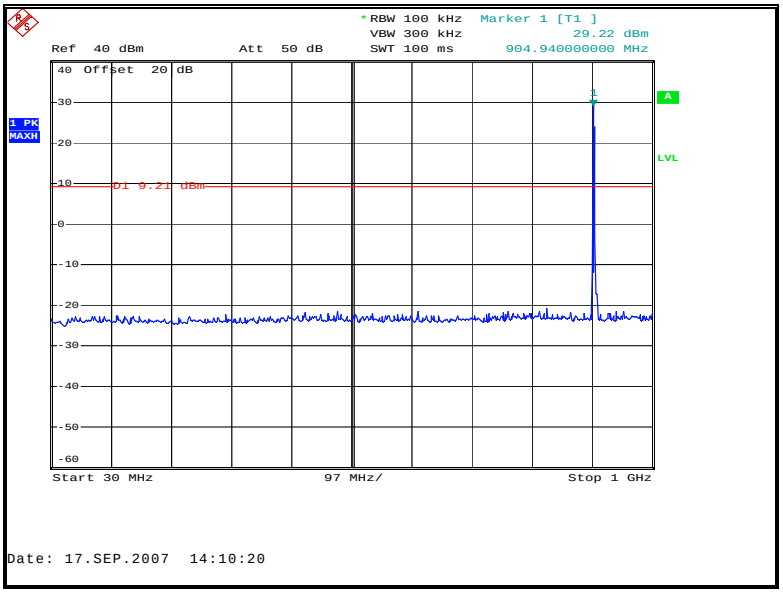

Figure 7.6.2-1 RF Conducted Spurious Emissions – Low Channel

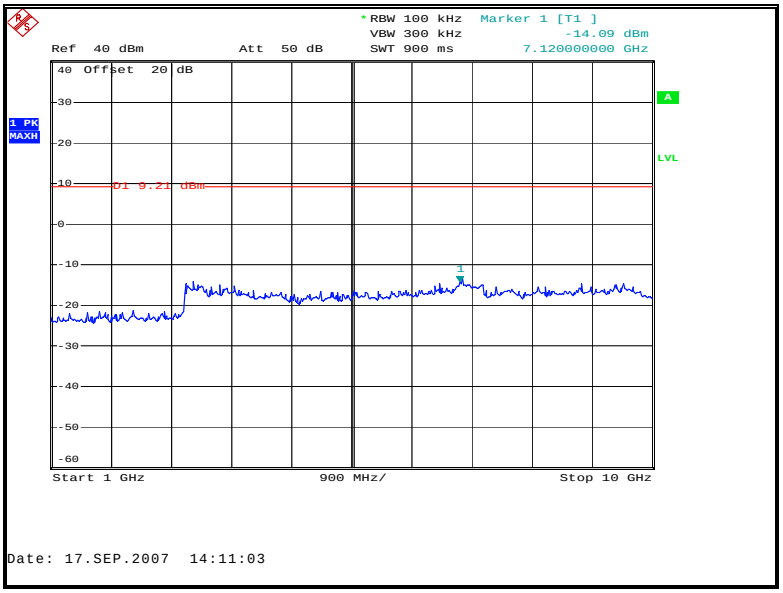

Figure 7.6.2-2 RF Conducted Spurious Emissions – Low Channel

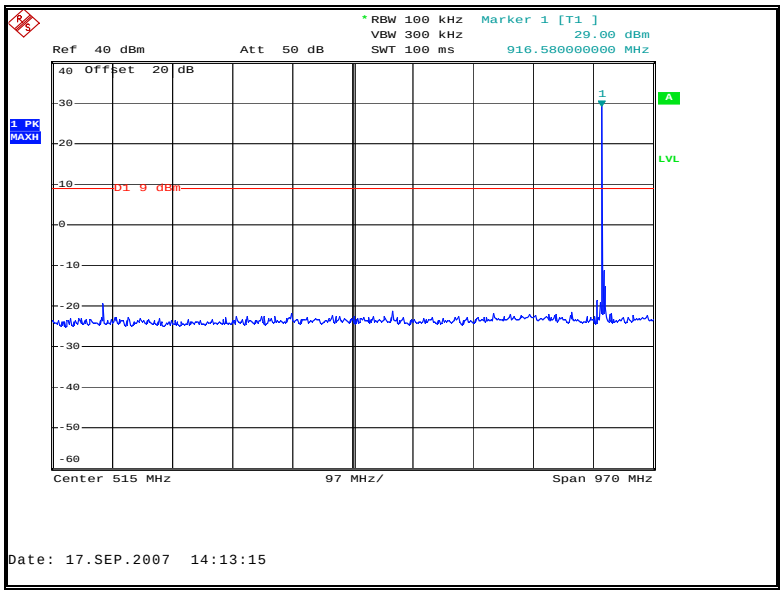

Figure 7.6.2-3 RF Conducted Spurious Emissions – Mid Channel

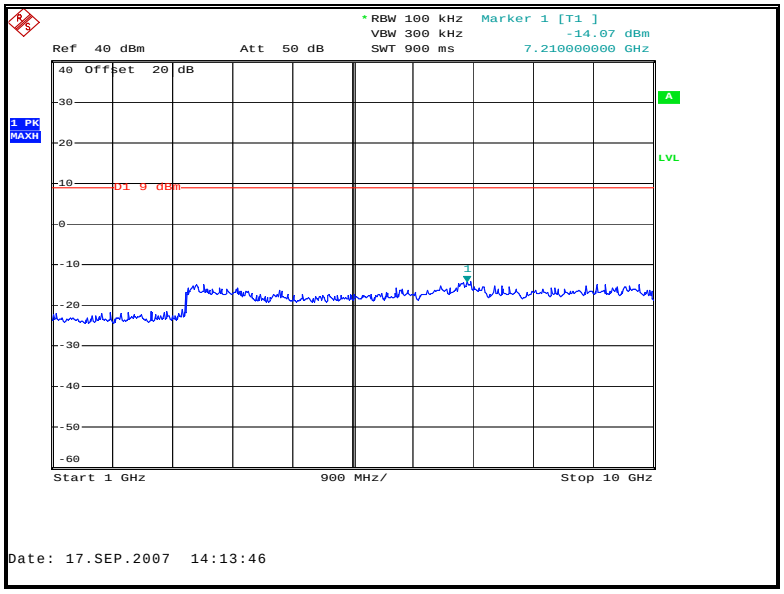

Figure 7.6.2-4 RF Conducted Spurious Emissions – Mid Channel

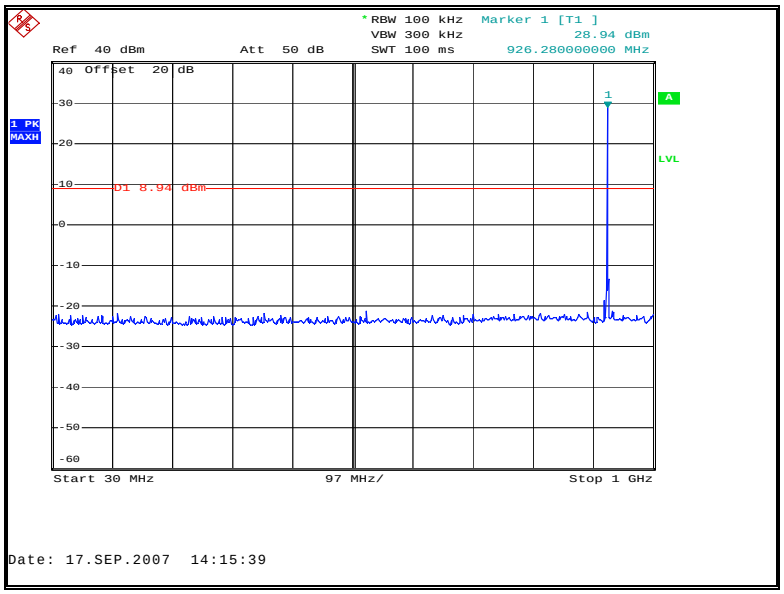

Figure 7.6.2-5 RF Conducted Spurious Emissions – High Channel

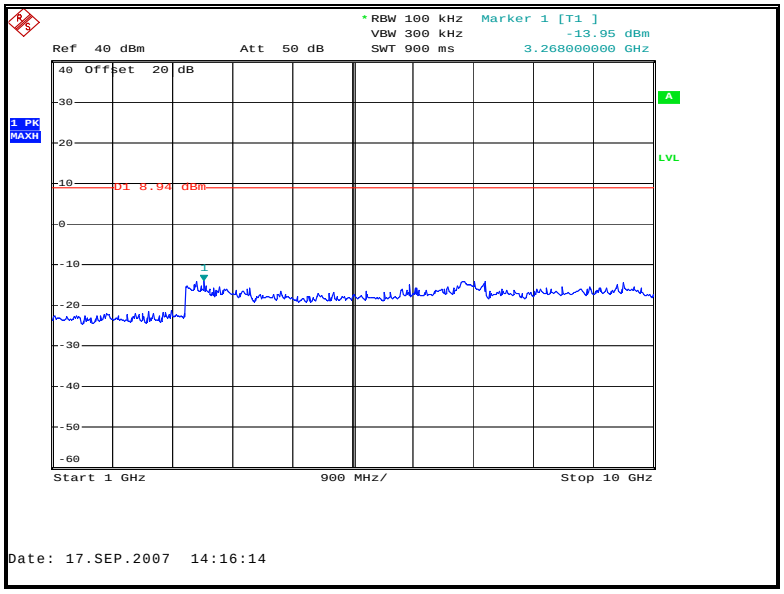

Figure 7.6.2-6 RF Conducted Spurious Emissions – High Channel

7.6.3 Radiated Spurious Emissions (Transmitter)

7.6.3.1 Test Methodology

Radiated emissions tests were made over the frequency range of 30MHz to 10GHz, 10 times the highest fundamental frequency.

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000MHz, quasi-peak measurements were made using a resolution bandwidth (RBW) of 120 kHz and a video bandwidth (VBW) of 300 kHz. For frequencies above 1000MHz, average measurements were made using an RBW of 1 MHz and a VBW of 10 Hz and peak measurements were made with RBW of 1 MHz and a VBW of 3 MHz.

The EUT could not generate a continuous modulated carrier therefore peak measurements were used for comparison to the average limits. Although section 7.5.3 specifies a dwell time of 7.5ms within a 100ms period, a value to 10ms was utilized in the duty cycle correction which was applied to the peak measurement for comparison to the average limits. This provided a worst case correction factor. The duty cycle correction applied was calculated as 20*log(10/100) = 20dB.

7.6.3.2 Test Results

Radiated spurious emissions found in the band of 30MHz to 10GHz are reported in Table 7.6.3-1. through 7.6.3-2. Each emission found to be in a restricted band as defined by section 15.205, was compared to the radiated emission limits as defined in section 15.209.

Table 7.6.3-1: Radiated Spurious Emissions – Pit Mount

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Spurious Emissions - Low Channel										
2715	68.11	68.11	H	0.57	68.68	48.68	74.0	54.0	5.32	5.32
2715	65.92	65.92	V	0.31	66.23	46.23	74.0	54.0	7.77	7.77
3620	65.34	65.34	H	3.50	68.84	48.84	74.0	54.0	5.16	5.16
3620	66.13	66.13	V	3.52	69.65	49.65	74.0	54.0	4.35	4.35
4525	68.03	68.03	H	5.81	73.84	53.84	74.0	54.0	0.16	0.16
4525	67.35	67.35	V	5.72	73.07	53.07	74.0	54.0	0.93	0.93
5430	60.64	60.64	H	8.09	68.73	48.73	74.0	54.0	5.27	5.27
5430	58.41	58.41	V	8.27	66.68	46.68	74.0	54.0	7.32	7.32
8145	58.51	58.51	H	12.48	70.99	50.99	74.0	54.0	3.01	3.01
8145	56.45	56.45	V	12.55	69.00	49.00	74.0	54.0	5.00	5.00
9050	53.25	53.25	H	12.99	66.24	46.24	74.0	54.0	7.76	7.76
9050	51.78	51.78	V	13.17	64.95	44.95	74.0	54.0	9.05	9.05
Spurious Emissions - Mid Channel										
2745	70.27	70.27	H	0.67	70.94	50.94	74.0	54.0	3.06	3.06
2745	66.61	66.61	V	0.42	67.03	47.03	74.0	54.0	6.97	6.97
3660	65.26	65.26	H	3.68	68.94	48.94	74.0	54.0	5.06	5.06
3660	66.61	66.61	V	3.71	70.32	50.32	74.0	54.0	3.68	3.68
4575	66.10	66.10	H	5.93	72.03	52.03	74.0	54.0	1.97	1.97
4575	64.86	64.86	V	5.86	70.72	50.72	74.0	54.0	3.28	3.28
7320	52.74	52.74	H	12.42	65.16	45.16	74.0	54.0	8.84	8.84
7320	52.16	52.16	V	12.48	64.64	44.64	74.0	54.0	9.36	9.36
8235	55.77	55.77	H	12.59	68.36	48.36	74.0	54.0	5.64	5.64
8235	54.29	54.29	V	12.65	66.94	46.94	74.0	54.0	7.06	7.06
9150	53.20	53.20	H	13.10	66.30	46.30	74.0	54.0	7.70	7.70
9150	50.81	50.81	V	13.25	64.06	44.06	74.0	54.0	9.94	9.94
Spurious Emissions - High Channel										
2775	71.43	71.43	H	0.78	72.21	52.21	74.0	54.0	1.79	1.79
2775	69.55	69.55	V	0.53	70.08	50.08	74.0	54.0	3.92	3.92
3700	68.18	68.18	H	3.86	72.04	52.04	74.0	54.0	1.96	1.96
3700	68.64	68.64	V	3.90	72.54	52.54	74.0	54.0	1.46	1.46
4625	63.59	63.59	H	6.04	69.63	49.63	74.0	54.0	4.37	4.37
4625	65.09	65.09	V	5.99	71.08	51.08	74.0	54.0	2.92	2.92
7400	52.82	52.82	H	12.49	65.31	45.31	74.0	54.0	8.69	8.69
7400	53.00	53.00	V	12.57	65.57	45.57	74.0	54.0	8.43	8.43
8325	53.33	53.33	H	12.71	66.04	46.04	74.0	54.0	7.96	7.96
8325	54.55	54.55	V	12.74	67.29	47.29	74.0	54.0	6.71	6.71

***** The magnitude of all emissions not reported were below the noise floor of the measurement system.

Table 7.6.3-2: Radiated Spurious Emissions – Wall Mount

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Spurious Emissions - Low Channel										
2715	66.28	66.28	H	0.57	66.85	46.85	74.0	54.0	7.15	7.15
2715	66.59	66.59	V	0.31	66.90	46.90	74.0	54.0	7.10	7.10
3620	67.53	67.53	H	3.50	71.03	51.03	74.0	54.0	2.97	2.97
3620	62.27	62.27	V	3.52	65.79	45.79	74.0	54.0	8.21	8.21
4525	63.29	63.29	H	5.81	69.10	49.10	74.0	54.0	4.90	4.90
4525	66.92	66.92	V	5.72	72.64	52.64	74.0	54.0	1.36	1.36
5430	56.76	56.76	H	8.09	64.85	44.85	74.0	54.0	9.15	9.15
5430	55.21	55.21	V	8.27	63.48	43.48	74.0	54.0	10.52	10.52
8145	50.03	50.03	H	12.48	62.51	42.51	74.0	54.0	11.49	11.49
8145	54.04	54.04	V	12.55	66.59	46.59	74.0	54.0	7.41	7.41
9050	53.97	53.97	H	12.99	66.96	46.96	74.0	54.0	7.04	7.04
9050	53.71	53.71	V	13.17	66.88	46.88	74.0	54.0	7.12	7.12
Spurious Emissions - Mid Channel										
2745	68.26	68.26	H	0.67	68.93	48.93	74.0	54.0	5.07	5.07
2745	68.29	68.29	V	0.42	68.71	48.71	74.0	54.0	5.29	5.29
3660	62.37	62.37	H	3.68	66.05	46.05	74.0	54.0	7.95	7.95
3660	59.88	59.88	V	3.71	63.59	43.59	74.0	54.0	10.41	10.41
4575	64.94	64.94	H	5.93	70.87	50.87	74.0	54.0	3.13	3.13
4575	62.55	62.55	V	5.86	68.41	48.41	74.0	54.0	5.59	5.59
7320	54.02	54.02	H	12.42	66.44	46.44	74.0	54.0	7.56	7.56
7320	52.39	52.39	V	12.48	64.87	44.87	74.0	54.0	9.13	9.13
8235	50.64	50.64	H	12.59	63.23	43.23	74.0	54.0	10.77	10.77
8235	53.84	53.84	V	12.65	66.49	46.49	74.0	54.0	7.51	7.51
9150	52.14	52.14	H	13.10	65.24	45.24	74.0	54.0	8.76	8.76
9150	54.12	54.12	V	13.25	67.37	47.37	74.0	54.0	6.63	6.63
Spurious Emissions - High Channel										
2775	70.17	70.17	H	0.78	70.95	50.95	74.0	54.0	3.05	3.05
2775	71.18	71.18	V	0.53	71.71	51.71	74.0	54.0	2.29	2.29
3700	58.95	58.95	H	3.86	62.81	42.81	74.0	54.0	11.19	11.19
3700	59.68	59.68	V	3.90	63.58	43.58	74.0	54.0	10.42	10.42
4625	60.52	60.52	H	6.04	66.56	46.56	74.0	54.0	7.44	7.44
4625	65.17	65.17	V	5.99	71.16	51.16	74.0	54.0	2.84	2.84
7400	47.64	47.64	H	12.49	60.13	40.13	74.0	54.0	13.87	13.87
7400	53.08	53.08	V	12.57	65.65	45.65	74.0	54.0	8.35	8.35
8325	49.63	49.63	H	12.71	62.34	42.34	74.0	54.0	11.66	11.66
8325	51.15	51.15	V	12.74	63.89	43.89	74.0	54.0	10.11	10.11

*The magnitude of all emissions not reported were below the noise floor of the measurement system.

7.6.3.3 Sample Calculation:

$R_C = R_U + CF_T$

Where:

CF_T	=	Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R_U	=	Uncorrected Reading
R_C	=	Corrected Level
AF	=	Antenna Factor
CA	=	Cable Attenuation
AG	=	Amplifier Gain
DC	=	Duty Cycle Correction Factor

Example Calculation

PEAK:
Corrected Level: 68.11 + 0.57 = 68.68dBuV
Margin: 74dBuV – 68.68dBuV = 5.32dB

AVERAGE:
Corrected Level: 68.11 + 0.57 -20dB = 48.68dBuV
Margin: 54dBuV – 48.68dBuV = 5.32dB

8.0 CONCLUSION

In the opinion of ACS, Inc. the 380135VHP (Wall Mount) and 380129VHP (Pit Mount), manufactured by MARS Company meets the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-210.

END REPORT