Excellence in Compliance Testing

Certification Test Report

FCC ID: SK9ITR24
IC: 864G-ITR24

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

ACS Report Number: 13-0281.W06.1A

Manufacturer: Itron Electricity Metering, Inc.
Model: ITR24

Test Begin Date: June 12, 2013
Test End Date: June 13, 2013

Report Issue Date: June 20, 2013

FOR THE SCOPE OF ACCREDITATION UNDER LAB Code 200612-0

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Reviewed by:

Kirby Munroe
Director, Wireless Certifications
ACS, Inc.

This report contains 22 pages

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1 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 for limited modular approval (LMA) certification.

1.2 Product Description

The Itron ITR24 is an electricity metering module which includes the register and display features for the meter as well as a Zigbee transmitter that operates in the 2405 MHz to 2475 MHz band. The module operates on alternating current voltage which is supplied by a host device.

The ITR24 is designed to be integrated into a variety of electric meter form factors and utility hardware, including 1S, 2S and 12S electric utility meter forms.

Technical Information:

Band of operation:	2405 – 2475 MHz
Number of channels:	15
Modulation format:	O-QPSK
Antenna Type / Gain:	PCB quarter wave embedded slot antenna, 3.8dBi
Operating Voltage:	24VDC (Via Host)

Manufacturer Information:
Itron Electricity Metering, Inc.
313 North Highway 11
West Union, SC 29696

Test Sample Serial Number: 5890000010-017 (Radiated); 5890000014-017 (RF Conducted)

Test Sample Condition: The test samples were provided in good working order with no visible defects.

1.3 Test Methodology and Considerations

The ITR24 is designed to be integrated into 1S, 2S and 12S electric utility meter forms therefore for radiated emissions, including band edge, the EUT were evaluated in the multiple hosts and worst case data presented in this report. Worst case data represents 2S electric utility meter form.

For the purpose of RF conducted measurements, the EUT was modified with a temporary 50 ohm antenna port.

2 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

ACS is accredited to ISO/IEC 17025 by the National Institute of Standards and Technology under their National Voluntary Laboratory Accreditation Program (NVLAP), Lab Code 200612-0. Unless otherwise specified, all tests methods described within this report are covered under the ISO/IEC 17025 scope of accreditation.

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.

FCC Registration Number: 511277
Industry Canada Lab Code: IC 4175A-1
VCCI Member Number: 1831

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

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:

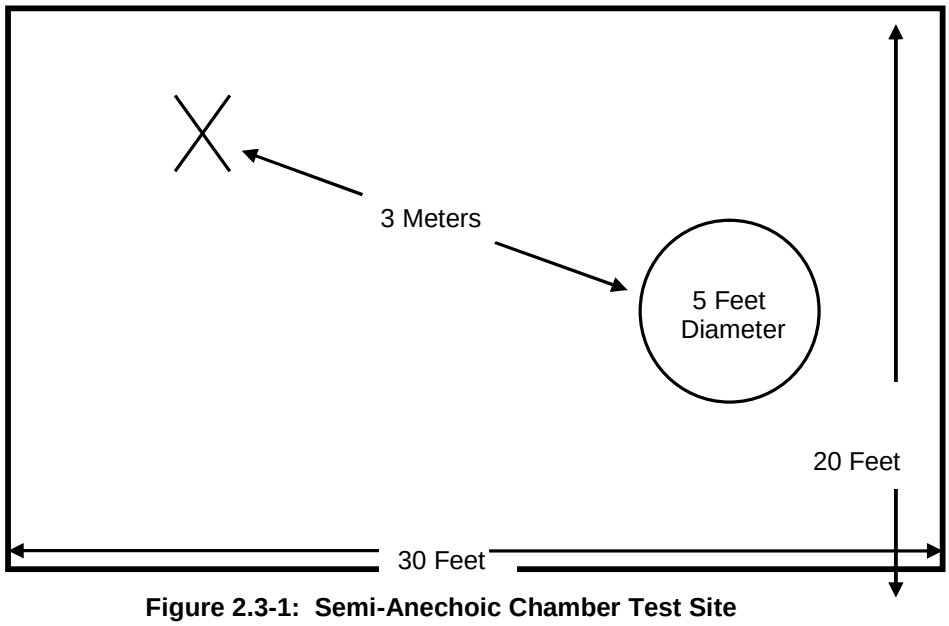

Figure 2.3-1: Semi-Anechoic Chamber Test Site

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:

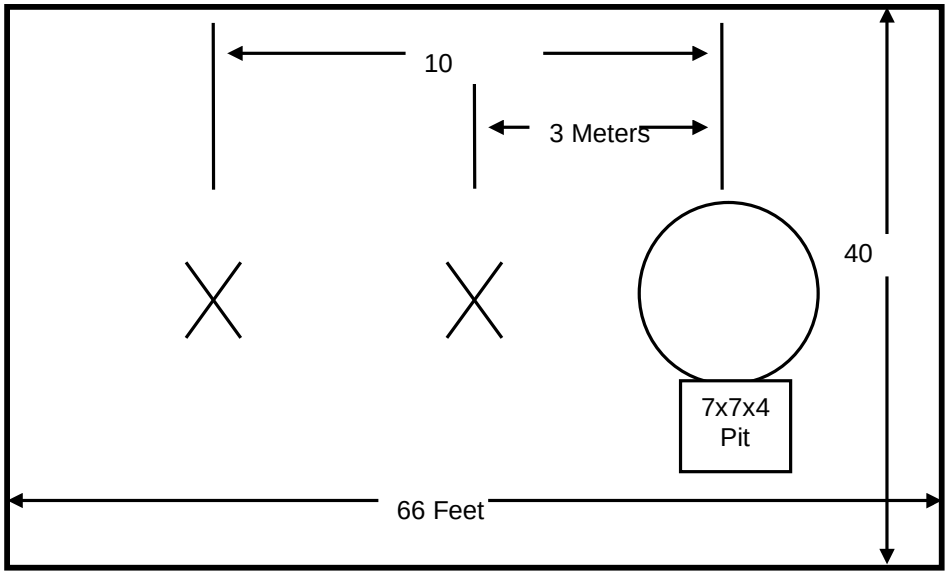

Figure 2.3-2: Open Area Test Site

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 ground 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:

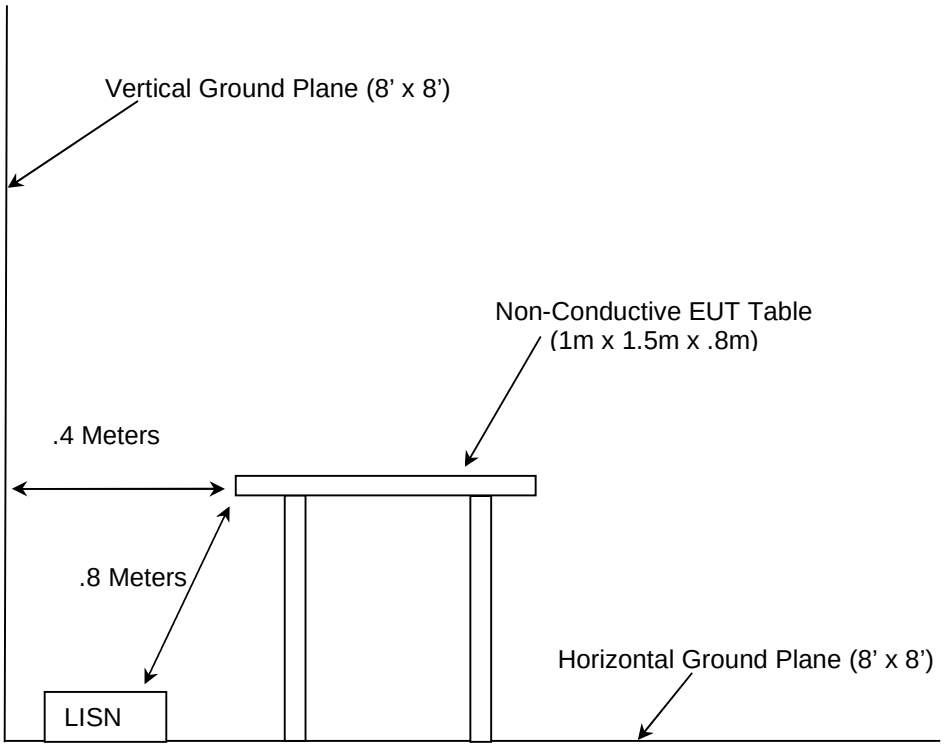

Figure 2.4-1: AC Mains Conducted EMI Site

3 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
- ANSI C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices
- US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2013
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2013
- FCC KDB 558074 D01 DTS Meas Guidance v03r01 - Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247, April 9, 2013
- Industry Canada Radio Standards Specification: RSS-210 - Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Issue 8, Dec 2010
- Industry Canada Radio Standards Specification: RSS-GEN – General Requirements and Information for the Certification of Radiocommunication Equipment, Issue 3, Dec 2010.

4 LIST OF TEST EQUIPMENT

The calibration interval of test equipment is annually or the manufacturer's recommendations. Where the calibration interval deviates from the annual cycle based on the instrument manufacturer's recommendations, it shall be stated below.

Table 4-1: Test Equipment

AssetID	Manufacturer	Model #	Equipment Type	Serial #	Last Calibration Date	Calibration Due Date
1	Rohde & Schwarz	ESMI - Display	Spectrum Analyzers	833771/007	8/2/2012	8/2/2014
2	Rohde & Schwarz	ESMI-Receiver	Spectrum Analyzers	839587/003	8/2/2012	8/2/2014
30	Spectrum Technologies	DRH-0118	Antennas	970102	4/23/2013	4/23/2015
40	EMCO	3104	Antennas	3211	2/14/2013	2/14/2015
153	EMCO	3825/2	LISN	9411-2268	7/31/2012	7/31/2014
167	ACS	Chamber EMI Cable Set	Cable Set	167	12/17/2012	12/17/2013
168	Hewlett Packard	11947A	Attenuators	44829	2/1/2013	2/1/2014
267	Agilent	N1911A	Meters	MY45100129	1/23/2012	1/23/2014
268	Agilent	N1921A	Sensors	MY45240184	1/17/2012	1/17/2014
283	Rohde & Schwarz	FSP40	Spectrum Analyzers	1000033	8/1/2012	8/1/2013
291	Florida RF Cables	SMRE-200W-12.0-SMRE	Cables	None	11/20/2012	11/20/2013
292	Florida RF Cables	SMR-290AW-480.0-SMR	Cables	None	3/26/2013	3/26/2014
321	Hewlett Packard	HPC 8447D	Amplifiers	1937A02809	8/27/2012	8/27/2013
324	ACS	Belden	Cables	8214	6/26/2012	6/26/2013
334	Rohde&Schwarz	3160-09	Antennas	49404	11/4/2010	NCR
335	Suhner	SF-102A	Cables	882/2A	8/2/2012	8/2/2013
338	Hewlett Packard	8449B	Amplifiers	3008A01111	8/2/2012	8/2/2013
340	Aeroflex/Weinschel	AS-20	Attenuators	7136	8/2/2012	8/2/2013
345	Suhner Sucoflex	102A	Cables	1077/2A	8/2/2012	8/2/2013
412	Electro Metrics	LPA-25	Antennas	1241	7/27/2012	7/27/2014
422	Florida RF	SMS-200AW-72.0-SMR	Cables	805	11/20/2012	11/20/2013
432	Microwave Circuits	H3G020G4	Filters	264066	7/2/2012	7/2/2013
RE90	Agilent	E7404A	Analyzers	US40240143	11/28/2012	11/28/2013

5 SUPPORT EQUIPMENT

Table 5-1: Support Equipment

Item	Equipment Type	Manufacturer	Model Number	Serial Number
1	Form 1S, 2S, 12S Electric Utility Meter	Itron	C2S0DS C2S0DS CN2S0DS	310 290 170 310 290 182 310 290 150
2	Transformer	Itron	Type T6R	53937721
3	Variac	Staco Energy	3PN1210B	N/A
3	DC Power Supply	Tektronics	PS280	TW60884

6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

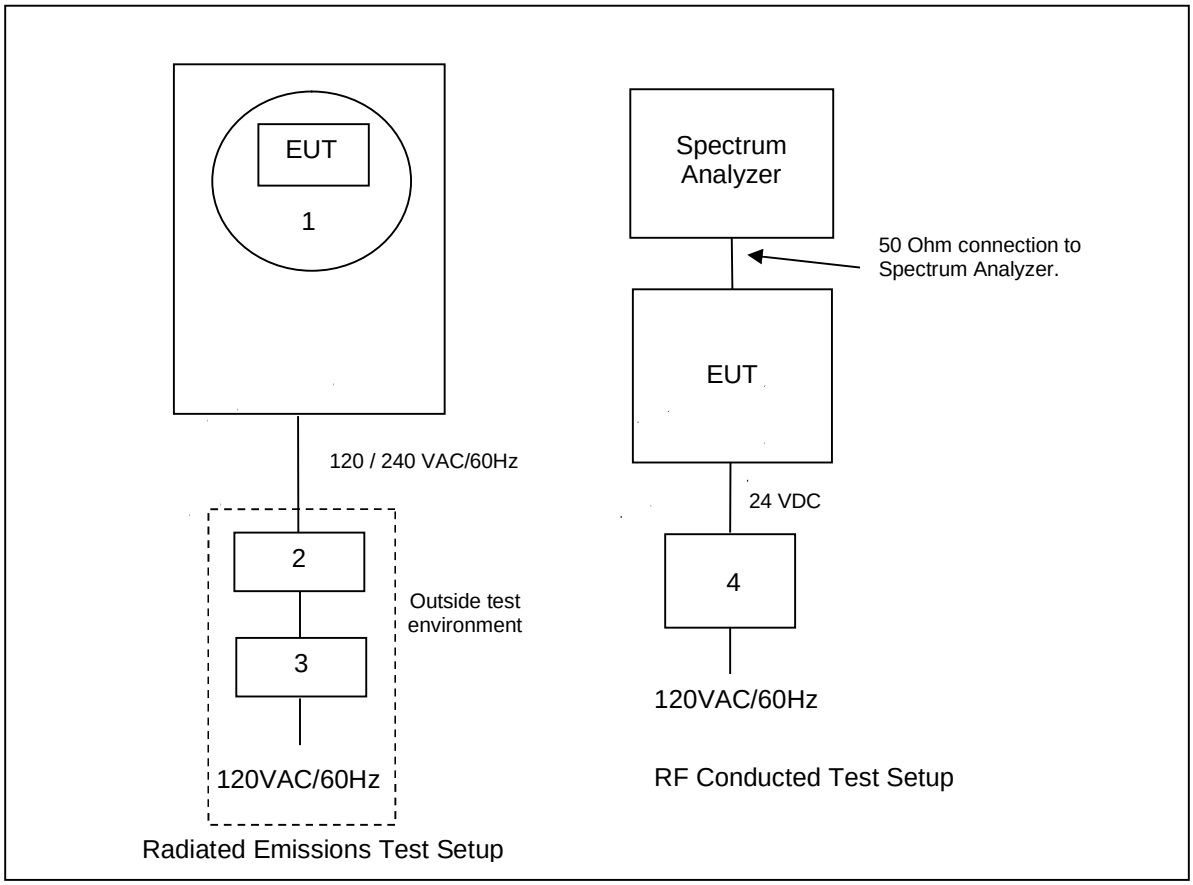

Figure 6-1: EUT Test Setup

7 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 – FCC: Section 15.203

The EUT utilizes an integral PCB quarter wave embedded slot antenna which cannot be removed without permanently damaging the device thus satisfying Part 15.203. The gain on the antenna is 3.8dBi.

7.2 Power Line Conducted Emissions – FCC: Section 15.207, IC: RSS-Gen 7.2.4

7.2.1 Measurement Procedure

ANSI C63.4 sections 6 and 7 were the guiding documents for this evaluation. Conducted emissions were performed from 150kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9kHz and the video bandwidth set to 30kHz. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss
Margin = Applicable Limit - Corrected Reading

7.2.2 Measurement Results

Results of the test are shown below in Tables 7.2.2-1 – 7.2.2-6.

Table 7.2.2-1: Conducted EMI Results – Line 1 – 1S Meter Host (120 VAC)

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
24.3494	12.682	10.941	10.719	23.4	21.66	60	50	36.6	28.34
4.08604	6.956	2.671	10.031	16.986	12.701	56	46	39.014	33.299
1.21523	7.828	3.426	9.989	17.817	13.416	56	46	38.183	32.584
0.4967	10.396	6.705	9.989	20.385	16.694	56.094	46.094	35.709	29.4
0.335724	8.285	4.032	9.992	18.277	14.024	60.694	50.694	42.417	36.67
0.150328	10.52	5.124	10.031	20.551	15.155	65.991	55.991	45.44	40.836

Table 7.2.2-2: Conducted EMI Results – Line 2 – 1S Meter Host (120 VAC)

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
27.1075	7.34	2.857	10.824	18.164	13.681	60	50	41.836	36.319
26.8036	7.526	3.412	10.828	18.354	14.241	60	50	41.646	35.759
20.8061	8.237	4.428	10.504	18.74	14.932	60	50	41.26	35.068
3.8003	7.181	3.042	10.026	17.206	13.068	56	46	38.794	32.932
0.4941	10.471	6.511	9.989	20.46	16.5	56.169	46.169	35.708	29.668
0.153128	10.383	5.32	10.024	20.407	15.344	65.911	55.911	45.504	40.567

Table 7.2.2-3: Conducted EMI Results – Line 1 – 2S Meter Host (240 VAC)

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
27.1602	15.612	12.438	10.827	26.438	23.264	60	50	33.562	26.736
26.6094	16.143	11.985	10.838	26.98	22.823	60	50	33.02	27.177
23.129	17.989	15.286	10.622	28.61	25.908	60	50	31.39	24.092
0.4848	10.283	4.107	9.989	20.272	14.097	56.434	46.434	36.162	32.338
0.441912	11.179	4.195	9.989	21.168	14.184	57.66	47.66	36.492	33.475
0.154406	20.495	6.879	10.021	30.515	16.899	65.874	55.874	35.359	38.975

Table 7.2.2-4: Conducted EMI Results – Line 2 – 2S Meter Host (240 VAC)

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
29.8983	6.377	2.39	11.235	17.612	13.625	60	50	42.388	36.375
27.4126	7.472	3.067	10.839	18.311	13.907	60	50	41.689	36.093
25.6934	12.34	8.521	10.852	23.192	19.373	60	50	36.808	30.627
24.4128	8.939	5.245	10.728	19.667	15.974	60	50	40.333	34.026
0.496399	10.468	5.164	9.989	20.457	15.153	56.103	46.103	35.646	30.95
0.420975	12.018	4.335	9.989	22.007	14.324	58.258	48.258	36.251	33.934

Table 7.2.2-5: Conducted EMI Results – Line 1 – 12S Meter Host (120VAC)

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
29.0512	6.162	1.488	10.938	17.1	12.426	60	50	42.9	37.574
28.3221	8.23	3.948	10.886	19.115	14.834	60	50	40.885	35.166
25.2351	5.716	1	10.829	16.544	11.829	60	50	43.456	38.171
2.15908	7.591	2.662	10.001	17.592	12.663	56	46	38.408	33.337
1.42399	8.22	2.774	9.991	18.211	12.766	56	46	37.789	33.234
0.759225	9.445	3.31	9.945	19.39	13.255	56	46	36.61	32.745

Table 7.2.2-6: Conducted EMI results – Line 2 – 12S Meter Host (120VAC)

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
23.9266	6.716	1.978	10.662	17.378	12.641	60	50	42.622	37.359
10.2348	6.46	1.461	10.206	16.666	11.667	60	50	43.334	38.333
1.47524	8.82	3.525	9.992	18.812	13.517	56	46	37.188	32.483
0.825537	10.286	5.09	9.986	20.272	15.077	56	46	35.728	30.923
0.488199	10.72	3.803	9.989	20.709	13.792	56.337	46.337	35.628	32.545
0.187181	11.614	4.579	9.94	21.553	14.518	64.938	54.938	43.384	40.419

7.3 6dB / 99% Bandwidth – FCC: Section 15.247(a)(2), IC: RSS-210 A8.2(a)

7.3.1 Measurement Procedure

The 6dB bandwidth was measured in accordance with the FCC KDB 558074 D01 DTS Meas Guidance v03r01. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 100 kHz. The Video Bandwidth (VBW) was set to ≥ 3 times the RBW. The trace was set to max hold with a peak detector active. The marker-delta function of the spectrum analyzer was utilized to determine the 6 dB bandwidth of the emission, Option 1.

The occupied bandwidth measurement function of the spectrum analyzer was used to measure the 99% bandwidth. The span of the analyzer was set to capture all products of the modulation process, including the emission sidebands. The resolution bandwidth was set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth was set to 3 times the resolution bandwidth. A sampling detector was used.

7.3.2 Measurement Results

Results are shown below in table 7.3.2-1 and figures 7.3.2-1 to 7.3.2-6:

Table 7.3.2-1: 6dB / 99% Bandwidth

Frequency [MHz]	6dB Bandwidth [MHz]	99% Bandwidth [MHz]
2405	1.61	2.34
2440	1.63	2.35
2475	1.64	2.34

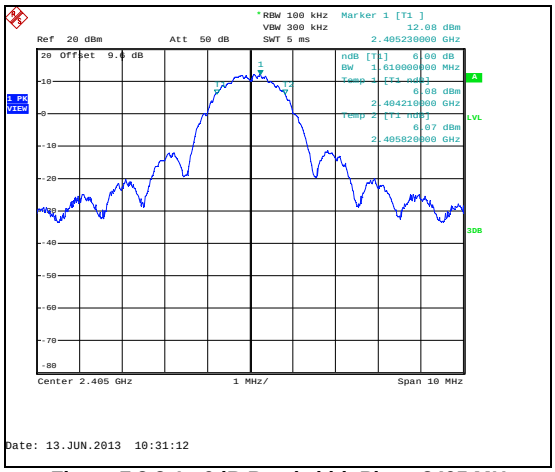

Figure 7.3.2-1: 6dB Bandwidth Plot – 2405 MHz

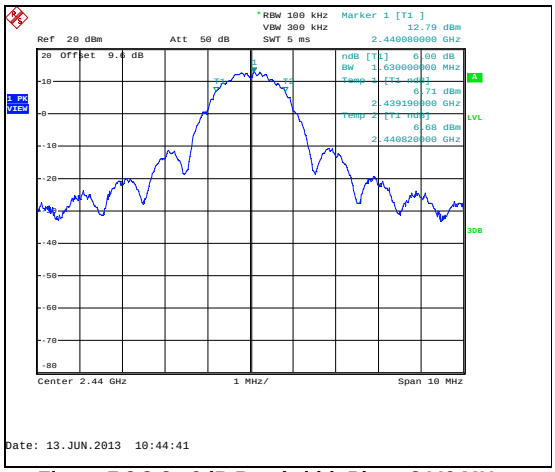

Figure 7.3.2-2: 6dB Bandwidth Plot – 2440 MHz

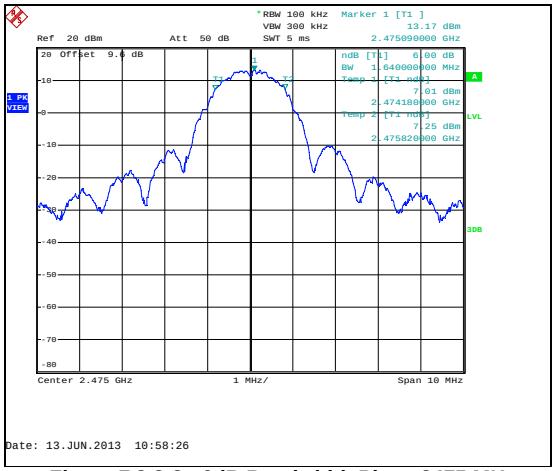

Figure 7.3.2-3: 6dB Bandwidth Plot – 2475 MHz

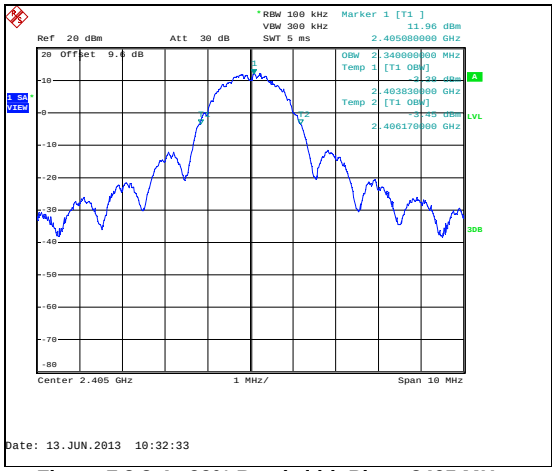

Figure 7.3.2-4: 99% Bandwidth Plot – 2405 MHz

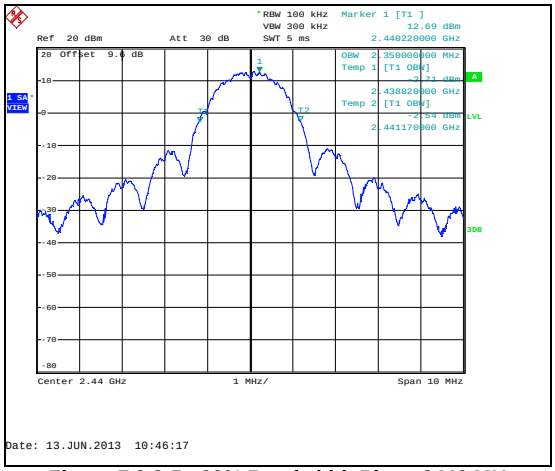

Figure 7.3.2-5: 99% Bandwidth Plot – 2440 MHz

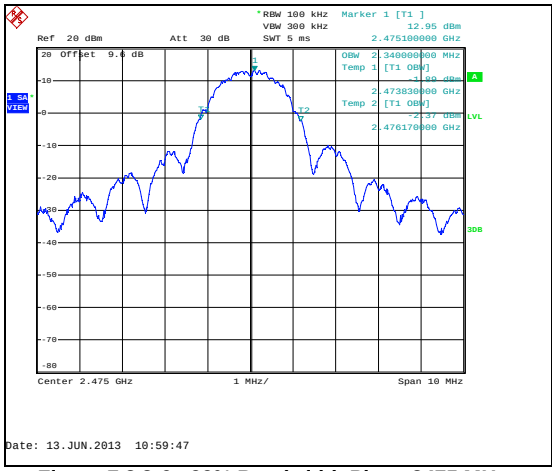

Figure 7.3.2-6: 99% Bandwidth Plot – 2475 MHz

7.4 Fundamental Emission Output Power – FCC: Section 15.247(b)(3), IC: RSS-210 A8.4(4)

7.4.1 Measurement Procedure

The maximum peak conducted output power was measured in accordance with FCC KDB 558074 D01 DTS Meas Guidance v03r01 utilizing the PKPM1 Peak power meter method. The RF output of the equipment under test was directly connected to the input of the peak power meter applying suitable attenuation.

7.4.2 Measurement Results

Results are shown below in Table 7.4.2-1.

Table 7.4.2-1: Maximum Peak Conducted Output Power

Frequency (MHz)	Output Power (dBm)
2405	16.82
2440	17.65
2475	18.03

7.5 Emission Levels – FCC: Section 15.247(d), 15.205 IC: RSS-210 2.2, A8.5

7.5.1 Emissions into Non-restricted Frequency Bands

7.5.1.1 Measurement Procedure

The unwanted emissions into non-restricted bands were measured conducted in accordance with FCC KDB 558074 D01 DTS Meas Guidance v03r01. The RF output of the equipment under test was directly connected to the input of the spectrum analyzer applying suitable attenuation. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 100 kHz. The Video Bandwidth (VBW) was set to ≥ 300 kHz. Span was set to 1.5 times the DTS bandwidth. The trace was set to max hold with a peak detector active. The resulting spectrum analyzer peak level was used to determine the reference level with respect to the 20 dBc limit. The spectrum span was then adjusted for the measurement of spurious emissions from 30MHz to 25GHz, 10 times the highest fundamental frequency.

Band-edge compliance was determined using the conducted marker-delta method in which the radio frequency power that is 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.

7.5.1.2 Measurement Results

RF Conducted Emissions are displayed in Figures 7.5.1.2-1 through 7.5.1.2-11.

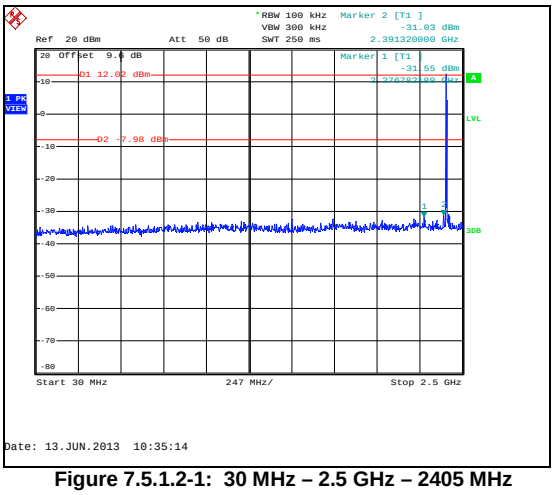

Figure 7.5.1.2-1: 30 MHz – 2.5 GHz – 2405 MHz

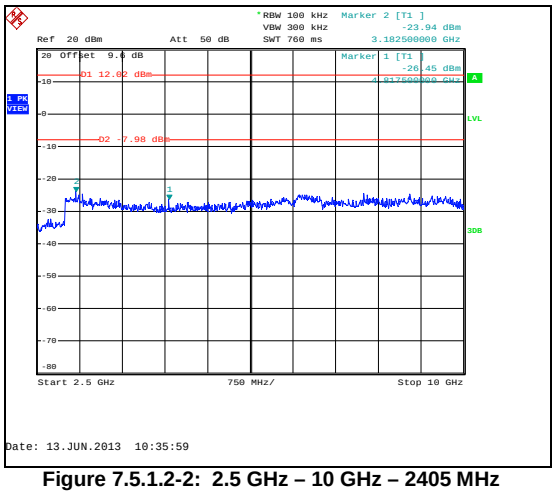

Figure 7.5.1.2-2: 2.5 GHz – 10 GHz – 2405 MHz

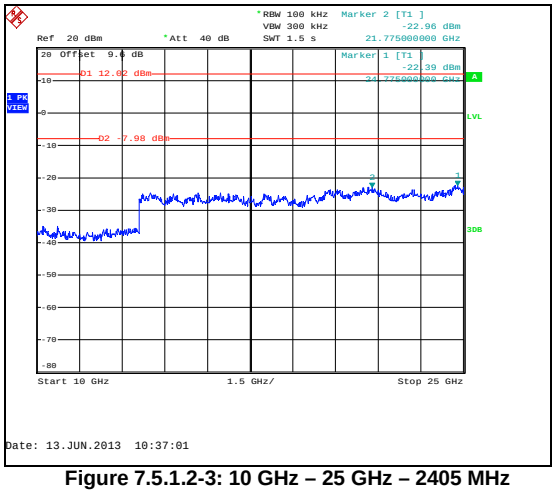

Figure 7.5.1.2-3: 10 GHz – 25 GHz – 2405 MHz

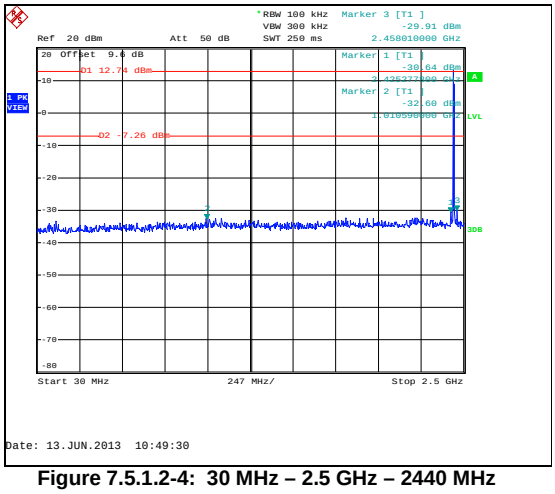

Figure 7.5.1.2-4: 30 MHz – 2.5 GHz – 2440 MHz

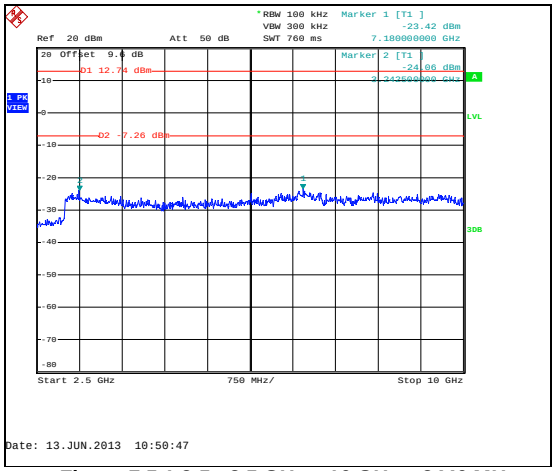

Figure 7.5.1.2-5: 2.5 GHz – 10 GHz – 2440 MHz

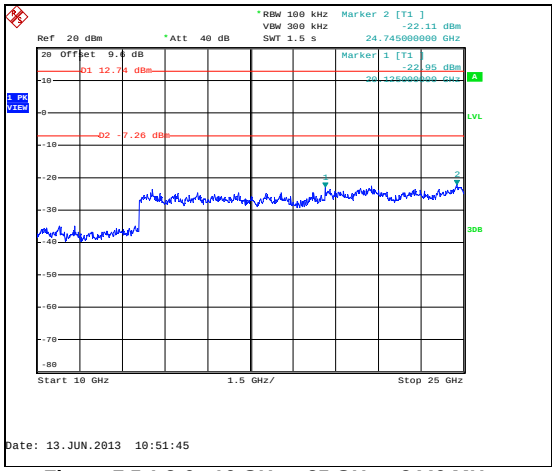

Figure 7.5.1.2-6: 10 GHz – 25 GHz – 2440 MHz

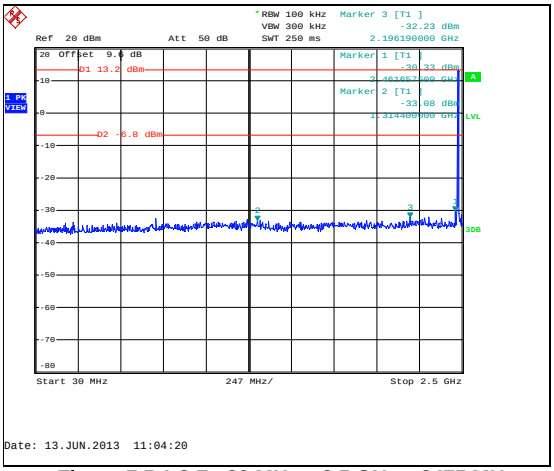

Figure 7.5.1.2-7: 30 MHz – 2.5 GHz – 2475 MHz

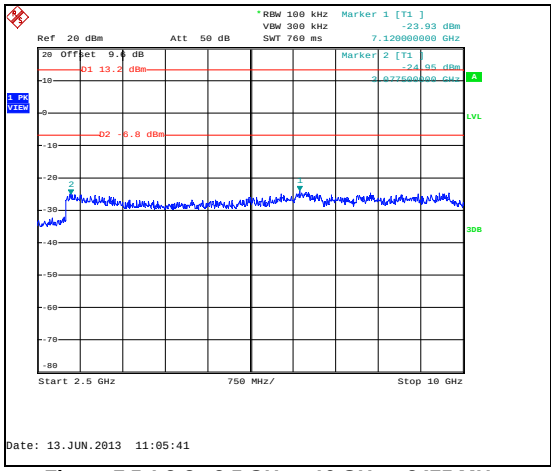

Figure 7.5.1.2-8: 2.5 GHz – 10 GHz – 2475 MHz

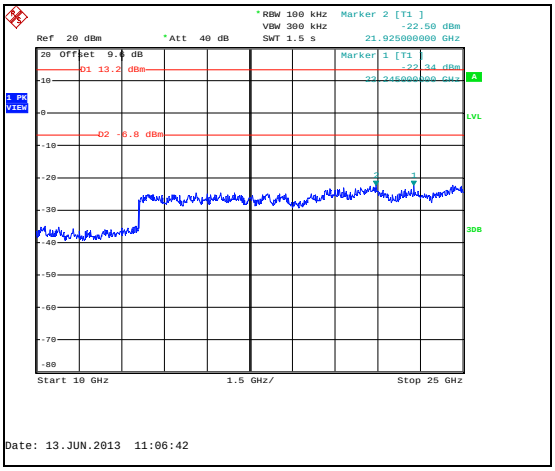

Figure 7.5.1.2-9: 10 GHz – 25 GHz – 2475 MHz

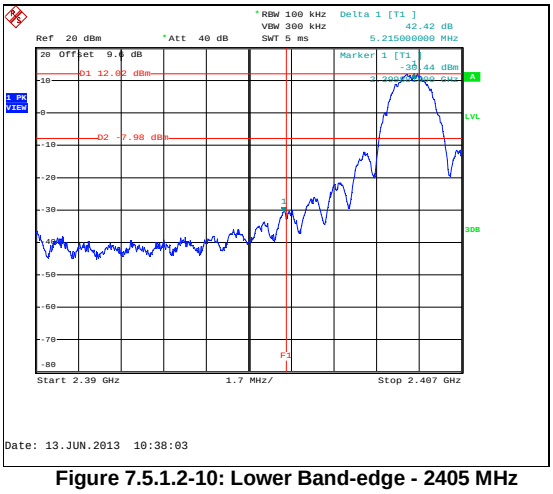

Figure 7.5.1.2-10: Lower Band-edge - 2405 MHz

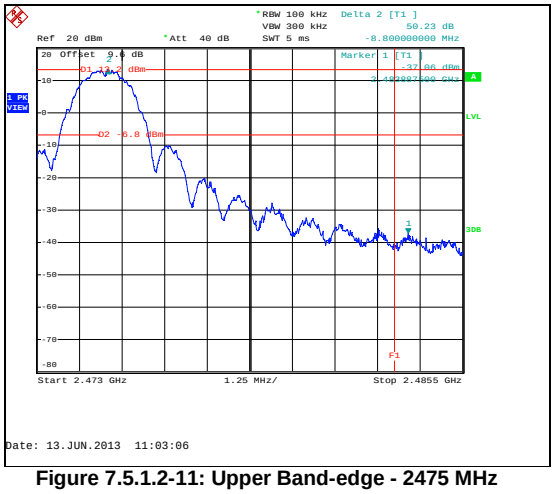

Figure 7.5.1.2-11: Upper Band-edge - 2475 MHz

7.5.2 Emissions into Restricted Frequency Bands

7.5.2.1 Measurement Procedure

The unwanted emissions into restricted bands were measured radiated over the frequency range of 30MHz to 25GHz, 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, peak and average measurements were made with RBW and VBW of 1 MHz and 3 MHz respectively. The average emissions were further corrected by applying the duty cycle correction of the EUT for comparison to the average limit.

Each emission found to be in a restricted band as defined by section 15.205, including any emission at the operational band-edge, was compared to the radiated emission limits as defined in section 15.209.

7.5.2.2 Duty Cycle Correction

For average radiated measurements, using a 27% duty cycle, the measured level was reduced by a factor 11.37dB. The duty cycle correction factor is determined using the formula: 20log (27/100) = - 11.37dB.

A detailed analysis of the duty cycle timing is provided in the Theory of Operation accompanying the application for certification.

7.5.2.3 Measurement Results

Radiated spurious emissions found in the band of 30MHz to 25GHz are reported in the table 7.5.2.3-1 below.

Table 7.5.2.3-1: Radiated Spurious 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
2405 MHz										
2278.1	68.14	61.11	H	-5.87	62.27	43.86	74.0	54.0	11.7	10.1
2278.1	67.21	58.55	V	-5.87	61.34	41.30	74.0	54.0	12.7	12.7
2342.7	59.26	46.03	H	-5.55	53.71	29.10	74.0	54.0	20.3	24.9
2342.7	59.64	46.25	V	-5.55	54.09	29.32	74.0	54.0	19.9	24.7
2374.3	64.46	53.42	H	-5.40	59.06	36.65	74.0	54.0	14.9	17.4
2374.3	65.13	53.95	V	-5.40	59.73	37.18	74.0	54.0	14.3	16.8
2389.4	75.35	67.61	H	-5.32	70.03	50.91	74.0	54.0	4.0	3.1
2389.4	75.86	68.19	V	-5.32	70.54	51.49	74.0	54.0	3.5	2.5
4810	48.32	39.35	H	2.38	50.70	30.36	74.0	54.0	23.3	23.6
4810	50.01	42.93	V	2.38	52.39	33.94	74.0	54.0	21.6	20.1
2440 MHz										
2313.7	67.74	61.03	H	-5.70	62.04	43.96	74.0	54.0	12.0	10.0
2313.7	68.12	61.59	V	-5.70	62.42	44.52	74.0	54.0	11.6	9.5
2378.2	61.25	47.40	H	-5.38	55.87	30.65	74.0	54.0	18.1	23.4
2378.2	60.17	46.86	V	-5.38	54.79	30.11	74.0	54.0	19.2	23.9
2489.2	57.36	46.61	H	-4.83	52.53	30.41	74.0	54.0	21.5	23.6
2489.2	60.06	49.61	V	-4.83	55.23	33.41	74.0	54.0	18.8	20.6
4880	47.31	37.32	V	2.63	49.94	28.58	74.0	54.0	24.1	25.4
2480 MHz										
2219.7	59.15	51.38	H	-6.16	52.99	33.85	74.0	54.0	21.0	20.2
2219.7	58.67	50.50	V	-6.16	52.51	32.97	74.0	54.0	21.5	21.0
2347.4	69.29	62.48	H	-5.53	63.76	45.58	74.0	54.0	10.2	8.4
2347.4	69.84	63.88	V	-5.53	64.31	46.98	74.0	54.0	9.7	7.0
2483.5	71.12	57.38	H	-4.86	66.26	41.15	74.0	54.0	7.7	12.9
2483.5	73.24	59.21	V	-4.86	68.38	42.98	74.0	54.0	5.6	11.0
2491	73.93	65.59	H	-4.82	69.11	49.40	74.0	54.0	4.9	4.6
2491	75.62	67.42	V	-4.82	70.80	51.23	74.0	54.0	3.2	2.8
12375	48.57	36.58	V	16.02	64.59	41.22	83.5	63.5	18.9	22.3

7.5.2.4 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: 68.14 - 5.87 = 62.27dBuV/m
Margin: 74dBuV/m – 62.27dBuV/m = 11.7dB

Example Calculation: Average

Corrected Level: 61.11 - 5.87 - 11.37 = 43.86dBuV
Margin: 54dBuV – 43.86dBuV = 10.1dB

7.6 Maximum Power Spectral Density in the Fundamental Emission – FCC: Section 15.247(e) IC: RSS-210 A8.2(b)

7.6.1 Measurement Procedure

The power spectral density was measured in accordance with the FCC KDB 558074 D01 DTS Meas Guidance v03r01 utilizing the PKPSD (peak PSD) method. The RF output of the equipment under test was directly connected to the input of the spectrum analyzer applying suitable attenuation. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 3 kHz. The Video Bandwidth (VBW) was set to 10 kHz. Span was set to 1.5 times the DTS bandwidth. The trace was set to max hold with a peak detector active.

7.6.2 Measurement Results

Results are shown below in table 7.6.2-1 and figures 7.6.2-1 to 7.6.2-3.

Table 7.6.2-1: Peak Power Spectral Density

Frequency (MHz)	PSD Level (dBm)
2405	4.23
2440	4.91
2475	5.39

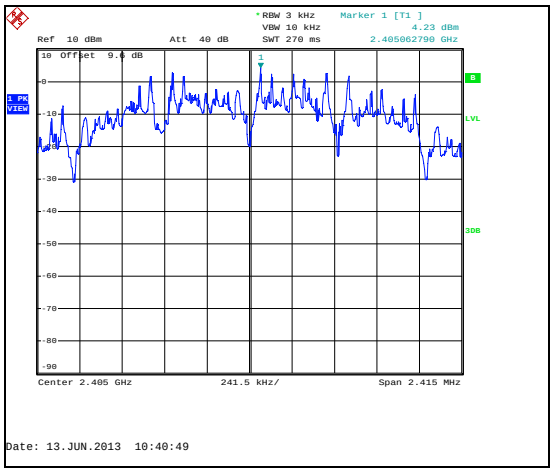

Figure 7.6.2-1: PSD Plot – 2405 MHz

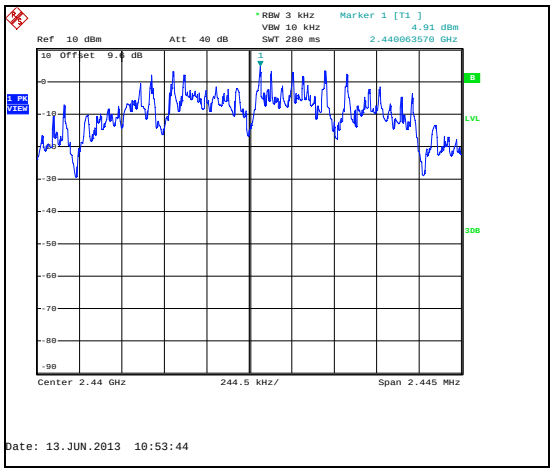

Figure 7.6.2-2: PSD Plot – 2440 MHz

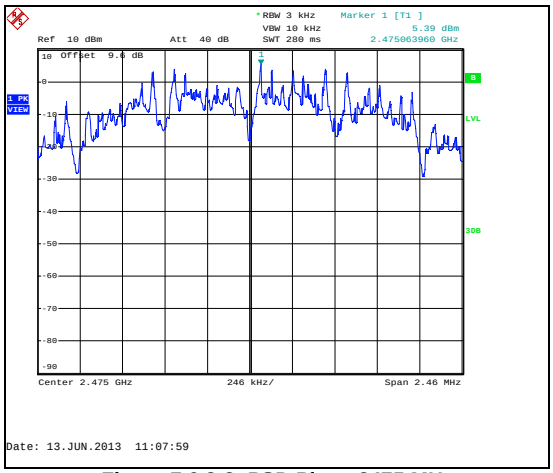

Figure 7.6.2-3: PSD Plot – 2475 MHz

8 CONCLUSION

In the opinion of ACS, Inc. the ITR24, manufactured by Itron Electricity Metering, Inc. meets the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-210.

END REPORT