

Report On

Application for Grant of Equipment Authorization of the IPS Group Inc.

MSCM Multiple Space Parking Meter Controller Module

FCC Part 15 Subpart C §15.231 IC RSS-Gen and RSS-210 Issue 8 December 2010

Report No. SC1401258A

April 2014

TEST REPORT NUMBER

PREPARED FOR

CONTACT PERSON

PREPARED BY

APPROVED BY



REPORT ON

Radio Testing of the IPS Group Inc. Multiple Space Parking Meter Controller Module

SC1401258A

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DATED

April 15, 2014



Revision History

SC1401258A IPS Group Inc. MSCM Multiple Space Parking Meter Controller Module					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
04/15/2014	Initial Release				Chip R. Fleury



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SECTION 1

REPORT SUMMARY

Radio Testing of the IPS Group Inc. Multiple Space Parking Meter Controller Module



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the IPS Group Inc. MSCM Multiple Space Parking Meter Controller Module to the requirements of the following:

- FCC Part 15 Subpart C §15.231
- IC RSS-Gen and RSS-210 Issue 8 December 2010.

Objective	To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.	
Manufacturer	IPS Group Inc.	
Model Number(s)	M800	
FCC ID Number	SGWIPS2010M800	
IC Number	11583A-IPS2010M800	
Serial Number(s)	N/A	
Number of Samples Tested	3	
Test Specification/Issue/Date	 FCC Part 15 Subpart C §15.231 (October 1, 2013). RSS-210 - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment (Issue 8, December 2010). RSS-Gen - General Requirements and Information for the Certification of Radio Apparatus (Issue 3, December 2010). 	
Start of Test	February 19, 2014	
Finish of Test	February 21, 2014	
Name of Engineer(s)	Alex Chang	
Related Document(s)	None. Supporting documents for EUT certification are separat exhibits.	



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC Part 15 Subpart C §15.231 with cross-reference to the corresponding IC RSS standard is shown below.

Section	§15.231 Spec Clause	RSS	Test Description	Result	Comments/ Base Standard
2.1	§15.207 (a)	RSS-Gen 7.2.4	Conducted Emissions	N/A *	
2.2	§15.231(a)(2)	RSS-210 A1.1.1(b)	Transmission Verification For Transmitter Activated Automatically	N/A **	
2.3	§15.231(a)(3)	_	Polling Or Supervision Transmissions, Including Data, To Determine System Integrity Of Transmitters Used In Security Or Safety Applications	Compliant	
2.3	§15.231(e)	RSS-210 A1.1.2	Field Strength Of Emissions	Compliant	
2.4	§15.231(c)	RSS-210 A1.1.3	Bandwidth Requirement	Compliant	
2.5	_	RSS-Gen 6.0	Receiver Spurious Emissions	Compliant	

* Not applicable. EUT is battery operated device.

** EUT is a transmitter that activates automatically, however provisions of §15.231(a)(3) applies.



1.3 **PRODUCT INFORMATION**

1.3.1 EUT General Description

The Equipment Under Test (EUT) was an IPS Group Inc. MSCM Multiple Space Parking Meter Controller Module as shown in the photograph below. This controller module is intended to be used across a number of IPS Multi Space Parking Meter platforms. These platforms include IPS designed multi space parking terminals as well as a number of existing designs that can be upgraded and retrofitted with this IPS technology. Parking terminals equipped with the MSCM may be configured as Pay and Display, Pay by Space, Pay be Plate and other configurations.

The MSCM consist of a large LCD display and a controller section enclosed in a protective mechanical housing. The controller PCBA supports a number of integrated features and interfaces to a number of optional peripheral units.

ISM/SRD 400 MHz band transmission Low, Mid, and High channels were verified in this test report.



Equipment Under Test



1.3.2 EUT General Description

EUT Description	MSCM Multiple Space Parking M		eter Controller Module	
Model Number(s)	M800			
Rated Voltage	External Battery Pack 3.7 VDC (No		ominal).	
Mode Verified	400 MHz Transmit Mode			
Capability	Item		Description	
	2G Bands	GSM	850, GSM 900, DCS1800, PCS1900	
	3G Bands		FDD B2, B4, and B5	
	RFID		13.56 MHz	
	ISM/SRD Band Transceiver		400 MHz	
Primary Unit (EUT)	Production			
	Pre-Production			
	Engineering			
Antenna Detail Specification	Manufacturer		RETECH	
	Model		RHA-601	
	Туре		SMA-Female (Rubber Pad)	
	Frequency		144/430 MHz	
	Gain		OdBi	
	Max. Power Length		10 Watts	
			45mm	
V.S.W.R			Less 1.5	
	Weight		12g	

1.3.3 Maximum Radiated Output Power

Transmitter Frequency (MHz)	Field Strength (dBμV/m @ 3 meters)	Part 15.231(e) limits in dBμV/m
	FSK modulation	
410	75.7	79.5
420	76.9	80.0
430	75.8	80.4

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1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
А	Radiated emission test configuration. Measurement was performed while EUT configured in continuously transmission mode.
В	Antenna conducted port test configuration. Measurement was performed while EUT configured in continuously transmission mode.
С	Antenna conducted port test configuration. Measurement was performed while EUT configured in normal transmission mode.

1.4.2 EUT Exercise Software

None. No special software was used to exercise the EUT. The EUT with built-in firmware revision 42.60.9 used during the investigation.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
—	_	_



1.4.4 Simplified Test Configuration Diagram

EUT – MSCM Controller Module

Radiated Emission Test Configuration



Conducted (Antenna Port) Test Configuration





1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted		
Serial Number: N/A				
N/A				

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

For conducted and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. This level was based on the maximized cable configuration from exploratory testing per ANSI C63.4-2009. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

1.8 TEST FACILITY LOCATION

1.8.1 TÜV SÜD America Inc. (Mira Mesa)

10040 Mesa Rim Road, San Diego, CA 92121-2912 (32.901268,-117.177681). Phone: 858 678 1400 Fax: 858 546 0364.

1.8.2 TÜV SÜD America Inc. (Rancho Bernardo)

Sony Electronics Inc., Building #8, 16530 Via Esprillo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: 858 942 5542 Fax: 858 546 0364.

1.9 TEST FACILITY REGISTRATION

1.9.1 FCC – Registration No.: US1146

TUV SUD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.498 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Registration is US1146.



1.9.2 Industry Canada (IC) Registration No.: 3067A

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego) has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No. 3067A.



SECTION 2

TEST DETAILS

Radio Testing of the IPS Group Inc. Multiple Space Parking Meter Controller Module



2.1 CONDUCTED EMISSIONS

2.1.1 Specification Reference

Part 15 Subpart C §15.207(a)

2.1.2 Standard Applicable

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

	Conducted limit (dBµV)		
Frequency of emission (MHz)	Quasi-peak	Average	
0.15–0.5	66 to 56*	56 to 46*	
0.5–5	56	46	
5–30	60	50	

*Decreases with the logarithm of the frequency.

2.1.3 Equipment Under Test and Modification State

Not applicable. EUT is a battery operate device.



2.2 TRANSMISSION VERIFICATION FOR TRANSMITTER ACTIVATED AUTOMATICALLY

2.2.1 Specification Reference

Part 15 Subpart C §15.231(a)(2)

2.2.2 Standard Applicable

(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

2.2.3 Equipment Under Test and Modification State

- Test not applicable. When activated, the EUT transmits short bust (<521.7µS) every two seconds until the EUT information/data are relayed then returns to dormant state until the next EUT (sensor) event.
- The manufacturer declares that the EUT based from its intended application falls under the Security or Safety Application category. Therefore Part 15 Subpart C §15.231(a)(3) applies. Please refer to Section 2.3 of this test report for details.



2.3 POLLING OR SUPERVISION TRANSMISSIONS, INCLUDING DATA, TO DETERMINE SYSTEM INTEGRITY OF TRANSMITTERS USED IN SECURITY OR SAFETY APPLICATIONS

2.3.1 Specification Reference

Part 15 Subpart C §15.231(a)(3)

2.3.2 Standard Applicable

(3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

2.3.3 Equipment Under Test and Modification State

Serial No: N/A/ Test Configuration A

2.3.4 Data of Test/Initial of test personnel who performed the test

February 21, 2014/AC

2.3.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.6 Environmental Conditions/Test Location

Test performed at TUV SUD America Inc. Rancho Bernardo facility.

Ambient Temperature	25.0°C
Relative Humidity	32.4%
ATM Pressure	98.8 Kpa

2.3.7 Calculations

EUT transmits short bust (<521.7 μ S) every two seconds when activated. Calculation presented is based from continuous transmission for one hour. EUT in normal operation does not transmit continuously for an hour:

Total transmission in 1 hour:521.7 μS x1800 (EUT transmissions/hour):939.06 mS:939.06 mS < 2 seconds (EUT complies)</td>



2.3.8 Test Result Plot



Date:21.FEB.2014 10:45:41

Normal operation of the EUT showing two (2) short burst 0.0005217ms) and two seconds apart.



Date:5MAR.2014 11:13:36

Single transmission burst / duty Cycle 10ms sweep



2.4 FIELD STRENGTH OF EMISSIONS

2.4.1 Specification Reference

Part 15 Subpart C §15.231(b)

2.4.2 Standard Applicable

(b) In addition to the provisions of §15.205, the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (microvolts/meter)	Field strength of spurious emissions (microvolts/meter)
40.66-40.70	2,250	225
70-130	1,250	125
130-174	¹ 1,250 to 3,750	¹ 125 to 375
174-260	3,750	375
260-470	¹ 3,750 to 12,500	¹ 375 to 1,250
Above 470	12,500	1,250

¹Linear Interpolations

2.4.3 Equipment Under Test and Modification State

Serial No: N/A/ Test Configuration A

2.4.4 Date of Test/Initial of test personnel who performed the test

February 20, 2014/AC

2.4.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.6 Environmental Conditions/Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	24.7°C
Relative Humidity	39.7%
ATM Pressure	99.1 kPa



2.4.7 Additional Observations

- This is a radiated test. The spectrum was searched from 30MHz to the 10th harmonic (5GHz), up to 18GHz presented.
- EUT ISM/SRD 400MHz radio antenna port was terminated with 50Ω when verifying radiated emission in receive mode.
- There are no emissions found that do not comply with the restricted bands defined in FCC Part 15 Subpart C, 15.205.
- Only the considered worst case configuration presented for radiated emissions above 1GHz.
- Measurement was done using EMC32 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.3.8 for sample computation.

2.4.8 Sample Computation (Radiated Emission)

Measuring equipment raw measure		24.4	
	Asset# 1066 (cable)	0.3	
	Asset# 1172 (cable)	0.3	
Correction Factor (dB)	Asset# 1016 (preamplifier)	-30.7	-12.6
	Asset# 1175(cable)	0.3	
	Asset# 1002 (antenna)	17.2	
Reported QuasiPeak Final Measur		11.8	

2.4.9 Test Results

See attached plots.





2.4.10 Test Results Below 1GHz (Receive Mode)

Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.240000	33.1	1000.0	120.000	146.0	Н	64.0	-10.5	6.9	40.0
71.421643	18.7	1000.0	120.000	200.0	V	342.0	-21.4	21.3	40.0
87.452745	17.7	1000.0	120.000	300.0	V	18.0	-20.4	22.3	40.0
187.551022	7.5	1000.0	120.000	214.0	V	268.0	-15.9	36.0	43.5
378.979800	12.0	1000.0	120.000	243.0	Н	291.0	-8.8	34.0	46.0
420.721443	36.0	1000.0	120.000	100.0	V	190.0	-8.3	10.0	46.0
495.293066	13.6	1000.0	120.000	250.0	Н	302.0	-6.1	32.4	46.0
591.183567	16.0	1000.0	120.000	156.0	Н	302.0	-3.2	30.0	46.0



2.4.11 Test Results Above 1GHz (Receive Mode)



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	53.2	1000.0	1000.000	270.0	Н	20.0	-1.0	20.7	73.9
1999.966667	50.0	1000.0	1000.000	403.0	Н	225.0	2.1	23.9	73.9
3649.533333	48.2	1000.0	1000.000	300.0	V	3.0	5.7	25.7	73.9
5049.033333	51.5	1000.0	1000.000	203.0	Н	47.0	8.0	22.4	73.9
11055.46666	56.6	1000.0	1000.000	363.0	V	20.0	16.5	17.3	73.9
16171.36666	63.4	1000.0	1000.000	335.0	V	10.0	23.0	10.5	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	39.9	1000.0	1000.000	270.0	Н	20.0	-1.0	14.0	53.9
1999.966667	36.0	1000.0	1000.000	403.0	Н	225.0	2.1	17.9	53.9
3649.533333	35.5	1000.0	1000.000	300.0	V	3.0	5.7	18.4	53.9
5049.033333	38.5	1000.0	1000.000	203.0	Н	47.0	8.0	15.4	53.9
11055.46666	43.8	1000.0	1000.000	363.0	V	20.0	16.5	10.1	53.9
16171.36666	50.5	1000.0	1000.000	335.0	V	10.0	23.0	3.4	53.9

Test Notes: No significant emissions observed above 6GHz. Measurement above 6GHz are noise floor figures.



Continuous Rotation TUV 3m Radiated 30 to 1000MHz 90-FCC Part 15.231 Fundamental 80-70 FCC Part 15.231 Spurious 60-Level in dBµV/m Class B Electric Field Strength QP FCC F 50-40 30-20-10 0-30M 50 60 80 100M 200 300 400 500 800 1G Frequency in Hz FCC Part 15.231 Spurious [..\EMI radiated\] FCC Part 15.231 Fundamental [.\EMI radiated\] FCC Part 15 Class B Electric Field Strength QP [..\EMI radiated\] Preview Result 1V-PK+ [Preview Result 1V.Result:2] Preview Result 1H-PK+ [Preview Result 1H.Result:2] Final Result 1-QPK [Final Result 1.Result:1]

2.4.12 Test Results Below 1GHz (Low Channel 410 MHz)

Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.240000	33.2	1000.0	120.000	128.0	Н	351.0	-10.5	6.8	40.0
40.207214	15.0	1000.0	120.000	400.0	Н	15.0	-16.0	25.0	40.0
71.541643	20.5	1000.0	120.000	200.0	V	103.0	-21.4	19.5	40.0
87.612745	15.7	1000.0	120.000	109.0	V	-12.0	-20.3	24.3	40.0
207.757675	20.9	1000.0	120.000	115.0	Н	51.0	-15.6	22.6	43.5
410.922004	75.7	1000.0	120.000	189.0	Н	72.0	-8.3	3.8	79.5
821.346212	43.9	1000.0	120.000	100.0	Н	321.0	1.2	2.1	46.0

Test Notes: There are no emissions found that do not comply with the restricted bands defined in FCC Part 15 Subpart C, 15.205.





2.4.13 Test Results Below 1GHz (Mid Channel 420 MHz)

Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.200000	33.2	1000.0	120.000	150.0	Н	292.0	-10.5	6.8	40.0
42.847214	10.7	1000.0	120.000	100.0	V	272.0	-16.9	29.3	40.0
71.541643	21.5	1000.0	120.000	200.0	V	223.0	-21.4	18.5	40.0
85.892745	12.3	1000.0	120.000	300.0	Н	342.0	-20.5	27.7	40.0
195.326573	17.9	1000.0	120.000	116.0	Н	20.0	-16.1	25.6	43.5
420.721443	76.9	1000.0	120.000	150.0	V	156.0	-8.3	3.1	80.0
840.945090	46.0	1000.0	120.000	100.0	V	178.0	1.5	15.9	61.9 *)

*) 840.945MHz is not in the restricted bands (FCC Part 15.231 Spurious limit apply).





2.4.14 Test Results Below 1GHz (High Channel 430 MHz)

Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.240000	33.2	1000.0	120.000	128.0	Н	291.0	-10.5	6.8	40.0
36.591663	20.3	1000.0	120.000	350.0	Н	-15.0	-14.2	19.7	40.0
71.581643	19.0	1000.0	120.000	200.0	V	356.0	-21.4	21.0	40.0
87.332745	17.5	1000.0	120.000	300.0	V	18.0	-20.4	22.5	40.0
206.109900	21.5	1000.0	120.000	150.0	Н	209.0	-15.8	22.0	43.5
430.520882	75.8	1000.0	120.000	100.0	V	227.0	-7.9	4.5	80.4
860.543968	44.8	1000.0	120.000	100.0	V	7.0	1.6	1.2	46.0

Test Notes: There are no emissions found that do not comply with the restricted bands defined in FCC Part 15 Subpart C, 15.205.





2.4.15 Test Results Above 1GHz (Worst case configuration present – Low Channel)

Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	50.9	1000.0	1000.000	257.0	V	3.0	-1.0	23.0	73.9
2102.966667	48.1	1000.0	1000.000	124.0	Н	60.0	2.2	25.8	73.9
3729.866667	48.8	1000.0	1000.000	164.0	V	111.0	5.8	25.1	73.9
6556.400000	51.3	1000.0	1000.000	177.0	Н	166.0	10.2	22.6	73.9
11019.466667	56.6	1000.0	1000.000	200.0	V	11.0	16.4	17.3	73.9
17051.933333	62.7	1000.0	1000.000	191.0	V	212.0	23.4	11.2	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1000.000000	38.0	1000.0	1000.000	257.0	V	3.0	-1.0	15.9	53.9
2102.966667	35.0	1000.0	1000.000	124.0	Н	60.0	2.2	18.9	53.9
3729.866667	35.5	1000.0	1000.000	164.0	V	111.0	5.8	18.4	53.9
6556.400000	38.2	1000.0	1000.000	177.0	Н	166.0	10.2	15.7	53.9
11019.466667	43.8	1000.0	1000.000	200.0	V	11.0	16.4	10.1	53.9
17051.933333	50.3	1000.0	1000.000	191.0	V	212.0	23.4	3.6	53.9

Test Notes: No significant emissions observed above 8GHz. Measurement above 8GHz are noise floor figures.

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2.5 BANDWIDTH REQUIREMENT

2.5.1 Specification Reference

Part 15 Subpart C §15.231(c)

2.5.2 Standard Applicable

(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

2.5.3 Equipment Under Test and Modification State

Serial No: N/A/ Test Configuration B

2.5.4 Date of Test/Initial of test personnel who performed the test

February 21, 2014/AC

2.5.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.6 Environmental Conditions/Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	25.0°C
Relative Humidity	32.4%
ATM Pressure	98.8 kPa

2.5.7 Additional Observations

- This is a radiated test.
- An offset of 20.3dB was added to compensate for the external attenuator and cable used from the antenna port to spectrum analyzer.
- Span is set to encompass the whole emission
- RBW is 1% of the span while VBW is greater than 3X RBW.
- Sweep is auto.
- Detector is peak.
- Max hold function activated.
- "x dB" function (20dB) under Occupied Bandwidth measurement of the spectrum analyzer was used for FCC requirement.
- Occupied bandwidth % power set to 99% for IC requirement.



2.5.8 Test Results

Transmitter Frequency (MHz)	Modulation	0.25% of the center frequency requirement	Measured 20dB Bandwidth (MHz)	99% Bandwidth (MHz)
410	FSK	<1.027 MHZ	564.4 kHz	513.7 kHz
420	FSK	<1.0515 MHz	571.6 kHz	513.7 kHz
430	FSK	<1.0759 MHz	564.4 kHz	513.7 kHz



2.5.9 Test Results Plots



Date:21.FEB.2014 15:47:20

20dB BW – Low Channel 410 MHz



Date:21.FEB.2014 15:48:04

99% BW – Low Channel 410 MHz





Date:21.FEB.2014 15:54:26





Date:21.FEB.2014 15:54:59

99% BW – Mid Channel 420 MHz





Date:21.FEB.2014 15:44:09





Date:21.FEB.2014 15:44:58

99% BW – High Channel 430 MHz



2.6 RECEIVER SPURIOUS EMISSIONS

2.6.1 Specification Reference

RSS-Gen 6.0

2.6.2 Standard Applicable

Receivers shall comply with the limits of spurious emissions set out in this section, measured over the frequency range determined in accordance with Section 4.10 of RSS-Gen.

Table 2: Radiated Limits of Receiver Spurious Emissions

Frequency (MHz)	Field Strength (microvolts/m at 3 metres)*
30-88	100
88-216	150
216-960	200
Above 960	500

*Measurements for compliance with limits in the above table may be performed at distances other than 3 metres, in accordance with Section 7.2.7 of RSS-Gen.

2.6.3 Equipment Under Test and Modification State

Serial No: N/A/ Test Configuration A

2.6.4 Date of Test/Initial of test personnel who performed the test

February 20, 2014/AC

2.6.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.6 Environmental Conditions/Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

Ambient Temperature	24.7°C
Relative Humidity	39.7%
ATM Pressure	99.1 kPa

2.6.7 Additional Observations

- This is a radiated test. The spectrum was searched from 30MHz to the 3rd harmonic (up to 18GHz performed).
- Results identical to Section 2.3.10 and 2.3.11 of this test report.
- EUT in RX (Receive) mode configuration.

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SECTION 3

TEST EQUIPMENT USED

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3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

ID Number (SDGE/SDRB)	Test Equipment	Туре	Serial Number	Manufacturer	Cal Date	Cal Due Date
Radiated Test Set	Radiated Test Setup					
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	11/19/13	11/19/14
Radiated Test Set	up					
1002	Bilog Antenna	3142C	00058717	ETS-Lindgren	01/21/13	01/21/14
7575	Double-ridged waveguide horn antenna	3117	00155511	ЕМСО	03/25/13	03/25/14
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	09/03/13	09/03/14
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	07/31/13	07/31/14
1016	Pre-amplifier	PAM-0202	187	PAM	10/08/13	10/08/14
Miscellaneous						
6452	Multimeter	3478A	2911A52177	Hewlett Packard	08/02/13	08/02/14
7560	Barometer/Temperature /Humidity Transmitter	iBTHX-W	1240476	Omega	01/30/14	01/30/15
1123	DC Power Supply	E3631A	N/A	Hewlett Packard	Verified	by 6452
	Test Software	EMC32	V8.53	Rhode & Schwarz	Ν	I/A



3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

3.2.1 Radiated Emission Measurements (Below 1GHz)

	Contribution	Probability Distribution Type	Probability Distribution x _i	Standard Uncertainty u(x _i)	[u(x _i)] ²
1	Receiver/Spectrum Analyzer	Rectangular	0.45	0.26	0.07
2	Cables	Rectangular	0.50	0.29	0.08
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.75	0.43	0.19
5	Site	Rectangular	3.89	2.25	5.04
6	EUT Setup	Rectangular	1.00	0.58	0.33
			Combined	d Uncertainty (u _c):	2.41
			Coverage Factor (k):		2
		Expanded Uncertainty:		4.82	

3.2.2 Radiated Emission Measurements (Above 1GHz)

	Contribution	Probability Distribution Type	Probability Distribution x _i	Standard Uncertainty u(x _i)	[u(x _i)] ²
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.70	0.40	0.16
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.37	0.21	0.05
5	Site	Rectangular	3.89	2.25	5.04
6	EUT Setup	Rectangular	1.00	0.58	0.33
			Combined Uncertainty (u _c):		2.40
			Co	verage Factor (k):	2

4.81

Expanded Uncertainty:



SECTION 4

DIAGRAM OF TEST SETUP

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4.1 **TEST SETUP DIAGRAM**



Analyzer

Radiated Emission Test Setup (Below 1GHz)

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Radiated Emission Test Setup (Above 1GHz)



SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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