

	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	 Test Lab Certificate No. 2470.01
	FCC Rule Part(s):	47 CFR §2, §90	Report Revision No.:	Revision 1.0	
			FCC Test Firm Reg. No.:	Accredited	
			IC Test Site No.:	IC 3874A-1	

Compliance Test Report	FCC PART 90
-------------------------------	--------------------

Test Lab Information	Name	CELLTECH LABS INC.
	Address	21-364 Lougheed Road, Kelowna, British Columbia V1X 7R8 Canada
Test Site Registration No.(s)	FCC	Accredited Site (ISO 17025:2005 - A2LA Test Lab Certificate No. 2470.01)
	IC	3874A-1
Applicant Information	Name	4RF Limited.
	Address	26 Glover St. Wellington 6032 New Zealand
Standard(s) & Procedure(s)	FCC	47 CFR Part 2; Part 90
	ANSI	TIA/EIA-603-C-2004, C63.4-2003
Device Classification(s)	FCC	Private Land Mobile Radio Services (TNB)
Application Type(s)	FCC/IC	New Certification
Device Identifier(s)	FCC ID:	UIPSQ450M140
Device Under Test (DUT)	Aprisa SR+ 12.5 / 25 KHz Channels, Point-to-Multipoint Transmitter, Scada applications. Model # SQ450M140	
<p>This wireless device has demonstrated compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in FCC 47 CFR Rule Parts 2 and Part 90; Industry Canada RSS-119 Issue 11 and RSS-Gen Issue 3; ANSI TIA/EIA-603-C-2004 and ANSI C63.4-2003.</p> <p>I attest to the accuracy of data. All measurements were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.</p> <p>The results and statements contained in this report pertain only to the device(s) evaluated. This test report shall not be reproduced partially, or in full, without the prior written approval of Celltech Labs Inc.</p>		
Test Report Approved By		Glen Westwell
		Lab Manager
		Celltech Labs Inc.

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	 Test Lab Certificate No. 2470.01
	FCC Rule Part(s):	47 CFR §2, §90	Report Revision No.:	Revision 1.0	
			FCC Test Firm Reg. No.:	Accredited	
			IC Test Site No.:	IC 3874A-1	

TABLE OF CONTENTS

SCOPE	4
1.0 REFERENCES	4
1.1 Normative References	4
2.0 PASS/FAIL CRITERIA.....	4
3.0 FACILITIES AND ACCREDITATIONS	4
4.0 GENERAL INFORMATION	5
5.0 RF OUTPUT POWER MEASUREMENT	7
6.0 SPURIOUS EMISSIONS AT THE ANTENNA TERMINAL	9
7.0 OCCUPIED BANDWIDTH AND EMISSION MASK	17
7.1 Test results - OBW, 12.5 KHz CH.	18
7.2 Test results - OBW, 25 KHz Ch.	21
7.3 Test results – Spectrum Mask D: 12.5 KHz Ch.	24
7.4 Test results – Spectrum Mask B: 25 KHz CH.	27
8.0 RADIATED SPURIOUS EMISSIONS – TX (SIGNAL SUBSTITUTION).....	31
9.0 FREQUENCY STABILITY	34
10.0 TEST SET-UP PHOTO'S	36
END OF DOCUMENT	38

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	 Test Lab Certificate No. 2470.01
			Report Revision No.:	Revision 1.0	
	FCC Rule Part(s):	47 CFR §2, §90	FCC Test Firm Reg. No.:	Accredited	
			IC Test Site No.:	IC 3874A-1	

GENERAL REMARKS

This report shall not be reproduced partially or in full without the prior written approval of Celltech Labs Inc. The results and statements contained in this report pertain only to the device(s) evaluated.


SUMMARY



The device under test (DUT) fulfills the general approval requirements as identified in this test report.

REVISION LOG

Revision	Description	Implemented By	Implementation Date
1.0	1st Release	Glen Westwell	1/24/2014

Test Report Prepared By	Date	QA Review By	Date
Glen Westwell	1/24/2014	Art Voss	1/24/2014

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	 Test Lab Certificate No. 2470.01
			Report Revision No.:	Revision 1.0	
	FCC Rule Part(s):	47 CFR §2, §90	FCC Test Firm Reg. No.:	Accredited	
			IC Test Site No.:	IC 3874A-1	

SCOPE

This report outlines the results collected during RF radiated and conducted measurements of the 4RF Aprisa SR+ SQ450M150 point-to-multipoint radio. The measurement results were applied against the applicable requirements and limits outlined in the technical rules and regulations set forth in the Federal Communication’s Commission Code of Federal Regulations Title 47 Part 2 and Part 90; and Industry Canada Radio Standards Specification RSS-119 and RSS-Gen.

1.0 REFERENCES

1.1 Normative References


ANSI/ISO 17025:2005	General Requirements for competence of testing and calibration laboratories
IEEE/ANSI C63.4:2003	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI/TIA/EIA-603-C:2004	Land Mobile FM or PM Communication Equipment Measurement and Performance Standards
CFR Title 47 Part 2	Code of Federal Regulations Title 47: Telecommunication Part 2: Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
CFR Title 47 Part 90	Code of Federal Regulations Title 47: Telecommunication Part 90: Private Land Mobile Radio Services
IC Spectrum Management & Telecommunications Policy	Radio Standards Specification RSS-119 – Land Mobile Fixed Services; 27.41-960 MHz RSS-Gen - General Requirements and Information for the Certification of Radiocommunication Equipment



2.0 PASS/FAIL CRITERIA

Unless otherwise noted in the Appendices, the pass/fail criteria are the limit set forth in the reference standards. The DUT is considered to have passed the requirements if the data collected during the described measurement procedure is no greater than the specified limits as defined. The pass/fail statements made in this report only apply to the unit tested.

3.0 FACILITIES AND ACCREDITATIONS

The facilities used in collecting the test results outlined in this report are located at 21-364 Lougheed Road, Kelowna, British Columbia, Canada V1X 7R8. The radiated emissions site conforms to the requirements set forth in ANSI C63.4 and is filed and listed with the FCC as an accredited test facility and Industry Canada under File Number IC 3874A-1.

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	 Test Lab Certificate No. 2470.01
			Report Revision No.:	Revision 1.0	
	FCC Rule Part(s):	47 CFR §2, §90	FCC Test Firm Reg. No.:	Accredited	
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4.0 GENERAL INFORMATION

DUT Description & Specifications


Device Description	Aprisa SR+,SQ450M150, 12.5 / 25 kHz channels, kHz Point-to-Multipoint Digital Radio	
Test Sample Serial No.	T/A Sample - Identical Prototype	
Device Identifier(s)	FCC ID:	UIPSQ450M140
Model Number(s)	SQ450M140	
FCC Frequency Band:	421-512 MHz	
Transmit Frequency Range DUT:	450 – 512 MHz (12.5 / 25 KHz Channels)	
Rated TX Power and Modulation	QPSK: +37.0 dBm 16QAM: +35.0 dBm 64QAM: +34.0 dBm	
Spectral Efficiency	Min. = 19,200 bits per second / 25 KHz or 4800 bits per second / 6.25 kHz	
Antenna	Maximum antenna gain = 15dBi.	
Emission Designator	25.0 KHz CH. = 20K0D7W (99% = 18.3 kHz, ABW = 20 kHz) 12.5 KHz Ch. = 11K25D7W (99% = 10.1 kHz, ABW = 11.25 kHz)	
DUT Power Source	10-30 Vdc	
Type of Equipment	Fixed. Licensed Non-Broadcast Station Transmitter (TNB)	
Deviation(s) from standard/procedure	None	
Modification of DUT	None	
Test Exercise	The DUT was placed in continuous transmit mode and CW mode.	
Applicable Standards	FCC Part 90.	



DUT Function & Test Statements

Spectrum Efficient Technologies Part 90.203(j)(5).


This device complies with the spectrum efficiency requirement of this rule part.
A manufacturer's attestation exhibit has been submitted with this filing.



This device has no voice frequency capability. It uses digital modulation only. Therefore no voice frequency test requirements have been reported.

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	 Test Lab Certificate No. 2470.01
			Report Revision No.:	Revision 1.0	
	FCC Rule Part(s):	47 CFR §2, §90	FCC Test Firm Reg. No.:	Accredited	
			IC Test Site No.:	IC 3874A-1	

<u>Section</u>	<u>Description of Test</u>	<u>Procedure Reference</u>	<u>Limit Reference</u>	<u>Result</u>
5	RF Output Power	ANSI/TIA/EIA-603-C	§2.1046, §90.205	Pass
6	Spurious Emissions at the antenna terminals (Conducted)	ANSI/TIA/EIA-603-C	§2.1051, 90.210	Pass
7	Occupied Bandwidth and Emission Mask	ANSI/TIA/EIA-603-C	§2.1049, §90.210	Pass
8	Radiated Spurious Emissions	ANSI C63.4-2003	§2.1053, §90.210	Pass
10	Frequency Stability	ANSI/TIA/EIA-603-C	§2.1055, §90.213	Pass
<u>Section</u>	<u>Description of Test</u>	<u>Procedure Reference</u>	<u>Limit Reference</u>	<u>Result</u>
5	Transmitter Output Power	RSS-Gen 4.8	RSS-119, 5.4	Pass
6	Spurious Emissions at the antenna terminals (Conducted)	RSS-Gen 4.9	RSS-119, 5.8	Pass
7	Occupied Bandwidth and Emission Mask	RSS-Gen 4.6.1	RSS-119, 5.5	Pass
8	Radiated Spurious Emissions	ANSI C63.4-2003	RSS-119, 5.8	Pass
10	Frequency Stability	RSS-Gen 4.7	RSS-119, 5.3	Pass

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	 Test Lab Certificate No. 2470.01
			Report Revision No.:	Revision 1.0	
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			IC Test Site No.:	IC 3874A-1	

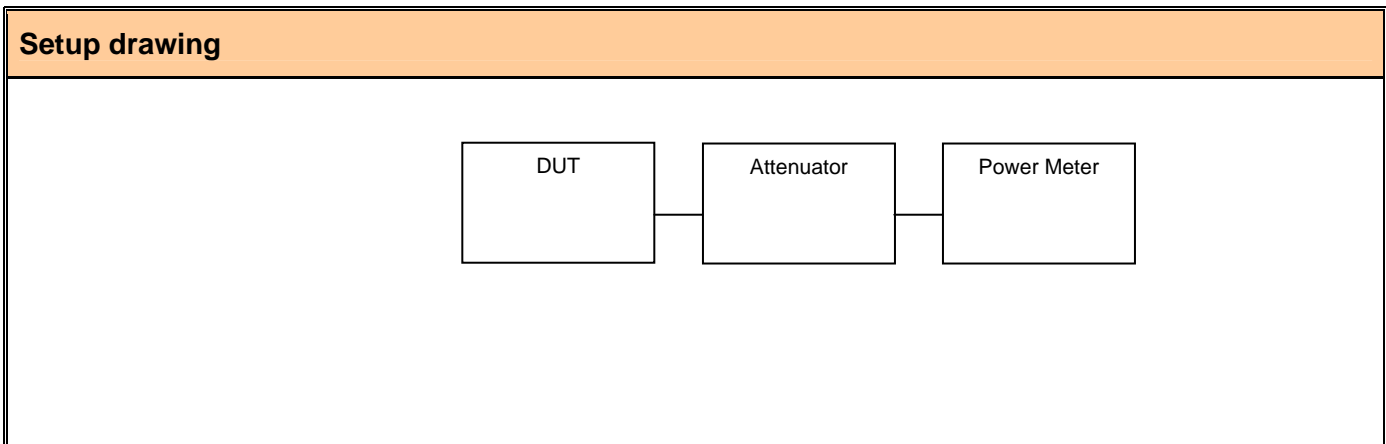
5.0 RF OUTPUT POWER MEASUREMENT


References	
Normative Reference Standard	FCC CFR 47 §2.1046, §90.205; IC RSS-119, 5.4
Procedure Reference	The RF output power measurements were performed in accordance with ANSI TIA/EIA Standard 603.



Limits	
FCC CFR 47 §90.279	ERP relative to Effective Antenna Height (EAH), 90.279.
RSS-119, 5.4	The output power shall be within ± 1.0 dB of the manufacturers rated power.

Environmental conditions	
Temperature	25 +/- 5 °C
Humidity	40 +/- 10 %
Barometric Pressure	101 +/- 3 kPa

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	CAL DUE
00007	Gigatronics	8652A	Power Meter	03-May-14
00237	Gigatronics	80334A	Power Sensor	03-May-14



Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	 Test Lab Certificate No. 2470.01
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Test results: Complies

Measured Frequency (MHz)	Conducted Output Power (dBm)	Conducted Output Power (dBm)	Rated Output Power (dBm)
	12.5 KHz Ch.	25 KHz Ch.	
QPSK	37.4	36.7	37.0
16QAM	35.6	35.6	35.0
64QAM	34.7	34.0	34.0

Sign-off


I attest to the accuracy of the data. All measurements reported herein were performed by me and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements.





Glen Westwell
Lab Manager
Celltech Labs Inc.

1/24/2014

Date

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	 Test Lab Certificate No. 2470.01
			Report Revision No.:	Revision 1.0	
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			IC Test Site No.:	IC 3874A-1	

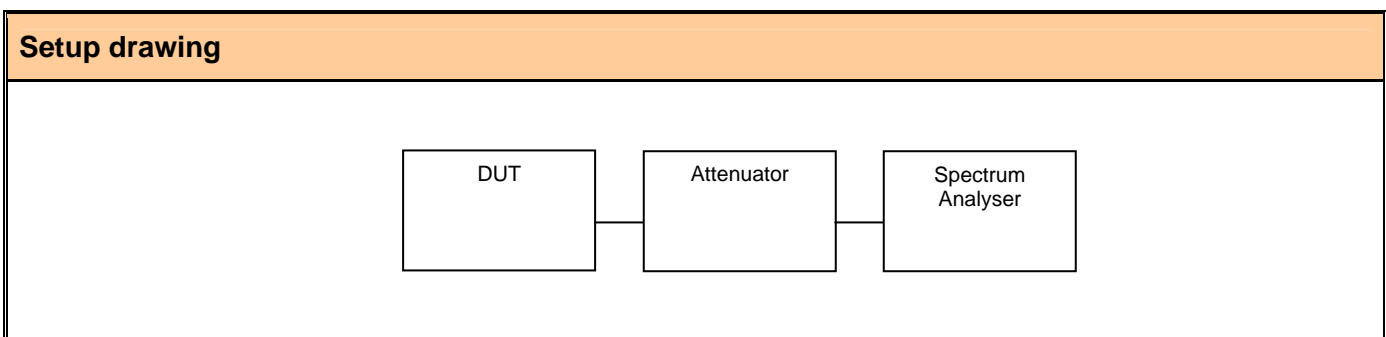
6.0 SPURIOUS EMISSIONS AT THE ANTENNA TERMINAL


References	
Normative Reference Standard	FCC CFR 47 §2.1051, §90.210; IC RSS-119, 5.8
Procedure Reference	<p>The spurious emissions measurements at the antenna terminal were performed in accordance with ANSI TIA/EIA Standard 603.</p> <p>The emission search was performed across all required ranges. The worst case performance has been presented.</p>

Limits	
FCC CFR 47 §90.210	25.0 KHz Ch.= 43 + 10 Log (Po) dB.
	12.5 KHz CH. = 50 + 10 Log (Po) dB.

Environmental conditions	
Temperature	25 +/- 5 °C
Humidity	40 +/- 10 %
Barometric Pressure	101 +/- 3 kPa

ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	CAL DUE
00051	HP	8566B	Spectrum Analyzer RF Section	10-May-2014
00047	HP	85685A	RF Preselector	10-May-2014
00241	R&S	FSU 40	Spectrum Analyzer	09-Apr-2015

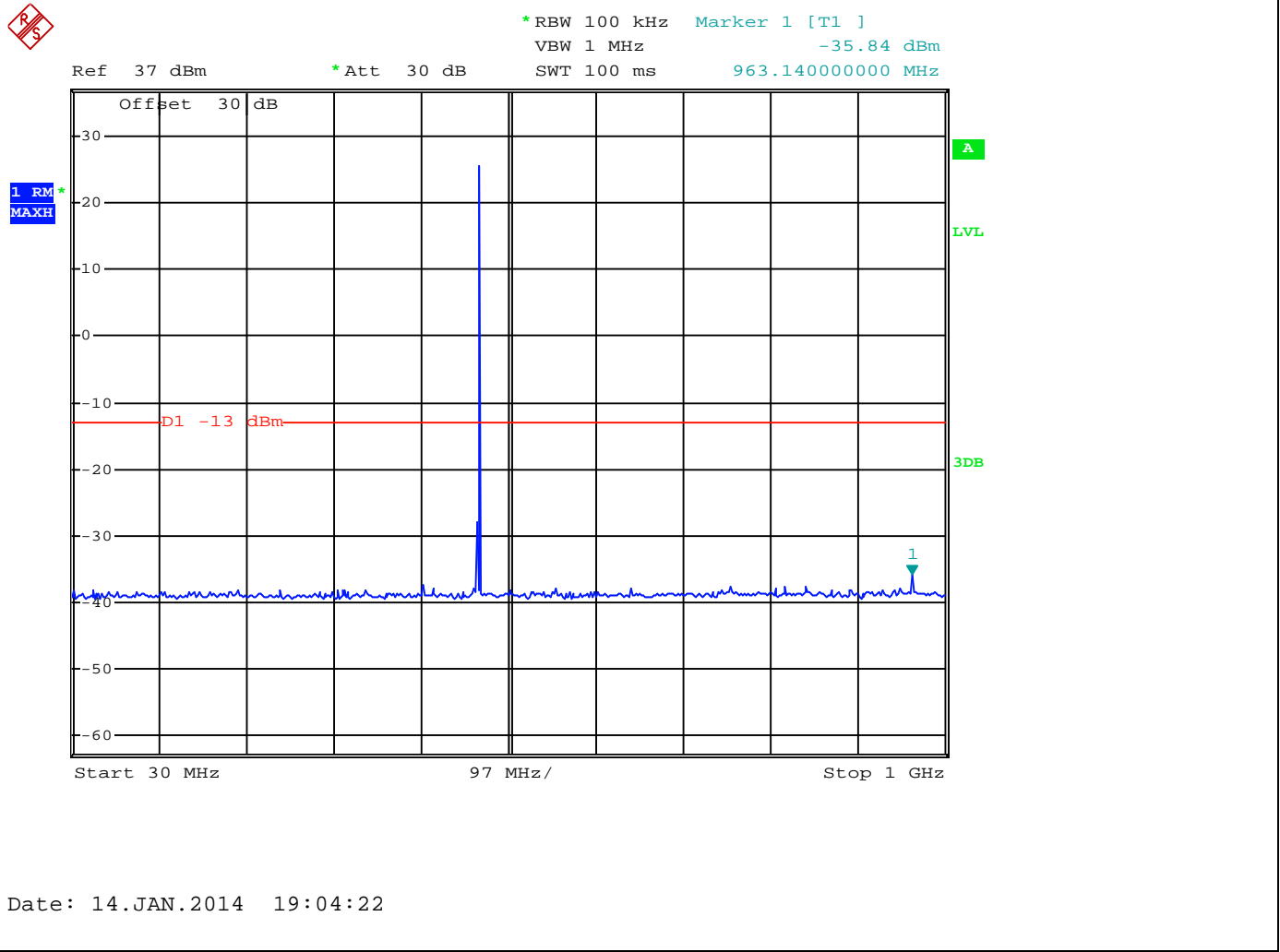


Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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Detected Emissions 12.5 KHz Ch.

Emission Frequency	Level	Limit	Margin
[MHz]	[dBm]	[dBm]	[dB]
962.0	-24.2	-20	-4.2

Test results: 12.5 KHz Channel



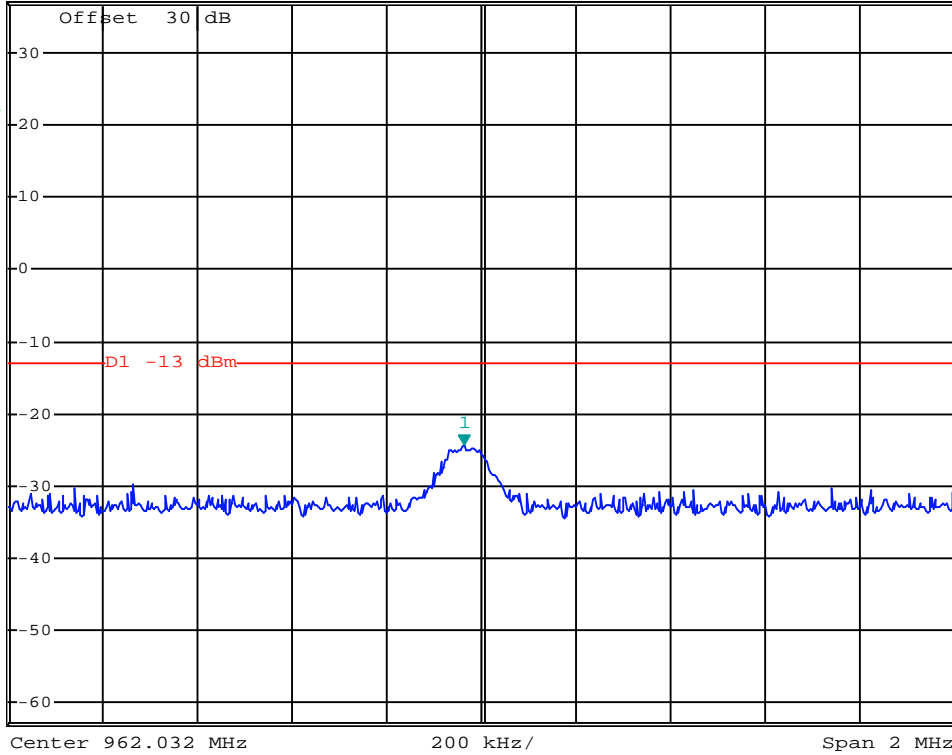


*RBW 100 kHz Marker 1 [T1]
 VBW 1 MHz -24.19 dBm
 SWT 2.5 ms 961.996000000 MHz

Ref 37 dBm

*Att 30 dB

1. RM*
 MAXH



Date: 14.JAN.2014 19:05:27

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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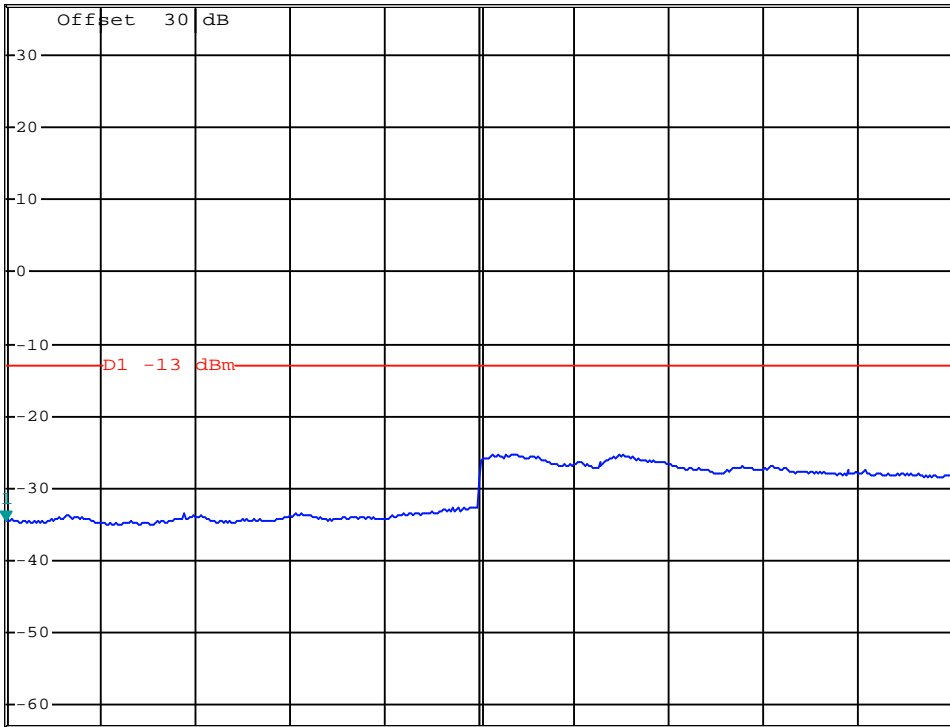


*RBW 1 MHz Marker 1 [T1]
 VBW 10 MHz -34.61 dBm
 SWT 80 ms 1.000000000 GHz

Ref 37 dBm

*Att 30 dB

1. RM
 MAXH



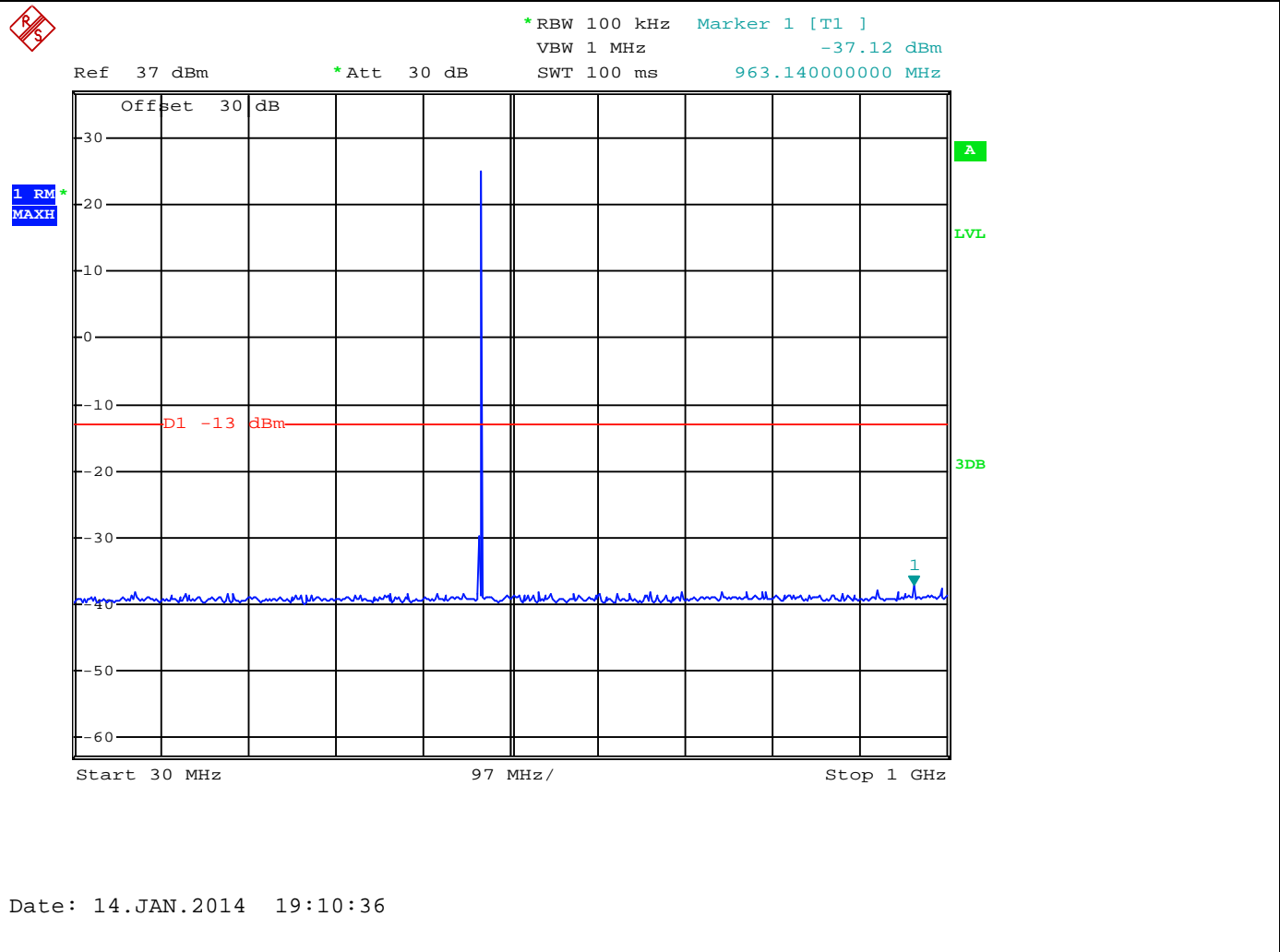
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Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
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Detected Emissions 25 KHz Ch.

Emission Frequency	Level	Limit	Margin
[MHz]	[dBm]	[dBm]	[dB]
962.0	-25.6	-13	-12.6

Test results: 25.0 KHz Channel



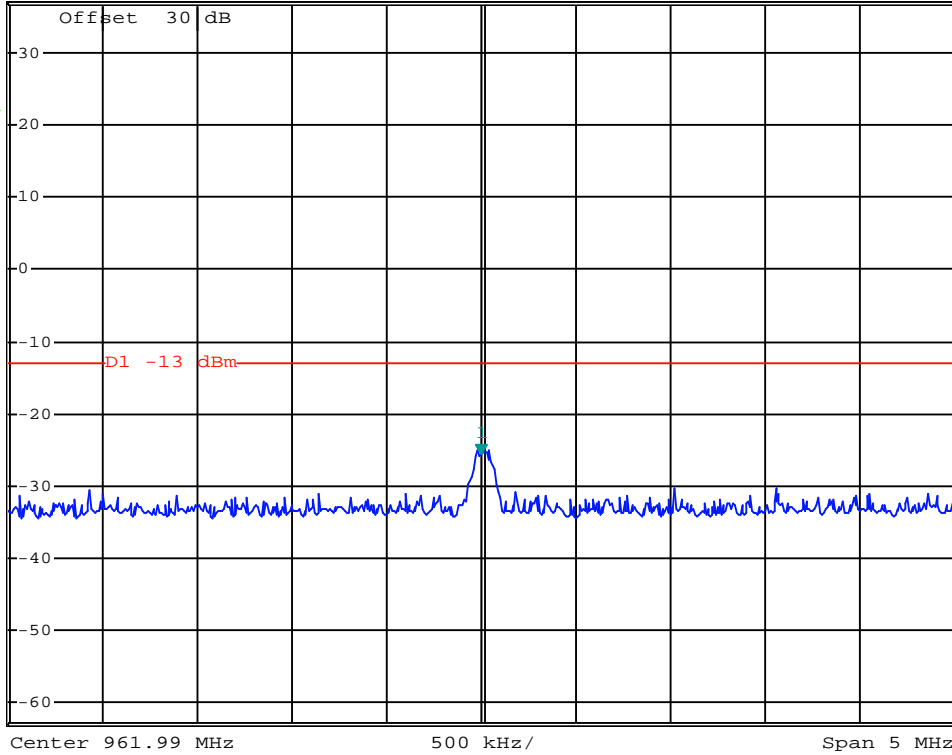


*RBW 100 kHz Marker 1 [T1]
 VBW 1 MHz -25.58 dBm
 SWT 2.5 ms 961.99000000 MHz

Ref 37 dBm

*Att 30 dB

1. RM*
 MAXH



Date: 14.JAN.2014 19:11:06

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
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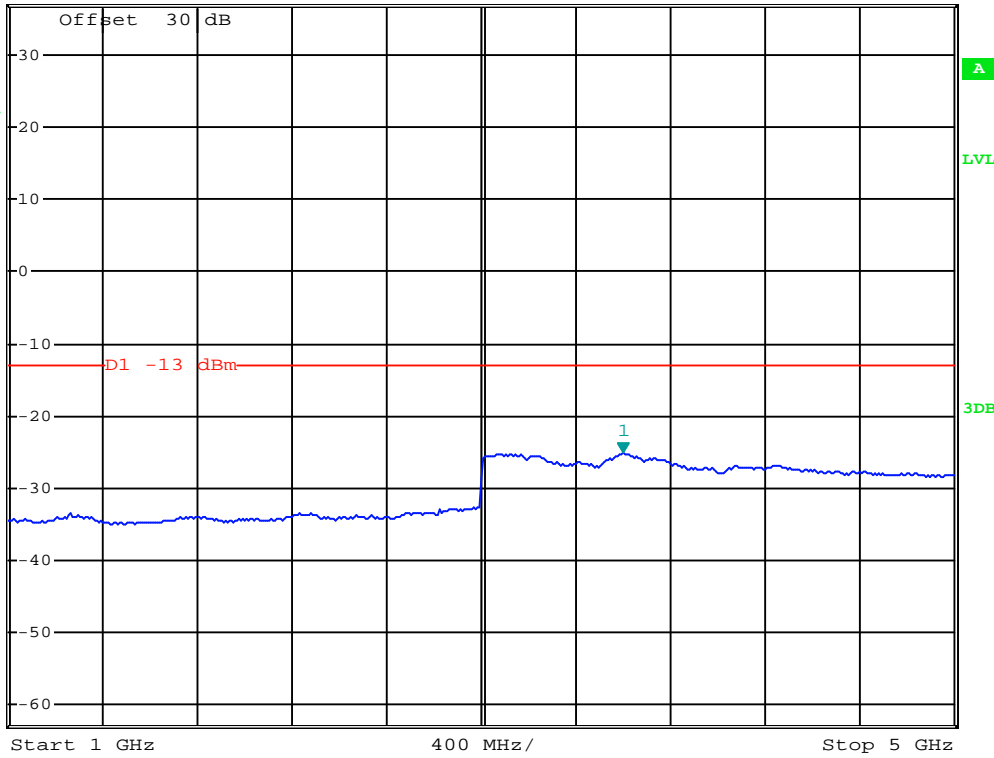


*RBW 1 MHz Marker 1 [T1]
 VBW 10 MHz -25.18 dBm
 SWT 80 ms 3.600000000 GHz

Ref 37 dBm



*Att 30 dB

1 RM
 MAXH



Date: 14.JAN.2014 19:09:46

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
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	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	 Test Lab Certificate No. 2470.01
	FCC Rule Part(s):	47 CFR §2, §90	Report Revision No.:	Revision 1.0	
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Sign-off


I attest to the accuracy of the data. All measurements reported herein were performed by me and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements.





Glen Westwell.
Lab Manager
Celltech Labs Inc.

1/24/2014

Date

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	 Test Lab Certificate No. 2470.01
			Report Revision No.:	Revision 1.0	
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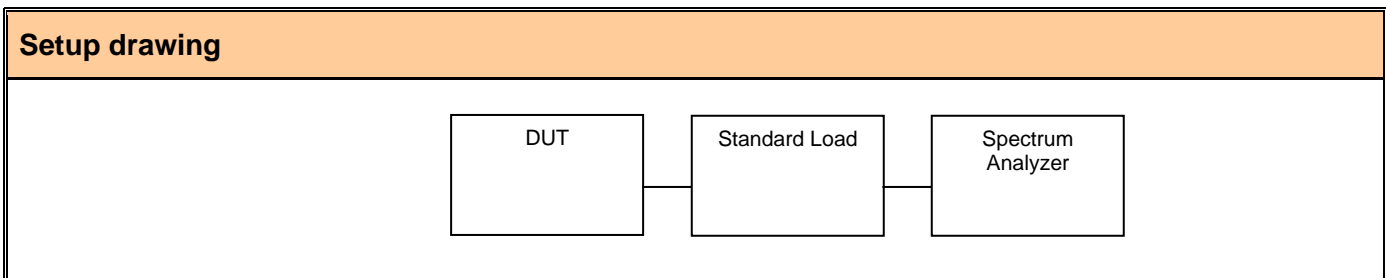
7.0 OCCUPIED BANDWIDTH AND EMISSION MASK


References	
Normative Reference Standard	FCC CFR 47 §2.1049, §90.210 RSS-119, 5.8
Procedure Reference / Description	Occupied bandwidth was performed by connecting the output of the DUT to the input of a spectrum analyzer.

Limits	
§90.210	Mask B /25 KHz CH. Mask D /12.5 KHz CH.

Environmental conditions	
Temperature	25 +/- 5 °C
Humidity	40 +/- 10 %
Barometric Pressure	101 +/- 3 kPa

Equipment list				
ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	CAL DUE
00241	R&S	FSU 40	Spectrum Analyzer	09-Apr-2015



Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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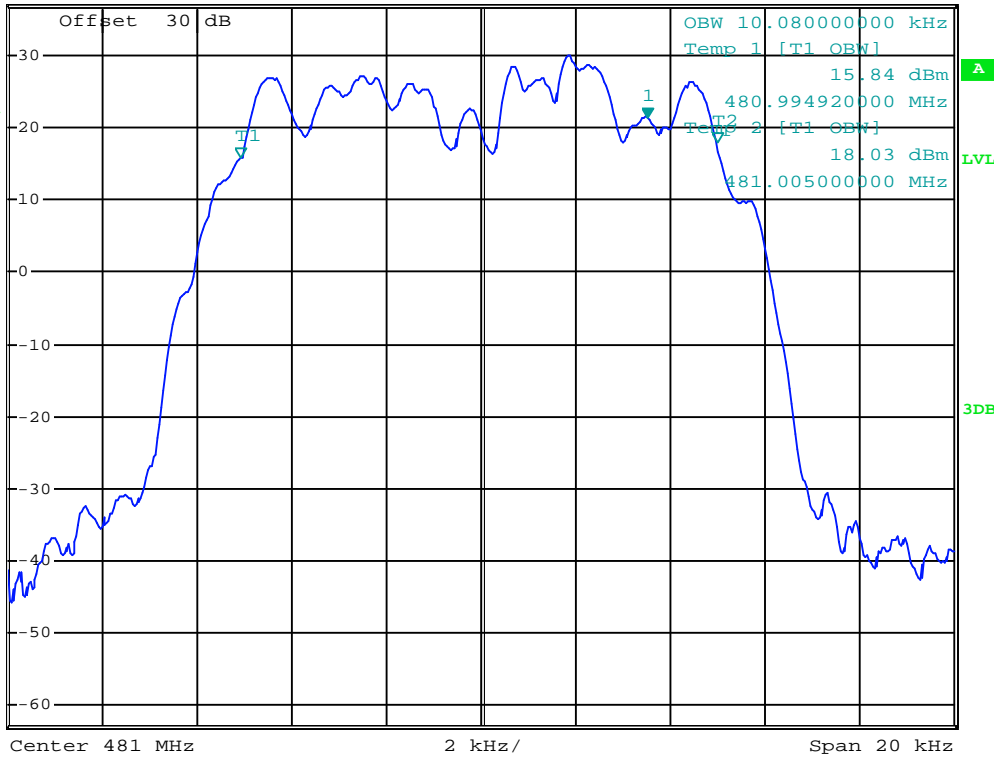
7.1 Test results - OBW, 12.5 KHz CH.

QPSK
99% Occupied Bandwidth = 10.1 kHz



Ref 37 dBm *Att 30 dB *RBW 300 Hz Marker 1 [T1] 21.30 dBm
 VBW 3 kHz SWT 225 ms 481.003500000 MHz

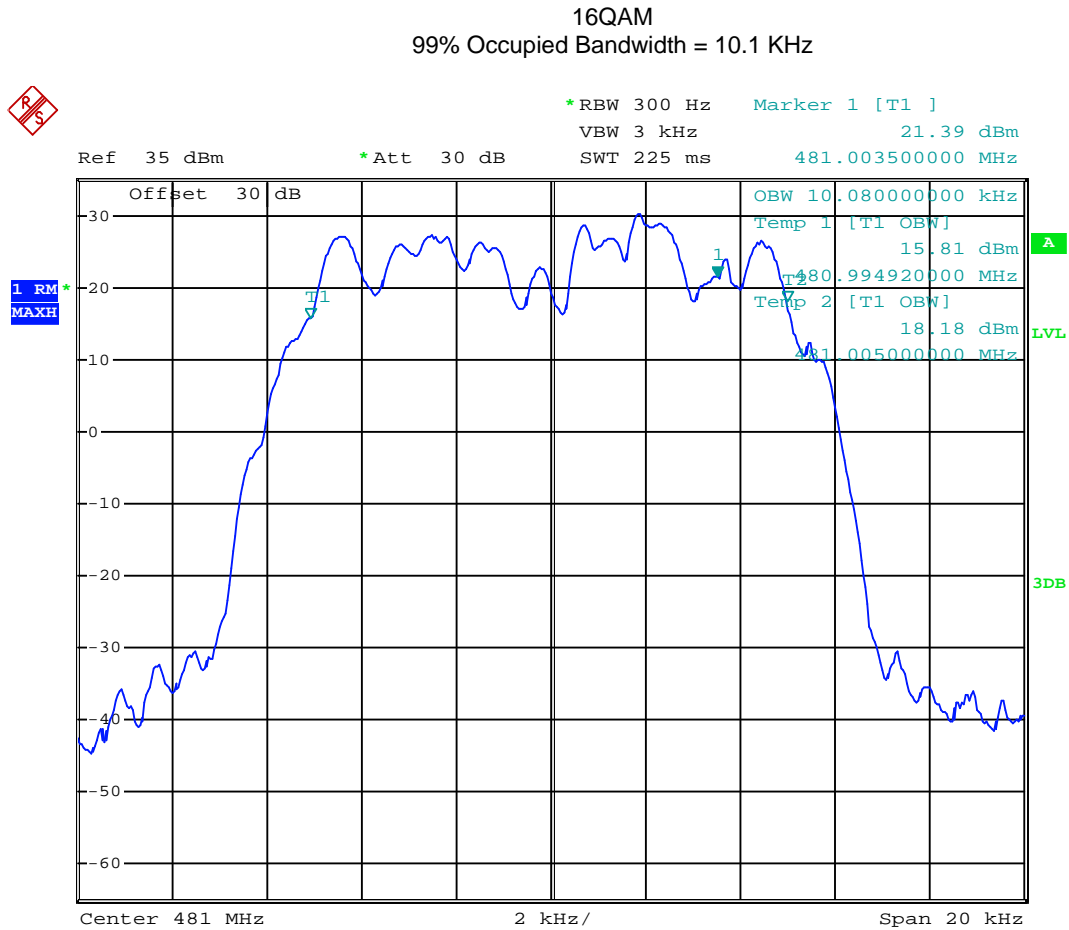
1 RM
MAXH



Date: 14.JAN.2014 18:55:14

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
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Test results Cont.



Date: 14.JAN.2014 18:57:10

Test results Cont.

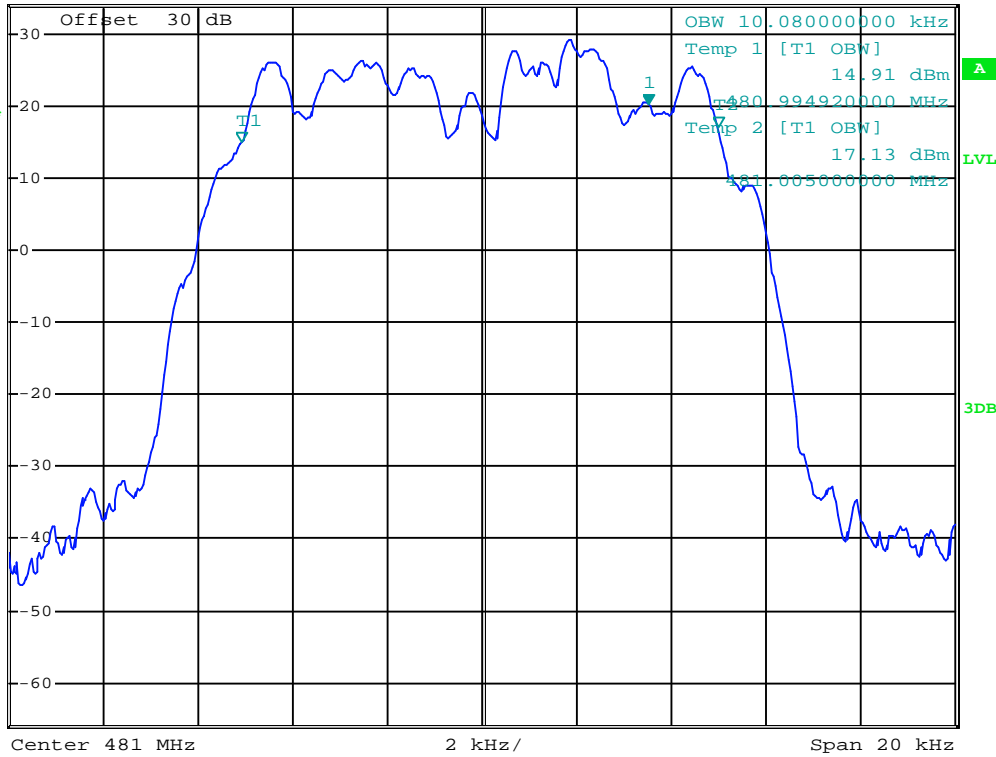
64QAM
99% Occupied Bandwidth = 10.1 KHz



*RBW 300 Hz Marker 1 [T1]
 VBW 3 kHz 20.31 dBm
 SWT 225 ms 481.003500000 MHz

Ref 34 dBm *Att 30 dB

1 RM
MAXH



Date: 14.JAN.2014 18:59:51

Test results Cont.

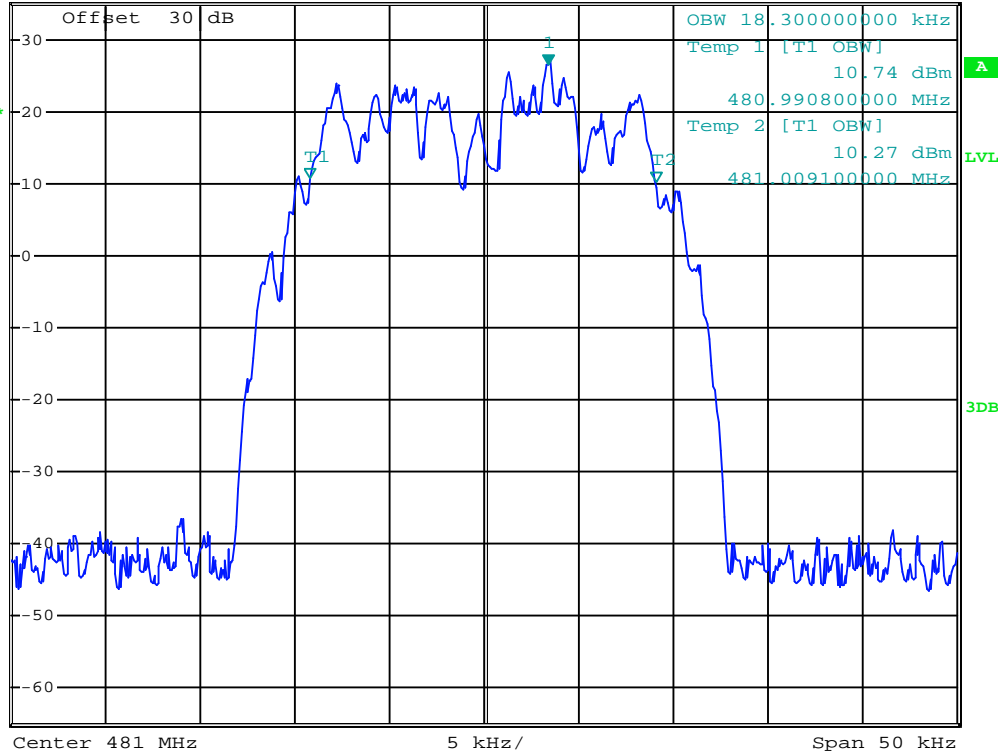
16QAM
99% Occupied Bandwidth = 18.3 KHz






Ref 35 dBm

*Att 30 dB

 *RBW 300 Hz Marker 1 [T1]
 VBW 3 kHz 26.45 dBm
 SWT 560 ms 481.003400000 MHz

 1 RM
MAXH


Date: 14.JAN.2014 18:48:33

	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	
	FCC Rule Part(s):	47 CFR §2, §90	Report Revision No.:	Revision 1.0	
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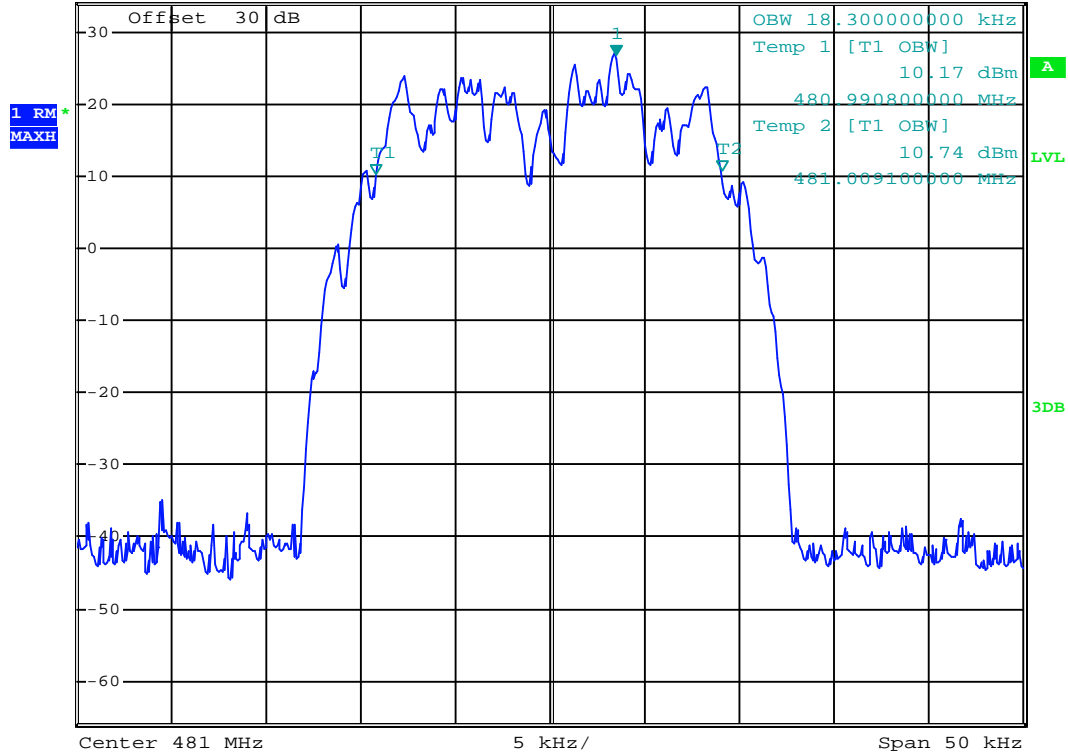
Test Lab Certificate No. 2470.01

Test results Cont.


64QAM
99% Occupied Bandwidth = 18.3 KHz



Ref 34 dBm *Att 30 dB *RBW 300 Hz Marker 1 [T1] VBW 3 kHz 26.78 dBm 481.003500000 MHz



Date: 14.JAN.2014 18:52:07

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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7.3 Test results – Spectrum Mask D: 12.5 KHz Ch.

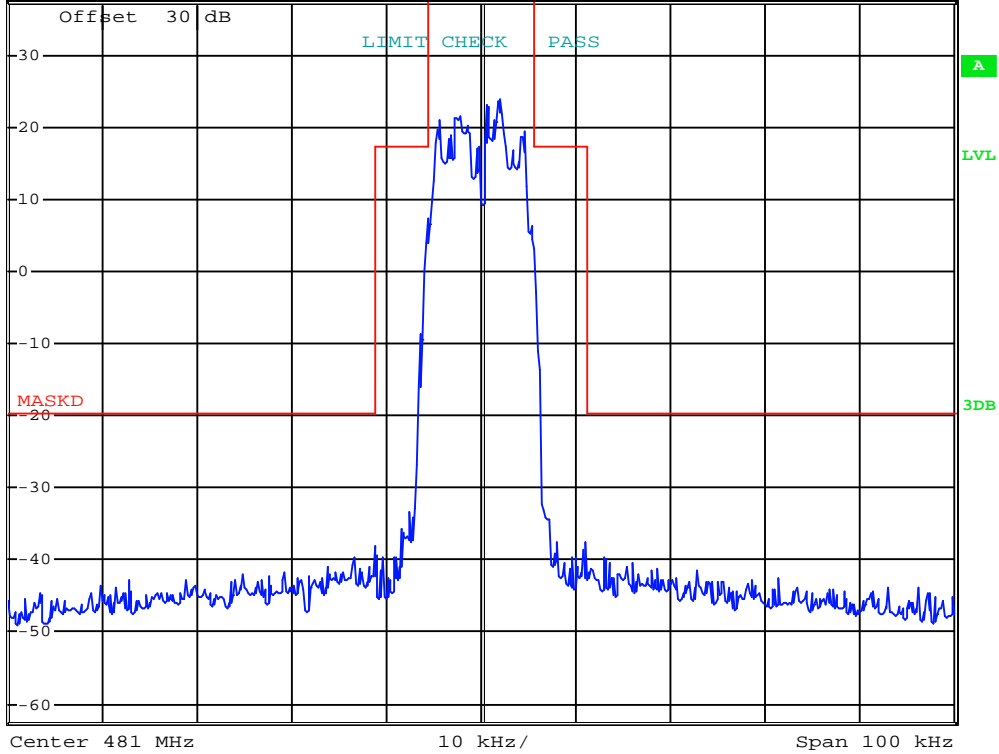


Emission Mask 12.5 KHz Channel QPSK

*RBW 100 Hz
*VBW 100 kHz

Ref 37.4 dBm *Att 40 dB SWT 12 s

1 PK
MAXH



Date: 24.JAN.2014 17:42:19

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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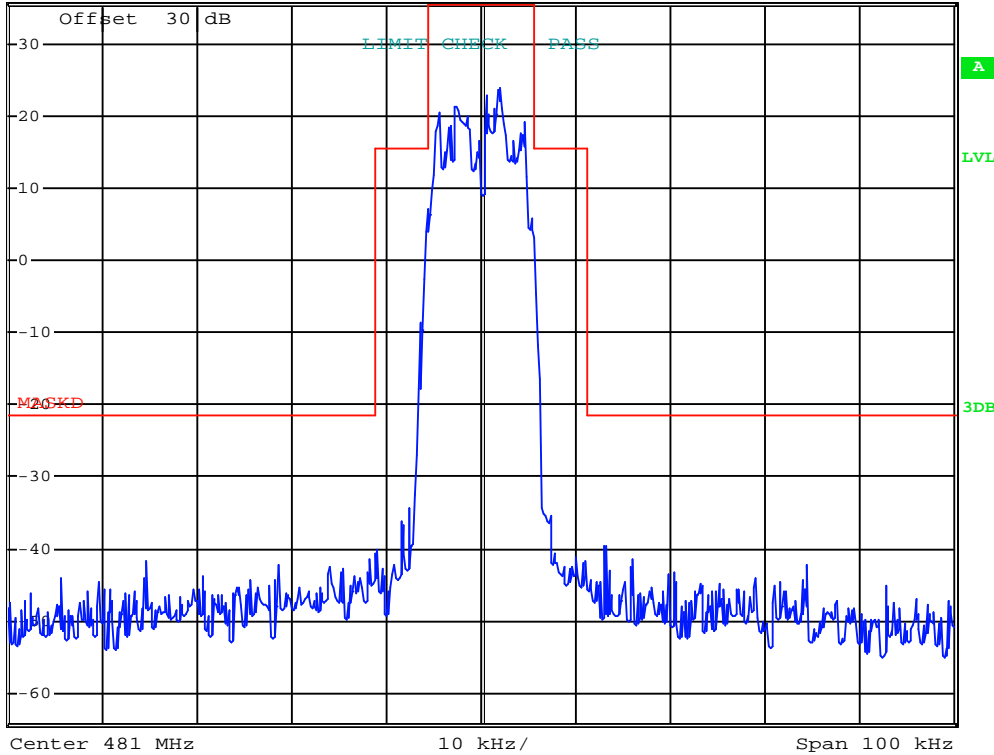
Emission Mask 12.5 KHz Channel
16QAM

*RBW 100 Hz
*VBW 100 kHz

Ref 35.6 dBm *Att 40 dB SWT 12 s



1 PK
MAXH



Date: 24.JAN.2014 17:45:14

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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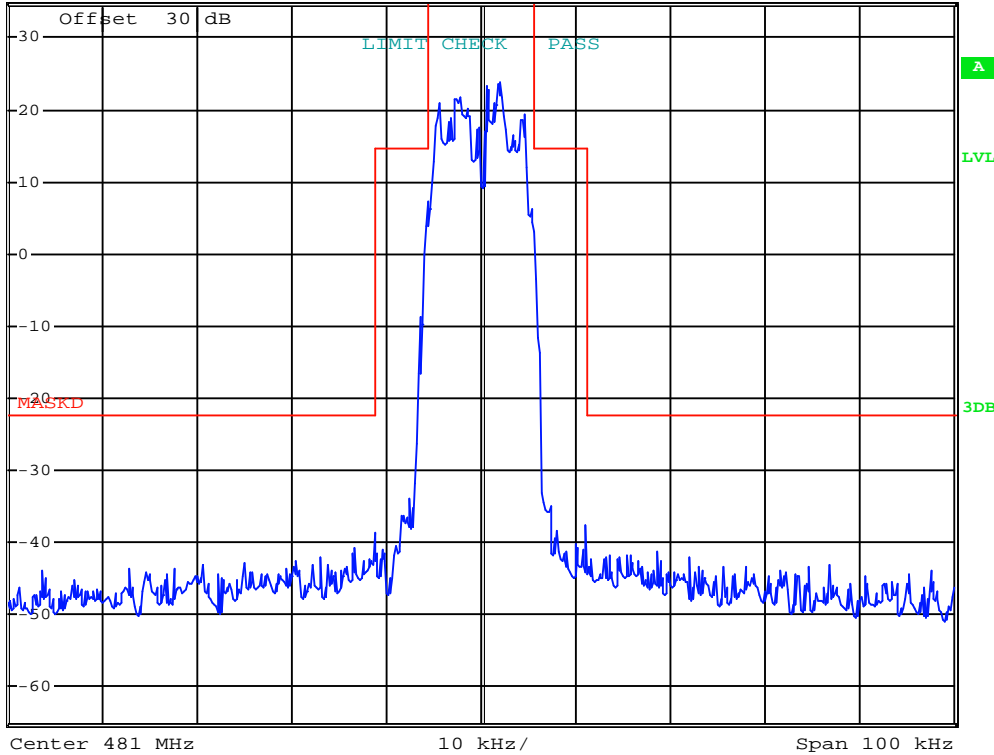
Emission Mask 12.5 KHz Channel
64QAM

*RBW 100 Hz
*VBW 100 kHz

Ref 34.7 dBm *Att 40 dB SWT 12 s



1 PK
MAXH



Date: 24.JAN.2014 17:49:26

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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Emission Mask 25 KHz Channel
16QAM

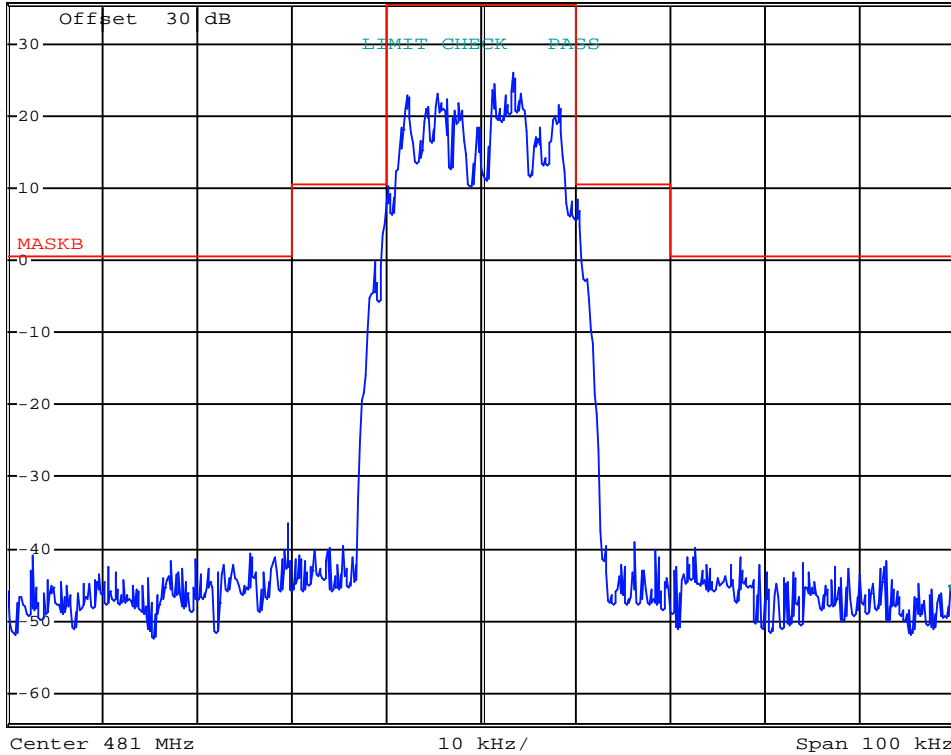


*RBW 300 Hz Marker 1 [T1]
 VBW 3 kHz -46.44 dBm
 SWT 1.15 s 481.050000000 MHz

Ref 35.6 dBm

*Att 30 dB

1 RM
MAXH



Date: 14.JAN.2014 19:18:21

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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Emission Mask 25 KHz Channel
64QAM

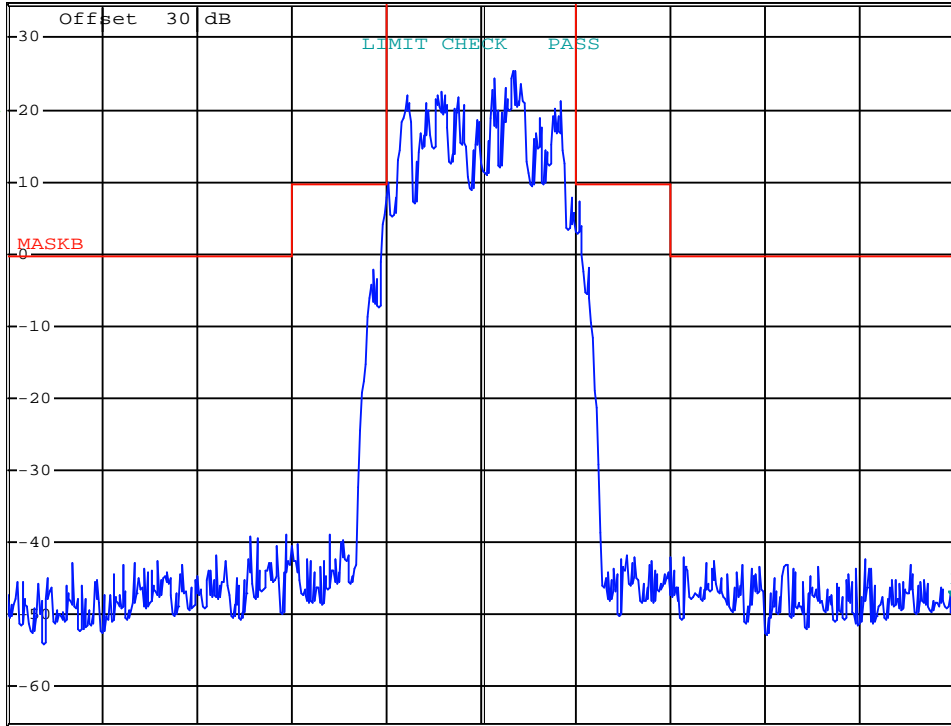


*RBW 300 Hz Marker 1 [T1]
 VBW 3 kHz -48.13 dBm
 SWT 1.15 s 481.050000000 MHz

Ref 34.7 dBm



*Att 30 dB

1 RM
MAXH



Date: 14.JAN.2014 19:20:43

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	 Test Lab Certificate No. 2470.01
	FCC Rule Part(s):	47 CFR §2, §90	Report Revision No.:	Revision 1.0	
			FCC Test Firm Reg. No.:	Accredited	
			IC Test Site No.:	IC 3874A-1	

Sign-off


I attest to the accuracy of the data. All measurements reported herein were performed by me and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements.





Glen Westwell,
Lab Manager
Celltech Labs Inc.

1/24/2014

Date

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	 Test Lab Certificate No. 2470.01
			Report Revision No.:	Revision 1.0	
	FCC Rule Part(s):	47 CFR §2, §90	FCC Test Firm Reg. No.:	Accredited	
			IC Test Site No.:	IC 3874A-1	

8.0 RADIATED SPURIOUS EMISSIONS – TX (SIGNAL SUBSTITUTION)


References	
Normative Reference Standard	FCC CFR 47 §2.1053; 90.210; IC RSS-119, RSS-GEN
Measurement Reporting	<ul style="list-style-type: none"> The transmitter spurious emissions were measured in accordance with ANSI/TIA-603-C. The spectrum was searched from the lowest frequency generated in the DUT up to the 10th harmonic of the fundamental frequency. The DUT was characterized on 3 orthogonal axis. Detected emissions are reported.



Limits	
§90.210, RSS-119,	Emissions must be at least 50 + 10 log ₁₀ (P) dB below the mean power output of the transmitter.

Environmental conditions	
Temperature	25 +/- 5 °C
Humidity	40 +/- 10 %
Barometric Pressure	101 +/- 3 kPa

Equipment list				
ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	CAL DUE
00072	EMCO	2075	Mini-mast	n/a
00073	EMCO	2080	Turn Table	n/a
00071	EMCO	2090	Multi-Device Controller	n/a
00241	R&S	FSU 40	Spectrum Analyzer	09-Apr-15
00050	Chase	CBL-6111A	Bilog Antenna	07-May-14
00055	EMCO	3121C	Dipole Antenna	07-Mat-14
00034	EMCO	3115	Horn Ant.	06-Dec-14
00035	EMCO	3115	Horn Ant.	06-Dec-14
00239	Miteq	JS4-00102600	LNA	COU
00006	R & S	SMR 20	Signal Generator (10MHz-40GHz)	1-May-14
00007	Gigatronics	8652A	Power Meter	03-May-14
00237	Gigatronics	80334A	Power Sensor	03-May-14

Note: COU = cal on use.

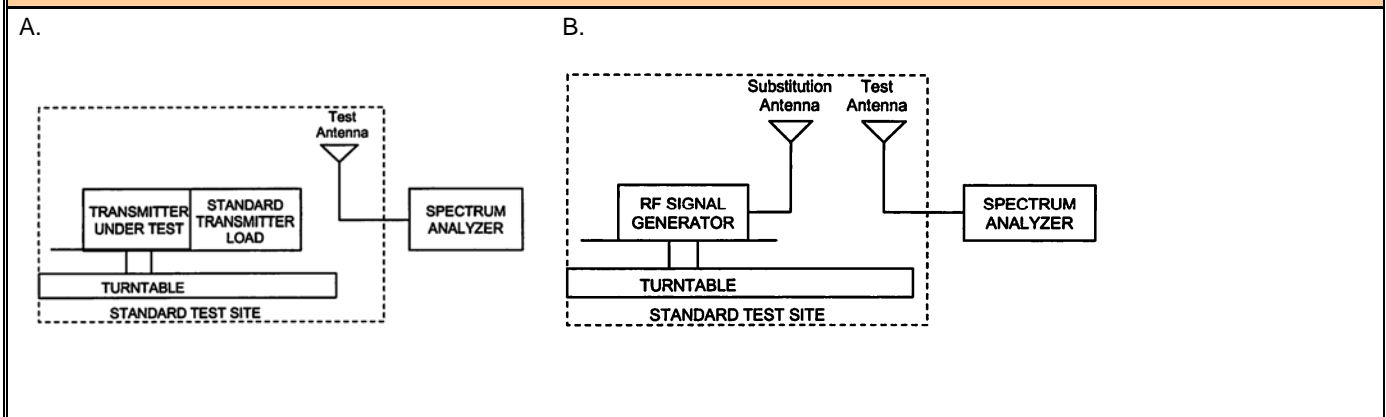
Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	 Test Lab Certificate No. 2470.01
	FCC Rule Part(s):	47 CFR §2, §90	Report Revision No.:	Revision 1.0	
			FCC Test Firm Reg. No.:	Accredited	
			IC Test Site No.:	IC 3874A-1	



Measurement equipment setup

MEASUREMENT EQUIPMENT CONNECTIONS	For the field strength measurements, the measurement equipment was connected as shown below. For the final substitutions, the DUT was replaced with the appropriate antenna and fed from a CW signal source sufficient to replicate the received field strength of the emission being investigated. Worst case performance is presented.		
	Frequency Range	RX Antenna	TX Antenna
	30 MHz - 1GHz	Bilog	Dipole
	1 GHz - 18 GHz	ETS 3115 Horn	ETS 3115 Horn
MEASUREMENT EQUIPMENT SETTINGS	Measurement Settings.		
	RBW	VBW	Detector
	MHz	MHz	
	100 kHz < 1GHz 1 MHz >1 GHz	300 kHz < 1 GHz 3 MHz > 1 GHz	Peak

Setup drawing(s)



Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	 Test Lab Certificate No. 2470.01
			Report Revision No.:	Revision 1.0	
	FCC Rule Part(s):	47 CFR §2, §90	FCC Test Firm Reg. No.:	Accredited	
			IC Test Site No.:	IC 3874A-1	

Radiated Emissions: Signal Substitution (Fig. A&B)

TX: 481.0 MHz	Ant. Polarity	Emission Level	Substitution Level	Antenna Gain (+)	Cable loss (+)	Amp Gain (-)	Corrected Pwr Level	Limit	Margin
(GHz)		(dBuV)	(dB)	(+dBi)	(dB)	(dB)	(dBm)	(dBm)	(dB)
1.3	V	45.2	-55.2	6.92	4.2	30.2	-36.12	-20.0	-16.2
1.4	V	35.2	-64.4	7.8	4.4	30.2	-46.4	-20.0	-26.4
1.45	V	35.2	-64.0	8.0	4.5	30.2	-46.3	-20.0	-26.3
1.5	V	39.6	-54.3	8.3	5.0	30.4	-37.0	-20.0	-17.0
1.8	H	37.1	-60.2	8.6	5.0	30.6	-43.2	-20.0	-23.2
1.924	V	28.7	-62.2	8.6	5.2	29.4	-46.6	-20.0	-26.6

Test results:

Complies.

- All detected emissions are reported.
- The worst case emission is 1.3 GHz at -36.12 dBm.
- The spectrum was searched from the lowest frequency generated in the DUT up to the 10th harmonic of the fundamental frequency.
- The DUT was characterized on 3 orthogonal axis.

Sign-off


I attest to the accuracy of the data. All measurements reported herein were performed by me and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements.





Glen Westwell
Lab Manager
Celltech Labs Inc.

1/24/2014

Date

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	 Test Lab Certificate No. 2470.01
			Report Revision No.:	Revision 1.0	
	FCC Rule Part(s):	47 CFR §2, §90	FCC Test Firm Reg. No.:	Accredited	
			IC Test Site No.:	IC 3874A-1	

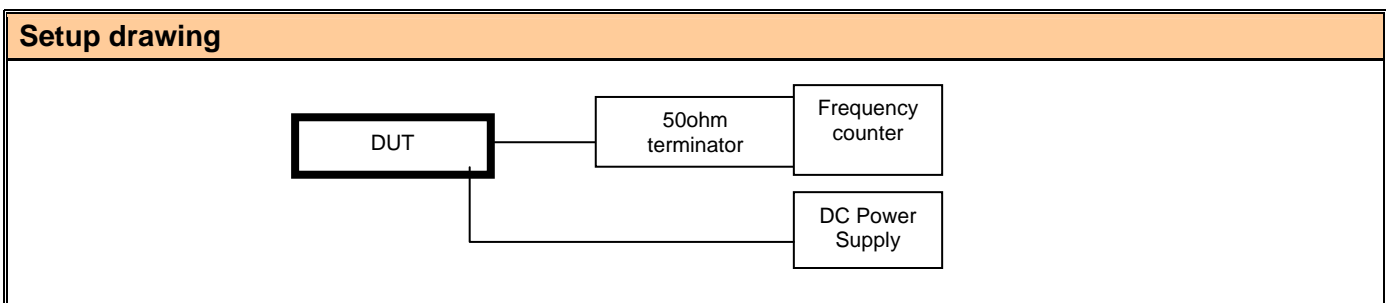
9.0 FREQUENCY STABILITY


References	
Normative Reference Standard	FCC CFR 47 §2.1055, §90.213; IC RSS-119
Procedure Reference / Description	§2.1055(a)(2) The frequency stability shall be measured with variation of ambient temperature as follows: (1) From -40° to +70° centigrade.



Limits	
§90.213 & RSS-119	90.213 - 421-512 MHz, 2.5ppm / 25 KHz CH.
	90.213 - 421-512 MHz, 1.5ppm / 12.5 KHz CH.

Environmental conditions	
Temperature	25 +/- 5 °C
Humidity	40 +/- 10 %
Barometric Pressure	101 +/- 3 kPa

Equipment list				
ASSET NUMBER	MANUFACTURER	MODEL	DESCRIPTION	CAL DUE
na	ESPEC	ECT-2	Heater/Refrigerator	na
0003	HP	53181A	Frequency Counter	02-May-14
na	HP	E3611A	DC Power Supply	na
00234	VWR	na	Temperature Humidity Monitor	20-July-14



Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	 Test Lab Certificate No. 2470.01
	FCC Rule Part(s):	47 CFR §2, §90	Report Revision No.:	Revision 1.0	
			FCC Test Firm Reg. No.:	Accredited	
			IC Test Site No.:	IC 3874A-1	

Test results: Complies

Temperature (degrees C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (Hz)	Frequency tolerance (ppm)
-40	481 000 000	480 999 558	442	-0.92
-30	481 000 000	480 999 594	406	-0.84
-20	481 000 000	480 999 614	386	-0.80
-10	481 000 000	480 999 647	353	-0.73
0	481 000 000	480 999 858	142	-0.30
10	481 000 000	480 999 845	155	-0.32
20 -end point	481 000 000	480 999 902	98	-0.20
20	481 000 000	480 999 899	101	-0.21
20 +end point	481 000 000	480 999 899	101	-0.21
30	481 000 000	480 999 881	119	-0.25
40	481 000 000	480 999 774	226	-0.47
50	481 000 000	480 999 768	232	-0.48
60	481 000 000	480 999 722	278	-0.58
70	481 000 000	480 999 655	345	-0.72

Sign-off



I attest to the accuracy of the data. All measurements reported herein were performed by me and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements.



Glen Westwell
Lab Manager
Celltech Labs Inc.


1/24/2014



Date

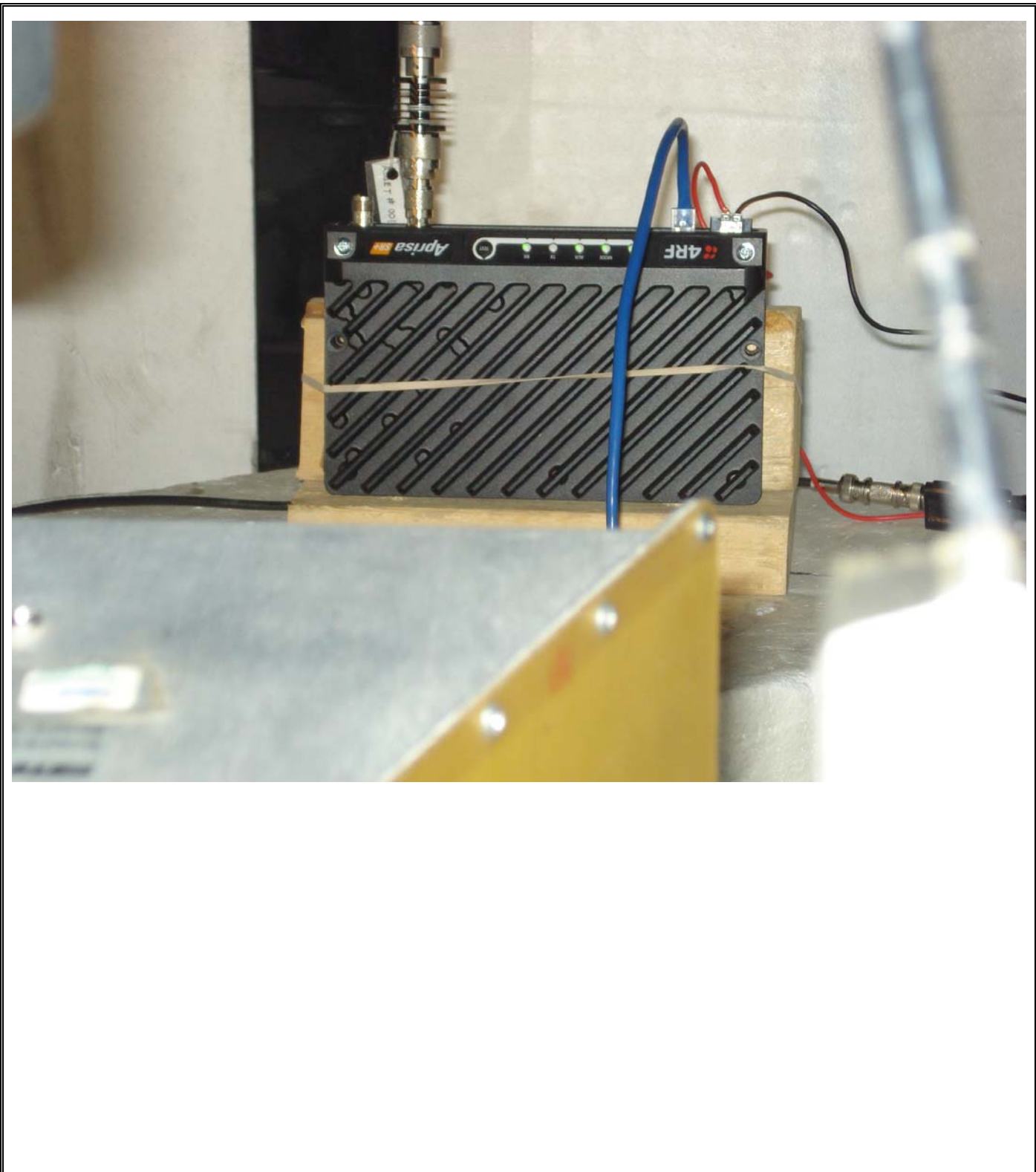
	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	 Test Lab Certificate No. 2470.01
	FCC Rule Part(s):	47 CFR §2, §90	Report Revision No.:	Revision 1.0	
			FCC Test Firm Reg. No.:	Accredited	
			IC Test Site No.:	IC 3874A-1	


10.0 TEST SET-UP PHOTO'S





Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	
	FCC Rule Part(s):	47 CFR §2, §90	FCC Test Firm Reg. No.:	Accredited	
			IC Test Site No.:	IC 3874A-1	Test Lab Certificate No. 2470.01



Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	1/24/2014	 Test Lab Certificate No. 2470.01
			Report Revision No.:	Revision 1.0	
	FCC Rule Part(s):	47 CFR §2, §90	FCC Test Firm Reg. No.:	Accredited	
			IC Test Site No.:	IC 3874A-1	

END OF DOCUMENT

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140				
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz		
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