

	Test Report Serial No.:	220114-T1283-E-900	Report Issue Date:	10/3/2016	
			Report Revision No.:	Revision 2.0	
	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

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	4 RF 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		
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. 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. 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.			
Test Report Approved By		Glen Westwell	Lab Manager
		Celltech Labs Inc.	

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

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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	1/24/2016
2.0	Emission Designator change	Art Voss	10/3/2016

Test Report Prepared By	Date	QA Review By	Date
Glen Westwell	1/24/2014	Art Voss	1/24/2016
Art Voss	10/3/2016	Ben Hewson	10/3/2016

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140			
DUT Type:	P-to-MP Transmitter	DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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Section	Description of Test	Procedure Reference	Limit Reference	Result
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
Section	Description of Test	Procedure Reference	Limit Reference	Result
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				
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IC 3874A-1



Test results: Complies

Measured Frequency	Conducted Output Power (dBm)	Conducted Output Power (dBm)	Rated Output Power
(MHz)	12.5 KHz Ch.	25 KHz Ch.	(dBm)
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.

Gi. W. Stuel

Glen Westwell Lab Manager Celltech Labs Inc.
--

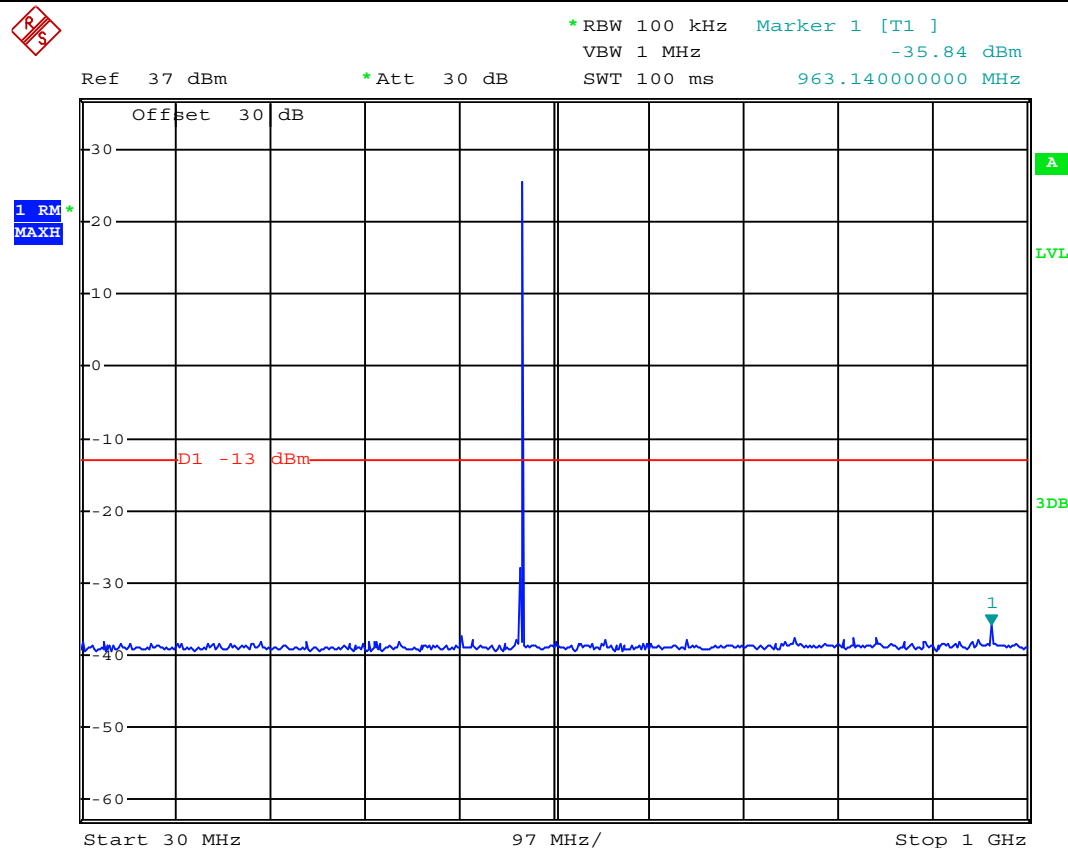
10/3/2016

Date _____

Detected Emissions 12.5 KHz Ch.

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

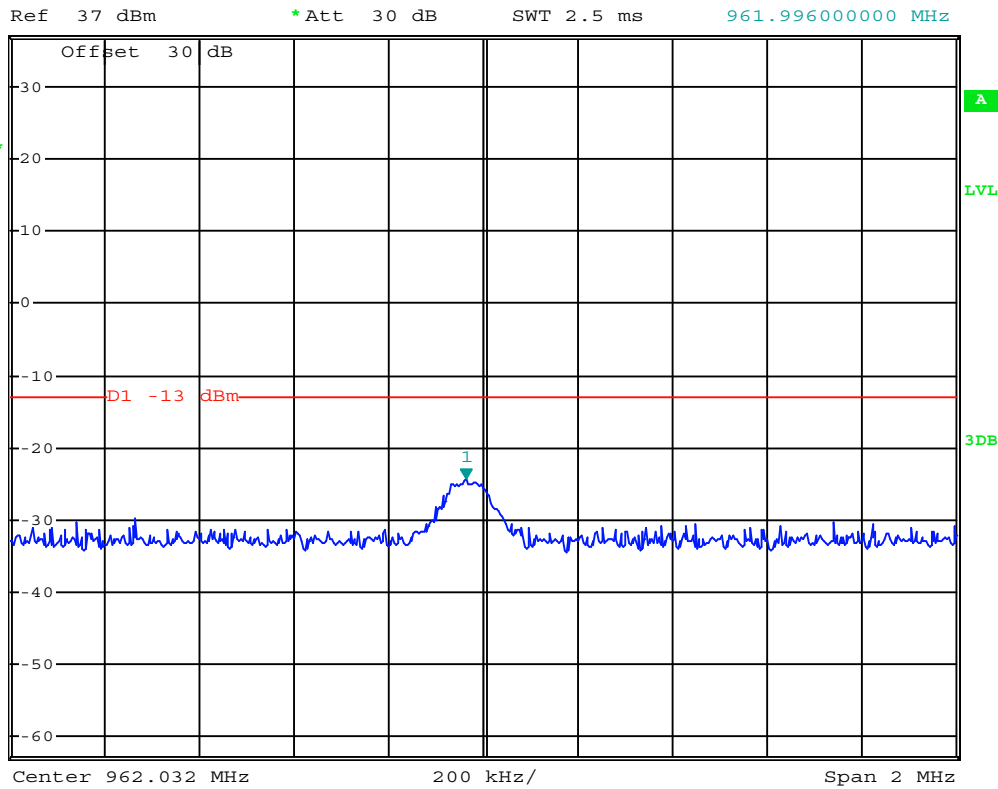
Test results: 12.5 KHz Channel



Date: 14.JAN.2014 19:04:22



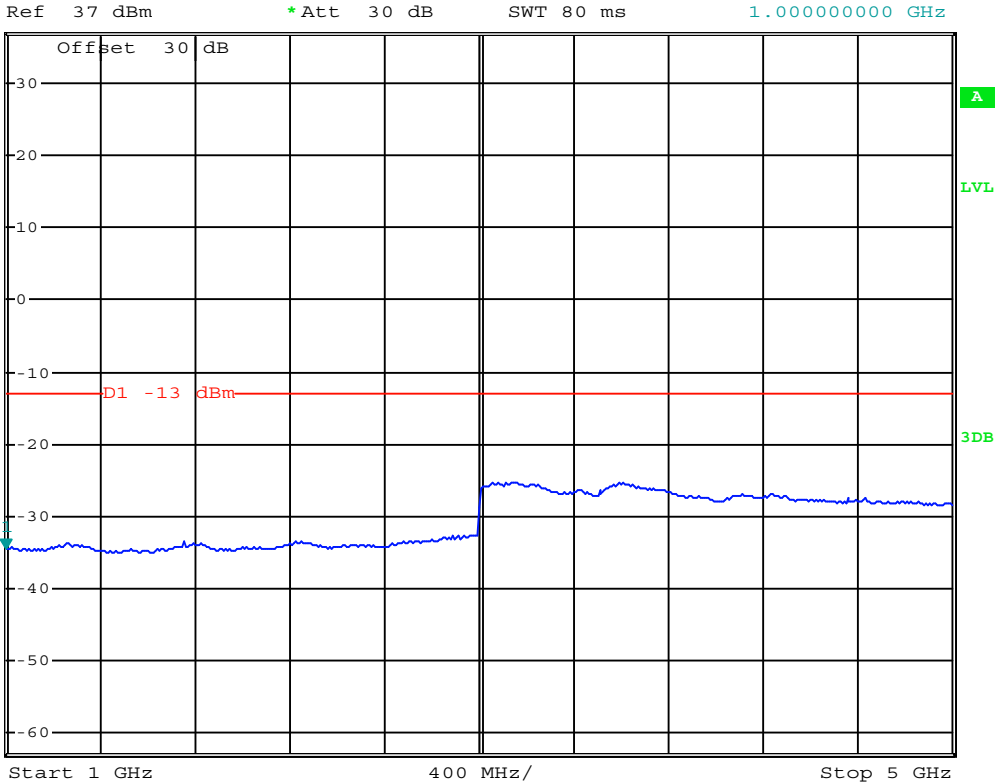
*RBW 100 kHz Marker 1 [T1]
 VBW 1 MHz -24.19 dBm
 SWT 2.5 ms 961.996000000 MHz



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



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

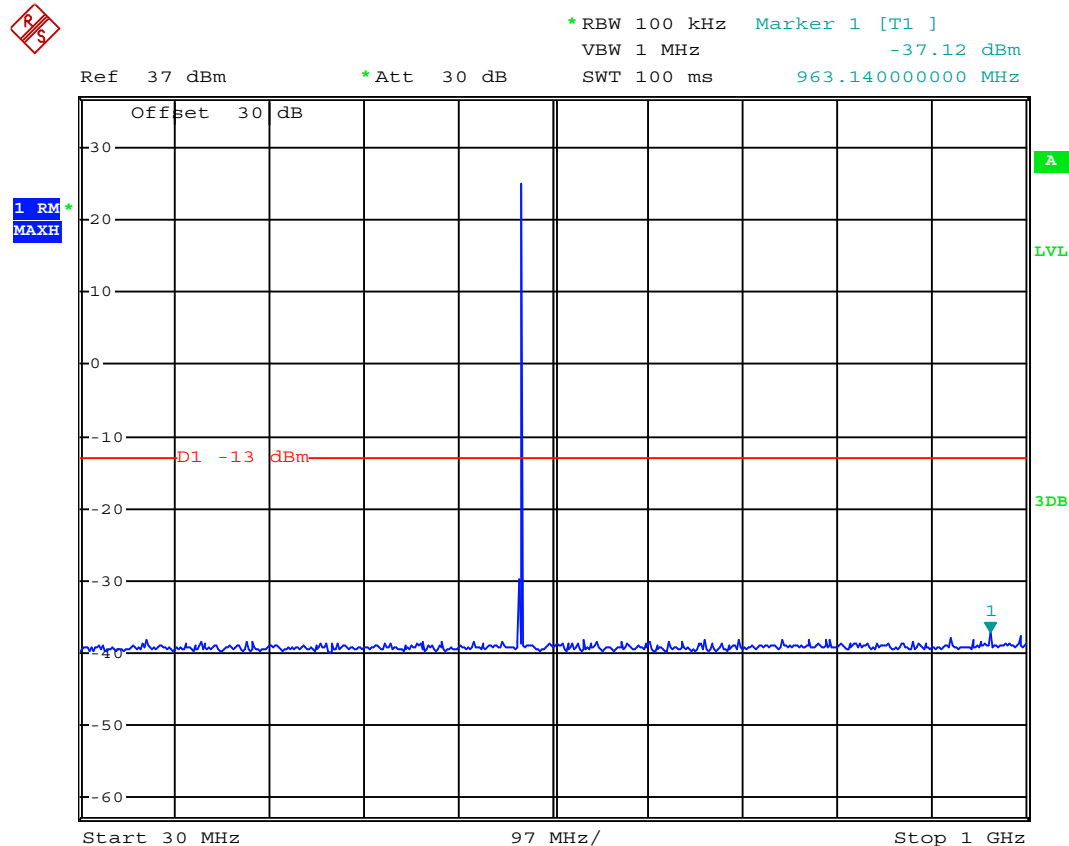


Date: 14.JAN.2014 19:06:34

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



Date: 14.JAN.2014 19:10:36

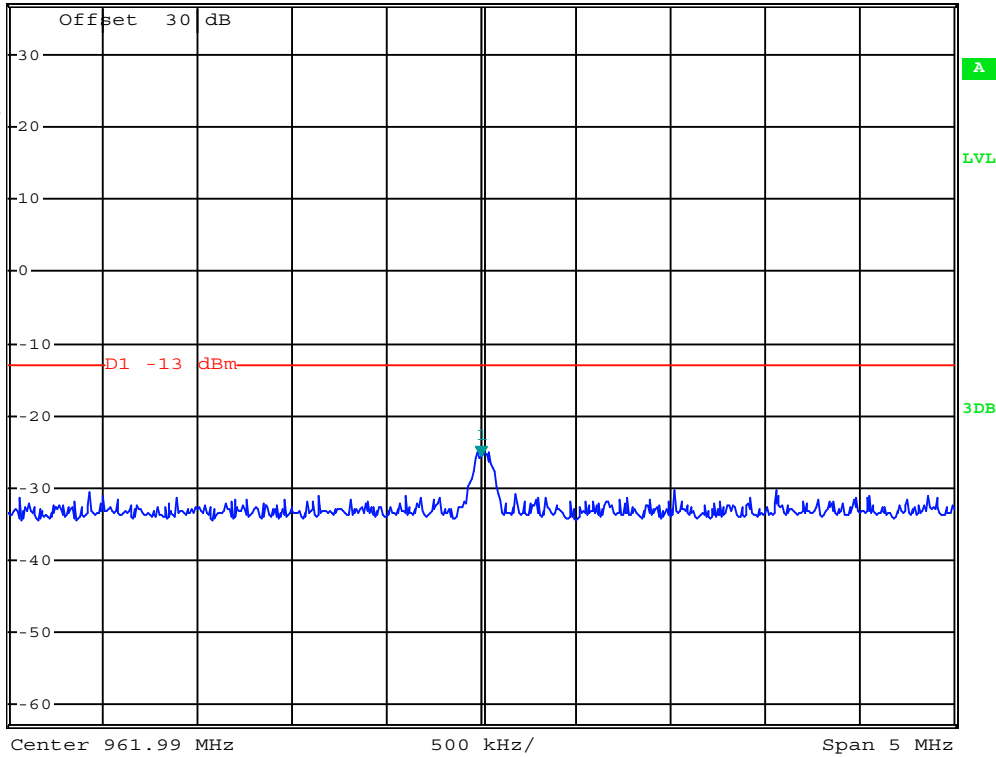


*RBW 100 kHz Marker 1 [T1]
 VBW 1 MHz -25.58 dBm
 SWT 2.5 ms 961.99000000 MHz

Ref 37 dBm

*Att 30 dB

1 RM
MAXH



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

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			IC Test Site No.:	IC 3874A-1	
Test Lab Certificate No. 2470.01					

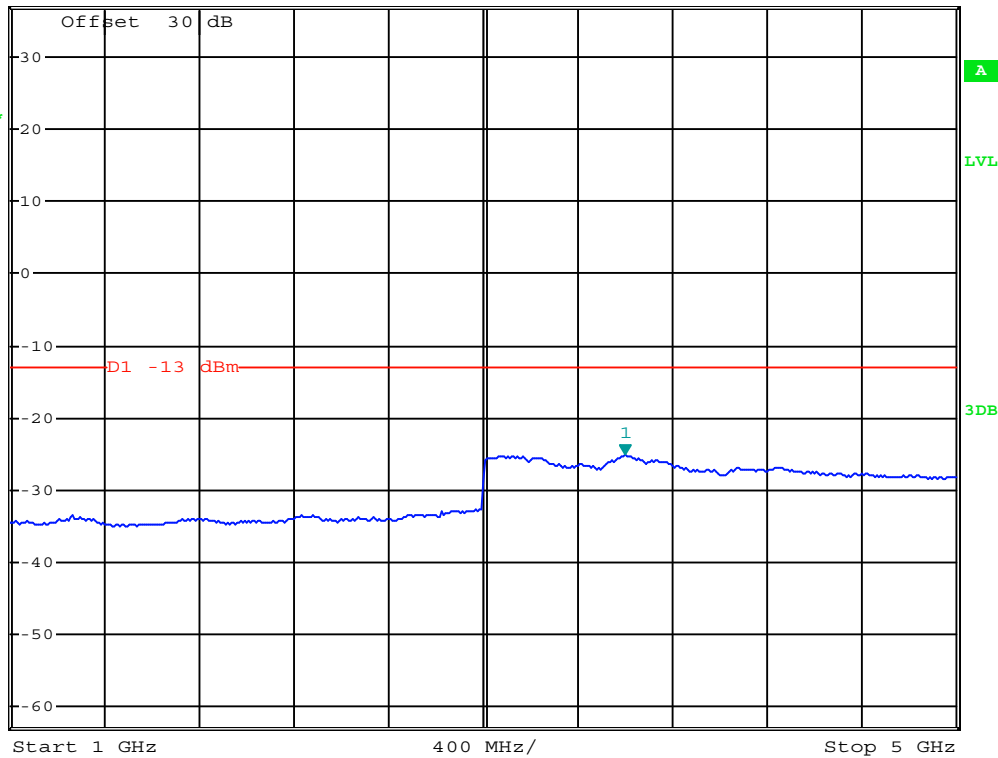


*RBW 1 MHz Marker 1 [T1]
 VBW 10 MHz -25.18 dBm
 SWT 80 ms 3.600000000 GHz

Ref 37 dBm

*Att 30 dB

1 RM
MAXH



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

Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140				
DUT Type:	P-to-MP Transmitter		DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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	FCC Rule Part(s):	47 CFR §2, §90	Report Revision No.:	Revision 2.0	
			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.

10/3/2016

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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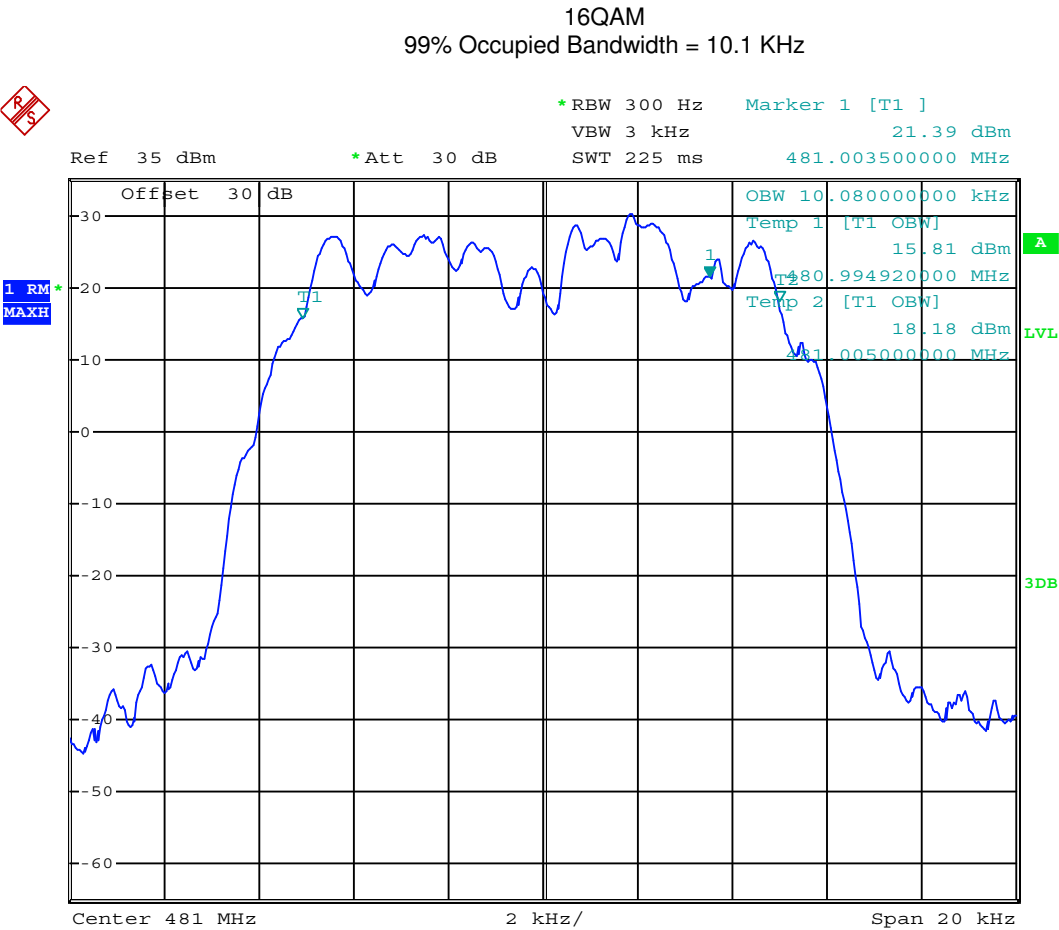
Test Report Serial No.:	220114-T1283-E-900
FCC Rule Part(s):	47 CFR §2, §90

Report Issue Date:	10/3/2016
Report Revision No.:	Revision 2.0
FCC Test Firm Reg. No.:	Accredited
IC Test Site No.:	IC 3874A-1



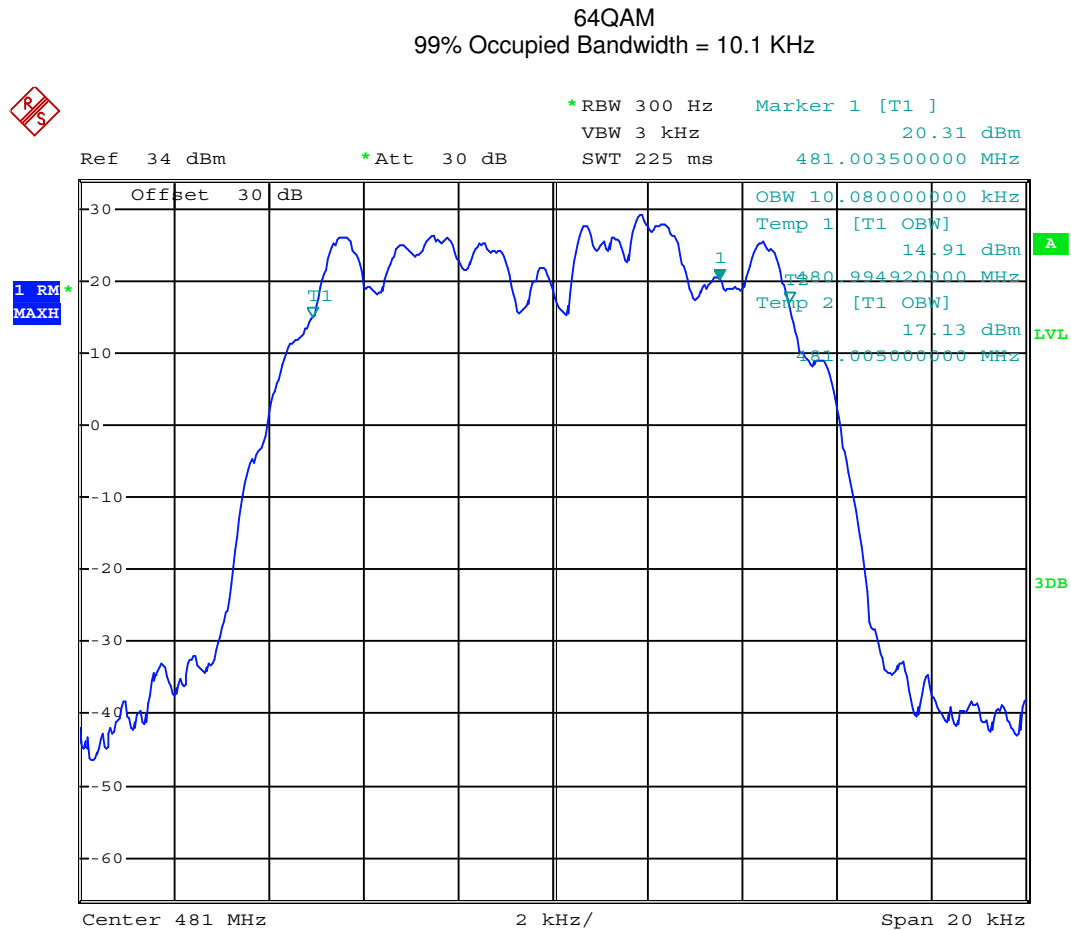
Test Lab Certificate No. 2470.01

Test results Cont.



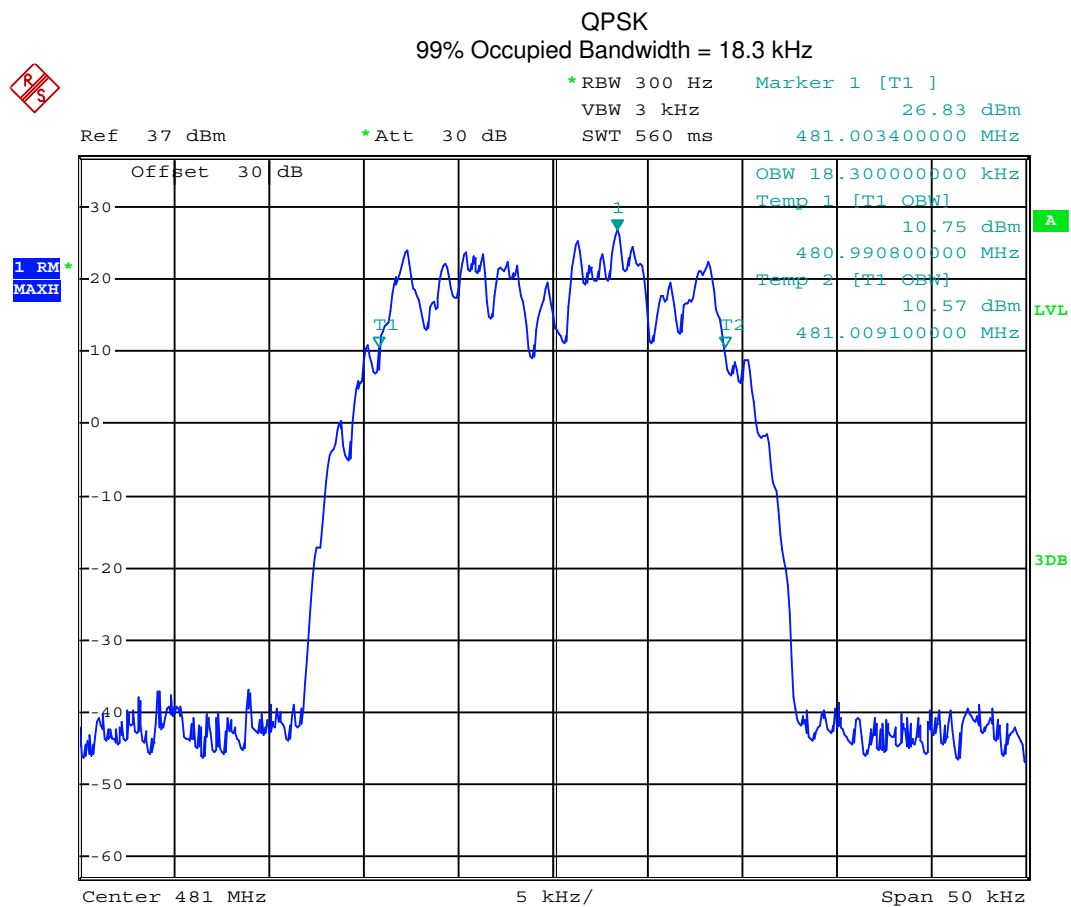
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Test results Cont.



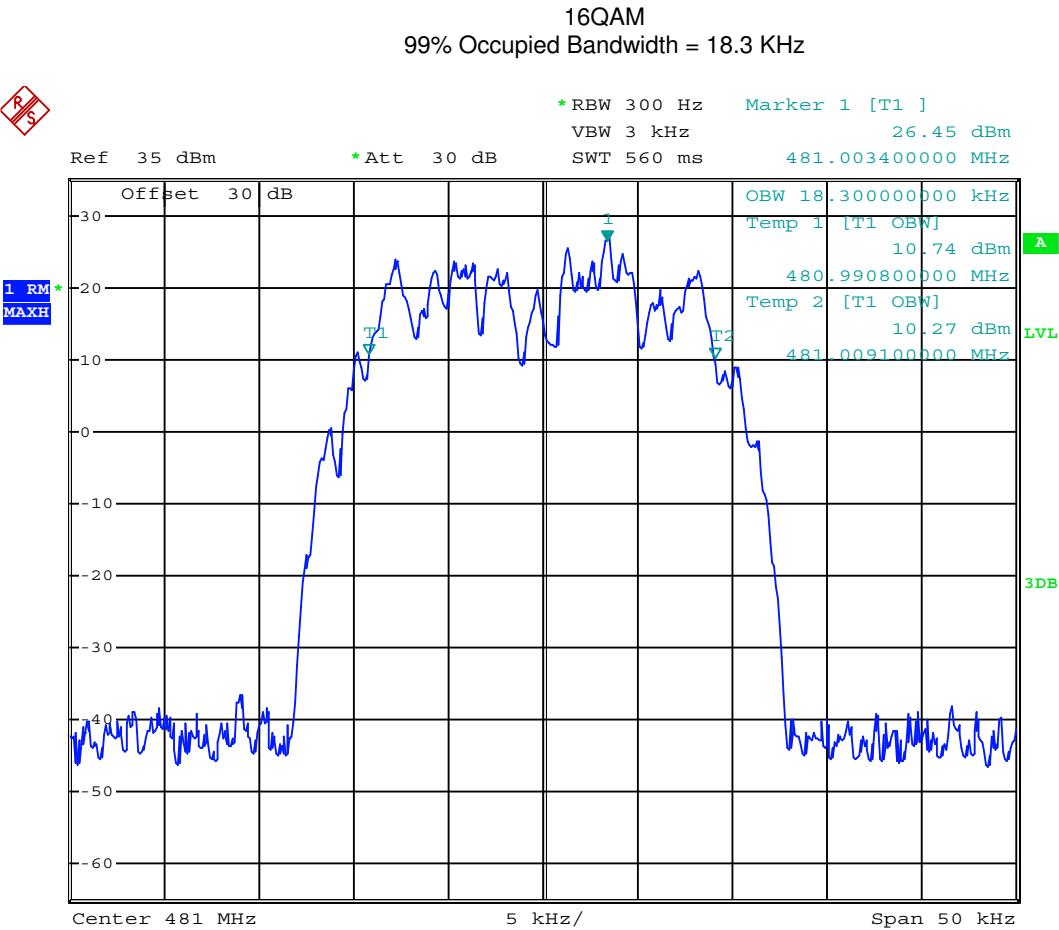
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7.2 Test results - OBW, 25 KHz Ch.



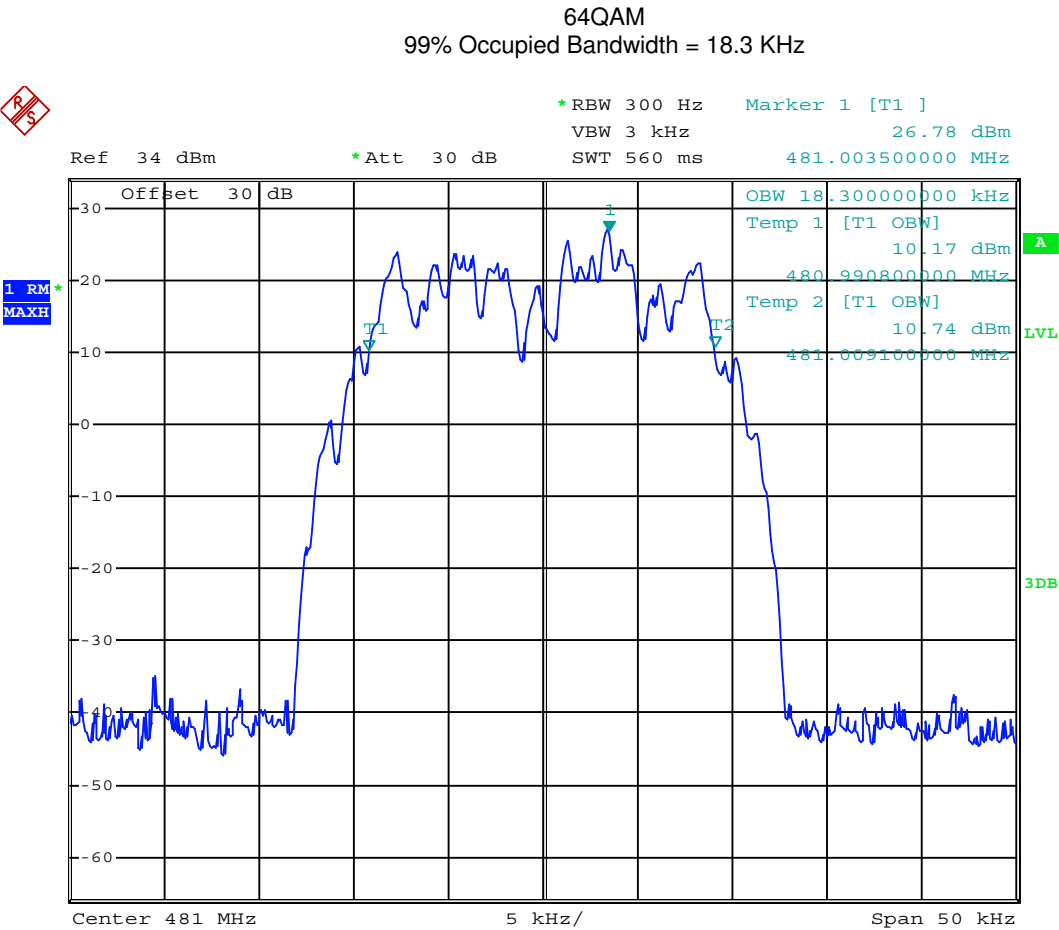
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Test results Cont.



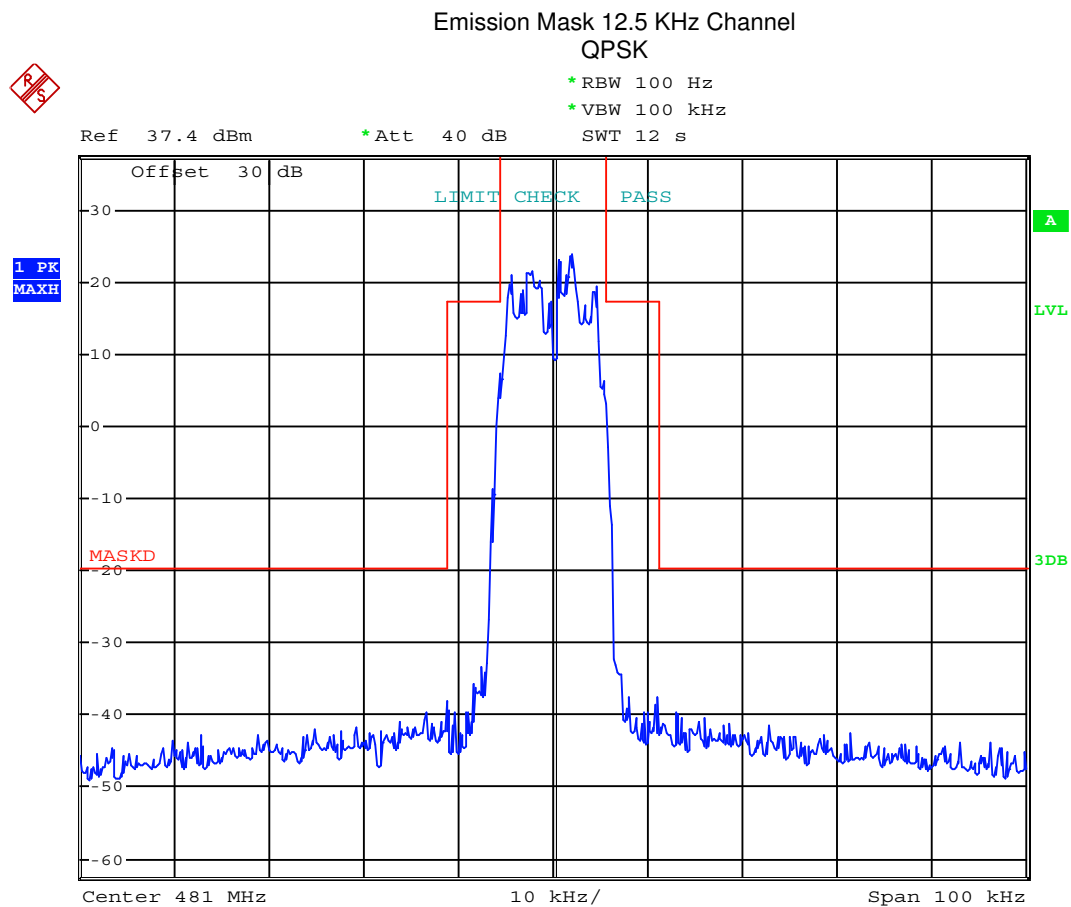
Date: 14.JAN.2014 18:48:33

Test results Cont.



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

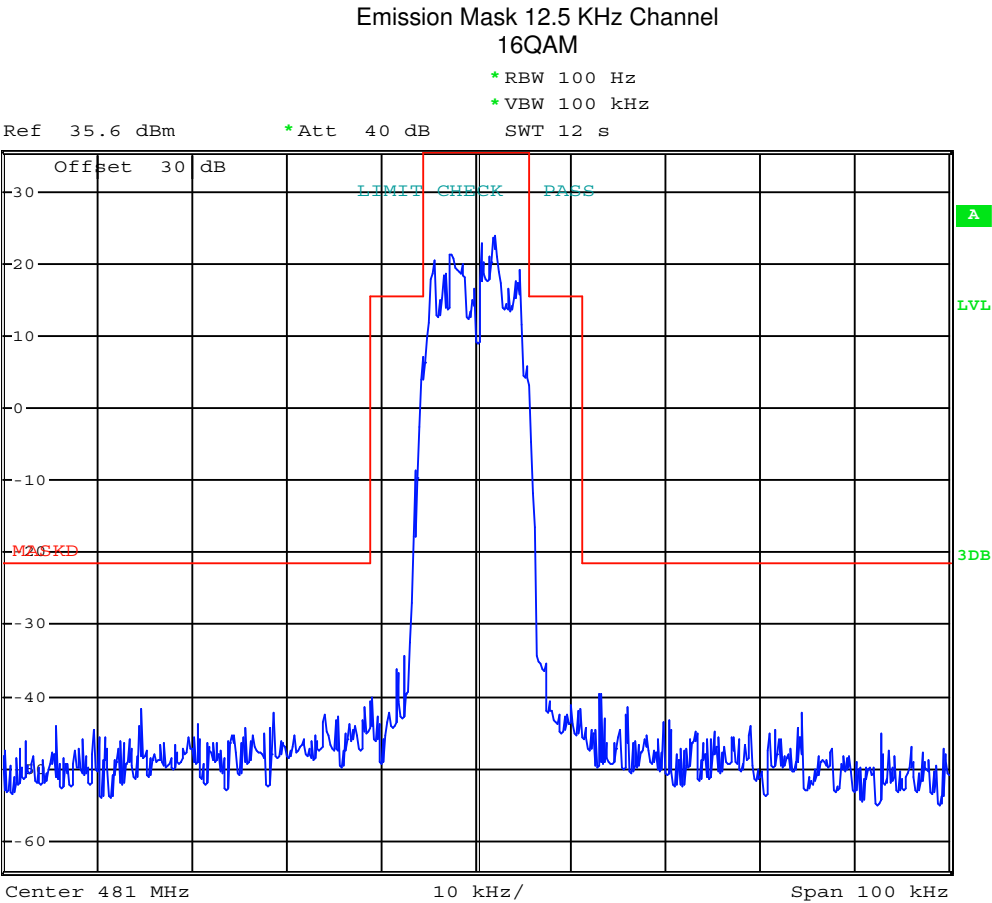
7.3 Test results – Spectrum Mask D: 12.5 KHz Ch.



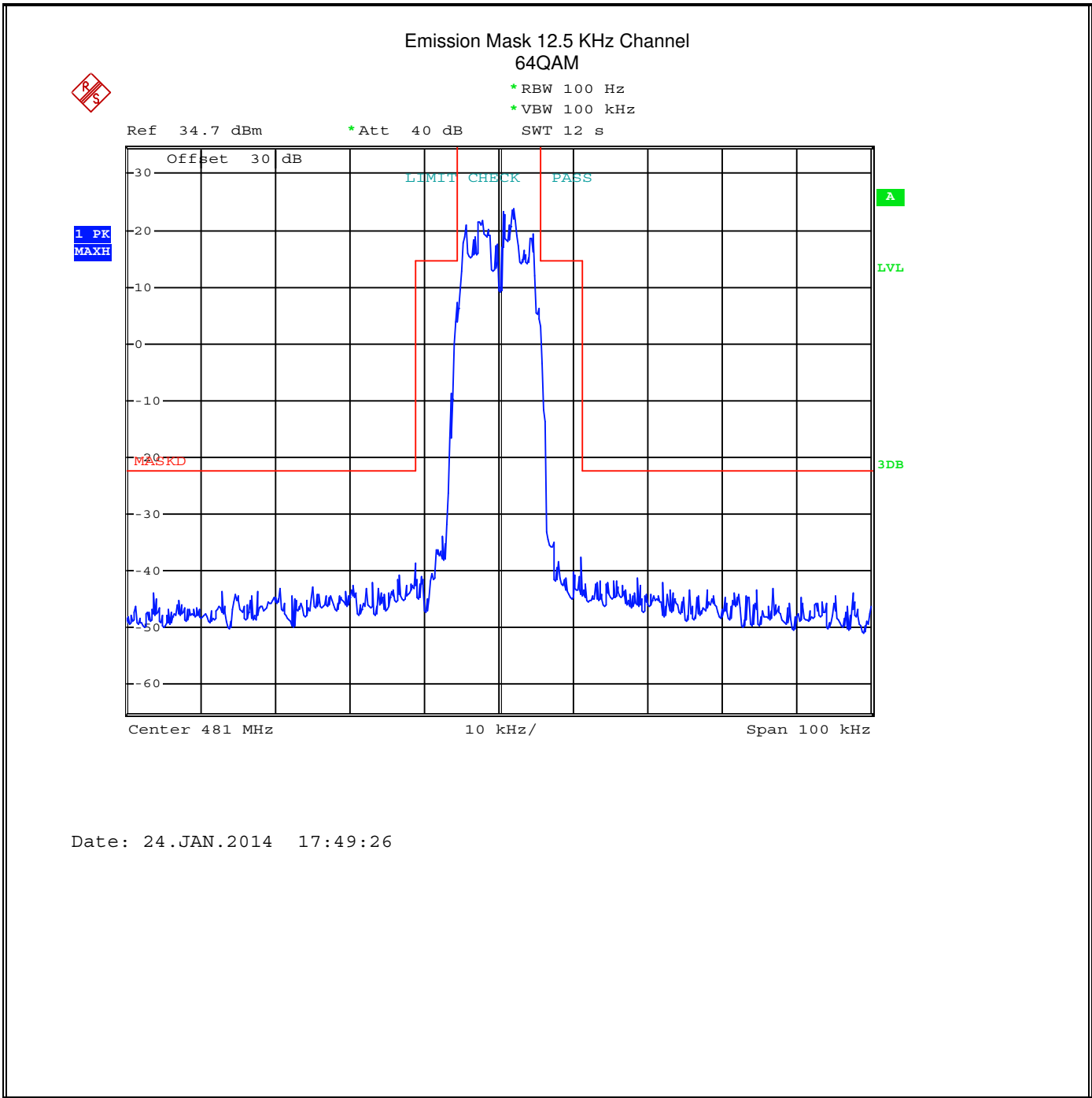
Date: 24.JAN.2014 17:42:19



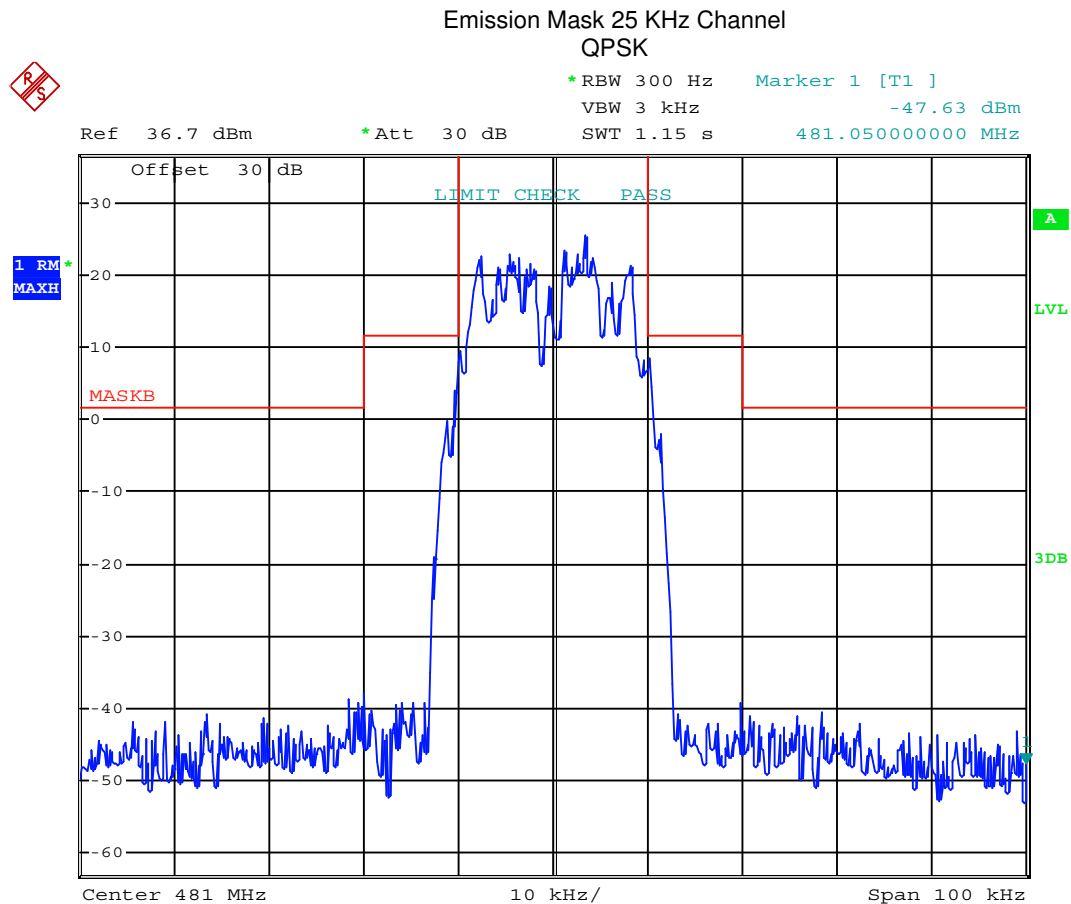
1 PK
MAXH



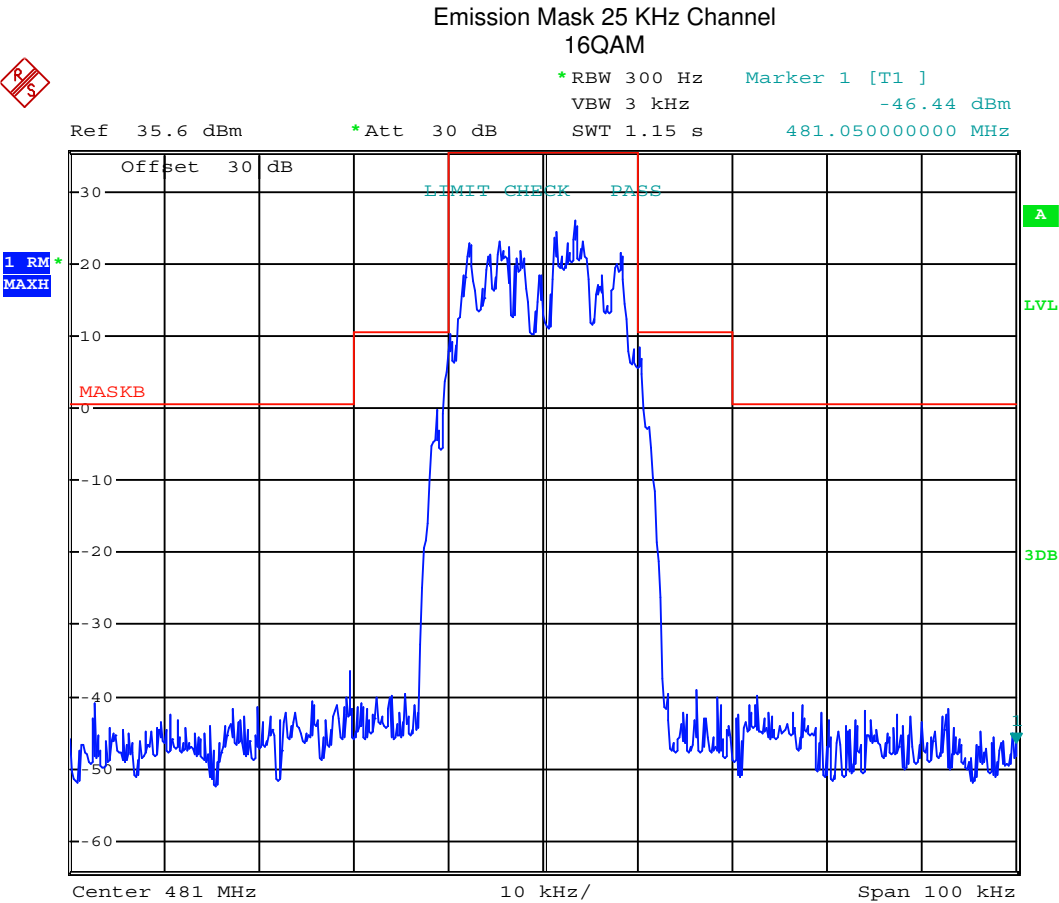
Date: 24.JAN.2014 17:45:14



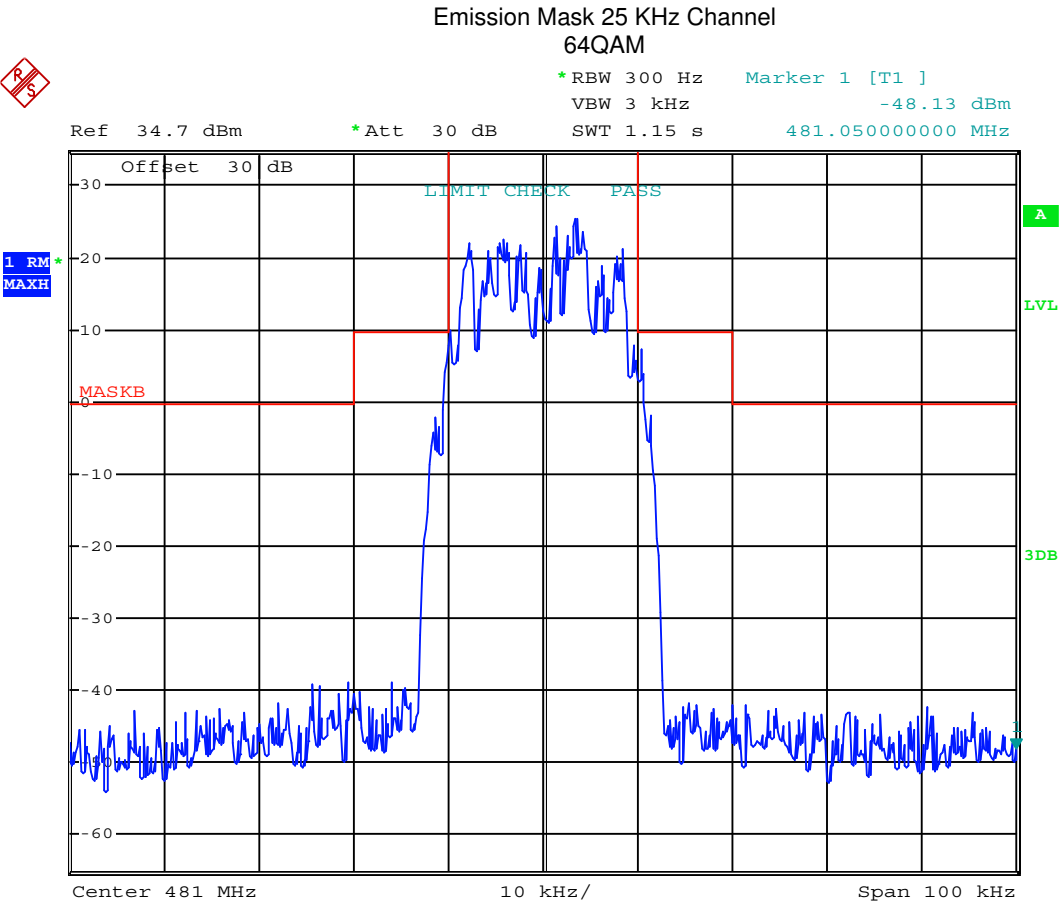
7.4 Test results – Spectrum Mask B: 25 KHz CH.



Date: 14.JAN.2014 19:16:17



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



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

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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.

10/3/2016

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 Lab Certificate No. 2470.01					

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	- 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.

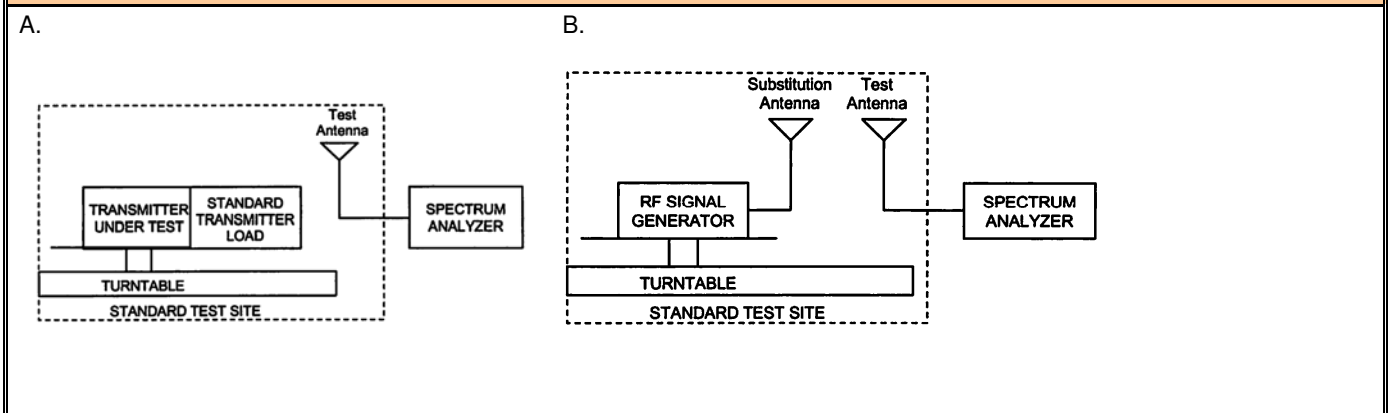
Applicant:	4RF Corp.	FCC ID:	UIPSQ450M140				
DUT Type:	P-to-MP Transmitter		DUT	Aprisa SR+ SQ450M140	Freq.:	450-512 MHz	
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Measurement equipment setup

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)



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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.

10/3/2016

Date

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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

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Lab Manager
Celltech Labs Inc.

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Test Lab Certificate No. 2470.01					

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:	10/3/2016	
	FCC Rule Part(s):	47 CFR §2, §90	Report Revision No.:	Revision 2.0	
			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:	10/3/2016	 Test Lab Certificate No. 2470.01
			Report Revision No.:	Revision 2.0	
	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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