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TEST REPORT FCC PART 15.247 FHSS

APPLICANT	KAR-TECH INC.
ADDRESS	111 ENTERPRISE ROAD P.O. BOX 180606 DELAFIELD WISCONSIN 53018 USA
FCC ID	P4U-MOD164
MODEL NUMBER	MOD164
PRODUCT DESCRIPTION	FHSS Modular transmitter
DATE SAMPLE RECEIVED	May 15 th 2014
DATE TESTED	May 19 th 2014
DATE REPORT ISSUED	May 23 rd 2014
TESTED BY	Mario de Aranzeta
APPROVED BY	Mario de Aranzeta
TIMCO REPORT NO.	790AUT14 Test Report
TEST RESULTS	☒ PASS ☐ FAIL

THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL
WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.

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ATTESTATION

This equipment has been tested in accordance with the standards identified in the referenced test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report and demonstrate that the equipment complies with the appropriate standards.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025: 2005 requirements.

I attest that the necessary measurements were made by me or under my supervision, at Timco Engineering, Inc. located at 849 N.W. State Road 45, Newberry, Florida 32669 USA.

AUTHORIZED BY: Mario de Aranzeta



SIGNATURE:

FUNCTION: Project Manager

DATE: May 23rd 2014

APPLICANT: KAR-TECH INC.

FCC ID: P4U-MOD164

REPORT: V:\K\KAR-TECH\790AUT14\790AUT14 Test Report.docx

REPORT SUMMARY

Disclaimer:	The test results relate only to the items tested.
Purpose of Test:	To demonstrate that the DUT is compliant with FCC Pt 15.247 requirements for a FHSS radio.
Applicable Standards:	DA 00-705, ANSI C63.4: 2003, ANSI TIA-603D: 2010, FCC Pt 15.109 & 15.247.
Related Reports:	N/A

TEST ENVIRONMENT AND TEST SETUP

Test Facilities:	All measurements were made at one or more of the test sites of TIMCO ENGINEERING INC. located at 849 N.W. State Road 45, Newberry, FL 32669.
Laboratory Test Conditions:	Temperature: 26°C Humidity: 55%
Test Exercise:	The DUT was operated in a normal mode except for the radiation emissions where the DUT was set in continuous transmit mode of operation.
Deviation to the Standards:	There was no deviation from the standard.
Modification to the DUT:	No modification was made.
Supporting Accessories:	None

DUT DESCRIPTION

DUT Description	FHSS Modular transmitter
FCC ID	P4U-MOD164
Model Number	MOD164
Maximum Output Power	0.08 Watts
Operating Frequency	902.5 to 927 MHz
Type of Modulation	QPSK, G1D
DUT Power Source	☐ 110–120Vac/50– 60Hz
	☒ DC Power
	☐ Battery Operated Exclusively
Test Item	☐ Prototype
	☒ Pre-Production
	☐ Production
Type of Equipment	☐ Fixed
	☒ Mobile
	☐ Portable
Antenna	1.8 dBi monopole
Antenna Connector	Reverse SMA

The external antenna is:

Manufacturer	Model	Type	Gain
Linx	ANT-916-CW-QW	Monopole	1.8 dBi
None	None	Wire monopole	1.8 dBi

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EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	12/31/13	12/31/2015
EMI Test Receiver	Rhode & Schwarz	ESU 40	100320	03/21/13	03/21/2015
Software: Field Strength Program	Timco	N/A	Version 4.0	NR	NR
EMI Test Receiver	Rhode & Schwarz	ESIB 40	100274	02/15/13	02/15/15
Power Meter	Boonton	4531	11793	1/19/13	1/19/2015
Power meter Sensor	Boonton	51072A	34647	1/19/13	1/19/2015
Firmware ESU40	Rohde & Schwarz	ESU 40	Version 4.43 SP3	NA	NA
Firmware ESIB40	Rohde & Schwarz	ESIB 40	Version 4.34.3	NA	NA
Antenna Log-Periodic	Electro-metrics	LPA-25	1122	5/09/13	5/09/2015
Antenna Bi-conical	Eaton	94455-1	1096	5/10/13	5/10/2015
Antenna Loop	EMCO	6512	9706-1211	6/14/12	6/14/2014
Antenna DR Horn	ETS Lindgren	3117	62529	10/09/13	10/09/2015
Software: Field Strength Program	Timco	N/A	Version 4.0	NA	NA

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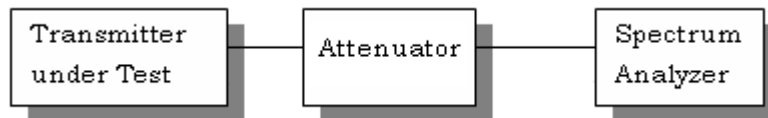
TEST PROCEDURES

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI C63.4-2003 using a 50uH LISN. Both lines were observed with the DUT transmitting. The resolution bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

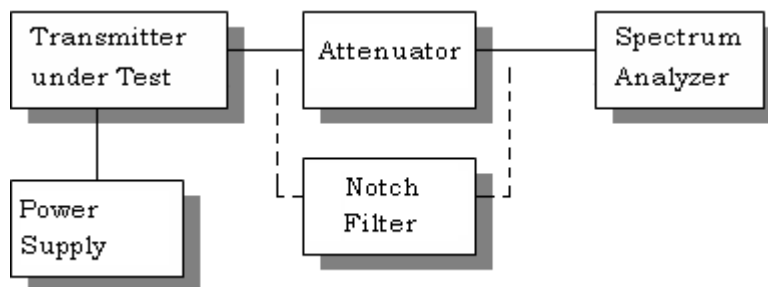
BANDWIDTH 20 dB: The procedure used was DA-00-705A. The measurements were made with the spectrum analyzer's resolution bandwidth (RBW) = 10 kHz and the video bandwidth (VBW) = 3 MHz and the span set as shown on plot.

RF Power Output: The RF power output was measured using the procedure as described in DA 00-705A at the antenna feed point using a spectrum analyzer.

Output Power Test Setup Diagram



ANTENNA CONDUCTED EMISSIONS: The RBW = 100 kHz, VBW = 300 kHz and the span set to 10.0 MHz and the spectrum was scanned from 30 MHz to the 10th Harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz. Power was measured by disconnecting the antennas and measuring across a 50 ohm load as recommended by the manufacturer using a peak power meter.



RADIATION INTERFERENCE: The test procedure used was ANSI C63.4-2003 using an Agilent spectrum receiver with preselector. The bandwidth (RBW) of the spectrum receiver was 100 kHz up to 1 GHz and 1 MHz above 1 GHz with an appropriate sweep speed. The VBW above 1 GHz was 3 MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

RADIATED SPURIOUS EMISSIONS INTO ADJACENT RESTRICTED BAND:

An in band field strength measurement of the fundamental emission using the RBW and detector function required by ANSI C63.4-2003 and the FCC rules.

POWER LINE CONDUCTED INTERFERENCE**RULES PART NO.:**15.207**REQUIREMENTS:**

Emission Frequency (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak (QP)	Average (AV)
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.		

TEST DATA: The following plots represent the emissions read for power line conducted.
Both lines were observed

Not applicable EUT was tested in a battery operated configuration.

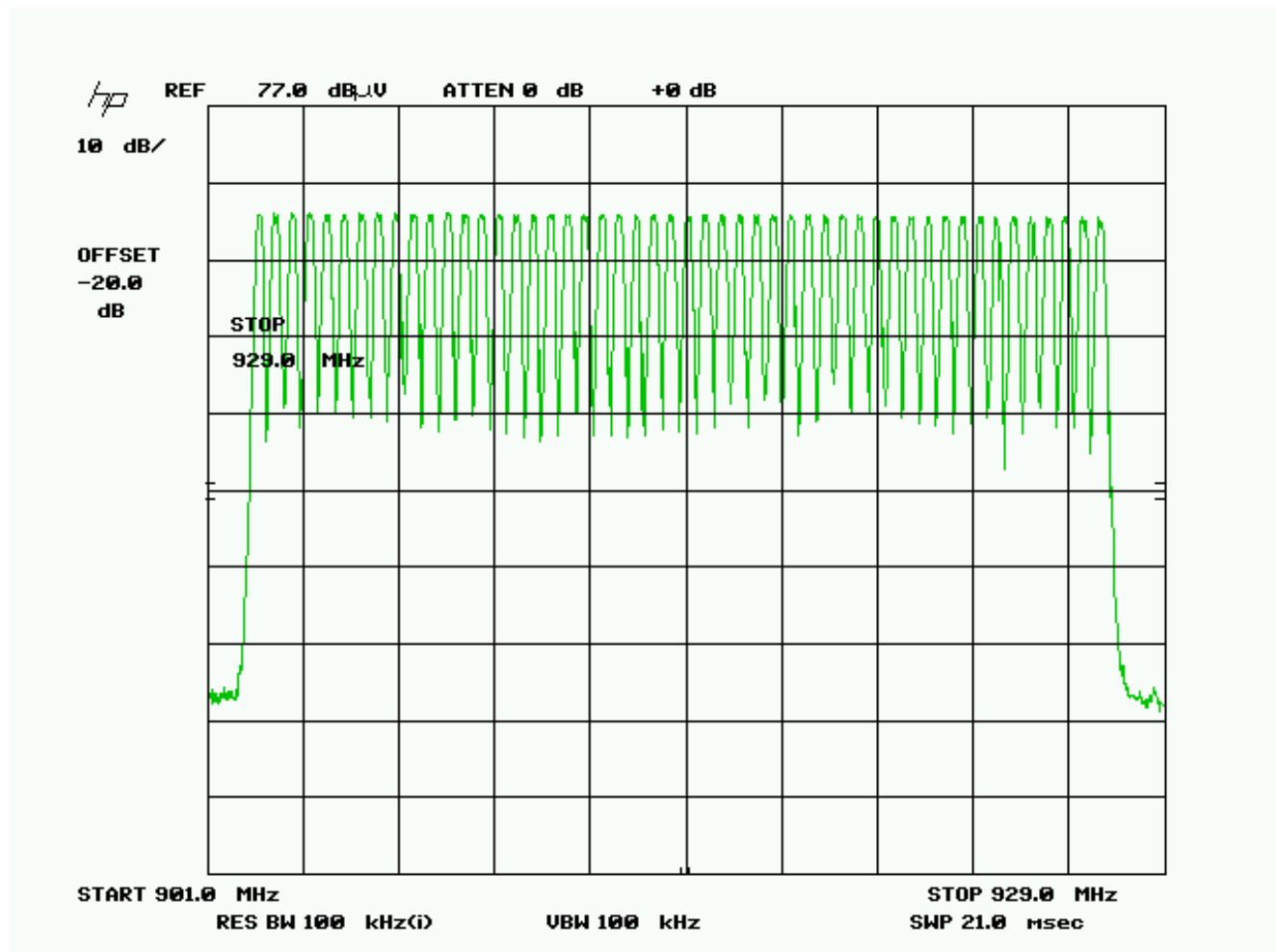
NUMBER OF HOPPING CHANNELS

Rules Part No.: 15.247(a)(1), RSS-210

Requirements:

902-928 MHz	If the 20 dB bandwidth is < 250 kHz, the system shall use at least 50 hopping frequencies.
	If the 20 dB bandwidth is 250 kHz or greater, the system shall use at least 25 hopping frequencies.
2400-2483.5 MHz	At least 15 channels
5725-5850 MHz	At least 75 channels

Test Data: There are 50 hopping channels



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DWELL TIME OF A HOPPING CHANNEL

RULES PART NO.: 15.247(a)(1)(i)

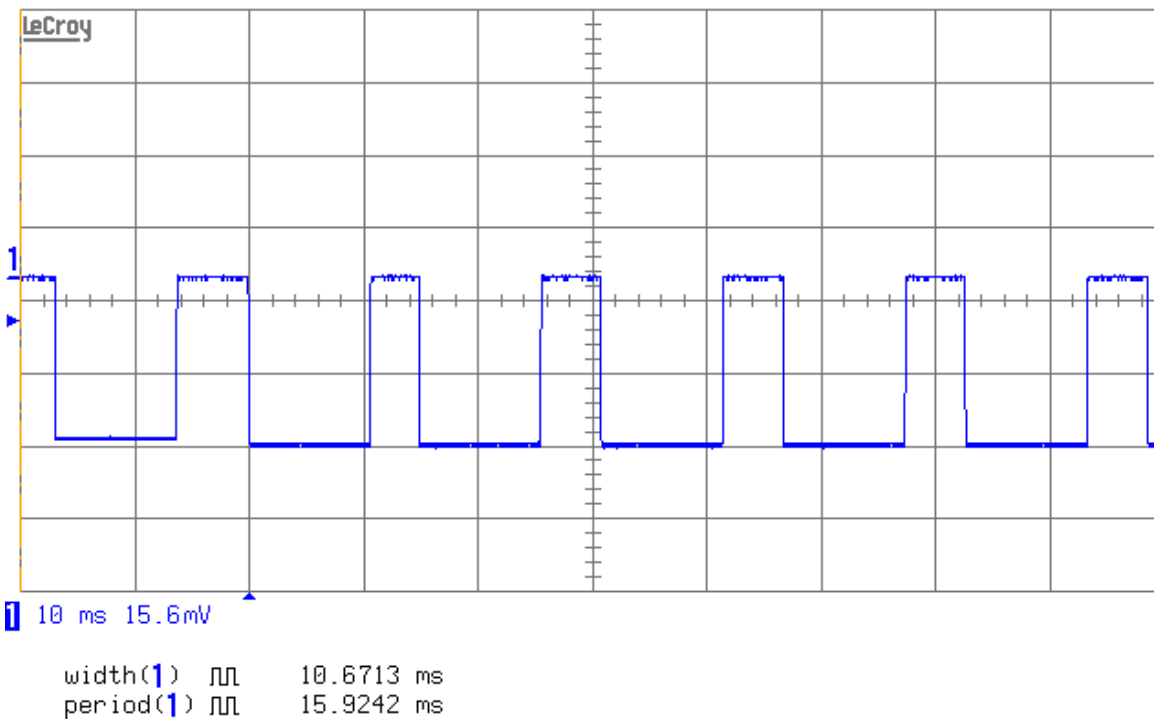
REQUIREMENTS:

902-928 MHz	If 20 dB bandwidth is < 250 kHz, average time of occupancy of any frequency shall not exceed 0.4 sec in 20 seconds.
	If 20 dB bandwidth is 250 kHz or greater, dwell time ≤ 0.4 seconds in a 10 second period.
2400-2483.5 MHz	≤ 0.4 seconds in a 0.4 seconds multiplied the number of hopping channels employed.
5725-5850 MHz	≤ 0.4 seconds in a 30 second period.

TEST DATA: The dwell time is 11 ms per hop.

Three places in the band were measured and the worst case presented.

The dwell time is 350ms in a 20 second period.



☐ STOPPED

Three places in the band were measured and the worst case presented.

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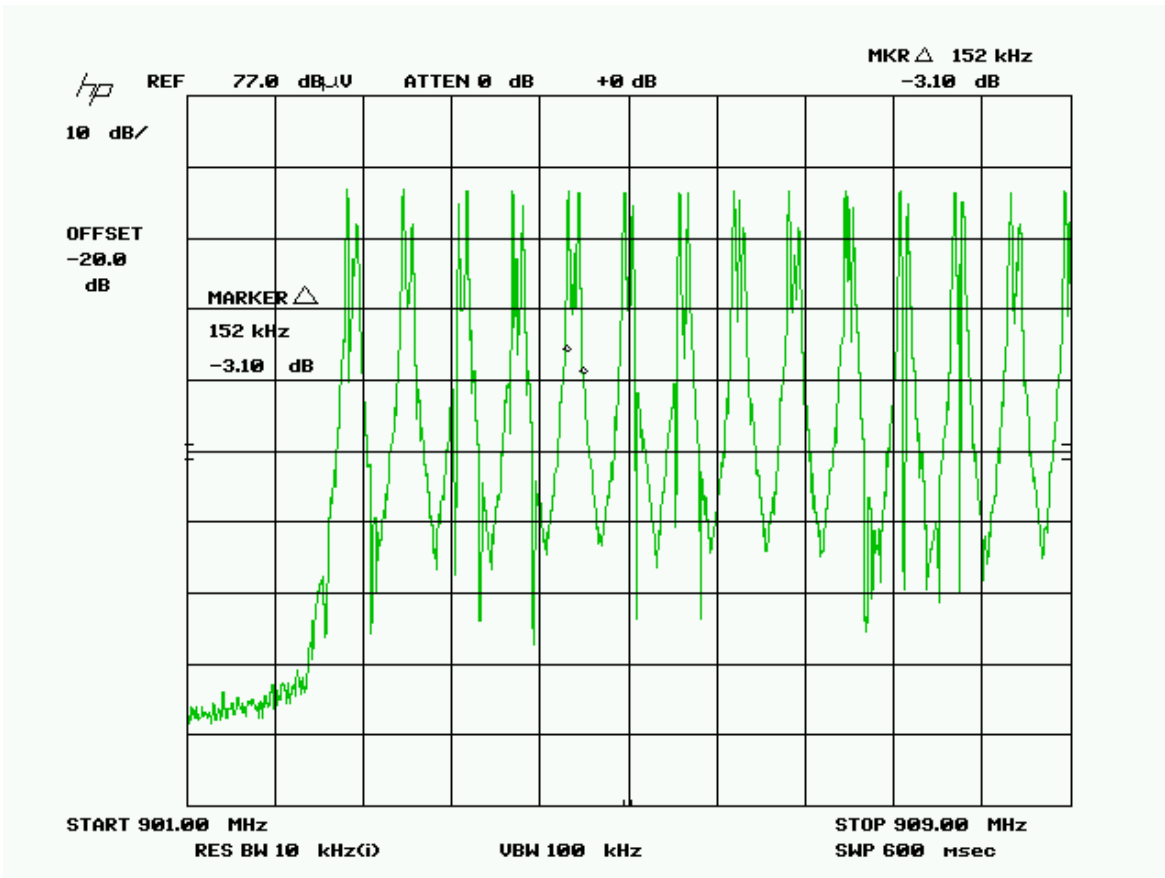
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20 dB BANDWIDTH

RULES PART NO.:15.247(a)(2), RSS-210

REQUIREMENTS: The 20 dB bandwidth must be less than 500 kHz.

TEST DATA: See the following plot(s). 150 kHz



Three places in the band were measured and the worst case presented above.

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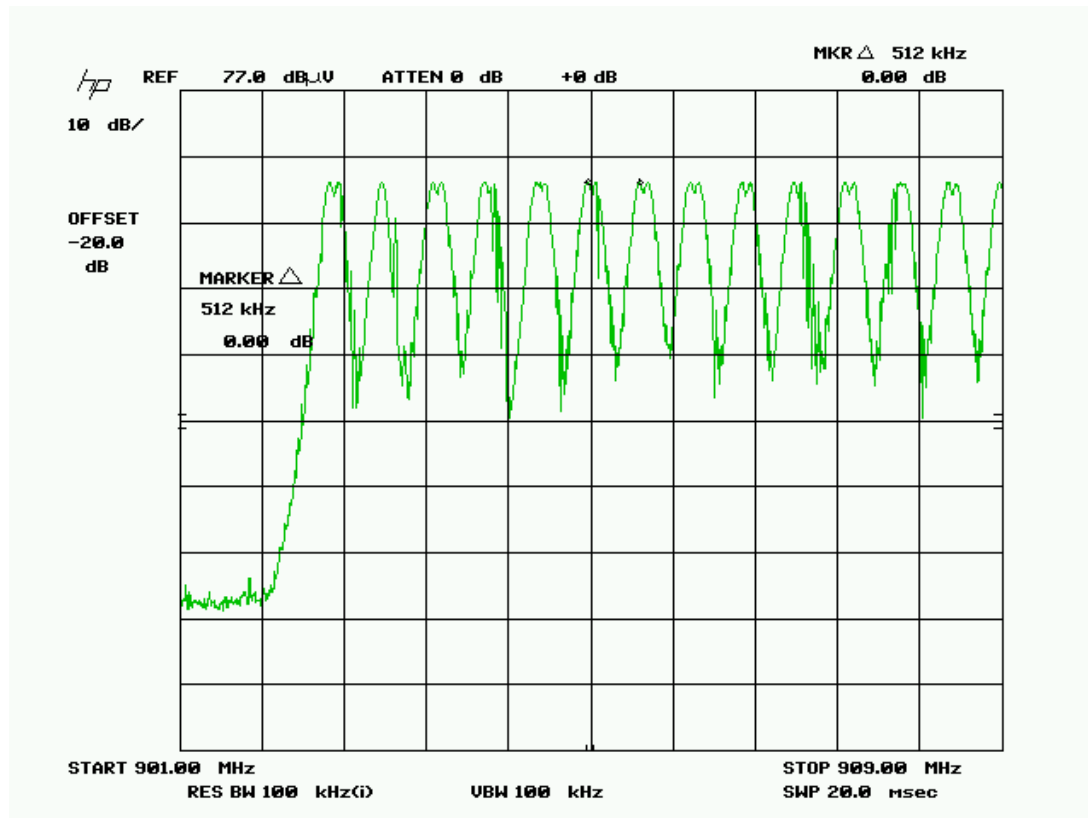
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CHANNEL SEPARATION

RULES PART NO.:15.247(a)(2)

REQUIREMENTS: The hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

TEST DATA: The separation is 512 kHz



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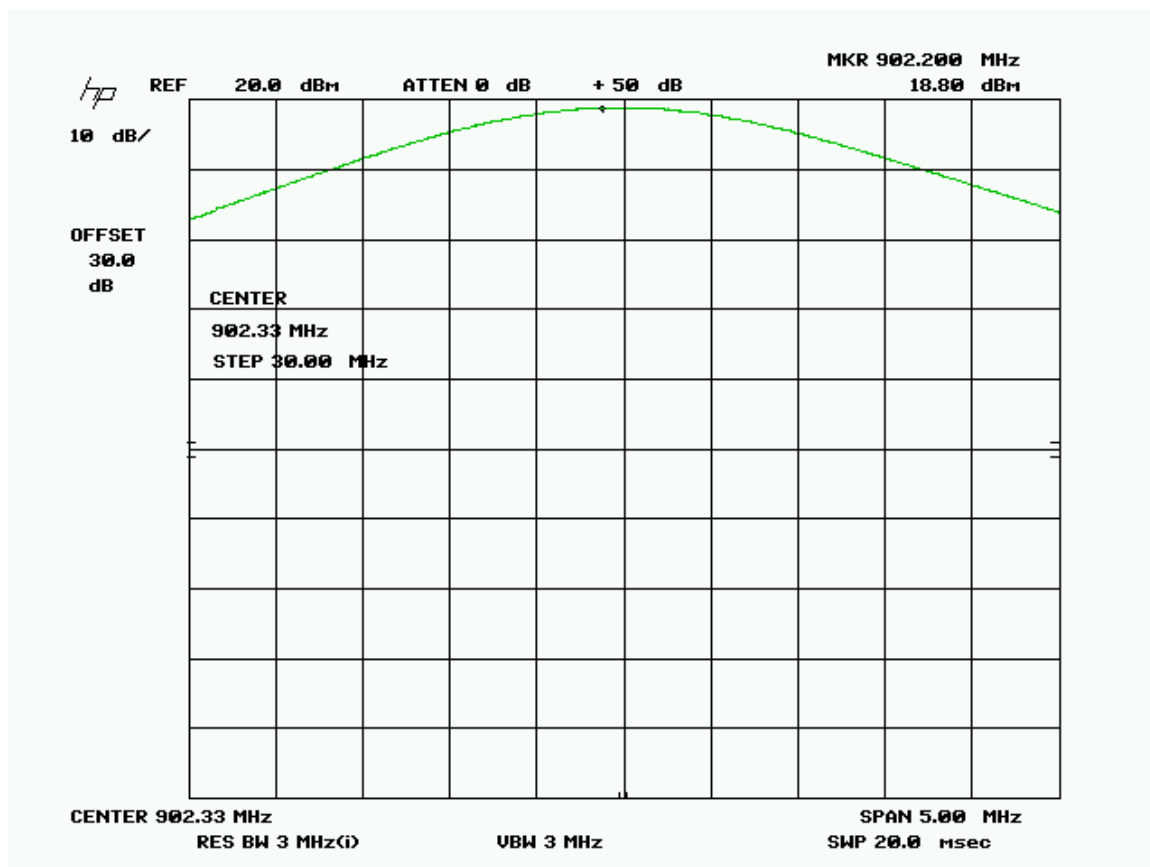
POWER OUTPUT

Rules Part No.: 15.247(b)

Requirements: The maximum peak output power shall not exceed 1 watt (30 dBm). If directional transmitting antennas with a gain of more than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Data: added 0.25 for cable loss.

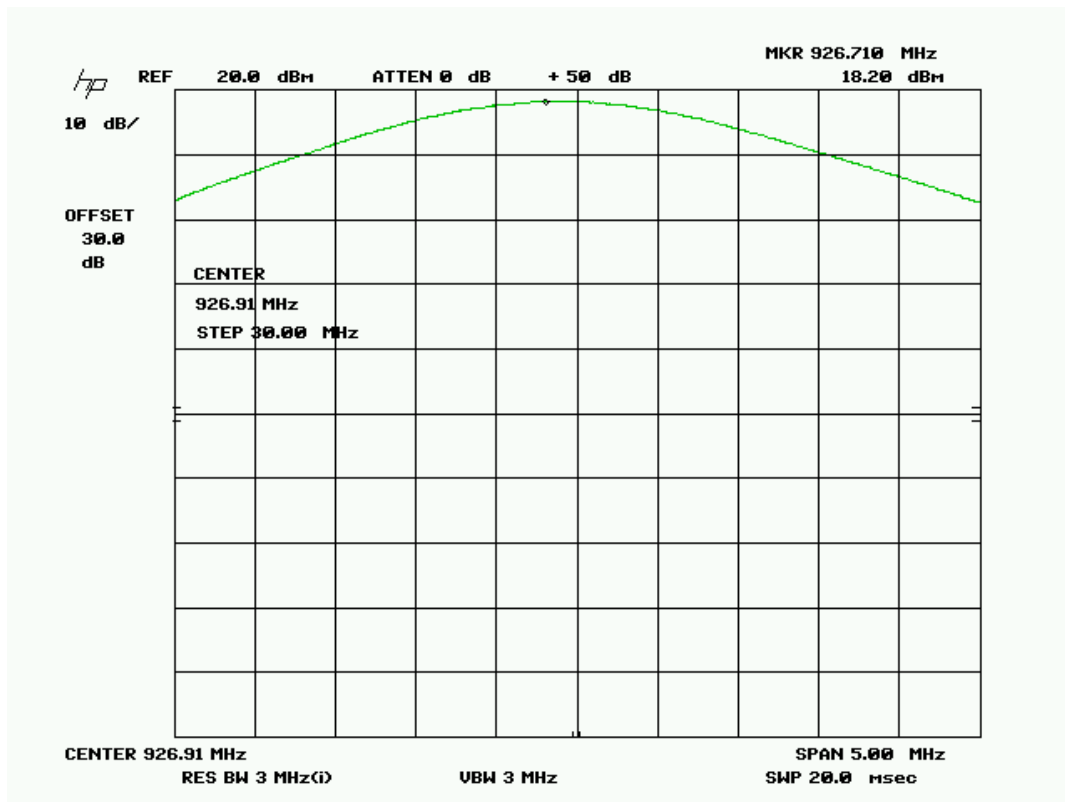
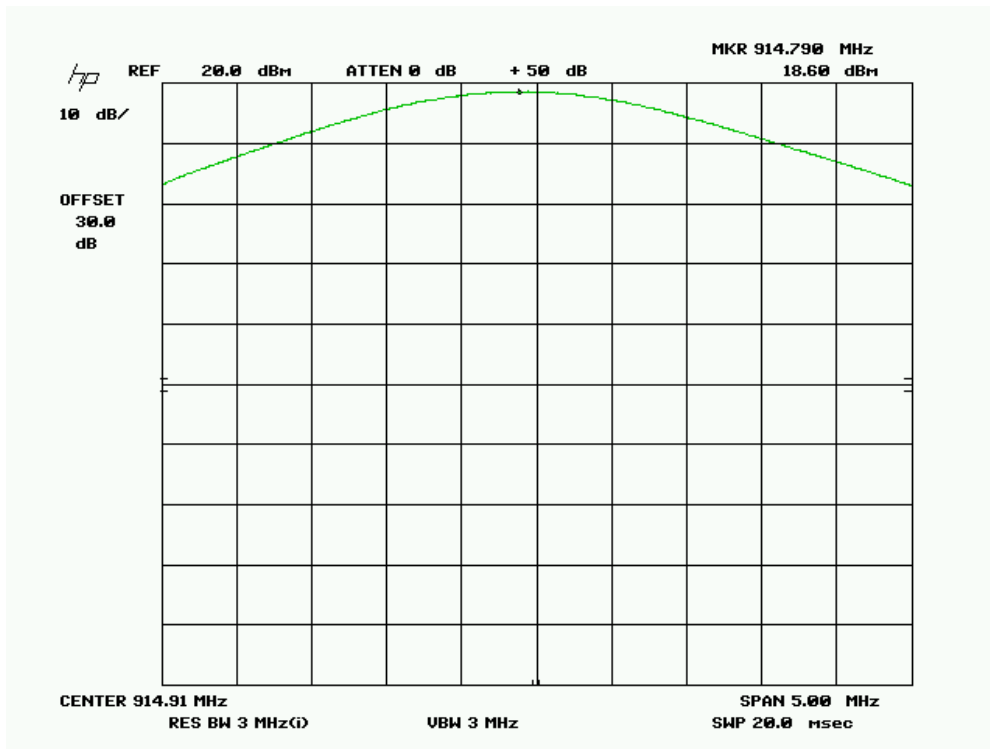
Frequency MHz	Power dBm	Power Watts
902.5	19.05	0.080
915	18.85	0.077
927	18.45	0.07



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SPURIOUS EMISSIONS AT ANTENNA TERMINALS

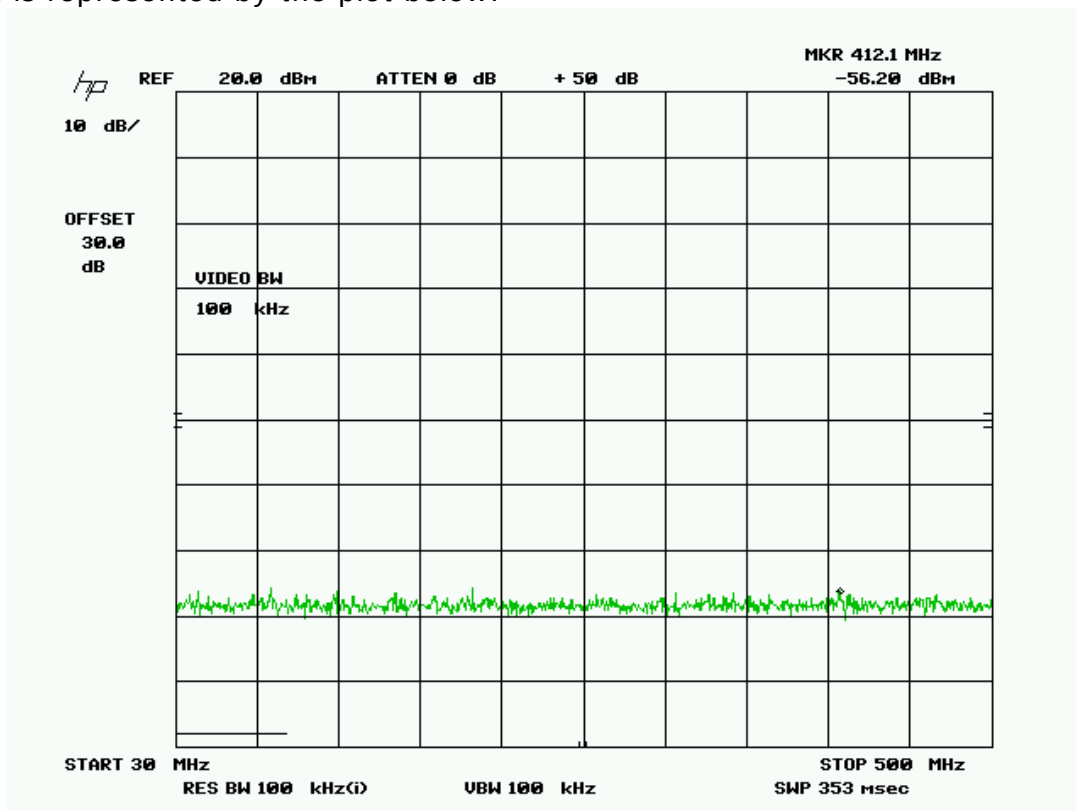
RULES PART NO.:15.247(c)

REQUIREMENTS: Emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

Note: The spectrum was measured from the lowest frequency generated or 9 kHz to the tenth harmonic.

TEST DATA

The emissions from the lowest frequency generated to 500 MHz for all 3 channels are identical. The data from 30 to 500 MHz for the transmitter operating on the lowest channel is represented by the plot below.



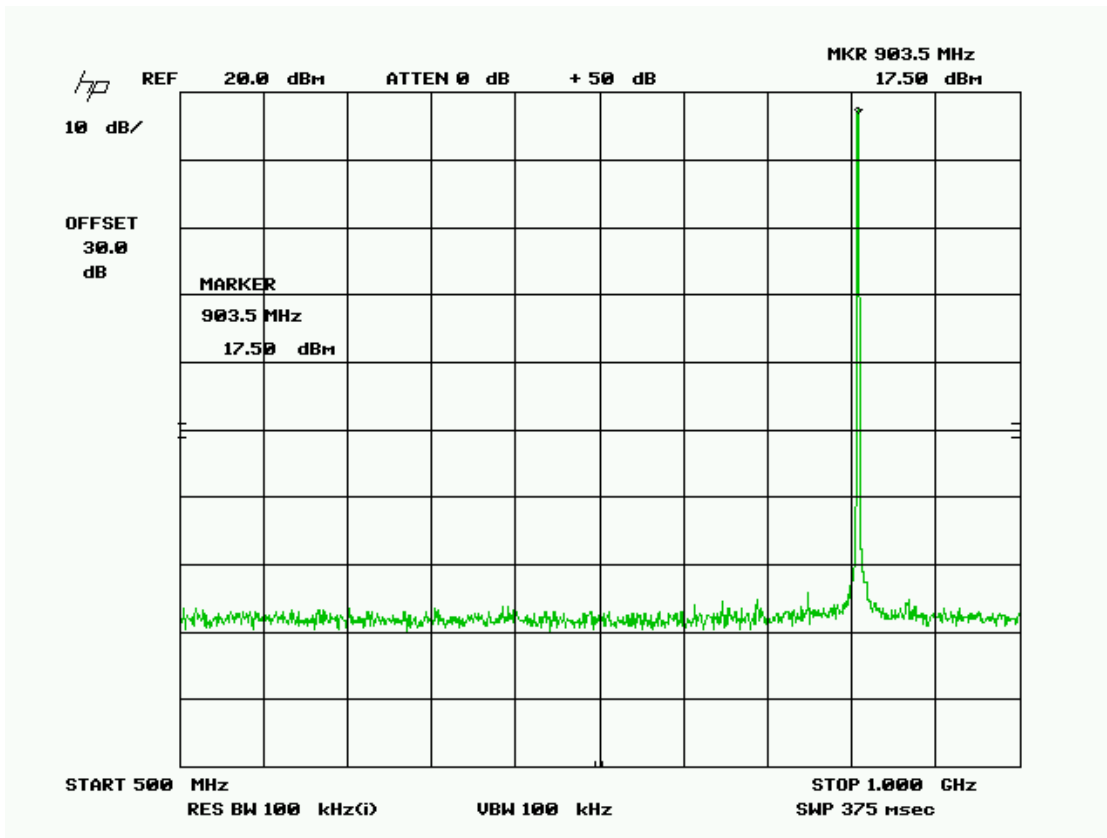
903 MHz
30 to 500 MHz

APPLICANT: KAR-TECH INC.

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903 MHz channel

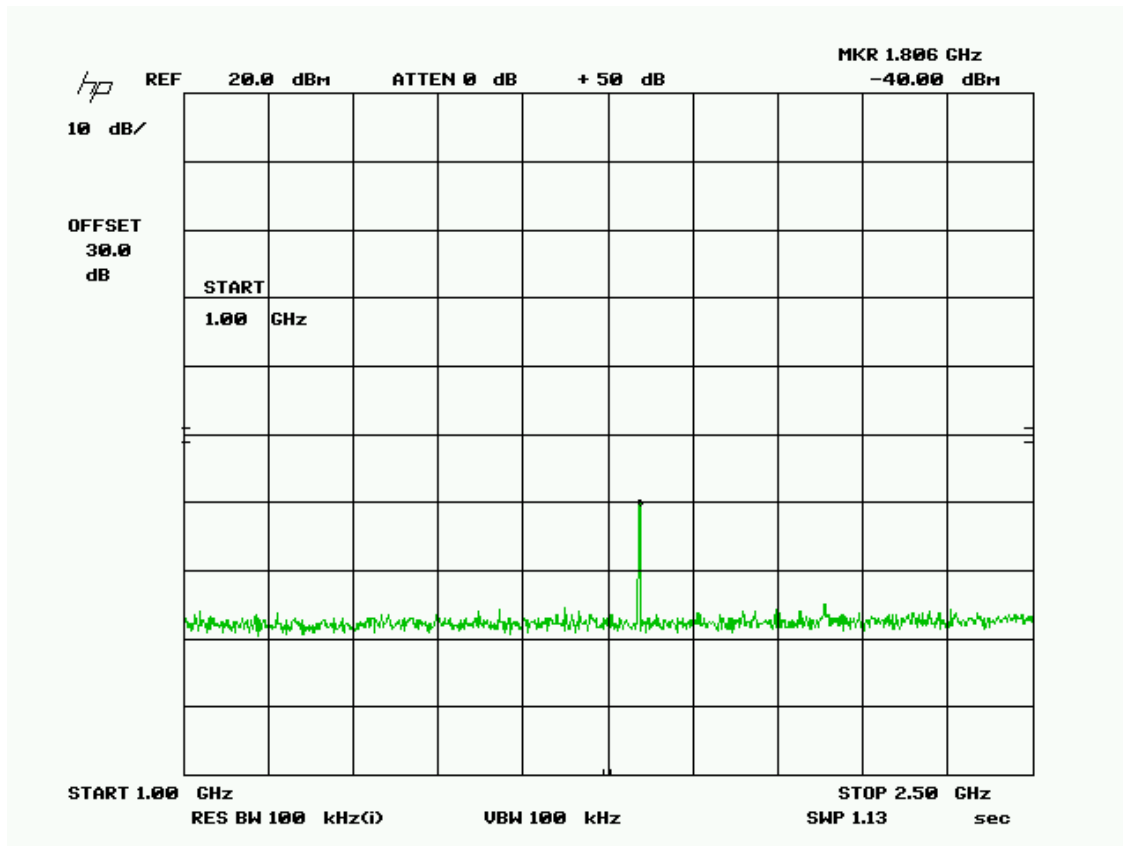


500 to 1000 MHz

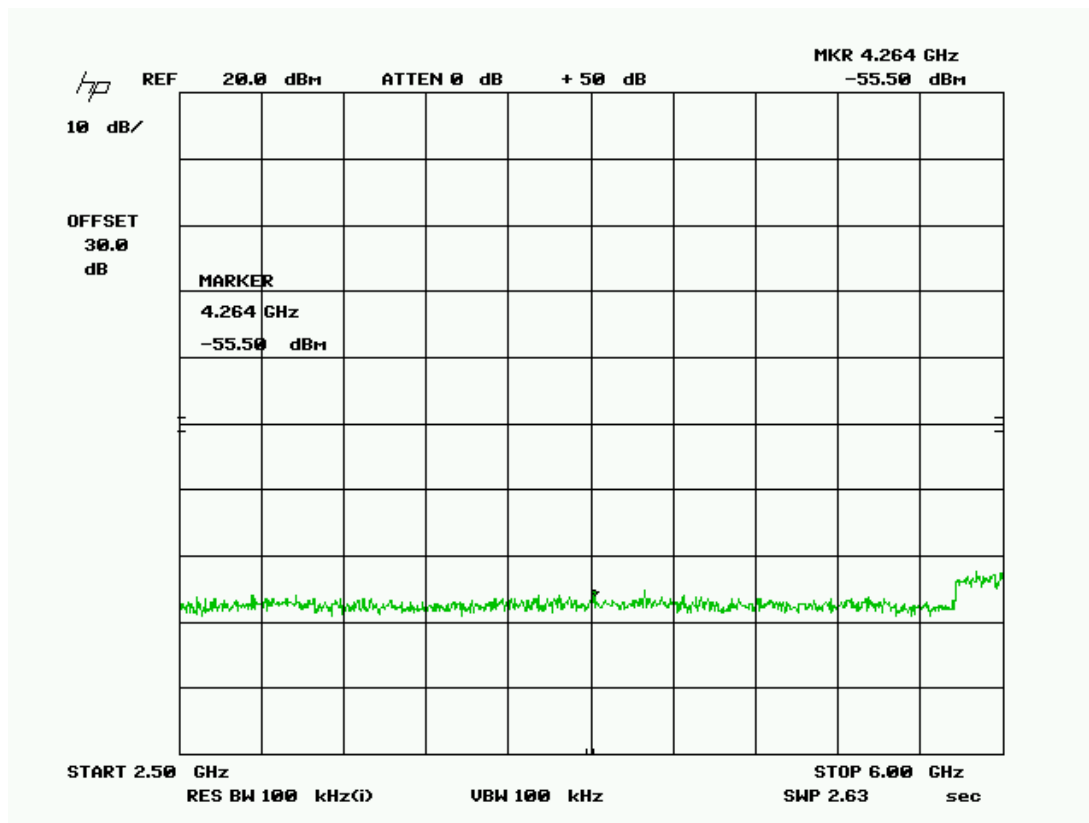
APPLICANT: KAR-TECH INC.

FCC ID: P4U-MOD164

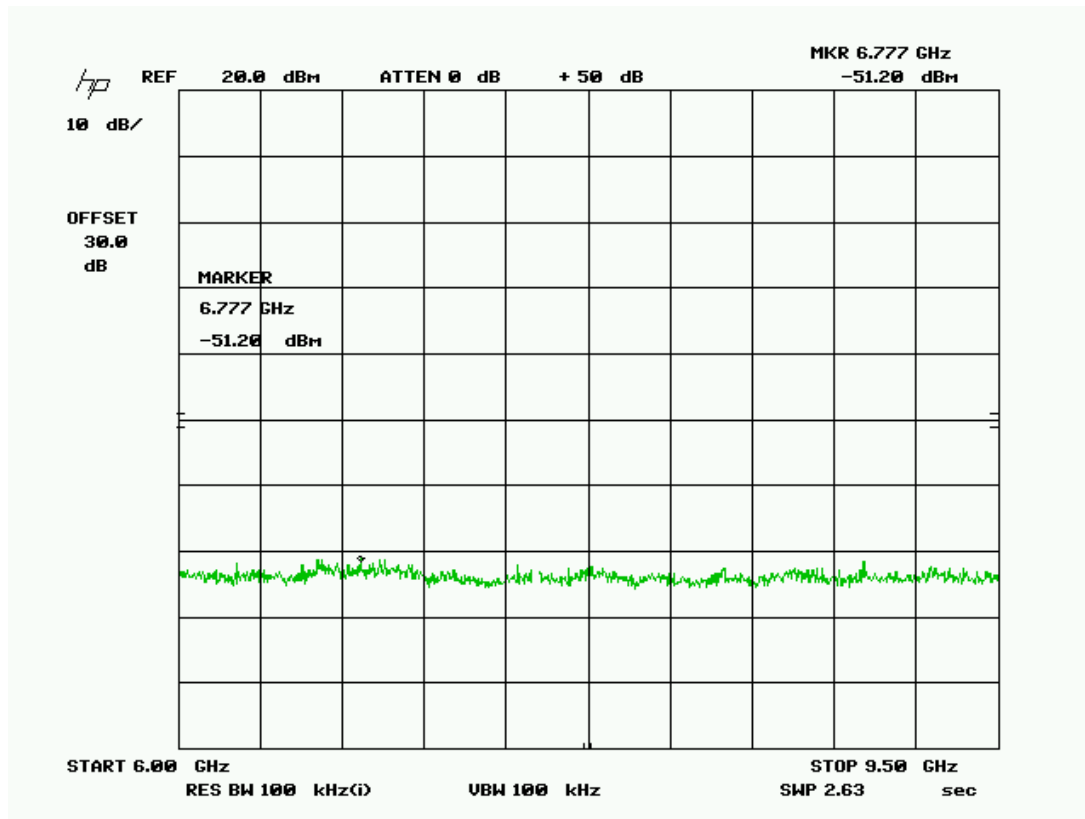
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1 to 2.5 GHz

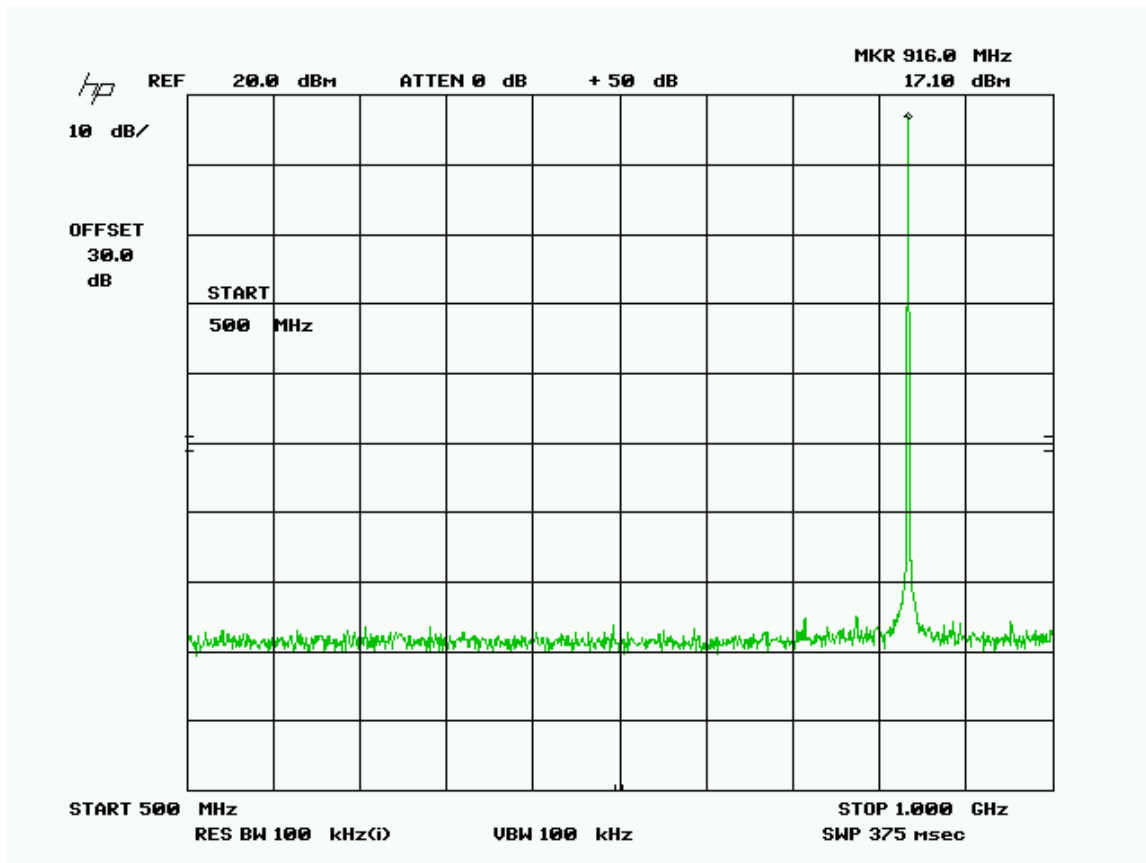


2.5 to 6 GHz



6 to 9.5 GHz

915 MHz channel

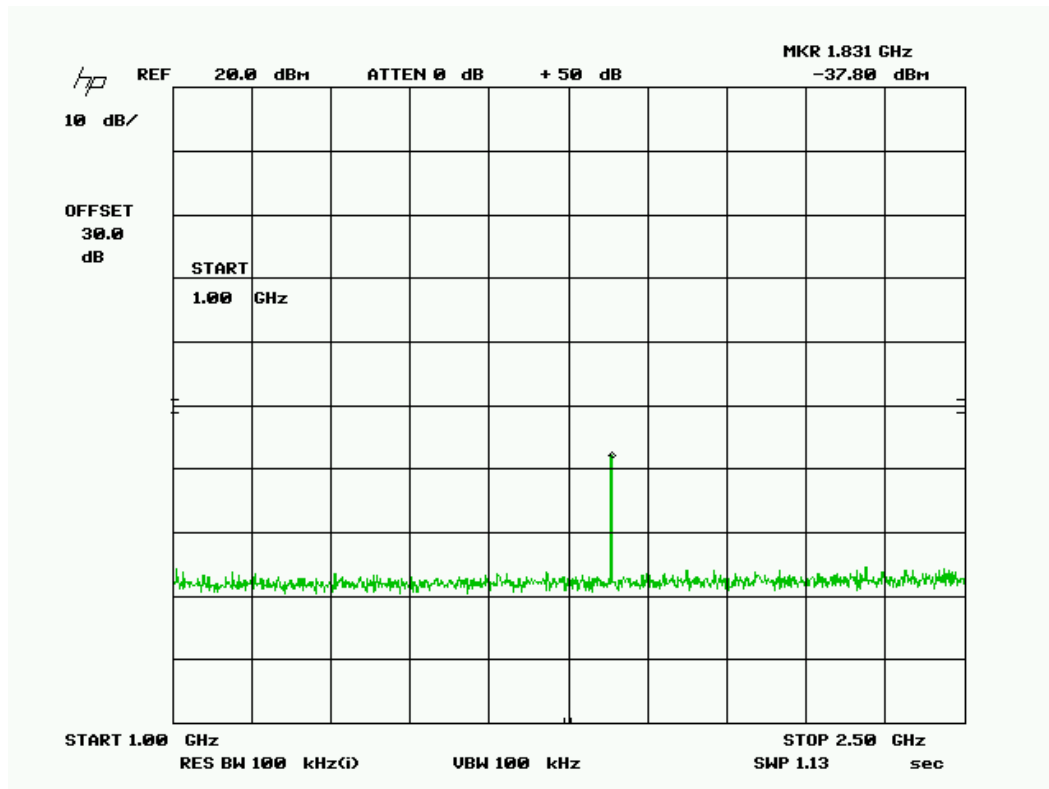


500 to 1000 MHz

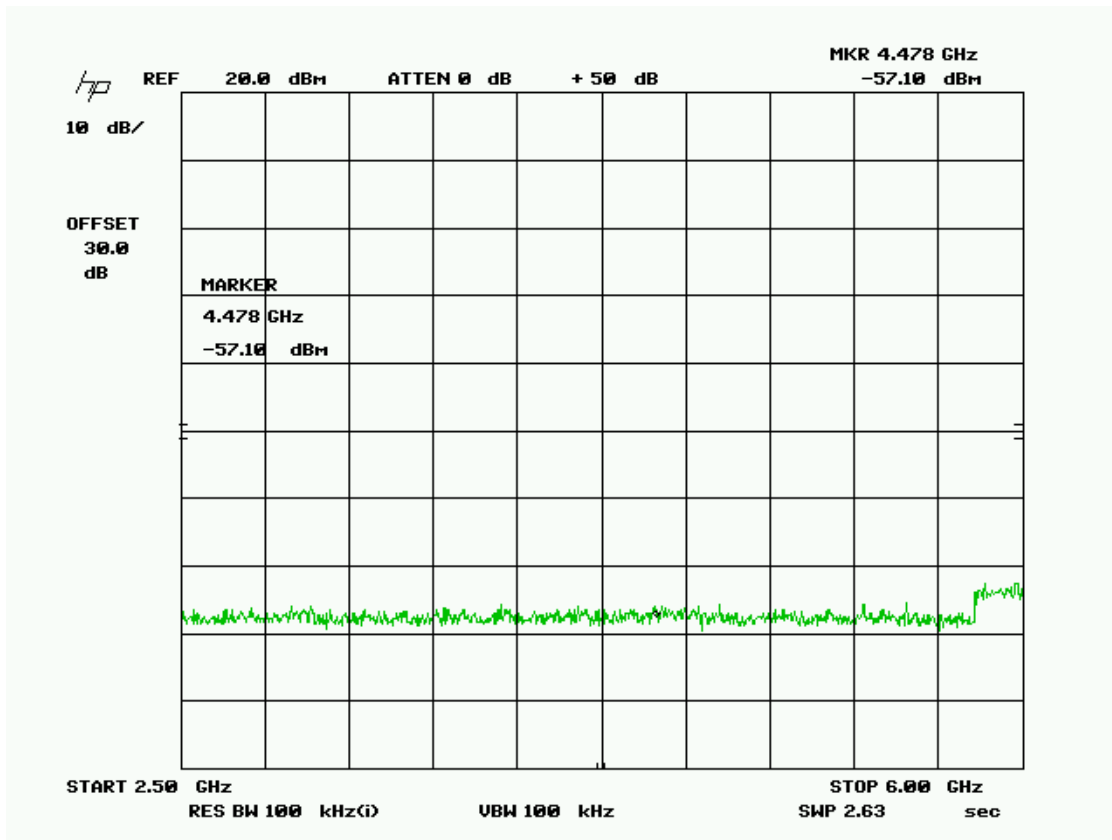
APPLICANT: KAR-TECH INC.

FCC ID: P4U-MOD164

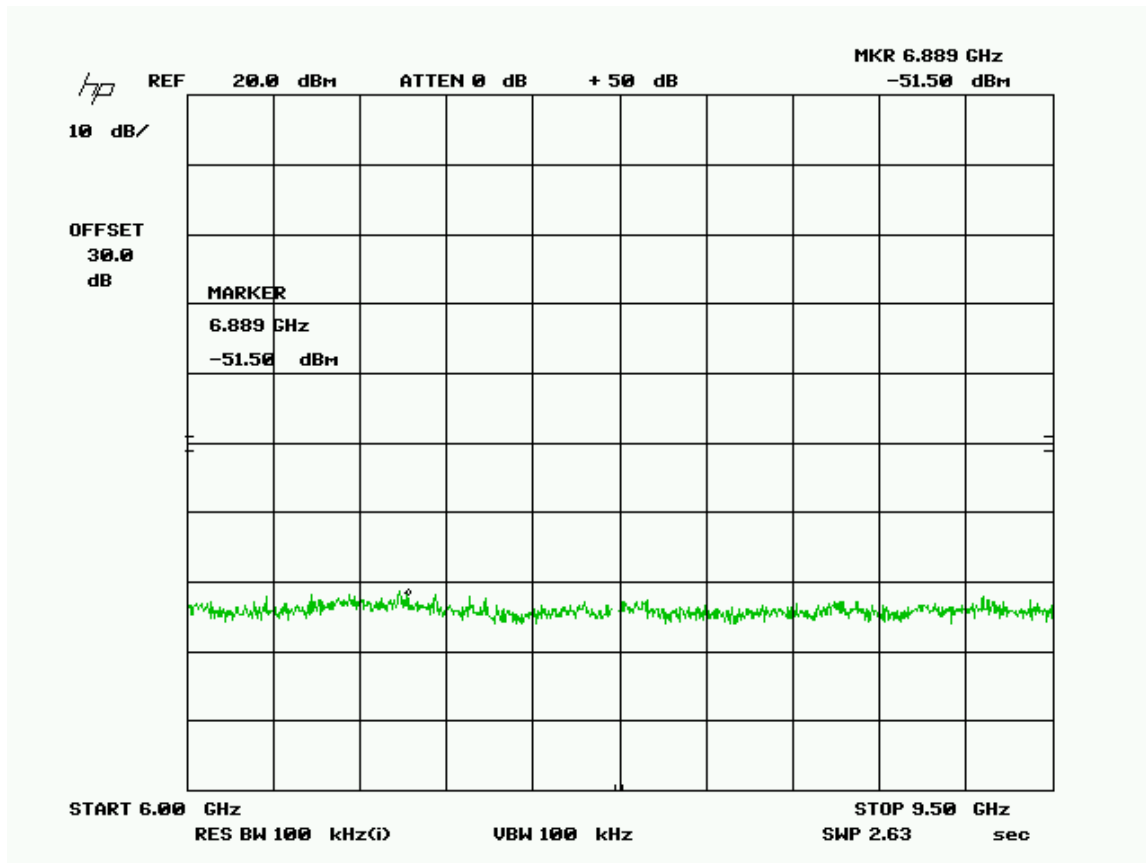
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1 to 2.5 GHz

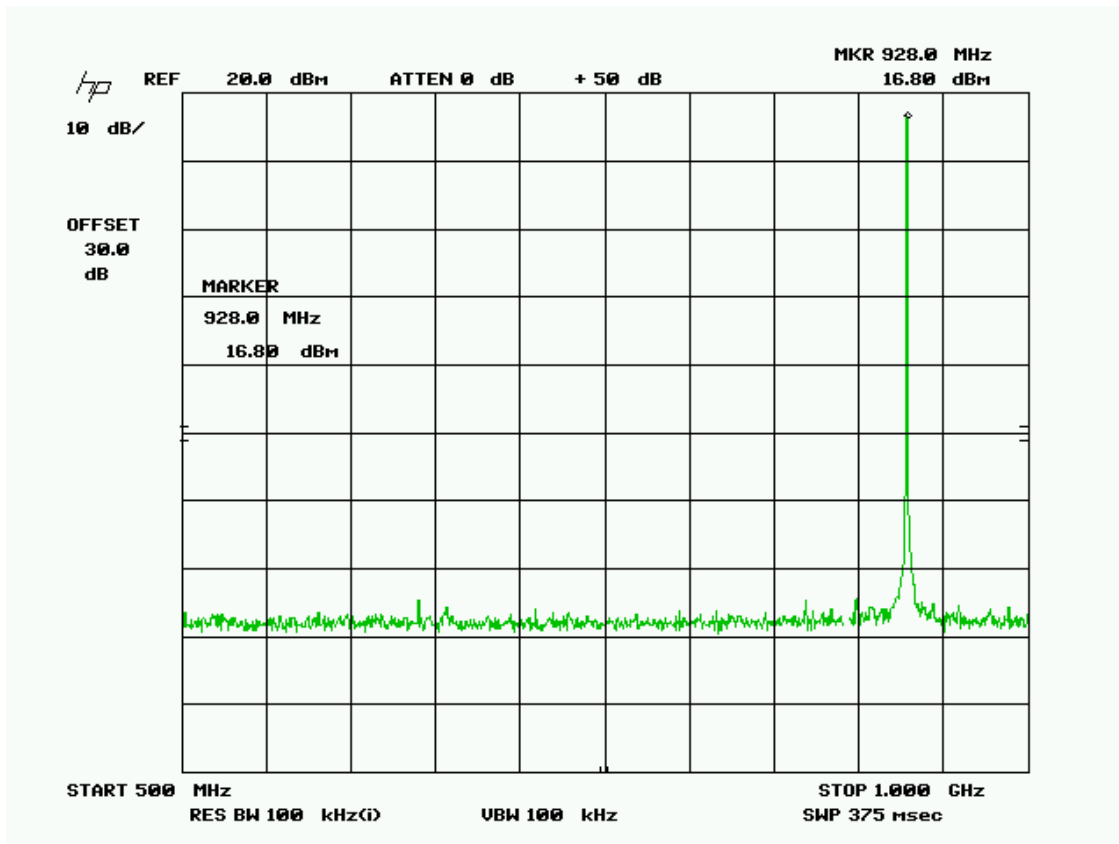


2.5 to 6 GHz



6 to 9.5 GHz

927 MHz channel

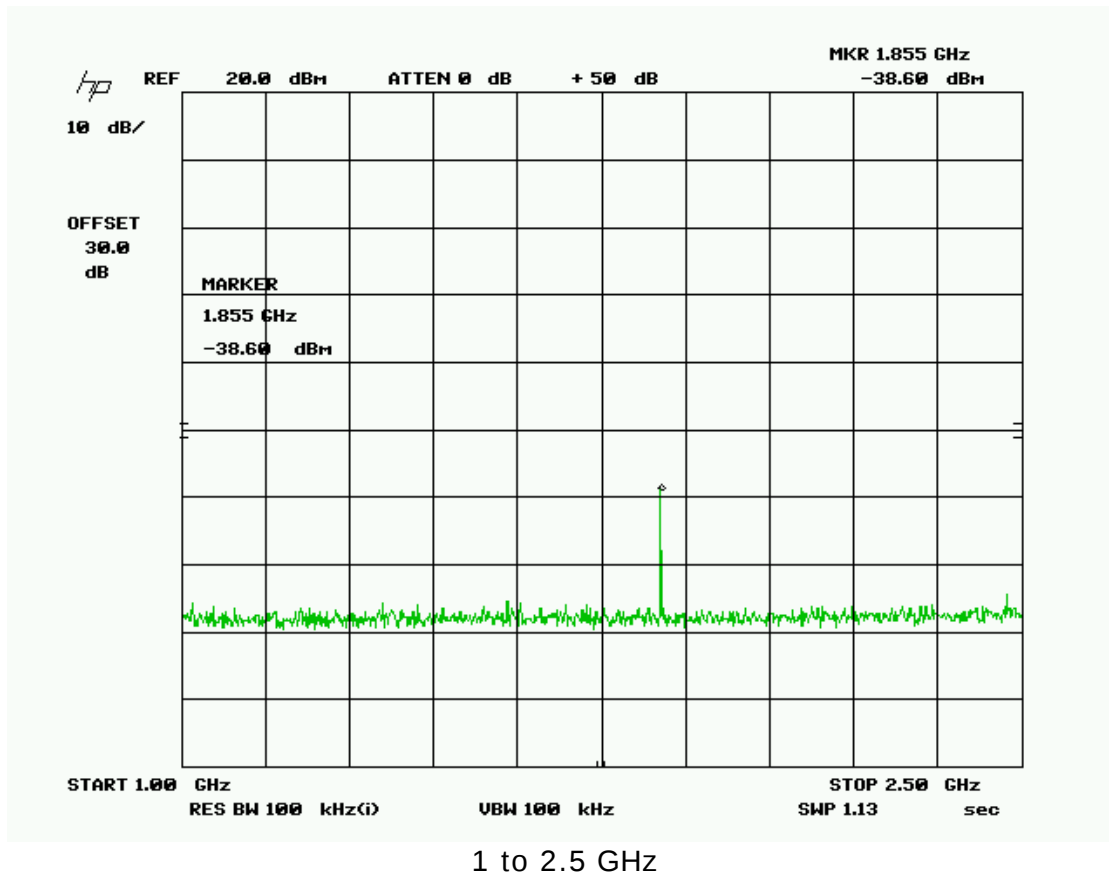


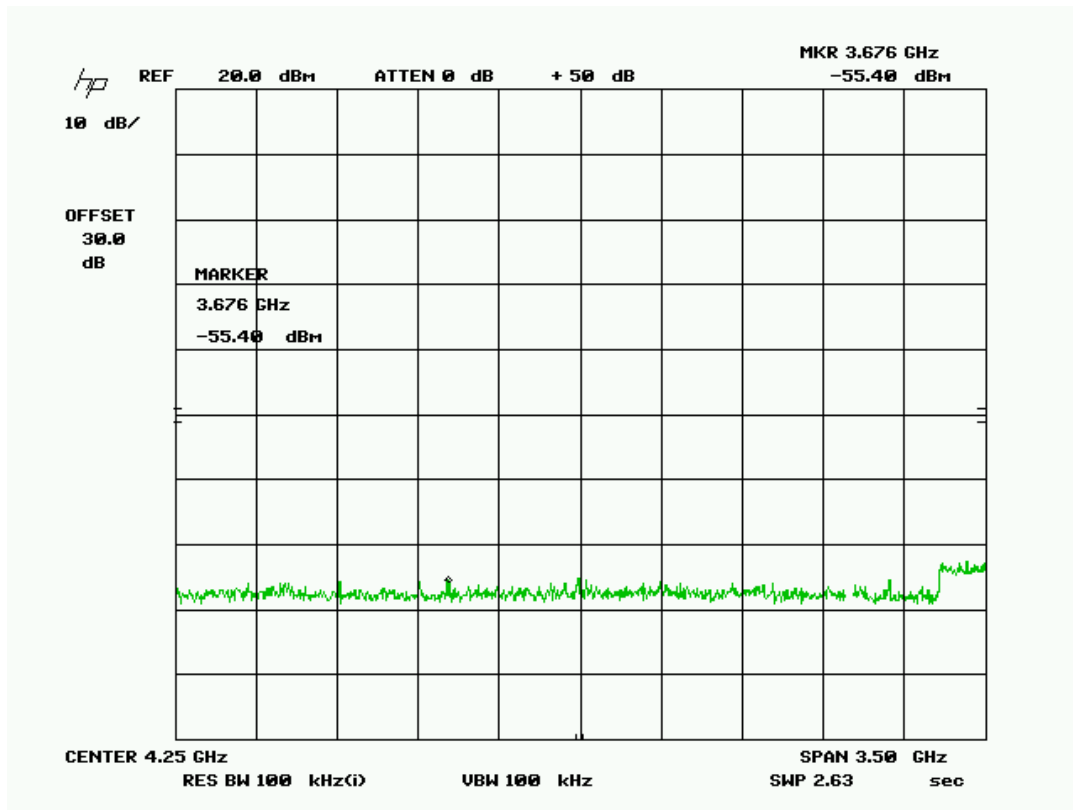
500 to 1000 MHz

APPLICANT: KAR-TECH INC.

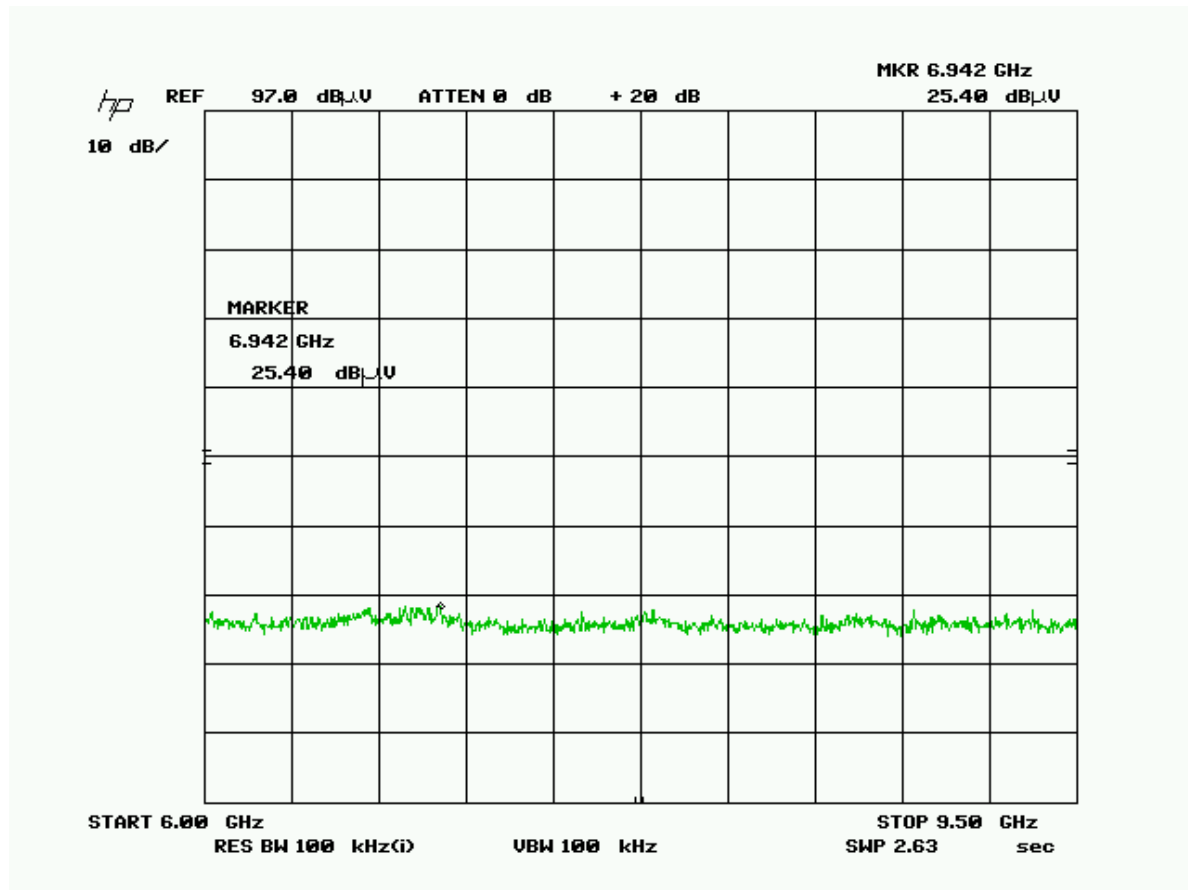
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2.5 to 6 GHz



6 to 9.5 GHz

FIELD STRENGTH OF SPURIOUS EMISSIONS

RULES PART NO.: 15.247(c), 15.205 & 15.209(b)

REQUIREMENTS:

§15.247(c) & §15.205	
(Fundamental) Frequency	(Field Strength) Limits
902 – 928 MHz 2.4 – 2.4835 GHz	127.37 dBuV/m
§15.209	
30 - 88 MHz	40 dBµV/m @3M
88 - 216 MHz	43.5 dBµV/m @3M
216 - 960 MHz	46 dBµV/m @3M
ABOVE 960 MHz	54 dBuV/m

Emissions that fall in the restricted bands (15.205) must be less than or equal to 500 uV/m (54 dBµV/m). Spurious not in a restricted band must be 20 dBc.

Emissions were measured from the lowest frequency generated or 9 kHz to the 10th harmonic. The attached plots represent the emissions generated in this region of frequencies.

There were no significant emissions from 9 kHz to 30 MHz for all 3 channels.

Test Data:

All readings are peak unless marked otherwise.

903 MHz



Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Vertical
Detectors Used Peak
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 12:54

Ref 77 dBμV/m

* Att 0 dB

* RBW 100 kHz

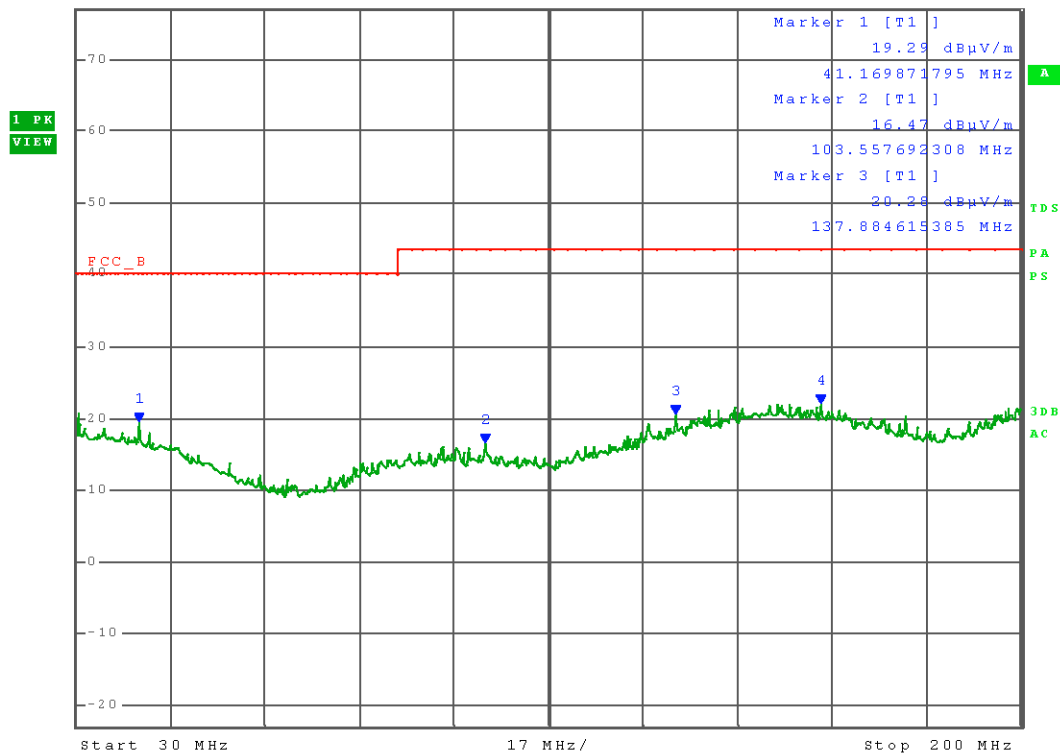
* VBW 100 kHz

SWT 20 ms

Marker 4 [T1]

21.86 dBμV/m

164.038461538 MHz



30 to 200 MHz

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Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Horizontal
Detectors Used Peak
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 12:49

Ref 77 dBμV/m

* Att 0 dB

* RBW 100 kHz

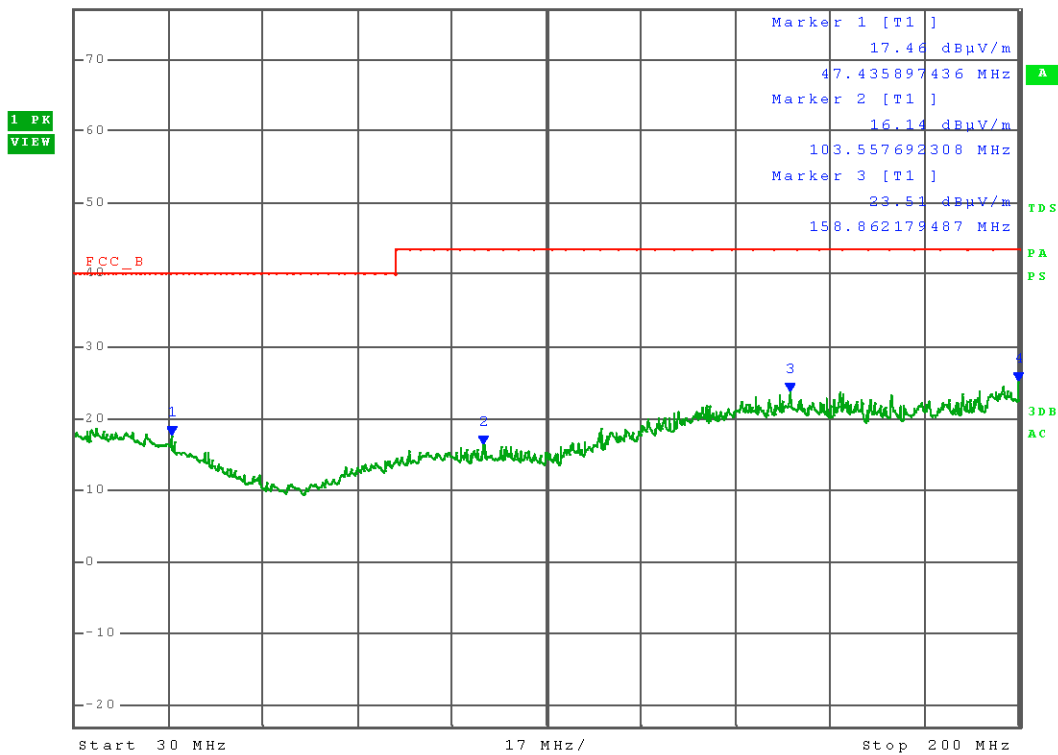
* VBW 100 kHz

SWT 20 ms

Marker 4 [T1]

24.91 dBμV/m

200.00000000 MHz



30 to 200 MHz

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Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Vertical
Detectors Used Peak
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 14:46

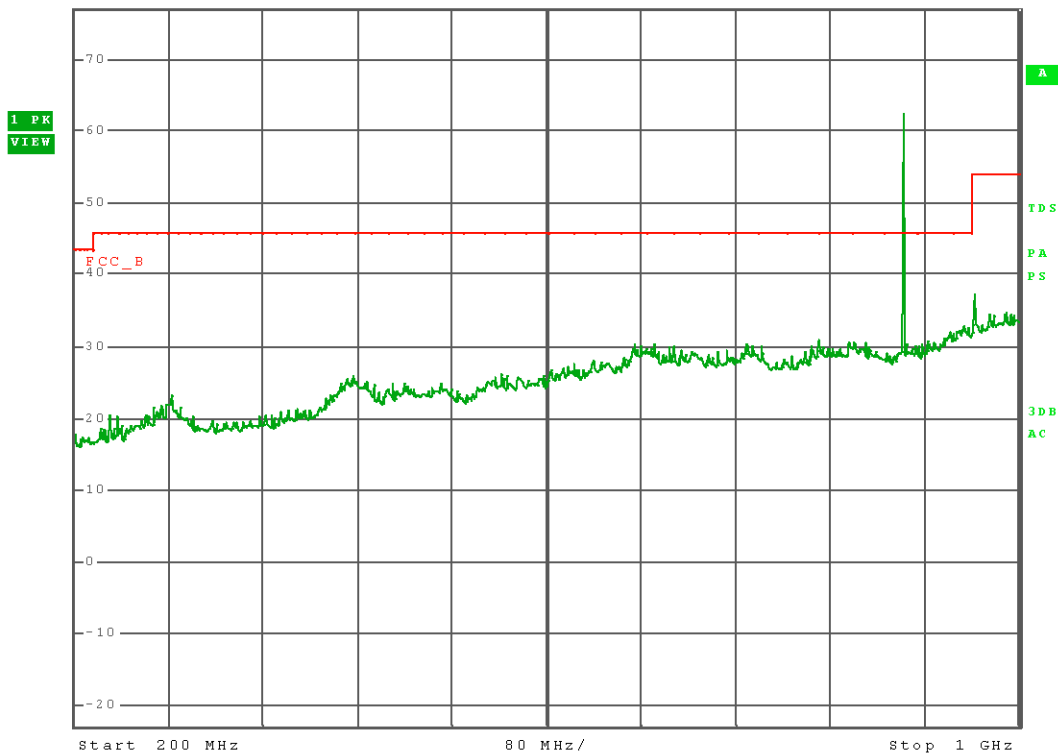
Ref 77 dBμV/m

* Att 0 dB

* RBW 100 kHz

* VBW 100 kHz

SWT 80 ms



200 to 1000 MHz

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Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Horizontal
Detectors Used Peak
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 14:42

Ref 77 dBμV/m

* Att 0 dB

* RBW 100 kHz

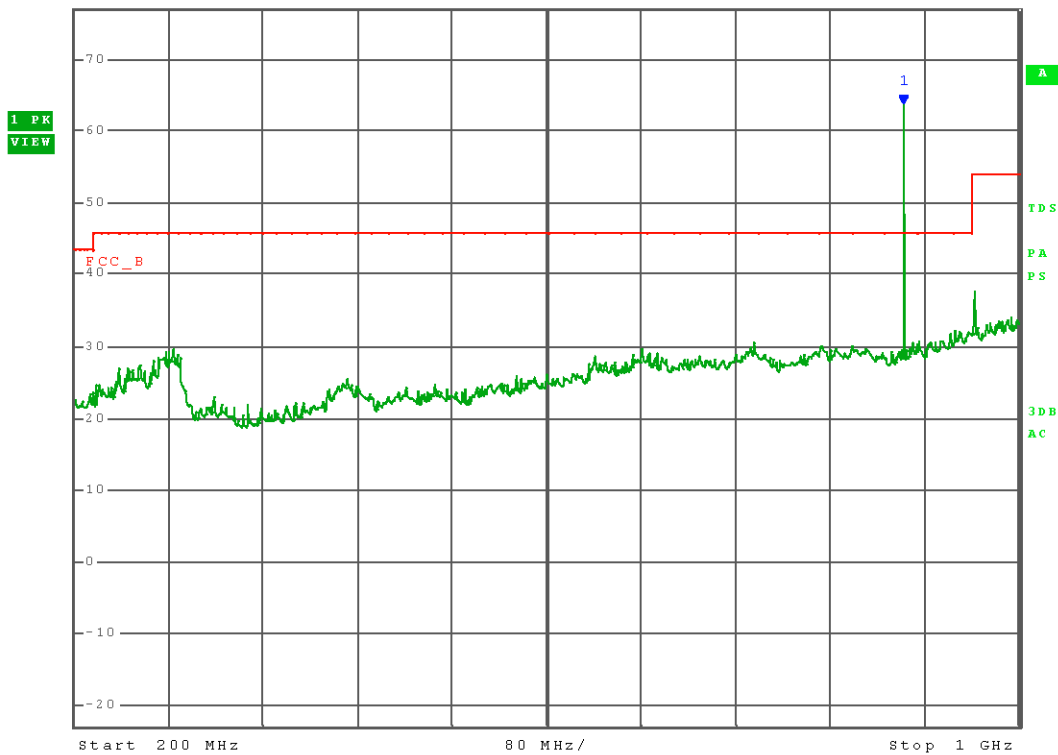
* VBW 100 kHz

SWT 80 ms

Marker 1 [T1]

63.70 dBμV/m

902.564102564 MHz



200 to 1000 MHz

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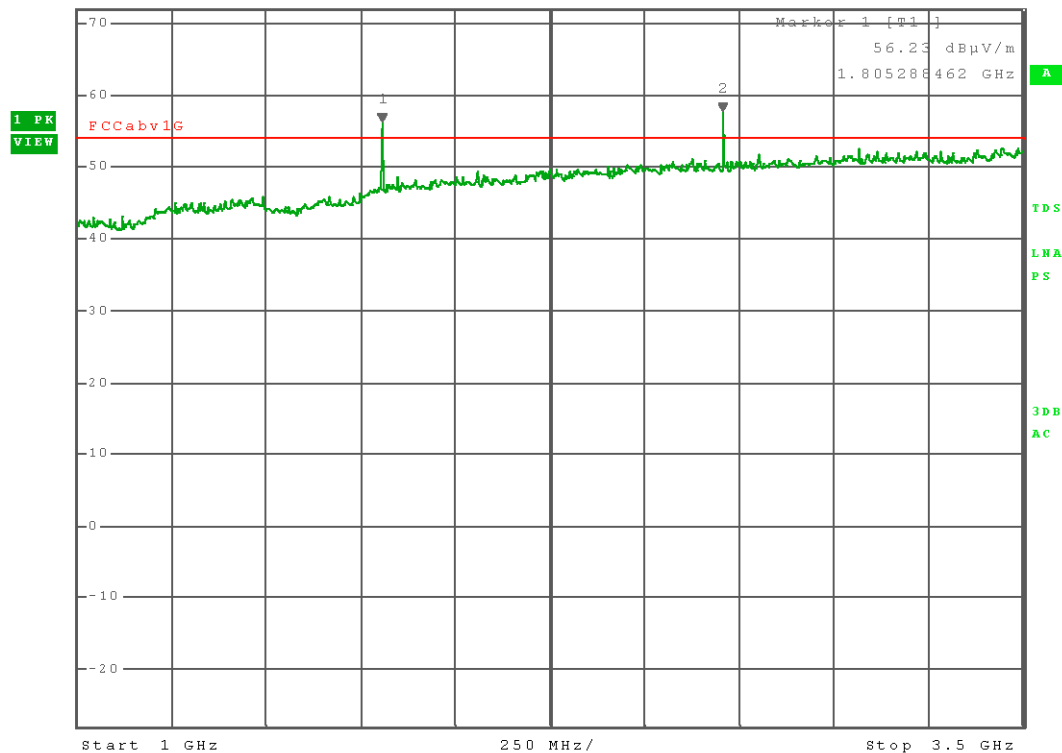


Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Vertical
Detectors Used Max Peak
Test Operator Mario de Aranzeta
Test Specification 15.247



20.May 14 15:34
 Ref 72 dBμV/m * Att 0 dB * RBW 1 MHz Marker 2 [T1] 57.68 dBμV/m
 * VBW 1 MHz SWT 10 ms 2.706730769 GHz



1 to 3.5 GHz (Peak)



Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Vertical
Detectors Used Average
Test Operator Mario de Aranzeta
Test Specification 15.247



20.May 14 15:41

Ref 72 dBμV/m

* Att 0 dB

* RBW 1 MHz

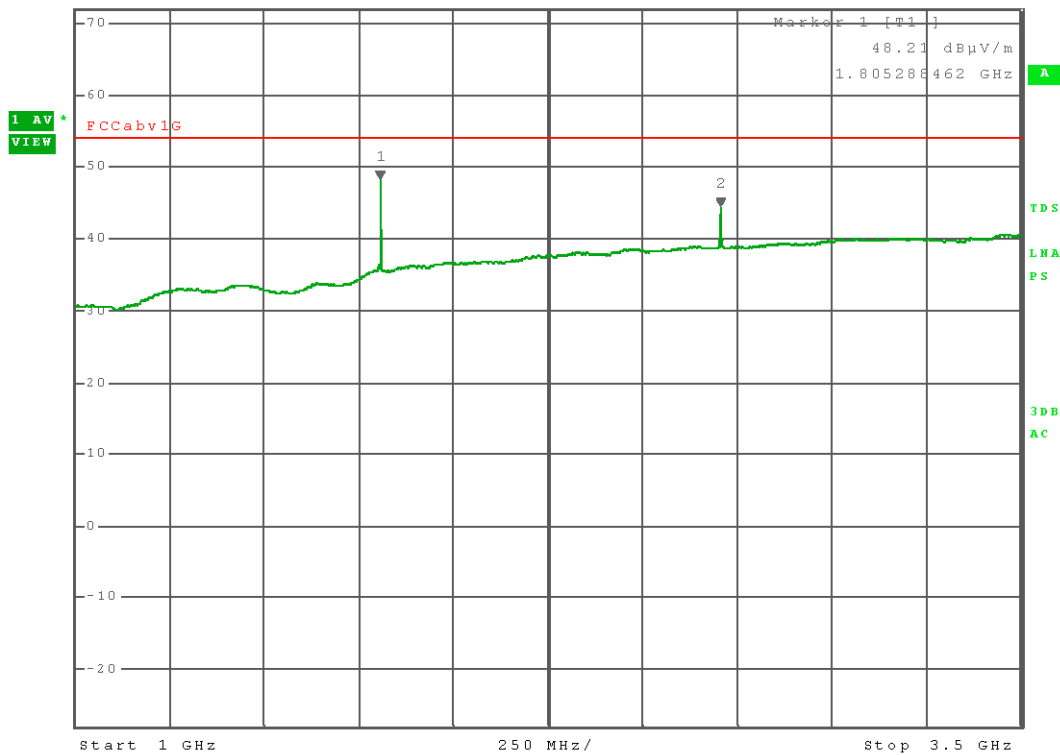
* VBW 1 MHz

SWT 10 ms

Marker 2 [T1]

44.30 dBμV/m

2.706730769 GHz



1 to 3.5 GHz (Average)

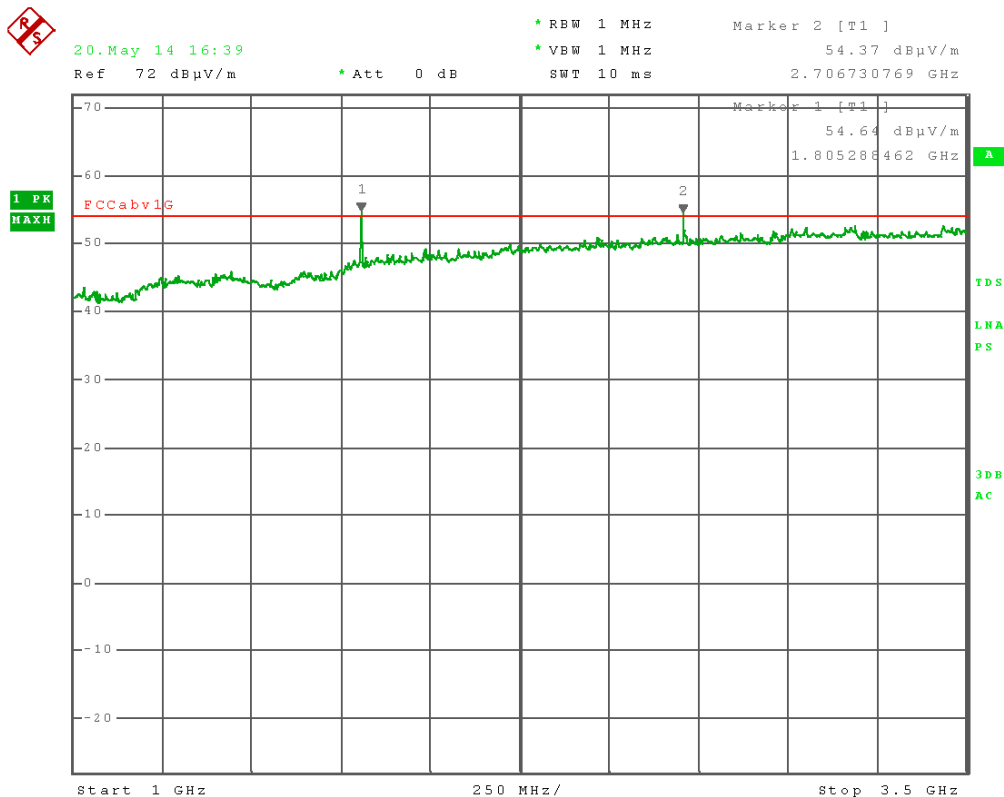
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FCC ID: P4U-MOD164

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Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Horizontal
Detectors Used Peak
Test Operator Mario de Aranzeta
Test Specification 15.247



1 to 3.5 GHz (Peak)



Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Horizontal
Detectors Used Average
Test Operator Mario de Aranzeta
Test Specification 15.247



20.May 14 16:25

Ref 72 dBμV/m

* Att 0 dB

* RBW 1 MHz

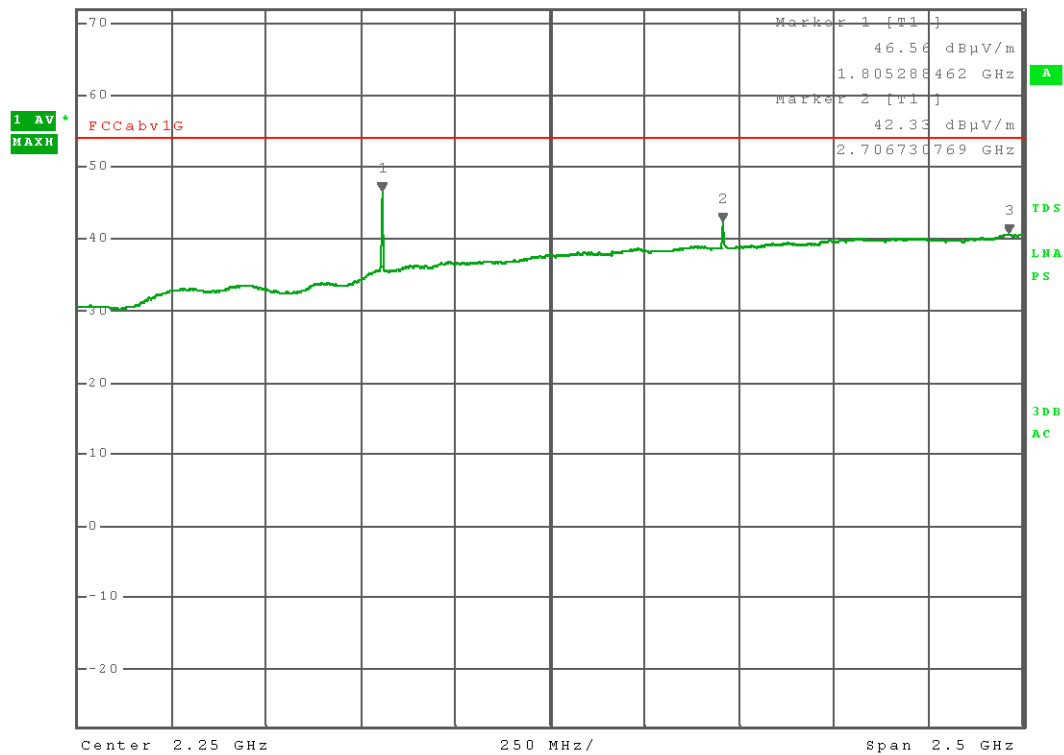
* VBW 1 MHz

SWT 10 ms

Marker 3 [T1]

40.52 dBμV/m

3.463942308 GHz



1 to 3.5 GHz (Average)

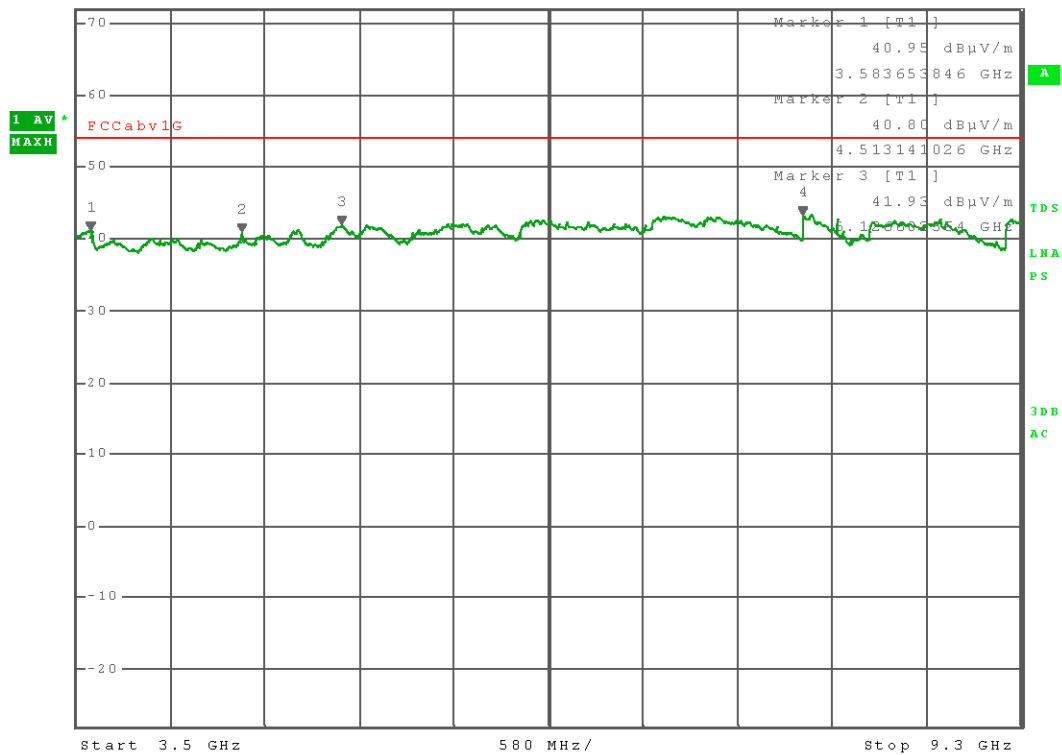


Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Vertical
Detectors Used Average
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 11:50
 Ref 72 dBμV/m * Att 0 dB SWT 35 ms
 * RBW 1 MHz Marker 4 [T1] 43.21 dBμV/m
 * VBW 1 MHz 7.961538462 GHz



3.5 to 9.3 GHz (Average)
 No significant emissions peak

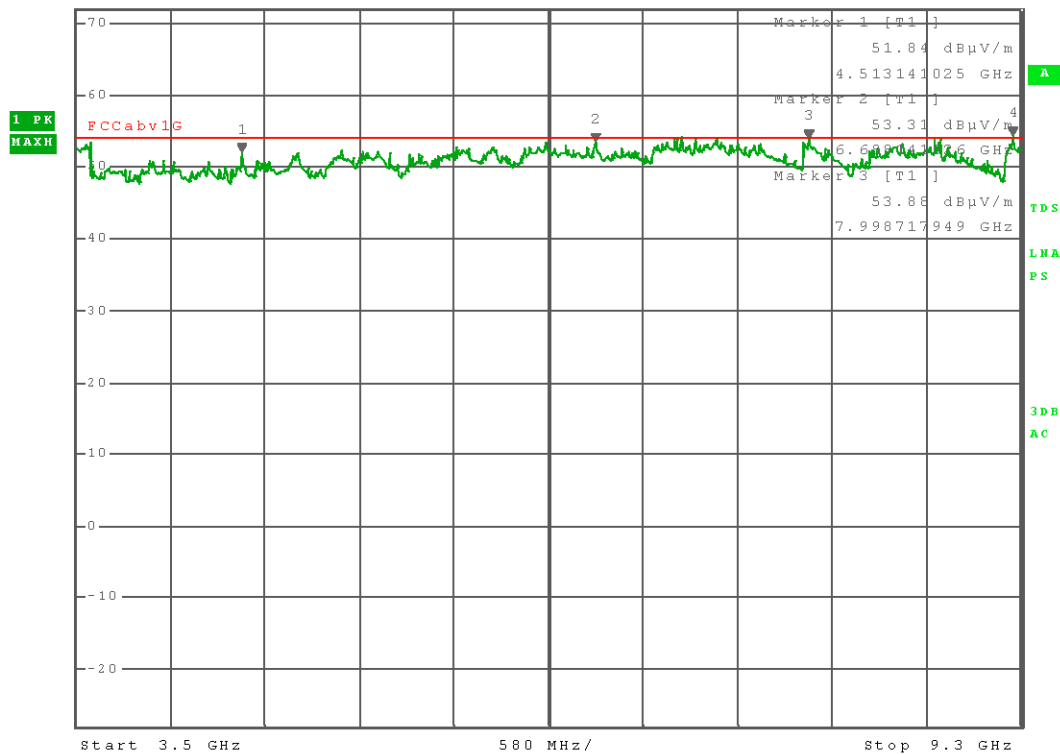


Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Horizontal
Detectors Used Peak
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 10:38
 Ref 72 dBμV/m * Att 0 dB SWT 35 ms
 * RBW 1 MHz Marker 4 [T1] 54.24 dBμV/m
 * VBW 1 MHz 9.253525641 GHz



3.5 to 9.3 GHz (Peak)



Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Horizontal
Detectors Used Average
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 11:02

Ref 72 dBμV/m

* Att 0 dB

* RBW 1 MHz

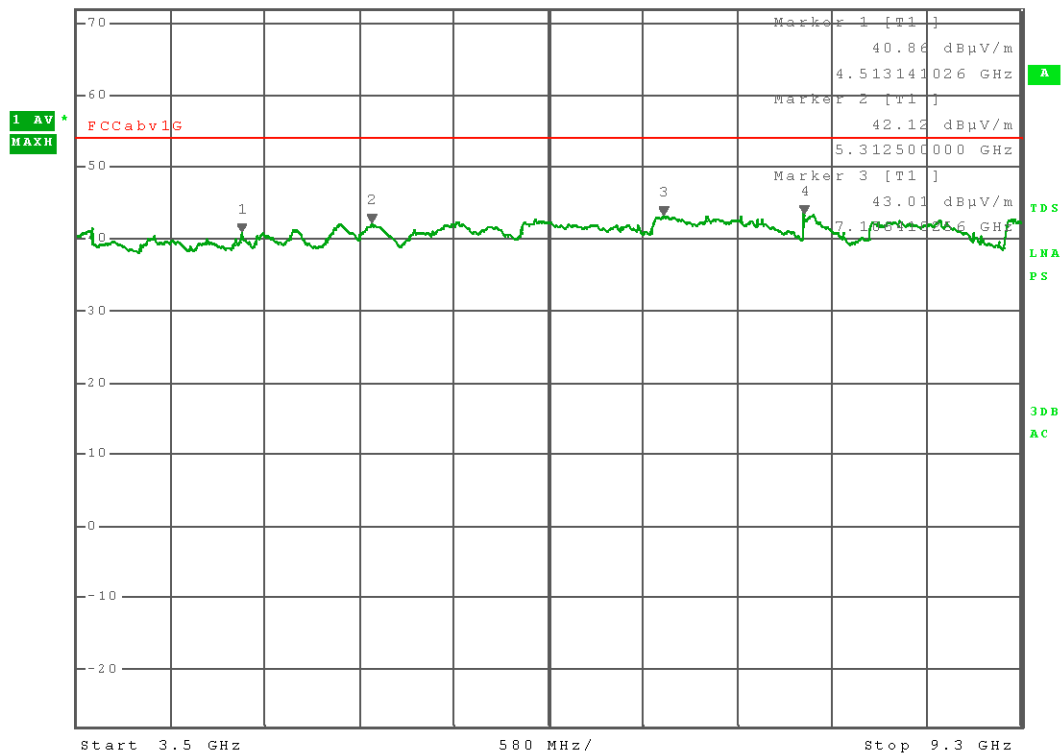
* VBW 1 MHz

SWT 35 ms

Marker 4 [T1]

43.43 dBμV/m

7.970833333 GHz



3.5 to 9.3 GHz (Average)

APPLICANT: KAR-TECH INC.

FCC ID: P4U-MOD164

REPORT: V:\K\KAR-TECH\790AUT14\790AUT14 Test Report.docx

915 MHz



Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Vertical
Detectors Used Peak
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 12:19

Ref 77 dBμV/m

* Att 0 dB

* RBW 100 kHz

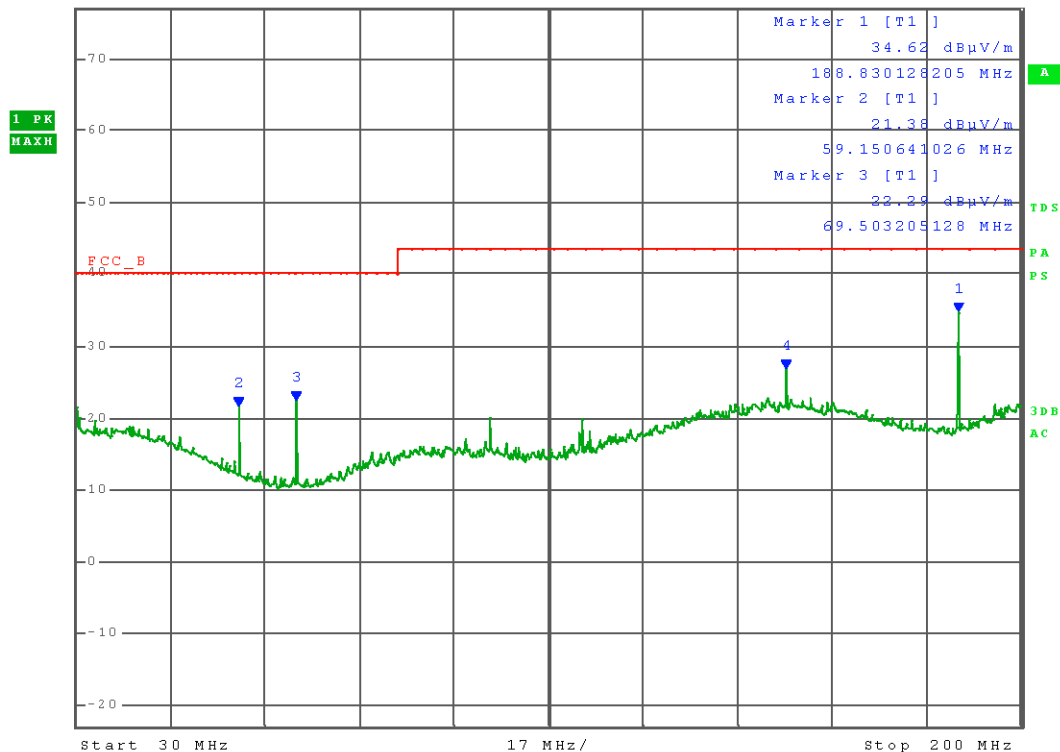
* VBW 100 kHz

SWT 20 ms

Marker 4 [T1]

26.77 dBμV/m

157.772435897 MHz



30 to 200 MHz

APPLICANT: KAR-TECH INC.

FCC ID: P4U-MOD164

REPORT: V:\K\KAR-TECH\790AUT14\790AUT14 Test Report.docx



Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Horizontal
Detectors Used Peak
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 12:41

Ref 77 dBμV/m

* Att 0 dB

* RBW 100 kHz

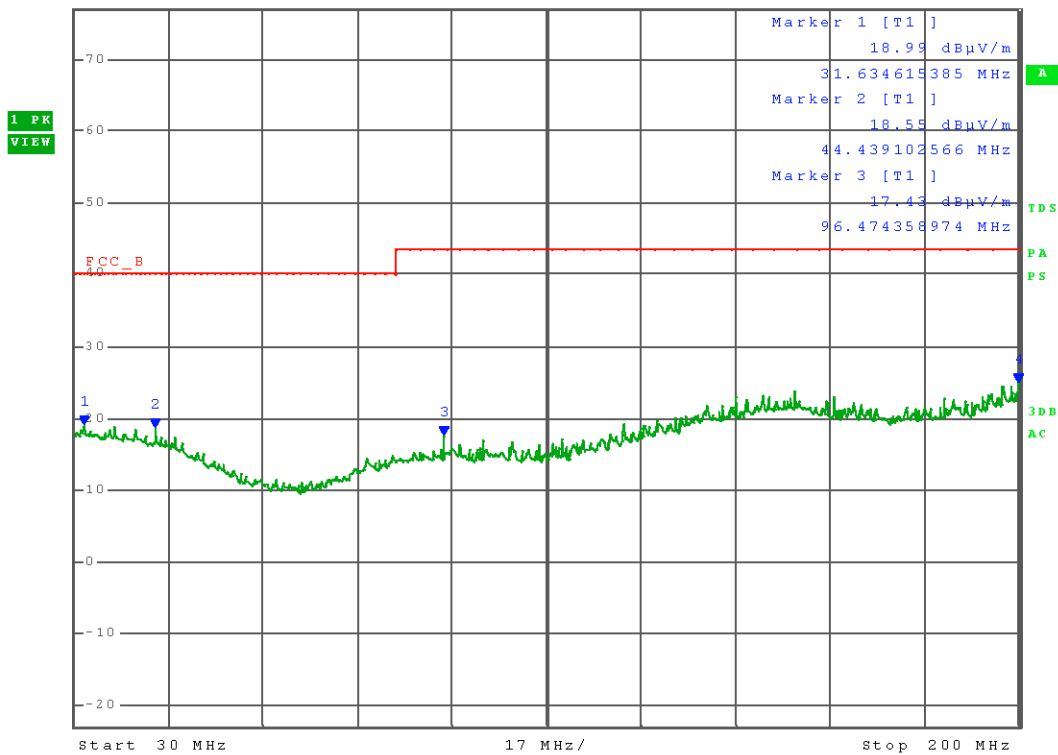
* VBW 100 kHz

SWT 20 ms

Marker 4 [T1]

24.70 dBμV/m

200.00000000 MHz



30 to 200 MHz

APPLICANT: KAR-TECH INC.

FCC ID: P4U-MOD164

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Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Vertical
Detectors Used Peak
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 14:52

Ref 82 dBμV/m

* Att 0 dB

* RBW 100 kHz

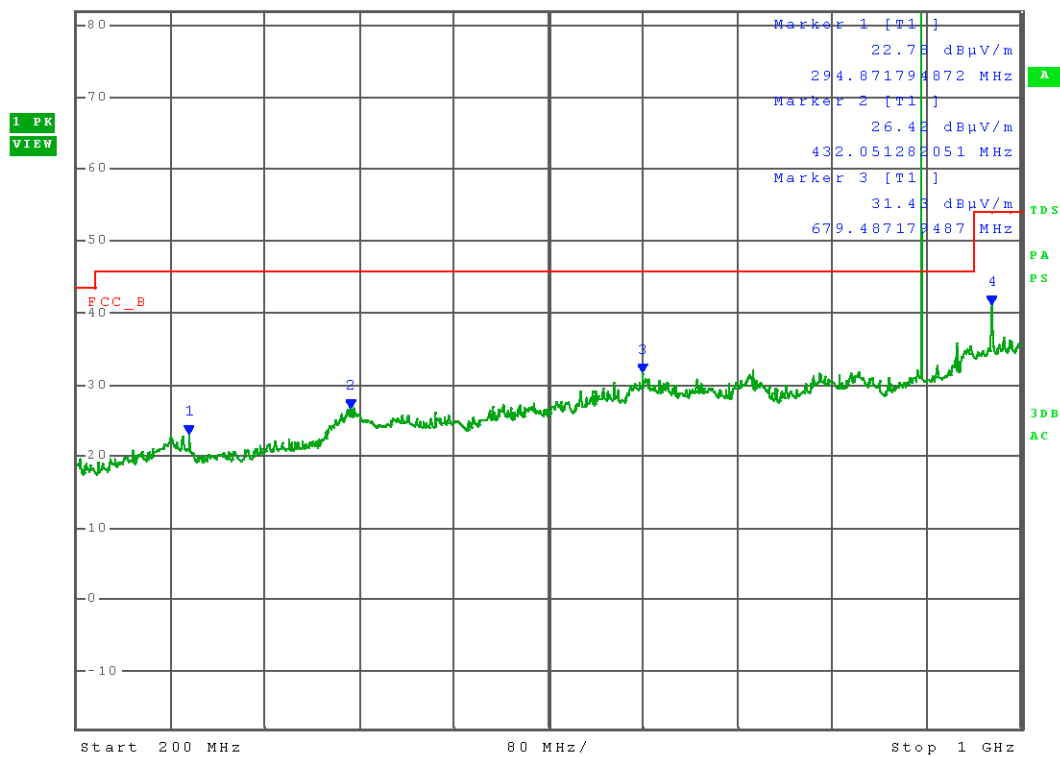
* VBW 100 kHz

SWT 80 ms

Marker 4 [T1]

40.89 dBμV/m

975.641025641 MHz



200 MHz to 1 GHz

APPLICANT: KAR-TECH INC.

FCC ID: P4U-MOD164

REPORT: V:\K\KAR-TECH\790AUT14\790AUT14 Test Report.docx



Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Horizontal
Detectors Used Peak
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 15:20

Ref 82 dBμV/m

* Att 0 dB

* RBW 100 kHz

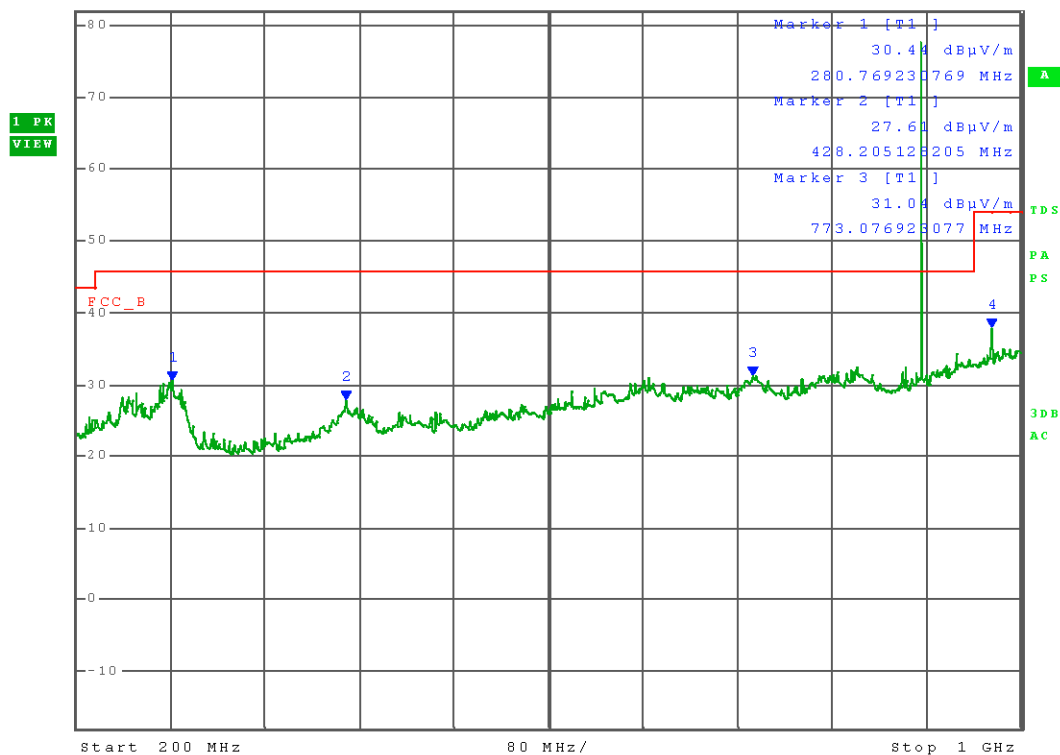
* VBW 100 kHz

SWT 80 ms

Marker 4 [T1]

37.69 dBμV/m

975.641025641 MHz



200 MHz to 1 GHz
 Desired at 903 MHz

APPLICANT: KAR-TECH INC.

FCC ID: P4U-MOD164

REPORT: V:\K\KAR-TECH\790AUT14\790AUT14 Test Report.docx

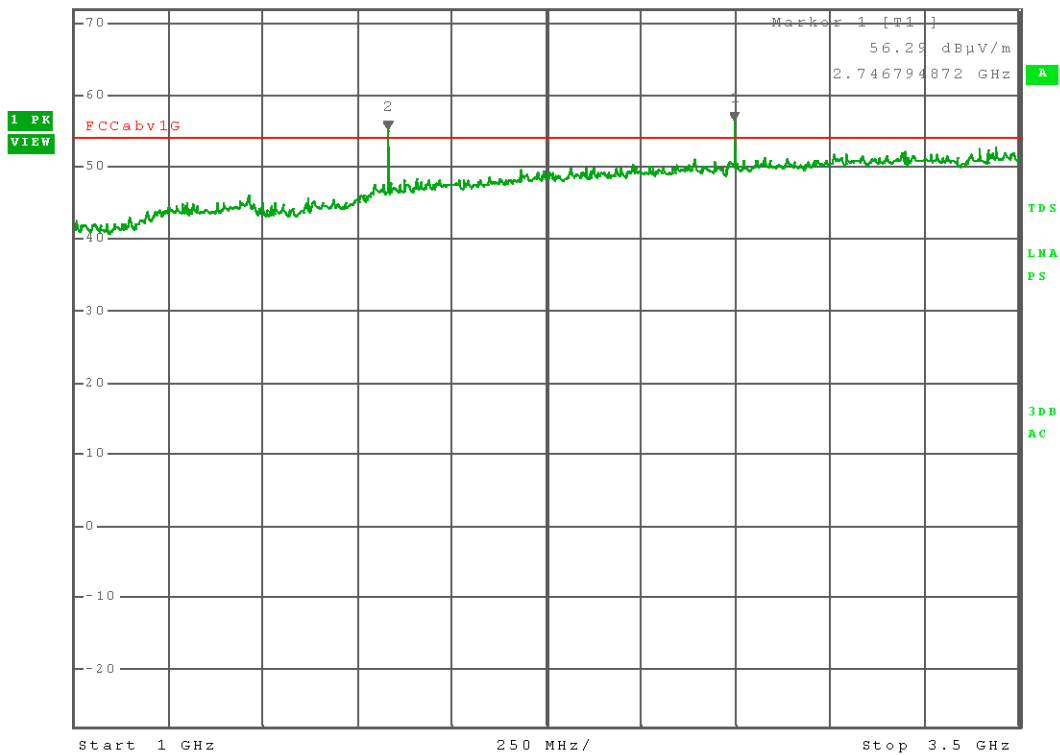


Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Vertical
Detectors Used Peak
Test Operator Mario de Aranzeta
Test Specification 15.247



20.May 14 16:00
 Ref 72 dBμV/m * Att 0 dB * RBW 1 MHz Marker 2 [T1] 55.14 dBμV/m
 * VBW 1 MHz 1.829326923 GHz
 SWT 10 ms



1 to 3.5 GHz (Peak)



Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Vertical
Detectors Used Average
Test Operator Mario de Aranzeta
Test Specification
 15.247



20.May 14 15:58

Ref 72 dBμV/m

* Att 0 dB

* RBW 1 MHz

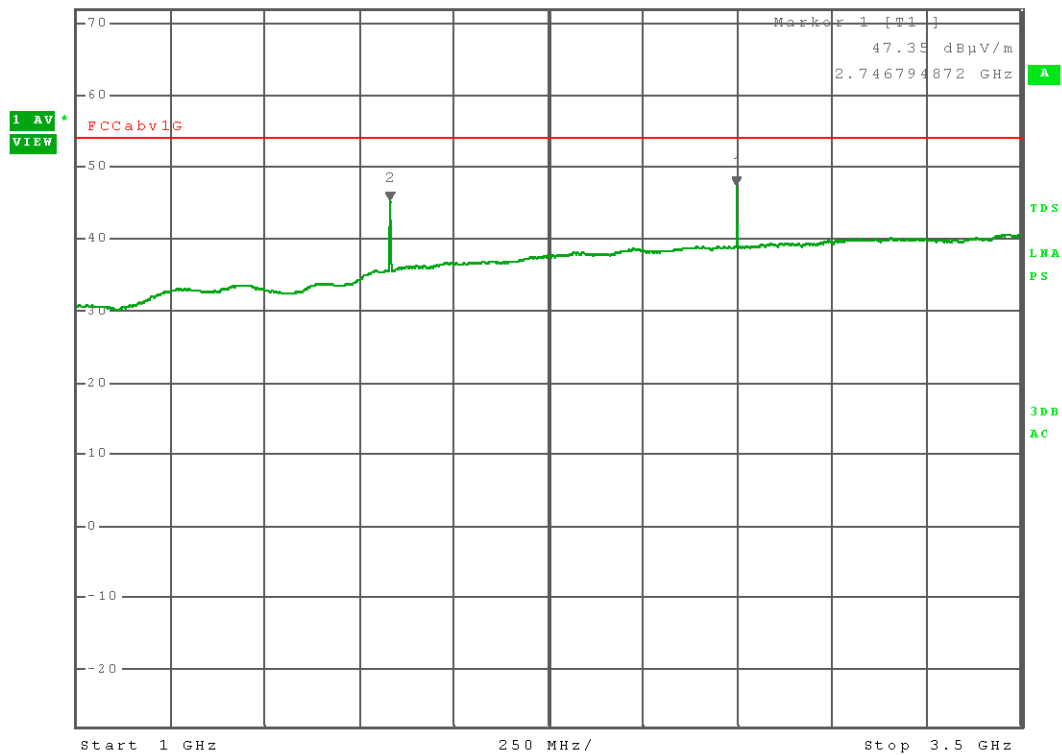
* VBW 1 MHz

SWT 10 ms

Marker 2 [T1]

45.22 dBμV/m

1.829326923 GHz



1 to 3.5 GHz (Average)

APPLICANT: KAR-TECH INC.

FCC ID: P4U-MOD164

REPORT: V:\K\KAR-TECH\790AUT14\790AUT14 Test Report.docx

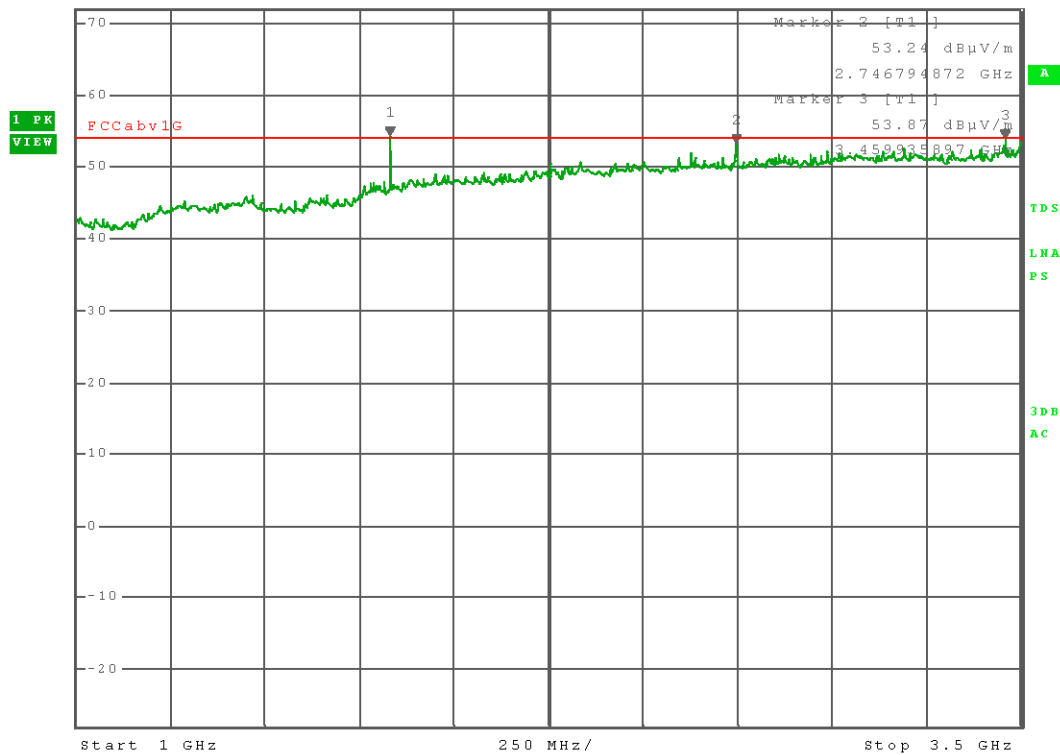


Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Horizontal
Detectors Used Peak
Test Operator Mario de Aranzeta
Test Specification
 15.247



20.May 14 16:14
 Ref 72 dBμV/m * Att 0 dB * RBW 1 MHz * VBW 1 MHz Marker 1 [T1] 54.14 dBμV/m
 SWT 10 ms 1.829326923 GHz



1 to 3.5 GHz (Peak)

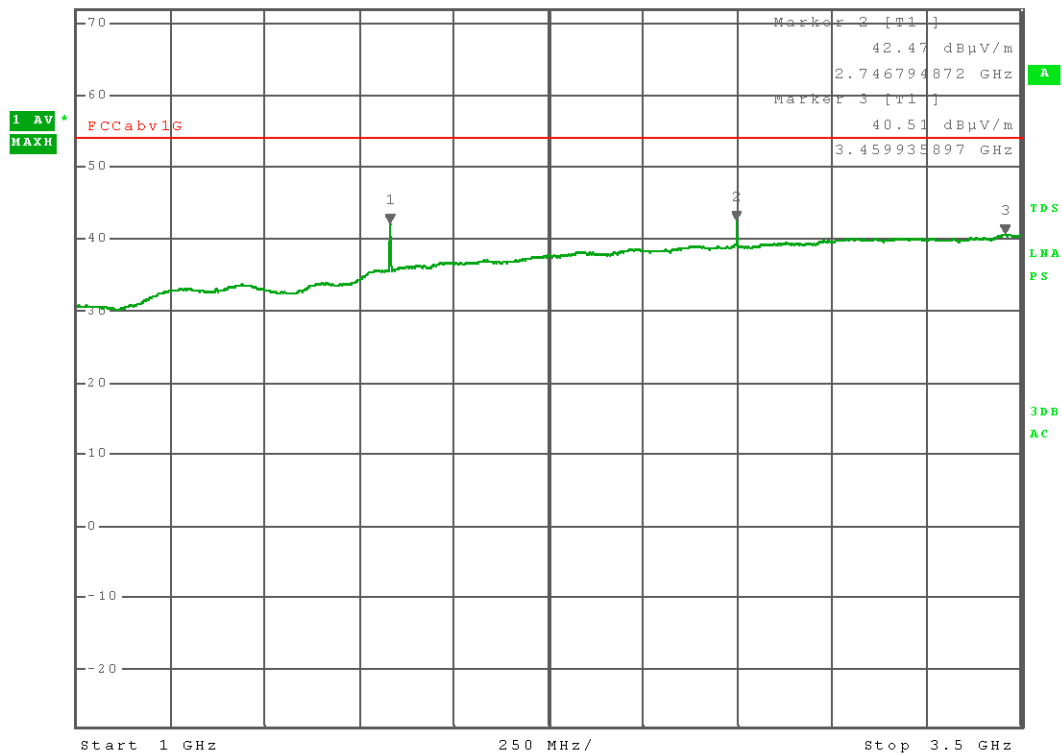


Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Horizontal
Detectors Used Average
Test Operator Mario de Aranzeta
Test Specification 15.247



20.May 14 16:21
 Ref 72 dBμV/m * Att 0 dB * RBW 1 MHz Marker 1 [T1] 42.03 dBμV/m
 * VBW 1 MHz SWT 10 ms 1.829326923 GHz



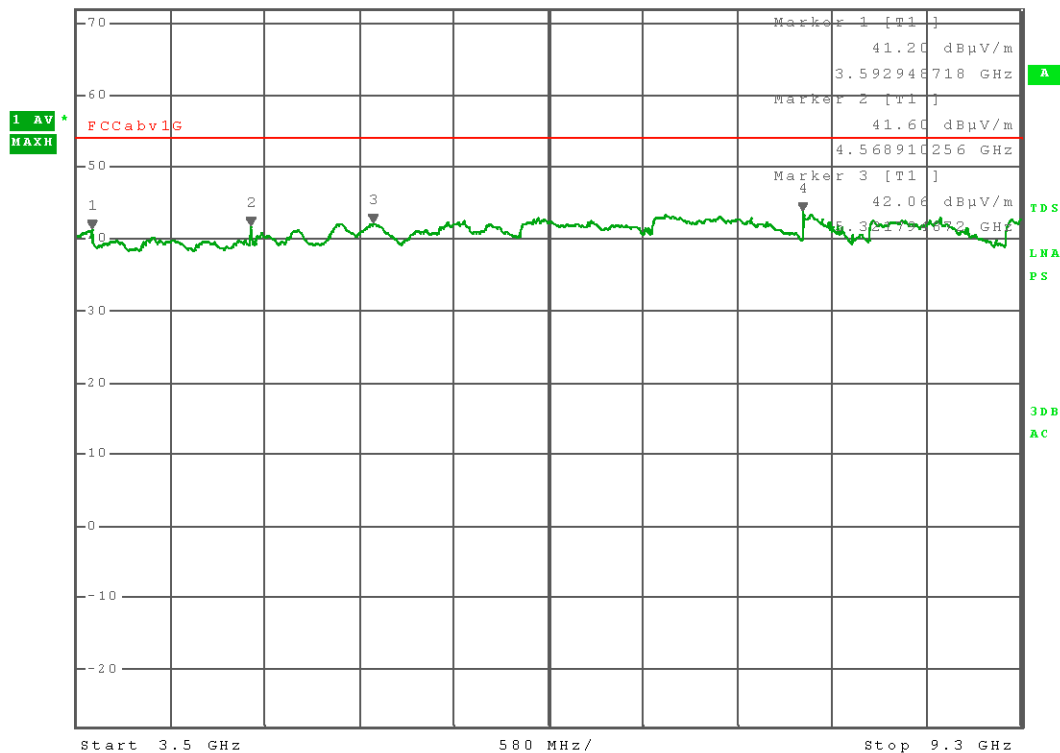


Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Vertical
Detectors Used Average
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 11:56
 Ref 72 dBμV/m * Att 0 dB SWT 35 ms
 * RBW 1 MHz Marker 4 [T1] 43.72 dBμV/m
 * VBW 1 MHz 7.961538462 GHz



3.5 to 9.3 GHz (Average)
 No significant emissions peak



Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Horizontal
Detectors Used Peak
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 10:38

Ref 72 dBμV/m

* Att 0 dB

* RBW 1 MHz

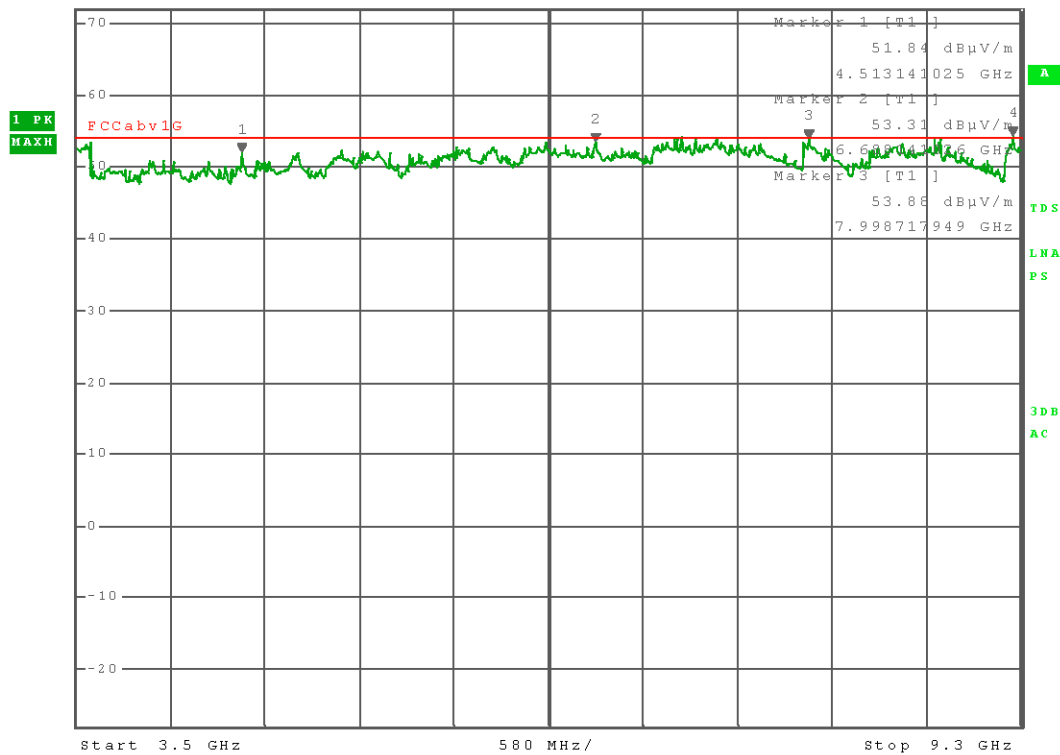
* VBW 1 MHz

SWT 35 ms

Marker 4 [T1]

54.24 dBμV/m

9.253525641 GHz



APPLICANT: KAR-TECH INC.

FCC ID: P4U-MOD164

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Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Horizontal
Detectors Used Average
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 11:02

Ref 72 dBμV/m

* Att 0 dB

* RBW 1 MHz

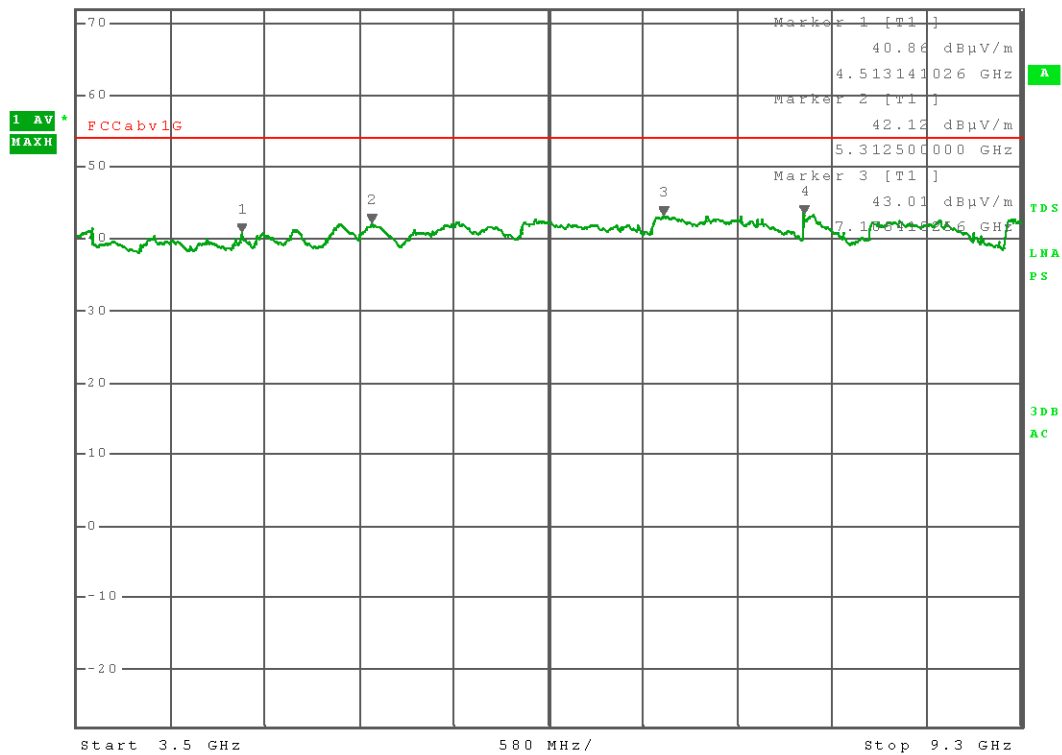
* VBW 1 MHz

SWT 35 ms

Marker 4 [T1]

43.43 dBμV/m

7.970833333 GHz



APPLICANT: KAR-TECH INC.

FCC ID: P4U-MOD164

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927 MHz



Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Vertical
Detectors Used Peak
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 15:30

Ref 82 dBμV/m

* Att 0 dB

* RBW 100 kHz

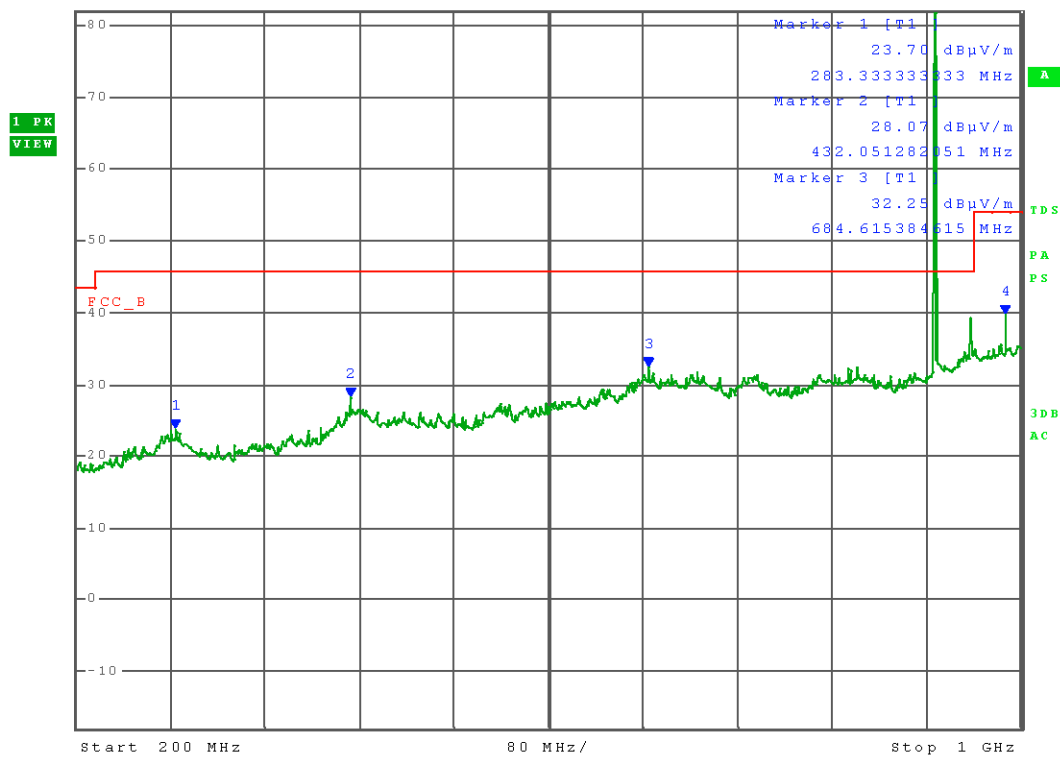
* VBW 100 kHz

SWT 80 ms

Marker 4 [T1]

39.69 dBμV/m

987.179487179 MHz



200 MHz to 1 GHz

APPLICANT: KAR-TECH INC.

FCC ID: P4U-MOD164

REPORT: V:\K\KAR-TECH\790AUT14\790AUT14 Test Report.docx



Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Horizontal
Detectors Used Peak
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 15:23

Ref 82 dBμV/m

* Att 0 dB

* RBW 100 kHz

* VBW 100 kHz

SWT 80 ms

Marker 4 [T1]

38.20 dBμV/m

987.179487179 MHz



200 MHz to 1 GHz

APPLICANT: KAR-TECH INC.

FCC ID: P4U-MOD164

REPORT: V:\K\KAR-TECH\790AUT14\790AUT14 Test Report.docx

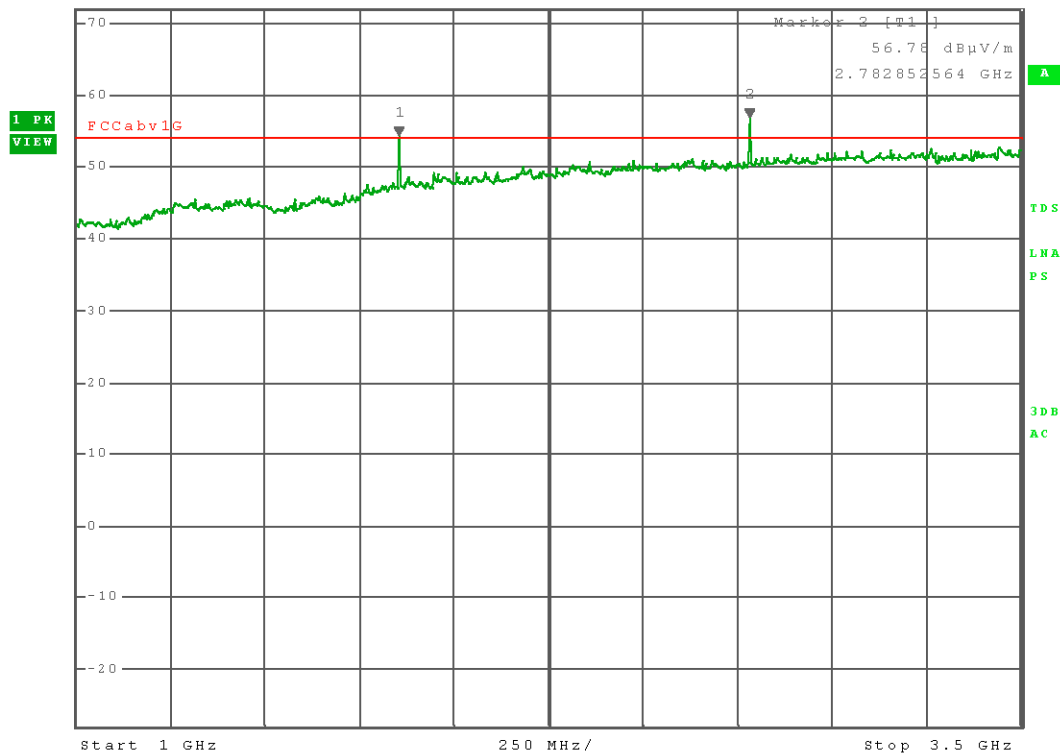


Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Vertical
Detectors Used Peak
Test Operator Mario de Aranzeta
Test Specification 15.247



20.May 14 15:52
 Ref 72 dBμV/m * Att 0 dB * RBW 1 MHz Marker 1 [T1] 54.18 dBμV/m
 * VBW 1 MHz SWT 10 ms 1.853365385 GHz



1 to 3.5 GHz (Peak)



Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Vertical
Detectors Used Average
Test Operator Mario de Aranzeta
Test Specification 15.247



20.May 14 15:55

Ref 72 dBμV/m

* Att 0 dB

* RBW 1 MHz

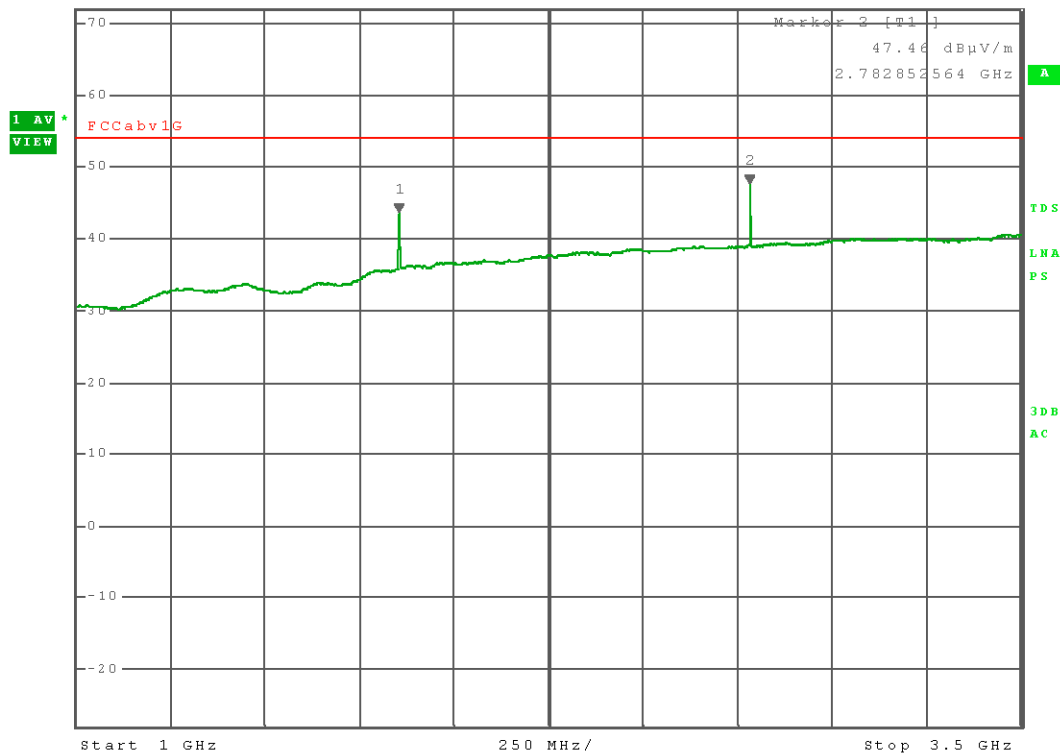
* VBW 1 MHz

SWT 10 ms

Marker 1 [T1]

43.48 dBμV/m

1.853365385 GHz



1 to 3.5 GHz (Average)

APPLICANT: KAR-TECH INC.

FCC ID: P4U-MOD164

REPORT: V:\K\KAR-TECH\790AUT14\790AUT14 Test Report.docx



Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Horizontal
Detectors Used Peak
Test Operator Mario de Aranzeta
Test Specification 15.247



20.May 14 16:47

Ref 72 dBμV/m

* Att 0 dB

* RBW 1 MHz

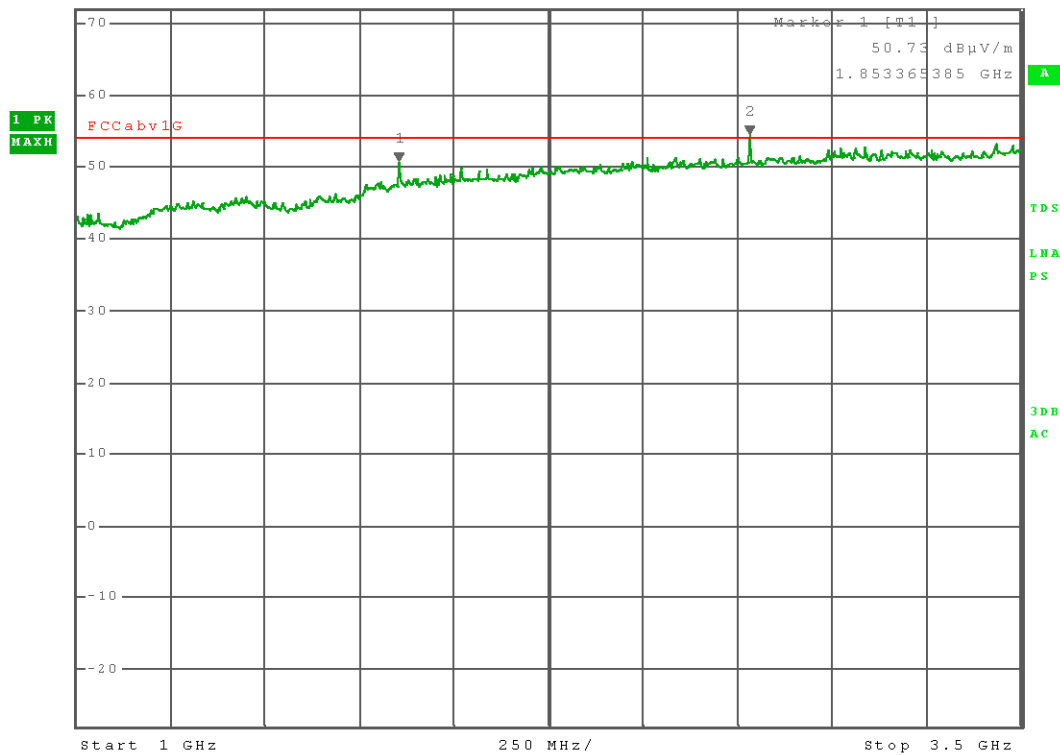
* VBW 1 MHz

SWT 10 ms

Marker 2 [T1]

54.53 dBμV/m

2.782852564 GHz



1 to 3.5 GHz (Peak)

APPLICANT: KAR-TECH INC.

FCC ID: P4U-MOD164

REPORT: V:\K\KAR-TECH\790AUT14\790AUT14 Test Report.docx

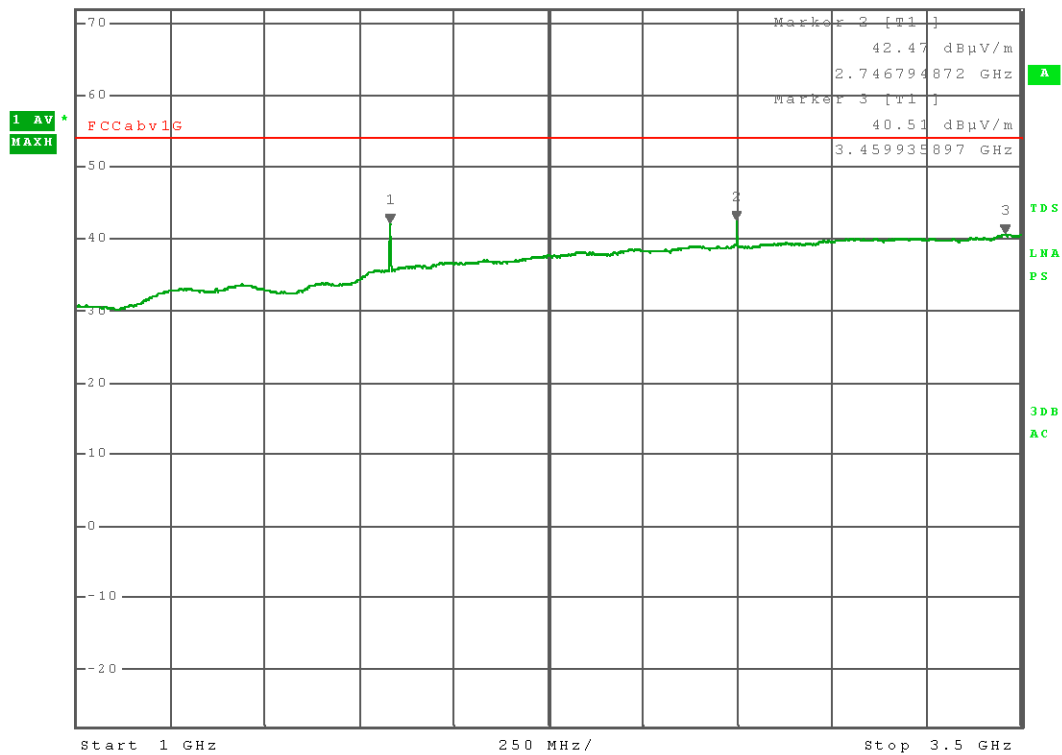


Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Horizontal
Detectors Used Average
Test Operator Mario de Aranzeta
Test Specification 15.247



20.May 14 16:21
 Ref 72 dBμV/m * Att 0 dB * RBW 1 MHz Marker 1 [T1] 42.03 dBμV/m
 * VBW 1 MHz SWT 10 ms 1.829326923 GHz



1 to 3.5 GHz (Average)



Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Vertical
Detectors Used Peak
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 11:30

Ref 72 dBμV/m

* Att 0 dB

* RBW 1 MHz

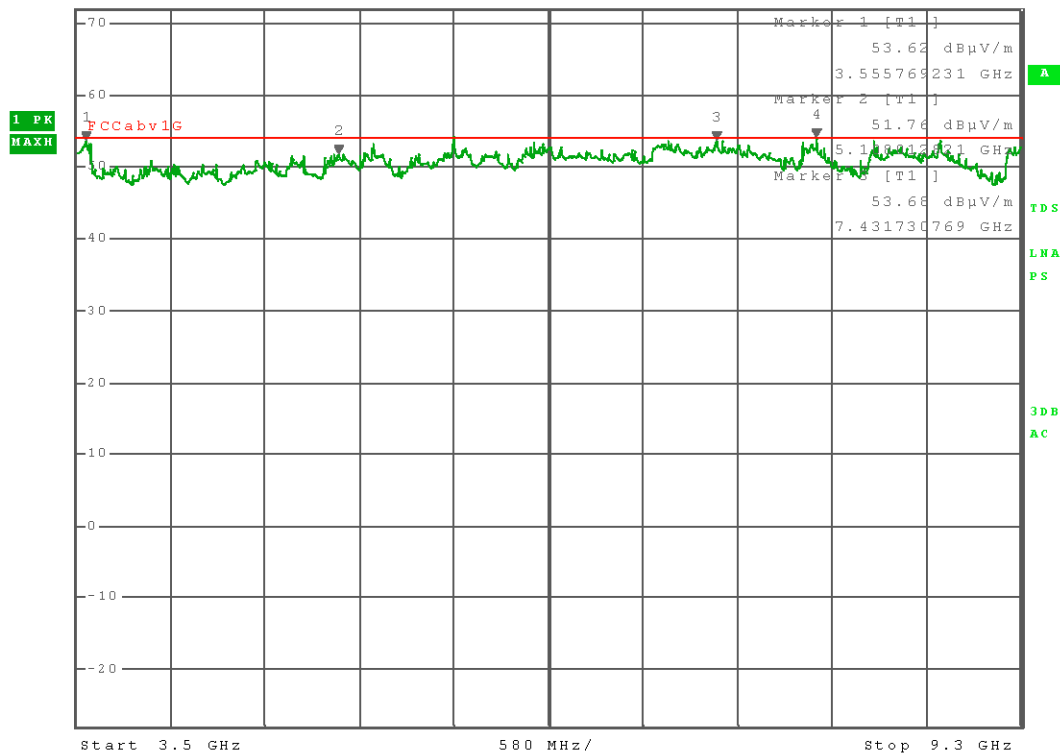
* VBW 1 MHz

SWT 35 ms

Marker 4 [T1]

53.96 dBμV/m

8.045192308 GHz



3.5 to 9.3 GHz (Peak)

APPLICANT: KAR-TECH INC.

FCC ID: P4U-MOD164

REPORT: V:\K\KAR-TECH\790AUT14\790AUT14 Test Report.docx



Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Vertical
Detectors Used Average
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 11:28

Ref 72 dBμV/m

* Att 0 dB

* RBW 1 MHz

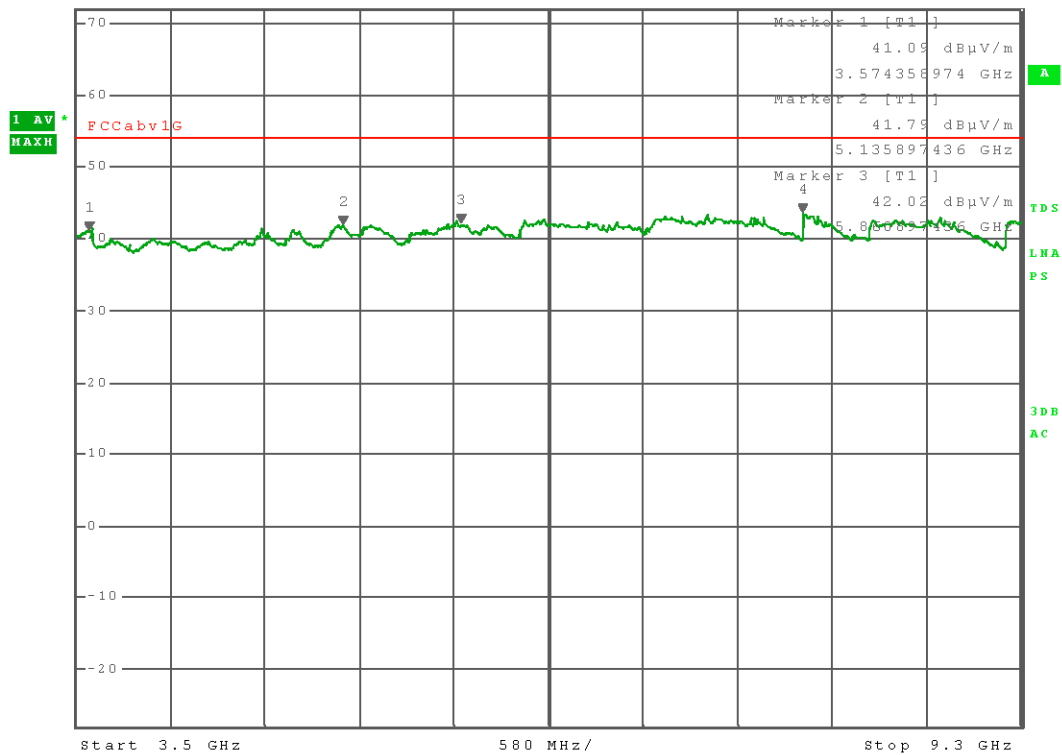
* VBW 1 MHz

SWT 35 ms

Marker 4 [T1]

43.63 dBμV/m

7.961538462 GHz



APPLICANT: KAR-TECH INC.

FCC ID: P4U-MOD164

REPORT: V:\K\KAR-TECH\790AUT14\790AUT14 Test Report.docx



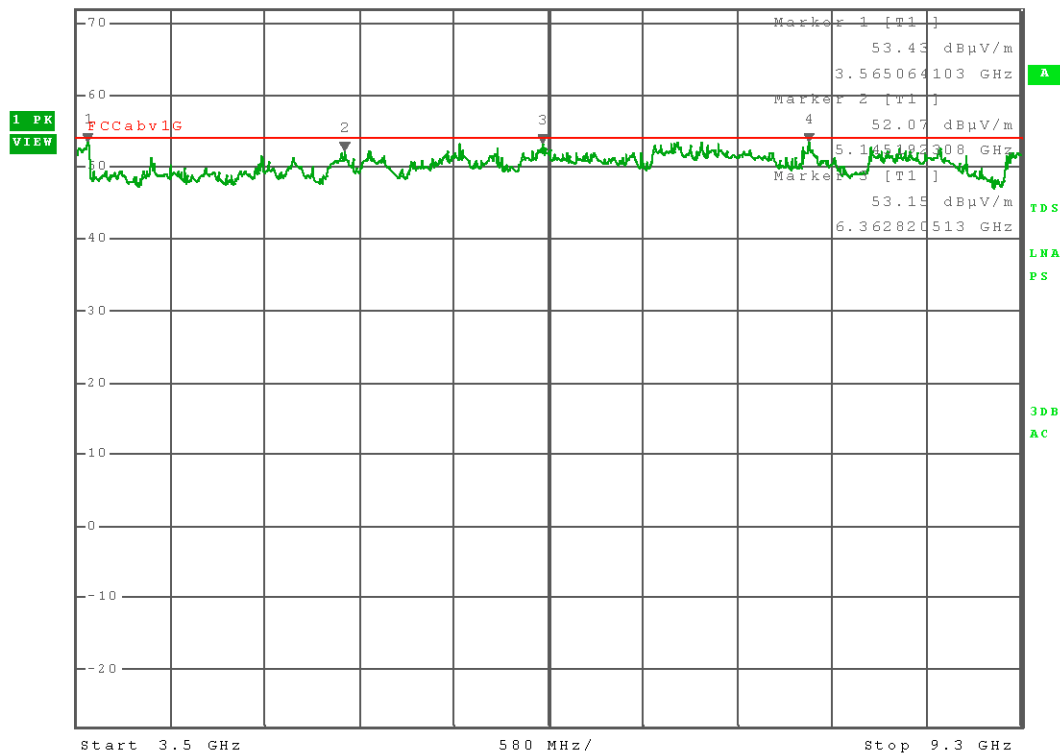
Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Horizontal
Detectors Used Peak
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 11:17
 Ref 72 dBμV/m * Att 0 dB SWT 35 ms

* RBW 1 MHz Marker 4 [T1]
 * VBW 1 MHz 53.43 dBμV/m
 7.998717949 GHz



3.5 to 9.3 GHz (Peak)



Radiated Emissions

Equipment Under Test Frequency Hopper
Test Mode Transmit
Antenna Polarity Horizontal
Detectors Used Average
Test Operator Mario de Aranzeta
Test Specification 15.247



21.May 14 11:19

Ref 72 dBμV/m

* Att 0 dB

* RBW 1 MHz

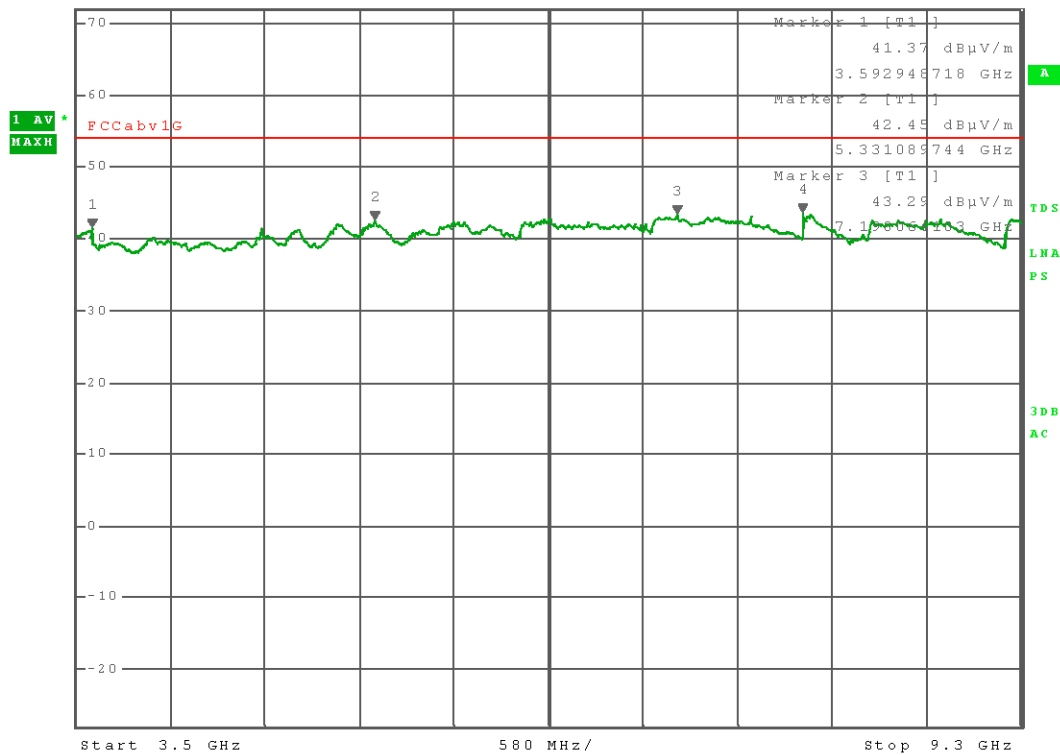
* VBW 1 MHz

SWT 35 ms

Marker 4 [T1]

43.50 dBμV/m

7.961538462 GHz



3.5 to 9.3 GHz (Average)

APPLICANT: KAR-TECH INC.

FCC ID: P4U-MOD164

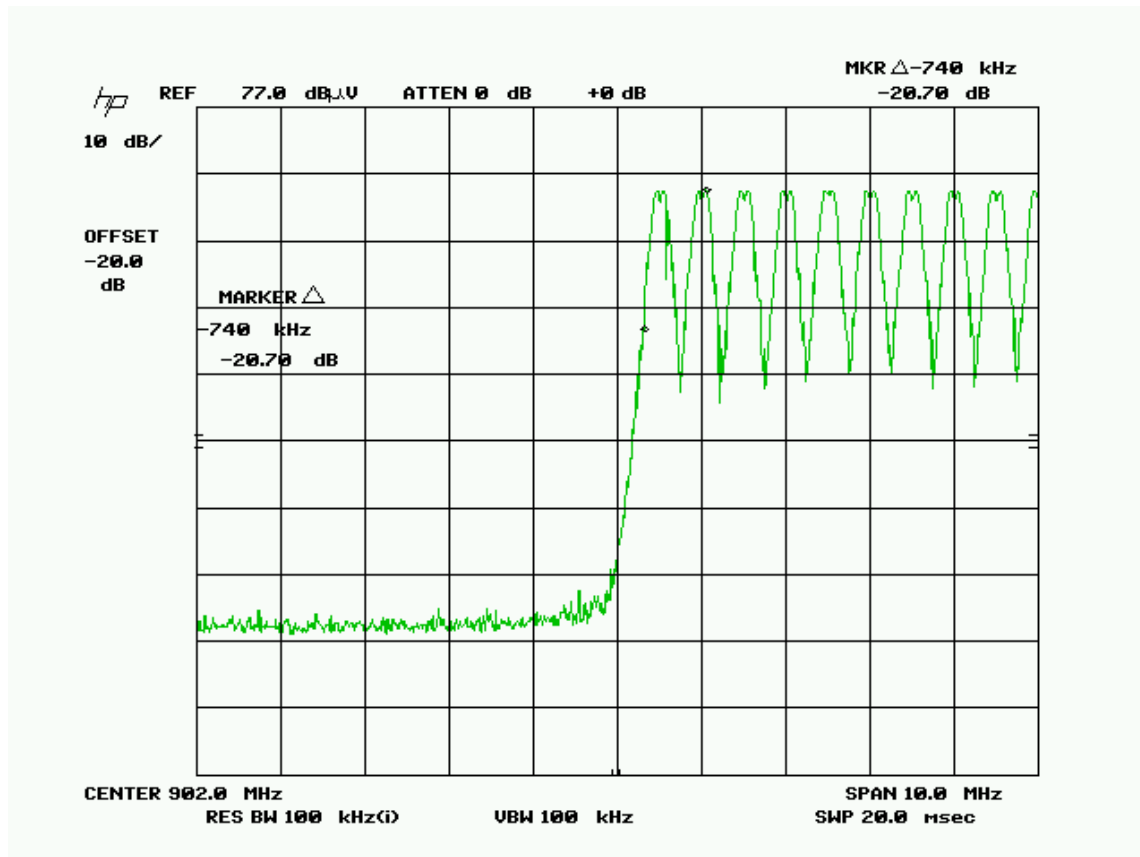
REPORT: V:\K\KAR-TECH\790AUT14\790AUT14 Test Report.docx

SPURIOUS EMISSIONS INTO ADJACENT BAND

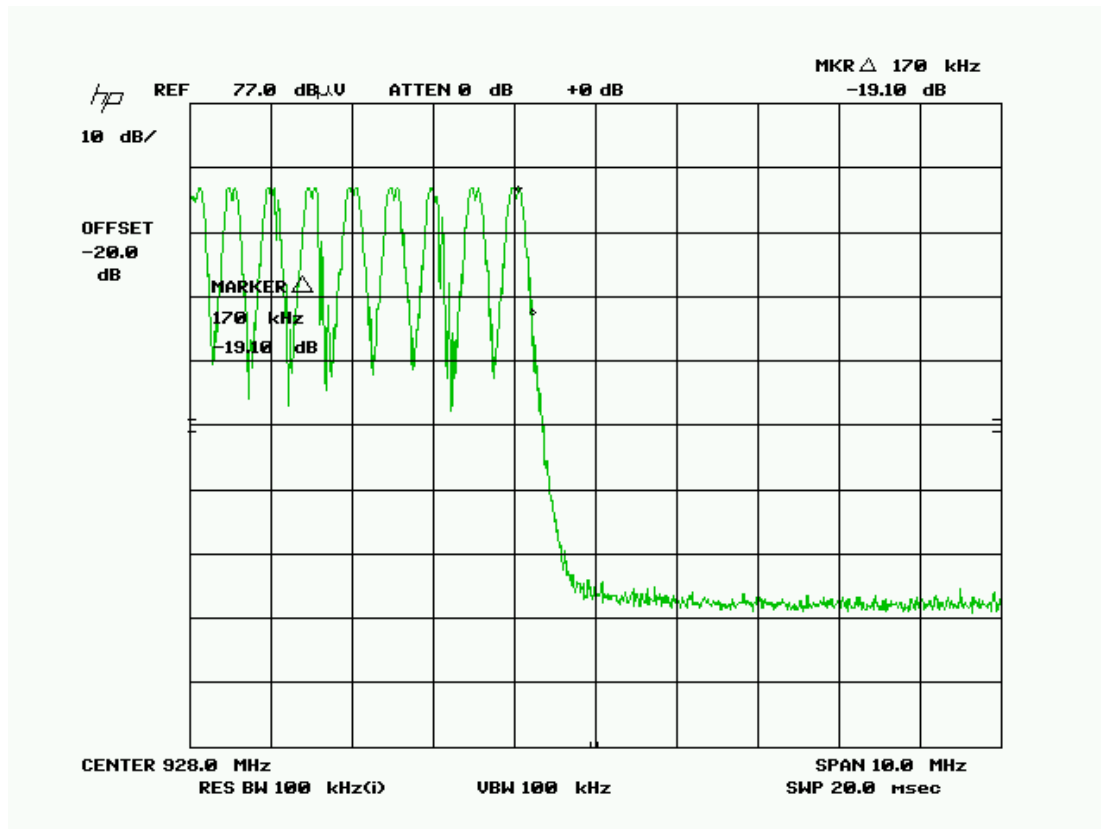
REQUIREMENTS: Emissions that fall in the restricted bands (15.205). These emissions must be less than or equal to 500 uV/m (54dBuV/m). Emissions not in the restricted band must be 20 dBc.

TEST DATA: The plots are presented below.

Lower bandedge peak detector (conducted)



Upper bandedge (peak detector) (conducted)



APPLICANT: KAR-TECH INC.

FCC ID: P4U-MOD164

REPORT: V:\K\KAR-TECH\790AUT14\790AUT14 Test Report.docx