



Test Report – FCC 15.249 Intentional Radiator

Applicant: Cattron North America Inc.

Approved for Release By:

Signature: Bruno Clavier

Name & Title: Bruno Clavier, General Manager

Date of Signature 9/2/2022

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Timco Engineering, Inc., an IIA Company
849 NW State Road 45, Newberry, Florida 32669
(352) 472-5500 / testing@timcoengr.com

1. Customer Information

Applicant: Cattron North America Inc.
Address: 655 N. River Road NW Suite A
Warren, OH 44483-2254, United States

1.1 Test Result Summary

The following regulatory standards were used FCC Title 47 CFR Part 15.249, IC RSS-210 Issue 8 A2.9 & RSS GEN Issue 4. The following test procedure was used ANSI C63.10-2013, C63.4-2014. Full test results are available in this report.

No additions to the test methods were needed. There were no deviations, or exclusions from the test methods. No test results are from external providers or from the customer. The test results relate only to the items tested. Timco does not offer opinions and interpretations, only a pass/fail statement.

FCC Rule Part No.	IC Standard Ref.	Requirement	Test Item	Result
2.1049	RSS-GEN 6.6	Occupied Bandwidth	99% Bandwidth	Pass
15.249(a)(c)	RSS-210 § A2.9(a)	Fundamental and Harmonics	Radiated Spurious Emissions	Pass
15.249(d)(e)	RSS-247 § 5.5	Spurious Emissions	Bandedge	N/A
			Radiated Spurious Emissions	Pass
15.207(a)	RSS-GEN § 8.8	AC Conducted Emissions	AC Powerline Conducted Emissions	N/A



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2. Location of Testing

2.1 Test Laboratory

Timco Engineering Inc. is a subsidiary of Industrial Inspection & Analysis, Inc. ("IIA"). Testing was performed at Timco's permanent laboratory located at 849 NW State Road 45, Newberry, Florida 32669

FCC test firm # 578780

FCC Designation # US1070

FCC site registration is under A2LA certificate # 0955.01

ISED Canada test site registration # 2056A

EU Notified Body # 1177

For all designations see A2LA scope # 0955.01

2.2 Testing was performed, reviewed by

Dates of Testing: 5/27/2022 – 6/01/2022

Signature:

Sr. EMC Engineer
EMC-003838-NE



Name & Title:

Tim Royer, EMC Engineer

Date of Signature

9/2/2022

Signature:

Name & Title:

Kristoffer Costa, EMC Technician

Date of Signature

9/2/2022



3. Test Sample(s) (EUT/DUT)

The test sample was received: 5/27/2022

3.1 Description of the EUT

A description as well as unambiguous identification of the EUT(s) tested. Where more than one sample is required for technical reasons (such as the use of connected units for the purpose of conducted output power testing where the product units will have integral antennas), each specific test shall identify which unit was tested.

Identification	
FCC ID:	CN289695
Brief Description	LRM2-900 MHZ Module
Type of Modular	N/A
Model(s) #	89695TRX
Firmware version	N/A
Software version	N/A
Serial Number	LA2PCA-8969A501

Technical Characteristics	
Technology	Low Power Transmitter Module
Frequency Range	902 -928 MHz
Modulation	N/A
Bandwidth & Emission Class	N/A
Number of Channels	N/A
Duty Cycle	38.85%
Antenna Connector	SMA
Voltage Rating (AC or Batt.)	3.3VDC



3.2 Configuration of EUT

Band (MHz)	Mode	Number of Ant.
902.45	Transmit	1
915		
927.75		

Operating conditions during Testing:

No modifications of the device under test (including firmware, specific software settings, and input/output signal levels to the EUT).

Peripherals used during Testing:

A laptop was used to program the EUT.

3.3 Test Setup of EUT

Equipment, antenna, and cable arrangement. The setup of the equipment and cable or wire placement on the test site that produces the highest radiated and the highest ac power-line conducted emissions shall be shown clearly and described. Information on the orientation of portable equipment during testing shall be included. Drawings or photographs may be used for this purpose.

Test Setups are included in the test report.



4. Test methods & Applicable Regulatory Limits

4.1 Test methods/Standards/Guidance

The measurement was performed as per FCC 15.249. Full test results are available in this report.

Limits and Regulatory Limits:

- 1) FCC 15.249

5. Measurement Uncertainty

Parameter	Uncertainty (dB)
Conducted Emissions	± 3.14 dB
Radiated Emissions (9kHz – 30 MHz)	± 3.08 dB
Radiated Emissions (30 – 200 MHz)	± 2.16 dB
Radiated Emissions (200 – 1000 MHz)	± 2.15 dB
Radiated Emissions (1 GHz – 18 GHz)	± 2.14 dB
Radiated Emissions (18 GHz – 40 GHz)	± 2.31 dB
Note: The uncertainties provided in this table represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of K=2.	

6. Environmental Conditions

Temperature & Humidity

Measurements performed at the test site did not exceed the following:

Parameter	Measurement
Temperature	23 C +/- 5%
Humidity	55% +/- 5%
Barometric Pressure	30.05 in Hg
Note: Specific environmental conditions that are applicable to a specific test are available in the test result section.	



7. List of Test Equipment and Test Facility

The test equipment used identified by type, manufacturer, serial number, or other identification and the date on which the next calibration or service check is due.

Description of the firmware or software used to operate EUT for testing purposes.

A complete list of all test equipment used shall be included with the test report. The manufacturer's model and serial numbers, and date of last calibration, and calibration interval shall be included. Measurement cable loss, measuring instrument bandwidth and detector function, video bandwidth, if appropriate, and antenna factors shall also be included where applicable.

List of Test Equipment

Test Equipment						
Type	Device	Manufacturer	Model	SN#	Current Cal	Cal Due
Antenna, NSA	Log-Periodic 1243	Eaton	96005	1243	5/4/21	5/3/2024
Antenna	Double-Ridged Horn/ETS Horn 1	ETS-Lindgren	3117	00035923	2/25/20	2/24/2023
CHAMBER	CHAMBER	Panashield	3M	N/A	3/12/19	12/21/2023
Pre-amp	Pre-amp	RF-LAMBDA	RLNA00M45GA	NA	2/27/19	7/26/2022
Receiver	EMI Test Receiver R&S ESU 40	Rohde & Schwarz	ESU 40	100320	5/27/21	5/26/2024
Receiver	EMI Test Receiver R&S ESW44	Rohde & Schwarz	ESW44	103049	10/13/21	10/12/2024
Function Generator	Function Generator	Standford	DS340	25200	1/13/21	1/13/2024
Signal Generator	Signal Generator HP 8648C	HP	8648C	3847A04696	3/31/21	3/30/2024

Software			
Software	Author	Version	Validation on
ESU Firmware	Rohde & Schwarz	4.43 SP3; BIOS v5.1-24-3	2018
RSCCommander	Rohde & Schwarz	1.6.4	2014
ScopeExplorer	LeCroy	v2.25.0.0	2009
Field Strength	Timco	v4.10.7.0	2016



8. Test Results

The results of the test are usually indicated in the form of tables, spectrum analyzer plots, charts, sample calculations, as appropriate for each test procedure.

A description and/or a block diagram of the test setup is usually provided.

The measurement results, along with the appropriate limits for comparison, may be presented in tabular or graphical form. In addition, any variation in the measurement environment may be reported if applicable (e.g., a significant change of temperature that could affect the cable loss and amplifier response).

Units of measurement

Unless noted otherwise in the referenced standard, the measurements of ac power-line conducted emissions and conducted power output will be reported in units of dBμV. Unless noted otherwise in the referenced standard, the measurements of radiated emissions will be reported in units of decibels, referenced to one microvolt per meter (dBμV/m) for electric fields, or to one ampere per meter (dBA/m) for magnetic fields, at the distance specified in the appropriate standards or requirements. The measurements of antenna-conducted power for receivers may be reported in units of dBμV if the impedance of the measuring instrument is also reported. Otherwise, antenna-conducted power will be reported in units of decibels referenced to one milliwatt (dBm). All formulas for data conversions and conversion factors, if used, will be included in this measurement report.

Example:

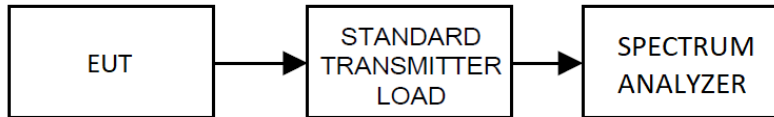
Freq (MHz)	Meter Reading	+ ACF	+CL	= FS
33	20 dBμV	+ 10.36 dB/m	+0.40 dB	=30.36 dBμV/m @ 3m

$$\text{EIRP} = \text{Pcond (dBm)} + \text{dBi}$$

8.1 OCCUPIED BANDWIDTH

Requirements and limits from FCC 2.1049, IC RSS GEN § 6.6. Test method from ANSI C63.10 § 6.9.3

Setup

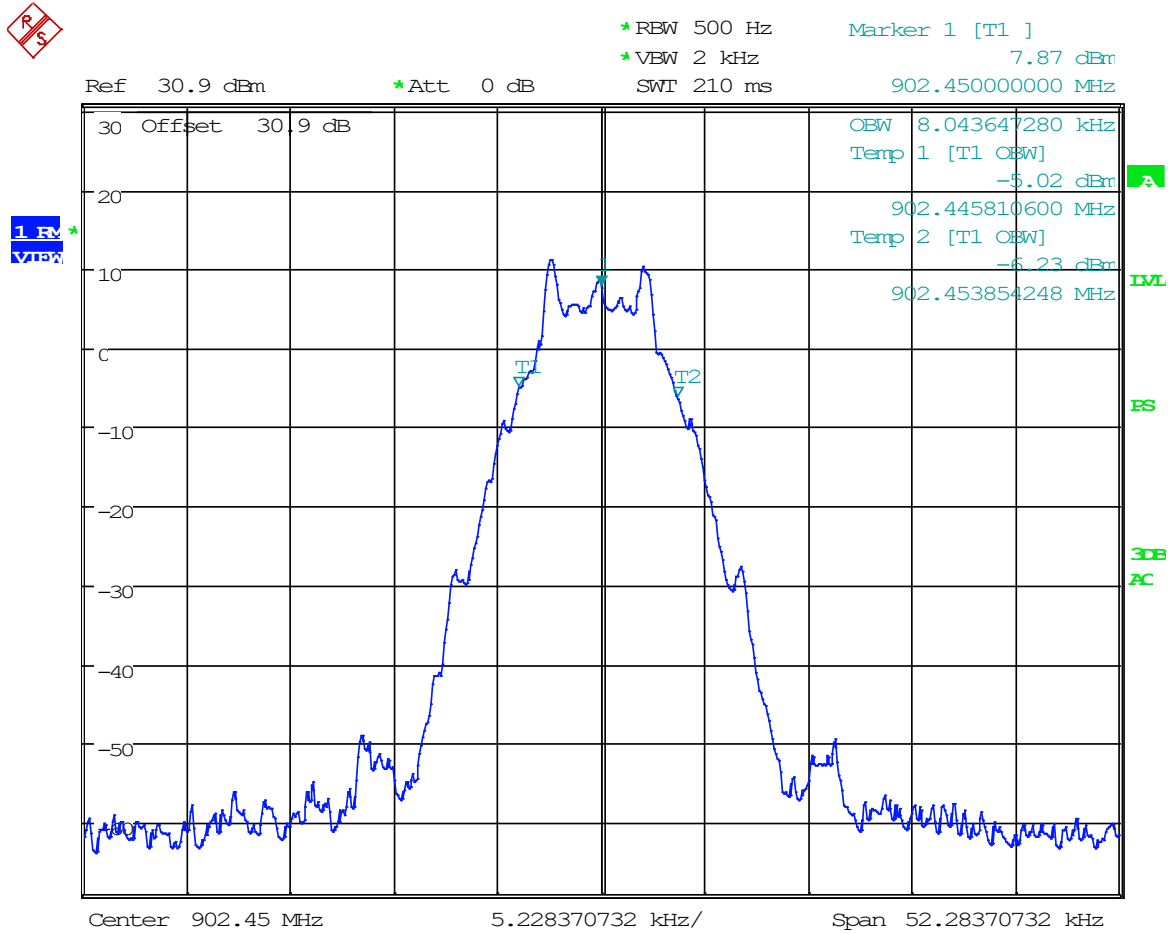


99% Bandwidth Measurement Table

Mode 1: w cm 0	
Tuned Frequency (MHz)	99% Occupied Bandwidth Limit (kHz)
902.45	8.04
915	8.08
927.75	8.04

Mode 2: w cm 1	
Tuned Frequency (MHz)	99% Occupied Bandwidth Limit (kHz)
902.45	17.00
915	17.18
927.75	17.09

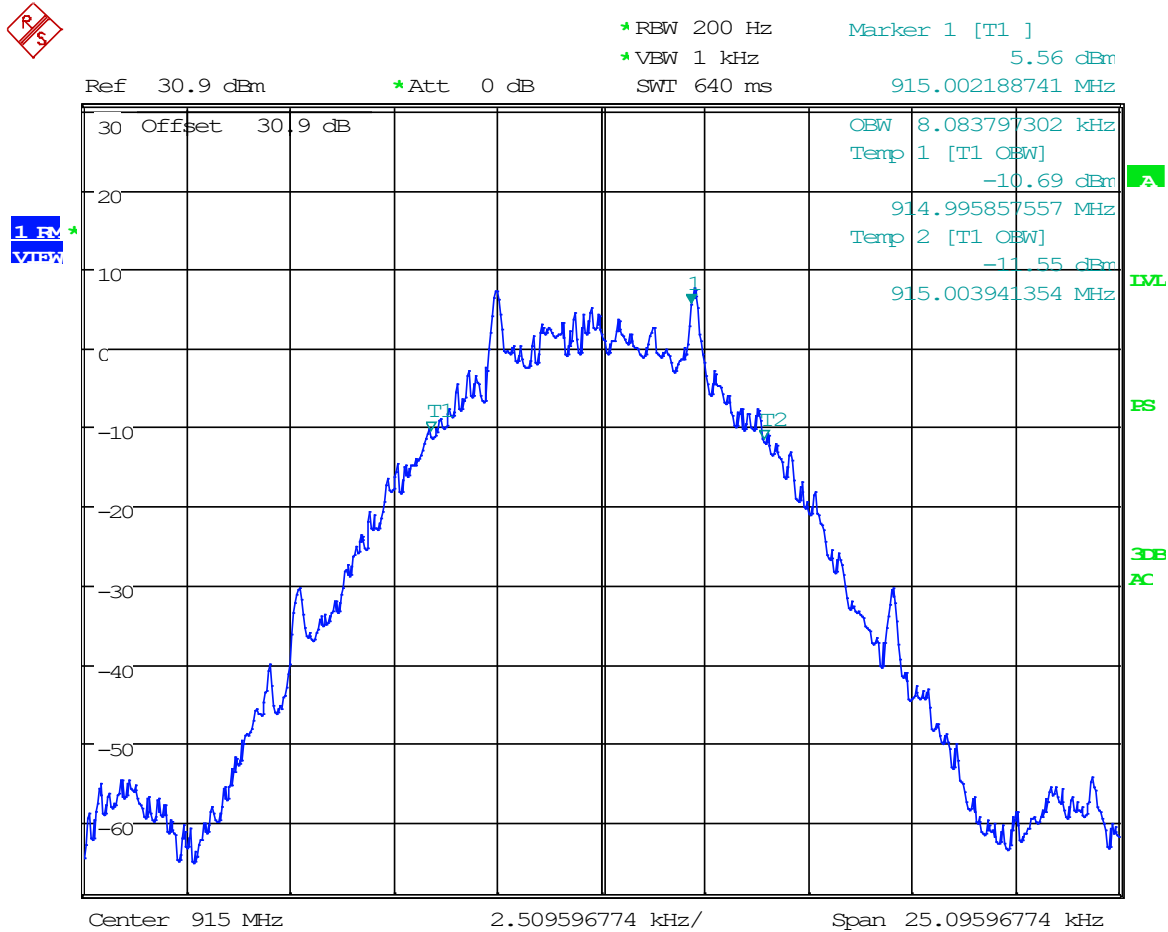
8.1.1 99% Bandwidth Plot, Mode 1, 902.45 MHz



Date: 31.MAY.2022 10:54:49



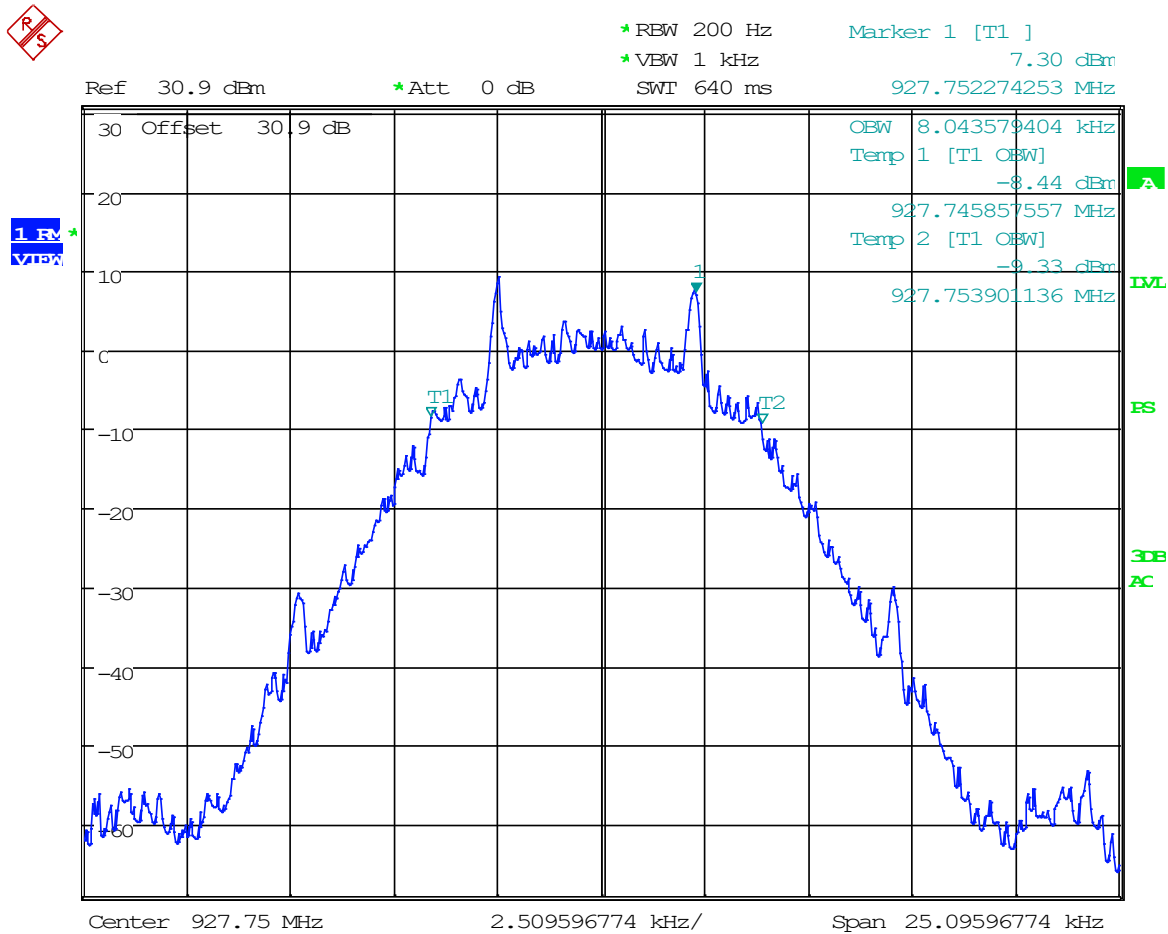
8.1.2 99% Bandwidth Plot, Mode 1, 915 MHz



Date: 31.MAY.2022 11:01:22



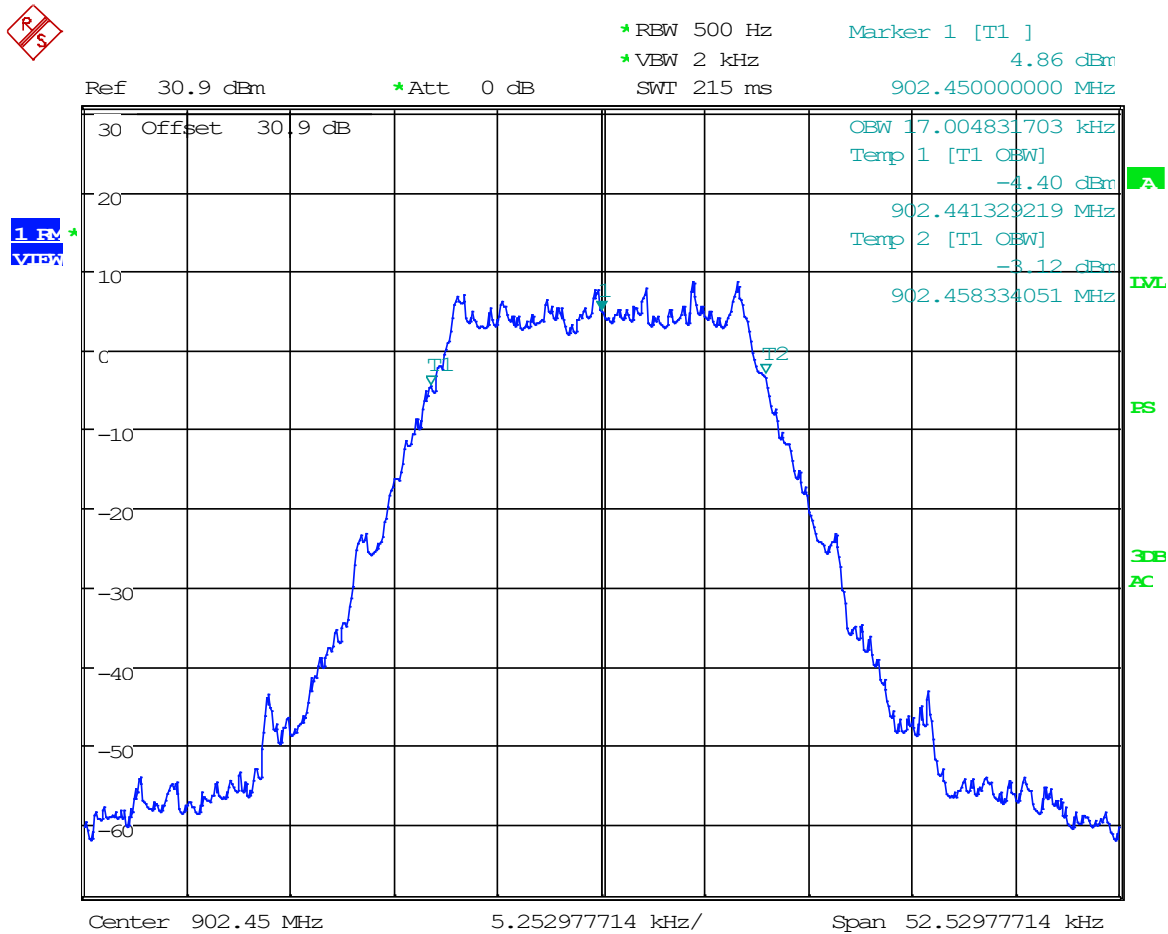
8.1.3 99% Bandwidth Plot, Mode 1, 927.75 MHz



Date: 31.MAY.2022 11:04:13



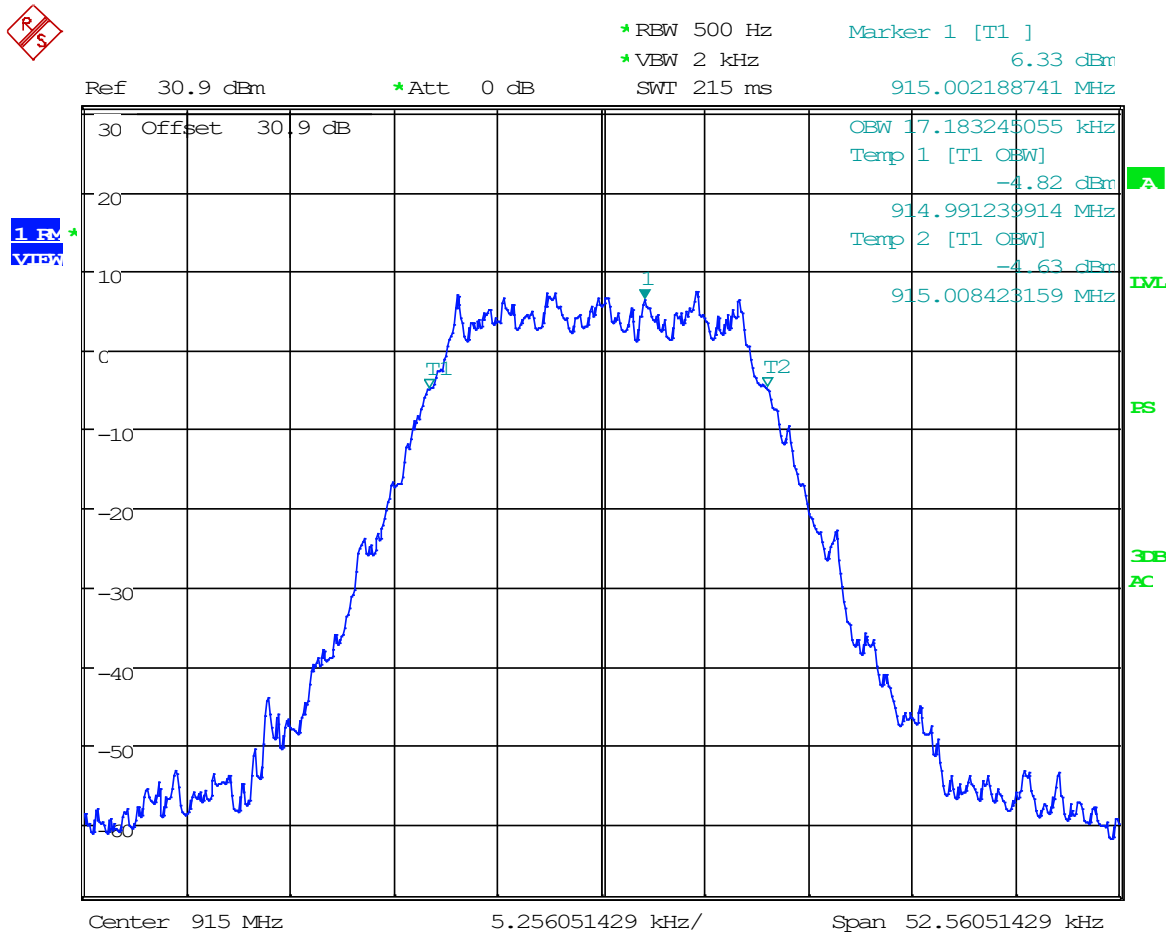
8.1.4 99% Bandwidth Plot, Mode 2, 902.45 MHz



Date: 31.MAY.2022 10:59:18



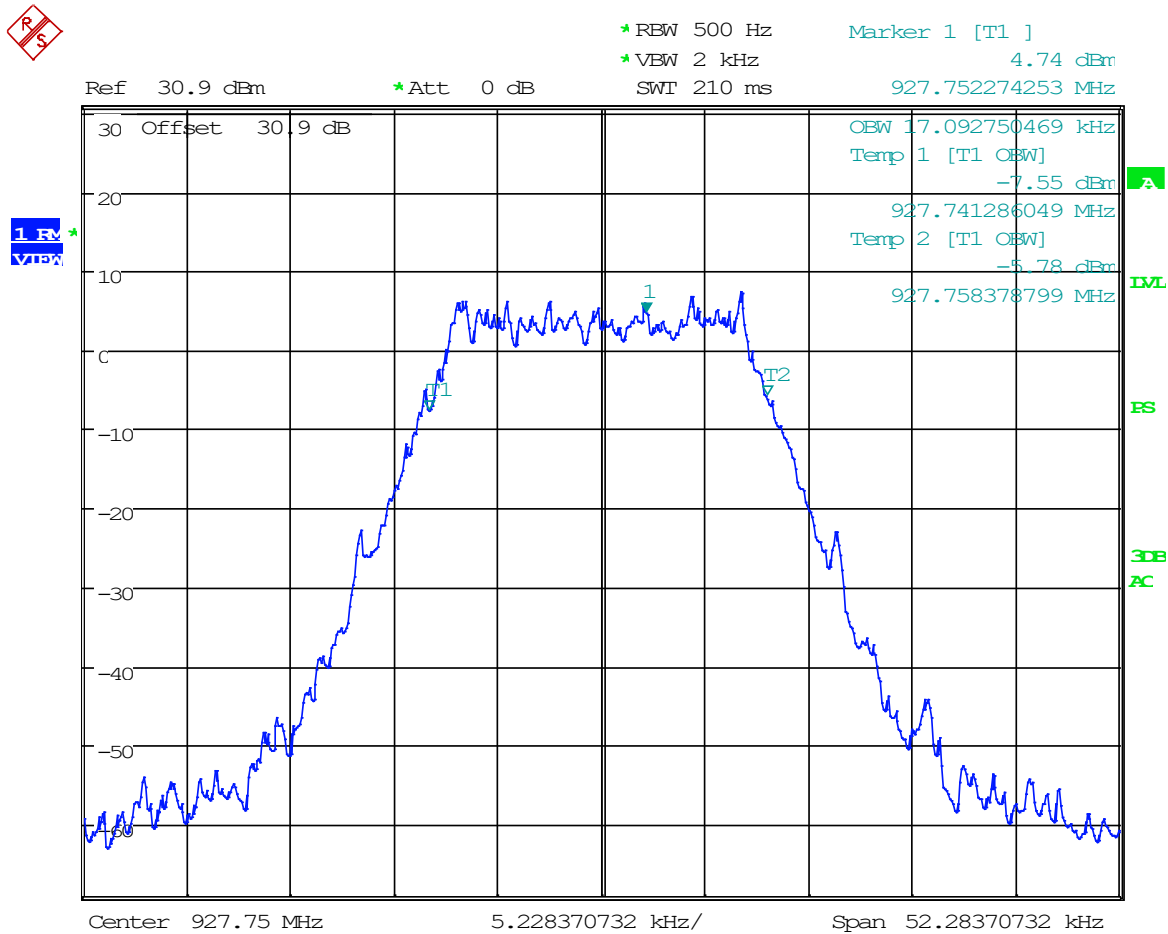
8.1.5 99% Bandwidth Plot, Mode 2, 915 MHz



Date: 31.MAY.2022 11:02:36



8.1.6 99% Bandwidth Plot, Mode 2, 927.75 MHz



Date: 31.MAY.2022 11:05:12

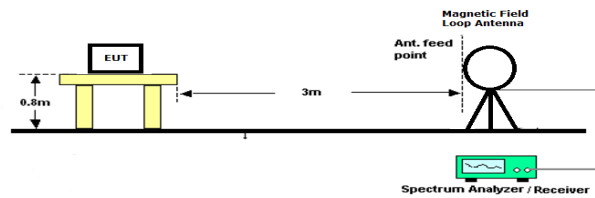
8.2 Radiated Spurious Emissions

Requirements:

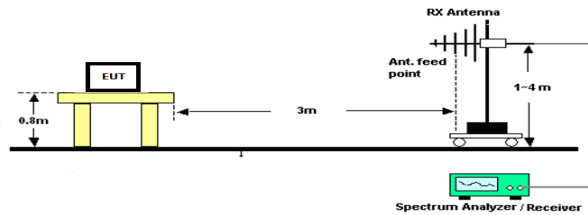
Requirements and limits from FCC part 15.249 (a)(c)(d)(e).

Setup:

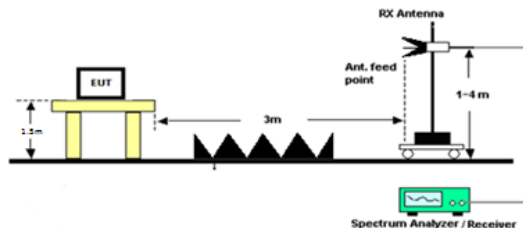
Radiated Test Setup, Below 30 MHz



Radiated Test Setup, 30 – 1000 MHz



Radiated Test Setup, Above 1000 MHz





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Radiated Emissions Tabular Data

8.2.1 Fundamental Data

Tuned Frequency (MHz)	Detector	Meter Reading (dBμV)	Antenna Polarity	Coax Loss (dB)	Duty Cycle Correction (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
902.45	PK	61.10	H	3.54	8.21	21.95	3.00	78.38	93.98	15.60
902.45	PK	70.57	V	3.54	8.21	21.95	3.00	87.85	93.98	6.13
915.00	PK	67.84	H	3.57	8.21	22.60	3.00	85.79	93.98	8.19
915.00	PK	72.70	V	3.57	8.21	22.60	3.00	90.65	93.98	3.33
927.75	PK	64.12	H	3.58	8.21	22.26	3.00	81.74	93.98	12.24
927.75	PK	71.40	V	3.58	8.21	22.26	3.00	89.02	93.98	4.96

Note: Fundamental data was taken using Test Level 2 (ex: w cm 0 902450000 tpx 2 test 3)



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Radiated Emissions Tabular Data

8.2.2 Field Strength at 3 Meters, 902.45 MHz

Tuned Frequency (MHz)	Emission Frequency (MHz)	15.205 Restricted Band	15.205, 15.35, 15.247(d) Detector	Meter Reading (dBμV)	Antenna Polarity	Coax Loss (dB)	Duty Cycle Correction (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
902.45	1804.90		PK	25.50	H	4.90	8.21	30.35	3.00	52.54	53.98	1.44
902.45	1804.90		PK	25.10	V	4.90	8.21	30.35	3.00	52.14	53.98	1.84
902.45	2707.35	X	PK	14.70	H	5.99	8.21	32.49	3.00	44.97	73.98	29.01
902.45	2707.35	X	PK	14.70	V	5.99	8.21	32.49	3.00	44.97	73.98	29.01
902.45	2707.35	X	AVG	0.90	H	5.99	8.21	32.49	3.00	31.17	53.98	22.81
902.45	2707.35	X	AVG	0.80	V	5.99	8.21	32.49	3.00	31.07	53.98	22.91
902.45	3609.80	X	PK	8.30	H	6.65	8.21	33.12	3.00	39.86	73.98	34.12
902.45	3609.80	X	PK	5.40	V	6.65	8.21	33.12	3.00	36.96	73.98	37.02
902.45	3609.80	X	AVG	-6.20	H	6.65	8.21	33.12	3.00	25.36	53.98	28.62
902.45	3609.80	X	AVG	-8.20	V	6.65	8.21	33.12	3.00	23.36	53.98	30.62
902.45	4512.25	X	PK	6.10	H	7.36	8.21	33.91	3.00	39.16	73.98	34.81
902.45	4512.25	X	PK	5.90	V	7.36	8.21	33.91	3.00	38.96	73.98	35.01
902.45	4512.25	X	AVG	-7.10	H	7.36	8.21	33.91	3.00	25.96	53.98	28.01
902.45	4512.25	X	AVG	-7.20	V	7.36	8.21	33.91	3.00	25.86	53.98	28.11
902.45	5414.70	X	PK	5.10	H	8.15	8.21	34.39	3.00	39.43	73.98	34.55
902.45	5414.70	X	PK	4.70	V	8.15	8.21	34.39	3.00	39.03	73.98	34.95
902.45	5414.70	X	AVG	-8.70	H	8.15	8.21	34.39	3.00	25.63	53.98	28.35
902.45	5414.70	X	AVG	-8.60	V	8.15	8.21	34.39	3.00	25.73	53.98	28.25
902.45	6317.15		PK	3.20	H	8.62	8.21	35.39	3.00	38.99	53.98	14.99
902.45	6317.15		PK	3.20	V	8.62	8.21	35.39	3.00	38.99	53.98	14.99
902.45	7219.60		PK	0.70	H	9.53	8.21	36.37	3.00	38.39	53.98	15.59
902.45	7219.60		PK	0.80	V	9.53	8.21	36.37	3.00	38.49	53.98	15.49
902.45	8122.05	X	PK	-0.10	H	9.96	8.21	35.80	3.00	37.45	73.98	36.53
902.45	8122.05	X	PK	-0.90	V	9.96	8.21	35.80	3.00	36.65	73.98	37.33
902.45	8122.05	X	AVG	-13.80	H	9.96	8.21	35.80	3.00	23.75	53.98	30.23
902.45	8122.05	X	AVG	-13.90	V	9.96	8.21	35.80	3.00	23.65	53.98	30.33
902.45	9024.50	X	PK	-3.20	H	10.69	8.21	36.12	3.00	35.40	73.98	38.58
902.45	9024.50	X	PK	-3.60	V	10.69	8.21	36.12	3.00	35.00	73.98	38.98
902.45	9024.50	X	AVG	-16.70	H	10.69	8.21	36.12	3.00	21.90	53.98	32.08
902.45	9024.50	X	AVG	-16.80	V	10.69	8.21	36.12	3.00	21.80	53.98	32.18



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8.2.3 Field Strength at 3 Meters, 915 MHz

Tuned Frequency (MHz)	Emission Frequency (MHz)	15.205 Restricted Band	15.205, 15.35, 15.247(d) Detector	Meter Reading (dBμV)	Antenna Polarity	Coax Loss (dB)	Duty Cycle Correction (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
915.00	1830.00		PK	25.20	H	4.94	8.21	30.65	3.00	52.57	53.98	1.41
915.00	1830.00		PK	24.60	V	4.94	8.21	30.65	3.00	51.97	53.98	2.01
915.00	2745.00	X	PK	11.80	H	6.08	8.21	32.40	3.00	42.07	73.98	31.91
915.00	2745.00	X	PK	12.30	V	6.08	8.21	32.40	3.00	42.57	73.98	31.41
915.00	2745.00	X	AVG	-1.60	H	6.08	8.21	32.40	3.00	28.67	53.98	25.31
915.00	2745.00	X	AVG	-1.50	V	6.08	8.21	32.40	3.00	28.77	53.98	25.21
915.00	3660.00	X	PK	10.10	H	6.62	8.21	33.20	3.00	41.70	73.98	32.28
915.00	3660.00	X	PK	10.20	V	6.62	8.21	33.20	3.00	41.80	73.98	32.18
915.00	3660.00	X	AVG	-3.90	H	6.62	8.21	33.20	3.00	27.70	53.98	26.28
915.00	3660.00	X	AVG	-3.70	V	6.62	8.21	33.20	3.00	27.90	53.98	26.08
915.00	4575.00	X	PK	7.50	H	7.53	8.21	34.03	3.00	40.84	73.98	33.14
915.00	4575.00	X	PK	7.40	V	7.53	8.21	34.03	3.00	40.74	73.98	33.24
915.00	4575.00	X	AVG	-6.30	H	7.53	8.21	34.03	3.00	27.04	53.98	26.94
915.00	4575.00	X	AVG	-6.20	V	7.53	8.21	34.03	3.00	27.14	53.98	26.84
915.00	5490.00		PK	4.70	H	8.07	8.21	34.47	3.00	39.03	53.98	14.95
915.00	5490.00		PK	5.00	V	8.07	8.21	34.47	3.00	39.33	53.98	14.65
915.00	6405.00		PK	2.00	H	8.95	8.21	35.46	3.00	38.20	53.98	15.78
915.00	6405.00		PK	1.60	V	8.95	8.21	35.46	3.00	37.80	53.98	16.18
915.00	7320.00	X	PK	0.10	H	9.61	8.21	36.24	3.00	37.73	73.98	36.24
915.00	7320.00	X	PK	-0.10	V	9.61	8.21	36.24	3.00	37.53	73.98	36.44
915.00	7320.00	X	AVG	-13.40	H	9.61	8.21	36.24	3.00	24.23	53.98	29.74
915.00	7320.00	X	AVG	-13.30	V	9.61	8.21	36.24	3.00	24.33	53.98	29.64
915.00	8235.00	X	PK	-1.30	H	10.00	8.21	35.80	3.00	36.29	73.98	37.69
915.00	8235.00	X	PK	-1.20	V	10.00	8.21	35.80	3.00	36.39	73.98	37.59
915.00	8235.00	X	AVG	-15.00	H	10.00	8.21	35.80	3.00	22.59	53.98	31.39
915.00	8235.00	X	AVG	-14.90	V	10.00	8.21	35.80	3.00	22.69	53.98	31.29
915.00	9150.00	X	PK	-4.00	H	10.81	8.21	36.18	3.00	34.78	73.98	39.20
915.00	9150.00	X	PK	-4.20	V	10.81	8.21	36.18	3.00	34.58	73.98	39.40
915.00	9150.00	X	AVG	-17.30	H	10.81	8.21	36.18	3.00	21.48	53.98	32.50
915.00	9150.00	X	AVG	-17.40	V	10.81	8.21	36.18	3.00	21.38	53.98	32.60



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8.2.4 Field Strength at 3 Meters, 927.75 MHz

Tuned Frequency (MHz)	Emission Frequency (MHz)	15.205 Restricted Band	15.205, 15.35, 15.247(d) Detector	Meter Reading (dBμV)	Antenna Polarity	Coax Loss (dB)	Duty Cycle Correction (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dB)
927.75	1855.50		PK	25.30	H	4.99	8.21	30.89	3.00	52.97	53.98	1.01
927.75	1855.50		PK	25.20	V	4.99	8.21	30.89	3.00	52.87	53.98	1.11
927.75	2783.25	X	PK	12.80	H	6.16	8.21	32.47	3.00	43.21	73.98	30.77
927.75	2783.25	X	PK	12.30	V	6.16	8.21	32.47	3.00	42.71	73.98	31.27
927.75	2783.25	X	AVG	-1.10	H	6.16	8.21	32.47	3.00	29.31	53.98	24.67
927.75	2783.25	X	AVG	-1.10	V	6.16	8.21	32.47	3.00	29.31	53.98	24.67
927.75	3711.00	X	PK	5.00	H	6.56	8.21	33.18	3.00	36.53	73.98	37.45
927.75	3711.00	X	PK	5.40	V	6.56	8.21	33.18	3.00	36.93	73.98	37.05
927.75	3711.00	X	AVG	-8.70	H	6.56	8.21	33.18	3.00	22.83	53.98	31.15
927.75	3711.00	X	AVG	-8.70	V	6.56	8.21	33.18	3.00	22.83	53.98	31.15
927.75	4638.75	X	PK	5.60	H	7.50	8.21	33.94	3.00	38.83	73.98	35.15
927.75	4638.75	X	PK	5.90	V	7.50	8.21	33.94	3.00	39.13	73.98	34.85
927.75	4638.75	X	AVG	-8.00	H	7.50	8.21	33.94	3.00	25.23	53.98	28.75
927.75	4638.75	X	AVG	-8.00	V	7.50	8.21	33.94	3.00	25.23	53.98	28.75
927.75	5566.50		PK	2.30	H	8.07	8.21	34.42	3.00	36.57	53.98	17.41
927.75	5566.50		PK	2.80	V	8.07	8.21	34.42	3.00	37.07	53.98	16.91
927.75	6494.25		PK	1.90	H	9.07	8.21	35.53	3.00	38.30	53.98	15.68
927.75	6494.25		PK	2.00	V	9.07	8.21	35.53	3.00	38.40	53.98	15.58
927.75	7422.00	X	PK	-1.20	H	9.53	8.21	36.03	3.00	36.15	73.98	37.83
927.75	7422.00	X	PK	-1.60	V	9.53	8.21	36.03	3.00	35.75	73.98	38.23
927.75	7422.00	X	AVG	-15.50	H	9.53	8.21	36.03	3.00	21.85	53.98	32.13
927.75	7422.00	X	AVG	-15.60	V	9.53	8.21	36.03	3.00	21.75	53.98	32.23
927.75	8349.75	X	PK	-3.30	H	10.16	8.21	35.91	3.00	34.55	73.98	39.43
927.75	8349.75	X	PK	-2.70	V	10.16	8.21	35.91	3.00	35.15	73.98	38.83
927.75	8349.75	X	AVG	-16.70	H	10.16	8.21	35.91	3.00	21.15	53.98	32.83
927.75	8349.75	X	AVG	-16.80	V	10.16	8.21	35.91	3.00	21.05	53.98	32.93
927.75	9277.50		PK	-2.10	H	10.86	8.21	36.31	3.00	36.85	53.98	17.13
927.75	9277.50		PK	-2.50	V	10.86	8.21	36.31	3.00	36.45	53.98	17.53



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9. ANNEX-A - Photographs of the EUT

Photographs of the EUT and any manufacturer supplied accessories to be used with the EUT are in a separate document.

10. ANNEX-B – Test Setup Photographs

Test setup photographs are located in a separate document.

11. History of Test Report Changes

Test Report #	Revision #	Description	Date of Issue
TR_2478-22_FCC_15.249_	1	Initial release	6/01/2022



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END OF TEST REPORT
