Test Report # TR_3289-20_FCC_PT22_1
Revision: 1
Issue Date: September 28, 2020
Final Test Date: September 15, 2020

A2LA ACCREDITED
CERTIFICATE #0955.01

TIMCO ENGINEERING, Inc.
An IIA Company

Test Report - FCC PART 22 / TNB
Prepared For: KP Electronic Systems Ltd.

Approved for Release By:

Signature: Bruno Clavier

Name & Title: Bruno Clavier, General Manager
Date of Signature (YYYY-MM-DD): 2020-09-28

Table of Contents

1. Customer Information

Applicant: KP Electronic Systems Ltd.
Address: P.O. BOX 42, TEFEN INDUSTRIAL PARK, , 24959, IL

Contact:: Efi Rushinek
Telephone: +972 4-987-3066
Email address: efi@kpsystems.com

1.1 Test Result Summary

The following test procedure and guidance were used for measuring FCC PART 90 (Private Land Mobile Radio Service) known as Licensed Land Mobile; ANSI C63.26-2015. 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.

The Following is for Test item FCC ID: H78KPMT2W-MK

FCC Clauses	Description of the requirements	Result: (Pass, Fail, N/A)
Applicable Clauses from Part 2		
2.202	Bandwidth & Emission	Reported
2.1033 (c)(8)	Power at the Final Amplifier	Reported
2.1046 (a)	RF Output Power	Pass
2.1047	Modulation characteristics	Pass
2.1049	Occupied Bandwidth	Reported
2.1051	Spurious emissions at antenna terminals	Pass
2.1053	Field strength of spurious radiation	Pass
2.1055	Frequency stability	Pass
Applicable Clauses from Part 90		
22.565	Transmitting Power Limits	Pass
22.357	Emission Types	Pass
22.359	Emission Limitations	Pass
22.355	Frequency Tolerance	Pass

2. Location of Testing

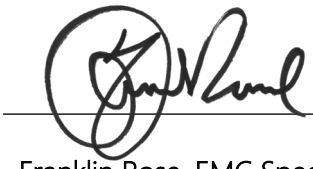
2.1 Test Laboratory

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

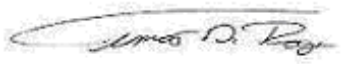
FCC test firm # 578780
FCC Designation # US1070
FCC site registration is under A2LA certificate # 0955.01
ISED Canada test site registration # 2056A
EU Notified Body # 1177
For all designations see A2LA scope # 0955.01

2.2 Testing was performed, reviewed by

Dates of Testing: September 8 - 15, 2020

Signature: 

Name & Title: Franklin Rose, EMC Specialist
Date of Signature
(YYYY-MM-DD): 2020-09-28

Signature: 

Sr. EMC Engineer
EMC-003838-NE

Name & Title: Tim Royer, EMC Engineer
Date of Signature
(YYYY-MM-DD): 2020-09-28

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

The test sample was received: September 16, 2020

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:	H78KPMT2W-MK
Brief Description	UHF Automatic Meter Reading transceiver
Type of Modular	n/a
Model(s) #	MT2W-MK
Trade name	n/a
Firmware version	n/a
Software version	n/a
Serial Number	n/a

Technical Characteristics	
Technology	FM Data
Frequency Range	454 - 455 MHz
RF O/P Power (Max.)	3 W
Modulation	FM
Bandwidth & Emission Class	11K3F1D
Number of Channels	1
Duty Cycle	100%
Antenna Type	Integrated
Antenna Gain (for each ant.)	0 dBi
Antenna Connector	N/A
Voltage Rating (AC or Batt.)	Battery 12.5 V

Antenna Characteristics			
Frequency Range	Mode / BW	Ant Gain 1	Ant Gain 2
450 - 470	n/a	0 dBi	n/a

3.2 Configuration of EUT

Test Modes						
Band	Mode (#)	Mode (Type)	Test Frequencies	BW (nominal)	Modulation	Number of Antennas
454 – 455 MHz	1	FM	454.2 MHz	11.25 kHz	FM	1

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:

No peripherals used.

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:

Test procedures and guidance for measuring Licensed Part 22 device; ANSI C63.26-2015.

1) ANSI C63.26-2015

4.2 Applied Limits and Regulatory Limits:

2) FCC CFR 47 Part 22

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

6.1 Temperature & Humidity

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

Temperature	23 C +/- 5%
Humidity	55% +/- 5%
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.

7.1 List of Test Equipment

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.

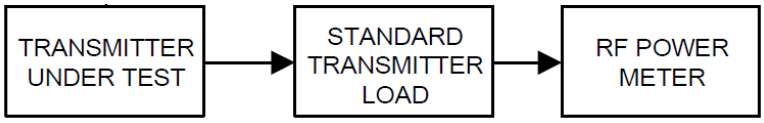
A description and/or a block diagram of the test setup is usually provided.

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).

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.

8.1 Bandwidth & Emission

Limits from FCC Part 2.201 - 2.202, FCC Part 22.357 and test procedure from ANSI C63.26-2015.

Test Setup


Test Results		
Occupied Bandwidth (kHz)	Necessary Bandwidth	Emission Type
4.51	11K3	F1D

8.2 Power at the Final Amplifier

Limits from FCC Part 2.1033 (c)(8).

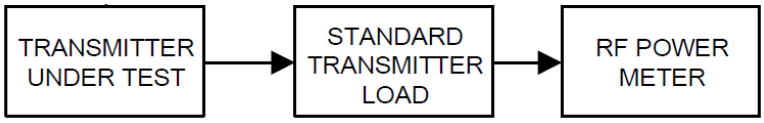
No method of measurement is specified. The result has been calculated based on all available information.

Test Results		
EUT Operating Voltage (V)	EUT Current (A)	Power at the Final Amplifier
12.5 V DC	0.8 A	10 W

8.3 RF Output Power

Limits from FCC Part 2.1046(a), FCC Part 22.565 and test procedure from ANSI C63.26-2015.

Test Setup

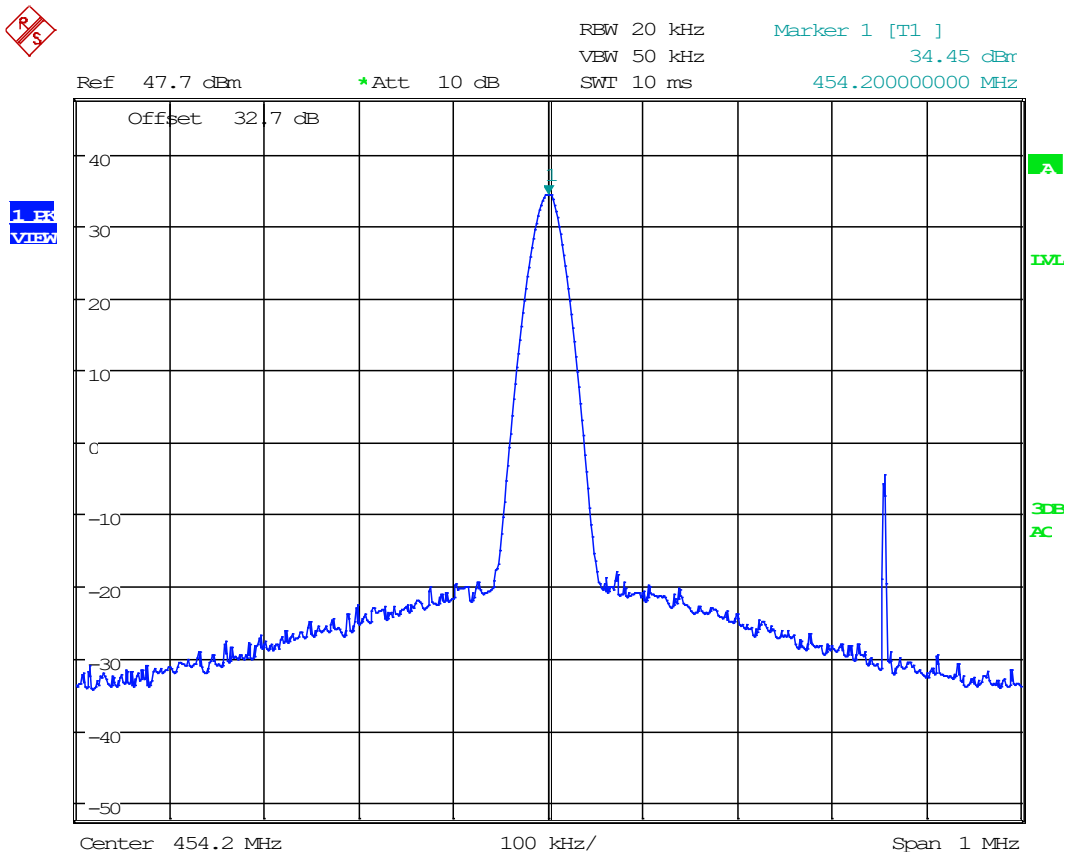


Test Results, Mode 1

Tuned Frequency (MHz)	Power Output (dBm)	Power Output (W)
454.2	34.45	2.79

Conducted Output Power, Spectrum Plots

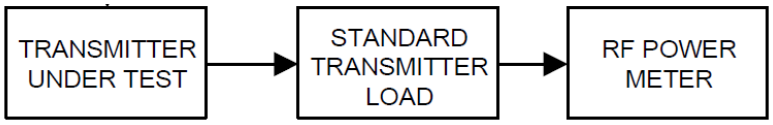
8.3.1 RF Output Power, 454.2 MHz



Date: 10.SEP.2020 15:22:56

8.4 Modulation Characteristics

Limits from FCC Part 2.1047 and test procedure from ANSI C63.26-2015

Conducted Test Setup


Modulation Characteristics, Data Plots

8.4.1 Audio Frequency Response, 454.2 MHz

N/A. Device does not carry Audio.

8.4.2 Low Pass Filter Response, 454.2 MHz

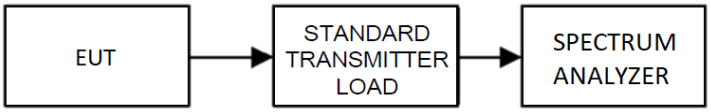
N/A. Device does not carry Audio.

8.4.3 Modulation Limiting, 454.2 MHz

N/A. Device does not need to limit modulation.

8.5 Occupied Bandwidth

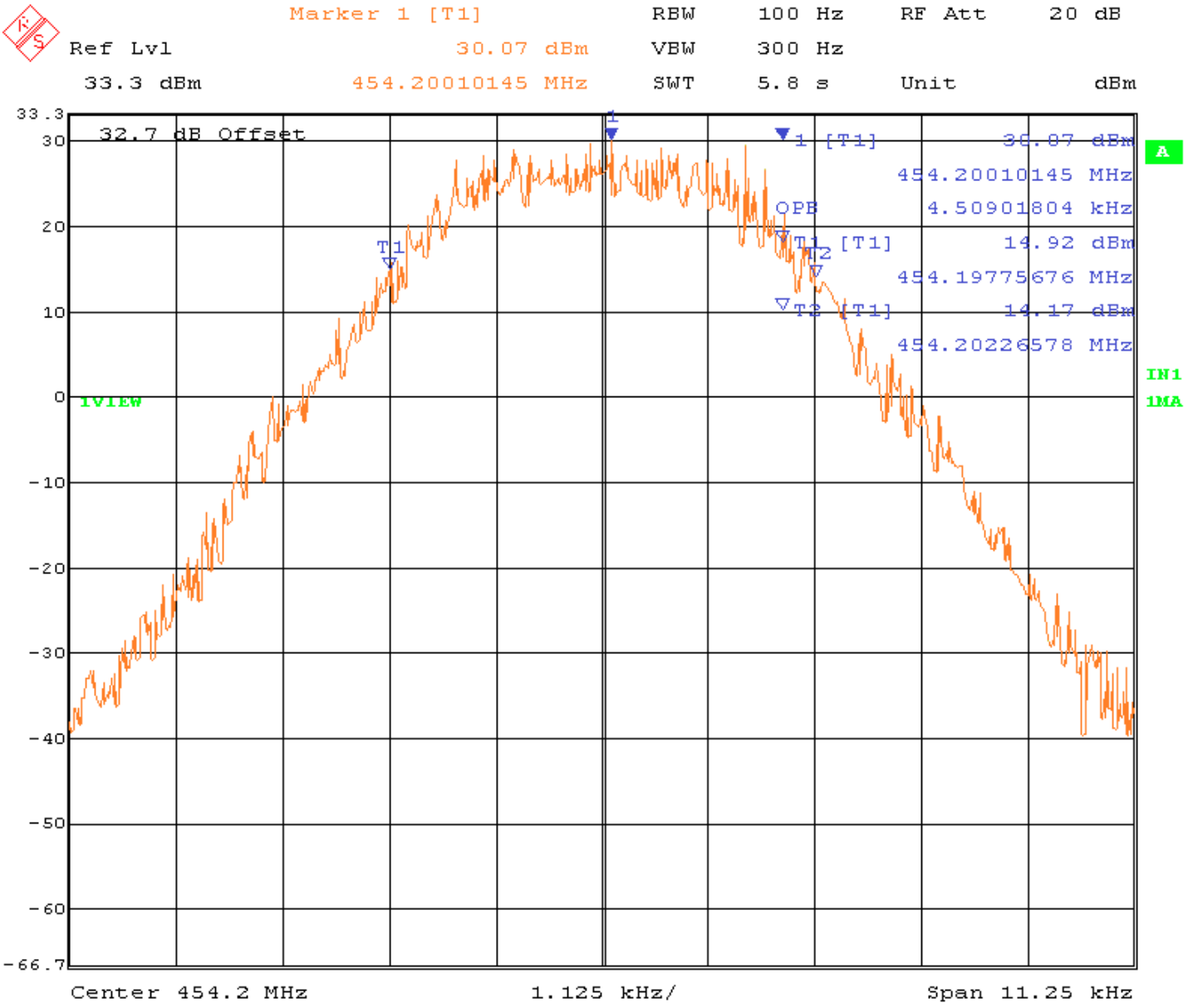
Limits from FCC Part 2.1049 and test procedure from ANSI C63.26-2015.

Test Setup


Test Results		
Tuned Frequency (MHz)	Occupied Bandwidth (kHz)	Method
454.2	4.509	99%

Occupied Bandwidth, Spectrum Plots

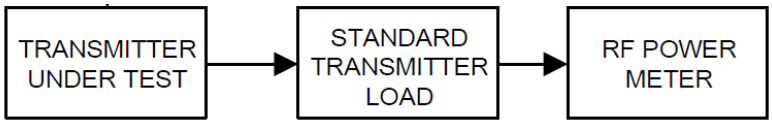
8.5.1 Bandwidth Plot, 454.2 MHz



8.6 Spurious Emissions at Antenna Terminals

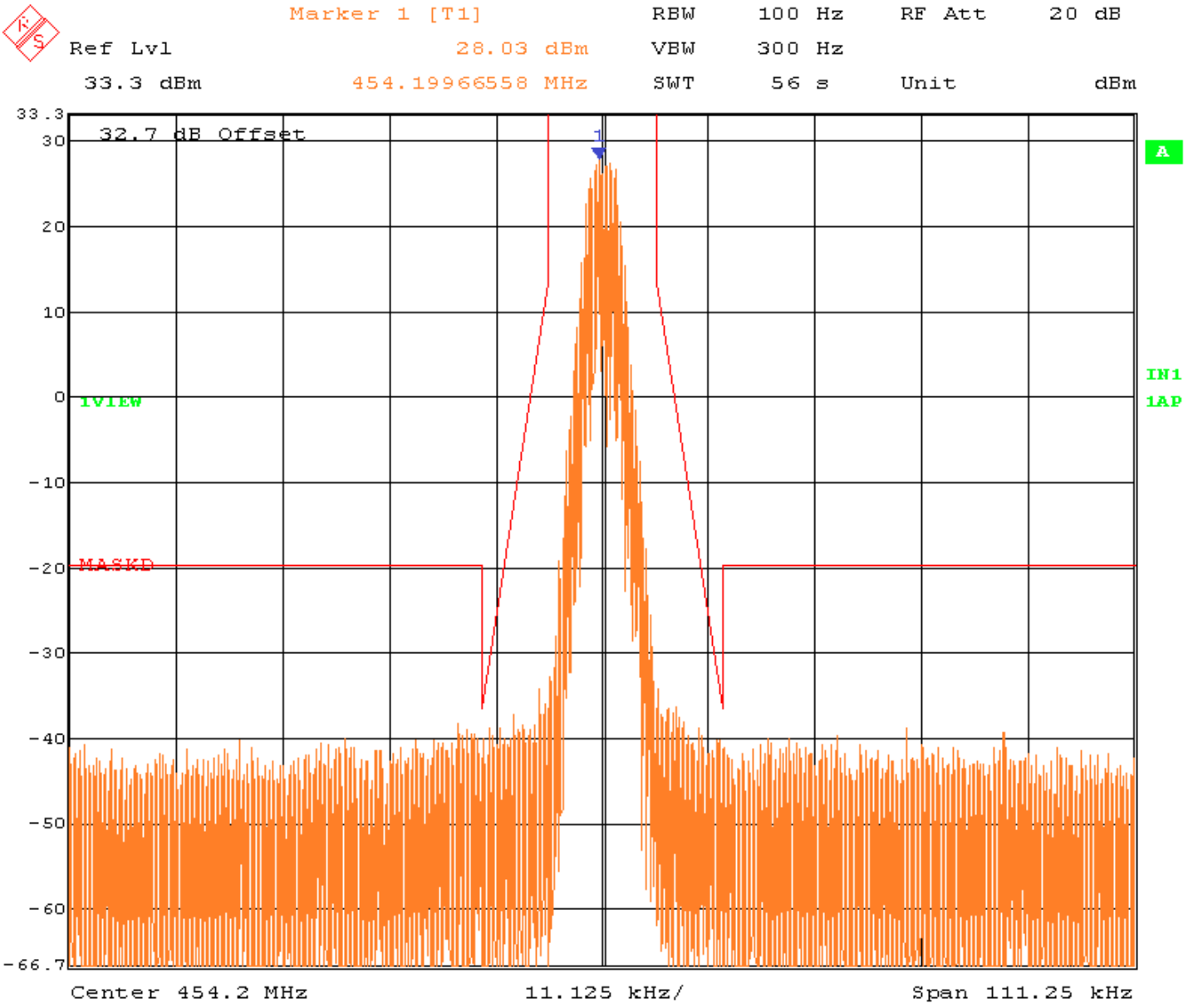
Limits from FCC Part 2.1051, FCC Part 22.359 and test procedure from ANSI C63.26-2015.

Conducted Test Setup



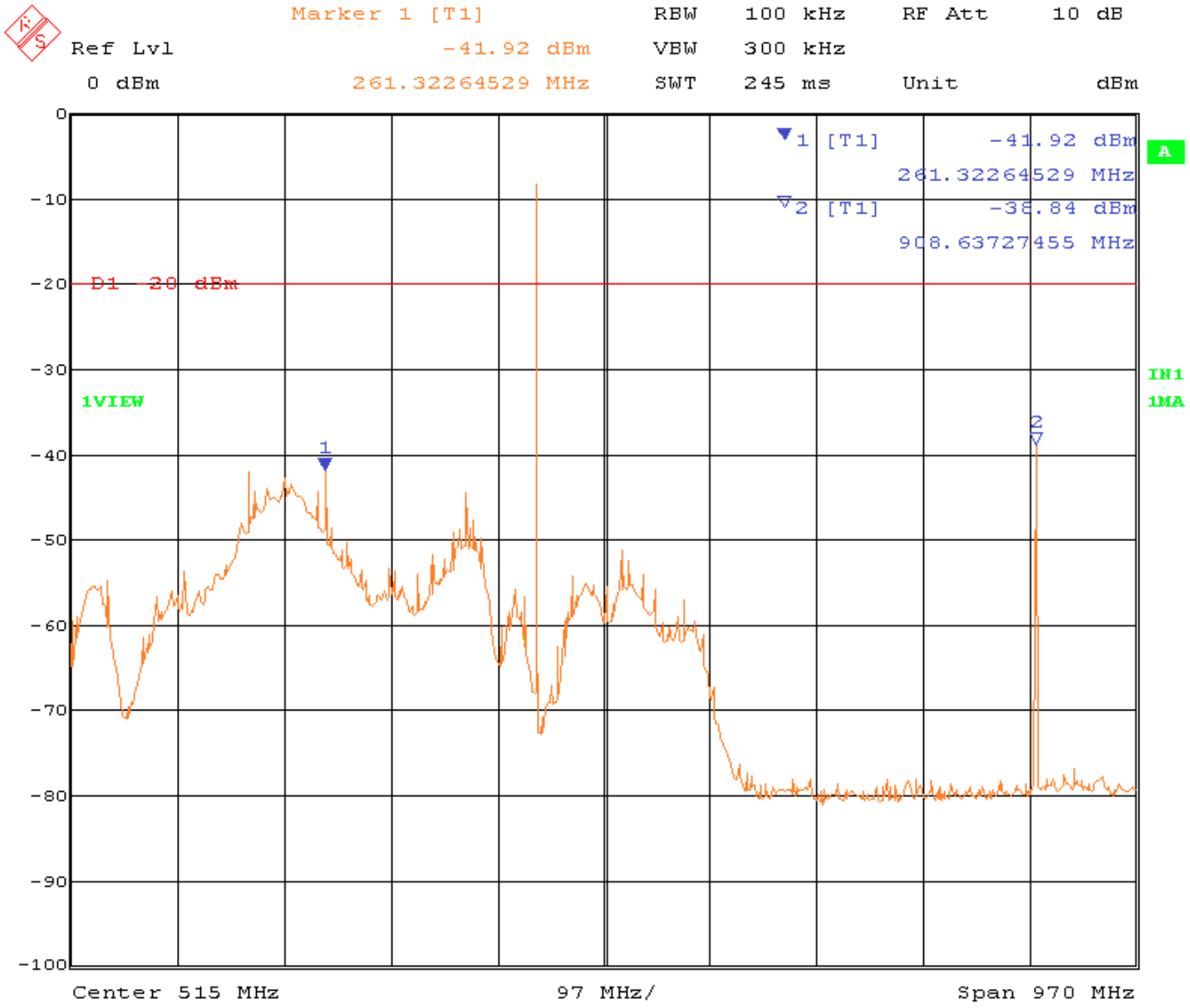
Conducted Emissions In-Band, Spectrum Plots

8.6.1 Conducted Emissions In-Band, 454.2 MHz



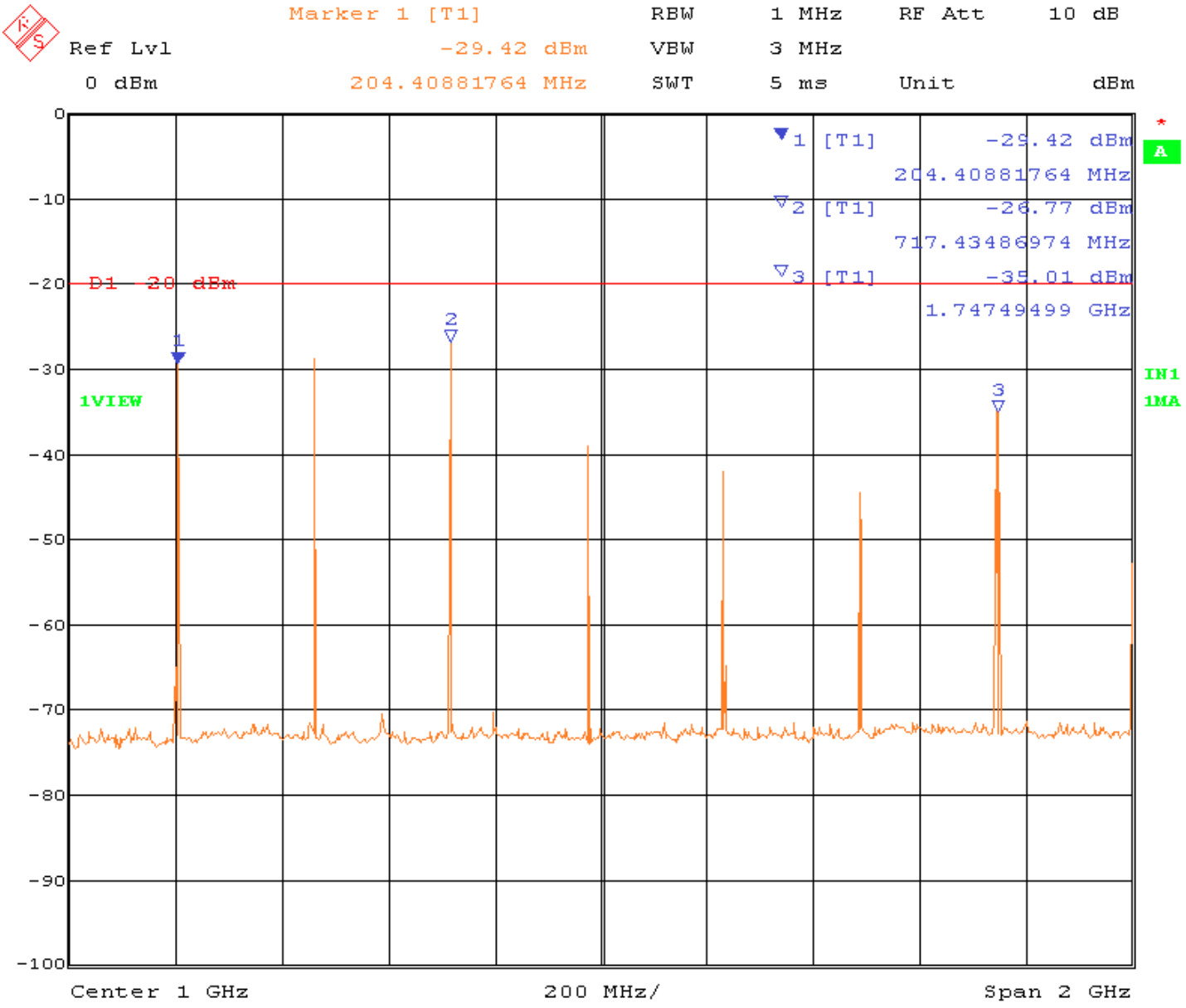
Conducted Emissions Spectrum Plots

8.6.2 Conducted Emissions Below 1 GHz, 454.2 MHz



Note: For this test, a band-reject filter was applied to the fundamental frequency.

8.6.3 Conducted Emissions Above 1 GHz, 454.2 MHz

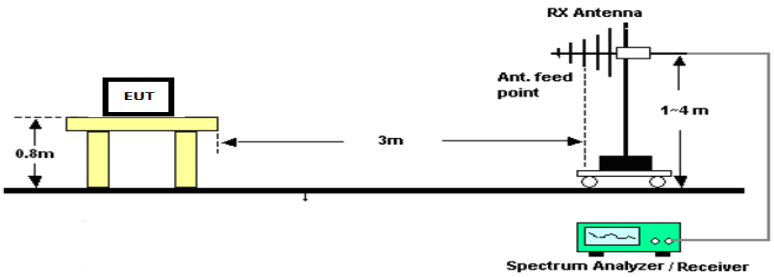


Note: For this test, a band-reject filter was applied to the fundamental frequency.

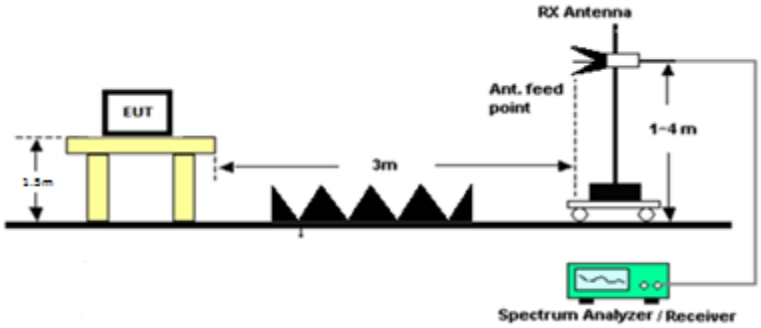
8.7 Radiated Emissions

Limits from FCC Part 2.1053, FCC Part 22.359 and test procedure from ANSI C63.26-2015.

Radiated Test Setup, 30 – 1000 MHz



Radiated Test Setup, Above 1000 MHz



Radiated Emissions, Tabular Data

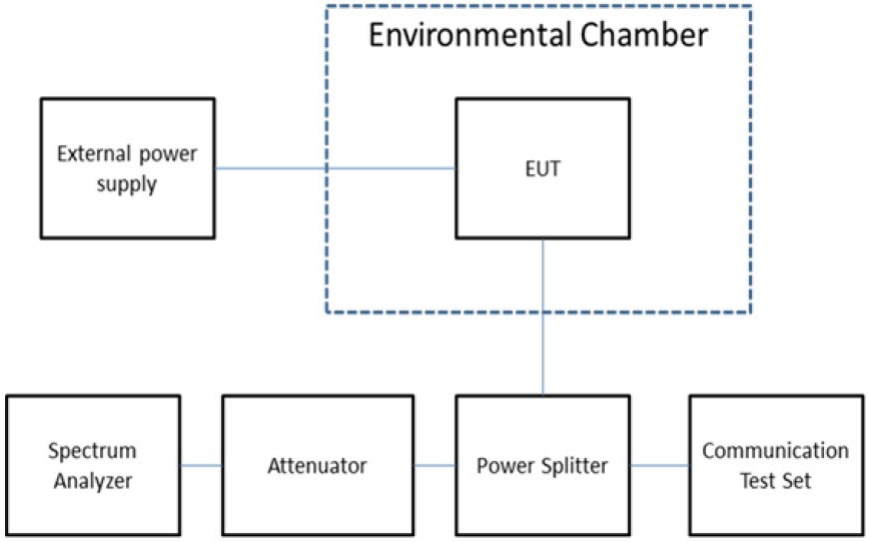
8.7.1 Radiated Emissions, 454.2 MHz

Tuned Frequency (MHz)	Emission Frequency (MHz)	Detector	Meter Reading (dBm)	Antenna Polarity	Coax Loss (dB)	Antenna Correction Factor (dB/m)	Distance (m)	Field Strength (dBµV/m)	ERP (dBm)	Spurious Limit (dBm)	Margin (dB)
454.20	95.32	PK	30.96	H	1.15	10.83	3.00	42.94	-54.43	-13.00	41.43
454.20	44.09	PK	32.65	V	0.75	12.69	3.00	46.09	-51.29	-13.00	38.29
454.20	908.40	PK	40.72	H	3.55	22.47	3.00	66.74	-30.64	-13.00	17.64
454.20	908.40	PK	36.62	V	20.47	22.47	3.00	79.56	-17.82	-13.00	4.82
454.20	1362.60	PK	36.97	H	4.28	28.68	3.00	69.93	-27.44	-13.00	14.44
454.20	1362.60	PK	21.01	V	4.28	28.68	3.00	53.97	-43.40	-13.00	30.40
454.20	1816.80	PK	35.84	H	4.92	30.49	3.00	71.25	-26.13	-13.00	13.13
454.20	1816.80	PK	16.25	V	4.92	30.49	3.00	51.66	-45.72	-13.00	32.72
454.20	2271.00	PK	28.03	H	5.45	31.35	3.00	64.84	-32.54	-13.00	19.54
454.20	2271.00	PK	15.66	V	5.45	31.35	3.00	52.47	-44.91	-13.00	31.91
454.20	2725.20	PK	15.80	H	6.04	32.45	3.00	54.28	-43.10	-13.00	30.10
454.20	2725.20	PK	17.54	V	6.04	32.45	3.00	56.02	-41.36	-13.00	28.36
454.20	3179.40	PK	15.16	H	6.60	32.72	3.00	54.47	-42.90	-13.00	29.90
454.20	3179.40	PK	20.52	V	6.60	32.72	3.00	59.83	-37.54	-13.00	24.54
454.20	3633.60	PK	15.20	H	6.62	33.17	3.00	54.98	-42.39	-13.00	29.39
454.20	3633.60	PK	20.47	V	6.62	33.17	3.00	60.25	-37.12	-13.00	24.12
454.20	4087.80	PK	10.01	H	7.13	33.40	3.00	50.54	-46.84	-13.00	33.84
454.20	4087.80	PK	13.40	V	7.13	33.40	3.00	53.93	-43.45	-13.00	30.45
454.20	4542.00	PK	9.50	H	7.45	33.98	3.00	50.93	-46.44	-13.00	33.44
454.20	4542.00	PK	16.84	V	7.45	33.98	3.00	58.27	-39.10	-13.00	26.10

8.1 Frequency Stability

Limits from FCC Part 2.1055, FCC Part 22.355 and test procedure from ANSI C63.26-2015.

Test Setup



Frequency Stability, Tabular Data

8.1.1 Frequency Stability, 454.2 MHz

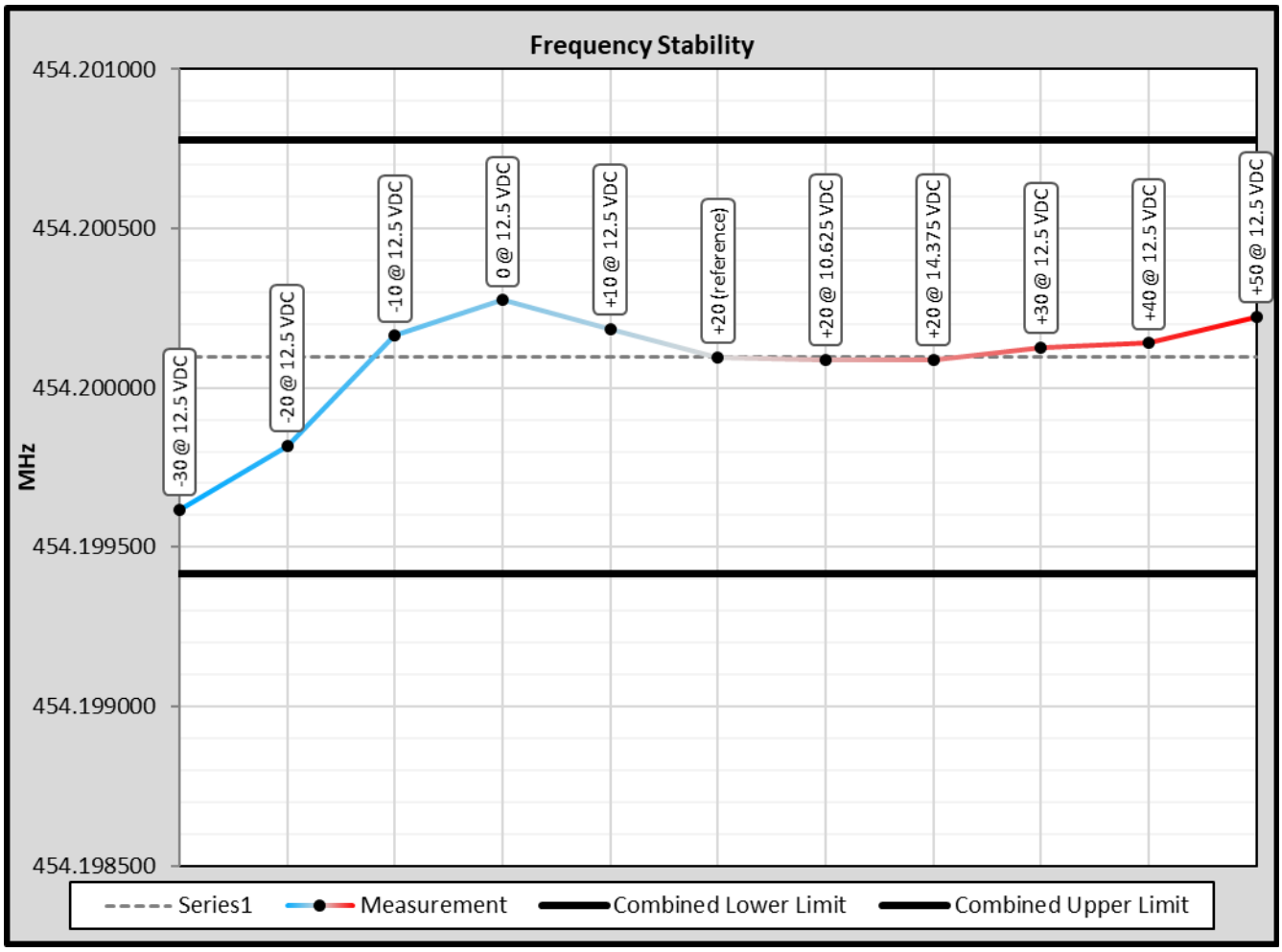
FCC Part 90 Limit	1.5	ppm
FCC Part 90 Limit, as ppb	1500	ppb (Parts per Billion)
FCC Part 90 Limit, as %	0.00015	%
FCC Part 90 Limit, as Hz	681.300	Hz
Combined Lower Limit	454.199415	MHz
Combined Upper Limit	454.200777	MHz
Rated Supply Voltage	12.5	○ AC ◉ DC

Temperature / Voltage Variation

Temperature (°C)	Supplied Voltage (V)	Frequency (MHz)	Deviation (Hz)
-30	12.5	454.199618	478
-20	12.5	454.199819	277
-10	12.5	454.200163	-67
0	12.5	454.200275	-179
+10	12.5	454.200185	-89
+20 (reference)	12.5	454.200096	0
+20	10.6	454.200088	8
+20	14.4	454.200088	8
+30	12.5	454.200128	-32
+40	12.5	454.200141	-45
+50	12.5	454.200224	-128

Frequency Stability, Data Plot

8.1.2 Frequency Stability, 454.2 MHz



9. ANNEX-A - Photographs of the EUT

Photographs of the EUT and any manufacturer supplied accessories to be used with the EUT are in separate supplementary documents labelled EXTERNAL PHOTOS and INTERNAL PHOTOS.

10. ANNEX-B – Test Setup Photographs

Test setup photographs are located in a separate supplementary ANNEX-B document.

11. History of Test Report Changes

Test Report #	Revision #	Description	Date of Issue
DRAFT TR_3289-20_FCC_PT22_1	1	Initial release	September 28, 2020

END OF TEST REPORT