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Limited Test report

402905-1TRFWL

Date of issue: August 14, 2020

Applicant:

Echodyne Corporation

Product:

Security and Surveillance Radar

Model:

700-0005-203_SSRB

FCC ID: 2ANLB-MESASSR00053

Specifications:

- FCC CFR 47 Part 87
  Aviation Services
- FCC CFR 47 Part 2
  Frequency Allocations and Radio Treaty Matters, General Rules and Regulations

Lab and test locations

Company name	Nemko USA Inc.
Address	2210 Faraday Ave, Suite 150
City	Carlsbad
State	California
Postal code	92008
Country	USA
Telephone	+1 760 444 3500
Website	www.nemko.com
FCC Site Number	Test Firm Registration Number: 392943 Designation Number: US5058
ISED Test Site	2040B-3

Tested by	James Cunningham, Wireless Supervisor
Reviewed by	Juan M Gonzalez, EMC & Wireless Divisions Manager
Review date	August 14, 2020
Reviewer signature	

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.
This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko USA's ISO/IEC 17025 accreditation.
This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

Copyright notification

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Section 1 Report summary

1.1 Applicant

Company name	Echodyne Corporation
Address	2380 116th Ave NE
City	Bellevue
Province/State	WA
Postal/Zip code	98004
Country	USA

1.2 Manufacturer

Company name	Echodyne Corporation
Address	2380 116th Ave NE
City	Bellevue
Province/State	WA
Postal/Zip code	98004
Country	USA

1.3 Test specifications

FCC CFR 47 Part 2	Frequency Allocations and Radio Treaty Matters General Rules and Regulations
FCC CFR 47 Part 87	Aviation Services

1.4 Test methods

ANSI C63.26-2015	American National Standard of Procedures for Compliance Testing of Transmitters Used in Licensed Radio Services

1.5 Exclusions

None

1.6 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was performed against a limited set of relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See "Summary of test results" for full details.

1.7 Test report revision history

Table 1.7-1: Test report revision history

Revision #	Details of changes made to test report
402905-1TRFWL	Original report issued

Notes:

Section 2 Summary of test results

2.1 FCC Part 2 and Part 87 test results

Part	Test description	Verdict
§2.1049 and Part 87.135 (a)	Occupied bandwidth	Not tested[1]
§2.1046 (a) and §87.131	RF power output	Pass
§87.139 (a) and NTIA RSEC Criteria A[1]	Spectral mask	Pass
§2.1055 and §87.133 (a)	Frequency stability	Not tested[1]
§2.1051 and §87.139 (a)[2]	Spurious emissions at antenna port	Pass[2]
§2.1053 and §87.139 (a)	Field strength of spurious radiation	Pass[2]

Notes: 1: Testing was limited to a selection of required tests to demonstrate that the modified product still complies with the relevant requirements. Tests not impacted by the modification were not performed. Original test report: 348292-1R4TRFWL (FCC Part 87)
2: Testing was performed on the middle channel (24.55 GHz) only
3: All testing was performed over the air since the EUT has an integral non-detachable antenna with no access to the conducted port. To show compliance with conducted port requirements, the measurements were corrected by subtracting the antenna gain.

Section 3 Equipment under test (EUT) details

3.1 Sample information

Receipt date	August 10, 2020
Nemko sample ID number	NEx: 402905

3.2 EUT information

Product name	Security and Surveillance Radar
Model	700-0005-203_SSRB
Serial number	SCR-K-001072
Cage Code	7DG42

3.3 Technical information

Frequency band	24.45 – 24.65 GHz
Minimum frequency (MHz)	24.49 GHz
Maximum frequency (MHz)	24.61 GHz
Type of modulation	FMCW
Occupied bandwidth (99%)	47.1 MHz
Emission classification	47M1F3N
Power requirements	9-32 VDC
Antenna information	The EUT uses a unique coupling/non-detachable antenna to the intentional radiator. Antenna nominal peak gain is 22 dBi.

3.4 Product description and theory of operation

The Echodyne Corporation MESA-SSR Radar (Model: 700-0005-203_SSR) is designed as a ground-based radar to aid safe navigation of aircraft compliant with the FCC 24.45-24.65 GHz band designated as RADIO-NAVIGATION. Functionally the radar operates primarily as a Ground-Air doppler ranging radar intended to provide safe operation for small UAS vehicles by providing localized situational awareness for UAS remote pilots and UAS traffic management systems from a fixed ground-based location. Echodyne has also requested a waiver from the FCC to use the radar in the same band on a secondary basis for Ground-Air security surveillance to enable tracking of drone intruders in protected airspace

3.5 EUT exercise and monitoring details

EUT was configured via TCP/IP (Ethernet) by sending programming commands using SSH/Telnet client application (PuTTY). During the test EUT was set into the SEARCH mode transmitting through its integral antenna on Low, Mid and High channels with max. power. The minimum/maximum azimuthal and elevation beam positions were set to 0 degrees which was found to be a worst-case test configuration.

Table 3.5-1: EUT sub assemblies

Description	Brand name	Model/Part number	Serial number	Rev.
Security and Surveillance Radar	Echodyne Corporation	700-0005-203_SSRB	SCR-K-001072	N/A

Table 3.5-2: EUT interface ports

Description	Qty.
DC power plus ethernet	1

Table 3.5-3: Support equipment

Description	Brand name	Model/Part number	Serial number	Rev.
Laptop	Dell	Inspiron 5548	9K643SS	N/A
DC power supply	BK Precision	1697	260G13306	N/A

Table 3.5-4: Inter-connection cables

Cable description	From	To	Length (ft)
Combined DC power plus ethernet	EUT	Laptop and DC power supply	6

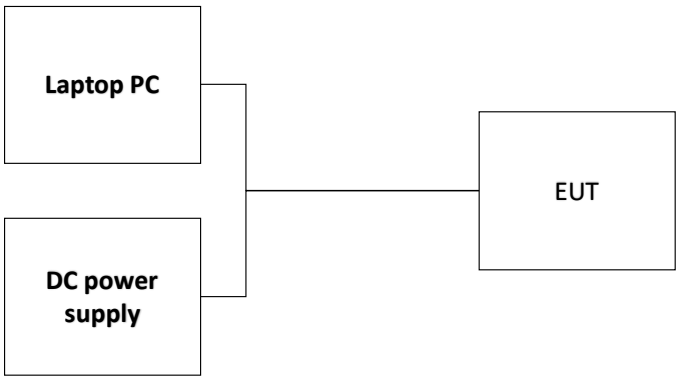

Figure 3.5-1: Test setup

Section 4 Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures

Section 5 Test conditions

5.1 Atmospheric conditions

Temperature	15-30 °C
Relative humidity	20-75 %
Air pressure	86–106 kPa

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

Section 6 Measurement uncertainty

6.1 Uncertainty of measurement

Measurement uncertainty budgets for the tests are detailed below. Measurement uncertainty calculations assume a coverage factor of K = 2 with 95% certainty.

Test name	Measurement uncertainty, dB
Radiated spurious emissions	3.78

Section 7 Test Equipment

Table 6.1-1: Test Equipment List

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Signal and spectrum analyzer	Rohde & Schwarz	FSV40	E1120	1 year	19-Nov-2020
EMI Test Receiver	Rohde & Schwarz	ESU40	E1121	1 year	25-Nov-2020
System Controller	Sunol Sciences	SC104V	E1129	NCR	NCR
Bilog Antenna	Schaffner	CBL6111C	1480	1 year	18-Oct-2020
Antenna, Horn (1-18 GHz)	ETS Lindgren	3117	1139	1 year	21-Mar-2021
Antenna, Horn (18-26 GHz)	SAGE Millimeter	SAR-2309-42-S2	E1143	2 year	05-Sep-2020
Antenna, Horn (26-40 GHz)	SAGE Millimeter	SAR-2309-28-S2	E1143	2 years	05-Sep-2020
Antenna, Horn (40-60 GHz)	SAGE Millimeter	SAR-2309-19-S2	E1144	NCR	NCR
Antenna, Horn (50-75 GHz)	SAGE Millimeter	SAR-2408-15-S2	E1152	NCR	NCR
Antenna, Horn (75-110 GHz)	SAGE Millimeter	SAR-2507-10-S2	E1146	NCR	NCR
Harmonic mixer (40-60 GHz)	Rohde & Schwarz	FS-Z60	E1138	1 year	07-Mar-2021
Harmonic mixer (50-75 GHz)	Rohde & Schwarz	FS-Z75	E1149	1 year.	07-Mar-2021
Harmonic mixer (75-110 GHz)	Rohde & Schwarz	FS-Z110	E1154	1 year	06-Feb-2021

Notes: NCR – no calibration required

Table 6.1-2: Test Software

Manufacturer of Software	Details
Rohde & Schwarz	EMC 32 V10.60.15 (radiated emissions)

Section 8 Testing data

8.1 §2.1046(a) and §87.131 RF output power

8.1.1 Definition and limits

Title 47 → Chapter I → Subchapter A → Part 2 → Subpart J → Subject group 219 → §2.1046(a)

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in §2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

Title 47 → Chapter I → Subchapter D → Part 87 → Subpart D → §87.131

The following table lists authorized emissions and maximum power. Power must be determined by direct measurement.

Table 8.1-1: Authorized emissions and maximum power

Class of station	Frequency band/frequency	Authorized emission(s)	Maximum power
Radionavigation	Various [1]	Various [1]	Various [1]

[1] Frequency, emission, and maximum power will be determined by appropriate standards during the certification process per Part 87.131

8.1.2 Test summary

Verdict	Pass		
Test date	August 11, 2020	Temperature	22 °C
Test engineer	James Cunningham	Air pressure	1004 mbar
Test location	3m semi anechoic chamber	Relative humidity	62 %

8.1.3 Notes

This is a radiated test with a measurement distance of 3 m.

EUT power was evaluated in terms of EIRP based on the guidelines for radiated test configuration provided in KDB 412172 D01 v01r01.

Direct calculation from the DUT power measured in a radiated configuration:

$EIRP = P_R + L_P$ [412172 D01 v01r01, eq.7]

EIRP = equivalent (or effective) isotropically radiated power, dBm
P_R = received power level, dBm
L_P = basic free space propagation path loss, dB

Received power level $P_R = P_{Meas} – G_R + L_C + L_{Atten} – G_{amp}$ [412172 D01 v01r01, eq.8]
$P_{Measured}$ = measured power level, dBm
G_R = gain of the receive (measurement) antenna, dBi
L_C = signal loss in the measurement cable, dB
L_{Atten} = value of external attenuation (if used), dB
G_{Amp} = value of external amplification (if used), dB

Combining equations 7 and 8:

$EIRP = P_{Meas} – G_R + L_C + L_{Atten} – G_{amp} + L_P$
L_{Atten} = 0 dB
G_{amp} = 0 dB
$EIRP = P_{Meas} – G_R + L_C + L_P$
$EIRP = P_{Meas}$ + Correction Factor
Correction Factor = $L_C + L_P - G_R$

The free space propagation path loss $L_P = 20 \text{ Log } F + 20 \text{ Log } D – 27.5$ [412172 D01 v01r01, eq.9]
L_P = basic free space propagation path loss, dB;
F = center frequency of radiated DUT signal, MHz;
D = measurement distance, meters

Table 8.1-2: EIRP correction factor

F (GHz)	F (MHz)	G_R (dBi)	L_C (dB)	D (m)	L_P (dB)	Correction Factor (dB)
24.49	24490	22.38	22.56	3.00	69.82	69.99
24.55	24550	22.39	22.60	3.00	69.84	70.05
24.61	24610	22.40	22.65	3.00	69.86	70.11

8.1.4 Setup details

EUT setup configuration	Tabletop
Test facility	3m semi anechoic chamber
Measurement method	Channel power measurement function of spectrum analyzer

Receiver/spectrum analyzer settings:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	RMS
Trace mode	Max Hold
Measurement time	Long enough for trace to stabilize

8.1.5 Test data

Table 8.1-3: RF output power test data

Authorized bandwidth	Channel	EIRP (dBm)	EIRP (W)
47.1 MHz	Low (24.49 GHz)	45.58	36.14
	Mid (24.55 GHz)	45.23	33.34
	High (24.61 GHz)	46.20	41.69

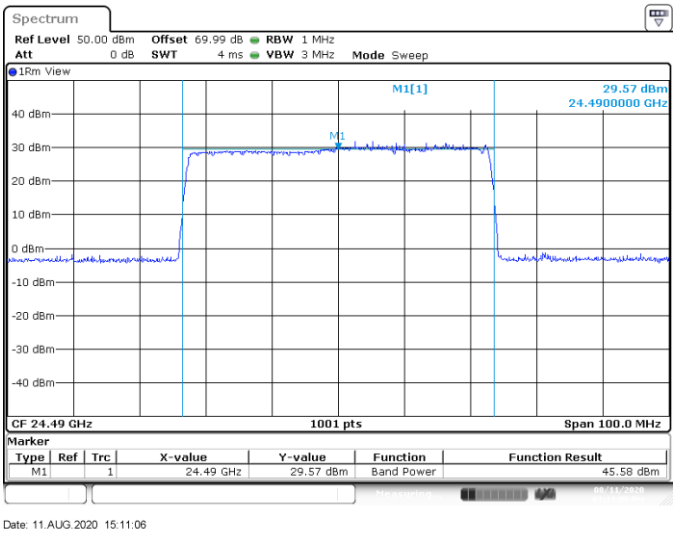

Figure 8.1-1: EIRP, low channel, 24.49 GHz

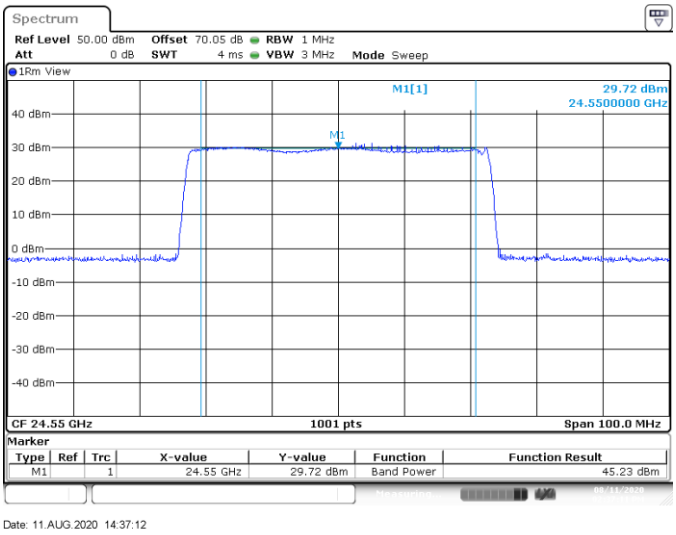

Figure 8.1-2: EIRP, mid channel, 24.55 GHz

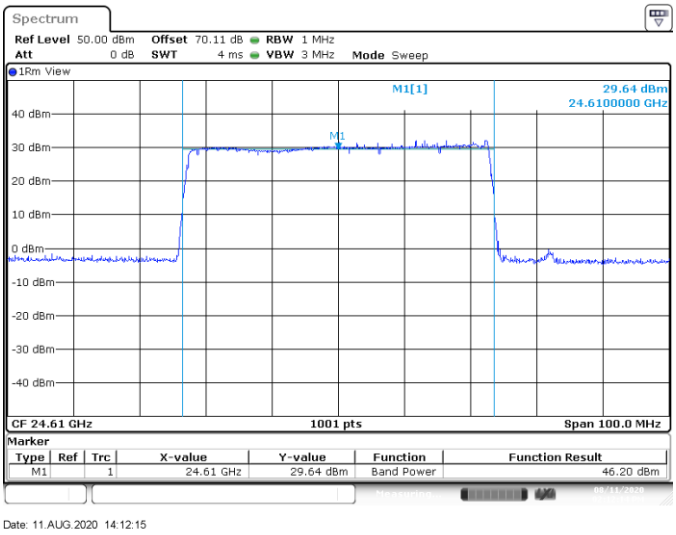

Figure 8.1-3: EIRP, high channel, 24.61 GHz

8.2 §87.139(a) Spectral mask

8.2.1 Definition and limits

Title 47 → Chapter I → Subchapter D → Part 87 → Subpart D → §87.139(a)

(a) Except for ELTs and when using single sideband (R3E, H3E, J3E), or frequency modulation (F9) or digital modulation (F9Y) for telemetry or telecommand in the 1435-1525 MHz, 2345-2395 MHz, or 5091-5150 MHz band or digital modulation (G7D) for differential GPS, the mean power of any emissions must be attenuated below the mean power of the transmitter (pY) as follows:

(1) When the frequency is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth the attenuation must be at least 25 dB;

(2) When the frequency is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth the attenuation must be at least 35 dB.

(3) When the frequency is removed from the assigned frequency by more than 250 percent of the authorized bandwidth the attenuation for aircraft station transmitters must be at least 40 dB; and the attenuation for aeronautical station transmitters must be at least 43 +10 $\log_{10}$ pY dB.

8.2.2 Test summary

Verdict	Pass		
Test date	August 11, 2020	Temperature	22 °C
Test engineer	James Cunningham	Air pressure	1004 mbar
Test location	3m semi anechoic chamber	Relative humidity	62 %

8.2.3 Notes

This is a radiated test with a measurement distance of 3 m.

Correction factors of 69.99 dB (Low channel), 70.05 dB (Mid channel) and 70.11 dB (High channel) were used to account for free-space loss, test antenna gain and cable loss. See section 8.1.3 of this test report for the sample correction factor calculation

Spectrum emission mask measurement function of the spectrum analyzer was used.

Emission mask is based on the 99% occupied bandwidth. This was measured during the initial certification to be 47.1 MHz.

8.2.4 Setup details

EUT setup configuration	Tabletop
Test facility	3m semi anechoic chamber
Measurement method	Spectrum emission mask measurement function of spectrum analyzer

Receiver/spectrum analyzer settings:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	RMS
Trace mode	Max Hold
Measurement time	Long enough for trace to stabilize

8.2.5 Test data

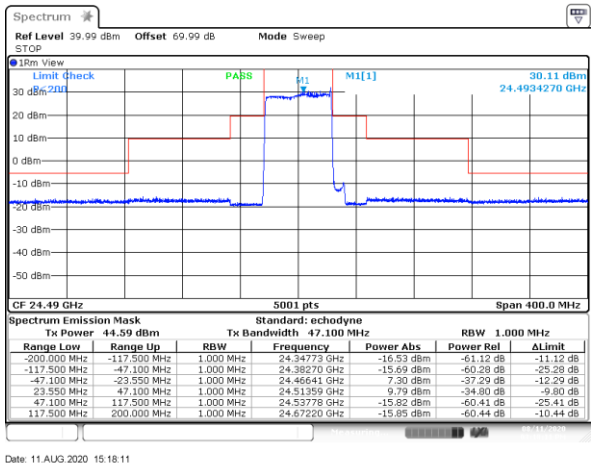

Figure 8.2-1: Spectrum emission mask, low channel, 24.49 GHz

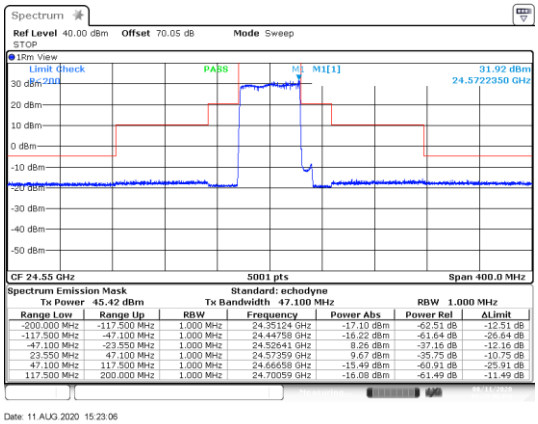

Figure 8.2-2: Spectrum emission mask, mid channel, 24.55 GHz

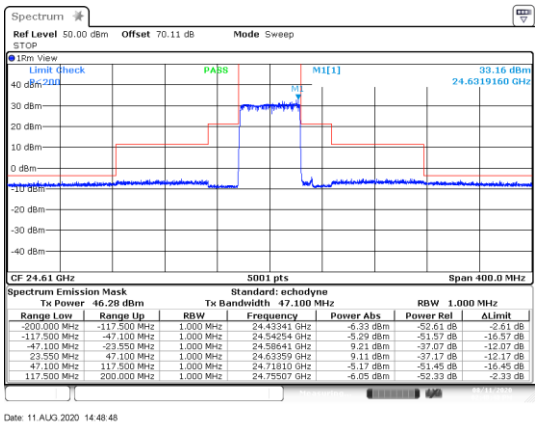

Figure 8.2-3: Spectrum emission mask, high channel, 24.61 GHz

8.3 §2.1051 and §87.139 Spurious emissions at antenna terminals

8.3.1 Definition and limits

Title 47 → Chapter I → Subchapter A → Part 2 → Subpart J → Subject group 219 → §2.1056
The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

Title 47 → Chapter I → Subchapter D → Part 87 → Subpart D → §87.139(a)

(a) Except for ELTs and when using single sideband (R3E, H3E, J3E), or frequency modulation (F9) or digital modulation (F9Y) for telemetry or telecommand in the 1435-1525 MHz, 2345-2395 MHz, or 5091-5150 MHz band or digital modulation (G7D) for differential GPS, the mean power of any emissions must be attenuated below the mean power of the transmitter (pY) as follows:
   (1) When the frequency is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth the attenuation must be at least 25 dB;
   (2) When the frequency is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth the attenuation must be at least 35 dB.
   (3) When the frequency is removed from the assigned frequency by more than 250 percent of the authorized bandwidth the attenuation for aircraft station transmitters must be at least 40 dB; and the attenuation for aeronautical station transmitters must be at least 43 +10 $\log_{10}$ pY dB.

8.3.2 Test summary

Verdict	Pass		
Test date	August 13, 2020 August 14, 2020	Temperature	22 °C (August 13) 22 °C (August 14)
Test engineer	James Cunningham	Air pressure	1004 mbar (August 13) 1004 mbar (August 14)
Test location	3m semi-anechoic chamber (Radiated)	Relative humidity	63 % (August 13) 54 % (August 14)

8.3.3 Notes

This is a radiated test with a measurement distance of 1.5 m.

Only harmonics and other spurious emissions were referenced to the transmitter output as explained in the test addendum provided by the manufacturer ("Special Test Addendum FCC Harmonic Emission Testing Sections 87.139 and 2.1051" by Echodyne issued on May 24, 2018. To derive the output power, the measured EIRP was the measured EIRP level was corrected by the EUT antenna gain, which was assumed to be equal to the nominal antenna gain of 22 dBi. The obtained output power results were evaluated against the limit for the transmitter mean power given in § 87.139 (a)(3). EUT complies.

The EUT was configured to transmit continuously on the middle channel.

8.3.4 Setup details

EUT setup configuration	Tabletop
Test facility	3m semi anechoic chamber

Receiver/spectrum analyzer settings:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	Peak
Trace mode	Max Hold
Measurement time	Long enough for trace to stabilize

8.3.5 Test data

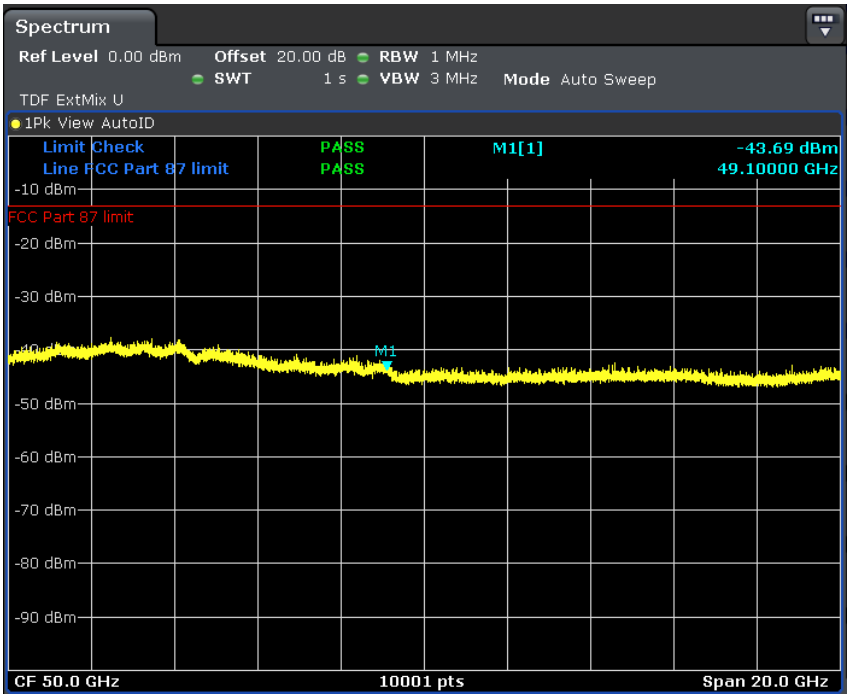

Figure 8.3-1: 40 – 60 GHz, mid channel, 24.55 GHz

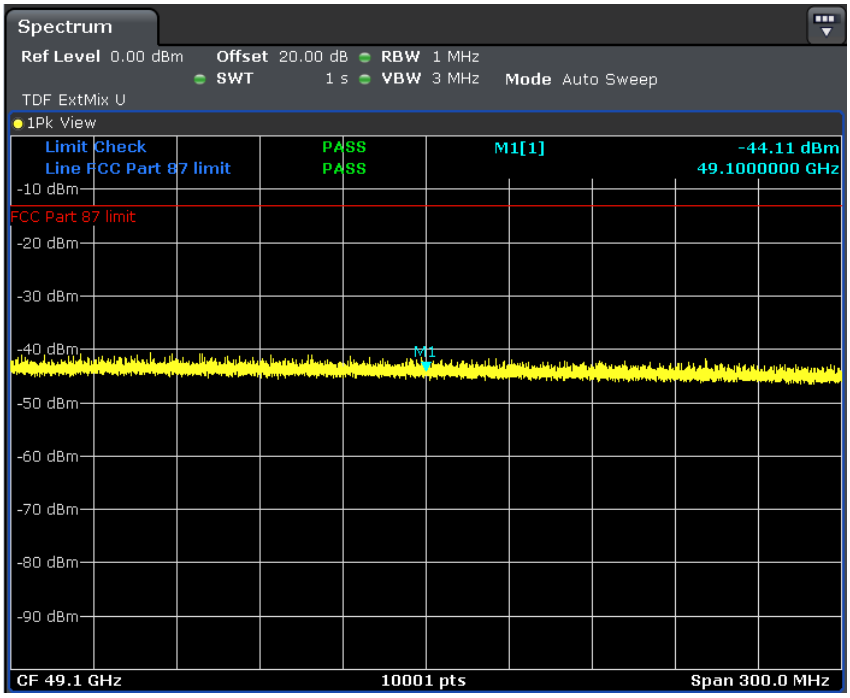

Figure 8.3-2: Zoom at 49.1 GHz, mid channel, 24.55 GHz

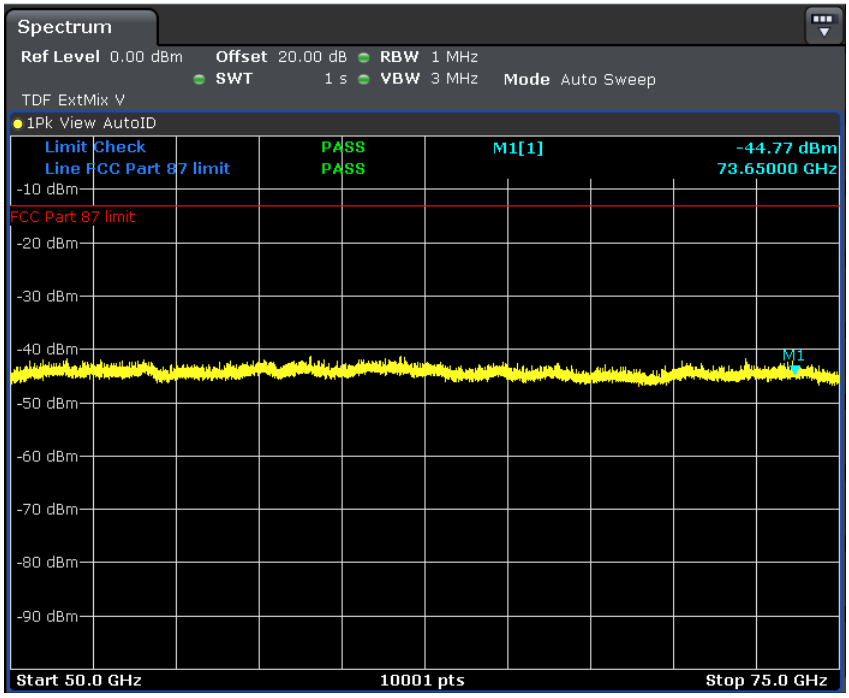

Figure 8.3-3: 50 – 75 GHz, mid channel, 24.55 GHz

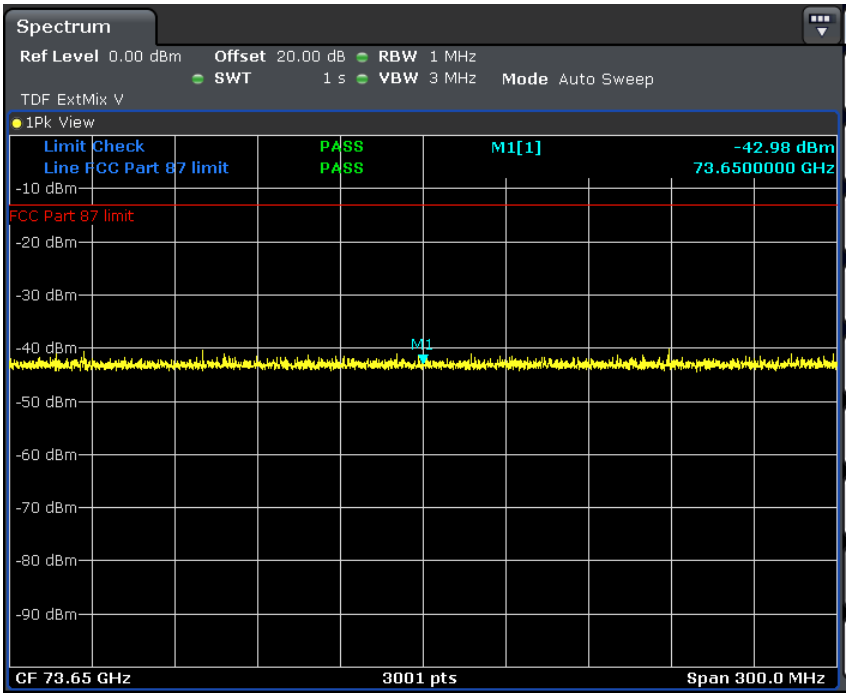

Figure 8.3-4: Zoom at 73.65 GHz, mid channel, 24.55 GHz

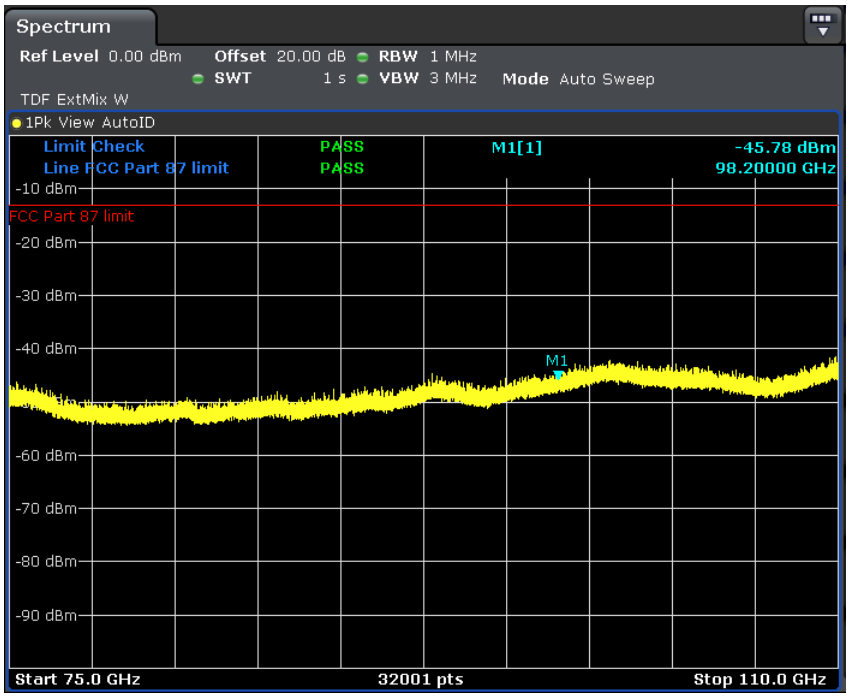

Figure 8.3-5: 75 - 110 GHz, mid channel, 24.55 GHz

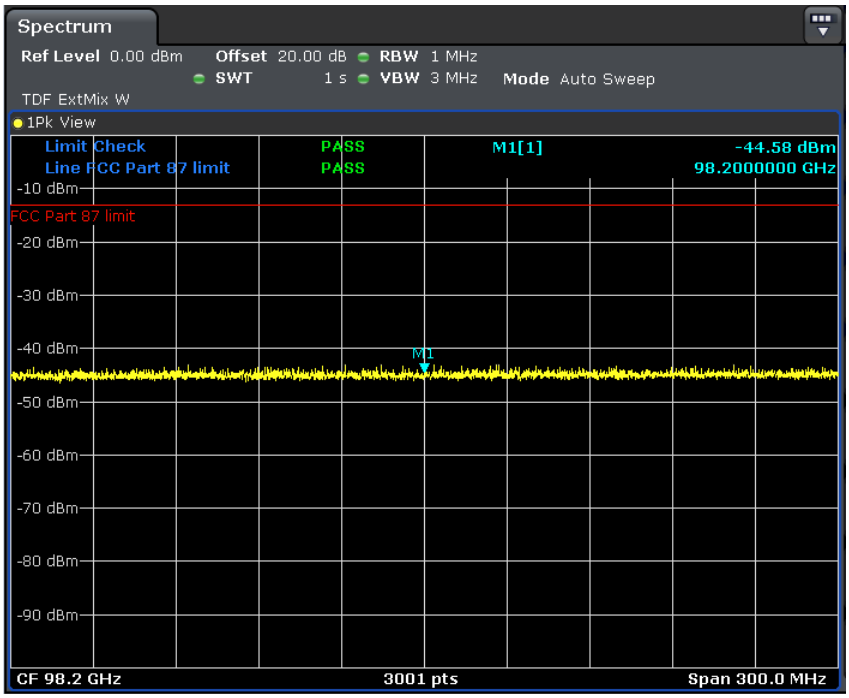

Figure 8.3-6: Zoom at 98.2 GHz, mid channel, 24.55 GHz

8.4 §2.1053 and §87.139 Field strength of spurious radiation

8.4.1 Definition and limits

Title 47 → Chapter I → Subchapter A → Part 2 → Subpart J → Subject group 219 → §2.1053

(a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.

Title 47 → Chapter I → Subchapter D → Part 87 → Subpart D → §87.139(a)

(b) Except for ELTs and when using single sideband (R3E, H3E, J3E), or frequency modulation (F9) or digital modulation (F9Y) for telemetry or telecommand in the 1435-1525 MHz, 2345-2395 MHz, or 5091-5150 MHz band or digital modulation (G7D) for differential GPS, the mean power of any emissions must be attenuated below the mean power of the transmitter (pY) as follows:

(4) When the frequency is removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth the attenuation must be at least 25 dB;

(5) When the frequency is removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth the attenuation must be at least 35 dB.

(6) When the frequency is removed from the assigned frequency by more than 250 percent of the authorized bandwidth the attenuation for aircraft station transmitters must be at least 40 dB; and the attenuation for aeronautical station transmitters must be at least 43 +10 $\log_{10}$ pY dB.

8.4.2 Test summary

Verdict	Pass		
Test date	August 13, 2020	Temperature	22 °C
Test engineer	James Cunningham	Air pressure	1004 mbar
Test location	3m semi-anechoic chamber (Radiated)	Relative humidity	63 %

8.4.3 Notes

The spectrum was searched from 30 MHz to 110 GHz. Below 40 GHz, the measurement distance was 3 m. Above 40 GHz, the measurement distance was 1.5 m.

The EUT was evaluated operating on the mid channel (24.55 GHz).

Above 40 GHz, the measured EUT emissions were referenced to the transmitter output as explained in the test addendum provided by the manufacturer (Special Test Addendum FCC Harmonic Emission Testing Sections 87.139 and 2.1051 by Echodyne issued on 5/24/2018). Testing was performed in BLE mode and the EUT transmitting on a fixed channel at full power.

All measurements above 40 GHz were noise floor. Only data from 30 MHz to 40 GHz are presented.

8.4.4 Setup details

EUT setup configuration	Tabletop
Test facility	3 m semi anechoic chamber

Receiver settings for radiated measurements within restricted bands below 1 GHz:

Resolution bandwidth	120 kHz
Video bandwidth	300 kHz
Detector mode	Peak (preview measurements) Quasi-Peak (final measurements)
Trace mode	Max Hold
Measurement time	5 s (final measurements)

Receiver settings for radiated measurements within restricted bands above 1 GHz:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	Peak (preview and final measurements)
Trace mode	Max Hold
Measurement time	5 s (final measurements)

8.4.5 Test data

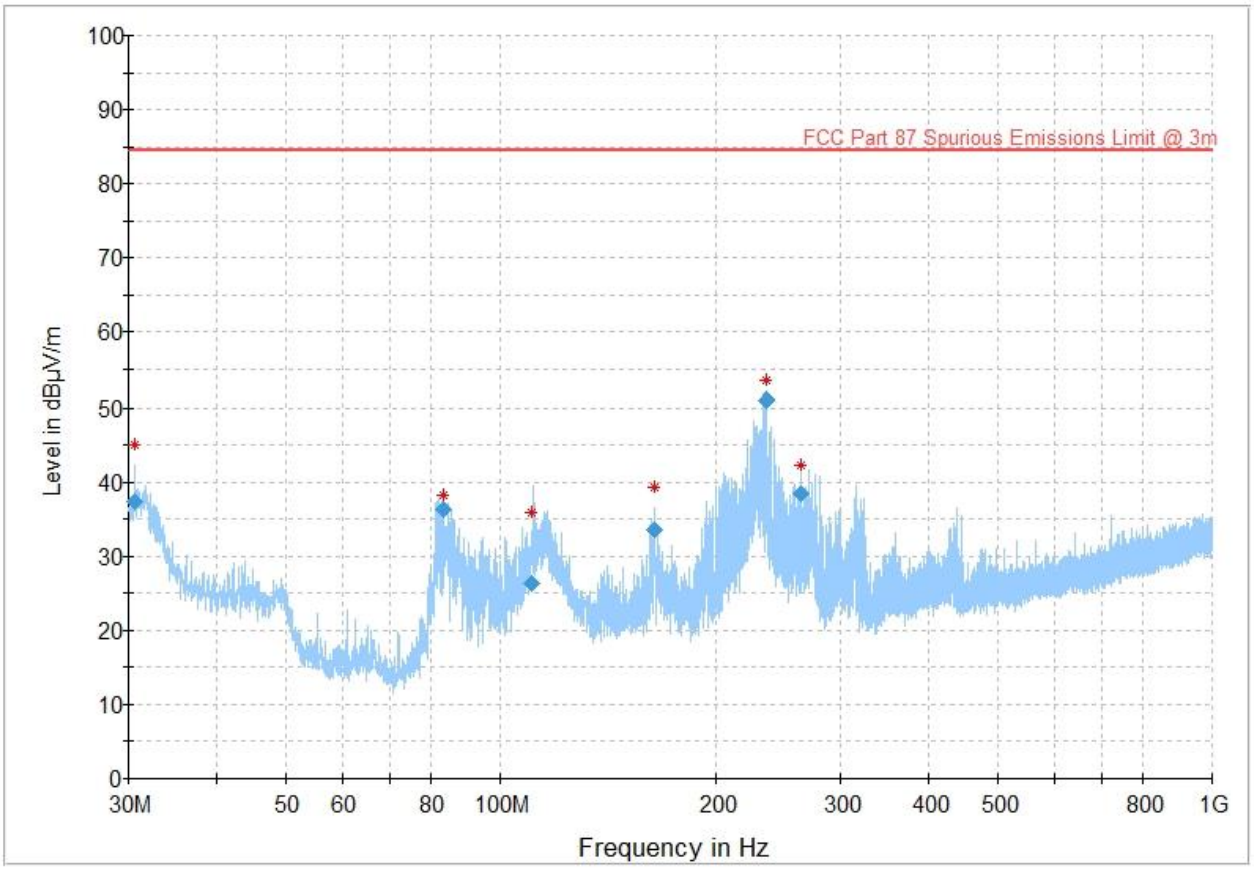

Figure 8.4-1: Radiated emissions, mid channel, 24.55 GHz, 30 – 1000 MHz

Table 8.4-1: Radiated emissions, mid channel, 24.55 GHz, 30 – 1000 MHz

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.586667	37.42	84.40	46.98	5000.0	120.000	124.0	V	56.0	26.1
83.402333	36.21	84.40	48.19	5000.0	120.000	386.0	H	82.0	15.1
111.016667	26.38	84.40	58.02	5000.0	120.000	290.0	H	188.0	18.6
164.095333	33.63	84.40	50.77	5000.0	120.000	162.0	H	104.0	18.2
235.781667	50.99	84.40	33.41	5000.0	120.000	121.0	H	92.0	19.1
263.620667	38.47	84.40	45.93	5000.0	120.000	114.0	H	284.0	21.5

Notes:

Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
Correction factors = antenna factor ACF (dB) + cable loss (dB)
Limits converted to dBµV/m and an inverse proportionality factor of 20 dB per decade has been used to normalize the specification limit to a measurement distance of 3 meters to determine compliance.

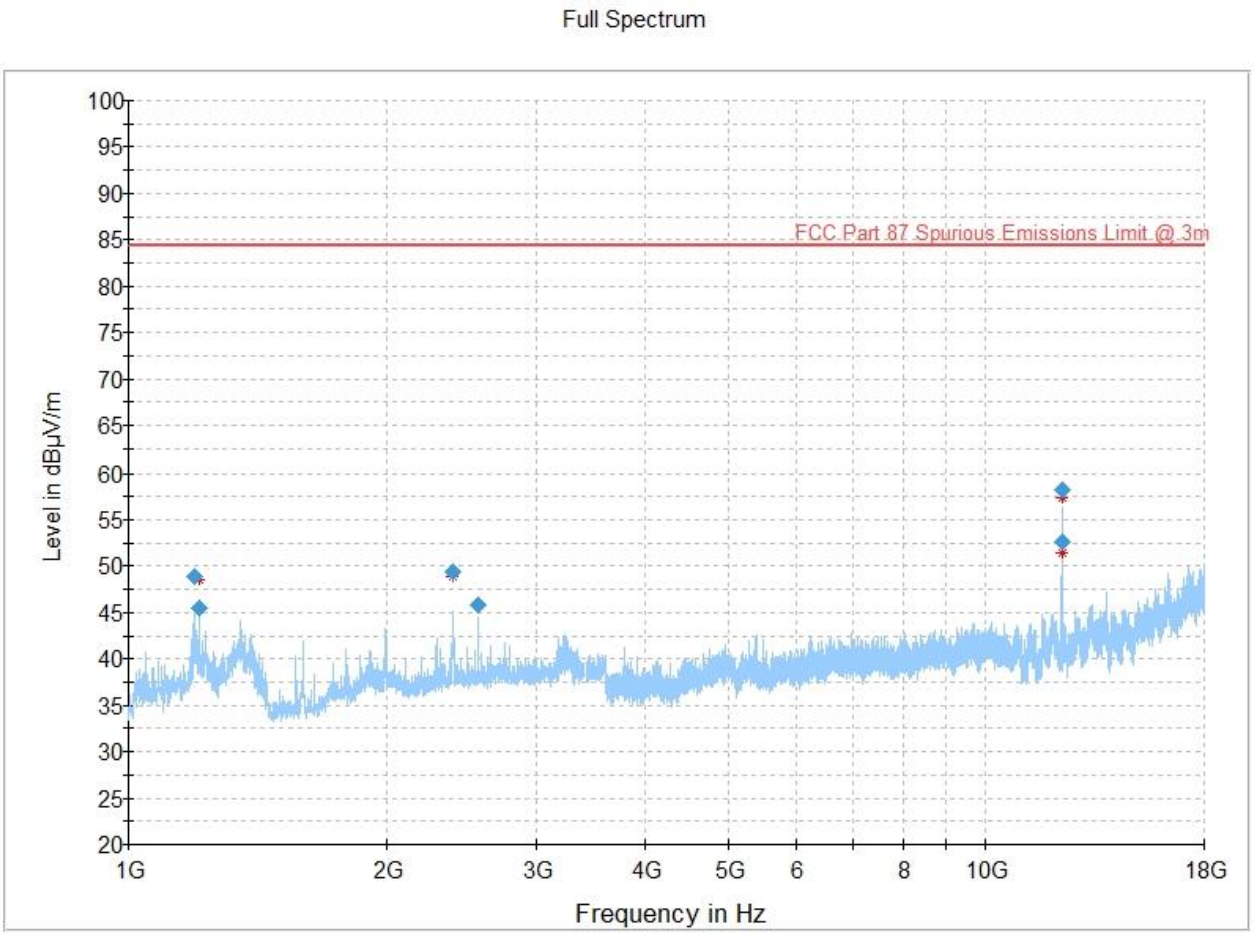

Figure 8.4-2: Radiated emissions, mid channel, 24.55 GHz, 1 – 18 GHz

Table 8.4-2: Radiated emissions, mid channel, 24.55 GHz, 1 – 18 GHz

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1192.965950	48.95	84.40	35.45	5000.0	1000.000	196.0	V	339.0	-14.2
1211.674550	45.51	84.40	38.89	5000.0	1000.000	160.0	V	0.0	-14.1
2395.305650	49.39	84.40	35.01	5000.0	1000.000	238.0	V	74.0	-10.4
2559.970450	45.87	84.40	38.53	5000.0	1000.000	147.0	V	0.0	-9.8
12271.896900	52.56	84.40	31.84	5000.0	1000.000	133.0	H	282.0	4.5
12282.486150	58.14	84.40	26.26	5000.0	1000.000	131.0	H	294.0	4.5

Notes:

Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
Correction factors = antenna factor ACF (dB) + cable loss (dB)
Limits converted to dBµV/m and an inverse proportionality factor of 20 dB per decade has been used to normalize the specification limit to a measurement distance of 3 meters to determine compliance.

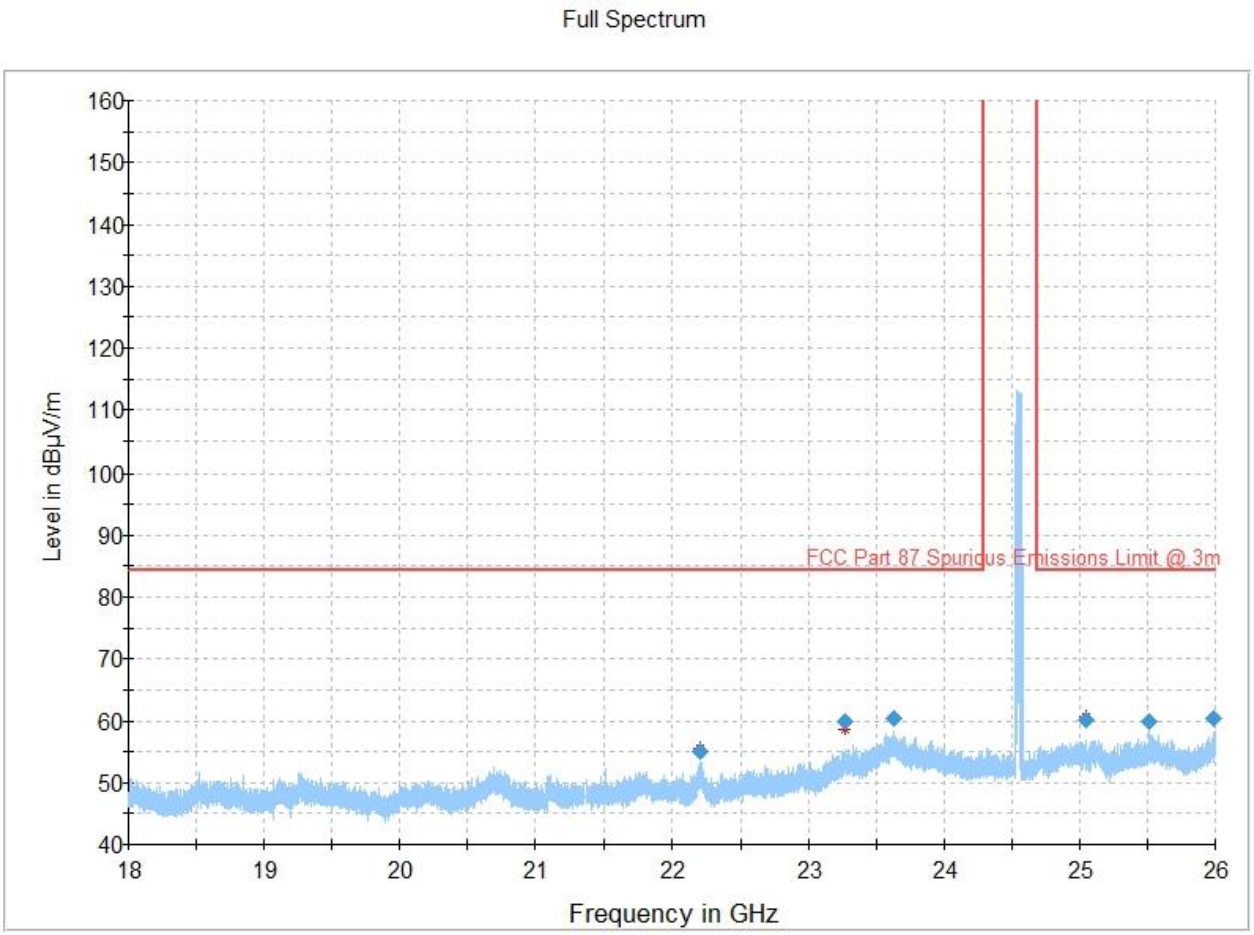

Figure 8.4-3: Radiated emissions, mid channel, 24.55 GHz, 18 - 26 GHz

Table 8.4-3: Radiated emissions, mid channel, 24.55 GHz, 18 – 26 GHz

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
22207.966667	54.93	84.40	29.47	5000.0	1000.000	349.0	H	10.0	15.9
23275.100000	59.98	84.40	24.42	5000.0	1000.000	211.0	H	99.0	18.6
23627.633333	60.39	84.40	24.01	5000.0	1000.000	257.0	V	21.0	20.2
25042.633333	60.19	84.40	24.21	5000.0	1000.000	136.0	H	114.0	19.1
25507.566667	59.83	84.40	24.57	5000.0	1000.000	285.0	V	62.0	19.1
25991.966667	60.40	84.40	24.00	5000.0	1000.000	319.0	V	11.0	20.5

Notes:

Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
Correction factors = antenna factor ACF (dB) + cable loss (dB)
Limits converted to dBµV/m and an inverse proportionality factor of 20 dB per decade has been used to normalize the specification limit to a measurement distance of 3 meters to determine compliance.

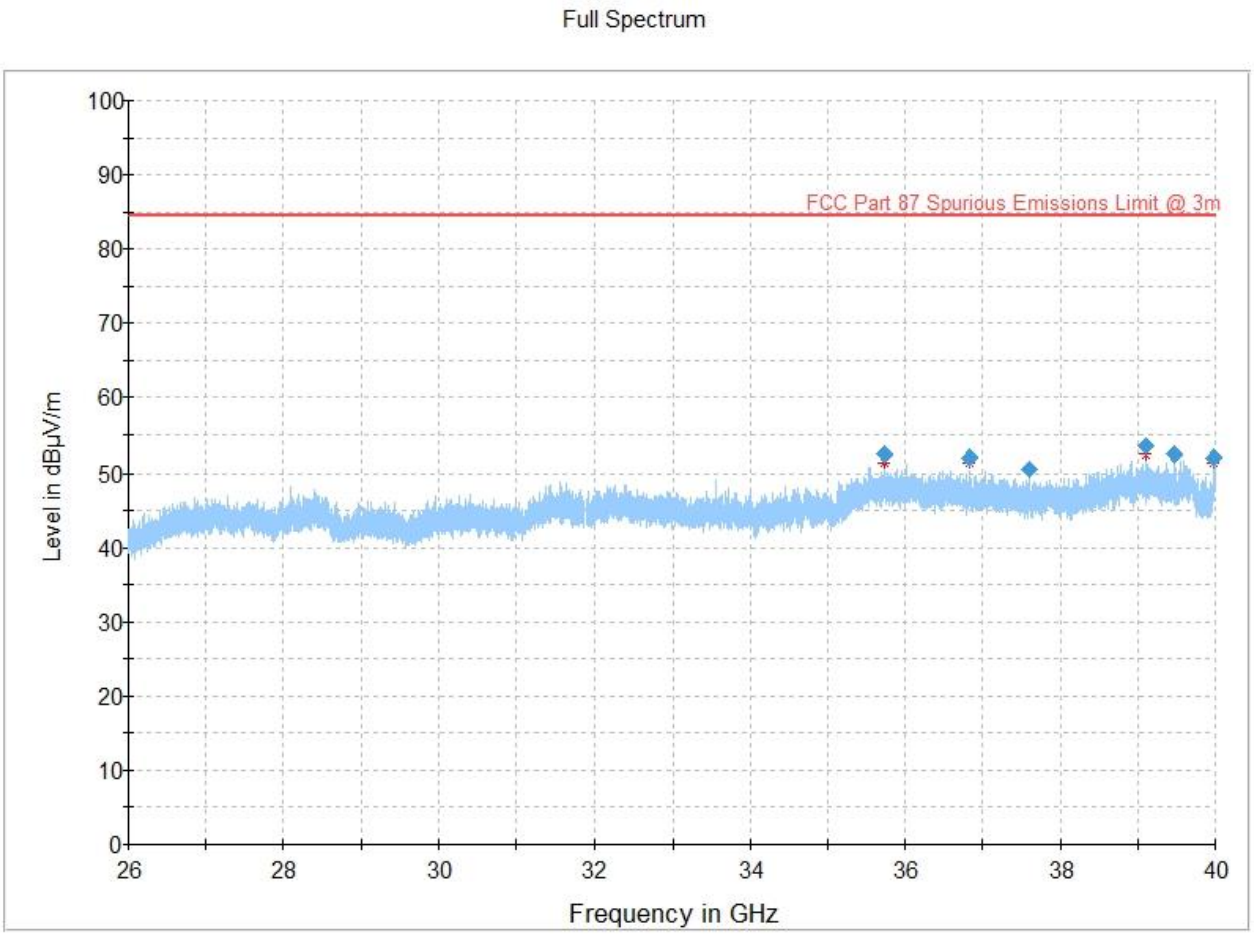

Figure 8.4-4: Radiated emissions, mid channel, 24.55 GHz, 26 - 40 GHz

Table 8.4-4: Radiated emissions, mid channel, 24.55 GHz, 26 – 40 GHz

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
35738.233333	52.35	84.40	32.05	5000.0	1000.000	111.0	H	36.0	16.1
36826.033333	52.05	84.40	32.35	5000.0	1000.000	175.0	V	147.0	15.6
37603.100000	50.51	84.40	33.89	5000.0	1000.000	118.0	H	339.0	15.8
39111.233333	53.48	84.40	30.92	5000.0	1000.000	189.0	V	64.0	18.6
39470.233333	52.47	84.40	31.93	5000.0	1000.000	100.0	H	33.0	17.9
39983.033333	52.01	84.40	32.39	5000.0	1000.000	104.0	V	21.0	18.6

Notes:

Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
Correction factors = antenna factor ACF (dB) + cable loss (dB)
Limits converted to dBµV/m and an inverse proportionality factor of 20 dB per decade has been used to normalize the specification limit to a measurement distance of 3 meters to determine compliance.

Section 9 Block diagrams of test set-ups

9.1 Radiated emissions set-up

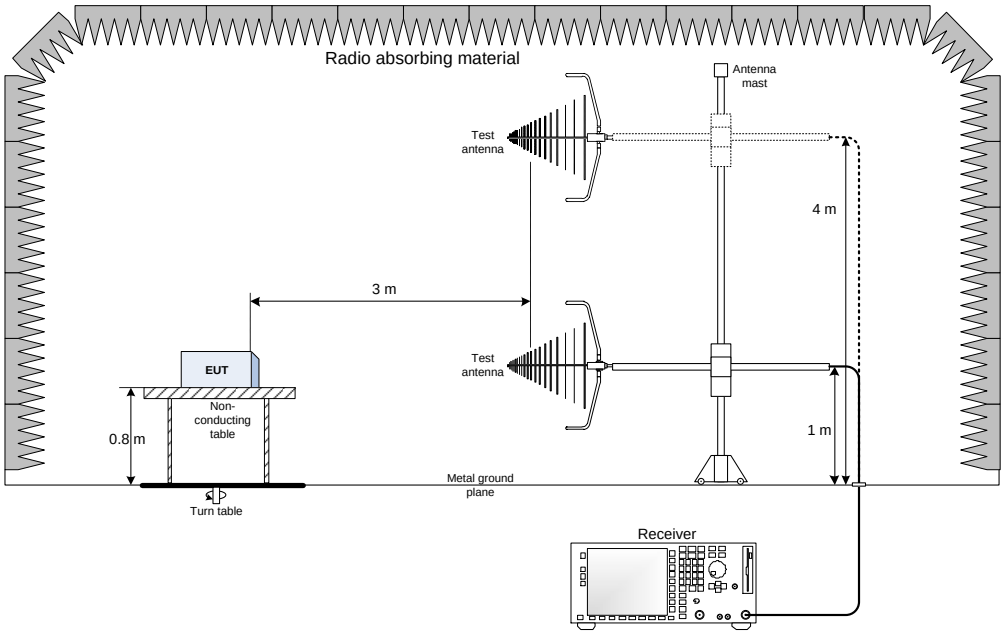

Figure 9.1-1 30 MHz - 1000 MHz Setup

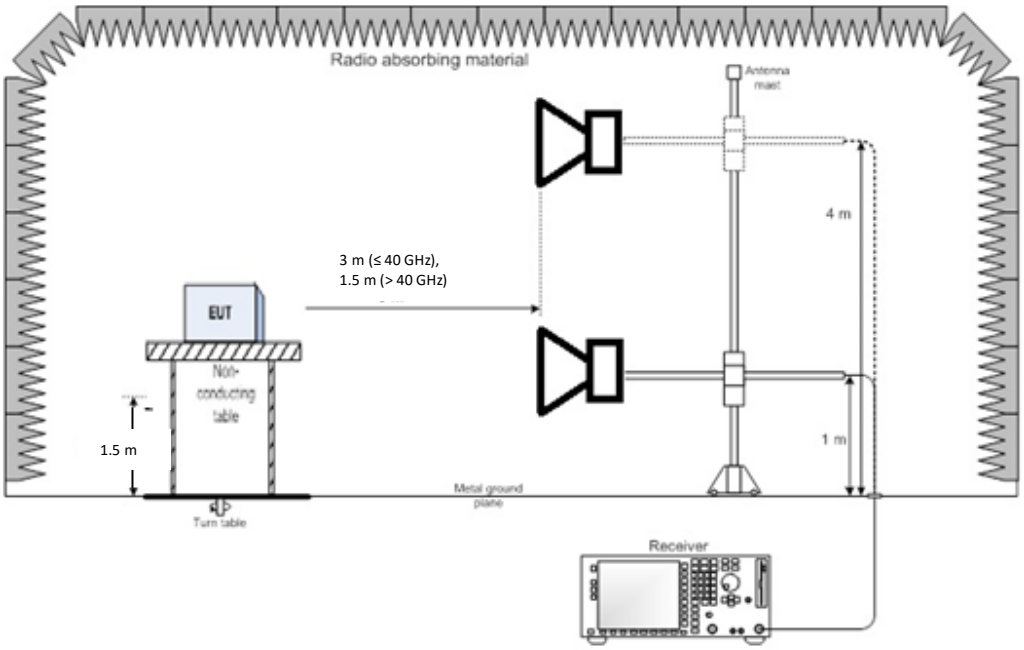

Figure 9.1-2 1 GHz - 110 GHz Setup

Thank you for choosing