Test report

356782-1TRFWL

Date of issue: July 9, 2019

Applicant:
Decatur Electronics

Product:
Vehicle mounted doppler radar

Model:
S795-45-0

FCC ID: HTRKA3

Specifications:

FCC 47 CFR Part 90 Subpart F

PRIVATE LAND MOBILE RADIO SERVICES - RADIOLOCATION SERVICE

Lab and test locations

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FCC Site Number	Test Firm Registration Number: **392943** Designation Number: **US5058**
ISED Test Site	**2040B-3**

Tested by	Martha Espinoza, Wireless Engineer
Reviewed by	Chip Fleury, Wireless and Certification Supervisor
Review date	July 26, 2019
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.

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Section 1 Report summary

1.1 Test specifications

FCC 47 CFR Part 90	PRIVATE LAND MOBILE RADIO SERVICES
ANSI C63.26-2015	COMPLIANCE TESTING OF TRANSMITTERS USED IN LICENSED RADIO SERVICES

1.2 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was completed against all 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.

1.3 Exclusions

None

1.4 Test report revision history

Revision	Details of changes made to test report
374712-TRFWL	Original report issued

Section 2 Summary of test results

2.1 FCC Part 90 Subpart I and Part 2 — General Technical Standards / Test results

Part	Test description	Verdict
§2.1046	Output Power	Pass
§90.209/2.1049	Bandwidth limitations.	Pass
§90.210	Emission masks	Pass
§90.212	Provisions relating to the use of scrambling devices and digital voice modulation[1]	Not applicable
§2.1055	Frequency stability.	Pass
§2.1051	Spurious Emissions at the antenna terminal	Not applicable
§2.1053	Field strength of spurious emissions.	Pass
§90.215	Transmitter measurements.	Not applicable
§90.221	Adjacent channel power limits.	Not applicable

Notes:

None

Section 3 Equipment under test (EUT) details

3.1 Applicant

Company name	Decatur Electronics
Address	16990 Goldentop Road
City	San Diego
Province/State	CA
Postal/Zip code	92127
Country	USA

3.2 Manufacturer

Company name	Decatur Electronics
Address	16990 Goldentop Road
City	San Diego
Province/State	CA
Postal/Zip code	92127
Country	USA

3.3 Sample information

Receipt date	July 1, 2019
Nemko sample ID number	374712

3.4 EUT information

Product name	Vehicle mounted doppler radar system
Model	S795-45-0
Model variant	N/A
Serial number	N/A
Power requirements	12 VDC (cigar receptacle)
Description/theory of operation	EUT is a system conformed by a signal processing unit (typically called computer unit), one or two Ka CW antennas (Radar can be sold with one antenna or two depending on the customer. One antenna is normally mounted in the front of the patrol vehicle facing forward while a second can be mounted in the back window facing rearward), IR (Infrared) remote control and the display unit. There are 3 LED windows on the front display. These windows display target vehicle speeds, locked or faster target speeds and patrol vehicle speeds. There are three mains modes of operation. These modes can be accessed through the IR hand remote as noted below. These modes are: 1) Stationary mode – radar is operated in a patrol vehicle, but patrol vehicle remains stationary. Moving (approaching or receding) target vehicles in front or behind patrol vehicle are detected and speeds displayed on the LED display. 2) Moving mode opposite – radar is operated in a moving patrol vehicle. Moving approaching targets are detected in the front antenna while receding targets are detected in the rear facing antenna. As above, speeds are displayed in the LED display. 3) Moving mode same – radar is operated in a moving patrol vehicle. Moving approaching and receding target vehicles are detected in front or rear antenna and are in the same lane as the patrol vehicle. Also, speeds are displayed in the LED display.

	The Ka antenna can be activated (transmit ON or OFF) through the IR hand remote. The display unit attaches to the front of the computer unit. Typically, only one Ka antenna is activated (transmitting) at any one time.
Operational frequencies	35.5 GHZ ± 100 MHZ (33.4 – 36 GHZ Band)
Antenna Gain	21 dBi (declared by manufacturer)
Software details	N/A

Section 3 Equipment under test (EUT) details continued

3.5 EUT exercise and monitoring details

According to the information showed previously (Description/theory of operation section), the tests were done for this report using the mode number three (moving same mode) and only one antenna was used it (front antenna). For turned the system is enough with use the power button of the computer and after that, use the remote control and turned on the antenna chosen (in this case the button than said “front” for the front antenna was used it).

Table 3.5-1: Support equipment

Description	Brand name	Model/Part number	Serial number	Rev.
Switching mode DC regulated power supply	BK Precision	1697	260G13306	-

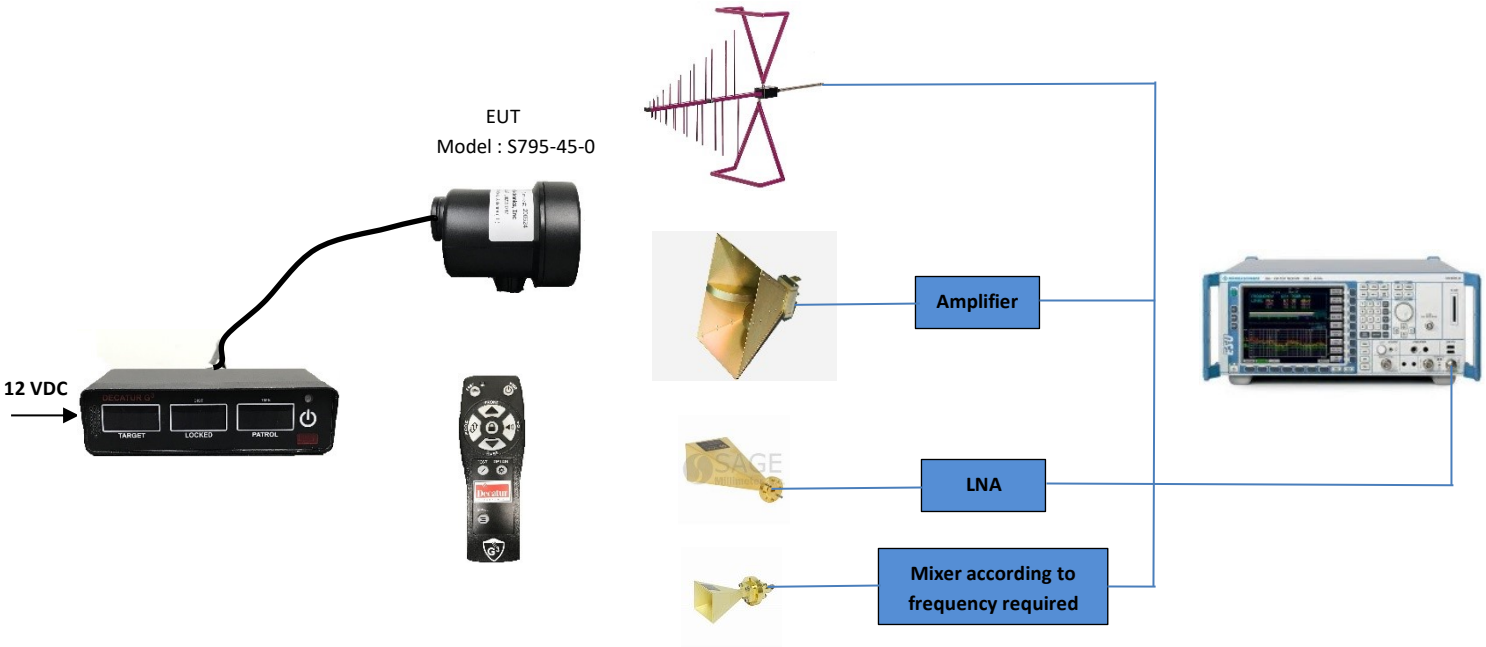


Figure 3.5-1: EUT Test Setup

Section 4 Engineering considerations

4.1 Modifications incorporated in the EUT

None

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	21.4 °C
Relative humidity	55.7 %
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
All antenna port measurements/ including OBW	0.55
Conducted spurious emissions	1.13
Radiated spurious emissions	3.78
AC power line conducted emissions	1.38
Supply Voltages	0.05%
Time	2.09%

Table 6.1-1: Measurement uncertainty.

Important note: All testing in this document were done using the maximum radiation side if the antenna for covering the worst case in all the measurements.

Section 7 Testing data

7.1 RF Output power (FCC 2.1046)

7.1.1 References

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.

7.1.2 Test summary

Verdict	Pass		
Test date	June 25, 2019	Temperature	21°C
Test engineer	Martha Espinoza	Air pressure	1003 mbar
Test location	10m semi anechoic chamber	Relative humidity	63 %

7.1.3 Notes

This test was done using the maximum radiation side if the antenna for covering the worst case in the measurements and it was measure at 3M.

7.1.4 Setup details

EUT setup configuration	Table top
Test facility	3M Semi anechoic chamber
Measuring distance	3 m
Antenna height variation	1.5 m
Turn table position	0° - 360°
Measurement details	A preview measurement was generated with receiver in continuous scan or sweep mode while the EUT was rotated and antenna adjusted to maximize radiated emission. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

Spectrum analyzer settings for frequencies above 1 GHz:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	RMS (Maximum power);
Trace mode	Clear/Write;
Measurement time	100 s;

7.1.4 Setup details continued

Table 7.1-1: RF Output Power equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Antenna, Horn	Sage Millimeter	SAR-2309-28-S2	E1148	03-13-2018	03-13-2020
Low Noise Amplifier	Sage Millimeter	SBL-1834034030-KFKF-SI	E1228	NCR	NCR
Signal analyzer	Rohde & Schwarz	FSV40	E1120	08-24-2018	08-24-2019

Notes: None

7.1.5 Test data RF Output Power

Frequency range (MHz)	Measured EIRP (dBµv/m)	Substitution factor, dB	Measured EIRP (dBm)	EIRP, W
35482	117.69	95.23	22.46	0.176

Table7.1-2: Output power test results

Frequency range (MHz)	EIRP (dBm)	Antenna Gain, dBi	Output power (dBm)	Output power, W
35482	22.46	21	1.46	0.0014

Table7.1-3: Output power Calculations results

7.1.6 Test plots

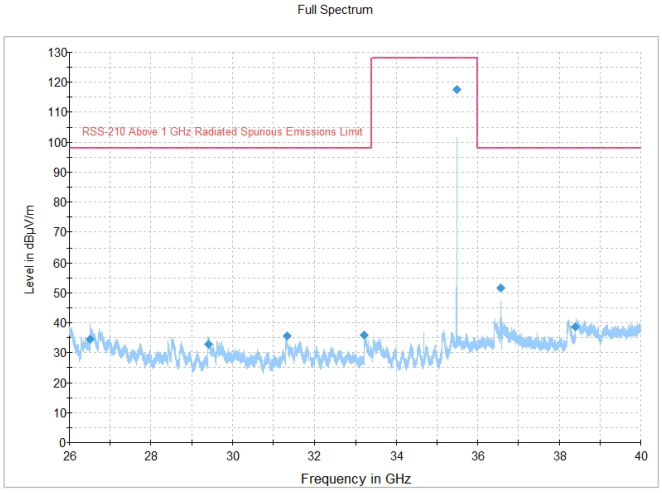


Figure 7.1-1: Maximum power plot. Center frequency 35.5 GHZ ± 100 MHZ

Frequency (MHz)	RMS (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
35481.933333	117.69	NA	NA	5000.0	1000.000	179.0	H	10.0	16.1

7.2 Occupied Bandwidth (FCC 2.1049)

7.2.1 References

Title 47 → Chapter I → Subchapter A → Part 2 → §2.1049/ ANSI C63.26: 2015
Title 47 → Part 90 →Subpart I→ General technical standards→ §90.209 Bandwidth limitations

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. Unless specified elsewhere, channel spacings and bandwidths that will be authorized in the following frequency bands are given in the following table.

STANDARD CHANNEL SPACING/BANDWIDTH

Frequency band (MHz)	Channel spacing (kHz)	Authorized bandwidth (kHz)
Below 25[2]		
25-50	20	20
72-76	20	20
150-174	[1]7.5	[1 3]20/11.25/6
216-220[5]	6.25	20/11.25/6
220-222	5	4
406-512[2]	[1]6.25	[1 3 6]20/11.25/6
806-809/851-854	12.5	20
809-817/854-862	12.5	[6]20/11.25
817-824/862-869	25	[6]20
896-901/935-940	12.5	13.6
902-928[4]		
929-930	25	20
1427-1432[5]	12.5	12.5
[3]2450-2483.5[2]		
Above 2500[2]		

7.2.2 Test summary

Verdict	Pass		
Test date	July 2, 2019	Temperature	24°C
Test engineer	Martha Espinoza	Air pressure	1002 mbar
Test location	3M Chamber	Relative humidity	53 %

7.2.3 Notes

This is a radiated test measurement at 3M.

7.2.4 Setup details

EUT setup configuration	Table top
Test facility	3M Semi anechoic chamber
Measuring distance	3 m
Antenna height variation	1.5 m
Turn table position	0°

Spectrum analyzer settings for frequencies above 1 GHz:

Resolution bandwidth	100 KHZ
Video bandwidth	300 KHZ
Detector mode	Peak
Trace mode	Single sweep
Measurement time	4 ms

Note: The single sweep capture and the short time for measuring were used for taking the continuous wave signal. This last one has a frequency variation due to the internal source microwave generator (VCO) declared by manufacturer as ±100 MHZ but inside to the band: 33.4 to 36 GHZ.

Table 7.2-1: Occupied bandwidth equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Antenna, Horn	Sage Millimeter	SAR-2309-28-S2	E1148	03-13-2018	03-13-2020
Low Noise Amplifier	Sage Millimeter	SBL-1834034030-KFKF-SI	E1228	NCR	NCR
Signal analyzer	Rohde & Schwarz	FSV40	E1120	08-24-2018	08-24-2019

Notes: None

7.2.5 Test data

Center Frequency (GHZ)	99 % OBW (KHZ)	26 dB OBW (KHZ)
35.4830332	256.776	314.189

Table 7.2-2: Occupied bandwidth results.

7.2.6 Test plots

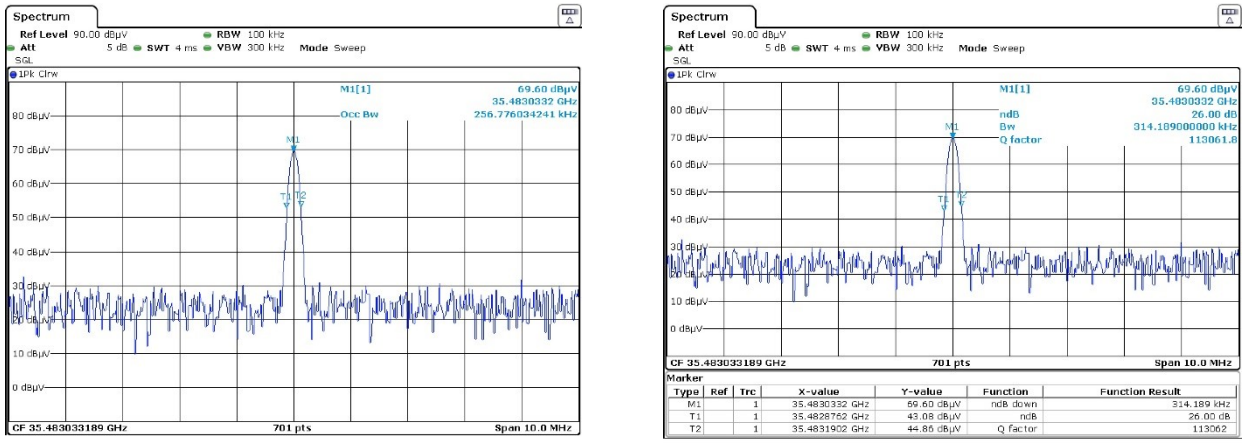


Figure 7.2-1: 99% and 26 dB Occupied bandwidth plot respectively.

7.3 Frequency Stability (FCC 2.1055)

7.3.1 References

Title 47 → Chapter I → Subchapter A → Part 2 → §2.1055 / ANSI C63.26: 2015

(a) The frequency stability shall be measured with variation of ambient temperature as follows:
(1) From −30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.
(2) From −20° to + 50° centigrade for equipment to be licensed for use in the Maritime Services under part 80 of this chapter, except for Class A, B, and S Emergency Position Indicating Radiobeacons (EPIRBS), and equipment to be licensed for use above 952 MHz at operational fixed stations in all services, stations in the Local Television Transmission Service and Point-to-Point Microwave Radio Service under part 21 of this chapter, equipment licensed for use aboard aircraft in the Aviation Services under part 87 of this chapter, and equipment authorized for use in the Family Radio Service under part 95 of this chapter.
(3) From 0° to + 50° centigrade for equipment to be licensed for use in the Radio Broadcast Services under part 73 of this chapter.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(c) In addition to all other requirements of this section, the following information is required for equipment incorporating heater type crystal oscillators to be used in mobile stations, for which type acceptance is first requested after March 25, 1974, except for battery powered, hand carried, portable equipment having less than 3 watts mean output power.
(1) Measurement data showing variation in transmitter output frequency from a cold start and the elapsed time necessary for the frequency to stabilize within the applicable tolerance. Tests shall be made after temperature stabilization at each of the ambient temperature levels; the lower temperature limit, 0° centigrade and + 30° centigrade with no primary power applied.
(2) Beginning at each temperature level specified in paragraph (c)(1) of this section, the frequency shall be measured within one minute after application of primary power to the transmitter and at intervals of no more than one minute thereafter until ten minutes have elapsed or until sufficient measurements are obtained to indicate clearly that the frequency has stabilized within the applicable tolerance, whichever time period is greater. During each test, the ambient temperature shall not be allowed to rise more than 10° centigrade above the respective beginning ambient temperature level.
(3) The elapsed time necessary for the frequency to stabilize within the applicable tolerance from each beginning ambient temperature level as determined from the tests specified in this paragraph shall be specified in the instruction book for the transmitter furnished to the user.
(4) When it is impracticable to subject the complete transmitter to this test because of its physical dimensions or power rating, only its frequency determining and stabilizing portions need be tested.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.
(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c), and (d) of this section. (For example measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment.)

7.3.2 Test summary

Verdict	Pass		
Test date	July 2, 2019	Temperature	24°C
Test engineer	Martha Espinoza	Air pressure	1002 mbar
Test location	Wireless bench	Relative humidity	53 %

7.3.3 Notes

This is a radiated test measurement done in line of sight between the EUT and receiving antenna with a glass window in the middle. The EUT DC feed point go inside to the chamber throughout a hole filled with foam material for maintaining the environmental conditions desired into the temperature chamber. This product has a natural frequency variation due to the internal source microwave generator (VCO) declared by manufacturer as ±100 MHZ but inside to the band: 33.4 to 36 GHZ.

7.3.4 Setup details

EUT setup configuration	Table top
Test facility	Environmental Chamber
Measuring distance	<.2m

Spectrum analyzer settings for frequencies above 1 GHz:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	Peak
Trace mode	Max Hold
Measurement time	47 ms

Note:

Table 7.3-1: Frequency stability equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Antenna, Horn	Sage Millimeter	SAR-2309-28-S2	E1148	03-13-2018	03-13-2020
Low Noise Amplifier	Sage Millimeter	SBL-1834034030-KFKF-SI	E1228	NCR	NCR
Signal analyzer	Rohde & Schwarz	FSV40	E1120	08-24-2018	08-24-2019
Temperature chamber	Test Equity	115A	E1162	06-18-2019	06-18-2020

Notes: None

7.3.5 Test Data

Temperature	Frequency (GHZ)	Variation (MHZ)	ppm
+50°C	35.482549	7.379	207.919
+40°C	35.488757	1.171	32.996
+30°C	35.494867	4.939	139.167
+20°C (Reference)	35.489928	**N/A**	**N/A**
+10°C	35.490614	0.686	19.330
0°C	35.492586	2.658	74.895
-10°C	35.49573	5.802	163.484
-20°C	35.499453	9.525	268.387
-30°C	35.502075	12.147	342.267

Note 1: The reference value for calculating the variation though the temperatures, it is the value measurement taken at +20°C. $PPM = \frac{(Freq\ meas\ with\ variation\ Temp\ (HZ)) - (Freq\ meas\ at\ Reference\ Temp(HZ))}{Reference\ frequency\ (MHZ)}$

Table 7.3-2. Temperature variation results.

Voltage (+20°C) ±15%	Frequency (GHZ)	Variation (MHZ)	ppm
10.2 VDC	35.489910	0.016	0.451
12 VDC (Reference)	**35.489928**	**N/A**	**N/A**
13.8 VDC	35.489786	0.142	3.551

Note 1: The reference value for calculating the variation though the voltage, it is the value measurement taken at 20°C and 12 VDC. $PPM = \frac{(Freq\ meas\ with\ variation\ Volt\ (HZ)) - (Freq\ meas\ at\ Reference\ Volt(HZ))}{Reference\ frequency\ (MHZ)}$

Table 7.3-3. Voltage variation results.

7.4 Emission Mask & Unwanted emissions

7.4.1 References

Title 47 → Part 90 →Subpart I→ General technical standards→ §90.210 Emission Mask
Title 47 → Chapter I → Subchapter A → Part 2 → §2.1053 / ANSI C63.26: 2015

Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (o) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere in this part, the table in this section specifies the emission masks for equipment operating under this part.

Applicable Emission Masks

Frequency band (MHz)	Mask for equipment with audio low pass filter	Mask for equipment without audio low pass filter
Below 25[1]	A or B	A or C
25-50	B	C
72-76	B	C
150-174[2]	B, D, or E	C, D or E
150 paging only	B	C
220-222	F	F
421-512[2 5]	B, D, or E	C, D, or E
450 paging only	B	G
806-809/851-854[6]	B	H
809-824/854-869[35]	B, D	D, G.
896-901/935-940	I	J
902-928	K	K
929-930	B	G
4940-4990 MHz	L or M	L or M
5850-5925[4]		
All other bands	B	C

(c) Emission Mask C. For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier output power (P) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5 kHz, but not more than 10 kHz: At least 83 log (f_d/5) dB;

(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 10 kHz, but not more than 250 percent of the authorized bandwidth: At least 29 log (f_d^2/11) dB or 50 dB, whichever is the lesser attenuation;

(3) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

7.4.2 Test summary

Verdict	Pass		
Test date	June 25, 2019 July 1, 2019 July 2, 2019	Temperature	21°C; 24°C; 24°C;
Test engineer	Martha Espinoza	Air pressure	1003; 1003; 1002 mbar;
Test location	3M semi anechoic chamber	Relative humidity	63 %; 56 %; 53 %;

Note: None

7.4.3 Setup details

EUT setup configuration	Table top
Test facility	3M Semi Anechoic Chamber (SAC)
Measuring distance	3 m
Antenna height variation	1–4 m
Turn table position	0–360°
Measurement details	A preview measurement was generated with receiver in continuous scan or sweep mode while the EUT was rotated and antenna adjusted to maximize radiated emission. Emissions detected within 6 dB or above limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.

Receiver/spectrum analyzer settings for frequencies below 1 GHz:

Resolution bandwidth	120 kHz
Video bandwidth	300 kHz
Detector mode	– Peak (Preview measurement) – Quasi-peak (Final measurement)
Trace mode	Max Hold
Measurement time	– 100 ms (Peak preview measurement) – 1000 ms (Quasi-peak final measurement)

Receiver/spectrum analyzer settings for frequencies above 1 GHz:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	Peak (Preview measurement) Peak and CAverage (Final measurement)
Trace mode	Max Hold
Measurement time	– 100 ms (Peak preview measurement) – 100 ms (Peak and CAverage final measurement)

Table 7.4-1: Radiated disturbance equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMC Test Receiver	Rohde & Schwarz	ESU 40	E1121	05-25-2018	05-25-2020
Signal Analyzer	Rohde & Schwarz	FSV 40	E1120	08-24-2018	08-24-2019
Signal Generator	Rohde & Schwarz	SMB 100A	E1128	12-20-2018	12-20-2019
Antenna, Bilog	Schaffner-Chase	CBL6111C	E1480	12-05-2018	12-05-2019
Antenna, Horn	ETS	3117-PA	E1139	01-26-2018	01-26-2020
Antenna, Horn	Sage Millimeter	SAR-2309-42-S2	E1143	03-05-2018	03-05-2020
Antenna, Horn	Sage Millimeter	SAR-2309-28-S2	E1148	03-13-2018	03-13-2020
Low Noise Amplifier	Sage Millimeter	SBL-1834034030-KFKF-SI	E1228	NCR	NCR
Antenna, Horn	Sage Millimeter	SAR-2309-19-S2	E1144	NCR	NCR
Mixer	Rohde & Schwarz	FS-Z60	E1138	03-07-2018	03-07-2020
Antenna, Horn	Sage Millimeter	SAR-2408-15-S2	E1152	NCR	NCR
Mixer	Rohde & Schwarz	FS-Z75	E1149	10-26-2018	10-26-2020
Antenna, Horn	Sage Millimeter	SAR-2507-10-S2	E1146	NCR	NCR
Mixer	Rohde & Schwarz	FS-Z110	E1154	02-06-2018	02-06-2020
Antenna, Horn	Sage Millimeter	SAR-2507-06-S2	E1182	NCR	NCR
Mixer	Radiometer Physics	HM110-170	E1178	09-27-2018	09-27-2019
Antenna, Horn	Sage Millimeter	SAR-2309-05-S2	E1184	NCR	NCR
Mixer	Radiometer Physics	HM140-220	E1177	09-25-2018	09-25-2019
Antenna, Horn	Sage Millimeter	SAR-2507-10-S2	E1147	NCR	NCR

Notes: None

7.4.4 Test Data and Test Plots

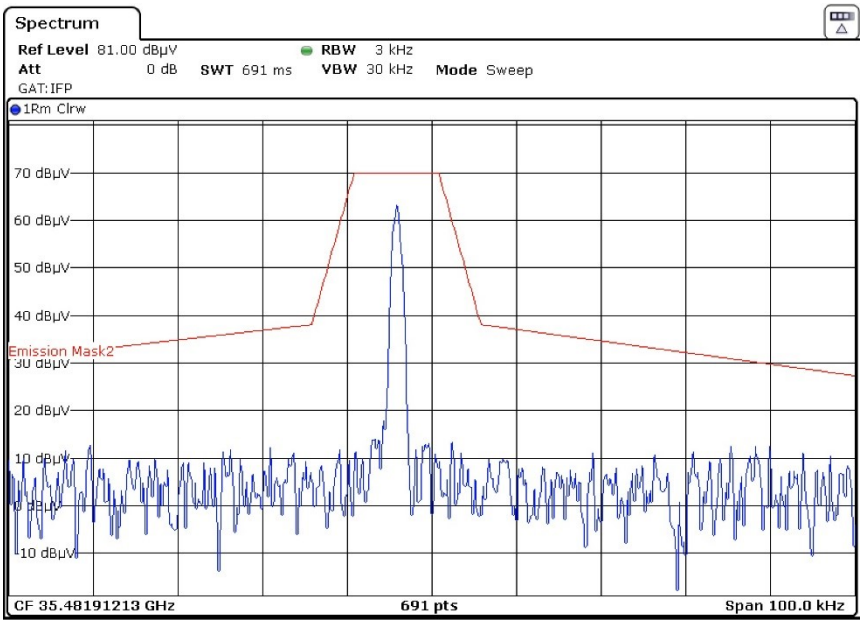


Figure 7.4-1: Emission mask "C".

7.4.4 Test Data and Test Plots continued

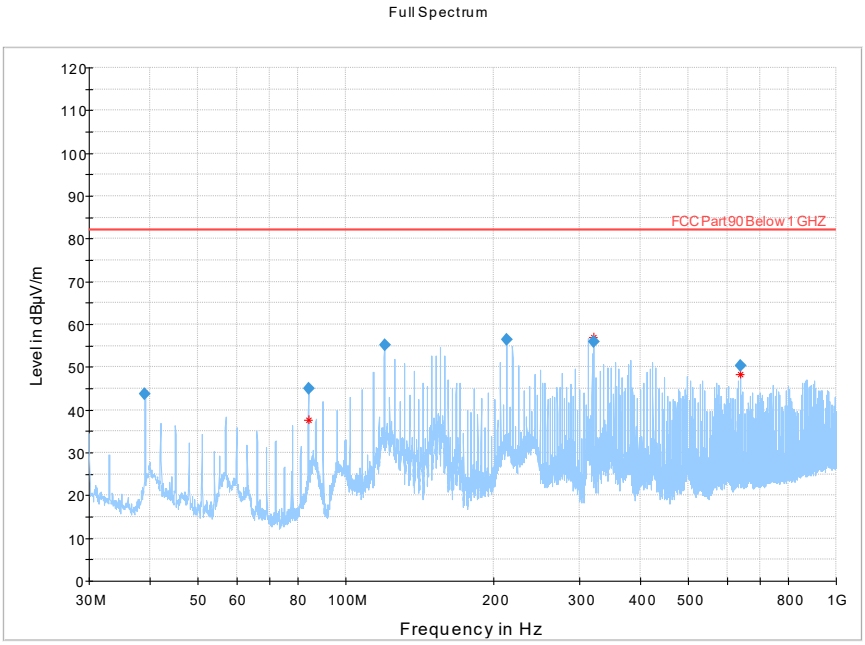


Figure 7.4-2: Radiated emissions plot – Field strength measured from 30 to 1000 MHZ. FCC Part 90.

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
38.992500	43.66	82.23	38.57	5000.0	120.000	100.0	V	247.0	15.9
84.000500	45.05	82.23	37.18	5000.0	120.000	319.3	H	0.0	9.5
120.007500	55.30	82.23	26.93	5000.0	120.000	274.2	H	353.0	13.5
212.990500	56.43	82.23	25.80	5000.0	120.000	113.4	H	293.0	12.0
320.030000	56.03	82.23	26.20	5000.0	120.000	112.5	H	329.0	16.7
638.994500	50.25	82.23	31.98	5000.0	120.000	113.5	H	286.0	23.8

Table 7.4-2: Radiated emissions results – Field strength measured from 30 to 1000 MHZ. FCC Part 90

Table 7.4-3: Radiated emissions results – Field strength measured from 1 to 18 GHZ.

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] The maximum measured value observed over a period of 15 seconds was recorded.
[4] The spectral plot is a summation of a vertical and horizontal scan.

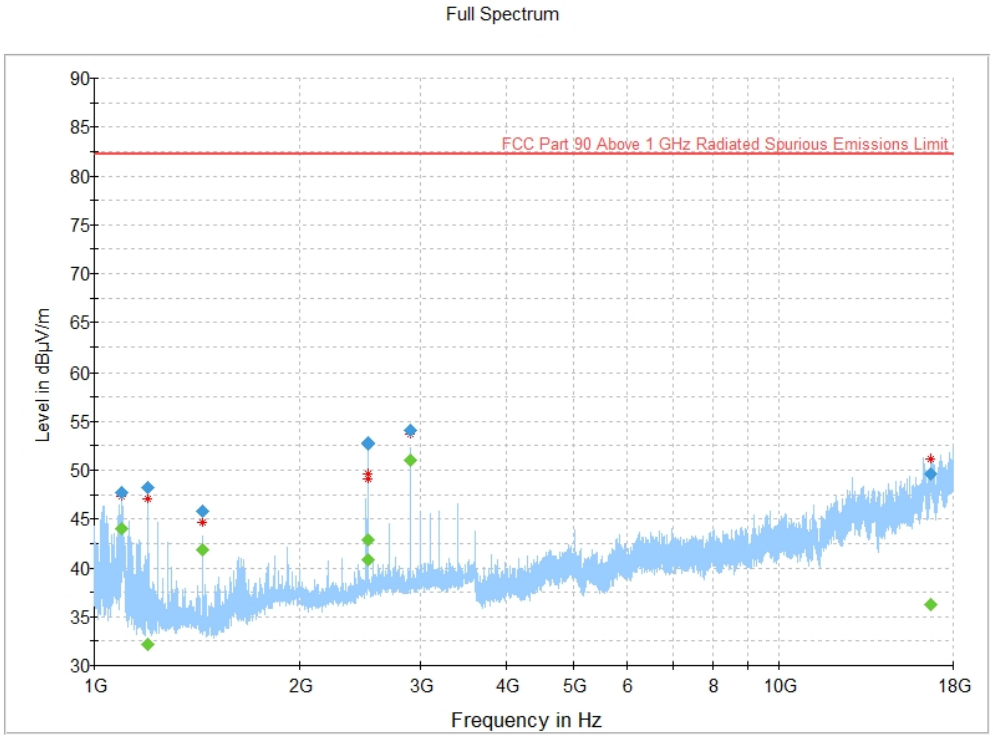


Figure 7.4-3: Radiated emissions plot – Field strength measured from 1 to 18 GHZ. FCC Part 90

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1094.833333	47.71	---	82.23	34.52	5000.0	1000.000	106.0	H	217.0	-15.4
1094.833333	---	44.01	82.23	38.22	5000.0	1000.000	106.0	H	217.0	-15.4
1200.066667	48.19	---	82.23	34.04	5000.0	1000.000	101.0	H	43.0	-14.5
1200.066667	---	32.16	82.23	50.07	5000.0	1000.000	101.0	H	43.0	-14.5
1439.933333	45.83	---	82.23	36.40	5000.0	1000.000	126.0	V	151.0	-15.5
1439.933333	---	41.87	82.23	40.36	5000.0	1000.000	126.0	V	151.0	-15.5
2512.333333	---	42.82	82.23	39.41	5000.0	1000.000	102.0	V	143.0	-10.4
2512.333333	52.82	---	82.23	29.41	5000.0	1000.000	102.0	V	143.0	-10.4
2513.133333	52.70	---	82.23	29.53	5000.0	1000.000	99.0	V	142.0	-10.4
2513.133333	---	40.86	82.23	41.37	5000.0	1000.000	99.0	V	142.0	-10.4
2899.833333	---	51.04	82.23	31.19	5000.0	1000.000	102.0	V	185.0	-9.2
2899.833333	54.07	---	82.23	28.16	5000.0	1000.000	102.0	V	185.0	-9.2
16702.066667	---	36.30	82.23	45.93	5000.0	1000.000	148.0	V	150.0	11.1
16702.066667	49.58	---	82.23	32.65	5000.0	1000.000	148.0	V	150.0	11.1

Table 7.4-3: Radiated emissions results – Field strength measured from 1 to 18 GHZ. FCC Part 90

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] The maximum measured value observed over a period of 15 seconds was recorded.
[4] The spectral plot is a summation of a vertical and horizontal scan.

7.4.4 Test Data and Test Plots continued

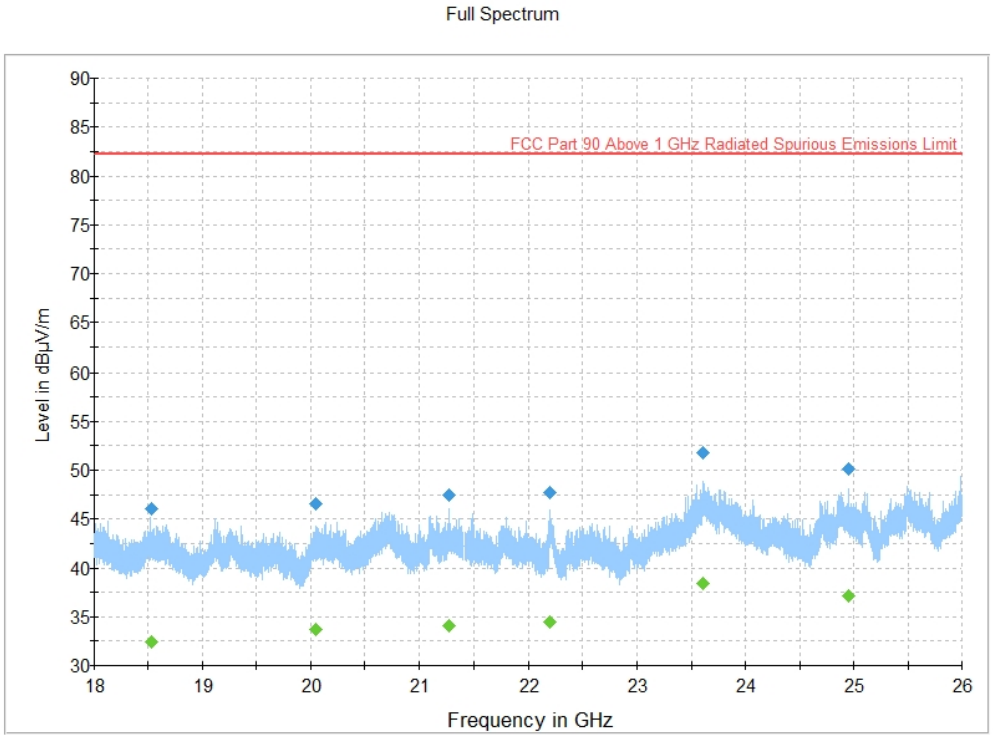


Figure 7.4-4: Radiated emissions plot – Field strength measured from 18 to 26 GHZ. FCC Part 90

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18523.666667	46.04	---	82.23	36.19	5000.0	1000.000	168.0	H	290.0	15.0
18523.666667	---	32.37	82.23	49.86	5000.0	1000.000	168.0	H	290.0	15.0
20041.400000	---	33.64	82.23	48.59	5000.0	1000.000	150.0	H	170.0	16.5
20041.400000	46.60	---	82.23	35.63	5000.0	1000.000	150.0	H	170.0	16.5
21273.533333	47.50	---	82.23	34.73	5000.0	1000.000	114.0	H	107.0	17.7
21273.533333	---	34.07	82.23	48.16	5000.0	1000.000	114.0	H	107.0	17.7
22196.200000	---	34.48	82.23	47.75	5000.0	1000.000	194.0	H	276.0	17.9
22196.200000	47.65	---	82.23	34.58	5000.0	1000.000	194.0	H	276.0	17.9
23611.266667	51.75	---	82.23	30.48	5000.0	1000.000	210.0	V	252.0	22.8
23611.266667	---	38.46	82.23	43.77	5000.0	1000.000	210.0	V	252.0	22.8
24959.133333	50.11	---	82.23	32.12	5000.0	1000.000	125.0	V	145.0	21.5
24959.133333	---	37.12	82.23	45.11	5000.0	1000.000	125.0	V	145.0	21.5

Table 7.4-4: Radiated emissions results – Field strength measured from 18 to 26 GHZ. FCC Part 90

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] The maximum measured value observed over a period of 15 seconds was recorded.
[4]The spectral plot is a summation of a vertical and horizontal scan.

7.4.4 Test Data and Test Plots continued

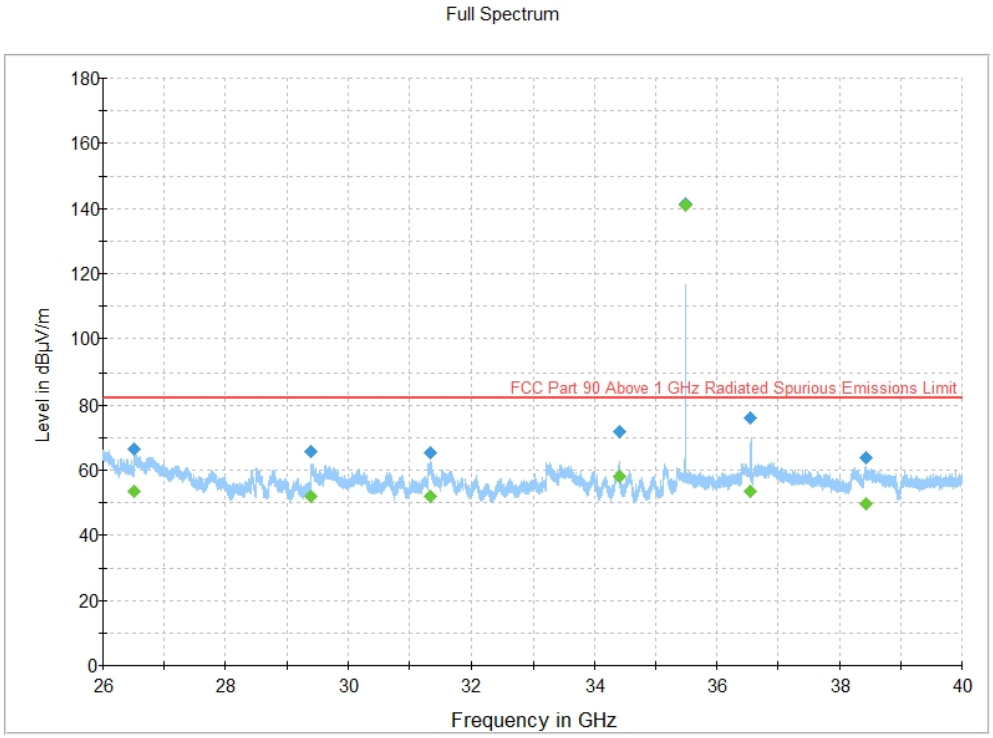


Figure 7.4-5: Radiated emissions plot – Field strength measured from 26 to 40 GHZ. FCC Part 90

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
26508.866667	---	53.46	82.23	28.77	5000.0	1000.000	134.0	V	155.0	27.4
26508.866667	66.69	---	82.23	15.54	5000.0	1000.000	134.0	V	155.0	27.4
29397.733333	---	51.80	82.23	30.43	5000.0	1000.000	175.0	H	294.0	28.2
29397.733333	65.59	---	82.23	16.64	5000.0	1000.000	175.0	H	294.0	28.2
31342.600000	65.21	---	82.23	17.02	5000.0	1000.000	173.0	H	55.0	29.2
31342.600000	---	51.95	82.23	30.28	5000.0	1000.000	173.0	H	55.0	29.2
34402.666667	---	58.24	82.23	23.99	5000.0	1000.000	203.0	H	2.0	30.0
34402.666667	71.90	---	82.23	10.33	5000.0	1000.000	203.0	H	2.0	30.0
35482.466667	---	------	82.23	Fundamental[5]	5000.0	1000.000	129.0	V	-2.0	30.3
35482.466667	-----	---	82.23	Fundamental[5]	5000.0	1000.000	129.0	V	-2.0	30.3
36550.333333	76.14	---	82.23	6.09	5000.0	1000.000	136.0	H	349.0	29.2
36550.333333	---	53.58	82.23	28.65	5000.0	1000.000	136.0	H	349.0	29.2
38429.866667	---	49.85	82.23	32.38	5000.0	1000.000	185.0	V	275.0	28.4
38429.866667	63.64	---	82.23	18.59	5000.0	1000.000	185.0	V	275.0	28.4

Table 7.4-5: Radiated emissions results – Field strength measured from 26 to 40 GHZ for FCC Part 90.

Notes:
[1] Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
[2] Correction factors = antenna factor ACF (dB) + cable loss (dB)
[3] The maximum measured value observed over a period of 15 seconds was recorded.
[4] The spectral plot is a summation of a vertical and horizontal scan.
[5] The fundamental signal is not part of this limit line. For FCC part 90 the output power of fundamental is not have a limit required. This is the worst case: Max peak value.

7.4.4 Test Data and Test Plots continued

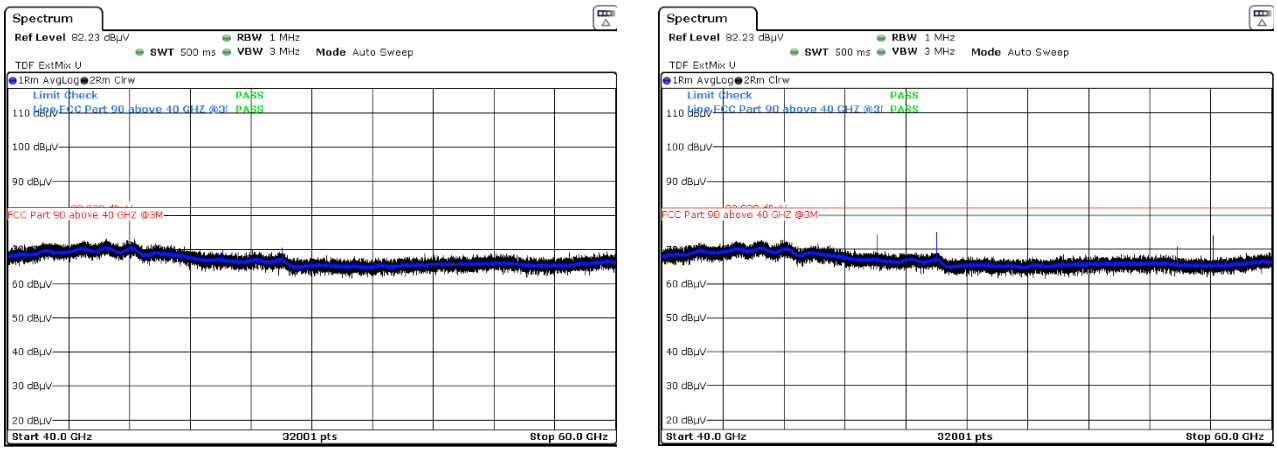


Figure 7.4-7: Radiated emissions plot – Field strength measured from 40 to 60 GHZ, Rx antenna in horizontal and vertical polarization, respectively @ 3M.

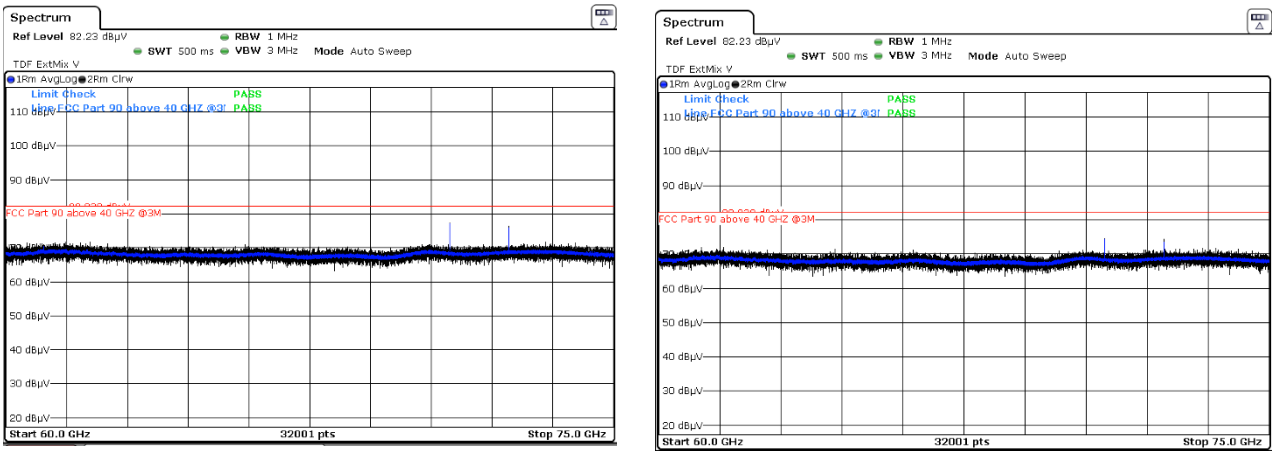


Figure 7.4-8: Radiated emissions plot – Field strength measured from 60 to 75 GHZ, Rx antenna in horizontal and vertical polarization, respectively @3M.

7.4.4 Test Data and Test Plots continued

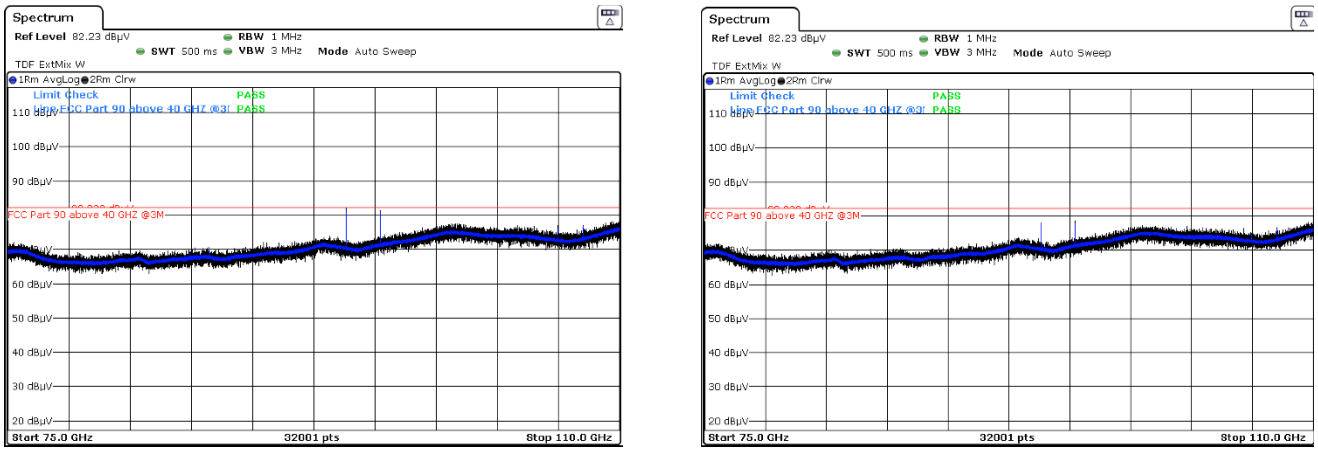


Figure 7.4-9: Radiated emissions plot – Field strength measured from 75 to 110 GHZ at 1 MHZ RBW, Rx antenna in horizontal and vertical polarization, respectively @3M.

Important note: From this range and up 220 GHZ, the measurement was taken twice due to noise floor must to be at least 6 dB or more from the limit under test with 1 MHZ RBW. These rules were defined by FCC. The first measurement was made according to FCC rules while the second one was made at 100 KHZ of RBW which is not according to FCC rules but is only to demonstrate than level showed on the plot is just the noise floor and it is not part of the measured signal from the EUT.

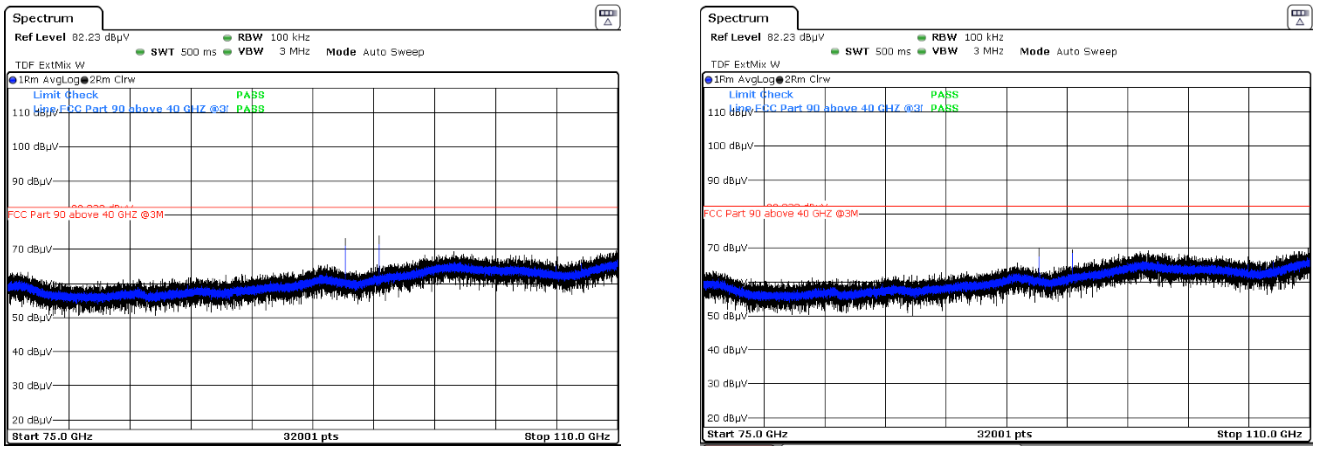
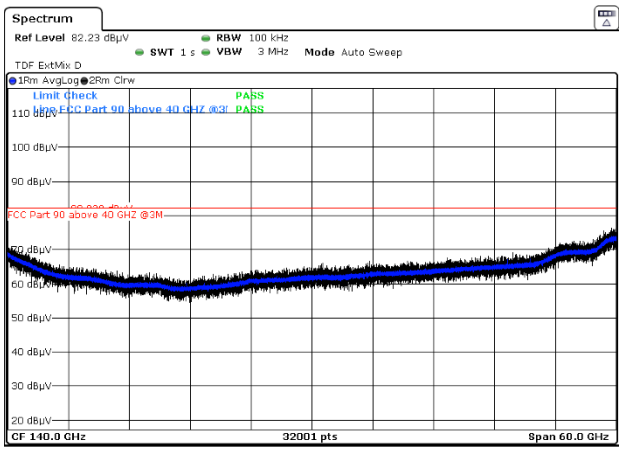


Figure 7.4-10: Radiated emissions plot – Field strength measured from 75 to 110 GHZ at 100 KHZ RBW, Rx antenna in horizontal and vertical polarization, respectively @3M.

7.4.4 Test Data and Test Plots continued



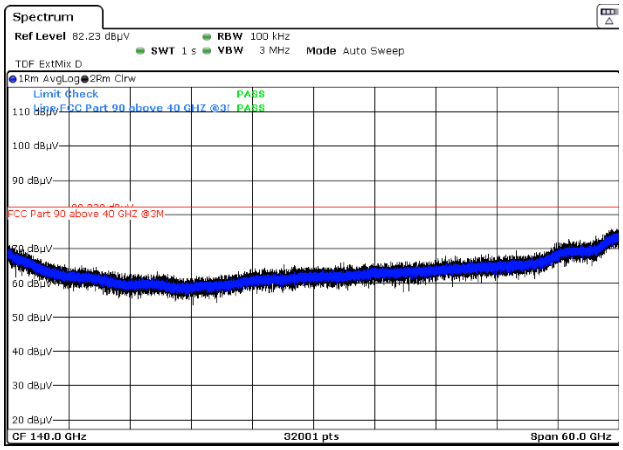
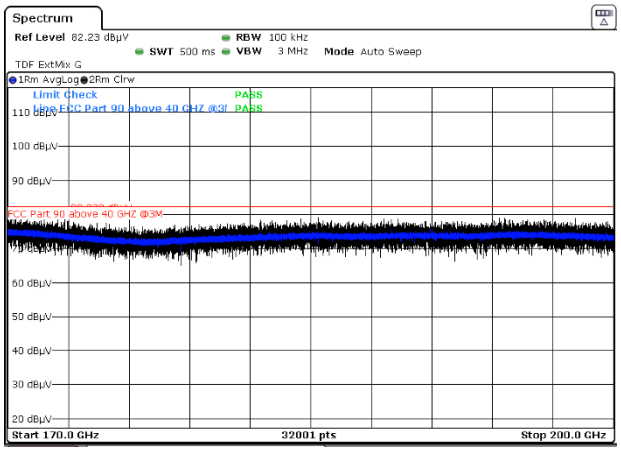


Figure 7.4-12: Radiated emissions plot – Field strength measured from 110 to 170 GHZ at 100 KHZ RBW, Rx antenna in horizontal and vertical polarization, respectively @3M.



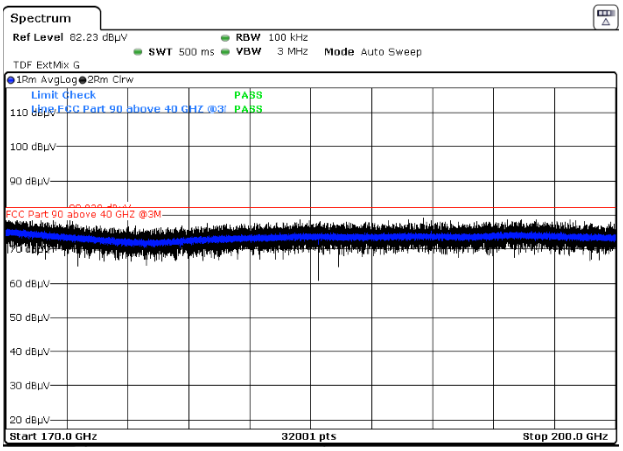


Figure 7.4-14: Radiated emissions plot – Field strength measured from 170 to 200 GHZ at 100 KHZ RBW, Rx antenna in horizontal and vertical polarization, respectively @3M.

Important note: From this range and up 220 GHZ, the measurement was taken at 100kHz bandwidth to demonstrate there are no harmonic emissions near or above the limit.

7.4.4 Test Data and Test Plots continued

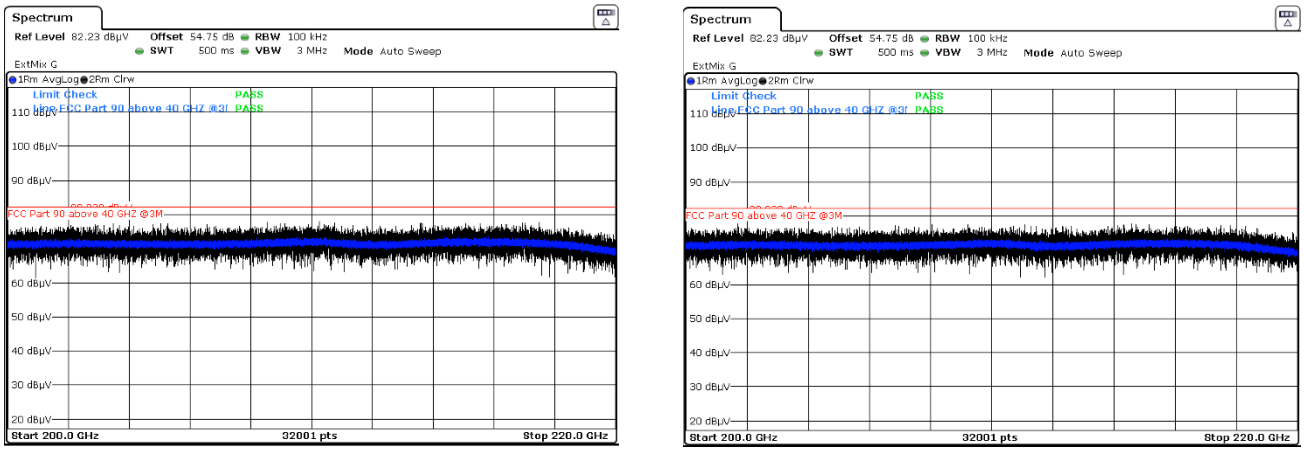
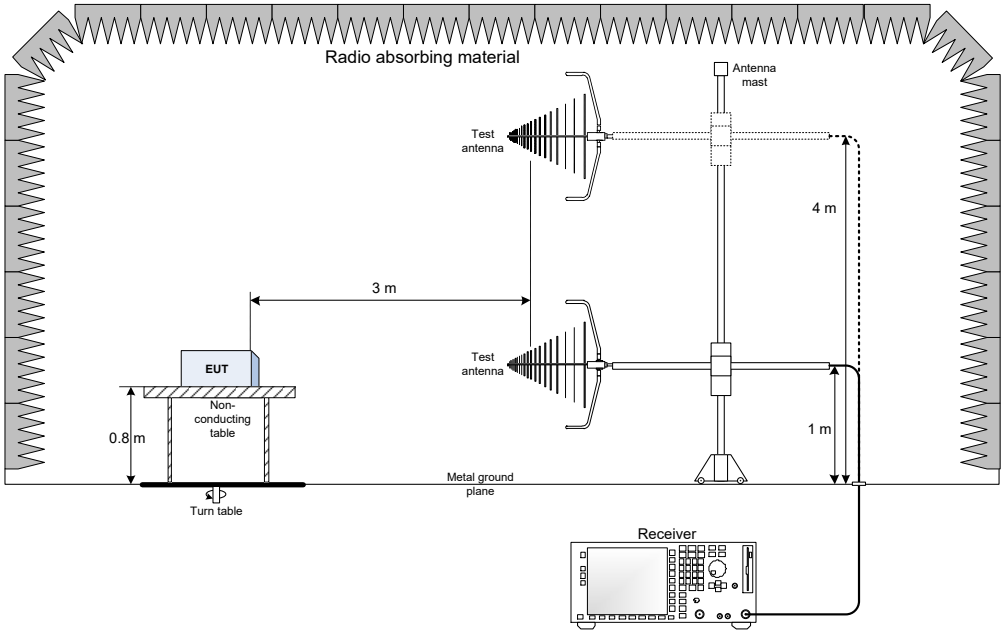


Figure 7.4-16: Radiated emissions plot – Field strength measured from 200 to 220 GHZ at 100 KHZ RBW, Rx antenna in horizontal and vertical polarization, respectively @3M.

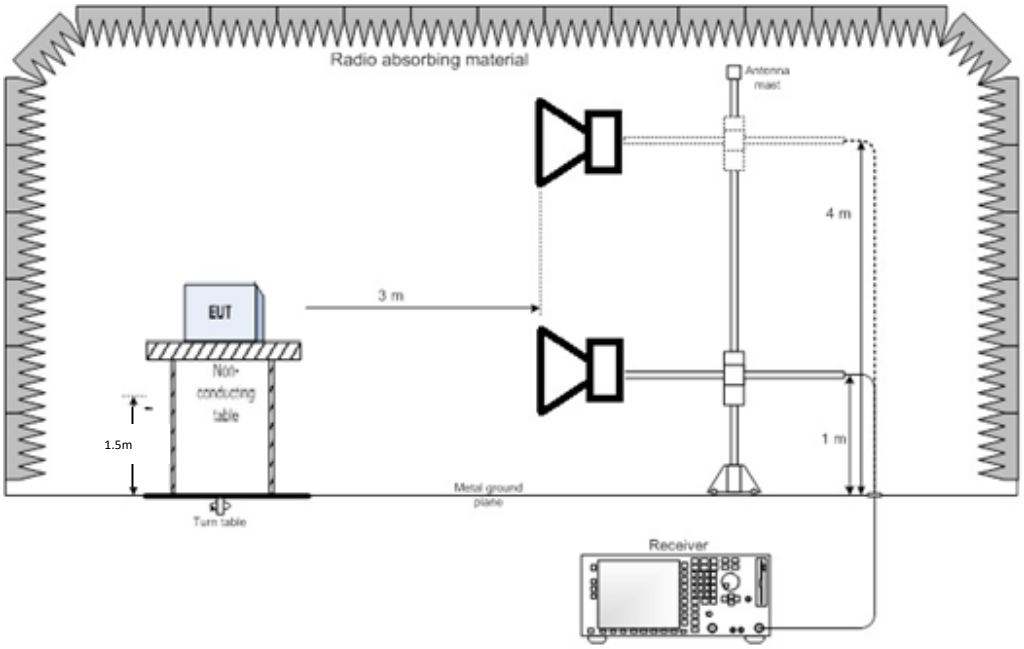
Important note: From this range and up 220 GHZ, the measurement was taken at 100kHz bandwidth to demonstrate there are no harmonic emissions near or above the limit.

Section 8 Block diagrams of test set-ups

8.1 Radiated emissions set-up



30-1000MHz Setup



Above 1GHz Setup

Thank you for choosing