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Report On

Radio Testing of the
Cardinal Health Commercial Technologies, LLC
POD-PAL

FCC Part 15 Subpart C §15.225

Report No. TP72128658.100 **July 2017**

REPORT ON	EMC Evaluation of the Cardinal Health Commercial Technologies, LLC POD-PAL
TEST REPORT NUMBER	TP72128658.100
REPORT DATE	11. July 2017
PREPARED FOR	Cardinal Health Commercial Technologies, LLC 7000 Cardinal Place Dublin, OH 43017
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DATED	21. July 2017

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Revision History

TP72128658.100 Cardinal Health Commercial Technologies, LLC POD-PAL RFID Reader Module					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
21. July 2017	Initial Release				P. Walsh

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SECTION 1

REPORT SUMMARY

Radio Testing of the
Cardinal Health Commercial Technologies, LLC
Model POD-PAL

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Cardinal Health Commercial Technologies, LLC POD-PAL to the requirements of FCC Part 15 Subpart C.

Objective	To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Cardinal Health Commercial Technologies, LLC
Model Name	POD-PAL
Model Number(s)	
FCC ID Number	2AMYL-FUSE005
Serial Number(s)	none
Number of Samples Tested	1
Test Specification/Issue/Date	FCC Part 15 Subpart C
Start of Test	19. June 2017
Finish of Test	20. June 2017
Name of Engineer(s)	David Foerstner, Steve Hoke
Related Document(s)	Supporting documents for EUT certification are separate exhibits.

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with Part 15 is shown below.

Section	FCC Part 15	§15.225 Spec Clause	Test Description	Result	Comments/Base Standard
	§15.31(e)		Voltage Requirement	Compliant	§15.225(e)
	§15.203 and 204		Antenna Requirements	Compliant	See Test Note[1]
2.1		§15.225(e)	Frequency Tolerance	Compliant	
2.2	§15.215(c)		20dB Bandwidth	Compliant	
2.3			Occupied Bandwidth	Compliant	
2.4		§15.225(a)(b)(c)	Emission Mask	Compliant	
2.5	§15.209 and 109	§15.225(d)	Spurious Radiated Emissions	Compliant	
2.6	15.107	§15.207(a)	Conducted Emissions	Compliant	

Test Note[1]: The internal antenna used is permanently attached. This is considered sufficient evidence to comply with the provisions of this requirement.

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1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a Cardinal Health Commercial Technologies, LLC Model POD-PAL as shown in the photographs below. The EUT includes RFID.

Photo 1.3.1-1 – Host Equipment Under Test

1.3.2 EUT General Description

EUT Description	Medicine pill dispenser/verifier for use in Pharmacies.
Model Name	POD-PAL
Model Number(s)	
EUT Measured Field Strength	57.1 dBµV/m @ 3 meters
Frequency Range	13.56 MHz in the 13.110 to 14.0101 MHz band
Number of Operating Frequencies	1
Antenna Type	PCBA

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	*Description*
A	Radiated Transmit Mode.
B	EUT RFID PWB's placed in temperature chamber with small loop antenna.

1.4.2 EUT Exercise Software

The EUT was exercised using proprietary software which set the RFID output power to (100%).

1.4.3 Support Equipment and I/O cables

Manufacturer	*Equipment/Cable*	*Description*
ACER		Notebook Computer
Phihong	PSAC05R-050L6	(EUT) External Power Supply (with ferrite bead attached)
-		USB cable (with ferrite beads at each end)

1.5 DEVIATIONS FROM THE STANDARD

No deviations from the standard were exercised.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number: none		

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10-2013. American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

For conducted and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. This level was based on the maximized cable configuration from exploratory testing per ANSI C63.10-2013. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

1.8 TEST FACILITY LOCATION

1.8.1 TÜV SÜD America Inc. (Tampa)

5610 W. Sligh Ave, Suite 100, Tampa, FL 33634

1.9 TEST FACILITY REGISTRATION

1.9.1 FCC – Site Registration: US1063

The TUV SUD America Inc. (Tampa), test facility has been registered with the Federal Communication Commission as an ISO/IEC 17025 accredited test laboratory and assigned the designation number US1063.

1.9.2 Innovation, Science and Economic Development Canada (IC) Registration No.: 2087A-2

The TUV SUD America Inc. (Tampa), test facility has been registered with Innovation, Science and Economic Development Canada and assigned the site number 2087A-2.

1.9.3 VCCI – Registration No. A-0256

The TUV SUD America Inc. (Tampa), test facility has been registered with the VCCI and assigned the registration number A-0256.

SECTION 2

TEST DETAILS

Radio Testing of the
Cardinal Health Commercial Technologies, LLC
Model POD-PAL

2.1 FREQUENCY STABILITY

2.1.1 Specification Reference

Part 15 Subpart C §15.225(e)

2.1.2 Standard Applicable

(e) The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

2.1.3 Equipment Under Test and Modification State

Serial No: none / Test Configuration B

2.1.4 Date of Test/Initial of test personnel who performed the test

22. June 2017 /SH

2.1.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Tampa facility.

Ambient Temperature	24 °C
Relative Humidity	44 %

2.1.7 Additional Observations

- This is a radiated test. The test antenna output is directly connected to the spectrum analyzer input via a suitable external attenuator.
- Measurement was done using the spectrum analyser to measure the frequency variation of the EUT's RFID system.
- The RBW was set to 1 kHz for better resolution.
- The temperature was varied from -10°C to +55°C as requested by the manufacturer in 10 degree increments with voltage variation of 85% and 115% output @ 20°C.
- The EUT was powered off, then powered on once the temperature stabilized and the frequency was then measured.

2.1.8 Test Results

Table 2.1.8-2 – Frequency Stability

RFID @ 13.56 MHz					
Voltage (%)	***Power (VDC)***	***Temp (°C)***	***Frequency (Hz)***	***Frequency Deviation (Hz)***	***Deviation (%)***
100	12.0	-20	13.559.350	+100	0.000738
		-10	13.559.300	+50	0.000369
		0	13.559.300	+50	0.000369
		+10	13.559.300	+50	0.000369
		+30	13.559.250	0	0
		+40	13.559.250	0	0
		+50	13.559.250	0	0
		+55	13.559.250	0	0
Voltage Variation (85% and 115%)	10.2	+20	13.559.250	0	0
	13.8	+20	13.559.250	0	0

Maximum Deviation = 0.000516% < 0.01% Limit **(Complies)**

2.2 20 dB BANDWIDTH

2.2.1 Specification Reference

Part 15 Subpart C §15.215(c)

2.2.2 Standard Applicable

(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §15.217 through §15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

2.2.3 Equipment Under Test and Modification State

Serial No: none / Test Configuration A

2.2.4 Date of Test/Initial of test personnel who performed the test

20. June 2017/DF

2.2.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Tampa facility.

Ambient Temperature	23 °C
Relative Humidity	44 %

2.2.7 Additional Observations

- This is a radiated test.
- Span is wide enough to capture the channel transmission.
- Since RBW wasn't specified, RBW was set to 9 kHz
- Sweep is auto.
- Detector is peak.
- The display line is set to -20 dBc. The spectrum analyser was used for this test.

2.2.8 Test Results

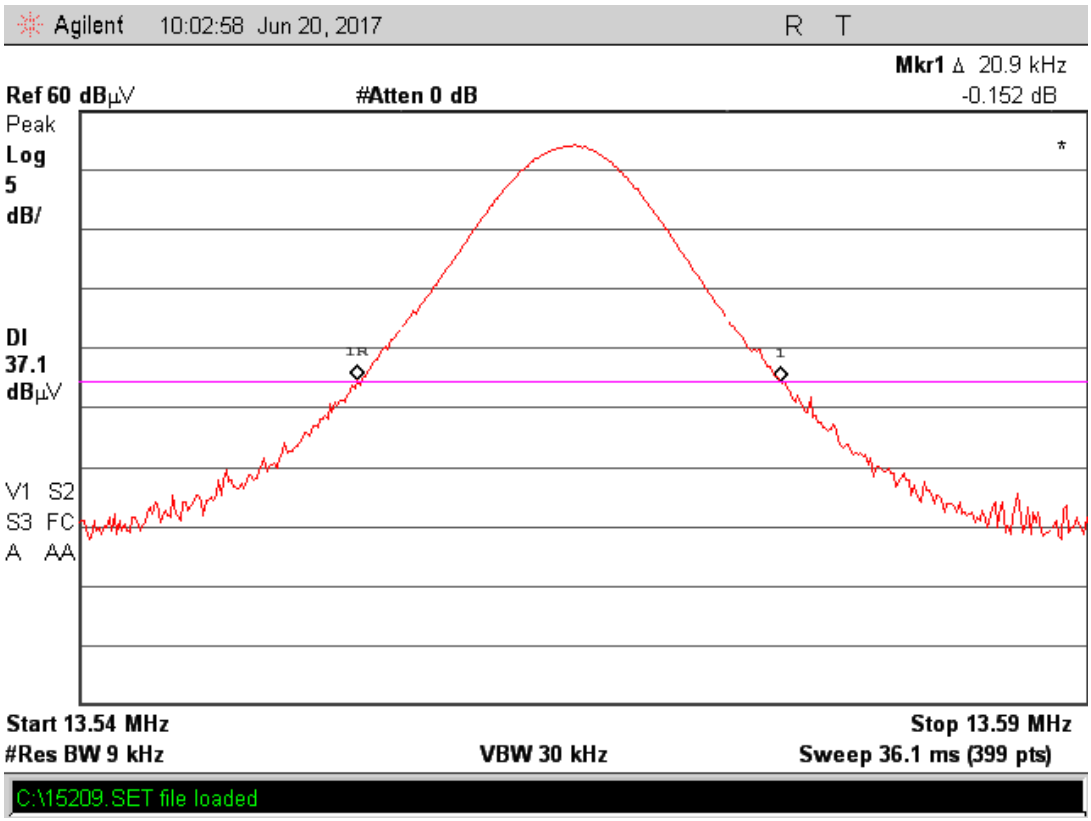


Figure 2.2.8-1 – Bandwidth Plot

Notes:

Measured 20dB Bandwidth: 3.98 kHz
Frequency Band: 13.110 to 14.010 MHz

Table 2.2.8-1 – Bandwidth Data

Frequency	20dB bandwidth
13.56 MHz	20.9 kHz

2.3 EMISSION MASK

2.3.1 Specification Reference

Part 15 Subpart C §15.225(a)(b)(c)

2.3.2 Standard Applicable

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

2.3.3 Equipment Under Test and Modification State

Serial No: none / Test Configuration A

2.3.4 Date of Test/Initial of test personnel who performed the test

20. June 2017 /DF

2.3.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Tampa facility.

Ambient Temperature	22 °C
Relative Humidity	38 %

2.3.7 Additional Observations

- This is a radiated test. The spectrum was searched from 13.110 MHz to 14.010 MHz.
- Limits were converted from 30 meters to 3 meters using 20 dB/decade extrapolation rules.
- Measurement was done using EMC32 V8.54 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.4.8 for sample computation.

2.3.8 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (dBµV) @ 30 MHz			20.0
Correction Factor (dB)	Cable 2	0.24	18.94
	TEMC00011 (antenna)	18.70	
Reported QuasiPeak Final Measurement (dBµV/m) @ 30 MHz			**38.94**

2.3.9 Sample Computation (Limits)

Limit @ 13.553–13.567 MHz:	= 15,848 µV/m @30 meters
	= 20 log(15,848 µV/m)
	= 84 dB µV/m @30 meters
Using 20dB/decade extrapolation rule:	= 20 log (30m/3m)
Measuring distance correction factor:	= 20 dB
Calculated limit @ 3 meters:	= 84 dB µV/m + 40 dB
	= 104 dB µV/m

2.3.10 Test Results

Complies. See attached plots.

2.3.11 Test Results

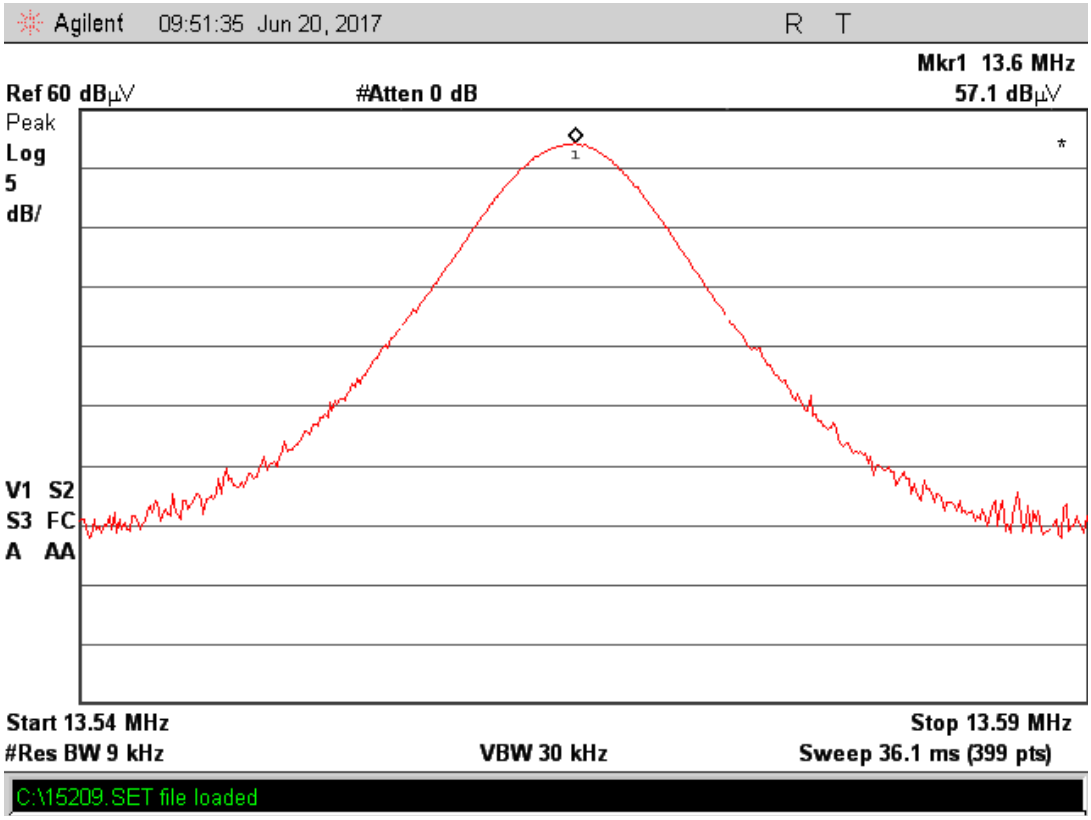


Figure 2.3.11-1 – Field Strength Plot of the Fundamental Emission

Table 2.3.11-1 – Field Strength Data of the Fundamental Emission

Frequency (MHz)	Peak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Margin (dB)	Limit (dBµV/m)
13.563	57.1	9.000	100.0	H	121	46.9	104.0

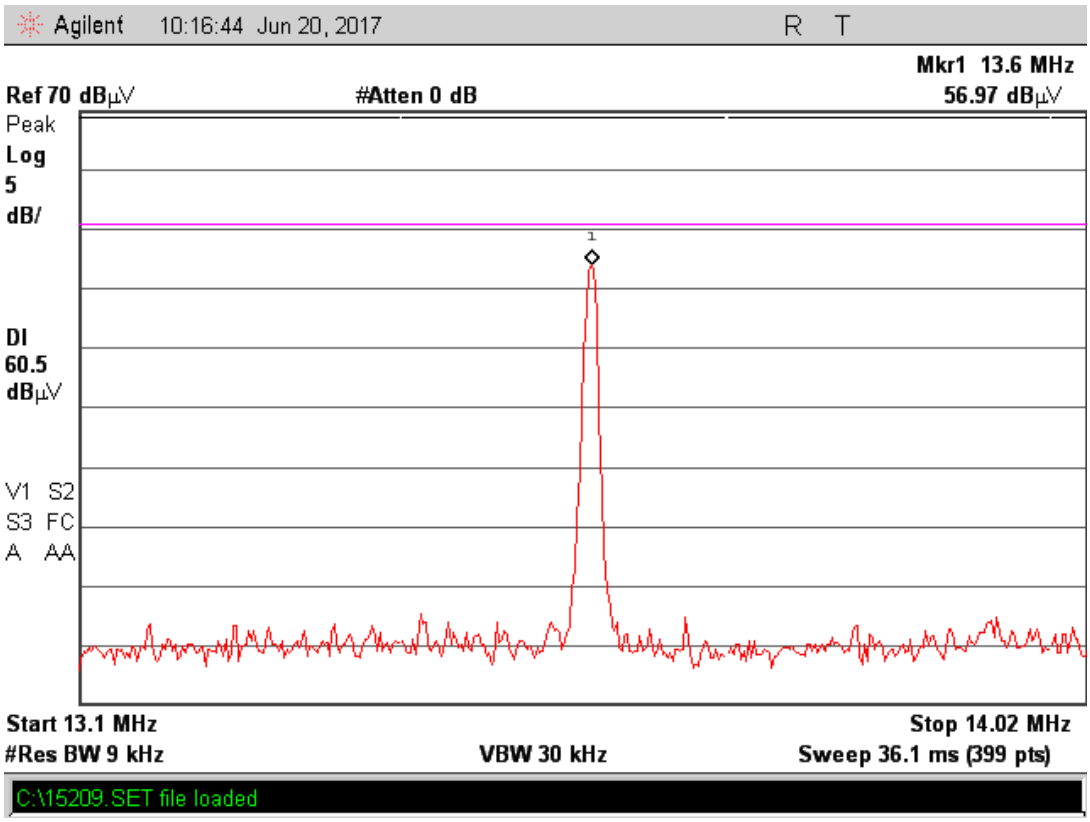


Figure 2.3.11-2 – Emissions within the 13.1 MHz to 14.01 MHz Band

Notes:

The tightest extrapolated limit is (60.5) dBµV/m at 3 meters for any spurious emission within 13.10 – 14.01 MHz.

2.4 SPURIOUS RADIATED EMISSIONS

2.4.1 Specification Reference

Part 15 Subpart C §15.225(d)

2.4.2 Standard Applicable

(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

2.4.3 Equipment Under Test and Modification State

Serial No: none / Test Configuration A

2.4.4 Date of Test/Initial of test personnel who performed the test

13. - 15. March 2017 /DF

2.4.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Tampa facility.

Ambient Temperature	25 °C
Relative Humidity	48 %

2.4.7 Additional Observations

- This is a radiated test. The spectrum was searched from 9kHz to 15GHz
- There were no emissions found that do not comply with the restricted bands defined in FCC Part 15 Subpart C, 15.205.
- Measurement was done using EMC32 V8.54 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.5.8 for sample computation.

2.4.8 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (dBµV) @ 30 MHz			20.0
Correction Factor (dB)	Cable 2	0.24	18.94
	TEMC00011 (antenna)	18.70	
Reported QuasiPeak Final Measurement (dBµV/m) @ 30MHz			**38.94**

2.4.9 Test Results

See attached plots.

2.4.10 Test Results Below 30MHz

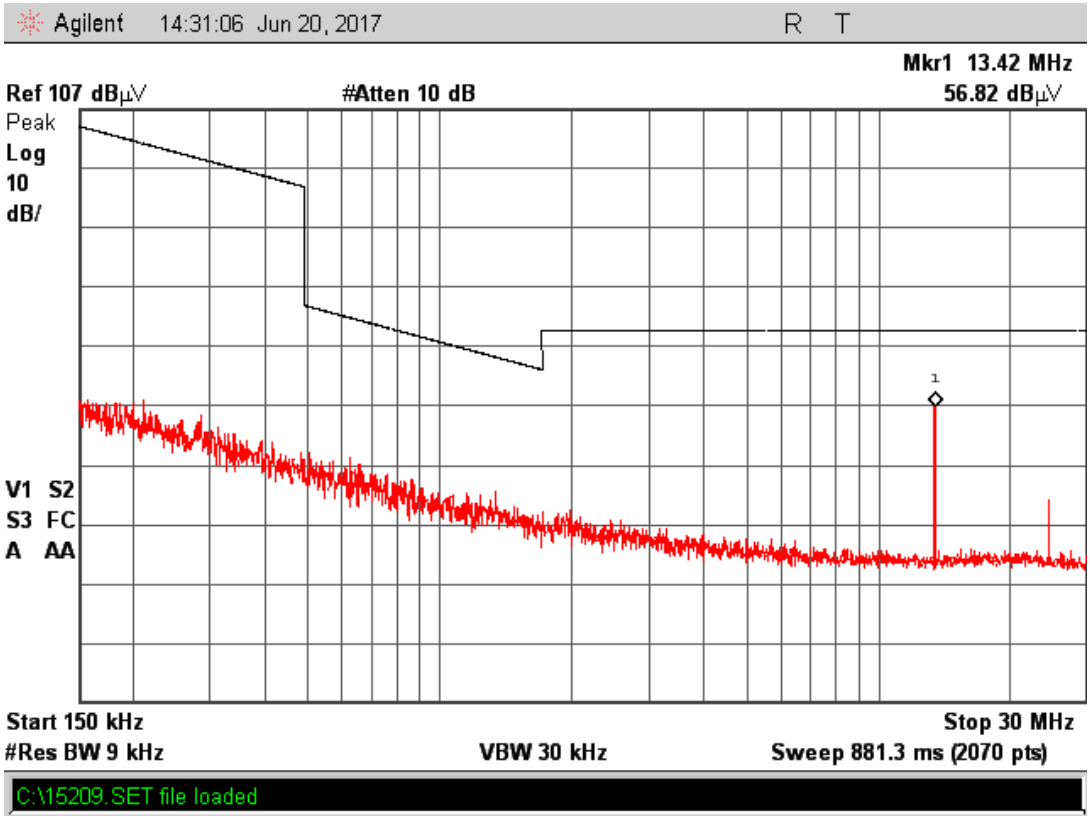
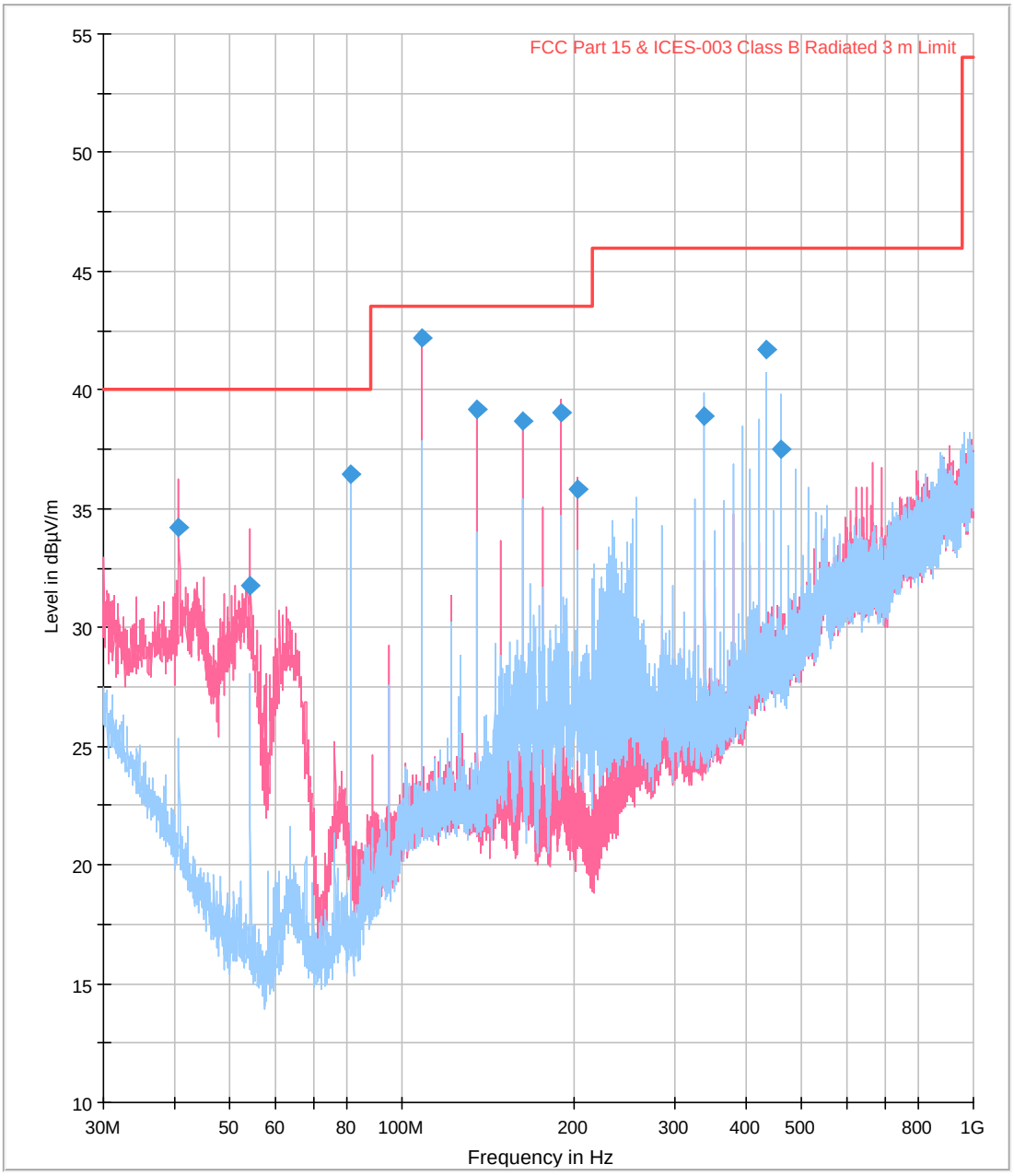


Figure 2.4.10-1 – Radiated Emissions Data 150 kHz – 30 MHz

Test Notes: Fundamental frequency ignored (13.56 MHz)

Frequency (MHz)	PEAK (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
13.560	56.8	100.0	Parallel	225	14.5	47.2	104.0
27.120	41.3	100.0	Parallel	135	14.6	28.2	69.5

2.4.11 Test Results 30MHz to 1GHz



FCC Part 15 & ICES-003 Class B Radiated 3 m Limit [..\EMI radiated\]
Preview Result 1V-PK+ [Preview Result 1V.Result:1]
Preview Result 1H-PK+ [Preview Result 1H.Result:1]
Final Result 1-QPK [Final Result 1.Result:1]

Figure 2.4.11-1 – Radiated Emissions 30 MHz to 1 GHz Plot

Table 2.4.11-1 - Quasi Peak Data (§15.209 Limits) 30 – 1000 MHz

Frequency (MHz)	QuasiPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
40.680000	34.2	100.0	V	46.0	19.6	5.8	40.0
54.280000	31.8	100.0	V	147.0	14.0	8.2	40.0
81.360000	36.5	375.0	H	178.0	14.8	3.5	40.0
108.480000	42.2	100.0	V	224.0	19.4	1.3	43.5
135.600000	39.2	100.0	V	145.0	19.4	4.3	43.5
162.720000	38.7	100.0	V	147.0	17.8	4.8	43.5
189.840000	39.1	100.0	V	92.0	17.3	4.4	43.5
203.400000	35.8	100.0	V	45.0	17.8	7.7	43.5
339.000000	38.9	100.0	H	280.0	22.6	7.1	46.0
433.920000	41.7	100.0	H	226.0	25.5	4.3	46.0
461.000000	37.5	100.0	H	226.0	25.6	8.5	46.0

2.5 CONDUCTED EMISSIONS

2.5.1 Specification Reference

Part 15 Subpart C §15.207(a)

2.5.2 Standard Applicable

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN).

Frequency of emission (MHz)	Conducted limit (dBµV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

**Decreases with the logarithm of the frequency.*

2.5.3 Equipment Under Test and Modification State

Serial No: none /Test Configuration A

2.5.4 Date of Test/Initial of test personnel who performed the test

20. June 2017/DF

2.5.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Tampa facility.

Ambient Temperature	22 °C
Relative Humidity	40 %

2.5.7 Additional Observations

- The EUT contains an RFID reader and this test is to show compliance to the general limits of §15.207(a).

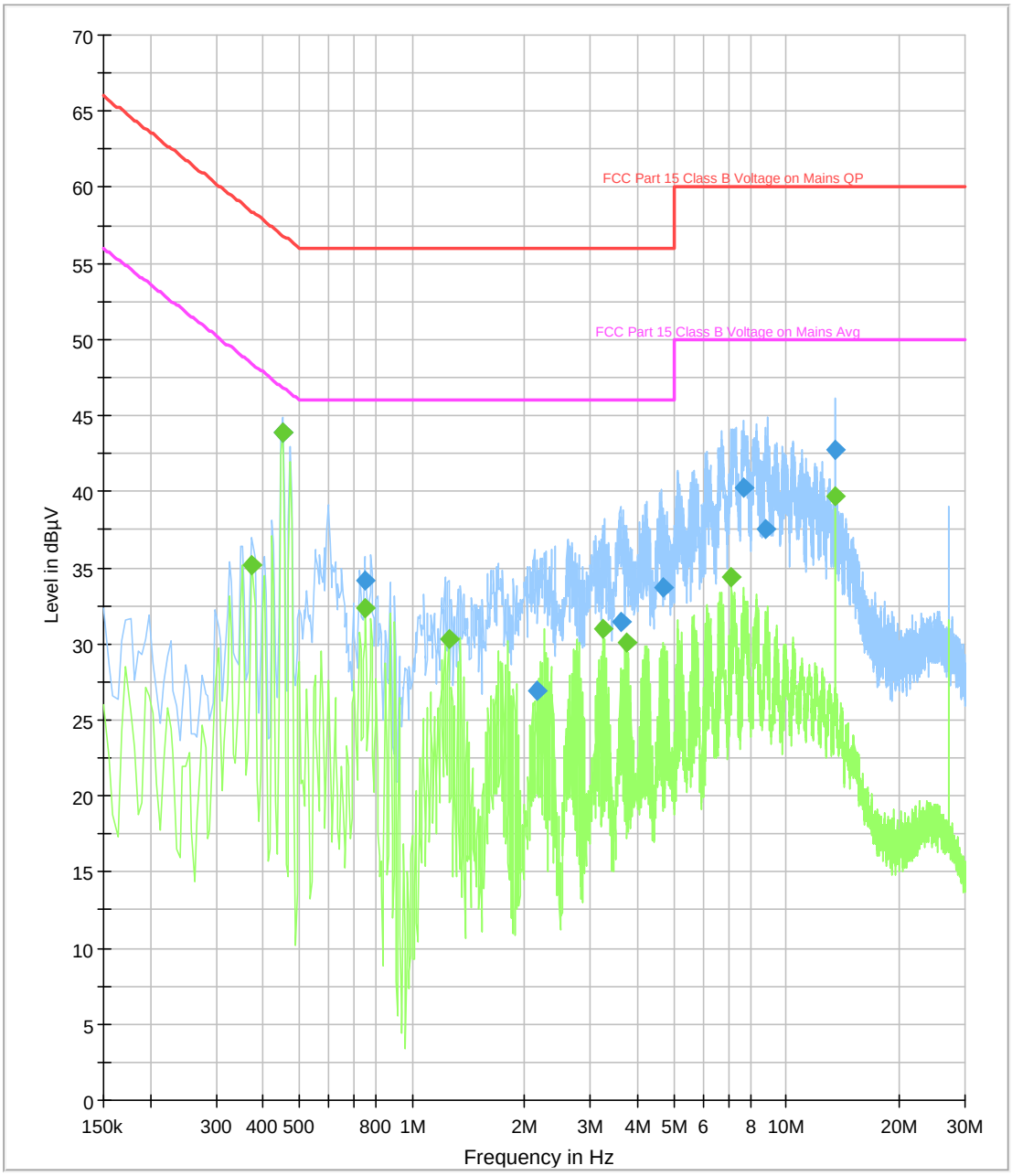
2.5.8 Sample Computation (Conducted Emission – Quasi Peak)

Measuring equipment raw measurement (dBµV) @ 150kHz			30.0
Correction Factor (dB)	TEMC00002 – LISN	0.03	0.11
	Cable 1	0.08	
Reported QuasiPeak Final Measurement (dBµV) @ 150kHz			**30.11**

2.5.9 Test Results

Compliant. See attached plots and tables.

2.5.10 120VAC 60Hz (Lines 1 & 2)



FCC Part 15 Class B Voltage on Mains QP [..\EMI conducted\]
FCC Part 15 Class B Voltage on Mains Avg [..\EMI conducted\]
Preview Result 1-PK+ [Preview Result 1.Result:1]
Preview Result 2-AVG [Preview Result 2.Result:2]
Final Result 1-QPK [Final Result 1.Result:1]
Final Result 2-AVG [Final Result 2.Result:1]

Figure 2.5.10-1 – Conducted Emissions Plot

Table 2.5.10-1 - Quasi Peak Detector Data

Frequency (MHz)	Quasi-peak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.451500	43.9	N	10.1	12.9	56.8
0.748500	34.2	N	10.1	21.8	56.0
2.148000	26.9	L1	10.1	29.1	56.0
3.606000	31.5	L1	10.2	24.5	56.0
4.677000	33.7	L1	10.2	22.3	56.0
7.665000	40.3	L1	10.5	19.7	60.0
8.848500	37.5	L1	10.6	22.5	60.0
13.560000	42.8	L1	11.1	17.2	60.0

Table 2.5.10-2 – Average Detector Data

Frequency (MHz)	Average (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.375000	35.1	N	10.1	13.2	48.4
0.451500	43.8	N	10.1	3.0	46.8
0.753000	32.4	N	10.1	13.6	46.0
1.252500	30.3	N	10.1	15.7	46.0
3.250500	31.0	N	10.2	15.0	46.0
3.750000	30.0	N	10.3	16.0	46.0
7.147500	34.3	L1	10.4	15.7	50.0
13.560000	39.7	L1	11.1	10.3	50.0

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

ID Number	Test Equipment	Type	Serial Number	Manufacturer	SW/FW Rev	Cal Due Date
Conducted Emissions						
TEMC00002	LISN	ESH3-Z5	840730/005	Rhode & Schwarz	N/A	8/9/2017
TEMC00012	Spectrum Analyzer	E7405A	MY42000055	Agilent	A.09.02	3/31/2018
Radiated Emission						
TEMC00025	Loop Antenna	AL-130	121033	Com-Power	N/A	11/30/2017
TEMC00005	Bilog Antenna	6112B	2579	Chase EMC	N/A	12/17/2017
TEMC00061	Double-ridged waveguide horn antenna	3117	00109296	ETS Lindgren	N/A	2/3/2018
TEMC00128	EMI Test Receiver	ESIB 40	100255/040	Rhode & Schwarz	4.35	11/7/2017
TEMC00013	Pre-amplifier	PA-122	181925	Compower	N/A	10/3/2017
TEMC00012	Spectrum Analyzer	E7405A	MY42000055	Agilent	A.09.02	3/31/2018
	Test Software	EMC32	854-0I100119	Rhode & Schwarz	V8.54	N/A
Temperature						
TAME01005	Thermometer	552	4475338	Fluke	N/A	1/11/2018
TEMC00091	Spectrum Analyzer	E7402A	US39150137	Agilent	N/A	2/4/2018
NA	Temperature Chamber	EC127	EC0152	Sun Electronics	NCR	

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

3.2.1 Radiated Measurements (Below 30MHz)

	Contribution	Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.45	0.26	0.07
2	Cables	Rectangular	0.50	0.29	0.08
4	Loop Antenna	Rectangular	0.75	0.44	0.19
5	Site	Rectangular	2.70	1.56	2.43
6	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	1.76
				Coverage Factor (k):	2
				Expanded Uncertainty:	3.53

3.2.2 MU for Radiated Emission Measurements (Below 1GHz)

Radiated Measurement 30 - 1000 MHz at a distance of 3 m

	Input Quantity (Contribution) X_i	Value		Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
1	Receiver reading	0.10	dB	Normal, k=1	1.000	0.10	0.01
2	Attenuation: antenna-receiver	0.20	dB	Normal, k=2	2.000	0.10	0.01
3	Antenna factor AF	0.58	dB	Normal, k=2	2.000	0.29	0.08
4	Receiver sinewave accuracy	0.40	dB	Normal, k=2	2.000	0.20	0.04
5	Receiver pulse amplitude	1.50	dB	Rectangular	1.732	0.87	0.75
6	Receiver pulse repetition rate	1.50	dB	Rectangular	1.732	0.87	0.75
7	Noise floor proximity	0.50	dB	Rectangular	1.732	0.29	0.08
8	Mismatch: antenna-receiver	0.95	dB	U-shaped	1.414	0.67	0.45
9	AF frequency interpolation	0.30	dB	Rectangular	1.732	0.17	0.03
10	AF height deviations	0.10	dB	Rectangular	1.732	0.06	0.00
11	Directivity difference at 3 m	3.12	dB	Rectangular	1.732	1.80	3.24
12	Phase center location at 3 m	1.00	dB	Rectangular	1.732	0.58	0.33
13	Cross-polarisation	0.90	dB	Rectangular	1.732	0.52	0.27
14	Balance	0.00	dB	Rectangular	1.732	0.00	0.00
15	Site imperfections	3.85	dB	Triangular	2.449	1.57	2.47
16	Separation distance at 3 m	0.30	dB	Rectangular	1.732	0.17	0.03
17	Effect of setup table material	0.77	dB	Rectangular	1.732	0.44	0.20
18	Table height at 3 m	0.10	dB	Normal, k=2	2.000	0.05	0.00
19	Near-field effects	0.00	dB	Triangular	2.449	0.00	0.00
20	Effect of ambient noise on OATS	0.00	dB				0.00
	Combined standard uncertainty			Normal	2.96	dB	
	Expanded uncertainty			Normal, k=2	**5.92**	**dB**	

3.2.3 MU for Radiated Emission Measurements (Above 1GHz)

Radiated Measurement Above 1 GHz at a distance of 3 m

	Input Quantity (Contribution) X_i	Value		Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
1	Receiver reading	0.10	dB	Normal, k=1	1.000	0.10	0.01
2	Attenuation: antenna-receiver	0.30	dB	Normal, k=2	2.000	0.15	0.02
3	Preamplifier Gain	0.20	dB	Normal, k=2	2.000	0.10	0.01
4	Antenna factor AF	0.75	dB	Normal, k=2	2.000	0.38	0.14
5	Sinewave accuracy	0.20	dB	Normal, k=2	2.000	0.10	0.01
6	Instability of preamp gain	1.21	dB	Rectangular	1.732	0.70	0.49
7	Noise floor proximity	0.70	dB	Rectangular	1.732	0.40	0.16
8	Mismatch: antenna-preamplifier	1.41	dB	U-shaped	1.414	1.00	0.99
9	Mismatch: preamplifier-receiver	1.30	dB	U-shaped	1.414	0.92	0.85
10	AF frequency interpolation	0.30	dB	Rectangular	1.732	0.17	0.03
11	Directivity difference at 3 m	1.50	dB	Rectangular	1.732	0.87	0.75
12	Phase center location at 3 m	0.30	dB	Rectangular	1.732	0.17	0.03
13	Cross-polarisation	0.90	dB	Rectangular	1.732	0.52	0.27
14	Site imperfections VSWR (Method 2)	2.25	dB	Triangular	2.449	0.92	0.84
15	Effect of setup table material	2.90	dB	Rectangular	1.732	1.67	2.80
16	Separation distance at 3 m	0.30	dB	Rectangular	1.732	0.17	0.03
17	Table height at 3 m	0.00	dB	Normal, k=2	2.000	0.00	0.00
	Combined standard uncertainty			Normal	2.73	dB	
	Expanded uncertainty			Normal, k=2	**5.46**	**dB**	

3.2.4 MU for Conducted Emissions Measurement

Conducted Measurement 150 kHz - 30 MHz, 50 ohm / 50 uH LISN

	Input Quantity (Contribution) X_i	Value		Prob. Dist.	Divisor	$u_i(x)$	$u_i(x)^2$
1	Receiver reading	0.10	dB	Normal, k=1	1.000	0.10	0.01
2	LISN-receiver attenuation	0.10	dB	Normal, k=2	2.000	0.05	0.00
3	LISN voltage division factor	0.10	dB	Normal, k=2	2.000	0.05	0.00
4	Receiver sinewave accuracy	0.40	dB	Normal, k=2	2.000	0.20	0.04
5	Receiver pulse amplitude	1.50	dB	Rectangular	1.732	0.87	0.75
6	Receiver pulse repetition rate	1.50	dB	Rectangular	1.732	0.87	0.75
7	Noise floor proximity	0.00	dB	Rectangular	1.732	0.00	0.00
8	AMN VDF frequency interpolation	0.10	dB	Rectangular	1.732	0.06	0.00
9	Mismatch	0.07	dB	U-shaped	1.414	0.05	0.00
10	LISN impedance	2.65	dB	Triangular	2.449	1.08	1.17
11	Effect of mains disturbance	0.00	dB			0.00	0.00
12	Effect of the environment						
	Combined standard uncertainty			Normal	1.65	dB	
	Expanded uncertainty			Normal, k=2	**3.31**	**dB**	

SECTION 4

DIAGRAM OF TEST SETUP

4.1 TEST SETUP DIAGRAM (EMISSION MASK AND BELOW 30 MHZ)

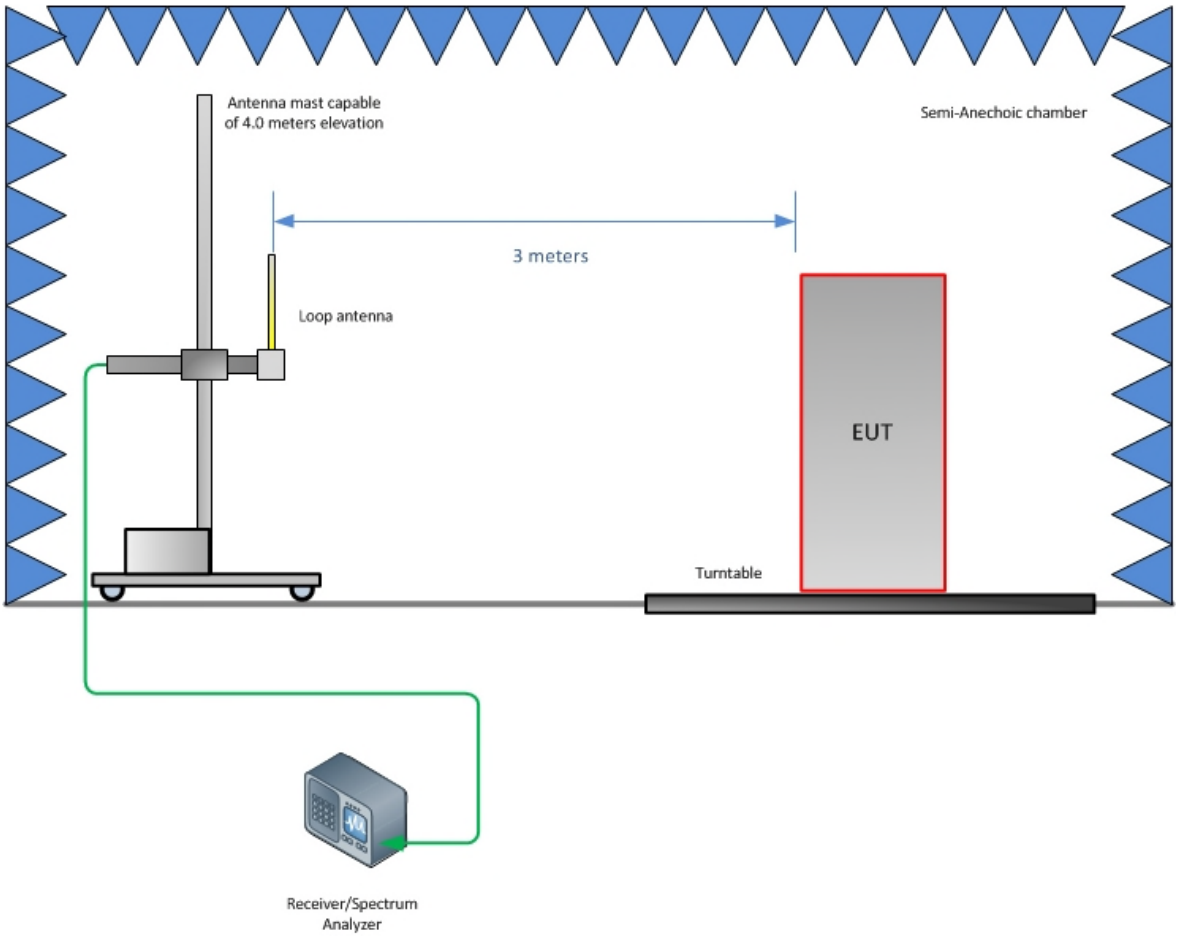


Figure 4.1-1 - Radiated Emission Test Setup Below 30 MHz

4.2 TEST SETUP DIAGRAM (30 MHZ TO 1 GHZ)

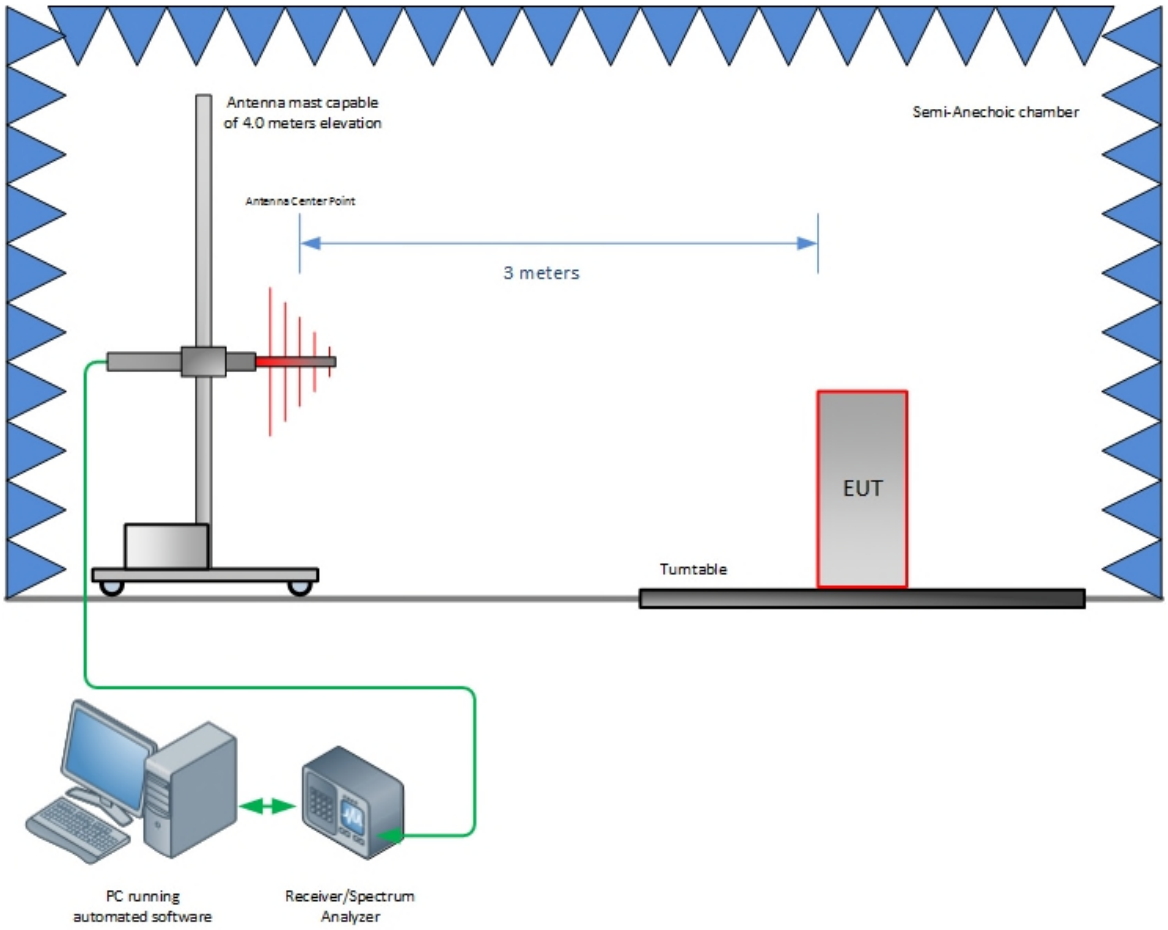


Figure 4.2-1 - Radiated Emission Test Setup 30 MHz – 1000 MHz

4.3 TEST SETUP DIAGRAM ABOVE 1 GHZ)

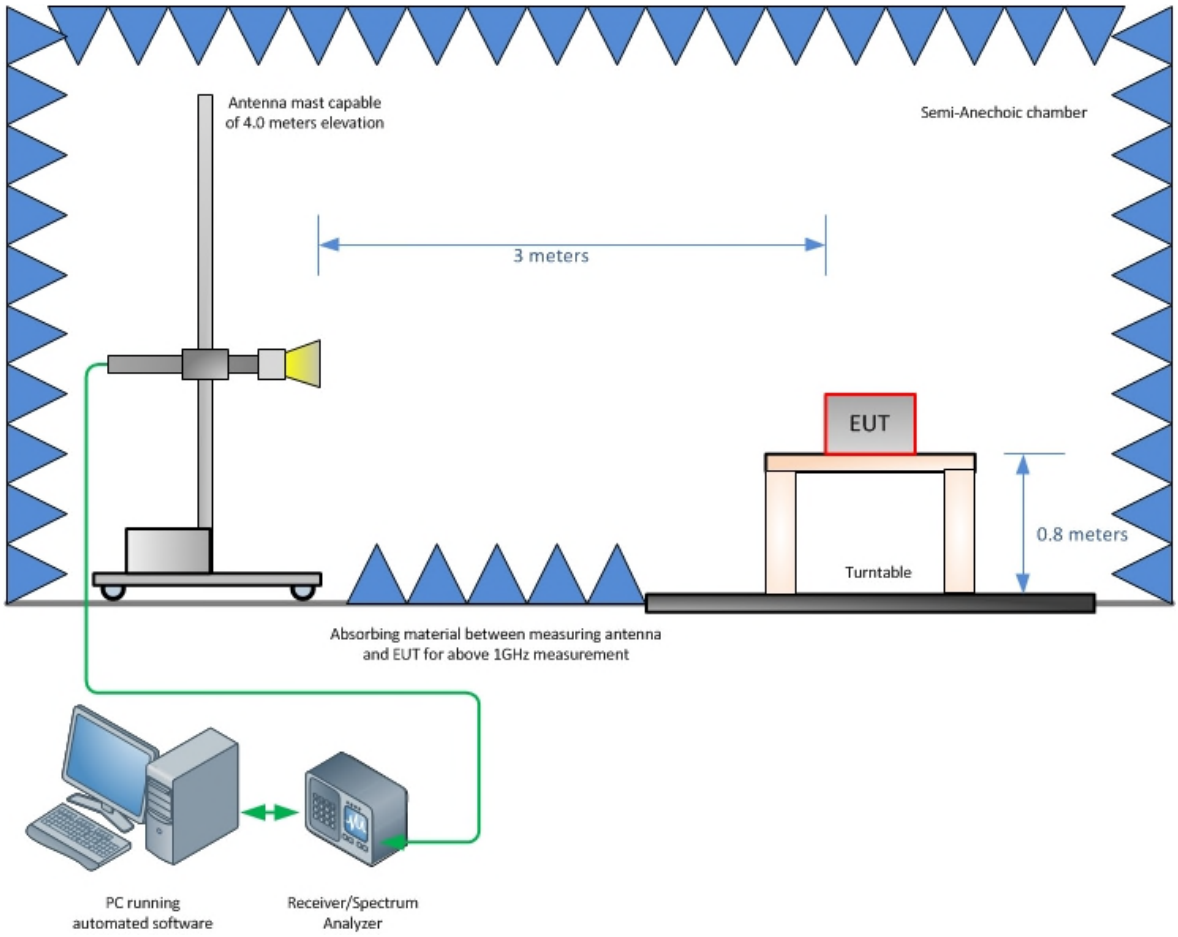


Figure 4.3-1 - Radiated Emission Test Setup (Above 1GHz)

4.4 TEST SETUP DIAGRAM (CONDUCTED EMISSIONS)

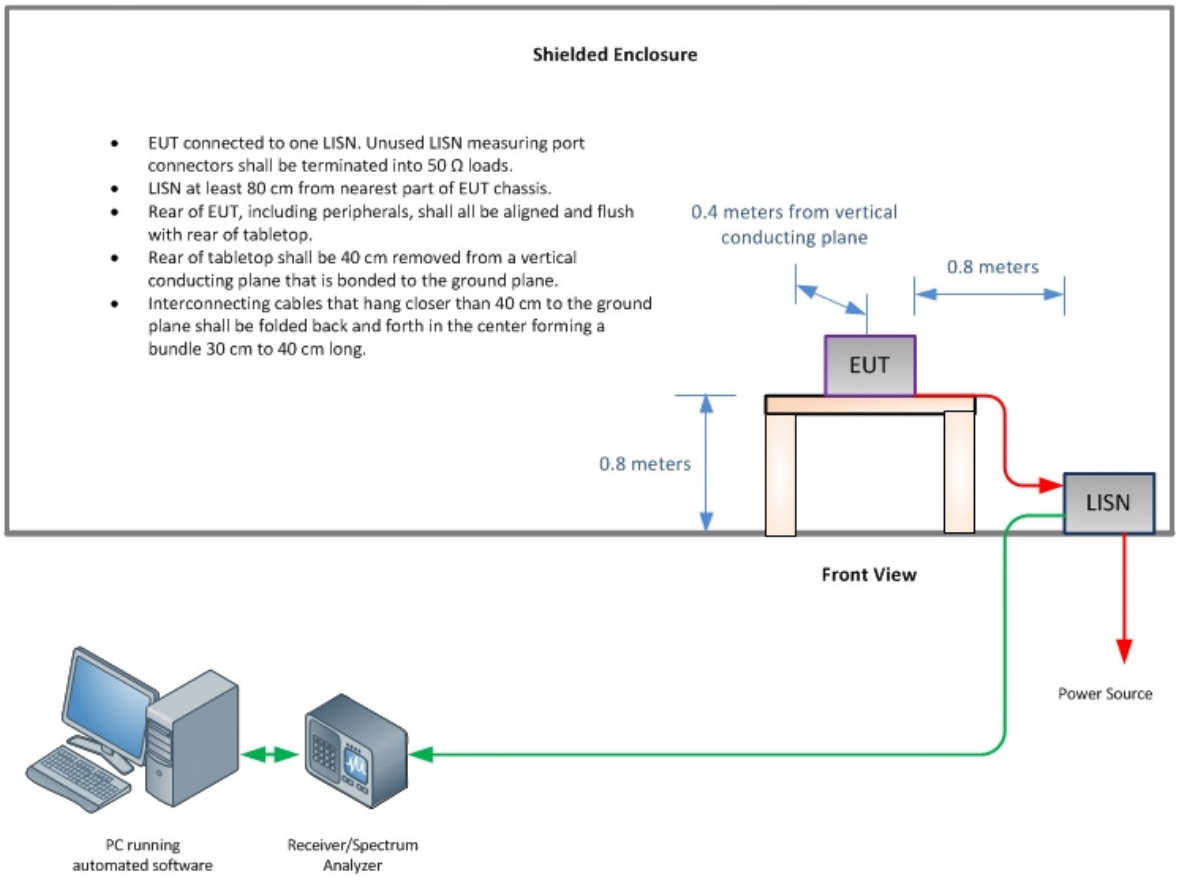


Figure 4.4-1 - Conducted Emission Test Setup

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 Accreditation, Disclaimers and Copyright

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