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Report On

Radio Testing of the
Omnicell Inc.
CALIBRATION STATION

FCC Part 15 Subpart C §15.225

Report No. TP72124266.101 **March 2019**

REPORT ON	EMC Evaluation of the Omnicell Inc. CALIBRATION STATION
TEST REPORT NUMBER	TP72124266.101
REPORT DATE	24. April 2017
PREPARED FOR	Omnicell Inc. 590 E. Middlefield Road Mountain View, CA 94043-4008
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APPROVED BY	Peter Walsh Authorized Signatory Title: Tampa Service Line Manager
DATED	25. April 2017

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Revision History

TP72124266.101 Omnicell Inc. CALIBRATION STATION RFID Reader Module					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
25. April 2017	Initial Release				P. Walsh
18.March 2019	TP72124266.100	TP72124266.101	Removed product photos	8 & 9	S. Hoke

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SECTION 1

REPORT SUMMARY

Radio Testing of the
Omnicell Inc.
Model CALIBRATION STATION

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Omnicell Inc. CALIBRATION STATION 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	Omnicell Inc.
Model Name	CALIBRATION STATION
Model Number(s)	
FCC ID Number	2ALLNVBMCAL
IC Number	
Serial Number(s)	18860189
Number of Samples Tested	1
Test Specification/Issue/Date	FCC Part 15 Subpart C
Start of Test	23. February 2017
Finish of Test	20. April 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 an Omnicell Inc. Model CALIBRATION STATION as shown in the photographs below. The EUT has RFID model GFT13-52256 – Cassette reader board housed inside the system under test. The EUT is used to calibrate the dispersion of pills used in in conjunction with the VBM 200 FLEX system.

Photo 1.3.1-1 - Host Equipment Under Test

RFID PWB

Photo 1.3.1-2 - PWB GFT13-52256 – Cassette reader board

1.3.2 EUT General Description

EUT Description	Calibrator for prescription pill cartridges
Model Name	
Model Number(s)	CALIBRATION STATION
EUT Measured Field Strength	61.8 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*
Dell	E25S	Server
N/A	Unshielded (12')	Ethernet cable (server to router)
N/A	Unshielded (12')	Ethernet cable (computer to router)
N/A	Shielded (6')	USB cable (ferrite loaded at both ends)
XP Power	VEC40US15	Calibrator PS – 15 VDC
Dell	ProSport	Computer (All-in-one)
Linksys	EA6350	Router
Dell	KB216t	Keyboard
Dell	MS116t	Mouse
Datalogic	Dedicated USB cable (12')	Barcode Reader

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: 18860189		
Added split core ferrite clamp (Laird Technologies Part Number 28A2026-0A2) to the PC end of the USB cable..	DF	15. March 2017

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
Omnicell Inc.
Model CALIBRATION STATION

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: 18860189 / Test Configuration B

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

23. February 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 – Cassette Reader Board Frequency Stability

RFID @ 13.56MHz - GFT13-52256 – Cassette Reader Board					
Voltage (%)	***Power (VDC)***	***Temp (°C)***	***Frequency (Hz)***	***Frequency Deviation (Hz)***	***Deviation (%)***
100	12.0	-20	13.562,520	+35	0.000258
		-10	13.562,520	+35	0.000258
		0	13.562,485	0	0
		+10	13.562,485	0	0
		+30	13.562,450	-35	0.000258
		+40	13.562,415	-70	0.000516
		+50	13.562,415	-70	0.000516
		+55	13.562,415	-70	0.000516
Voltage Variation (85% and 115%)	10.2	+20	13.562,485	0	0
	13.8	+20	13.562,485	0	0

Maximum Deviation = 0.000516% = 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: 18860189 / Test Configuration A

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

23. February 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 1 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

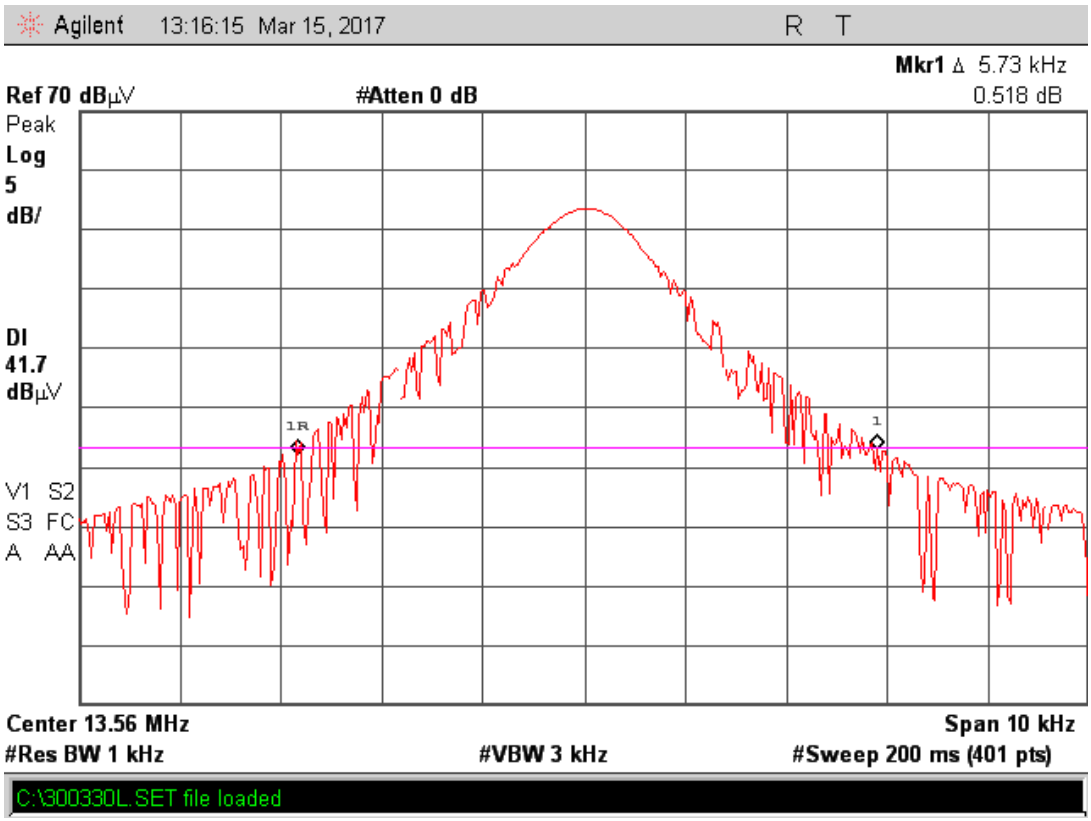


Figure 2.2.8-1 – Bandwidth Plot

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	5.73 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: 18860189 / Test Configuration A

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

15. March 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 V8.54automated 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

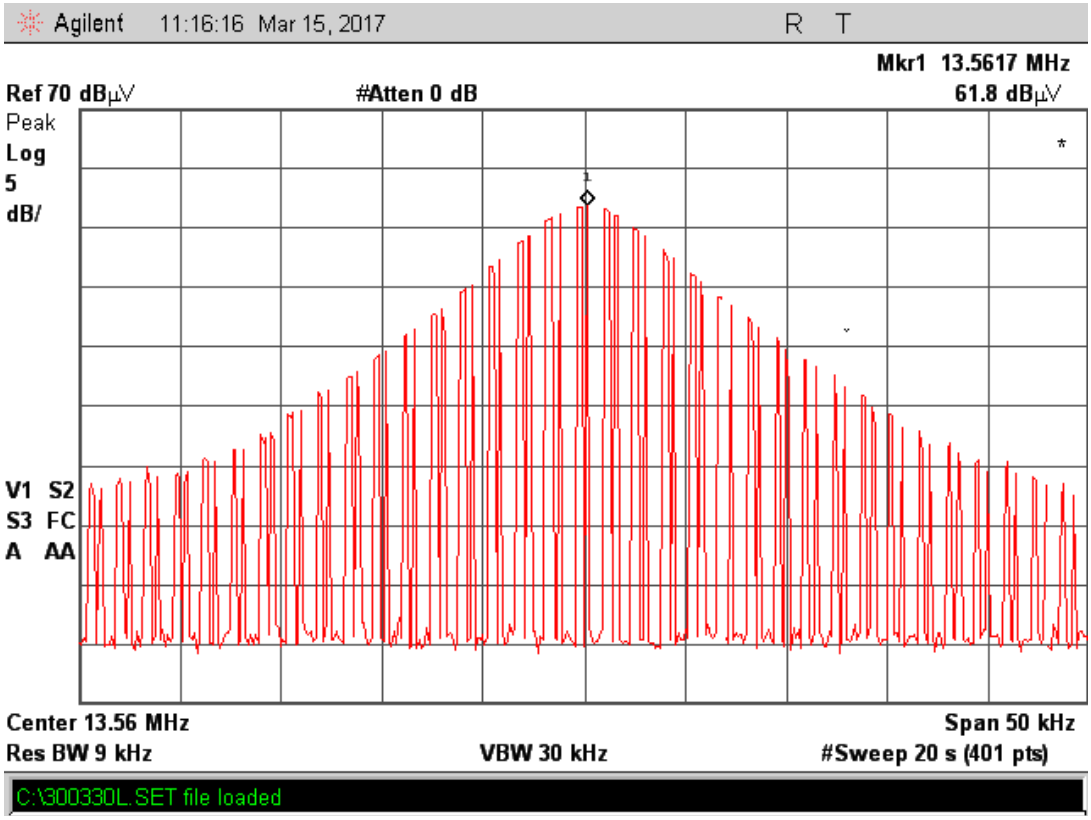


Figure 2.3.11-1 – Field Strength Plot of the Fundamental Emission

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	61.8	9.000	100.0	H	121	42.2	104.0

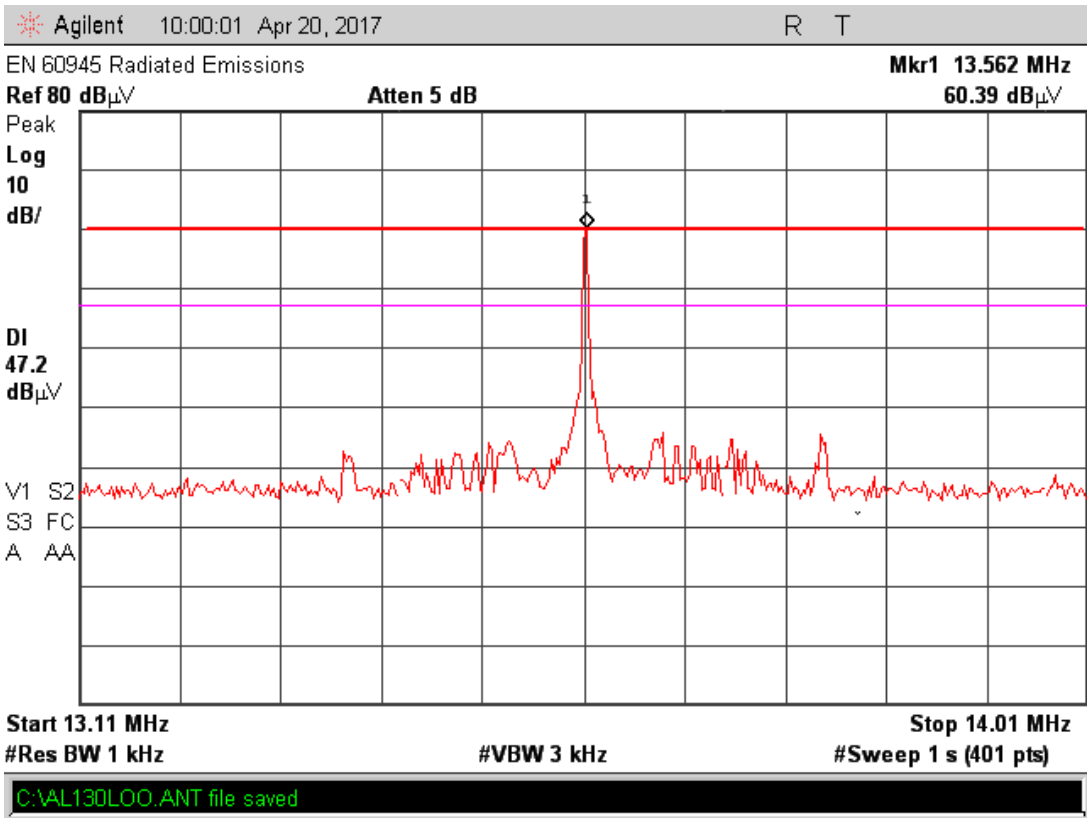


Figure 2.3.11-2 – Emissions within the 13.1 MHz to 14.01 MHz Band

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: 18860189 / 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

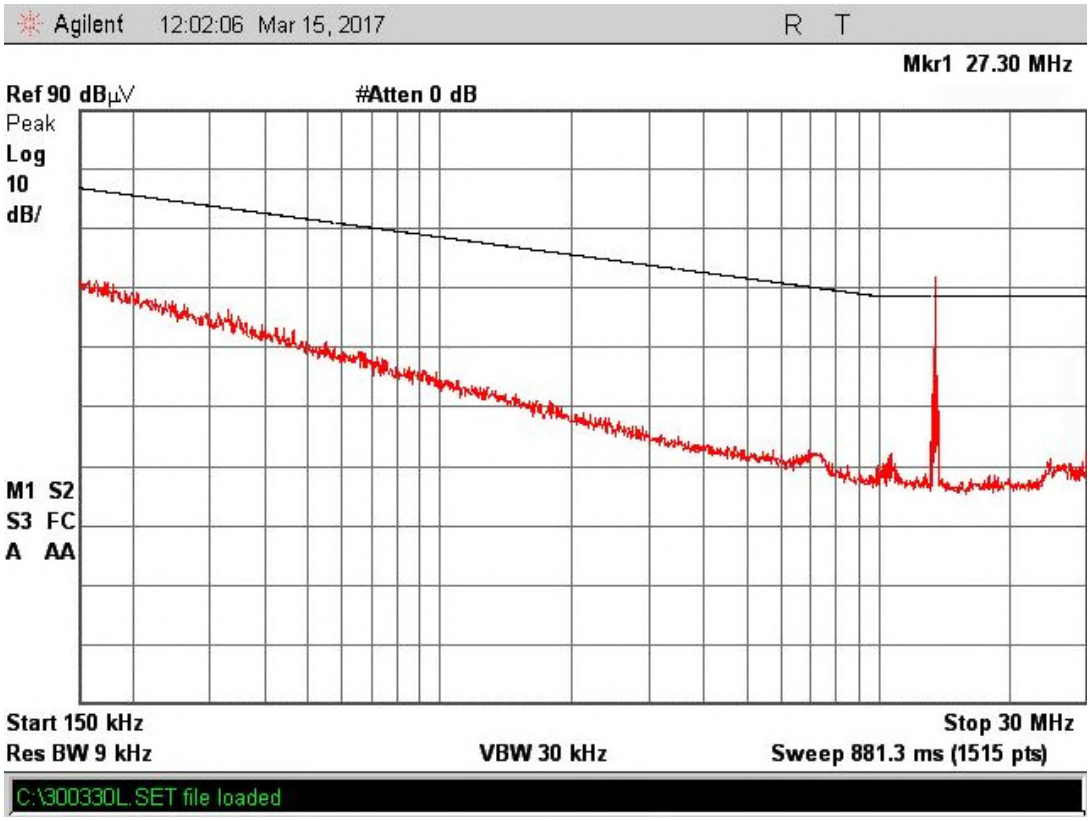


Figure 2.4.10-1 – Radiated Emissions Data 150 kHz – 30 MHz

Test Notes: Fundamental frequency ignored (13.56 MHz)

2.4.11 Test Results 30MHz to 1GHz

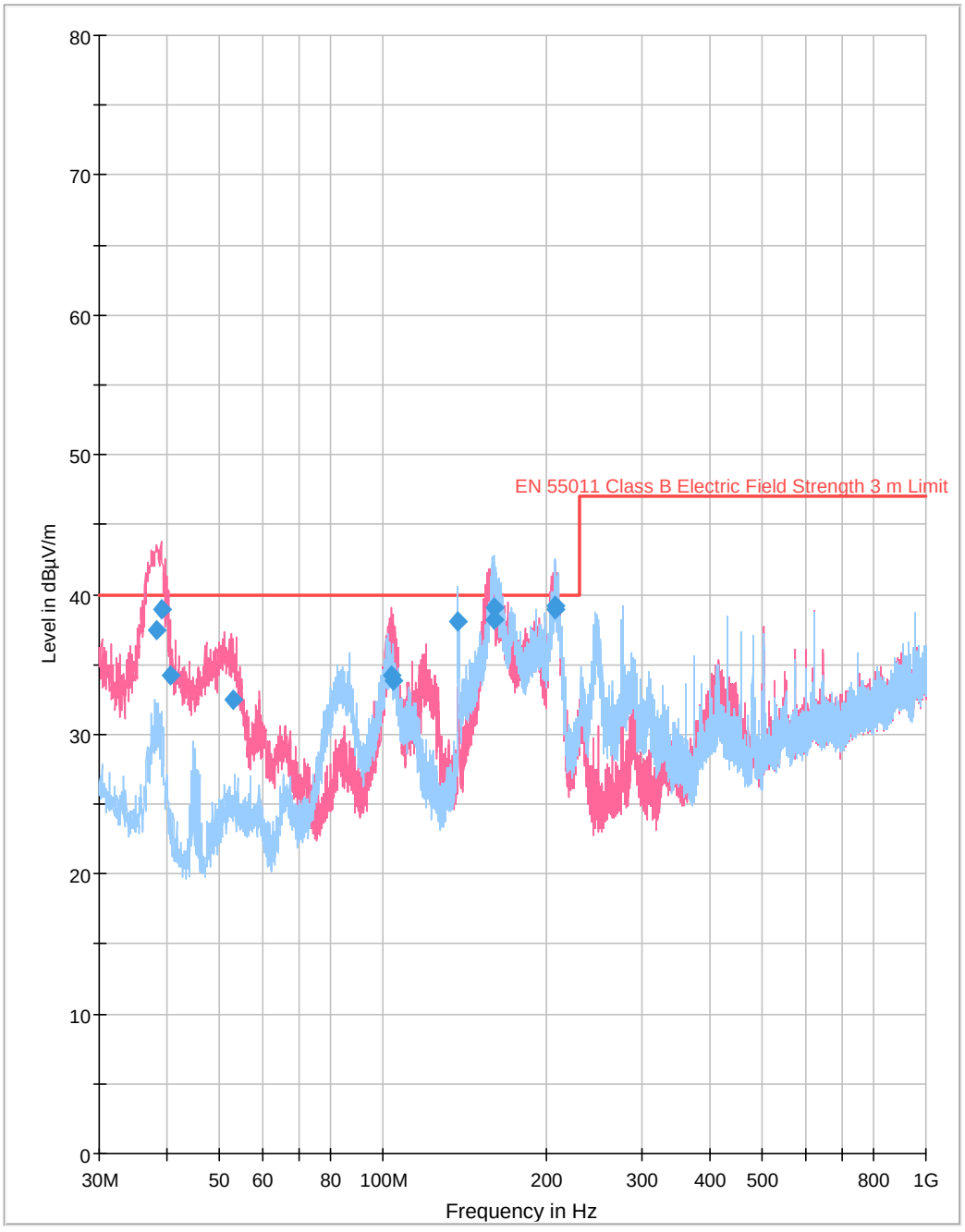


Figure 2.4.11-1 – Radiated Emissions 30 MHz to 1 GHz Plot

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)
38.320000	37.5	100.0	V	225.0	19.9	2.5	40.0
39.000000	38.9	100.0	V	132.0	19.4	1.1	40.0
40.680000	34.2	100.0	V	120.0	18.5	5.8	40.0
53.040000	32.5	149.0	V	273.0	13.3	7.5	40.0
103.600000	34.2	149.0	V	135.0	18.0	5.8	40.0
104.200000	33.8	149.0	V	91.0	18.1	6.2	40.0
137.480000	38.1	187.0	H	99.0	18.2	1.9	40.0
159.720000	39.1	249.0	H	42.0	16.9	0.9	40.0
160.440000	38.2	244.0	H	56.0	16.9	1.8	40.0
207.040000	39.2	138.0	H	236.0	16.5	0.8	40.0
208.160000	39.0	139.0	H	235.0	16.4	1.0	40.0

2.4.12 Test Results 1 GHz to 18 GHz

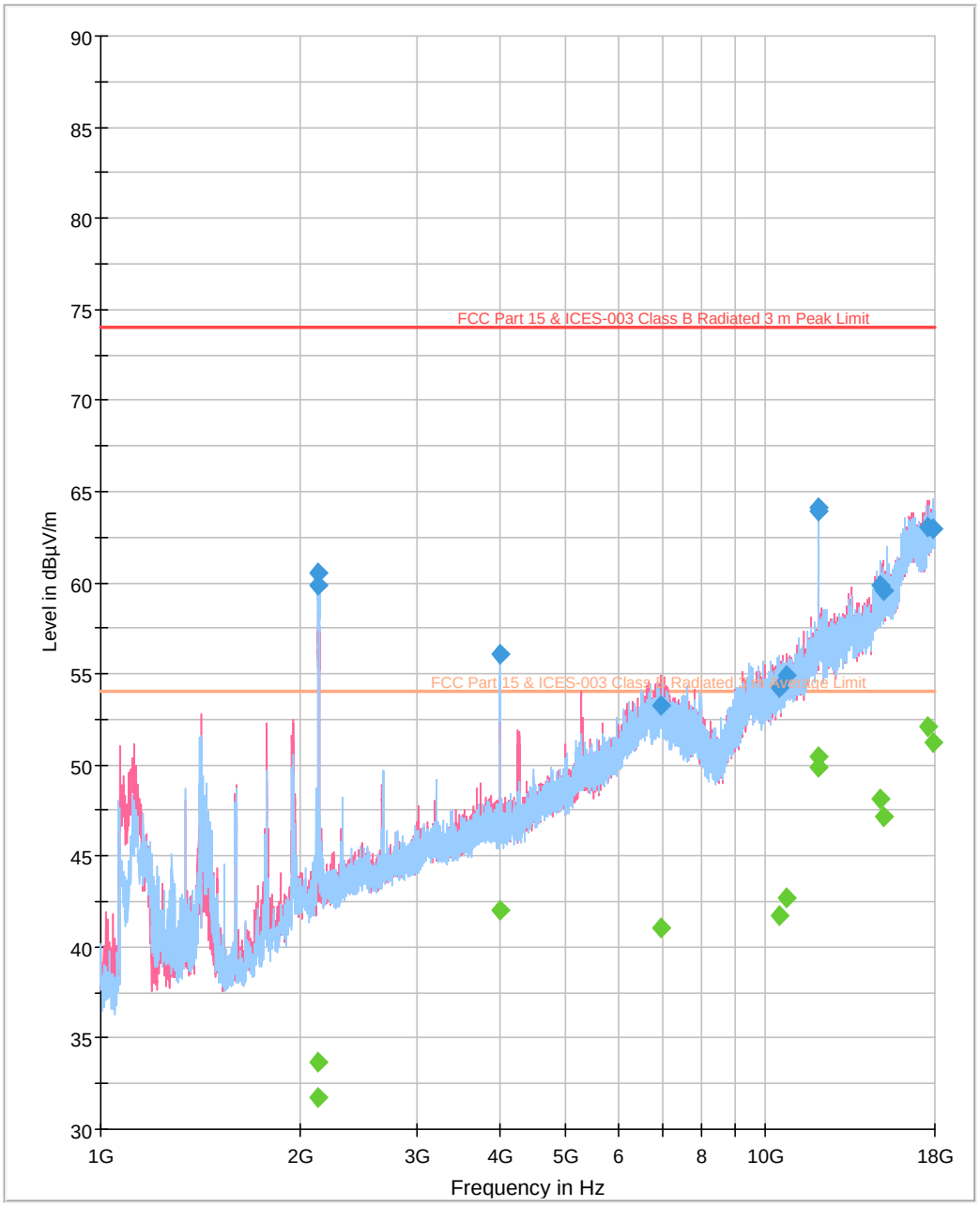


Figure 2.4.12-1 – Radiated Emissions 1 to 18 GHz Plot

Table 2.7.4-1 –-Peak Detector Data 1 – 18 GHz

Frequency (MHz)	Peak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2123.400000	59.9	160.0	V	138.0	1.1	14.1	74.0
2125.400000	60.5	143.0	H	60.0	1.1	13.5	74.0
3994.200000	56.1	166.0	H	329.0	5.1	17.9	74.0
6977.400000	53.3	137.0	V	348.0	10.3	20.7	74.0
10520.20000	54.3	148.0	H	283.0	15.3	19.7	74.0
10772.20000	54.9	216.0	V	330.0	16.2	19.1	74.0
11998.20000	64.1	98.0	H	4.0	17.0	9.9	74.0
11998.60000	64.0	98.0	H	2.0	17.0	10.0	74.0
14904.60000	59.9	300.0	H	90.0	17.7	14.1	74.0
15048.60000	59.5	299.0	H	5.0	17.9	14.5	74.0
17535.80000	63.1	136.0	H	286.0	23.8	10.9	74.0
17857.00000	62.9	400.0	V	152.0	24.9	11.1	74.0

Table 2.7.4-2 –-Average Detector Data 1 – 18 GHz

Frequency (MHz)	Average (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2123.400000	31.7	160.0	V	138.0	1.1	2123.4000	31.7
2125.400000	33.7	143.0	H	60.0	1.1	2125.4000	33.7
3994.200000	42.0	166.0	H	329.0	5.1	3994.2000	42.0
6977.400000	41.0	137.0	V	348.0	10.3	6977.4000	41.0
10520.20000	41.7	148.0	H	283.0	15.3	10520.200	41.7
10772.20000	42.7	216.0	V	330.0	16.2	10772.200	42.7
11998.20000	49.9	98.0	H	4.0	17.0	11998.200	49.9
11998.60000	50.5	98.0	H	2.0	17.0	11998.600	50.5
14904.60000	48.2	300.0	H	90.0	17.7	14904.600	48.2
15048.60000	47.1	299.0	H	5.0	17.9	15048.600	47.1
17535.80000	52.1	136.0	H	286.0	23.8	17535.800	52.1
17857.00000	51.2	400.0	V	152.0	24.9	17857.000	51.2

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: 18860189 /Test Configuration A

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

27. March 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 two different RFID readers 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)

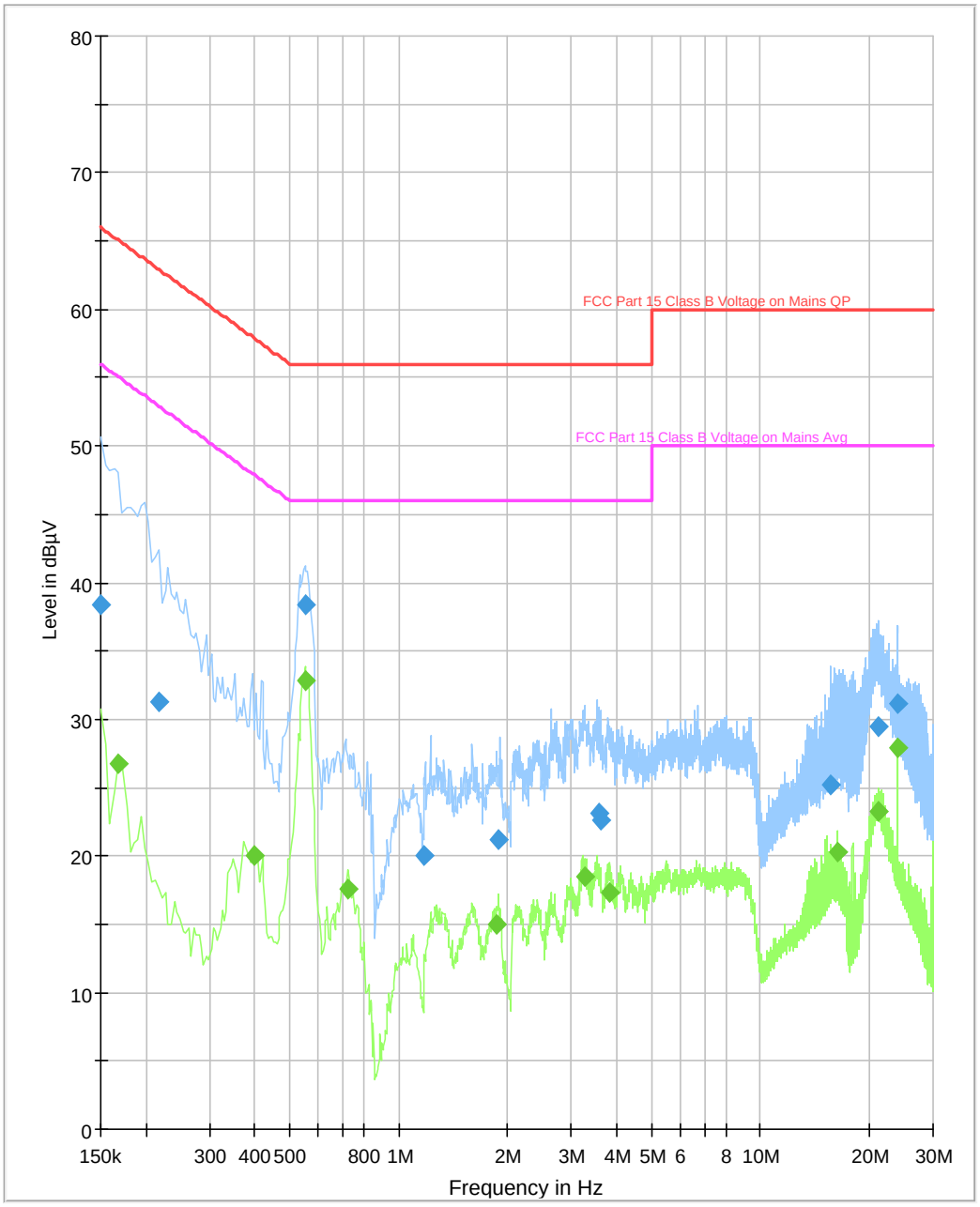


Figure 2.5.10-1 – Conducted Emissions Plot

Table 2.5.10-1 - Quasi Peak Detector Data

Frequency (MHz)	Quasi-peak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	38.4	L1	10.1	27.6	66.0
0.217500	31.3	L1	10.1	31.6	62.9
0.555000	38.4	L1	10.2	17.6	56.0
1.180500	20.0	N	10.4	36.0	56.0
1.882500	21.2	N	10.5	34.8	56.0
3.579000	23.1	L1	10.6	32.9	56.0
3.619500	22.6	N	10.7	33.4	56.0
15.598500	25.2	L1	11.6	34.8	60.0
21.232500	29.4	N	12.0	30.6	60.0
23.982000	31.1	L1	12.3	28.9	60.0

Table 2.5.10-2 – Average Detector Data

Frequency (MHz)	Average (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.168000	26.7	L1	10.1	28.4	55.1
0.397500	20.0	L1	10.2	27.9	47.9
0.555000	32.8	L1	10.2	13.2	46.0
0.721500	17.6	L1	10.3	28.4	46.0
1.855500	15.0	L1	10.5	31.0	46.0
3.264000	18.5	N	10.6	27.5	46.0
3.831000	17.3	L1	10.6	28.7	46.0
16.251000	20.3	N	11.6	29.7	50.0
21.084000	23.2	L1	12.1	26.8	50.0
23.977500	28.0	L1	12.3	22.0	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
TEMC00093	DVM	87	5920853	Fluke	N/A	12/28/2016
TAME01064	DC Power Supply	HPD 60-5	NA	XANTREX	NCR	
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

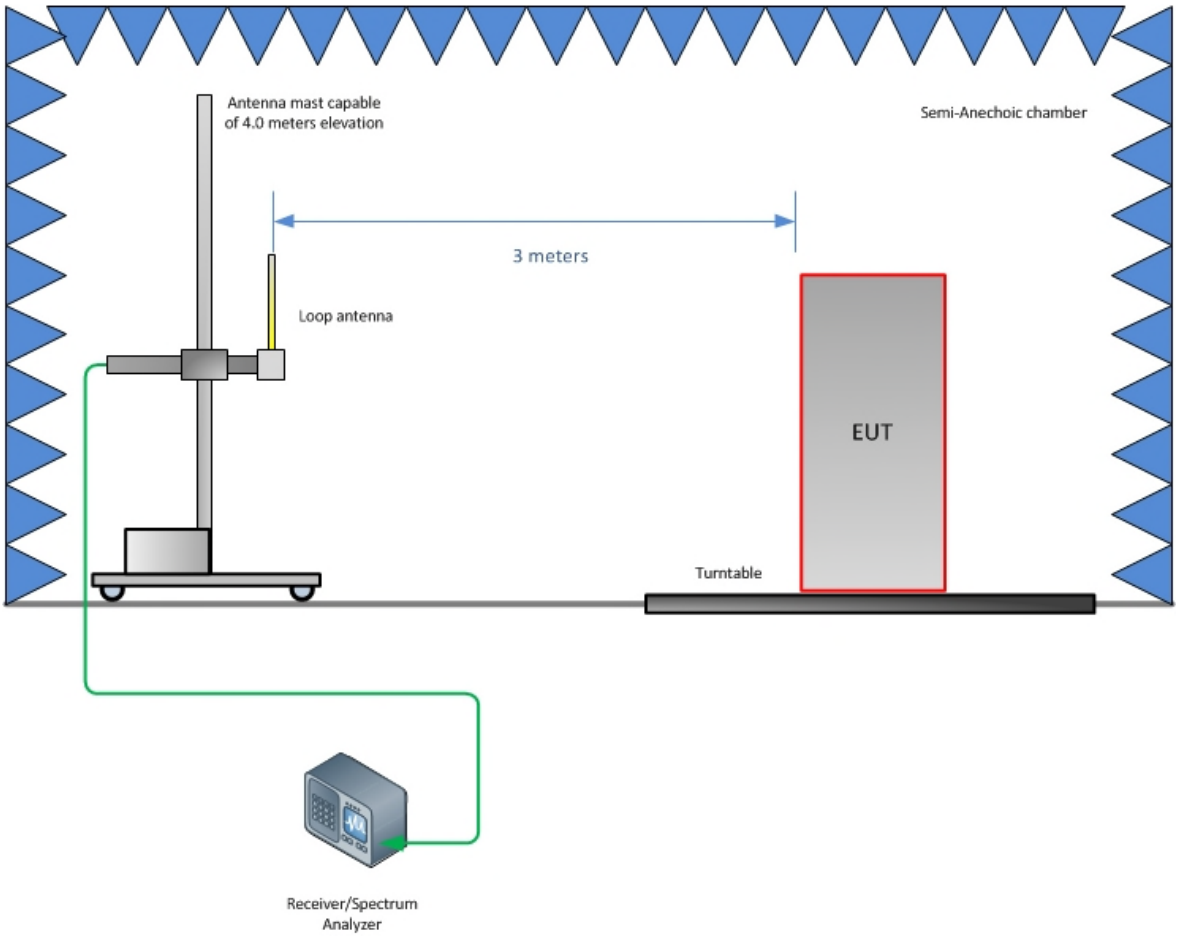
Conducted Measurement 150 kHz - 30 MHz, 50 ohm / 50 uH LISN

	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**	

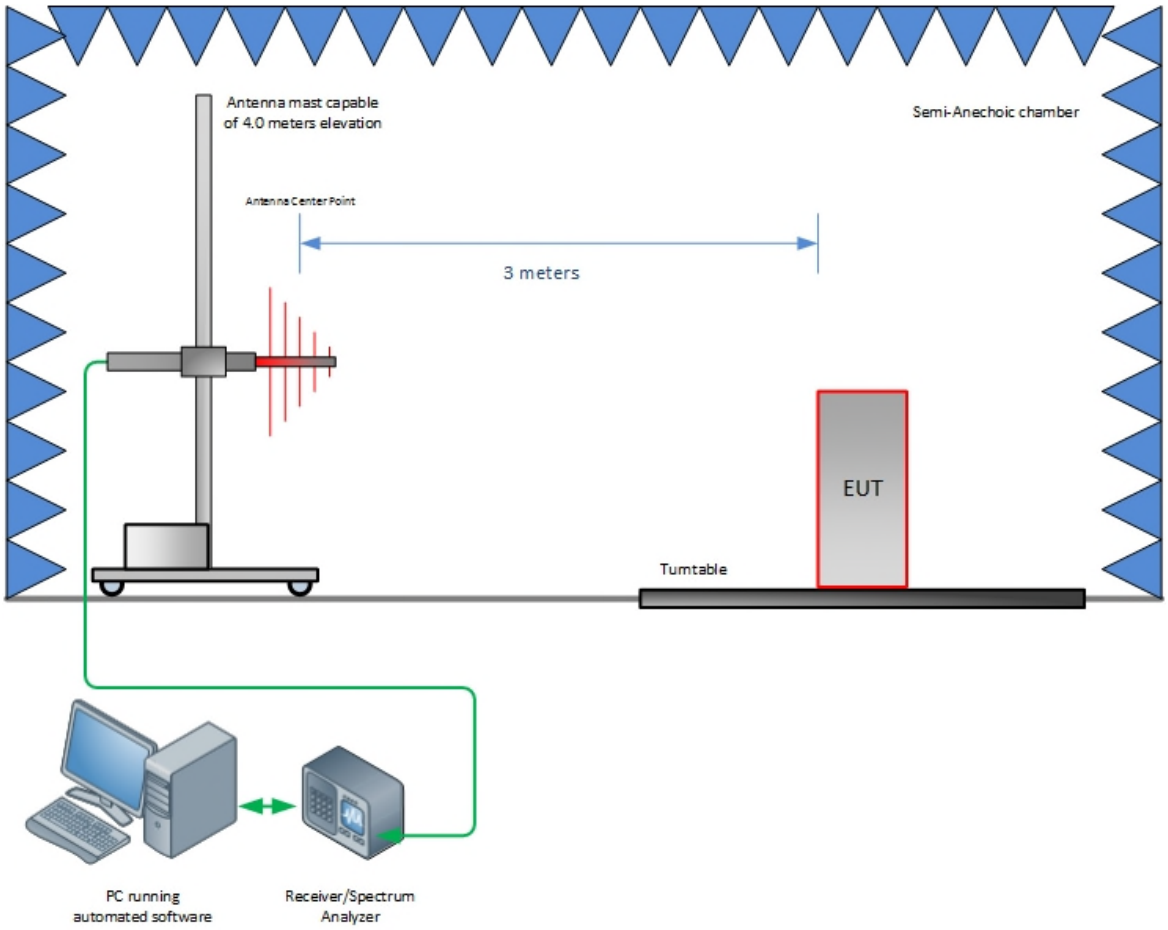
SECTION 4

DIAGRAM OF TEST SETUP

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

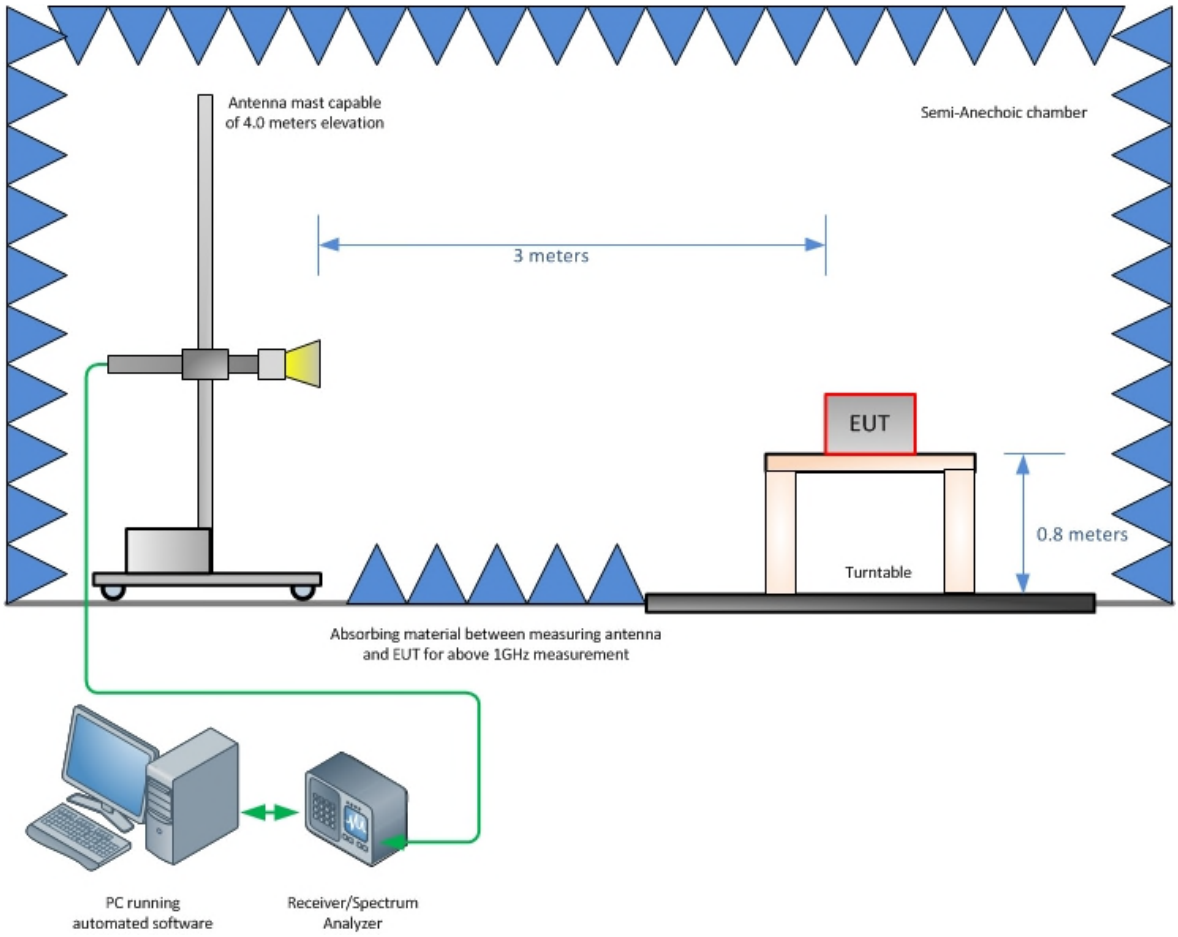


4.2 TEST SETUP DIAGRAM (30 MHZ TO 1 GHZ)



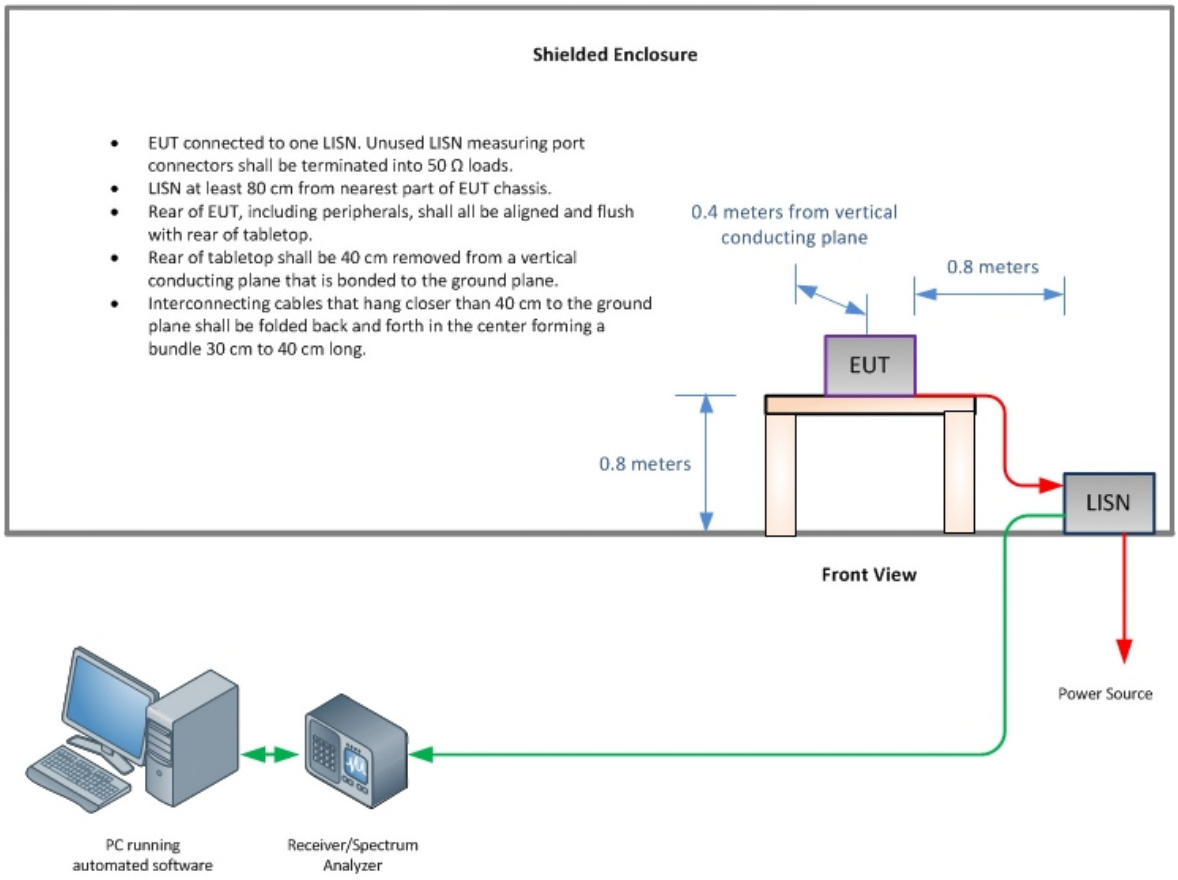
Radiated Emission Test Setup (Below 1GHz)

4.3 TEST SETUP DIAGRAM ABOVE 1 GHZ)



Radiated Emission Test Setup (Above 1GHz)

4.4 TEST SETUP DIAGRAM (CONDUCTED EMISSIONS)



Conducted Emission Test Setup

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 Accreditation, Disclaimers and Copyright

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