



**Choose certainty.
Add value.**

Report On

Radio Testing of the
Sick AG

SISTRA Safety Switch

Model Numbers: STR1-XDAU03P5, STR1-XDAU03P8, STR1-
XDAM03P5 and STR1-XDAM0AC8

CFR 47 Part 15, Subpart C
RSS-Gen Issue 4

Report No. SD72119613-0816

September 2016




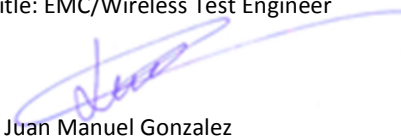
REPORT ON Radio Testing of the
Sick AG
SISTRA Safety Switch

TEST REPORT NUMBER SD72119613-0816

PREPARED FOR Sick AG
Erwin-Sick-Straße 1
79183 Waldkirch, Germany

CONTACT PERSON Victor Phay
Sick Product Center Asia Pte. Ltd.; Singapore

PREPARED BY 
Nikolay Shtin
Name
Authorized Signatory
Title: EMC/Wireless Test Engineer

APPROVED BY 
Juan Manuel Gonzalez
Name
Authorized Signatory
Title: EMC Service Line Manager Western Region

DATED September 28, 2016



Revision History

SD72119613-0816 Sick AG SISTRA Safety Switch					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
09/28/2016	Initial Release				Juan Manuel Gonzalez



CONTENTS

Section	Page No
1	REPORT SUMMARY..... 5
1.1	Introduction 6
1.2	Brief Summary of Results..... 7
1.3	Product Information 8
1.4	EUT Test configuration..... 10
1.5	Deviations from the Standard..... 11
1.6	Modification Record 11
1.7	Test Methodology..... 11
1.8	Test Facility Location..... 11
1.9	Test Facility Registration 11
2	TEST DETAILS 13
2.1	Occupied bandwidth..... 14
2.2	Radiated Emissions 17
2.3	Conducted Emissions 24
3	TEST EQUIPMENT USED 29
3.1	Test Equipment Used..... 30
3.2	Measurement Uncertainty 31
4	DIAGRAM OF TEST SETUP 32
4.1	Test Setup Diagram (radiated emissions) 33
4.2	Test Setup Diagram (conducted emissions)..... 35
5	ACCREDITATION, DISCLAIMERS AND COPYRIGHT 36
5.1	Accreditation, Disclaimers and Copyright..... 37



SECTION 1

REPORT SUMMARY

Radio Testing of the
Sick AG
SISTRA Safety Switch



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Sick AG Safety Switch to the requirements of the CFR 47 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	Sick AG
Model Number(s)	STR1-XDAU03P5, STR1-XDAU03P8, STR1-XDAM03P5 and STR1-XDAM0AC8 Note: As declared by manufacturer, all four listed models are electrically identical. Model tested in this test report was STR1-XDAU03P5.
FCC ID Number	N/A
Serial Number(s)	1073231
Number of Samples Tested	1
Test Specification/Issue/Date	<ul style="list-style-type: none">• CFR 47 Part 15, Subpart C (October 1, 2015)• RSS-Gen Issue 4 (November 13, 2014)
Start of Test	September 15, 2016
Finish of Test	September 15, 2016
Test Facility location	All tests performed on this test report were performed at: TÜV SÜD America Inc. (Mira Mesa Location) 10040 Mesa Rim Road, San Diego, CA 92121-2912 (32.901268,-117.177681). Phone: 858 678 1400, FAX: 858-546 0364
Name of Engineer(s)	Nikolay Shtin
Related Document(s)	None. 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 CFR 47 Part 15, Subpart C with cross-reference to the corresponding ISED RSS-GEN Issue 4 standard is shown below.

Section	FCC	RSS	Test Description	Result	Comments/Base Standard
-	§2.1046(a)		Conducted output power	N/A*	
2.1	§2.1049, §2.202(a)	RSS-Gen 6.6	Occupied Bandwidth	As Reported	
2.2	§15.205, §15.209	RSS-Gen 8.9 and 8.10	Radiated Emissions	Compliant	
2.3	§15.207(a)	RSS-Gen 8.8	AC Conducted Emissions	Compliant	

N/A* Not applicable. No requirements on the EUT output power.

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a Sick AG SISTRA Safety Switch as shown in the photograph below. The SISTRA safety switch system is designed as a Sensor and Actuator pair using 125 KHz Low Frequency RFID, consisting of the Sensor Unit, Actuator Unit and the Interface Unit.



Equipment Under Test



1.3.2 EUT General Description

EUT Description	Safety Switch
Model Name	SISTRA
Model Number(s)	STR1-XDAU03P5
Rated Voltage	19.2-28.8 VDC, 24.0 VDC (Nominal)
Mode Verified	RF Transponder
Device Capabilities	RF Transponder
Frequency Range	125.000 kHz
Primary Unit (EUT)	<input type="checkbox"/> Production <input type="checkbox"/> Pre-Production <input checked="" type="checkbox"/> Engineering
Output Power	56.41 dB μ V/m @ 3 meters
Number of Operating Frequencies	1
Channel Verified	125.000 KHz
Antenna Type (used during evaluation)	Integrated antenna (12mmx 3mm)
Modulation Used	ASK

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
Default	EUT in test mode continuously reading Transponder tag.

1.4.2 EUT Exercise Software

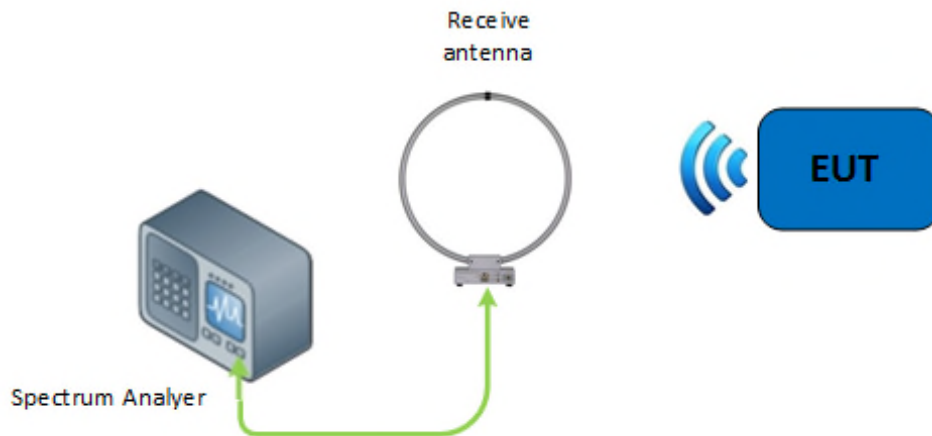
None.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Sick AG	Transponder tag STR1-XAS	s/n 1073223
Sick AG	Transponder tag STR1-XAF	s/n 1073221
Sick AG	Transponder tag STR1-XAM	s/n 1073222

1.4.4 Simplified Test Configuration Diagram

Radiated Test Setup



Not To Scale – Illustration Purpose Only
 Objects may not represent actual image of original equipment or set-up.



1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number: N/A		
N/A	-	-

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 C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

1.8 TEST FACILITY LOCATION

1.8.1 TÜV SÜD America Inc. (Mira Mesa)

10040 Mesa Rim Road, San Diego, CA 92121-2912 (32.901268,-117.177681). Phone: 858 678 1400 FAX: 858-546 0364

1.8.2 TÜV SÜD America Inc. (Rancho Bernardo)

16530 Via Esprillo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: 858 942 5542 FAX: 858-546 0364

1.9 TEST FACILITY REGISTRATION

1.9.1 FCC – Registration No.: US1146

TUV SUD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.498 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Registration is US1146.

1.9.2 Innovation, Science and Economic Development Canada Registration No.: 3067A

The Semi-anechoic chamber of TUV SUD America Inc. (San Diego) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 3067A.



1.9.3 BSMI – Laboratory Code: SL2-IN-E-028R (US0102)

TUV Product Service Inc. (San Diego) is a recognized EMC testing laboratory by the BSMI under the MRA (Mutual Recognition Arrangement) with the United States. Accreditation includes CNS 13438 up to 6GHz.

1.9.4 VCCI – Registration No. A-0230

TUV SUD America Inc. (San Diego) is a VCCI registered measurement facility which includes radiated field strength measurement, radiated field strength measurement above 1GHz, mains port interference measurement and telecommunication port interference measurement.



SECTION 2

TEST DETAILS

Radio Testing of the
Sick AG
SISTRA Safety Switch



2.1 OCCUPIED BANDWIDTH

2.1.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1049 and 2.202(a)

2.1.2 Standard Applicable

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

2.1.3 Equipment Under Test and Modification State

Serial No: 1073231 / Default Test Configuration

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

September 15, 2016/NS

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

Ambient Temperature	23.8°C
Relative Humidity	43.6%
ATM Pressure	100.2kPa

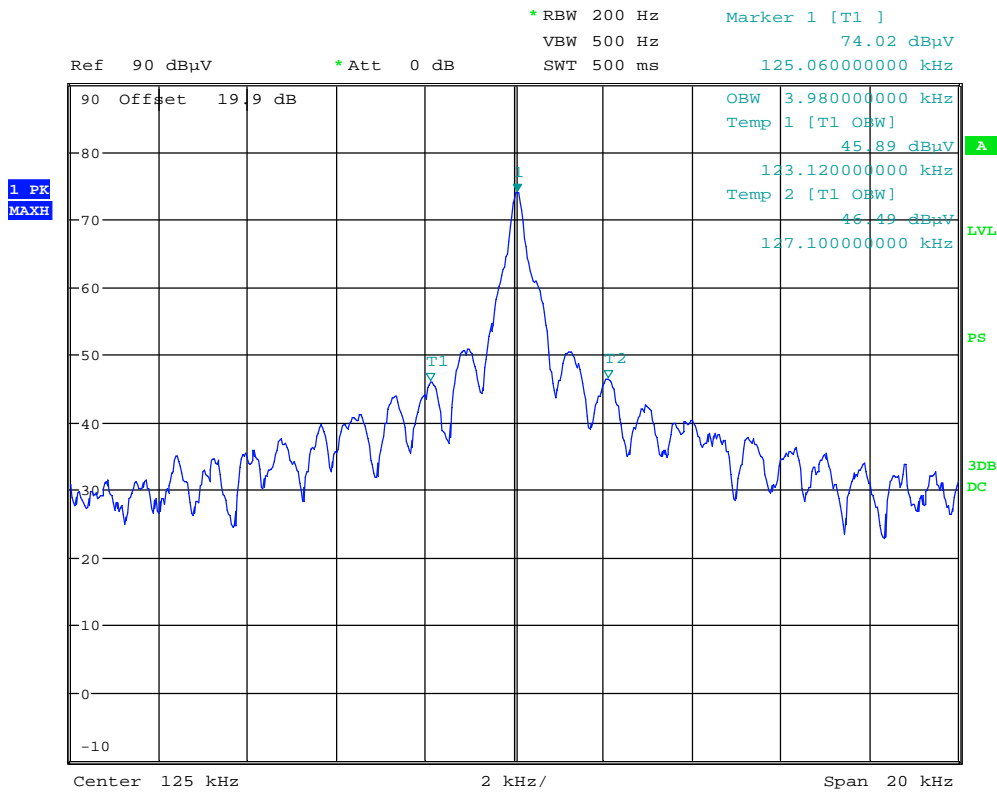
2.1.7 Additional Observations

- This is a radiated test using a loop antenna connected to the spectrum analyzer.
- A peak output reading was taken.
- For 99% bandwidth, the OBW measurement function of the spectrum analyzer was used.
- 20dB bandwidth verified using the “n” dB down marker function of the spectrum analyzer.
- Span is wide enough to capture the channel transmission.
- RBW is 200 Hz
- VBW is 500 Hz.
- Sweep is auto.
- Detector is peak.
- Trace is Max Hold.



2.1.8 Test Results

Frequency	20 dB Bandwidth	99% Bandwidth
125.060 kHz	1.28 kHz	3.98 kHz



99% OBW



2.2 RADIATED EMISSIONS

2.2.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.205 and 15.209
RSS-GEN Issue 4 Sections 8.9 and 8.10

2.2.2 Standard Applicable

§ 15.209 Radiated emission limits; general requirements.

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency of emission (MHz)	Field Strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.

(b) In the emission table above, the tighter limit applies at the band edges.

(c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

§ 15.205 Restricted bands of operation.

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz
² Above 38.6

(b) Except as provided in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35 apply to these measurements.

(c) Except as provided in paragraphs (d) and (e) of this section, regardless of the field strength limits specified elsewhere in this subpart, the provisions of this section apply to emissions from any intentional radiator.

2.2.3 Equipment Under Test and Modification State

Serial No: 1073231 / Default Test Configuration

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

September 15, 2016/NS

2.2.5 Test Equipment Used

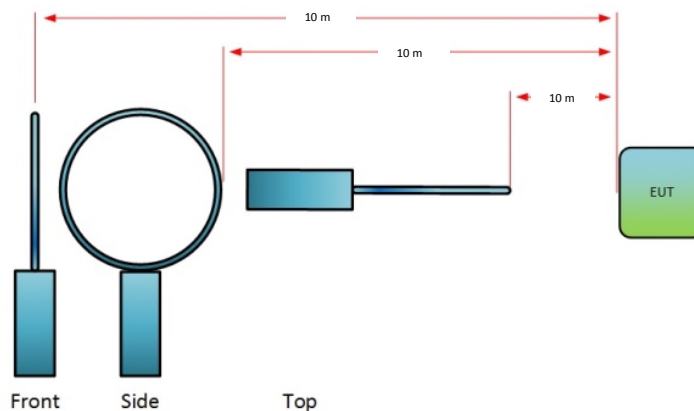
The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.6 Environmental Conditions

Ambient Temperature	23.8°C
Relative Humidity	43.6%
ATM Pressure	100.2kPa

2.2.7 Additional Observations

- This is a radiated test. The spectrum was searched from 9 kHz to 1GHz.
- Below 30MHz, prescans were performed to determine best test antenna orientation with the highest recorded emissions. Verification was performed using “Side” configuration (see the figure below) corresponding to the best antenna orientation as found during the prescans.



- The EUT was verified in three (3) orthogonal axes. Only the worst case configuration presented (“X” Axis).



- Measurement was done at 3 meters. Limits below 30MHz were corrected using extrapolation factor of 40 dB/decade. See sample computation below:
 - Limit @ 9kHz = 2400/F(kHz) μ V/m
 - = 20 log (2400/9) dB μ V/m
 - = 48.52 dB μ V/m @ 300 meters
 - = 48.52 dB μ V/m + (40 log 300/3) @ 10 meters
 - = 128.52 dB μ V/m @ 10 meters
- Measurement was done using EMC32 V9.26.0 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Sections 2.2.8 and 2.2.9 for sample computations.

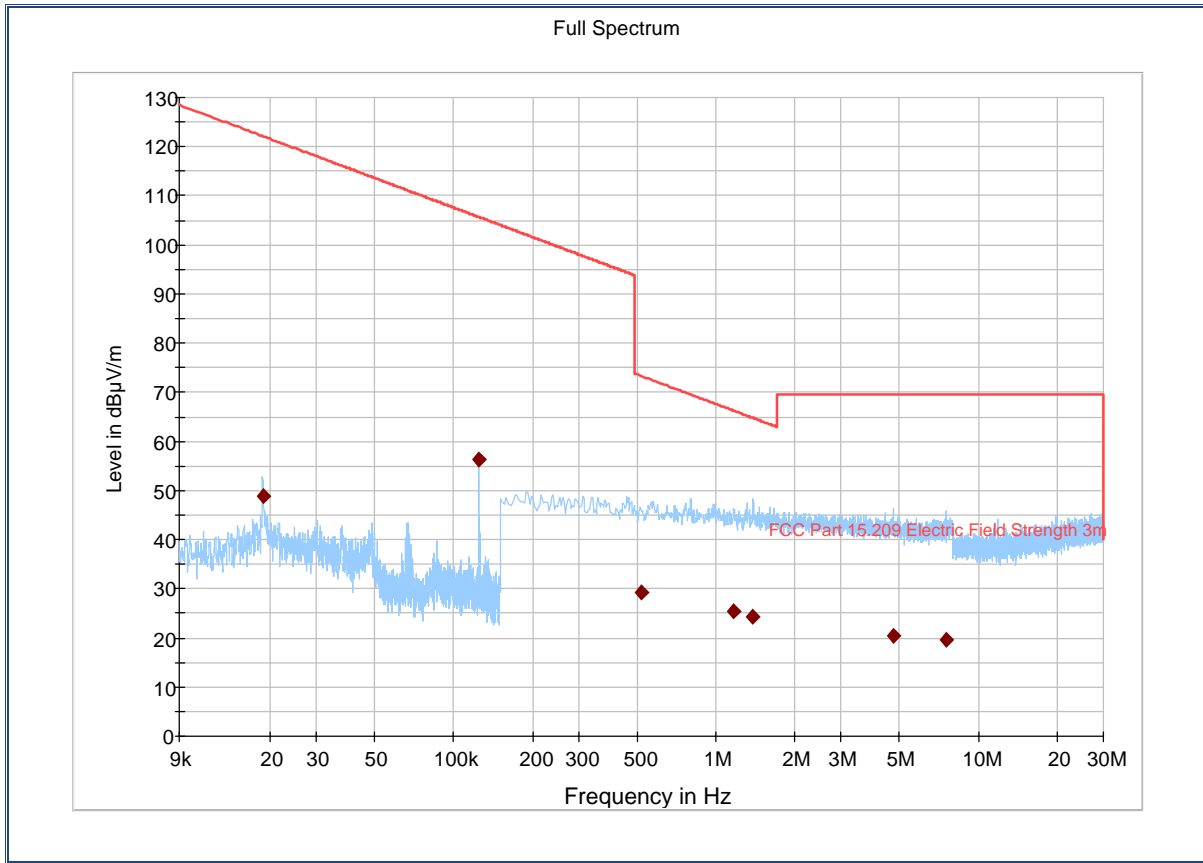
2.2.8 Sample Computation (Radiated Emission 9kHz to 30MHz)

Measuring equipment raw measurement (db μ V) @ 9 kHz			25.0
Correction Factor (dB)	Asset# 1057 (cable)	0.1	24.8
	Asset# 8850 (cable)	0.3	
	Asset# 6628 (antenna)	24.4	
Reported QuasiPeak Final Measurement (dbμV/m) @ 9kHz			49.8

2.2.9 Sample Computation (Radiated Emission 30MHz to 1GHz)

Measuring equipment raw measurement (db μ V) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3	-12.6
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	
	Asset# 8850 (cable)	0.3	
	Asset# 1033 (antenna)	17.2	
Reported QuasiPeak Final Measurement (dbμV/m) @ 30MHz			11.8

2.2.10 Test Results (Worst Case Orientation 9kHz to 30MHz)

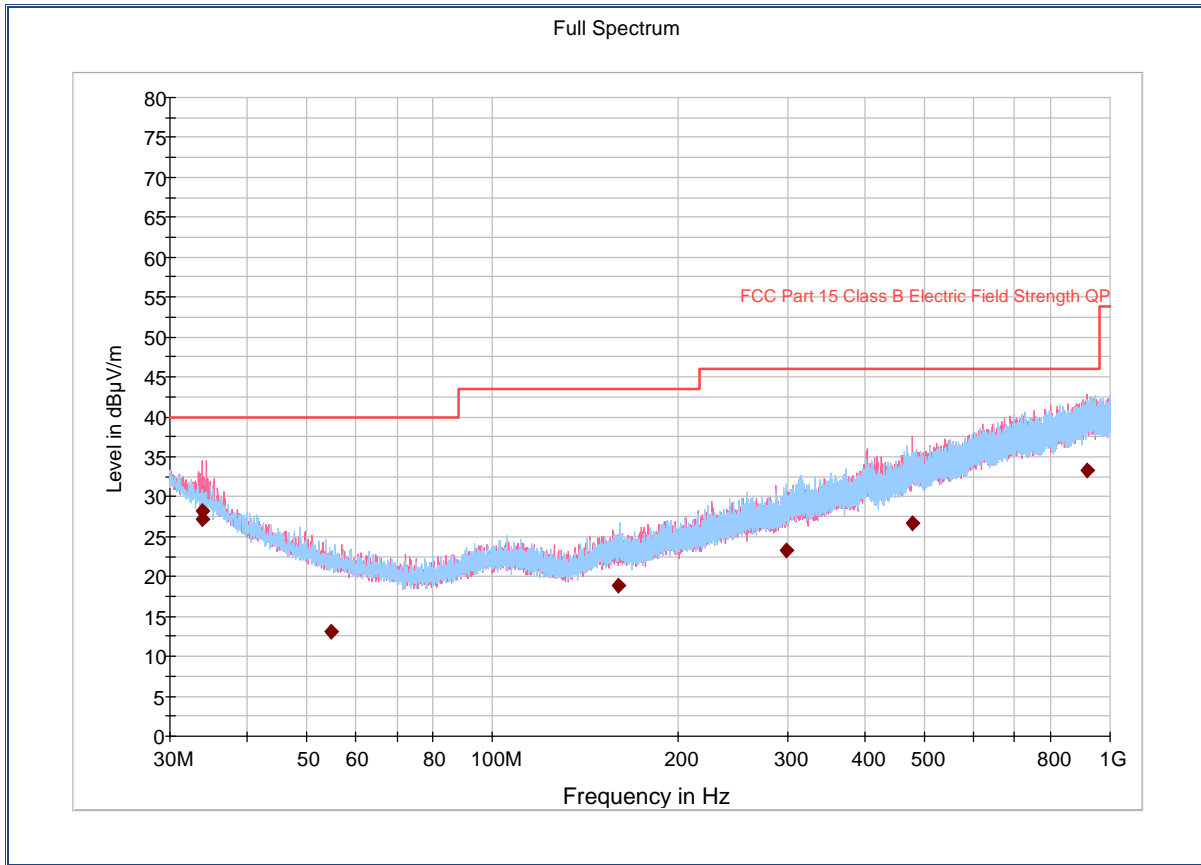


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
0.018761	48.88	1000.0	0.200	100.0	H	146.0	22.5	73.25	122.13
0.125091	56.41	1000.0	0.200	100.0	H	146.0	19.9	49.25	105.66
0.516670	29.21	1000.0	9.000	100.0	H	20.0	20.0	44.13	73.34
1.167400	25.53	1000.0	9.000	100.0	H	15.0	20.2	40.72	66.25
1.384290	24.36	1000.0	9.000	100.0	H	342.0	20.2	40.41	64.77
4.769355	20.42	1000.0	9.000	100.0	H	87.0	20.3	49.08	69.50
7.574225	19.62	1000.0	9.000	100.0	H	126.0	20.4	49.88	69.50

Test Notes:

2.2.11 Test Results (Worst Case Orientation 30MHz to 1GHz)



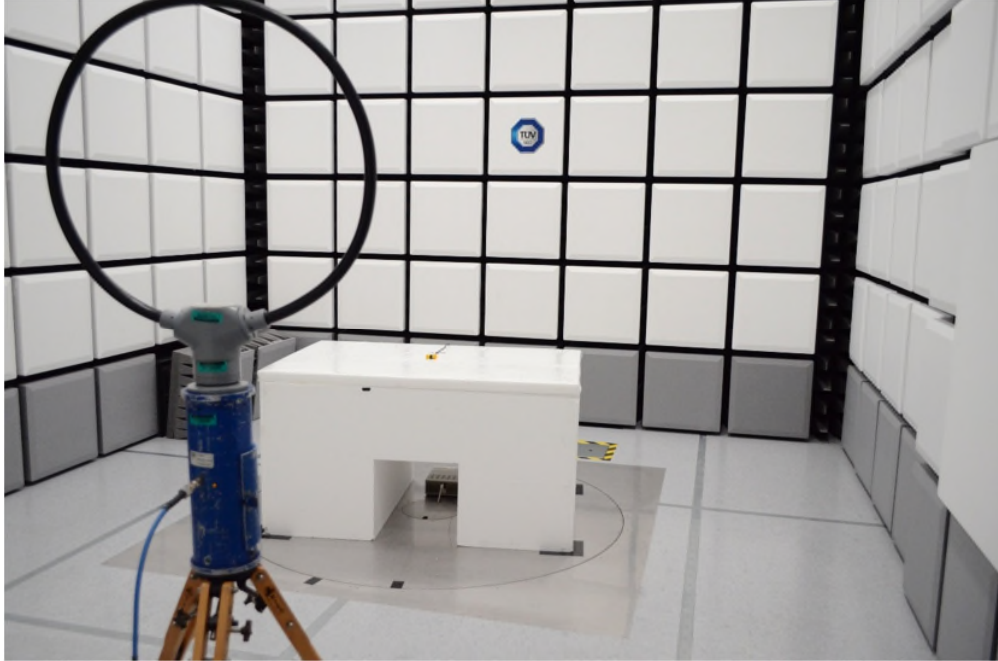
Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
33.837333	27.15	1000.0	120.000	99.9	V	58.0	22.6	12.85	40.00
33.847667	28.27	1000.0	120.000	103.7	V	214.0	22.6	11.73	40.00
54.718667	13.15	1000.0	120.000	104.1	H	150.0	15.1	26.85	40.00
159.448000	18.93	1000.0	120.000	210.4	H	262.0	16.8	24.57	43.50
298.608333	23.26	1000.0	120.000	99.9	H	136.0	21.8	22.74	46.00
477.723000	26.71	1000.0	120.000	104.4	V	176.0	27.0	19.29	46.00
918.162333	33.31	1000.0	120.000	126.2	V	253.0	33.4	12.69	46.00

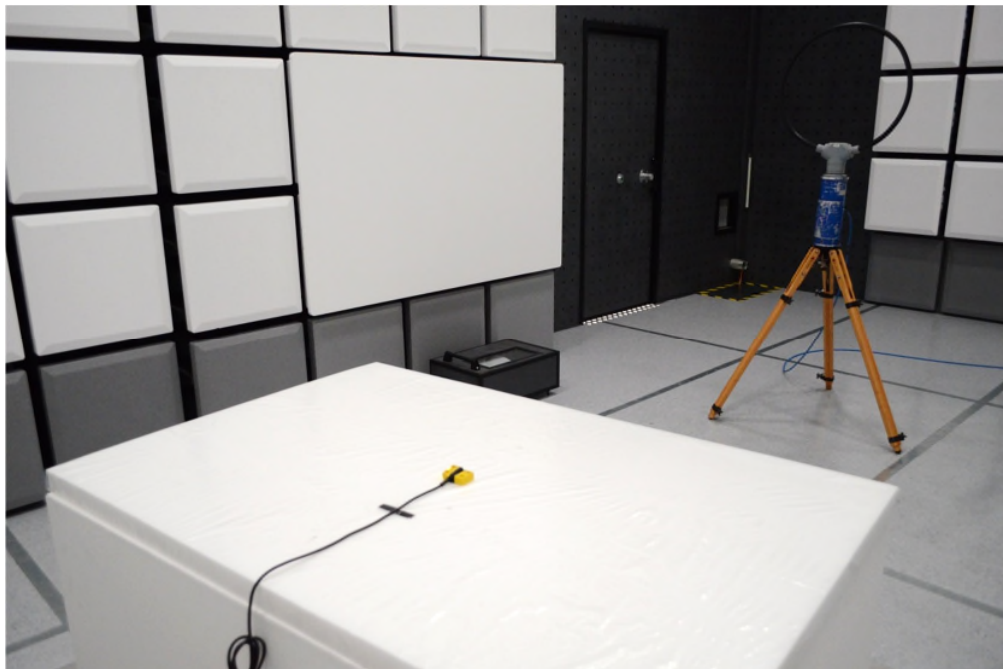
Test Notes:

2.2.12 Test Setup Pictures

9 kHz to 30 MHz (Front)

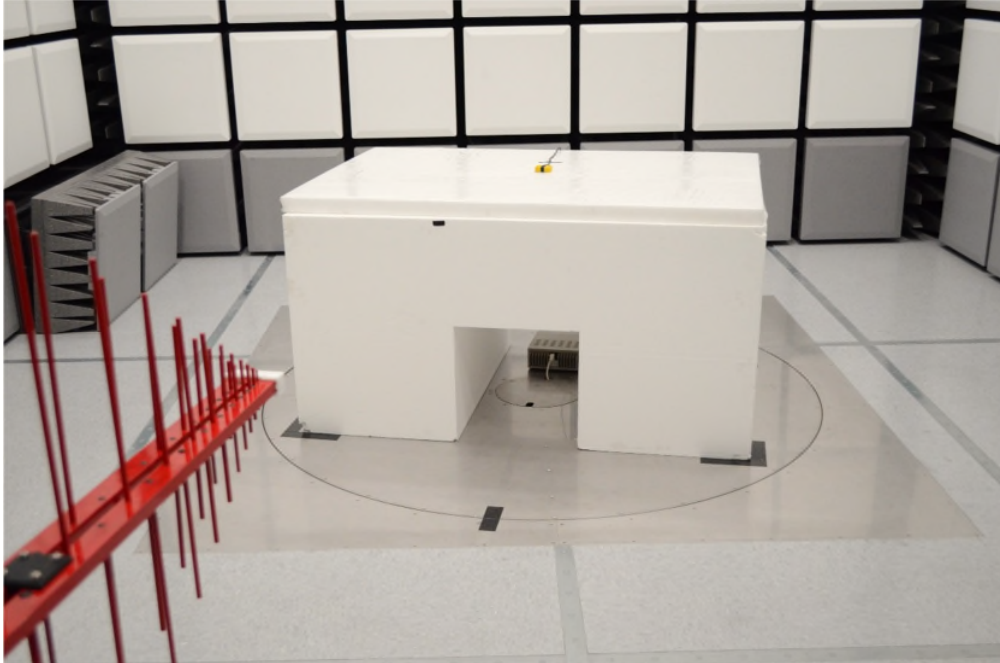


9 kHz to 30 MHz (Back)

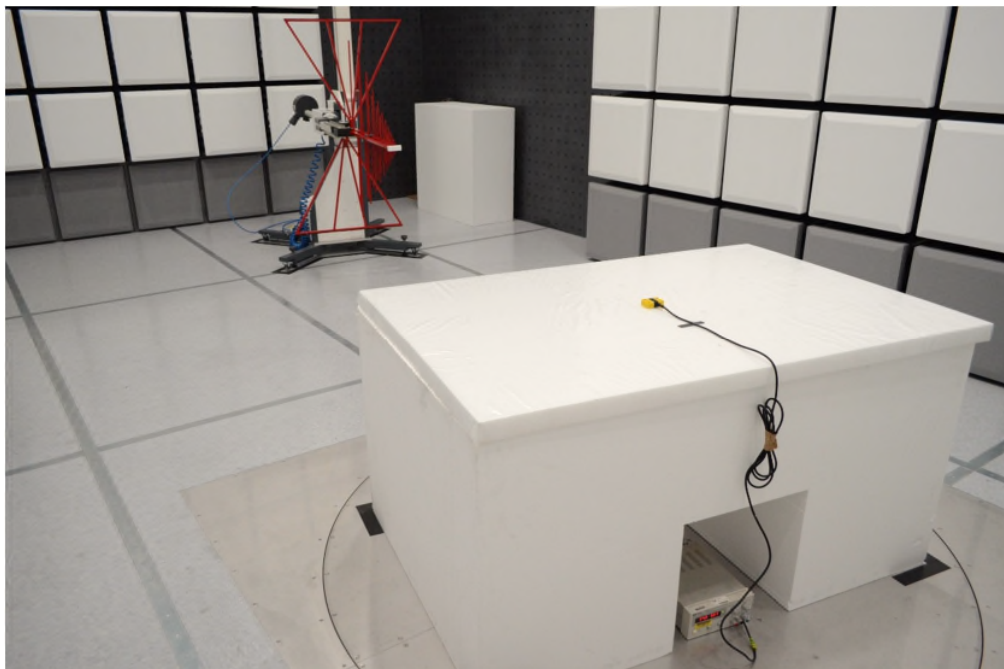


2.2.13 Test Setup Pictures

30 to 1000 MHz (Front)



30 to 1000 MHz (Back)





2.3 CONDUCTED EMISSIONS

2.3.1 Specification Reference

Part 15 Subpart C §15.207(a)

2.3.2 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.*

2.3.3 Equipment Under Test and Modification State

Serial No: 1073231 / Default Test Configuration

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

September 15, 2016 /NS

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. Rancho Bernardo facility

Ambient Temperature	23.8°C
Relative Humidity	44.3%
ATM Pressure	100.2 kPa

2.3.7 Additional Observations

- The EUT was powered from a laboratory DC power supply.



- Measurement was done using EMC32 V8.53 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 2.3.8 for sample computation.

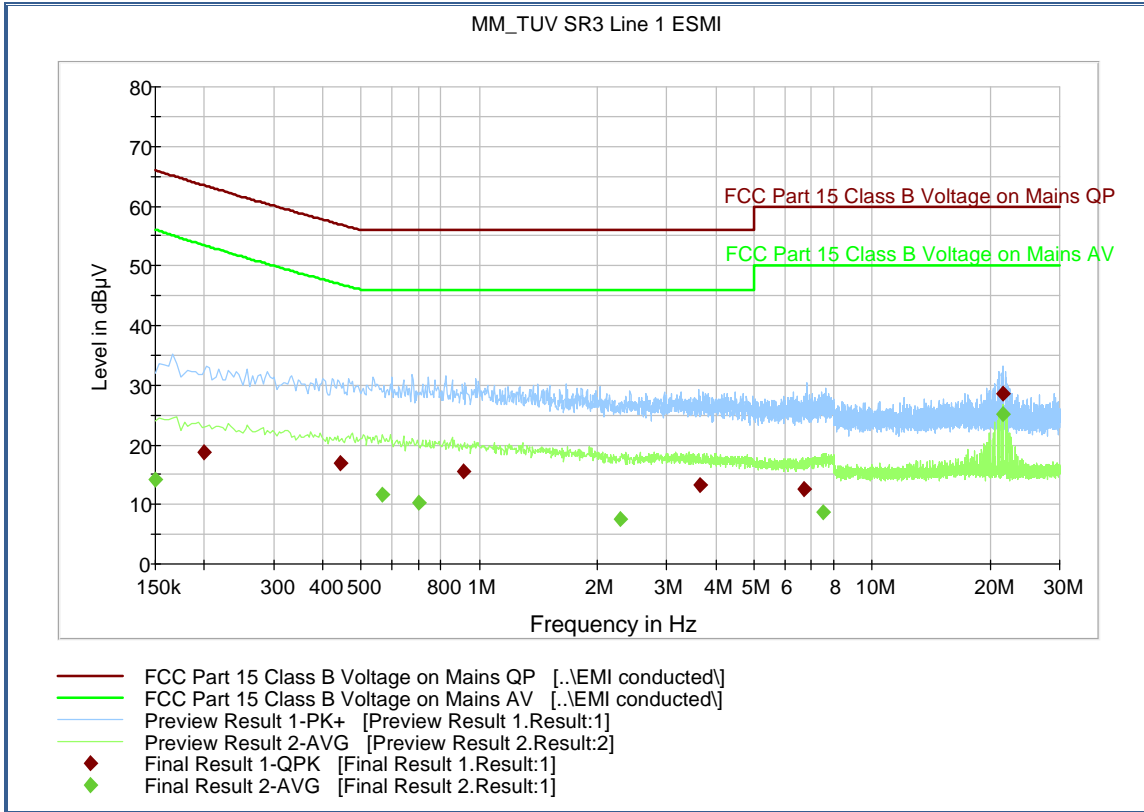
2.3.8 Sample Computation (Conducted Emission – Quasi Peak)

Measuring equipment raw measurement (db μ V) @ 150kHz		5.5
Correction Factor (dB)	Asset# 8607 (20 dB attenuator)	19.9
	Asset# 1177 (cable)	0.15
	Asset# 1176 (cable)	0.35
	Asset# 7568 (LISN)	0.30
Reported QuasiPeak Final Measurement (dbμV) @ 150kHz		26.2

2.3.9 Test Results

Compliant. See attached plots and tables.

2.3.10 Line 1 (Hot)



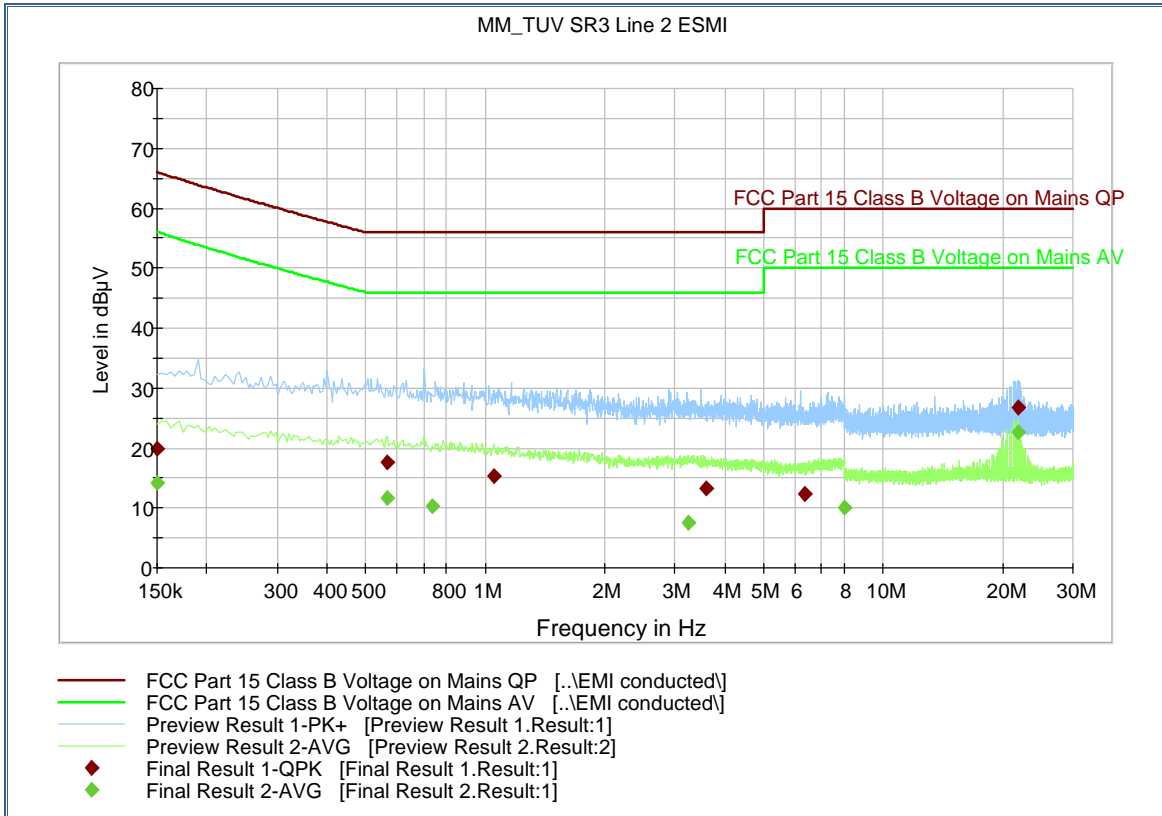
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)	Comment
0.199500	18.8	1000.0	9.000	Off	L1	20.2	44.7	63.5	
0.444000	16.9	1000.0	9.000	Off	L1	20.1	40.0	56.9	
0.910000	15.6	1000.0	9.000	Off	L1	20.1	40.4	56.0	
3.644000	13.3	1000.0	9.000	Off	L1	20.1	42.7	56.0	
6.715500	12.5	1000.0	9.000	Off	L1	20.1	47.5	60.0	
21.539500	28.6	1000.0	9.000	Off	L1	20.5	31.4	60.0	

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV)	Comment
0.150000	14.2	1000.0	9.000	Off	L1	20.3	41.8	56.0	
0.566000	11.7	1000.0	9.000	Off	L1	20.1	34.3	46.0	
0.704000	10.4	1000.0	9.000	Off	L1	20.1	35.6	46.0	
2.293500	7.7	1000.0	9.000	Off	L1	20.1	38.4	46.0	
7.475000	8.7	1000.0	9.000	Off	L1	20.1	41.3	50.0	
21.530000	25.2	1000.0	9.000	Off	L1	20.5	24.8	50.0	

2.3.11 Line 2 (Neutral)



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	19.8	1000.0	9.000	Off	N	20.3	46.2	66.0	
0.567000	17.5	1000.0	9.000	Off	N	20.1	38.5	56.0	
1.054000	15.2	1000.0	9.000	Off	N	20.1	40.8	56.0	
3.585000	13.2	1000.0	9.000	Off	N	20.1	42.8	56.0	
6.366500	12.3	1000.0	9.000	Off	N	20.1	47.7	60.0	
21.785500	26.8	1000.0	9.000	Off	N	20.5	33.2	60.0	

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	14.2	1000.0	9.000	Off	N	20.3	41.8	56.0	
0.567000	11.6	1000.0	9.000	Off	N	20.1	34.4	46.0	
0.734500	10.3	1000.0	9.000	Off	N	20.1	35.7	46.0	
3.250500	7.6	1000.0	9.000	Off	N	20.1	38.4	46.0	
7.974000	10.1	1000.0	9.000	Off	N	20.1	39.9	50.0	
21.931000	22.5	1000.0	9.000	Off	N	20.5	27.5	50.0	

2.3.12 Test Set up Pictures





SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

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

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date	Cal Due Date
Radiated Emission						
1002	Bilog Antenna	3142C	00058717	ETS-Lindgren	11/06/15	11/06/17
6628	Loop Antenna	HFH 2 –Z2	880 458/25	Rhode & Schwarz	10/28/15	10/28/16
8878	High-frequency cable	R90-088-240	N/A	Teledyne/Storm Microwave	03/16/16	03/16/17
8879	High-frequency cable	084-0505-100	N/A	Teledyne/Storm Microwave	03/16/16	03/16/17
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	03/17/16	03/17/17
Conducted Test Setup						
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	03/17/16	03/17/17
6836	LISN	FCC-LISN-50-25-2	5024	FCC	4/29/16	04/29/17
Miscellaneous						
-	Test Software	EMC32	V8.5.3	Rhode & Schwarz	N/A	
	Test Software	EMC32	V9.26.0	Rhode & Schwarz	N/A	
7619	Barometer/Temperature/Humidity Transmitter	iBTHX-W	15250268	Omega	10/19/15	10/19/16
6455	DC Power Supply	E3611A	2529	HP	N/A	

3.2 MEASUREMENT UNCERTAINTY

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

3.2.1 Conducted Emissions (AC) Measurements

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.36	0.21	0.04
2	Cables	Rectangular	0.50	0.29	0.08
3	LISN	Rectangular	0.66	0.38	0.15
4	Attenuator	Rectangular	0.30	0.17	0.03
5	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					0.80
Coverage Factor (k):					2
Expanded Uncertainty:					1.59

3.2.2 Radiated Emission Measurements (Below 1GHz)

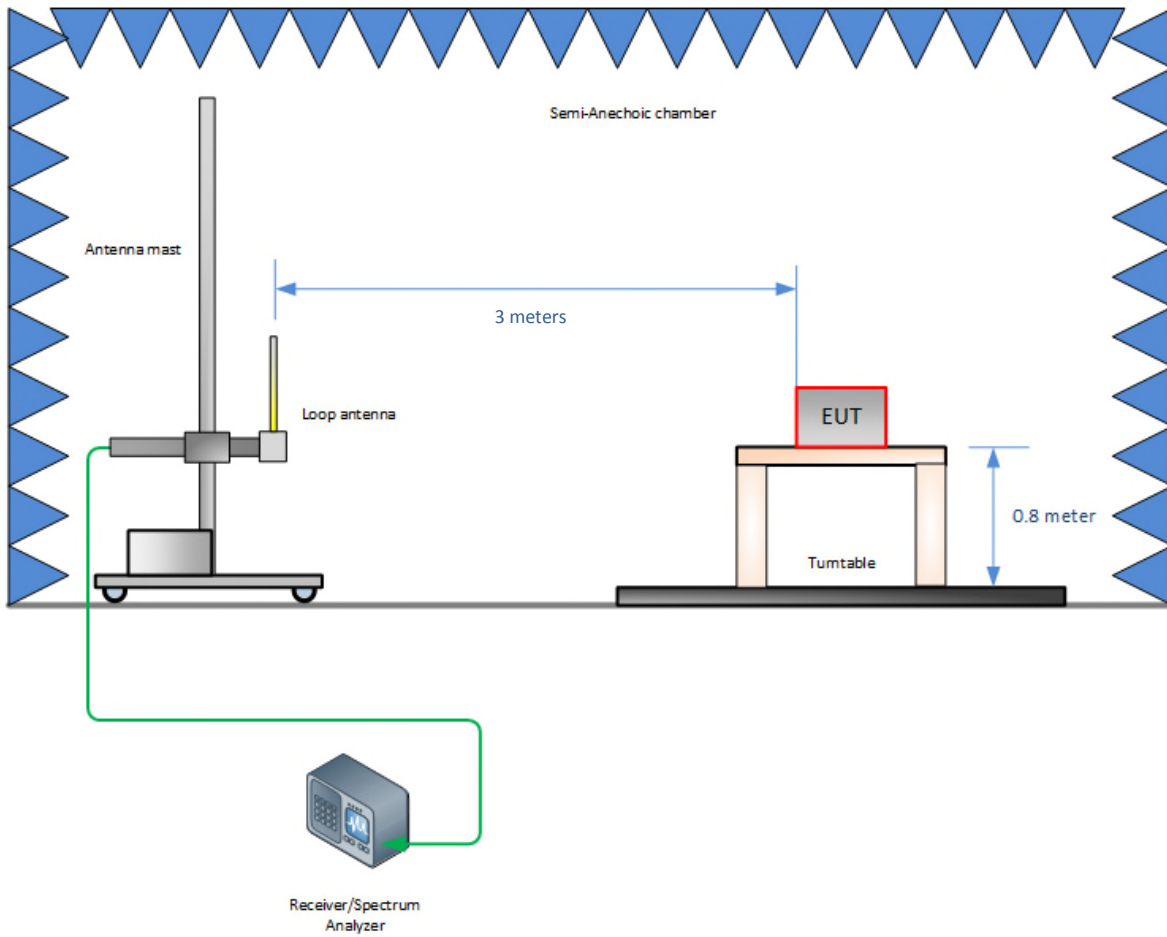
Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.45	0.26	0.07
2	Cables	Rectangular	0.50	0.29	0.08
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.75	0.43	0.19
5	Site	Rectangular	2.70	1.56	2.43
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					1.78
Coverage Factor (k):					2
Expanded Uncertainty:					3.57



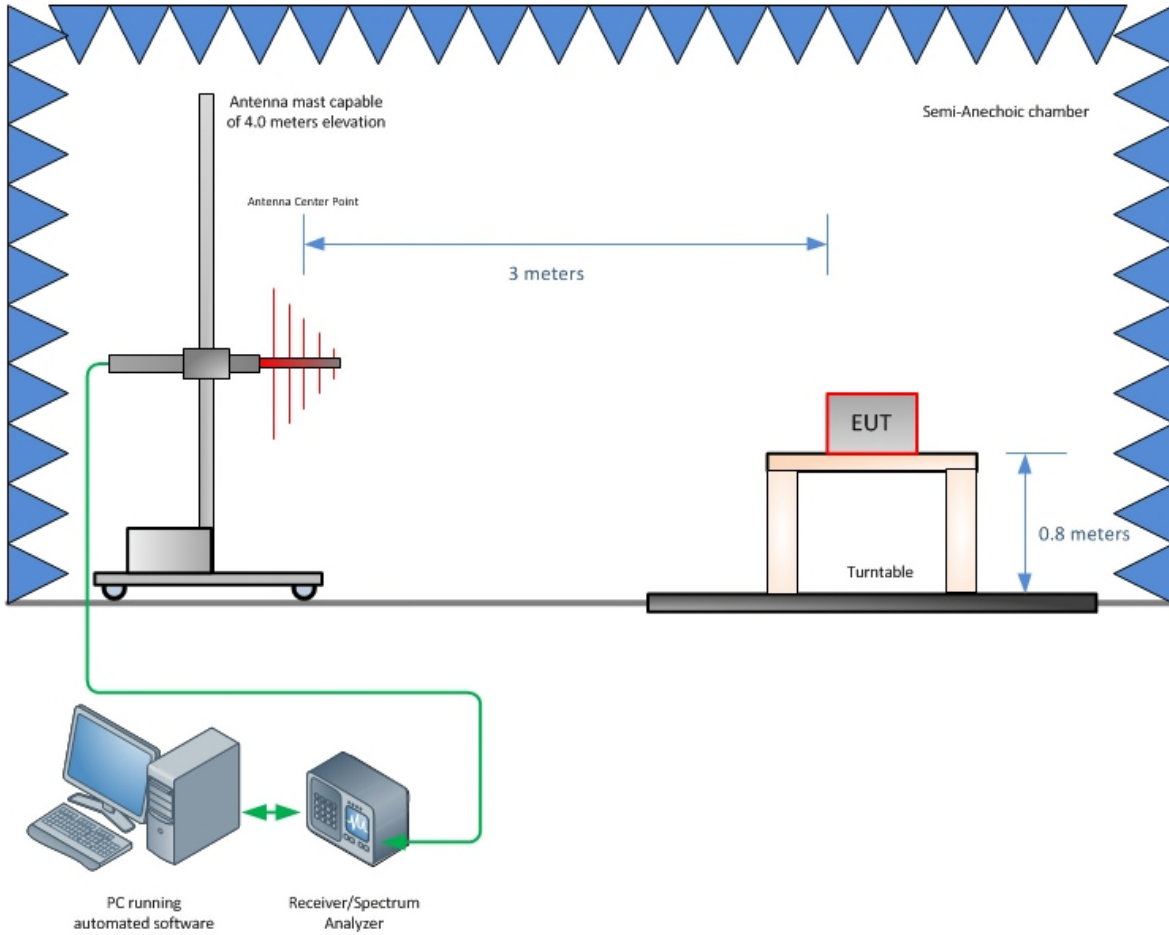
SECTION 4

DIAGRAM OF TEST SETUP

4.1 TEST SETUP DIAGRAM (RADIATED EMISSIONS)

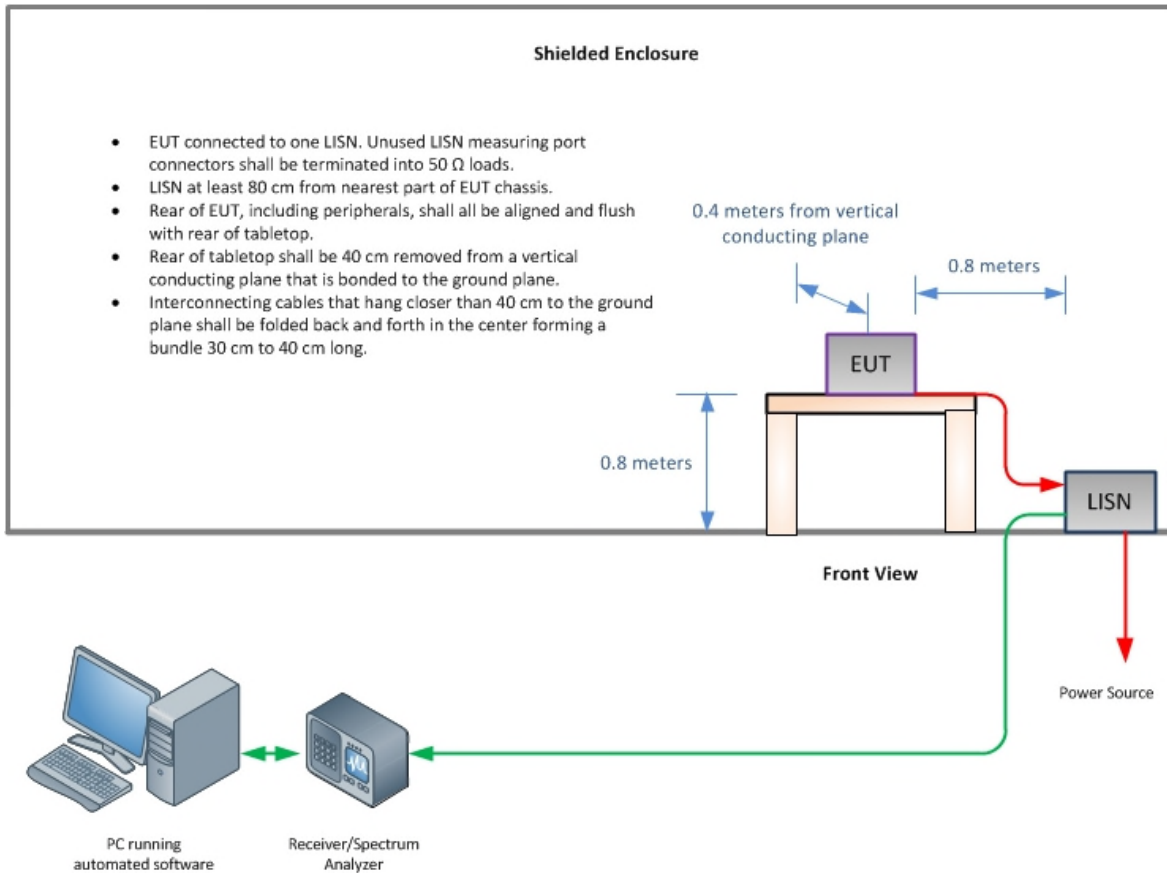


Radiated Emission Test Setup (Below 30 MHz)



Radiated Emission Test Setup (30MHz to 1GHz)

4.2 TEST SETUP DIAGRAM (CONDUCTED EMISSIONS)





SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

TÜV SÜD America Inc.'s reports apply only to the specific sample tested under stated test conditions. It is the manufacturer's responsibility to assure the continued compliance of production units of this model. TÜV SÜD America, Inc. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD America, Inc.'s issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and TÜV SÜD America, Inc., extracts from the test report shall not be reproduced, except in full without TÜV SÜD America, Inc.'s written approval.

This report must not be used to claim product certification, approval, or endorsement by A2LA, NIST, or any agency of the federal government.

TÜV SÜD America, Inc. and its professional staff hold government and professional organization certifications for AAMI, ACIL, AEA, ANSI, IEEE, A2LA, NIST and VCCI.



A2LA Cert. No. 2955.13