
**COMPLIANCE WORLDWIDE INC.
TEST REPORT 515-13**

**In Accordance with the Requirements of
Federal Communications Commission CFR Title 47 Part 15.227, Subpart C
Industry Canada RSS 210, Issue 8, Annex 2**

**Low Power License-Exempt Radio Communication Devices
Intentional Radiators**

**Issued to
Reactive Technologies
For
Arluk Technologies, LLC
3-I Taggart Drive
Nashua, NH 03060**

**for the
SuperCar
27 MHz Transmitter / Remote Control Device**

FCC ID: 2ABDPSCV10T

Report Issued on December 13, 2013

Tested by



Brian F. Breault

Reviewed by



Larry K. Stillings

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1. Scope

This test report certifies that the Arluk Technologies, LLC SuperCar 27 MHz Transmitter / Remote Control Device, as tested, meet the FCC Part 15.227, and Industry Canada RSS 210 requirements.

The scope of this test report is limited to the test samples provided by the client, only in as much as those samples represent other production units. If any significant changes are made to the units, the changes shall be evaluated and a retest may be required.

2. Product Details

- 2.1. **Manufacturer:** Arluk Technologies, LLC
- 2.2. **Model Number:** SuperCar with 27 MHz Transmitter / Remote Control Device
- 2.3. **Serial Number:** N/A
- 2.4. **Description of EUT:** Radio Controlled Electric Car
- 2.5. **Power Sources:** 3 Volts (Two AA Alkaline Batteries)
- 2.6. **Hardware Revision:** N/A
- 2.7. **Software Revision:** N/A
- 2.8. **EMC Modifications:** C7 was changed from 100 Pf to 22 Pf

3. Product Configuration

3.1. Operational Characteristics & Software

The two transmitter controls were positioned in the on state to produce a constant, worst case transmitter output.

3.2. EUT Hardware

Manufacturer	Model/Part # / Options	Serial Number	Input Voltage	Frq (Hz)	Description/Function
Arluk Technologies	27 MHz Transmitter	N/A	3	VDC	SuperCar RF Transmitter

3.3. EUT Connected Hardware

Manufacturer	Model	Serial Number	Description
None	N/A	N/A	

3.4. EUT Cables/Transducers

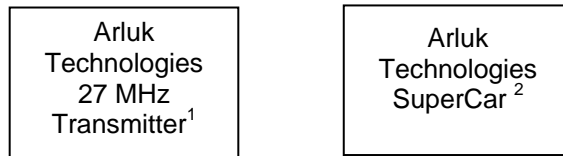
Cable Type	Length	Shield	From	To
None				

3.5. Support Equipment

Manufacturer	Model	Serial Number	Input Voltage	Frq (Hz)	Description/Function
Arluk Technologies	SuperCar	N/A	9	VDC	For testing the functionality of the 27 MHz Transmitter

3. Product Configuration (continued)

3.6. Block Diagram



¹ Device under Test
² Support Equipment

4. Measurements Parameters

4.1. Measurement Equipment Used to Perform Tests

Device	Manufacturer	Model No.	Serial No.	Cal Interval	Cal Due
EMI Test Receiver, 9kHz - 7GHz	Rohde & Schwarz	ESR7	101156	2 years	4/4/2015
Spectrum Analyzer	Rohde & Schwarz	FSV40	100899	2 years	6/6/2015
Spectrum Analyzer	Hewlett Packard	8546A	3650A00360	2 years	6/13/2014
Microwave Preamp	Hewlett Packard	8449B	3008A01323	2 years	6/5/2015
Loop Antenna, Passive, 9 kHz to 30 MHz	EMCO	6512	9309-1139	2 years	8/28/2014
Biconilog Antenna, 30 MHz to 2000 MHz	Sunol Sciences	JB1	A050913	1 year	5/15/2014
Double Ridged Antenna, 1 - 18 GHz	ETS-Lindgren	3117	00143292	2 years	1/14/2015
Horn Antenna, 18 - 40 GHz	Com-Power	AH-840	03075	2 years	8/27/2014
DMM / Temperature Meter	Fluke	187	79690058	1 year	2/22/2014
Signal Generator, 100 kHz to 40 GHz	Rohde & Schwarz	SMB 100A	175352	2 years	5/14/2014
Compact Digital Barometer	Control Company	4195	ID236	2 years	2/25/2015
Thermal Chamber	Assoc. Testing Labs	SLHU-1-CRLC	N/A	Not Required	Not Required

4.2. Measurement & Equipment Setup

Test Dates: November 12, 2013
 Test Engineer: Cody Merry
 Normal Site Temperature (15 - 35°C): 22.0
 Relative Humidity (20 -75%RH): 33%
 Frequency Range: .009 MHz to 1 GHz
 Measurement Distance: 3 Meters
 EMI Receiver IF Bandwidth: 200 Hz – 9 kHz to 150 kHz
 9 kHz – 150 kHz to 30 MHz
 120 kHz - 30 MHz to 1 GHz
 1 MHz - Above 1 GHz
 EMI Receiver Avg Bandwidth: 300 Hz – 9 kHz to 150 kHz
 30 kHz – 150 kHz to 30 MHz
 300 kHz - 30 MHz to 1 GHz
 3 MHz - Above 1 GHz
 Detector Function: Peak, QP, Avg – 150 kHz to 30 MHz
 Peak, QP - 30 MHz to 1 GHz
 Peak, Avg - Above 1 GHz
 Unless otherwise specified.

4. Measurements Parameters (continued)

4.3. Measurement Procedure

The test measurements contained in this report are based on the requirements detailed in FCC Part 15.227, Subpart C - Intentional Radiators, notably Section 15.227, Operation within the band 26.96–27.28 MHz

The test methods used to generate the data in this test report are in accordance with ANSI C63.10: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices, Section 15.

5. Choice of Equipment for Test Suits

5.1. Choice of Model

This test report is based on the test samples supplied by the manufacturer and are reported by the manufacturer to be equivalent to the production units.

5.2. Presentation

The test sample was tested complete with all required ancillary equipment. Refer to Section 3 of this report for the product equipment configuration.

5.3. Choice of Operating Frequencies

The transmitter in the unit under test utilizes a single operating frequency at approximately 27.145 MHz

6. Measurement Summary

Test Requirement	FCC Part 15 Reference	RSS Reference	Test Report Section	Result	Comment
Antenna Requirement	15.203	RSS-GEN Section 7.1.2	7.1	Compliant	
Operation within the Band 26.96 MHz – 27.28 MHz (Field Strength)	15.227	RSS-210 Section A2.6	7.2	Compliant	
Spurious Radiated Emissions	15.209		7.4	Compliant	
Power Line Conducted Emissions	15.207	RSS-GEN Section 7.2.4	7.5	Not Required	DUT runs on 2 AA Batteries
Occupied Bandwidth/ Lower and Upper Band Edges	15.215(c) C63.10	N/A	7.6	Compliant	
99% Power Bandwidth	N/A	RSS-GEN Section 4.6.1	6.7	Compliant	

7. Measurement Data

7.1. Antenna Requirement (Section 15.203, RSS-GEN 7.1.2)

Requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section.

Result: Compliant.

Status: The unit under test employs an antenna specifically designed for the device under test.

7. Measurement Data

7.2. Operation within the Band 26.96–27.28 MHz (Field Strength)

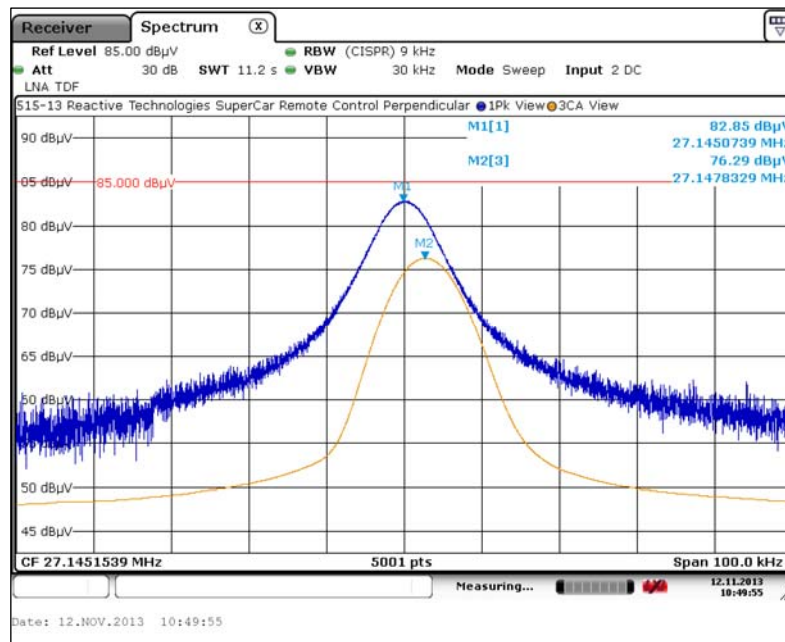
Requirement: The field strength of any emissions within the band 26.96 MHz – 27.28 MHz shall not exceed 10,000 microvolts/meter (80 dB μ V/m) at 3.0 meters. This emission limit is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

Result: The unit under test complies with the requirements detailed in FCC Part 15.227.

Freq.	Dist.	Meas. Field Strength	Ant. Factor ¹	Cable Loss ¹	Corr. Field Strength	Limit	Margin
MHz	Meters	dB μ V	dB	dB	dB μ V/m	dB μ V/m	(dB)
27.15	3	41.46	34.06	0.77	76.29	80.00	-3.71

¹ Correction factors are included in the measurement analyzer and are provided here for informational purposes.

7.2.1. Measurement Plot



7. Measurement Data (continued)

7.4. Transmitter Spurious Radiated Emissions (15.225 (d), 15.209)

Requirement: The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table (Reference FCC 15.209):

Frequency Range (MHz)	Distance (Meters)	Limit (dBµV/m) ¹
0.009 to 0.490	3	128.5 to 93.8
0.490 to 1.705	3	73.8 to 63.0
1.705 to 30	3	69.5
30 to 88	3	40.0
88 to 216	3	43.5
216 to 960	3	46.0
>960	3	54.0

¹ Measurements in the 9 to 90 kHz, 110 to 490 kHz and above 1000 MHz ranges employ an average detector. Otherwise a quasi-peak detector is used.

² Extrapolation below 30 MHz is calculated at 40 dB/decade.

Procedure: Test measurements were made in accordance with ANSI C63.4-2008, Standard Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronics Equipment in the Range of 9 kHz to 40 GHz.

Test Notes: First, the intentional radiators were disabled and a scan of the unit under test was performed. The intentional radiators were then enabled and a second scan was performed. The two scans were compared to determine the contribution of the intentional radiators to the overall emissions profile.

Results: The transmitter installed in the unit under test meet the FCC Part 15.209 emissions requirements.

7. Measurement Data (continued)

7.4. Transmitter Spurious Radiated Emissions (15.209) (continued)

7.4.1. Transmitter Spurious Radiated Emissions – 9 kHz to 150 kHz

7.4.1.1. Antenna is Parallel to the UUT



7.4.1.2. Antenna is Perpendicular to the UUT



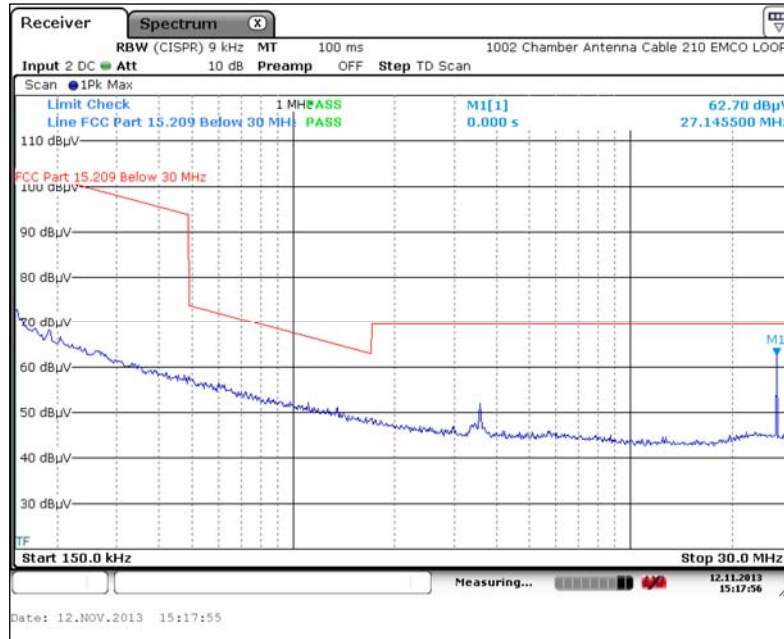
7. Measurement Data (continued)

7.4. Transmitter Spurious Radiated Emissions (15.209) (continued)

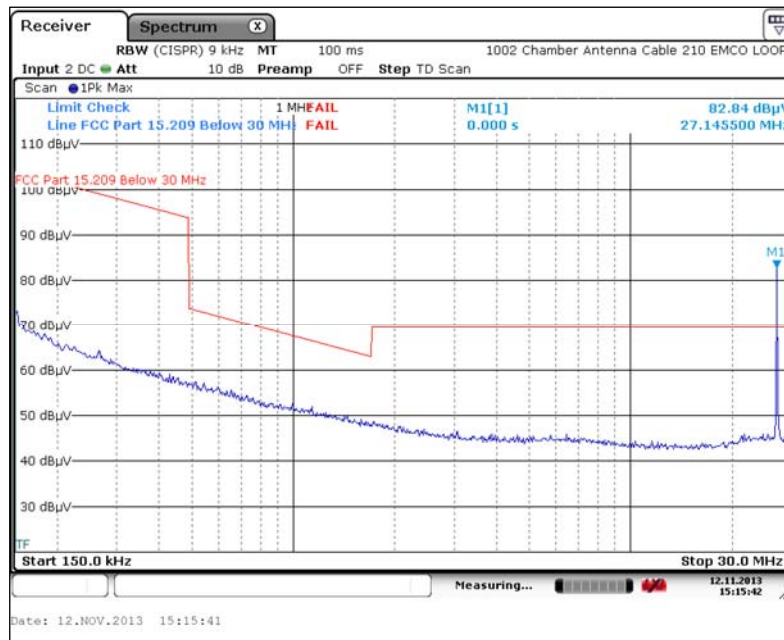
7.4.2. Transmitter Spurious Radiated Emissions – 150 kHz to 30 MHz (continued)

Note: Emission denoted by marker M1 is the intentional radiator.

7.4.2.1. Antenna is Parallel to the UUT



7.4.2.2. Antenna is Perpendicular to the UUT

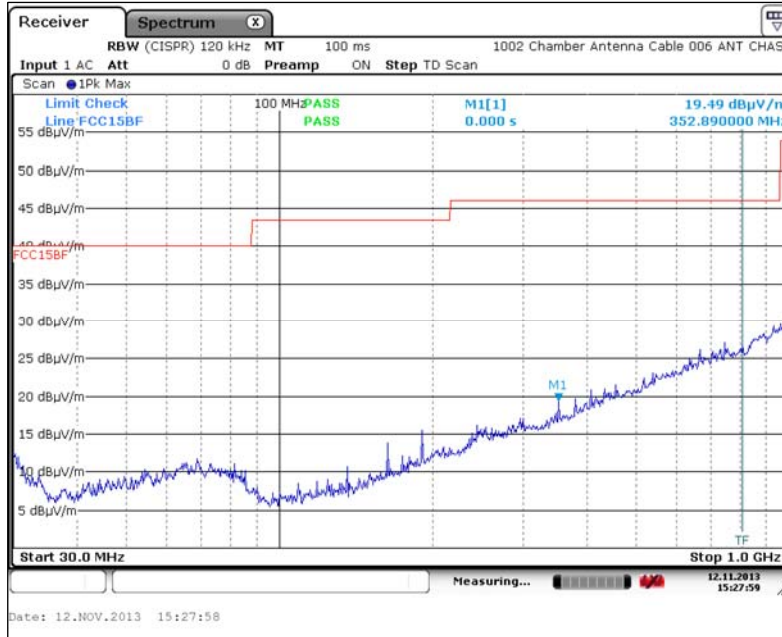


7. Measurement Data (continued)

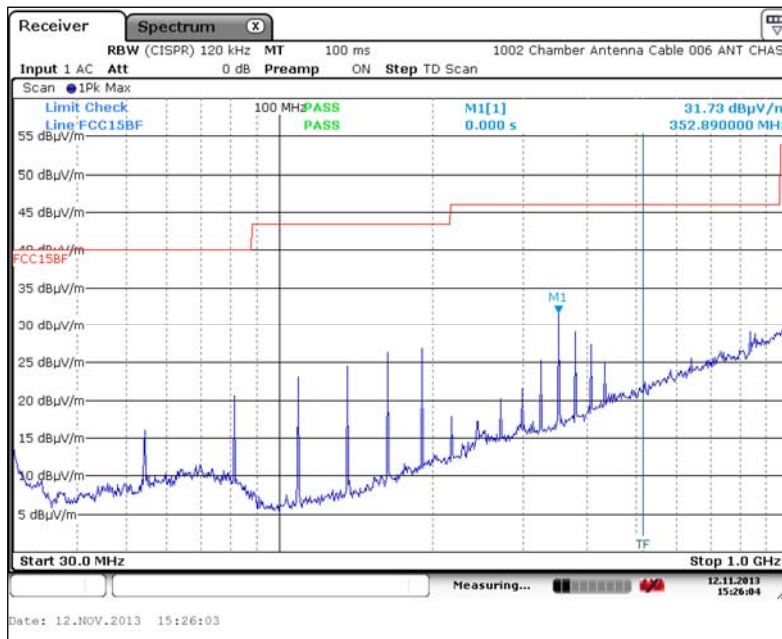
7.4. Spurious Radiated Emissions (15.209) (continued)

7.4.3. Spurious Radiated Emissions – 30 MHz to 1 GHz

7.4.3.1. Antenna is Horizontal



7.4.3.2. Antenna is Vertical



7. Measurement Data (continued)

7.4. Spurious Radiated Emissions (15.209) (continued)

7.4.4. Harmonic Emissions

Test Note: The emissions in the table below represent the worst case polarity, elevation and azimuth.

Frequency (MHz)	Pk Amp (dBµV/m)	QP Amp (dBµV/m)	QP Limit (dBµV/m)	Margin (dB)	Ant Pol (H/V)	Ant Ht (cm)	Table (Deg)	Result
54.28	25.38	21.60	40.0	-18.40	H	353	180	Compliant
81.42	27.53	24.05	40.0	-15.95	V	100	348	Compliant
108.56	33.51	30.36	43.5	-13.14	V	102	354	Compliant
135.70	31.71	30.32	43.5	-13.18	V	100	348	Compliant
162.84	35.86	33.88	43.5	-9.62	V	100	194	Compliant
189.98	27.31	25.36	43.5	-18.14	V	100	302	Compliant
217.12	27.24	22.93	46.0	-23.07	V	100	238	Compliant
244.26	27.90	23.81	46.0	-22.19	V	100	354	Compliant
271.45	29.04	24.92	46.0	-21.08	V	100	304	Compliant

7. Measurement Data (continued)

7.6. Occupied Bandwidth (Section 15.215 (c) and ANSI C63.10, Section 6.9)

Requirement: Intentional radiators operating under the alternative provisions to the general emission limits, as contained in Sections 15.217 through 15.255 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission is contained within the frequency band designated in the rule.

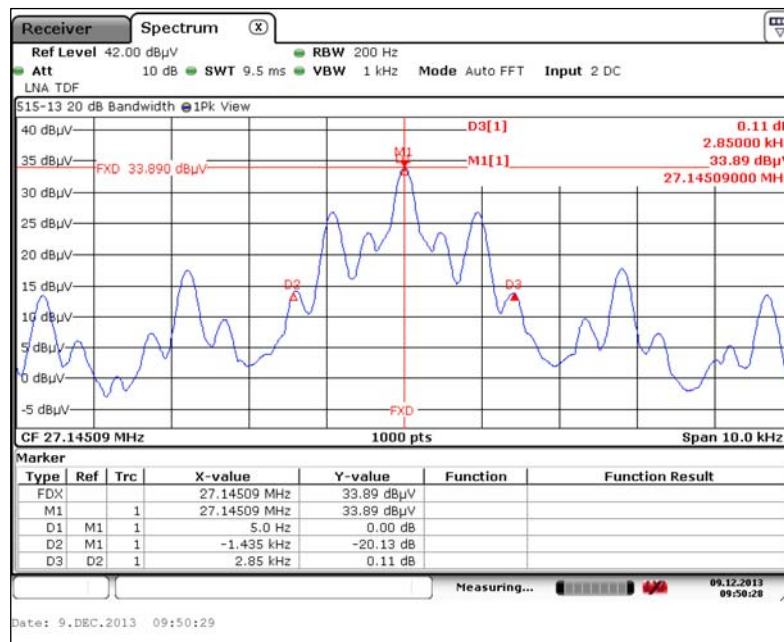
Frequency Band: $F_{MIN} = 26.96$ MHz

$F_{MAX} = 27.28$ MHz

Requirement: The DUT remains within the required frequency band.

	-20 dB Frequency Measured	Lower & Upper Band Edge (F_{MIN} & F_{Max})	Result
	MHz	MHz	
F_{LO}	27.1436	26.96	Compliant ($F_{LO} > F_{MIN}$)
F_{HI}	27.1465	27.28	Compliant ($F_{HI} < F_{Max}$)

7.6.1. Plot of 20 dB Bandwidth



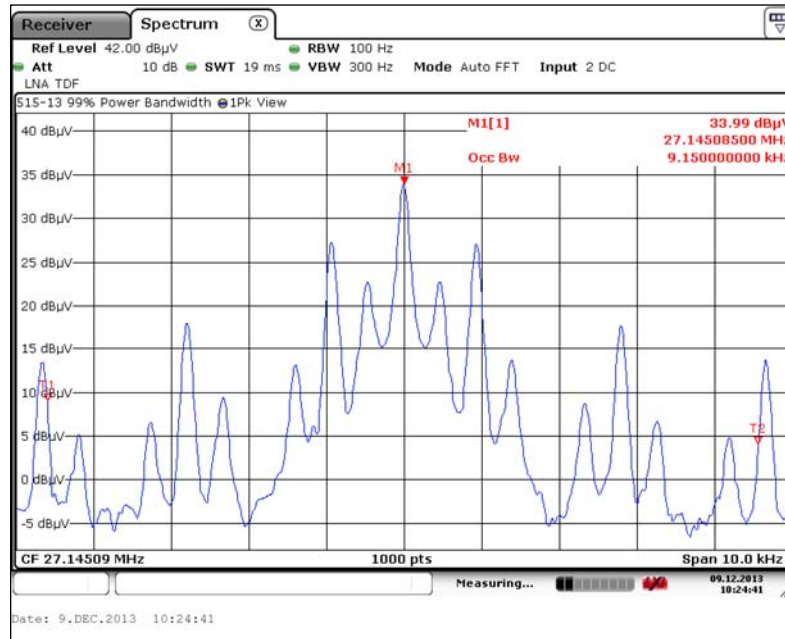
7. Measurement Data (continued)

7.7. 99% Power Bandwidth (RSS-GEN Section 4.6.1)

Requirement: When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.
 The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth.

Procedure: This test was performed utilizing the automated 99% bandwidth function of the spectrum analyzer.

Frequency	99% Power Bandwidth
(MHz)	(kHz)
13.56	9.15



8. Test Site Description

Compliance Worldwide is located at 357 Main Street in Sandown, New Hampshire. The test sites at Compliance Worldwide are used for conducted and radiated emissions testing in accordance with Federal Communications Commission (FCC), Industry Canada, and Voluntary Control Council Interference (VCCI) standards. A description of the test sites is on file with the FCC (registration number 96392), Industry Canada (file number IC 3023A-1).

The radiated emissions test site is a 3 and 10 meter enclosed open area test site (OATS). Personnel, support equipment and test equipment are located in the basement beneath the OATS ground plane.

The conducted emissions site is part of a 16' x 20' x 12' ferrite tile chamber and uses one of the walls for the vertical ground plane required by EN 55022.

Both sites are designed to test products or systems 1.5 meters W x 1.5 meters L x 2.0 meters H, floor standing or table top.