

TÜV SÜD Canada Inc.

EMC & RF Test Report

As per

FCC Part 90 Subpart I:2015

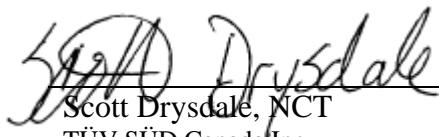
Operation as per 90.217 (< 120 mW)

RSS-119 Section 5.10 (< 120 mW)

General Technical Standards

on the

Flare Transmitter



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Testing produced for



See Appendix A for full customer & EUT details.

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

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Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Report Scope

This report addresses the EMC verification testing and test results of Flare Transmitter, herein referred to as EUT (Equipment Under Test) performed at TUV SUD Labs..

The EUT was tested for compliance against the following standards:

FCC Part 90 Subpart I:2015
RSS-119 Section 5.10

Test procedures, results, justifications, and engineering considerations, if any, follow later in this report.

The results contained in this report relate only to the item(s) tested.

This report does not imply product endorsement by A2LA or any other accreditation agency, any government, or TÜV SÜD Canada Inc.

Opinions/interpretations expressed in this report, if any, are outside the scope of TUV SUD Inc accreditation. Any opinions expressed do not necessarily reflect the opinions of TUV SUD Inc, unless otherwise stated.

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Summary

The results contained in this report relate only to the item(s) tested.

EUT FCC ID:	Flare Transmitter I5TT1FG1601
CANADA:	1454B-T1FG1601
EUT Passed all tests performed.	Yes (see test results summary)
Tests conducted by	Scott Drysdale

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Test Results Summary

Standard/Method	Description	Limit	Result
FCC 2.1046 FCC 90.217 RSS-119 Section 5.10	Output Power	N/A < 120 mW	Pass
	Occupied Bandwidth	N/A	Pass
FCC 2.1051 FCC 90.217(a)	Spurious antenna port conducted emissions	$43 + 10 \log_{10} P_{max}$ dB. $> 30 \text{ dBc at } 40 \text{ kHz}$	Pass
FCC 2.1053 FCC 90.217(a)	Spurious radiated emissions	$43 + 10 \log_{10} P_{max}$ dB. $> 30 \text{ dBc at } 40 \text{ kHz}$	Pass
FCC 2.1055 FCC 90.217(a)	Frequency stability	Must keep $> 30 \text{ dBc}$ within 40 kHz.	Pass
Overall Result			PASS

All tests were performed by Scott Drysdale.

If the product as tested or otherwise complies with the specification, the EUT is deemed to comply with the requirement and is deemed a 'PASS' grade. If not 'FAIL' grade will be issued. Note that 'PASS' / 'FAIL' grade is independent of any measurement uncertainties. A 'PASS' / 'FAIL' grade within measurement uncertainty is marked with a '*'.

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Justifications, Descriptions, or Deviations

The following justifications for tests not performed or deviations from the above listed specifications apply:

Power line conducted emissions does not apply as this device is powered by a 9 Volt battery and has no provisions for AC power or DC input.

The EUT was scanned in X,Y, and Z orthogonal axis, and the worst case results are presented in this report.

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Applicable Standards, Specifications and Methods

ANSI C63.4:2014 Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

ANSI/TIA-603-C-2004 Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

CFR 47 FCC Part 2 Subpart J –
Code of Federal Regulations – Equipment Authorization Procedure

CFR 47 FCC Part 90 Code of Federal Regulations – Private Land Mobile Radio Services

FCC KDB 412172 D01 Determining ERP and EIRP v01

ISO 17025:2005 General Requirements for the competence of testing and calibration laboratories

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Sample calculation(s)

Margin = limit – (received signal + antenna factor + cable loss – pre-amp gain)

Margin = 50.5dBuV/m – (50dBuV + 10dB + 2.5dB – 20dB)

Margin = 8.5 dB

Reference Offset = Attenuator + Cable Loss

Reference Offset = 10 dB + 0.4 dB

Reference Offset = 10.4 dB

Document Revision Status

Revision 1 –

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Definitions and Acronyms

The following definitions and acronyms are applicable in this report.
See also ANSI C63.14.

AE – Auxillary Equipment.

BW – Bandwidth. Unless otherwise stated, this is refers to the 6 dB bandwidth.

EMC – Electro-Magnetic Compatibility

EMI – Electro-Magnetic Immunity

EUT – Equipment Under Test

ITE – Information Technology Equipment with a primary function(s) of entry, storage, display, retrieval, transmission, processing, switching, or control, of data.

LISN – Line impedance stabilization network

NCR – No Calibration Required

RF – Radio Frequency

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Testing Facility

Testing for EMC on the EUT was carried out at TUV SUD labs in Montréal, Québec, Canada. The testing lab consists of a 3m semi-anechoic chamber calibrated to be able to allow measurements on an EUT with a maximum width or length of up to 2m and height up to 3m. The chamber is equipped with a turn table that is capable of testing devices up to 3300lb in weight. This facility is capable of testing products that are rated for 120 Vac and 240Vac single phase, or 208 Vac 3 phase input. DC capability is also available. The chamber is equipped with an antenna mast that controls polarization and height from the control room adjoining the shielded chamber. Radiated emissions measurements are performed using a Bilog, and Horn antenna where applicable. Conducted emissions, unless otherwise stated, are performed using a LISN and using the Vertical Ground plane.

Calibrations and Accreditations

The 3m semi-anechoic chamber is registered with Federal Communications Commission (FCC, 382292), and Industry Canada (IC, 6844B-1). This semi-anechoic chamber complies with the requirements of EN55016-2-3:2006, section 7.5 and the site attenuation requirements of EN55016-1-4. This chamber was additionally calibrated for Normalized Site Attenuation (NSA) using test procedures outlined in ANSI C63.4 “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz”. The chamber is lined with ferrite tiles and absorption cones to minimize any undesired reflections. The NSA data is kept on file at TUV SUD. For radiated susceptibility testing, a 16 point field calibration has been performed on the chamber. The field uniformity data is kept on file at TUV SUD. TUV SUD Inc is accredited to ISO/IEC 17025 by A2LA with Testing Certificate #2955.02. The laboratories current scope of accreditation listing can be found as listed on the A2LA website. All measuring equipment is calibrated on an annual or bi-annual basis as listed for each respective test.

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Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Testing Environmental Conditions and Dates

Following were the environmental conditions in the facility during time of testing –

Date	Test	Init.	Temperature (°C)	Humidity (%)	Pressure (kPa)
Apr 20- 29. 2016	Output Power	SD	20-24°C	35 – 41%	96 -102kPa
Apr 20- 29. 2016	Occupied Bandwidth	SD	20-24°C	35 – 41%	96 -102kPa
Apr 20- 29. 2016	Spurious Antenna conducted	SD	20-24°C	35 – 41%	96 -102kPa
Apr 20- 29. 2016	Frequency stability	SD	20-24°C	35 – 41%	96 -102kPa
Apr 20- 29. 2016	Radiated spurious	SD	20-24°C	35 – 41%	96 -102kPa

Client	Senstar Corporation
Product	Flare Transmitter
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10



Detailed Test Results Section

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Output Power

Purpose

The purpose of this test is to ensure that the maximum power conducted to the radiating element does not exceed the limits specified.

Limits

The limits are defined in FCC Part 90.217 (EIRP < 120 mW) and FCC Part 2.1046(c).

Results

The EUT met the requirements. .

Table(s)

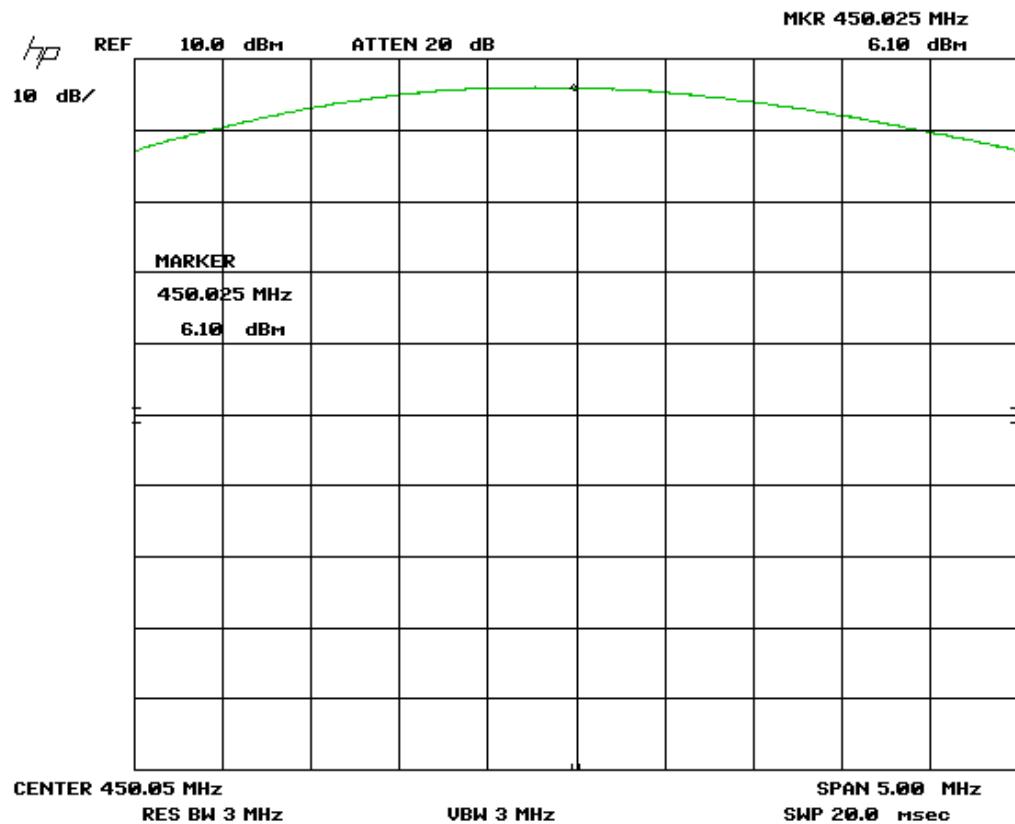
Frequency (MHz)	Conducted Power (dBm)	Field Strength at 3 m (dBuV/m)	EiRP (dBm)	Power milliWatts (worst case)
450	16.1	99.2	4.3	40.7
458.1	16.2	100.4	5.2	41.7
470	16.0	102.3	7.1	40.0

Graph(s)

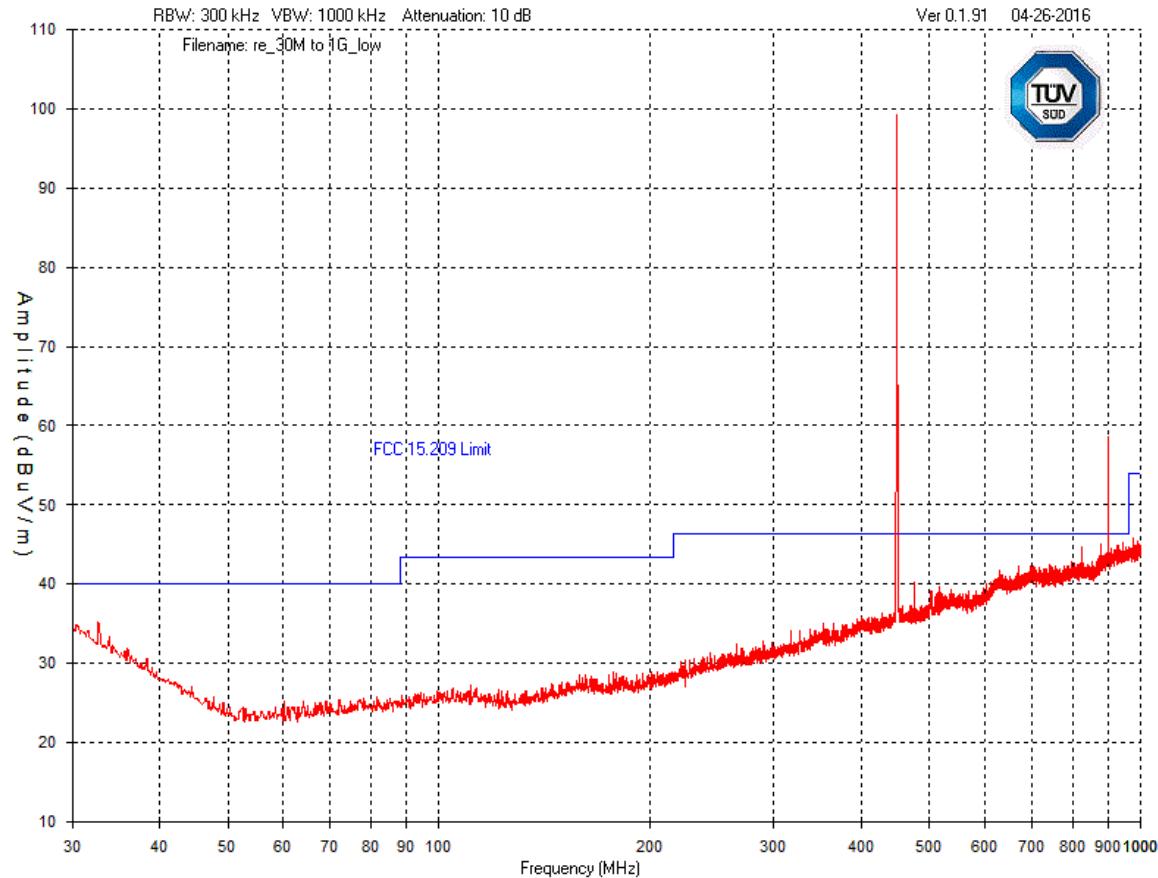
The conducted graphs below show examples of the Peak Power during the operation of the device. Measurements were performed using a spectrum analyzer with a Peak detector of 3 MHz RBW and the VBW at maximum. This measurement is a peak measurement. Max hold is performed for a duration of not less than 1 minute. The radiated graphs are performed using a RBW exceeding the 20 dB bandwidth of the device and a VBW more than 3 times the RBW.

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

450 MHz

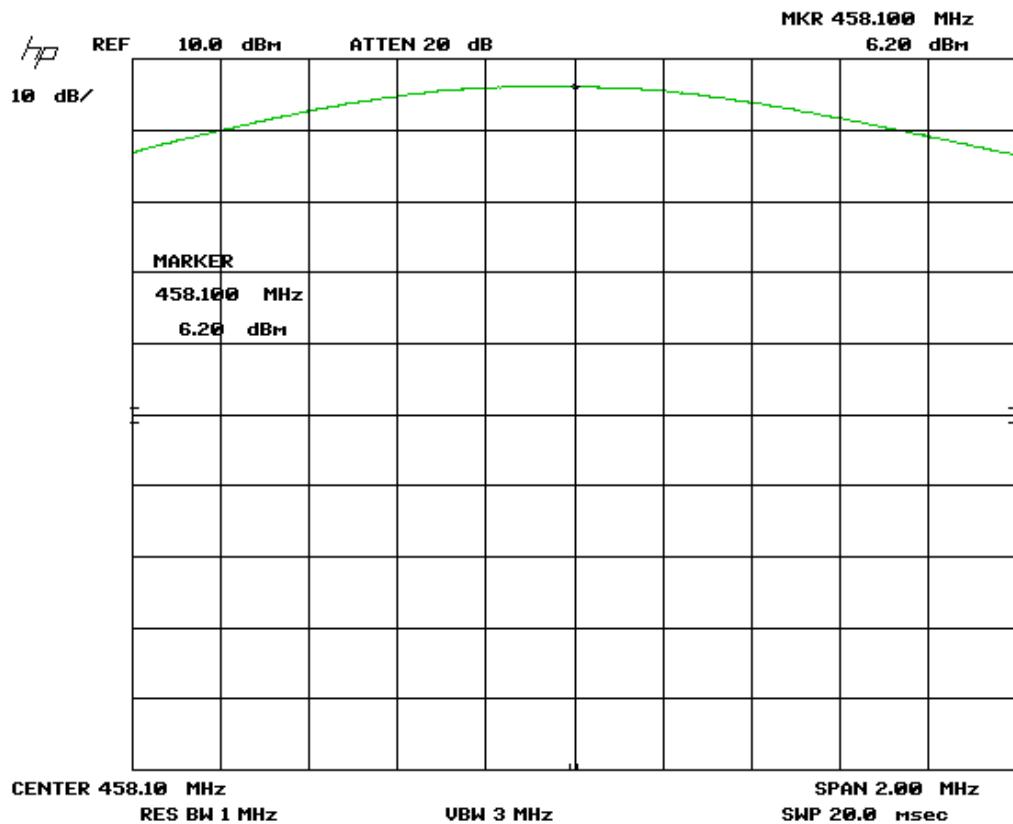


Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

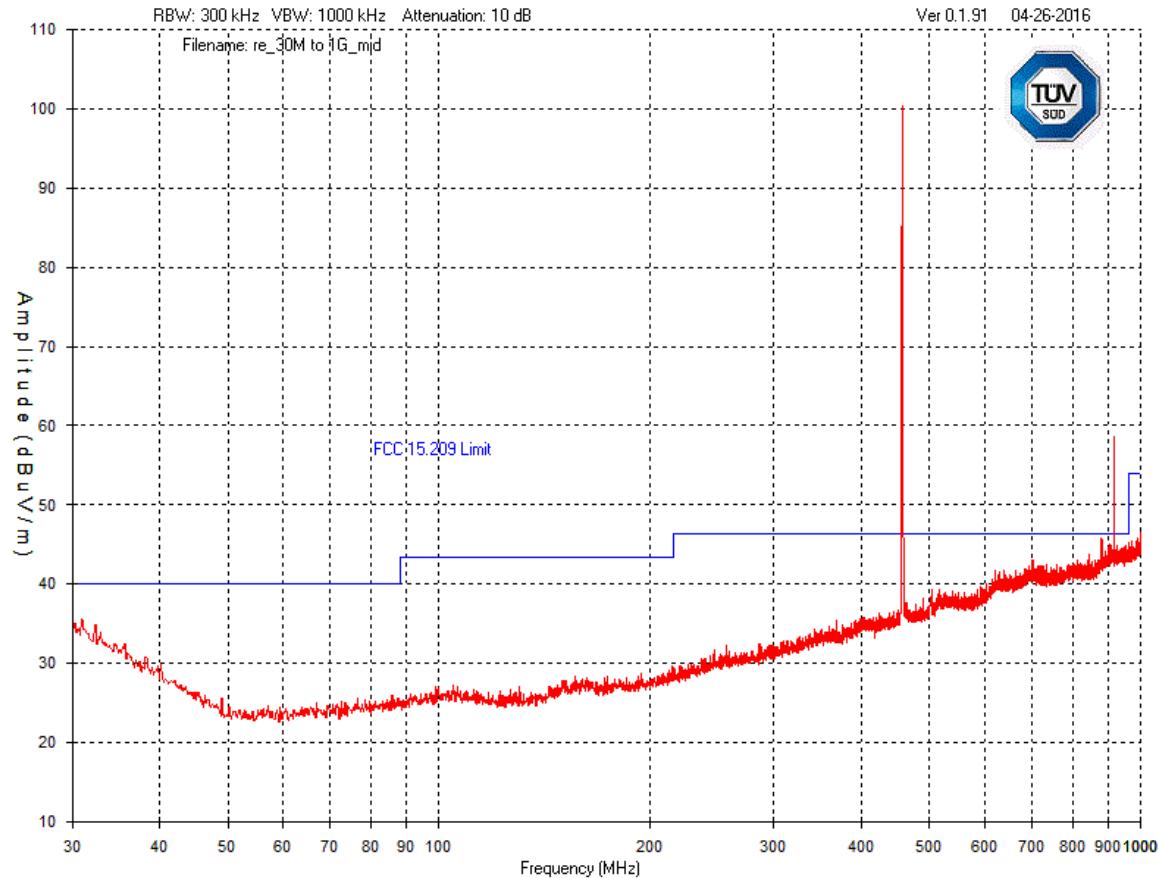


Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

458.1 MHz

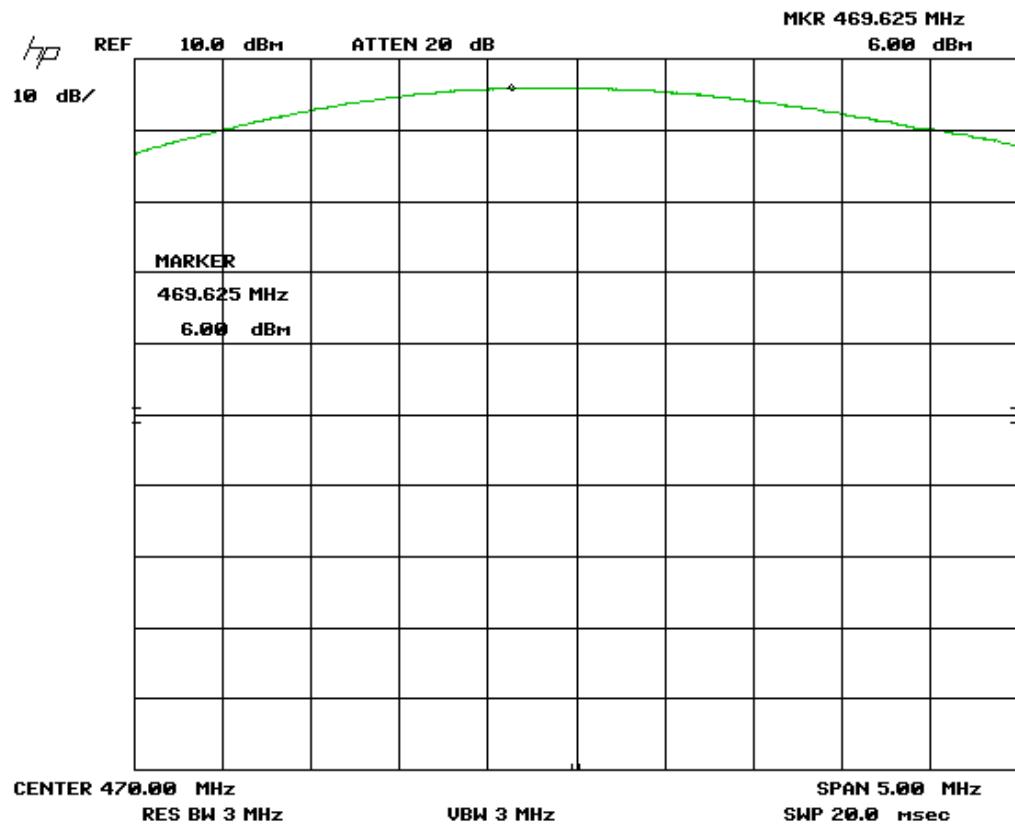


Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

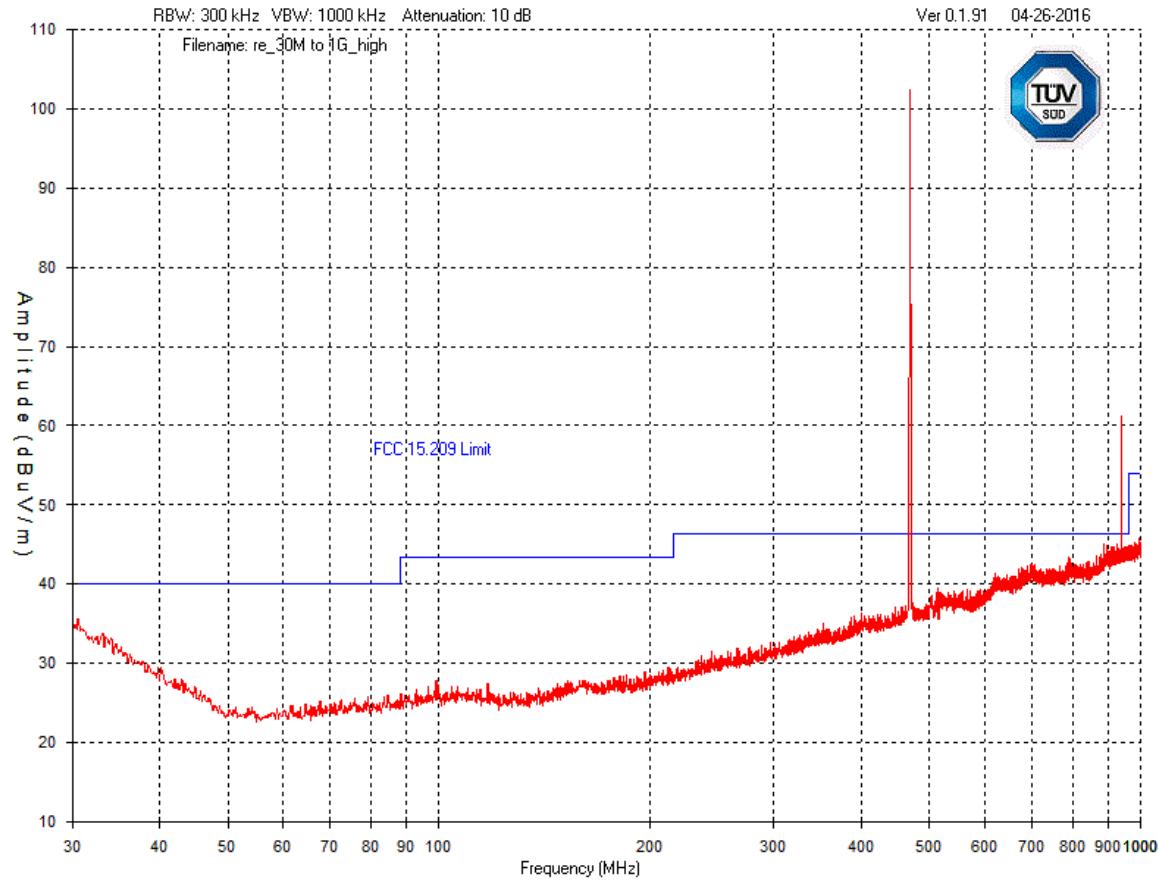


Client	Senstar Corporation	
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Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

470 MHz



Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	 The logo is a blue octagonal seal with a white border. Inside the border, the word "TÜV" is written in a large, bold, black sans-serif font, with a horizontal line separating it from the word "SUD" which is also in a bold, black sans-serif font.



Note: See ‘Appendix B – EUT & Test Setup Photographs’ for photos showing the test set-up.

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Test Equipment List

Equipment	Model No.	Manufacturer	Last Calibration Date ¹	Next Calibration Date ¹	Asset #
Spectrum Analyzer Display	8566B	HP	1-28-15	1-28-17	4168
Spectrum Analyzer	8566B	HP	1-28-15	1-28-17	4169
Power Attenuator 20 dB	25-A-FFN-20	Bird / Hutton	1-28-15	1-28-17	GEMC 49
RF Cable 1m	LMR-400-1M-50OHM-MN-MN	LexTec	1-28-15	1-28-17	GEMC 29

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Occupied Bandwidth

Purpose

The purpose of this test is to ensure that the bandwidth occupied exceeds a stated minimum. This helps ensure the utilization of the frequency allocation is sufficiently wide. This also helps prevent corruption of data by ensuring adequate data separation to distinguish the reception of the intended information.

Limits

As per 90.217 (a) For equipment designed to operate with a 25 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 40 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.

Results

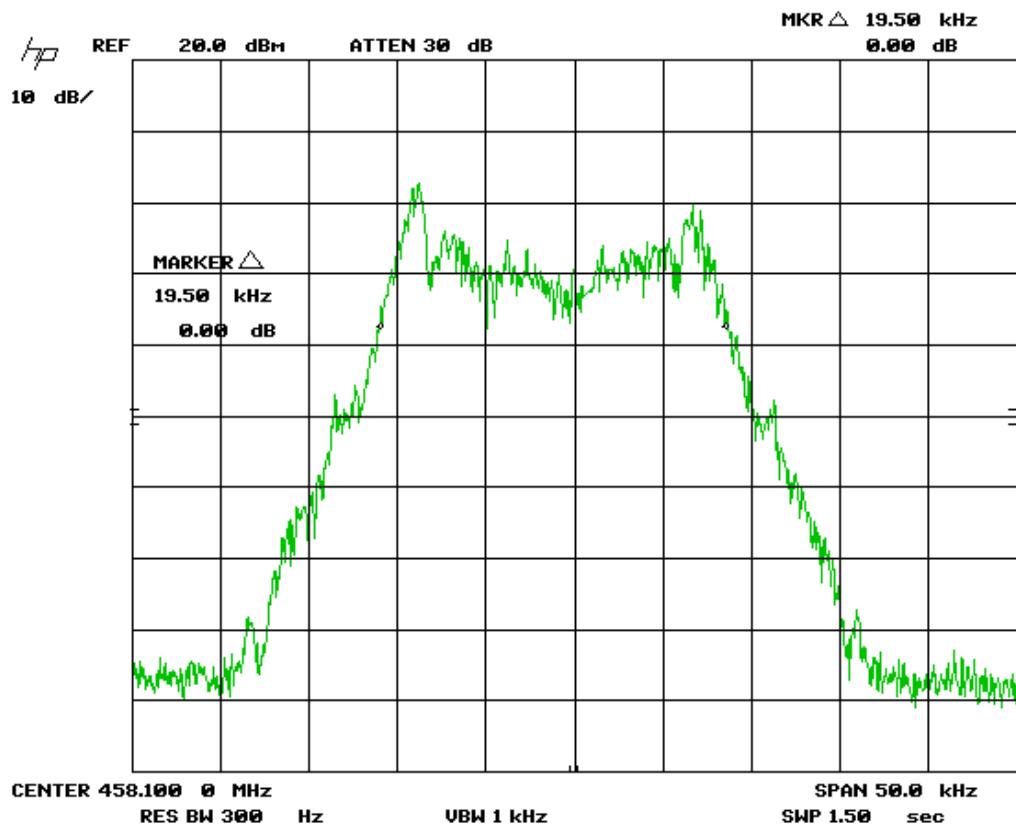
The EUT passed.

Graph(s)

The graphs showed below shows the OBW during the operation of the device. This is measured by a max hold on the spectrum analyzer and the highest resolution bandwidth that is sufficiently low to exhibit the 99% bandwidth of a channel during operation of the EUT, or the lowest available Bandwidth on the spectrum analyzer. This measurement is a peak measurement. Max hold is performed for a duration of not less than 1 minute.

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Mid Channel



Note: The markers on the graph above shows the 20 dB bandwidth. The span is 50 kHz, which represents 5 kHz per division. The device more than meets the 30 dBc requirements at the +/- 15 kHz marks. This allows for 25 kHz of deviation, or less, for frequency stability to ensure that 30 dBc is met at 40 kHz removed from assigned frequency. See frequency stability for details.

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Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Test Equipment List

Equipment	Model No.	Manufacturer	Last Calibration Date ¹	Next Calibration Date ¹	Asset #
Spectrum Analyzer Display	8566B	HP	1-28-15	1-28-17	4168
Spectrum Analyzer	8566B	HP	1-28-15	1-28-17	4169
Power Attenuator 20 dB	25-A-FFN-20	Bird / Hutton	NCR	NCR	GEMC 49
RF Cable 1m	LMR-400-1M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 29
RF Cable 1m	LMR-400-1M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 29

This report module is based on GEMC template "FCC – Power Line Conducted Emissions Class B_Rev1"

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Spurious Conducted Emissions

Purpose

The purpose of this test is to ensure that the maximum power conducted to the radiating element at frequencies outside of the authorized spectrum does not exceed the limits specified. This ensures that the only the intended signal is delivered to the radiating element.

Limits

FCC Part §90.217(a) states: For equipment designed to operate with a 25 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 40 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.

Results

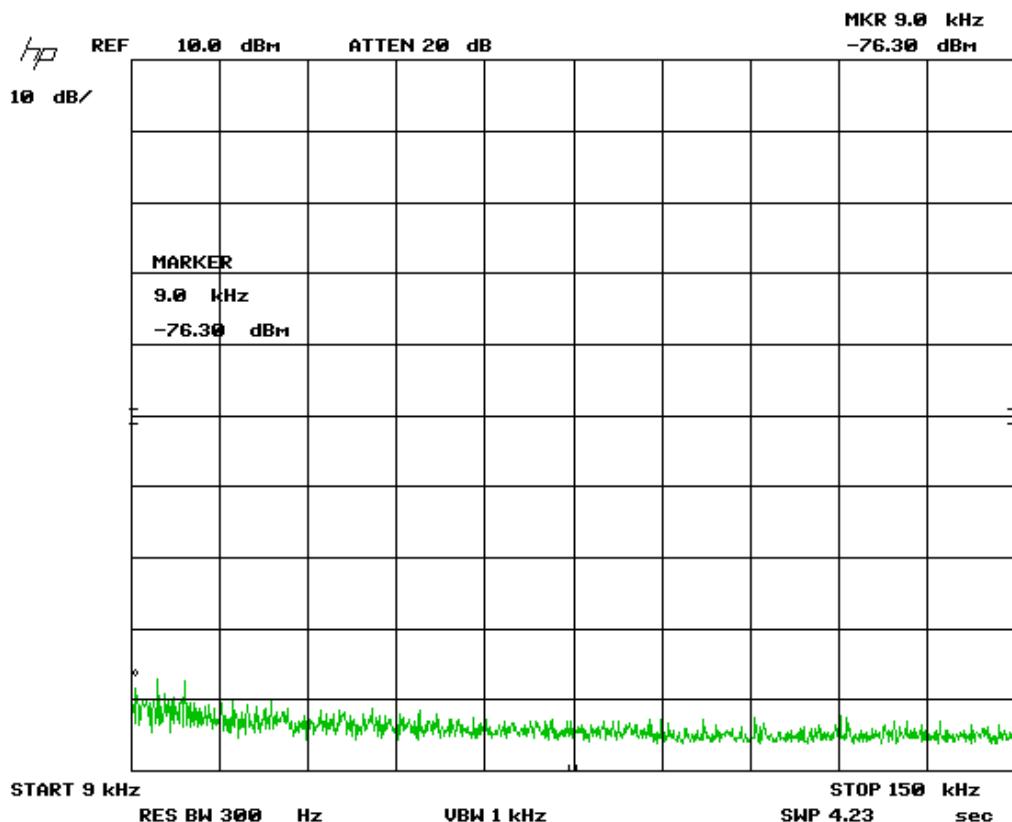
The EUT passed the requirements. Low, middle and high band was measured. The worst case for each band is presented as a graph for the spectrum.

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Graph(s)

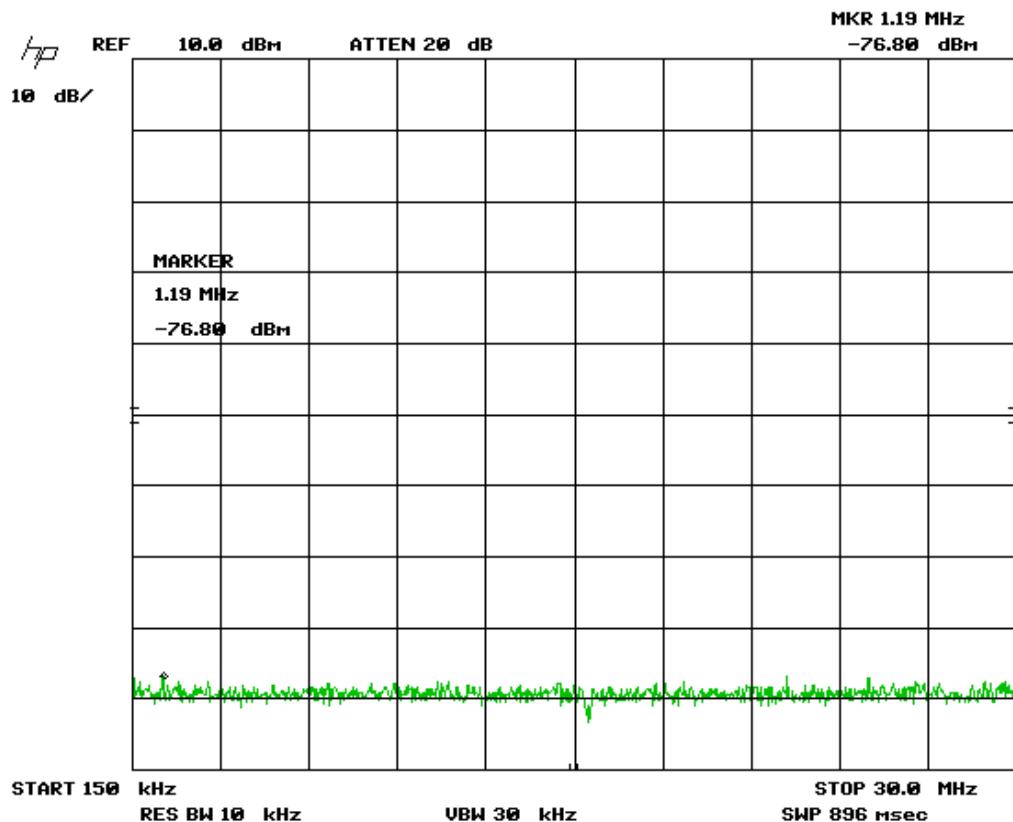
The graphs shown below shows the peak power output of the device during the antenna conducted measurement during transmit operation of the EUT. Note there was 10 dB of external attenuation taken during this measurement.

Frequencies below fundamental



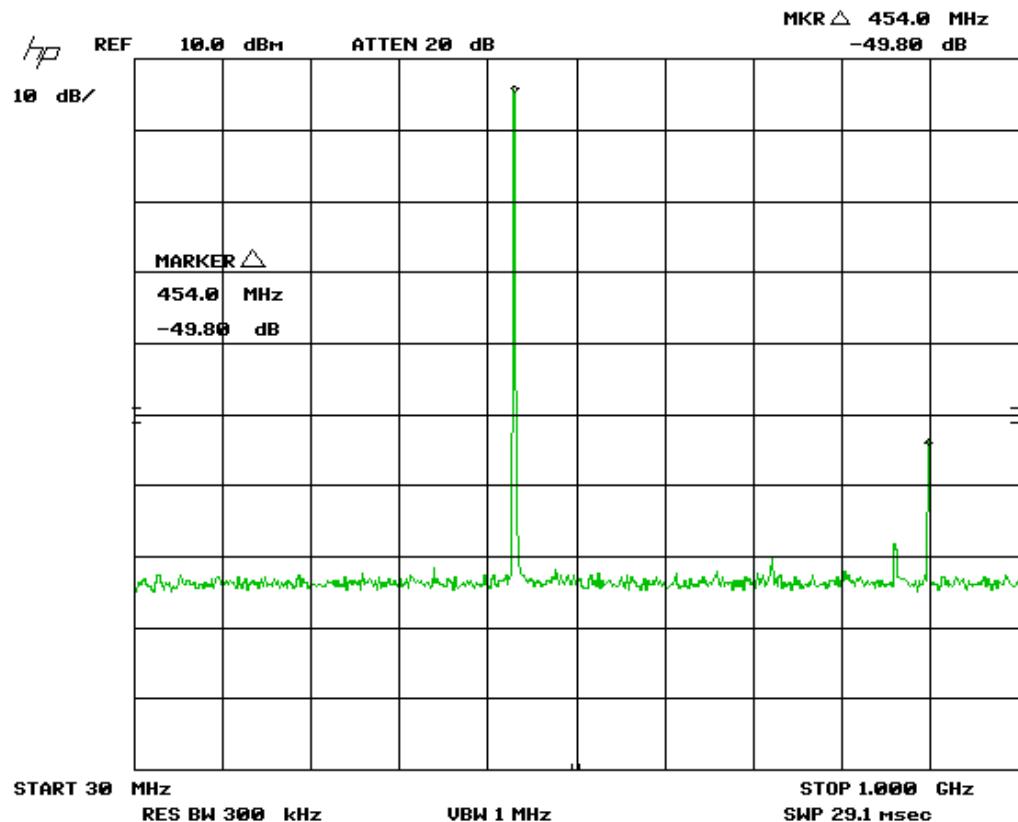
Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Frequencies below fundamental



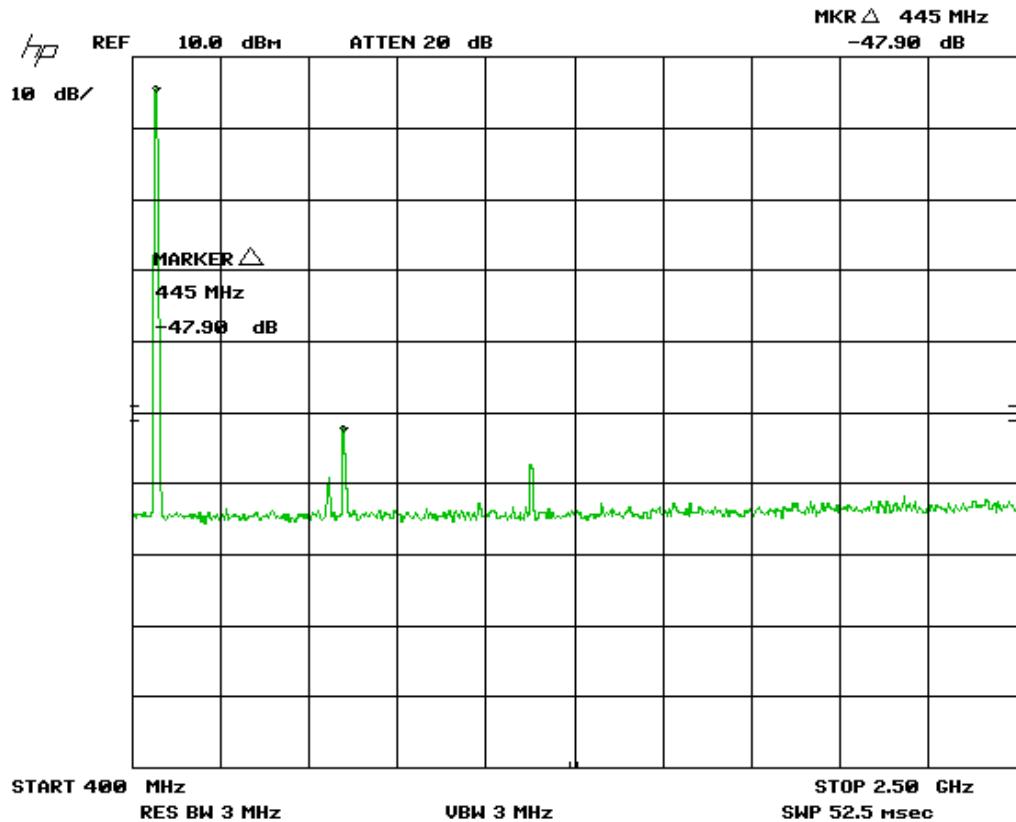
Client	Senstar Corporation	
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Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Span including fundamental and 2nd harmonic



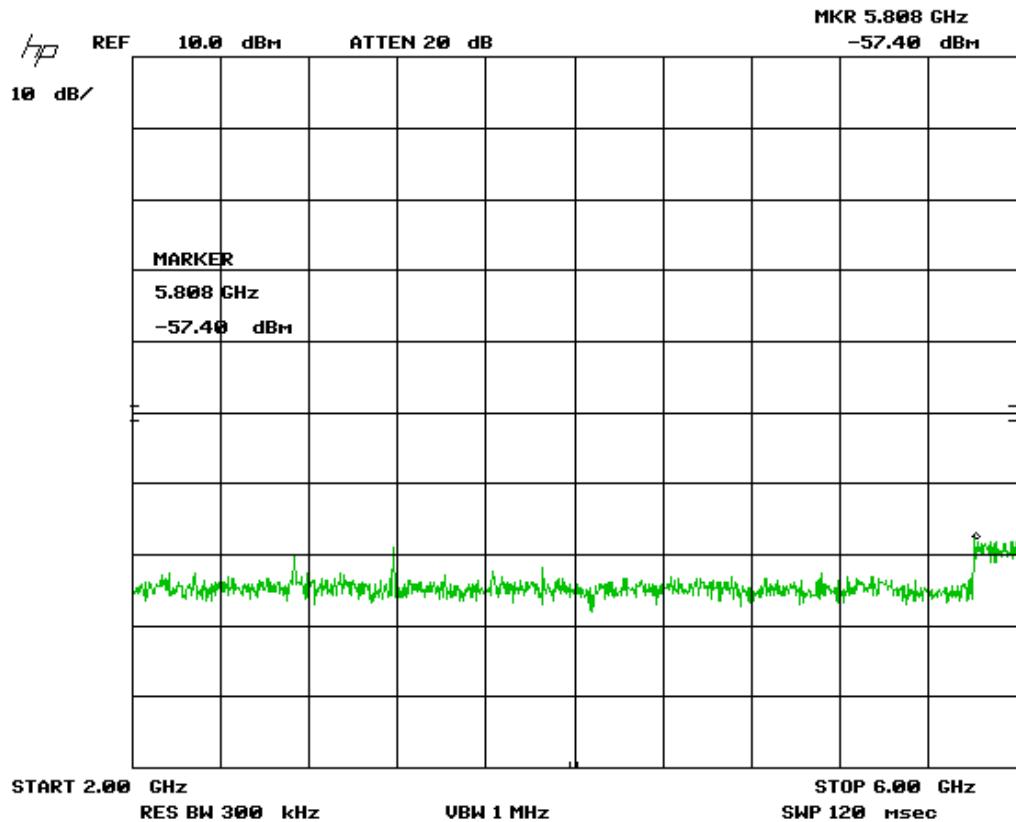
Client	Senstar Corporation	
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Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Span including fundamental, 2nd, 3rd and up to 2.5 GHz.



Client	Senstar Corporation	
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Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Frequencies above 2 GHz



Note: See 'Appendix B – EUT & Test Setup Photographs' for photos showing the test set-up.

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Test Equipment List

Equipment	Model No.	Manufacturer	Last Calibration Date ¹	Next Calibration Date ¹	Asset #
Spectrum Analyzer Display	8566B	HP	1-28-15	1-28-17	4168
Spectrum Analyzer	8566B	HP	1-28-15	1-28-17	4169
Quasi Peak Adapter	85650A	HP	1-28-15	1-28-17	4170
BiLog Antenna	3142-C	ETS	9-8-14	9-8-16	8
Horn Antenna	ATH1G18G	AR	4-23-15	4-23-17	4003
Biconical Antenna	EM-6913	Electro-Metrics	4/28/15	4/28/17	4060
Log Periodic Antenna	LPA-25	Electro-Metrics	4/14/15	4/14/17	4087
Attenuator 3 dB	FP-50-3	Trilithic	1-28-15	1-28-17	4028
LNA pre-amp	LNA-1450	RF Bay Inc.	7-22-15	7-22-16	4089
1-26.5GHz preamp	8449B	Agilent	9-9-14	9-9-16	6351
RF Cable 10m	LMR-400-10M-50OHM-MN-MN	LexTec	1-28-15	1-28-17	4025
RF Cable 7m	LMR-400-7M-50OHM-MN-MN	LexTec	1-28-15	1-28-17	4026
Emission software	0.1.87	TUV SUD	1-28-15	1-28-17	58

This report module is based on GEMC template "FCC – Power Line Conducted Emissions Class B_Rev1"

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Transmitter Spurious Radiated Emissions

Purpose

The purpose of this test is to ensure that the RF energy unintentionally emitted from the EUT does not exceed the limits listed below as defined in the applicable test standard, as measured from a receiving antenna. This helps protect broadcast radio services such as television, FM radio, pagers, cellular telephones, emergency services, and so on, from unwanted interference.

Limit(s) and Method

The EUT must comply with the requirements for radiated spurious emissions. These emissions must meet the limits specified in §90.217 (a) for peak measurements.

Spurious radiated emissions of the EUT was performed at 3 meters. . The approximate field strength limit for the EUT is give in the below:

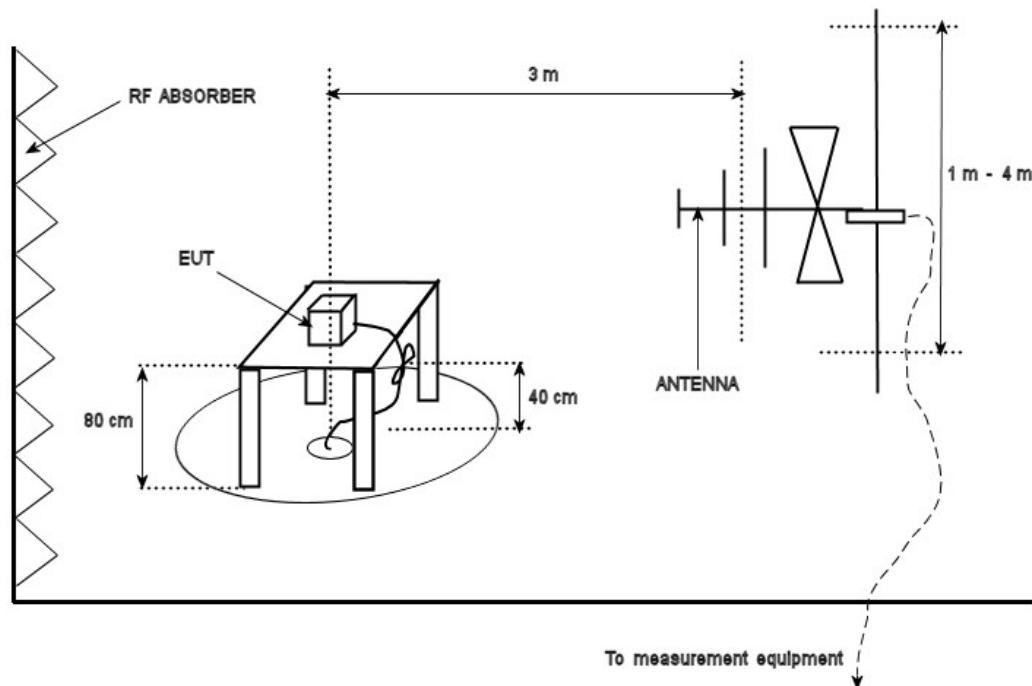
$$E(\text{dB}\mu\text{V/m}) = \text{EIRP}(\text{dBm}) + 95.2$$

This limit is applicable all emission at 3 meter measurement distance.

The measurement is performed with 100 kHz measurement bandwidth and using a Peak detector.

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Typical Radiated Emissions Setup



Measurement Uncertainty

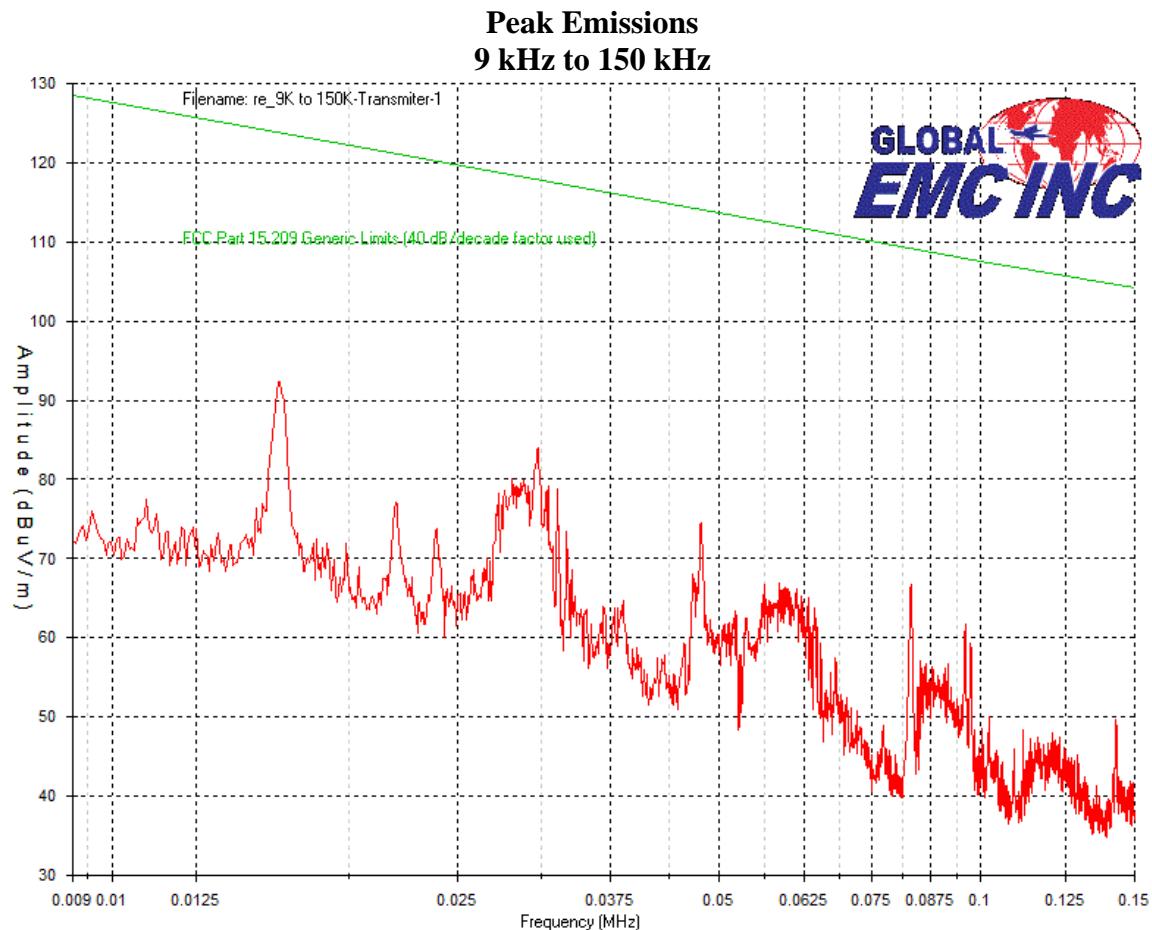
The expanded measurement uncertainty is calculated in accordance with CISPR 16-4-2 and is +/-4.4 dB with a 'k=2' coverage factor and a 95% confidence level.

Preliminary Graphs

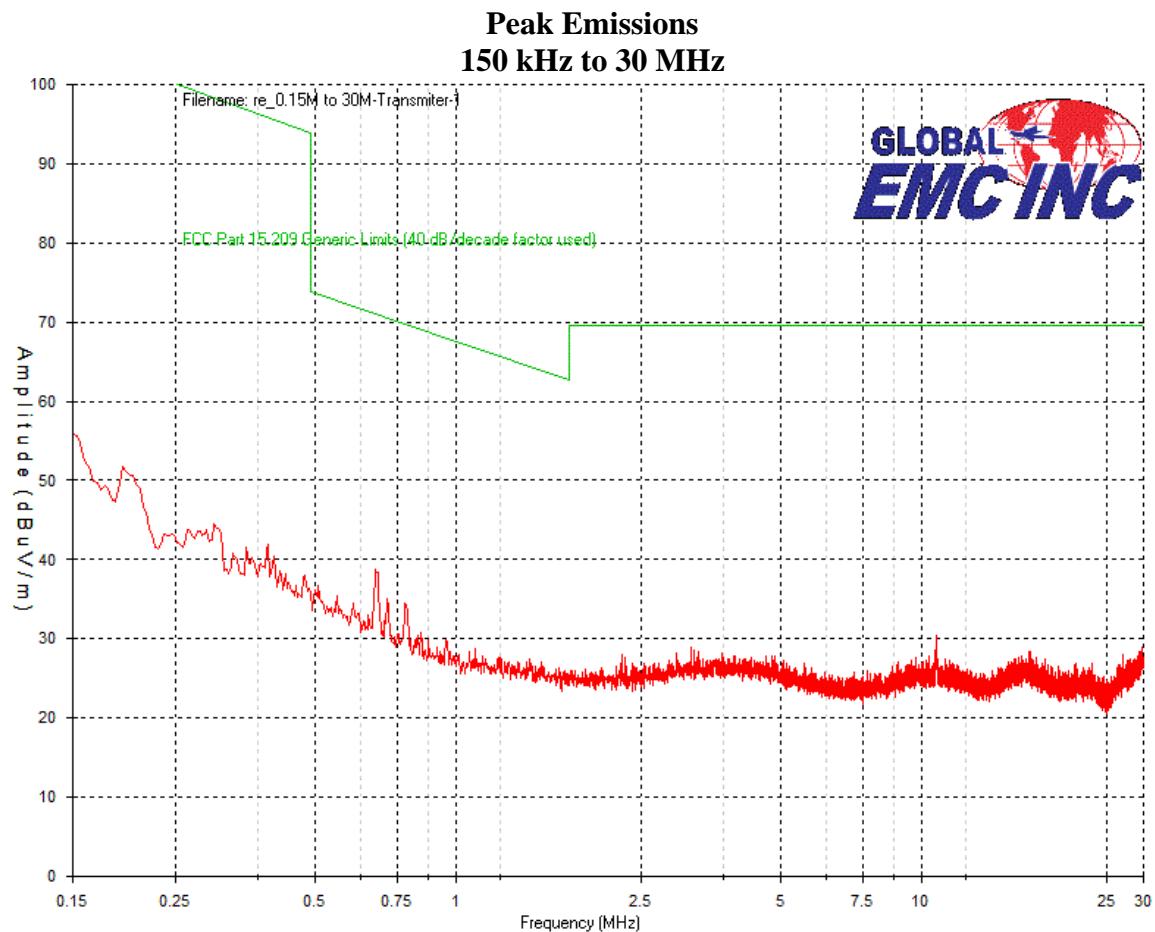
Note the graphs shown below are for graphical illustration only. For reference the 15.209 limits are graphed, but the FCC part 90 limits were applied. Once all emissions were measured, a substitute antenna was used to transmit frequencies and levels that matched the EUT emissions and EIRP was determined. ERP was calculated by subtracting 2.15 from the EIRP results and compared to the limit of -13dBm. Test results are tabulated in the Tables below. For final measurements with the appropriate detector, please refer to the final measurement table where applicable. The graph shown below is a maximized peak measurement graph, measured with a resolution bandwidth greater than the final required detector and over a full 0-360 rotation. This peaking process is done as a worst case measurement. This process enables the detection of frequencies of concern for final measurement, and provides considerable time savings.

The device was scanned to the 10th harmonic or 40 GHz, whichever is lower.

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

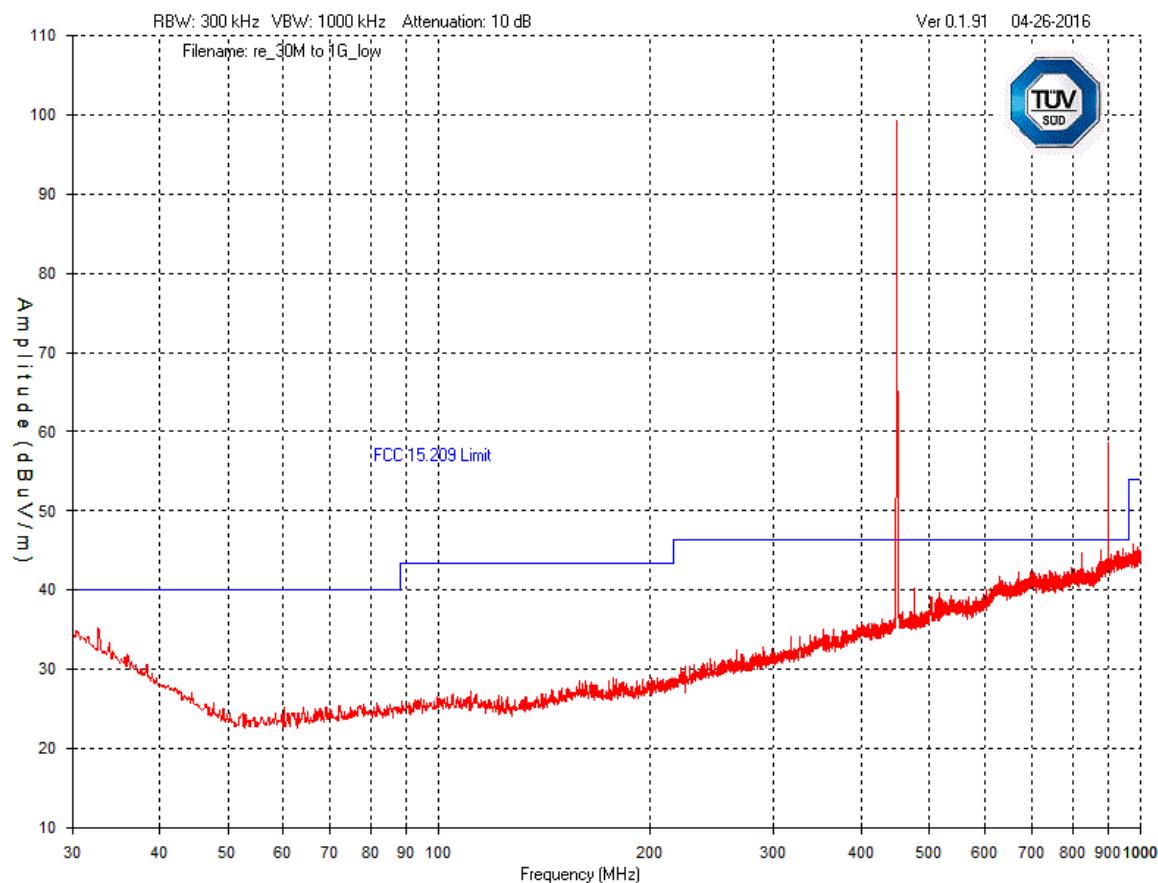


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Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	



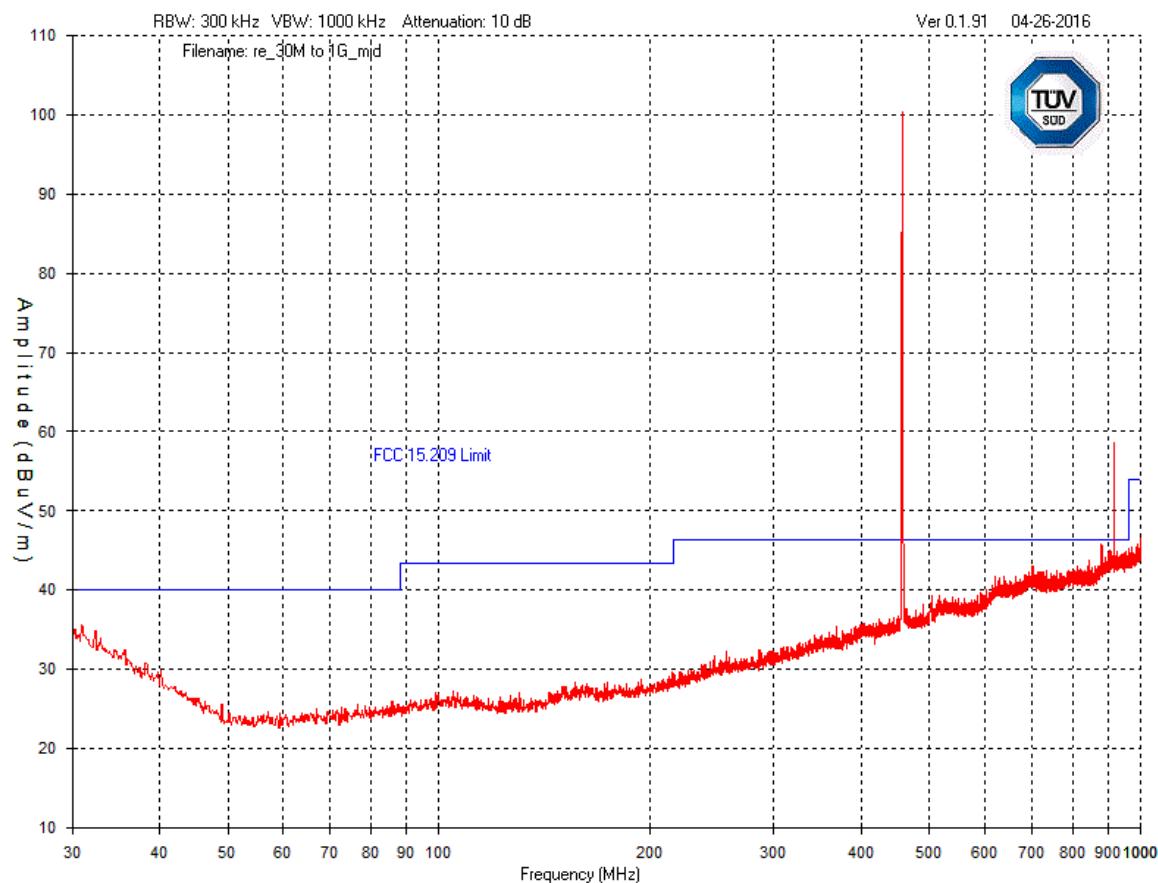
Client	Senstar Corporation	
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Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Peak Emissions – Vertical - 30 MHz to 1GHz – Low



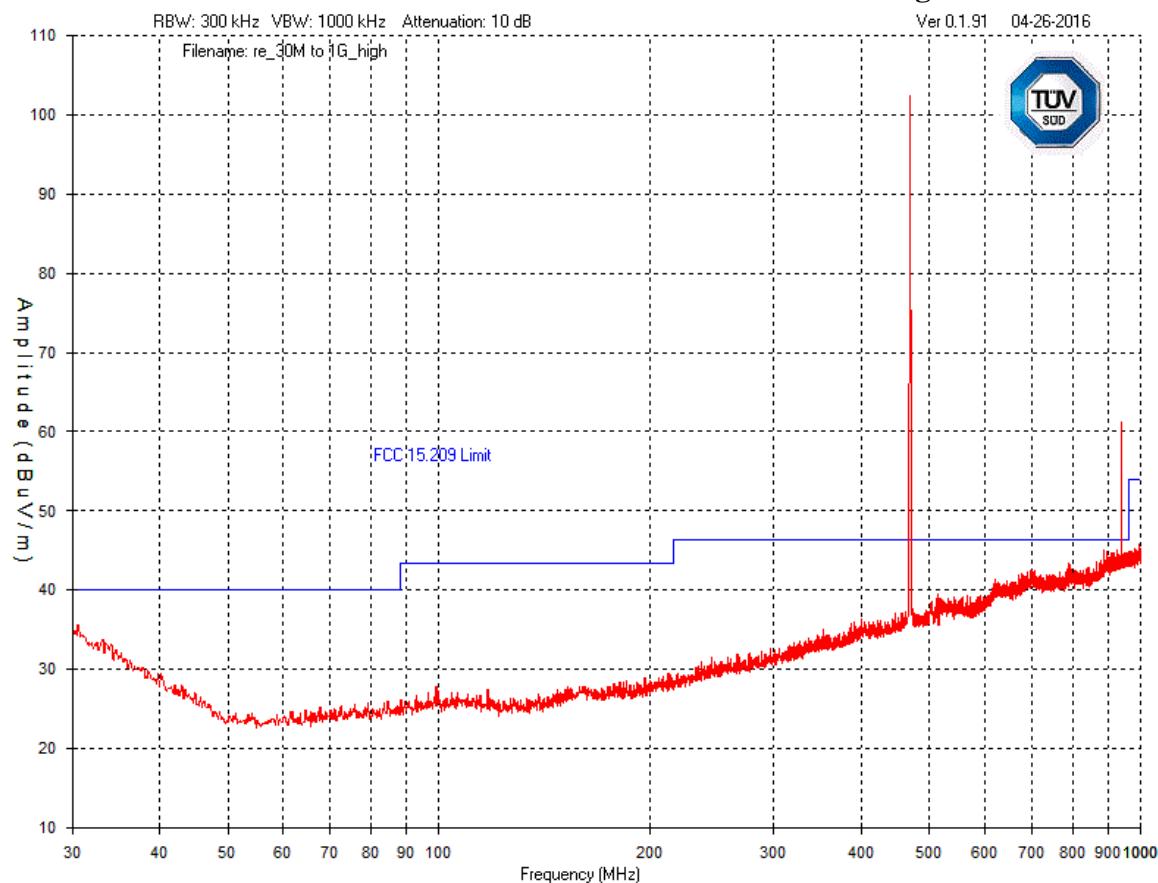
Client	Senstar Corporation	
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Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Peak Emissions – Vertical - 30 MHz to 1GHz – Middle



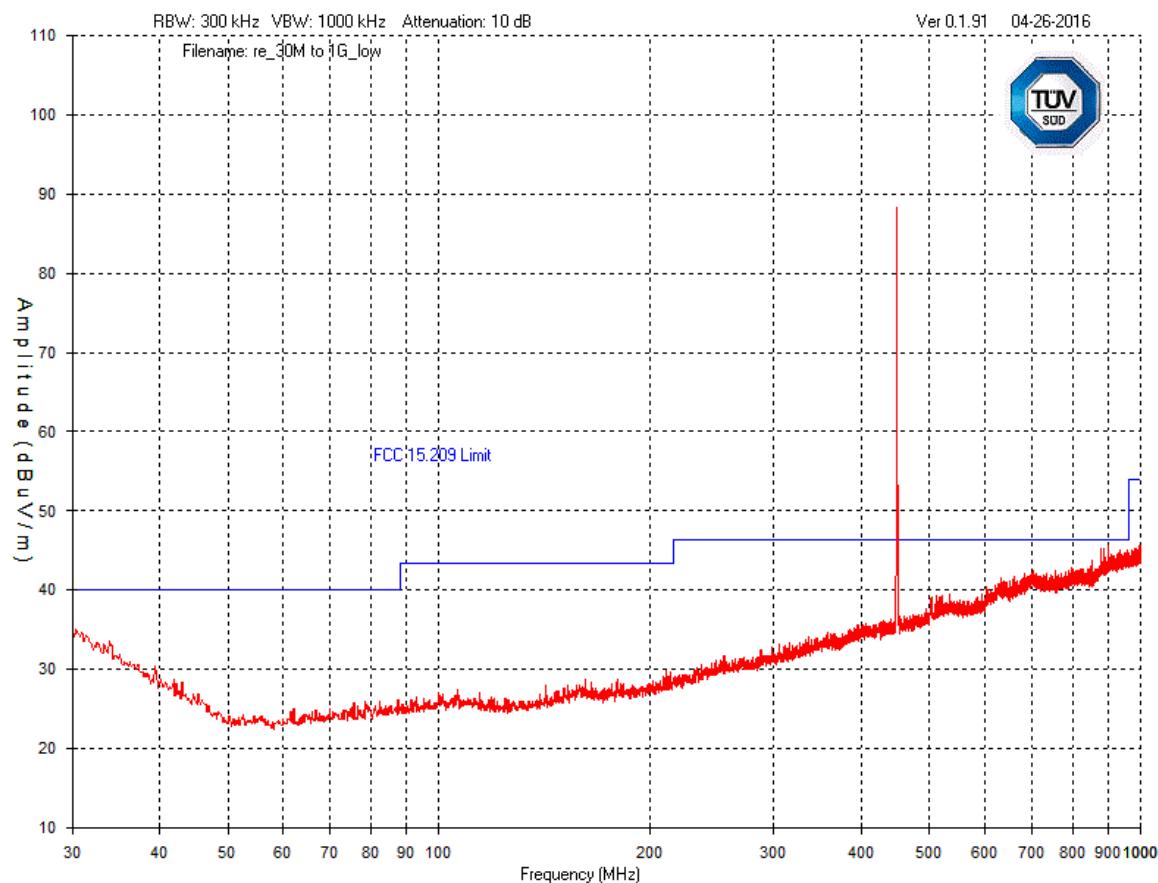
Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Peak Emissions – Vertical - 30 MHz to 1GHz – High



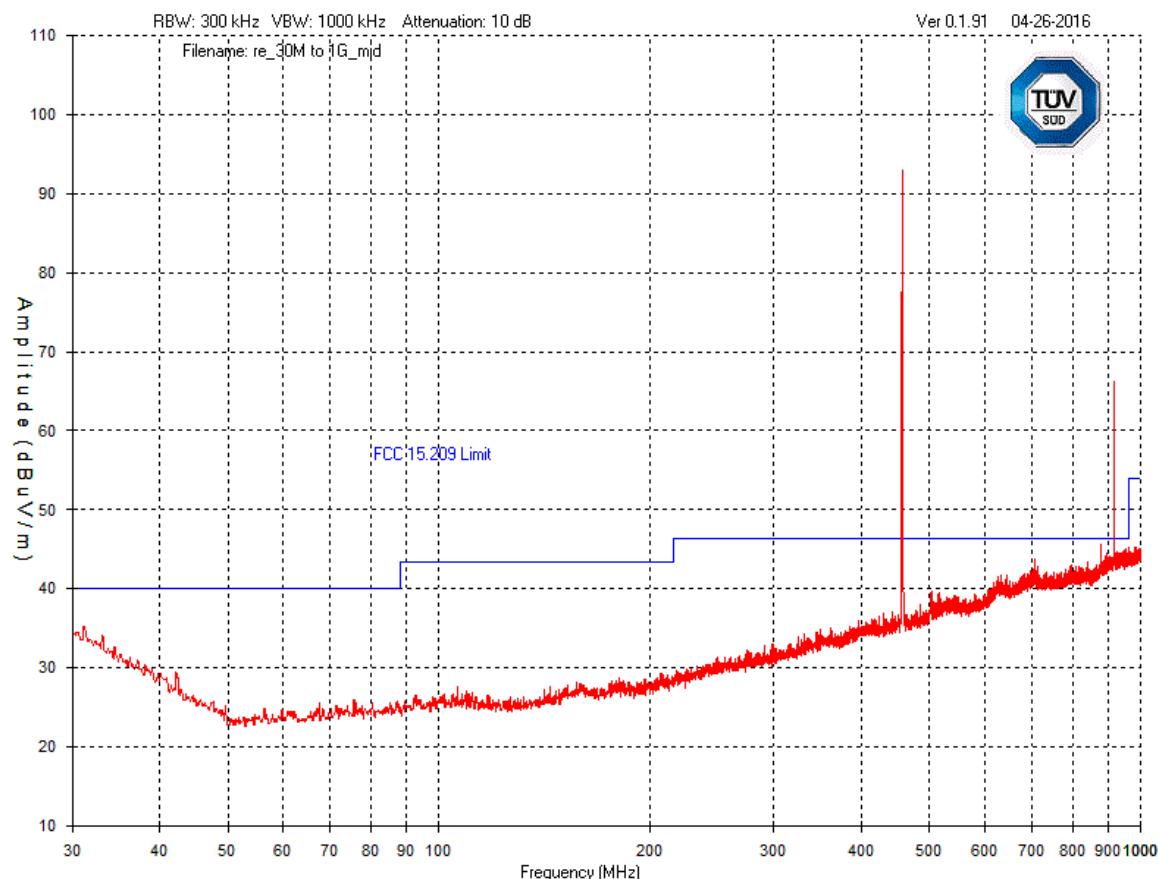
Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Peak Emissions – Horizontal - 30 MHz to 1GHz – Low



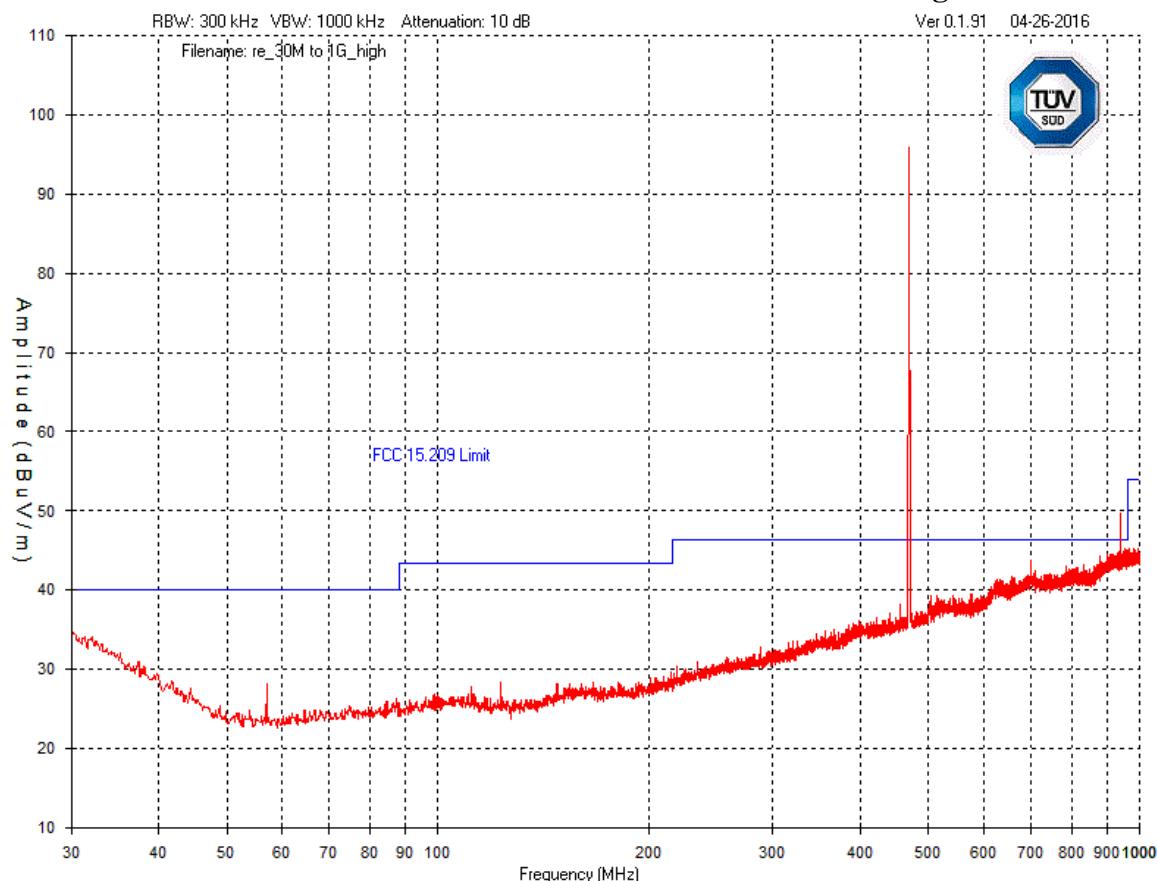
Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Peak Emissions – Horizontal - 30 MHz to 1GHz – Middle



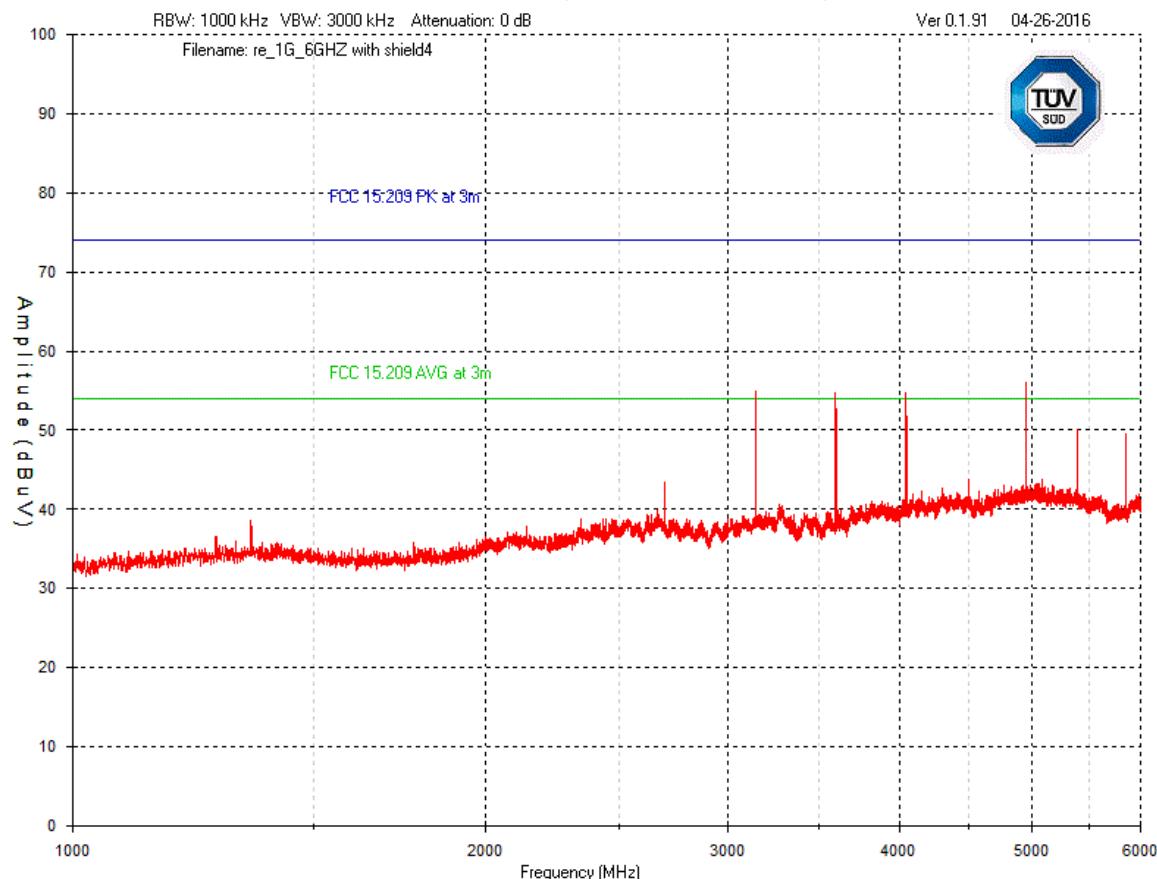
Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Peak Emissions – Horizontal - 30 MHz to 1GHz – High



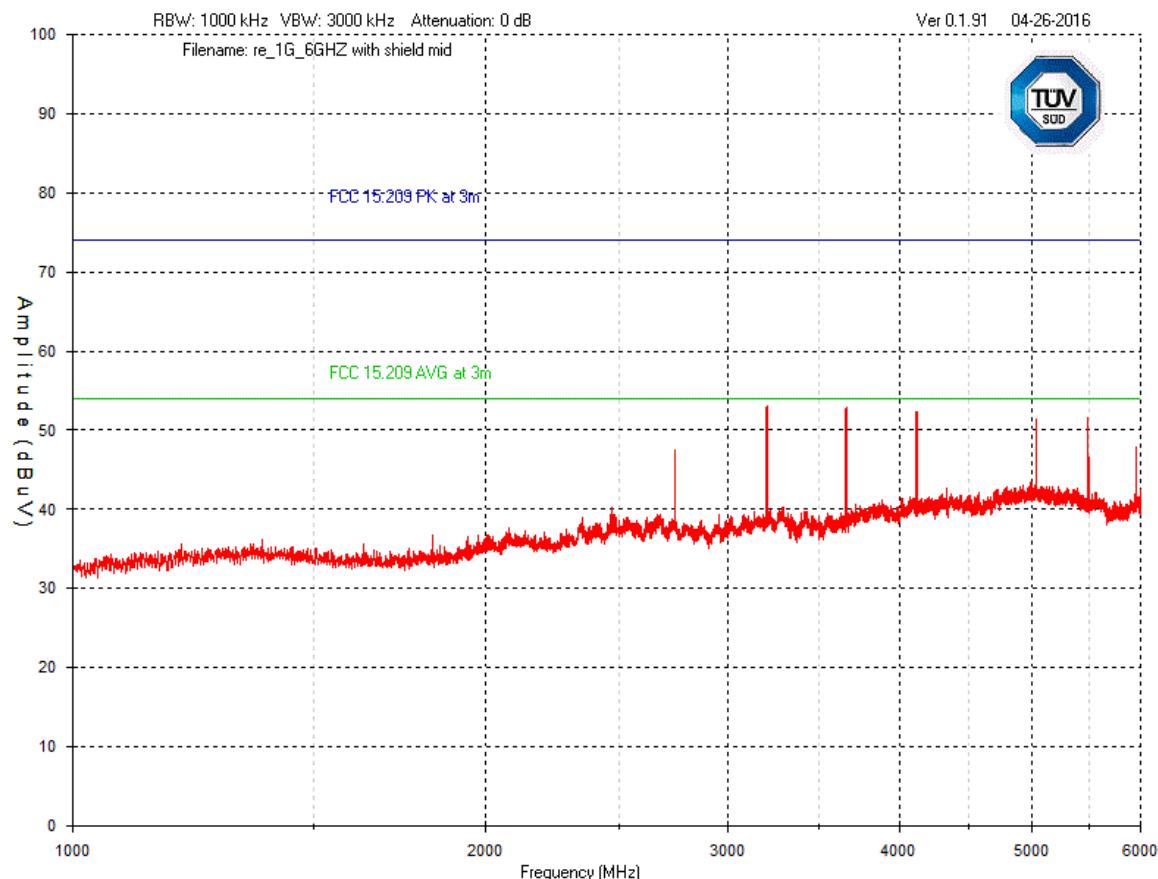
Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Vertical – Peak Emission Graph 1GHz – 6 GHz (worst case channel)



Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Horizontal – Peak Emissisons Graph 1GHz – 6 GHz



Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Results

Pass.

The EUT meets the Transmitter Spurious Radiated Emissions requirements.

All scan were perform with a measurement bandwidth greater than the required bandwidth. No peak emissions were above the limit.

Test Equipment List

Equipment	Model No.	Manufacturer	Last Calibration Date ¹	Next Calibration Date ¹	Asset #
Spectrum Analyzer Display	8566B	HP	1-28-15	1-28-17	4168
Spectrum Analyzer	8566B	HP	1-28-15	1-28-17	4169
Quasi Peak Adapter	85650A	HP	1-28-15	1-28-17	4170
BiLog Antenna	3142-C	ETS	9-8-14	9-8-16	8
Horn Antenna	ATH1G18G	AR	4-23-15	4-23-17	4003
Biconical Antenna	EM-6913	Electro-Metrics	4/28/15	4/28/17	4060
Log Periodic Antenna	LPA-25	Electro-Metrics	4/14/15	4/14/17	4087
Attenuator 3 dB	FP-50-3	Trilithic	1-28-15	1-28-17	4028
LNA pre-amp	LNA-1450	RF Bay Inc.	7-22-15	7-22-16	4089
1-26.5GHz preamp	8449B	Agilent	9-9-14	9-9-16	6351
RF Cable 10m	LMR-400-10M-50OHM-MN-MN	LexTec	1-28-15	1-28-17	4025
RF Cable 7m	LMR-400-7M-50OHM-MN-MN	LexTec	1-28-15	1-28-17	4026
Emission	0.1.87	TUV SUD	1-28-15	1-28-17	58

Client	Senstar Corporation
Product	Flare Transmitter
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10



software						
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Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Temperature Frequency Stability

Purpose

The purpose of this test is to ensure that the RF energy unintentionally emitted from the EUT does not exceed the permitted bandwidth during extreme temperature variations. This helps protect radio broadcasts and receivers with spectrum nearby to the equipment under test from unwanted interference. This also helps ensure proper reception of the intended signal by ensuring the transmit frequency is correct in any temperature.

Limit(s) and Method

The methods are given in FCC Part 2.1055. As per 90.217 (a) For equipment designed to operate with a 25 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 40 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier. Based on the 30 dBc points being less than 15 kHz from center frequency, this allows for up to 25 kHz of deviation.

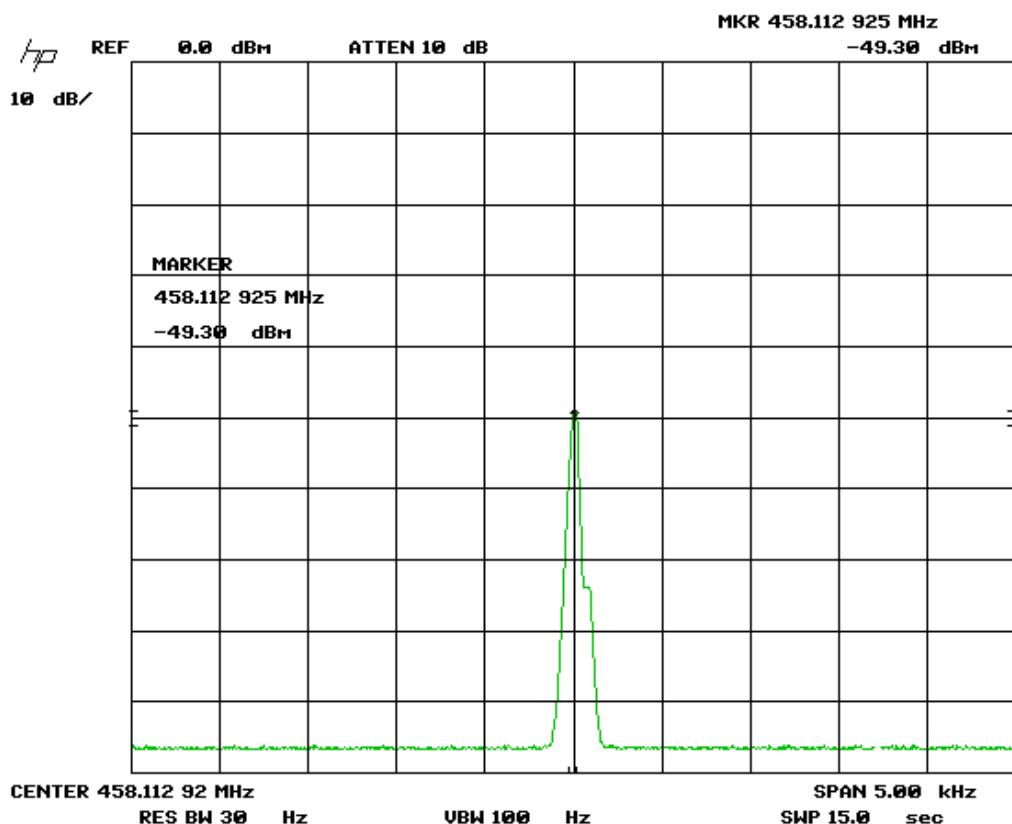
Frequency tolerances measurements are taken for information purpose. Frequency must be maintained from -20 C to +50 C. The EUT is monitored at each 10 degree increment. At each temperature, the device is checked after a stabilization period required for the device to reach the temperature.

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Measurement Graphs

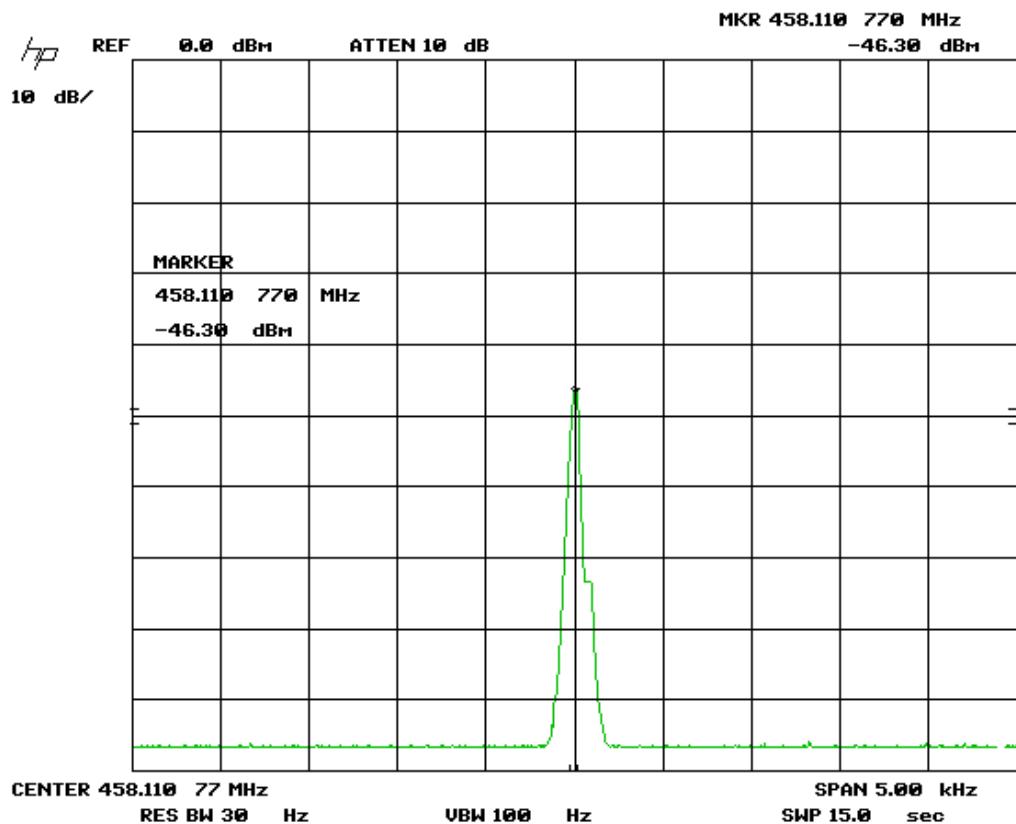
The worst case results are presented, with the frequency shown. The device was checked at each 10 degree increment of temperature

-20 C (max cold)



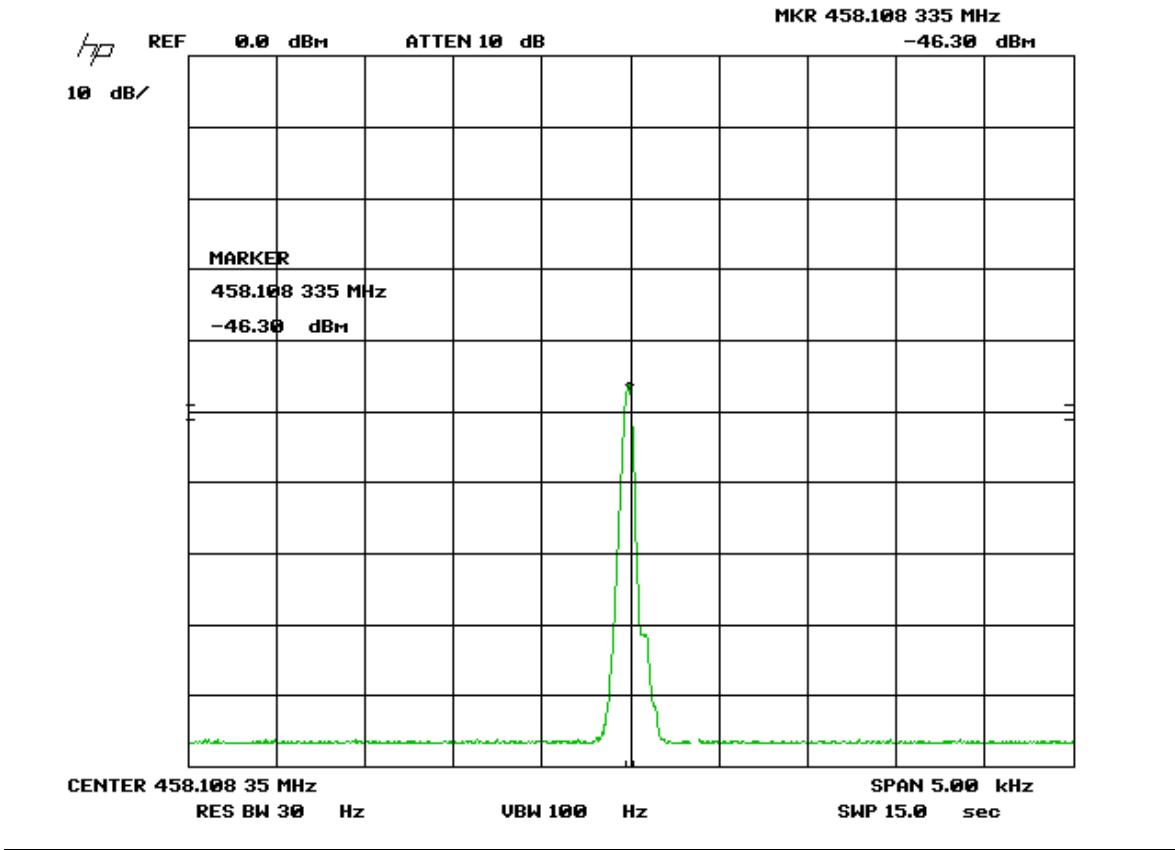
Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

20C Room Temperature



Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

+50C (max temperature)



Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Table

Worst case readings appears at 9350 MHz.

Test Condition	Set Frequency	Measured Frequency (MHz)	Deviation (Hz)	Frequency Drift (ppm)
-20°C	458.1125	458.112925	+425	0.9
20C (room temperature)	458.1125	458.110770	-1230	2.79
+50°C	458.1125	458.108335	-4165	9.09

Note: The frequency of the device was set to 458.1125 MHz which was observed as being equal frequency deviation when the device was set to 450 MHz, 458.1 MHz and 470 MHz. The device was also observed modulated, and no impact on modulation bandwidth was observed.

No frequency deviation was observable when the supplied voltage was varied from +85% to 115% of nominal.

Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Spectrum Analyzer Display	8566B	HP	1-28-15	1-28-17	4168
Power Attenuator 20 dB	25-A-FFN-20	Bird / Hutton	1-28-15	1-28-17	GEMC 49
RF Cable 7m	LMR-400-7M-50OHM-MN-MN	LexTec	1-28-15	1-28-17	GEMC 28
Environmental Chamber	SM-32-7800	Thermotron	1-28-15	1-28-17	GEMC 153

This report module is based on GEMC template "FCC - 15.225 - RFID Freq Stab_Rev1.doc"

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Appendix A – EUT Summary

For further details for filing purposes, refer to filing package.

General EUT Description

Organization / Address	Senstar 119 John Cavanaugh Drive, Carp, Ontario, Canada
Contact	Timothy Snider
Phone	613-839-5572 x4382
Email	tsnider@senstar.com
EUT (Equipment Under Test) Details	
EUT Name (for report title)	Flare Transmitter
EUT Model / SN (if known)	
EUT revision	New product
Software version	1
Equipment category	
EUT is powered using	Battery
Input voltage range(s) (V)	5 – 9VDC
Frequency range(s) (Hz)	450MHz – 470MHz
Rated input current (A)	150mA Max
Nominal power consumption (W)	0.00027
Number of power supplies in EUT	1
Transmits RF energy? (describe)	Yes Transmits when button is activated
Basic EUT functionality description	Battery operated device that transmits a packet when the button is pressed
High level block diagram of EUT (attachment)	No
Modes of operation	Transmit only
Step by step instructions for setup and operation	Push button. Button can be held down for repeat transmissions.
Customer to setup EUT on site?	Yes
EUT response time (ms)	< 1s

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

EUT setup time (min)	1
Frequency of all clocks present in EUT	16MHz
I/O cable description Specify length and type	None
Available connectors on EUT	Barrel connector
Peripherals required to exercise EUT Ex. Signal generator	No
Dimensions of product	L 120 mm W 50 mm H 25 mm
Method of monitoring EUT and description of failure for immunity.	Unit beeps when button is pressed.

Note the EUT is considered to have been received the date of the commencement of the first test, unless otherwise stated. For a close-up picture of the EUT, see 'Appendix B – EUT & Test Setup Photographs'.

EUT Configurations

Please see Appendix B for a picture of the unit running in normal conditions. .

Operational Setup

These devices are required to be attached to the EUT for its normal operation.

- None

Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Appendix B – EUT and Test Setup Photographs

Client	Senstar Corporation
Product	Flare Transmitter
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10



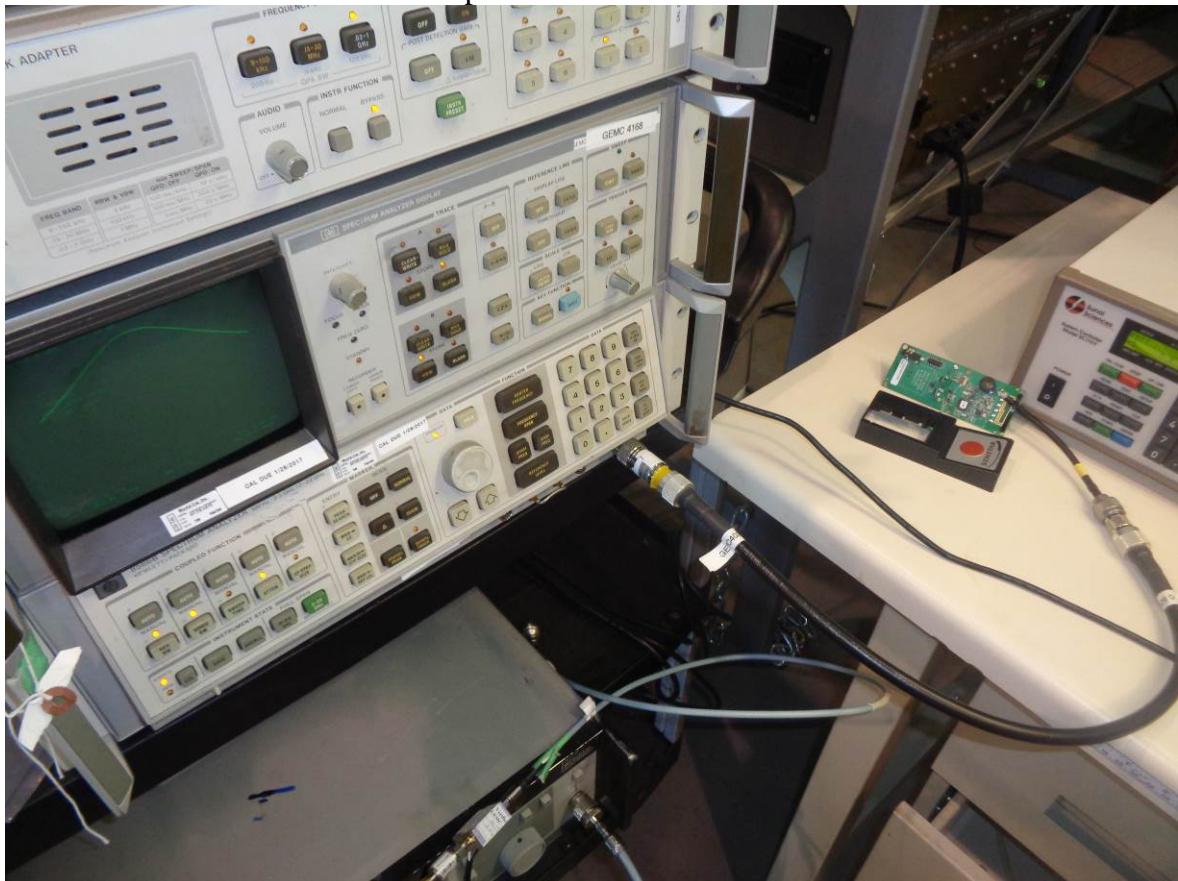
Note: These photos are for information purposes only. Also refer to PDF files that are separate from this test report.

EUT



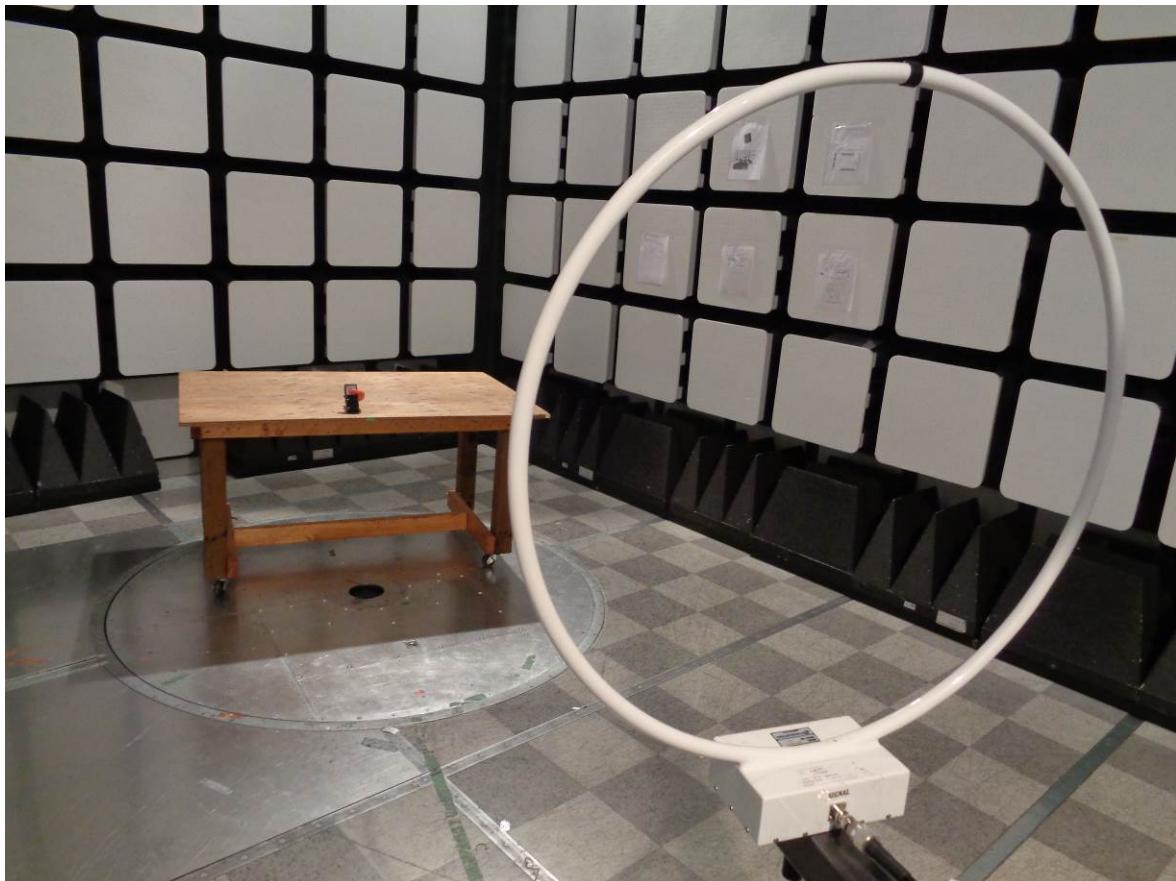
Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Antenna Conducted Emissions Setup Photo



Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Radiated Emissions Photo – 9K to 30 MHz - Scan



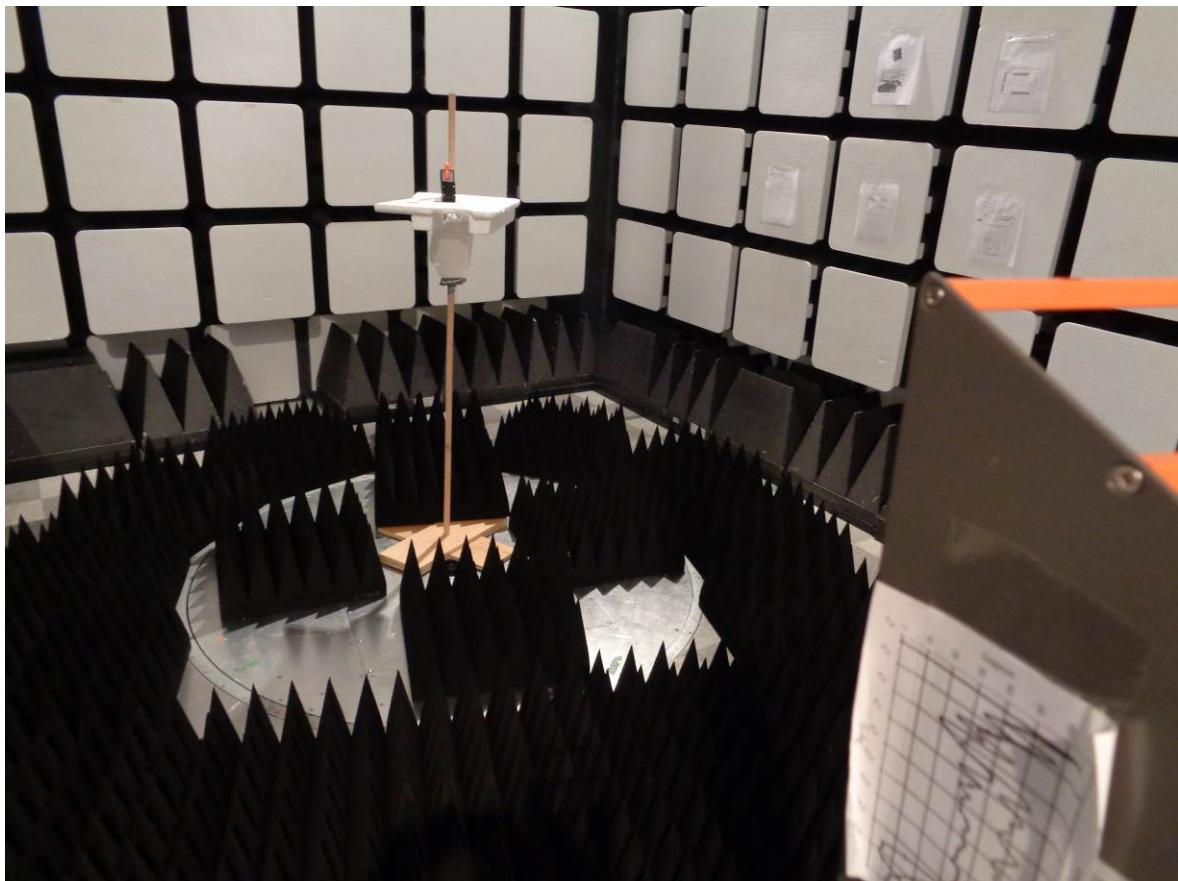
Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Radiated Emissions – 30 MHz to 1 GHz – Scan



Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Radiated Emissions 1 GHz to 6GHz – Scan



Client	Senstar Corporation	
Product	Flare Transmitter	
Standard(s)	FCC Part 90 Subpart I, RSS-119 Section 5.10	

Temperature Frequency stability

