



RF EXPOSURE REPORT

Report Number: 14663671-E3V1

Applicant : SPOTTER RF LLC
709 E. TECHNOLOGY AVE. BLDG E 3100
OREM, UTAH 84097, U.S.A.

Model : C550, AX250-3D, 3D-250, AX350-2D, AX400-2D

Brand : SPOTTER RF LLC

FCC ID : CO6-C550-LIC

EUT Description : COMPACT SURVEILLANCE RADAR

Test Standard(s) : FCC Part 1 Subpart I
FCC Part 2 Subpart J

Date of Issue:
March 20, 2023

Prepared by:
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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2023-3-20	Initial Issue	--

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	4
2. TEST METHODOLOGY	5
3. REFERENCES	5
4. FACILITIES AND ACCREDITATION	5
5. DECISION RULES AND MEASUREMENT UNCERTAINTY	6
5.1. <i>METROLOGICAL TRACEABILITY</i>	<i>6</i>
5.2. <i>DECISION RULES.....</i>	<i>6</i>
6. MAXIMUM PERMISSIBLE EXPOSURE (LIMITS AND EQUATIONS)	7
6.1. <i>FCC RULES</i>	<i>7</i>
6.2. <i>EQUATIONS.....</i>	<i>8</i>
7. RF EXPOSURE RESULTS.....	10

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SPOTTERRF LLC
709 E. TECHNOLOGY AVE. BLDG E 3100
OREM, UTAH 84097, U.S.A.

EUT DESCRIPTION: COMPACT SURVEILLANCE RADAR

MODEL: C550, AX250-3D, 3D-250, AX350-2D, AX400-2D

SERIAL NUMBER: SP45345

SAMPLE RECEIPT DATE: 2023-2-3

DATE TESTED: 2022-2-7 to 2022-2-15


APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 1 SUBPART I & PART 2 SUBPART J	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document.

Approved & Released For
UL Verification Services Inc. By:



Francisco de Anda
Staff Engineer
UL Verification Services Inc.

Prepared By:



Henry Lau
Senior Project Engineer
UL Verification Services Inc.

2. TEST METHODOLOGY

All calculations were made in accordance with FCC Parts 1.1310, 2.1091, 2.1093, KDB 447498 D01 v06, KDB 447498 D03 V01, IEEE Std C95.1-2005, IEEE Std C95.3-2002,.

3. REFERENCES

All measurements were made as documented in test report UL Verification Services Inc. Document 14663671-E1 for operation in the 10 GHz band.

Output power and Antenna gain data is excerpted from the above test report.

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, Certificate Number 0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
<input type="checkbox"/>	Building 1: 47173 Benicia Street Fremont, California 94538, U.S.A.	US0104	2324A	550739
<input type="checkbox"/>	Building 2: 47266 Benicia Street Fremont, California 94538, U.S.A.	US0104	22541	550739
<input type="checkbox"/>	Building 4: 47658 Kato Rd Fremont, California 94538, U.S.A.	US0104	2324B	550739

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

5.2. DECISION RULES

For all tests where the applicable $U_{LAB} \leq U_{MAX}$ the Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.2, where $U_{MAX} = 30\%$ (0.3) for RF Exposure evaluations. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

For all tests where the applicable $U_{LAB} > U_{MAX}$ the Decision Rule is based on Guarded Acceptance in accordance with ISO Guide 98-4: 2012 Clause 8.3.2, with a guard band equal to $(U_{LAB} - U_{MAX})$, where $U_{MAX} = 30\%$ (0.3) for RF Exposure evaluations. (Test results are adjusted by the value of the guard band to determine conformity with a specified requirement.)

6. MAXIMUM PERMISSIBLE EXPOSURE (LIMITS AND EQUATIONS)

6.1. FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	≤6
3.0-30	1842/f	4.89/f	*900/f ²	≤6
30-300	61.4	0.163	1.0	≤6
300-1,500			f/300	≤6
1,500-100,000			5	≤6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	≤30
1.34-30	824/f	2.19/f	*180/f ²	≤30
30-300	27.5	0.073	0.2	≤30
300-1,500			f/1500	≤30
1,500-100,000			1.0	≤30

f = frequency in MHz

* = Plane-wave equivalent power density

Notes:

- (1) Occupational/controlled exposure limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when a person is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
- (2) General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure

6.2. EQUATIONS

POWER DENSITY

Power density is given by:

$$S = \text{EIRP} / (4 * \text{Pi} * \text{D}^2)$$

Where

S = Power density in mW/cm²

EIRP = Equivalent Isotropic Radiated Power in mW

D = Separation distance in cm

Power density in units of mW/cm² is converted to units of W/m² by multiplying by 10.

DISTANCE

Distance is given by:

$$D = \text{SQRT} (\text{EIRP} / (4 * \text{Pi} * S))$$

Where

D = Separation distance in cm

EIRP = Equivalent Isotropic Radiated Power in mW

S = Power density in mW/cm²

SOURCE-BASED DUTY CYCLE

Where applicable (for example, multi-slot cell phone applications) a duty cycle factor may be applied.

$$\text{Source-based time-averaged EIRP} = (\text{DC} / 100) * \text{EIRP}$$

Where

DC = Duty Cycle in %, as applicable

EIRP = Equivalent Isotropic Radiated Power in mW

MIMO AND COLOCATED TRANSMITTERS (IDENTICAL LIMIT FOR ALL TRANSMITTERS)

For multiple chain devices, and colocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the EIRP (in linear units) of each transmitter.

$$\text{Total EIRP} = (\text{EIRP1}) + (\text{EIRP2}) + \dots + (\text{EIRPn})$$

where

EIRPx = Source-based time-averaged EIRP of chain x or transmitter x

The total EIRP is then used to calculate the Power Density or the Distance as applicable.

MIMO AND COLOCATED TRANSMITTERS (NON-IDENTICAL LIMIT FOR ALL TRANSMITTERS)

For multiple colocated transmitters operating simultaneously in frequency bands where different limits apply:

The Power Density at the specified separation distance is calculated for each transmitter chain or transmitter.

The fraction of the exposure limit is calculated for each chain or transmitter as (Power Density of chain or transmitter) / (Limit applicable to that chain or transmitter).

The fractions are summed.

Compliance is established if the sum of the fractions is less than or equal to one.

7. RF EXPOSURE RESULTS

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc is only responsible for the validity of results after the integration of the data provided by the customer.

Below is a list of the data provided by the customer:

1. Antenna gain and type (Patch antenna with a maximum gain of 14 dBi)
2. Cable loss (1 dB)

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

Single Chain and non-colocated transmitters - Power Density								
Band	Mode	Separ. Distance (cm)	Output AVG Power (dBm)	Ant. Gain (dBi)	Duty Cycle (%)	EIRP (mW)	FCC PD (mW/cm ²)	FCC PD Limit (mW/cm ²)
10445 MHz	Transmit	20	20.98	14.00	100.0	3147.75	0.63	1.00

Single Chain and non-colocated transmitters - Minimum Separation Distance								
Band	Mode	FCC Limit (mW/cm ²)	Output AVG Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Duty Cycle (%)	EIRP (mW)	Separ. Distance FCC (cm)
10445 MHz	Transmit	1.00	20.98	14.00	34.98	100.0	3147.75	15.83

Notes:

- 1) The manufacturer configures output power so that the maximum power, after accounting for manufacturing tolerances, will never exceed the maximum power level measured.
- 2) The output power in the tables above is the maximum power per chain among various channels and various modes within the specific band.
- 3) The antenna gain in the tables above is the maximum antenna gain among various channels within the specified band.

END OF TEST REPORT