





# **Peak Output Power**

E.U.T Description Radar-Based, Outdoor

Perimeter Security Sensor

Type SR150F

Serial Number: Not designated

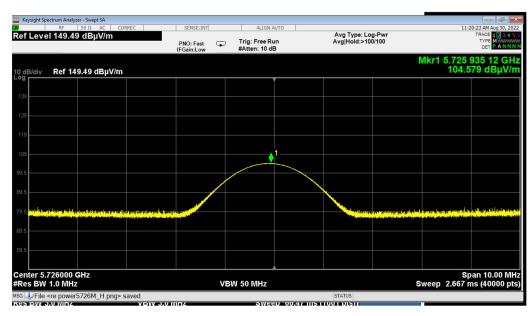


Figure 29 Low, Vertical

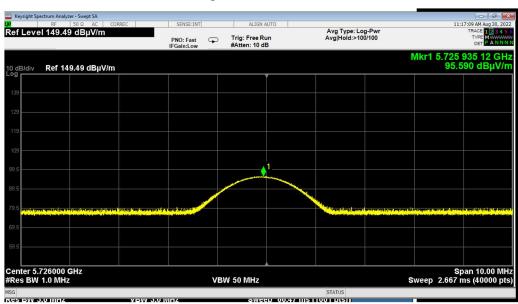


Figure 30 Low, Horizontal







# **Peak Output Power**

E.U.T Description Radar-Based, Outdoor

Perimeter Security Sensor

Type SR150F

Serial Number: Not designated

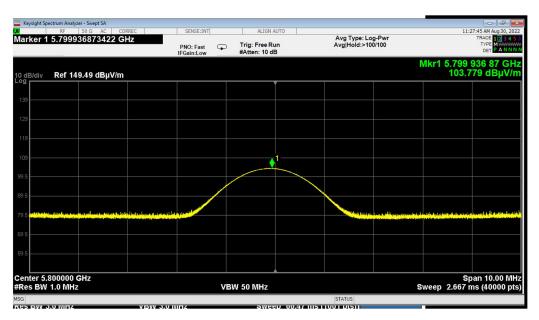


Figure 31 Mid, Vertical

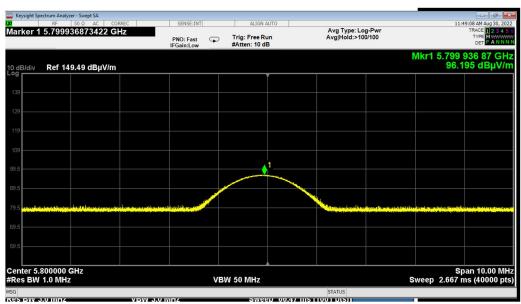


Figure 32 Mid, Horizontal







# **Peak Output Power**

E.U.T Description Radar-Based, Outdoor

Perimeter Security Sensor

Type SR150F

Serial Number: Not designated

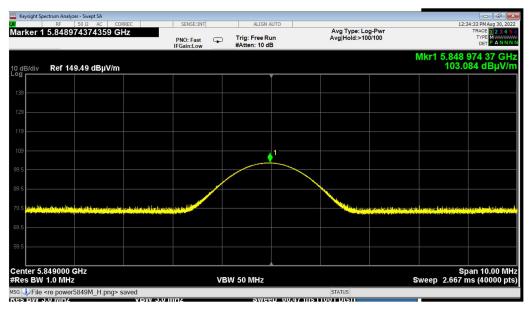


Figure 33 High, Vertical

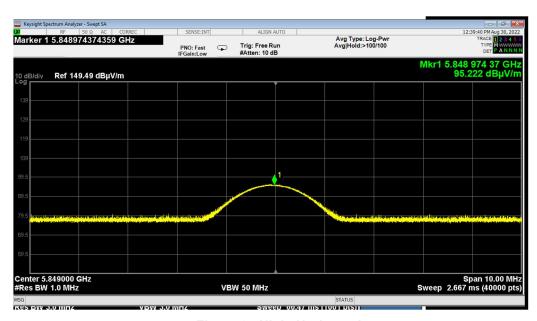


Figure 34 High, Horizontal







### 9.5 Test Equipment Used, Peak Output Power

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
EMI Receiver	R&S	ESCI7	100724	February 20, 2022	February 20, 2023
Horn Antenna	ETS	3115	6142	May 25, 2021	May 25, 2024
RF Cable	Commscope ORS	0623 WBC-400	G020133	May 16, 2022	May 16, 2023
full Anechoic Civil Chamber	ETS	S81	SL 11643	NCR	NCR

Figure 35 Test Equipment Used





### 10 Dwell Time on Each Channel

#### 10.1 Test Specification

FCC Part 15, sub part C, Section 15.247(a)(1)(ii)

#### 10.2 Test Procedure

(Temperature (22°C)/ Humidity (55%RH))

The E.U.T operation mode and test set-up are as described in Section 2 of this report.

The E.U.T was tested in the chamber, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 1.5 meters above the ground and 3-meter distance from testing antenna.

The spectrum analyzer was set to the following parameters:

- Span = zero span, centered on a hopping channel, RBW≥ 1MHz
- Detector Function: Peak, Trace: Maximum Hold

#### 10.3 Test Limit

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

#### 10.4 Test Results

JUDGEMENT: Passed

The E.U.T met the requirements of the FCC Part 15, Section 15.247(a)(1)(ii) and RSS 247, Issue 2, clause 5.1(e).

Additional information of the results is given in *Figure 36* to *Figure 37*.





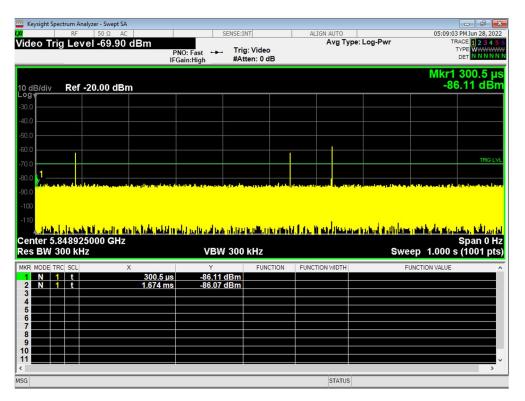


Figure 36 Number of Bursts in 1sec=4, in 30sec=120

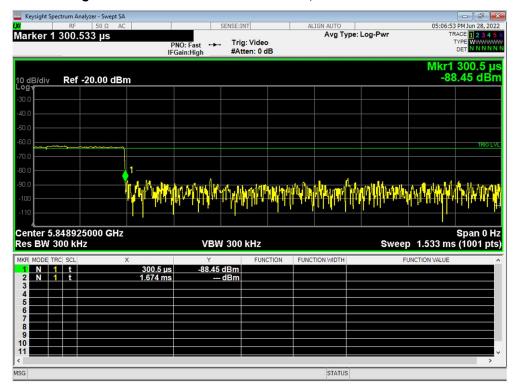


Figure 37 Burst Duration1 =0.3ms

Dwell Time = 0.3msec\*120= 36msec<0.4s







### 10.5 Test Equipment Used, Dwell Time on Each Channel

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
EMI Receiver	R&S	ESCI7	100724	February 20, 2022	February 20, 2023
Horn Antenna	ETS	3115	6142	May 25, 2021	May 25, 2024
RF Cable	Commscope ORS	0623 WBC-400	G020133	May 16, 2022	May 16, 2023
Full Anechoic Civil Chamber	I FIS	S81	SL 11643	NCR	NCR

Figure 38 Test Equipment Used







### 11 Band Edge

#### 11.1 Test Specification

FCC Part 15, Section 15.247(d)

#### 11.2 Test Procedure

(Temperature (22°C)/ Humidity (55%RH))

The E.U.T operation mode and test set-up are as described in Section 2 of this report. The E.U.T was tested in the chamber, placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 1.5 meters above the ground and a

3 meter distance from testing antenna.

The transmitter unit operated in 2 modes: hopping enabled and hopping disabled.

The RBW was set to 100 kHz.

The display line was set to 20 dBc

The E.U.T. was tested at the lower and the upper channels.

#### 11.3 Test Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

#### 11.4 Test Results

Mode	Operation Frequency	Band Edge Frequency	Spectrum Level	Limit	Margin
	(MHz)	(MHz)	(dBm)	(dBm)	(dB)
	5726.0	5725.0	-89.2	-74.9	
Hopping	5849.0	5850.0	-89.0	-76.2	
Non-	5726.0	5725.0	-70.0	-49.0	
Hopping	5849.0	5850.0	-73.0	-49.0	

Figure 39 Band Edge Test Results

JUDGEMENT: Passed by 3.4 dB

For additional information see *Figure 40* to *Figure 43*.





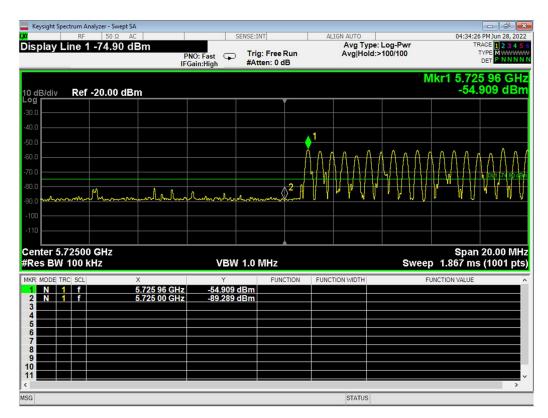


Figure 40 Hopping, Lower Band Edge

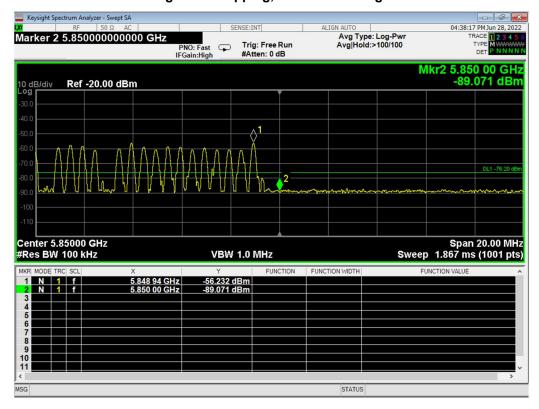


Figure 41 Hopping, Higher Band Edge





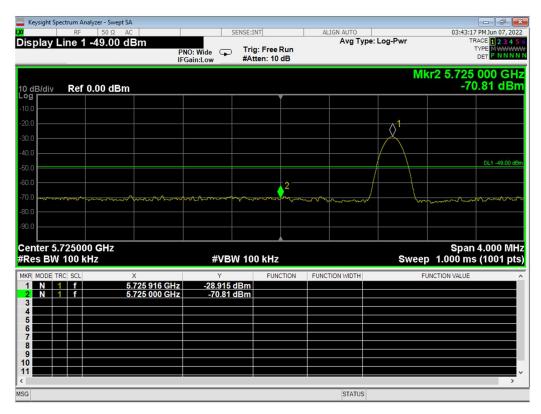


Figure 42 Non-Hopping, Lower Band Edge

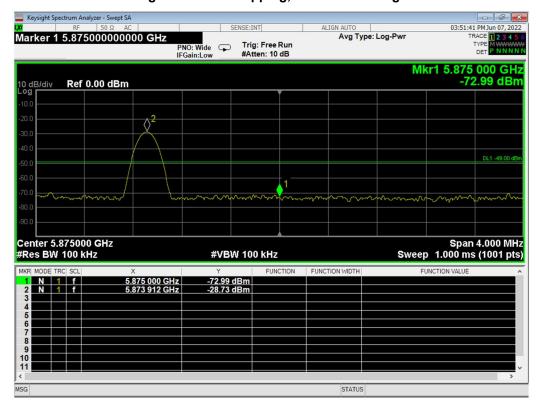


Figure 43 Non-Hopping, Higher Band Edge





### 11.5 Test Equipment Used, Band Edge

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
EMI Receiver	R&S	ESCI7	100724	February 20, 2022	February 20, 2023
Horn Antenna	ETS	3115	6142	May 25, 2021	May 25, 2024
RF Cable	Commscope ORS	0623 WBC-400	G020133	May 16, 2022	May 16, 2023
Full Anechoic Civil Chamber	ETS	S81	SL 11643	NCR	NCR

Figure 44 Test Equipment Used







### 12 Emissions in non-Restricted Frequency Bands

#### 12.1 Test Specification

FCC, Part 15, Subpart C, Section 247(d)

#### 12.2 Test Procedure

(Temperature (22°C)/ Humidity (55%RH))

The E.U.T. operation mode and test set-up are as described in Section 2 of this report.

#### For measurements between 0.009MHz-30MHz:

The E.U.T was tested inside the shielded room and placed on a non-metallic table, 0.8 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.

The frequency range 0.009MHz-30MHz was scanned.

#### For measurements between 30.0MHz-1.0GHz:

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization. The frequency range 30.0MHz -1.0GHz was scanned and the list of the highest emissions was verified and updated accordingly.

#### For measurements between 1.0GHz-40.0GHz:

The E.U.T was tested inside the shielded room and placed on a non-metallic table, 1.5 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.

The frequency range 1.0GHz -40.0GHz was scanned.

RBW was set to 100 kHz and detector set to max peak and trace to "max hold".

#### 12.3 Test Limit

"In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power."

#### 12.4 Test Results

JUDGEMENT: Passed







The EUT met the requirements of the FCC Part 15, Subpart C, Section 247 (d) specification –

all detected emissions were greater than 20 dBc below the fundamental level.

# 12.5 Test Equipment Used, Emissions in Non-Restricted Frequency Bands

Instrument	Mfr.	Model	Serial No.	Last	Calibration
	77.600	6700	20.70	Calibration	Due
Active Loop	EMCO	6502	2950	05-Jul 2022	05-Jul 2023
Antenna					
Low Noise	Narda	DBS-	13	16-May 2022	16-May
Amplifier		0411N313			2023
Filter Band pass	Serno	MFR01341-	322	16-May 2022	16-May
8-16 GHz		HI-3816JJ-1			2023
Spectrum	HP	8564E	3442A00275	23-Feb 2022	23-Feb
Analyzer					2023
EMI Receiver	HP	8542E	3906A00276	22-Feb 2022	22-Feb
	(Agilent)				2023
RF Filter	HP	85420E	3705A00248	22-Feb 2022	22-Feb
	(Agilent)				2023
Wideband RF	OSR	-	-	May 16,	May 16,
Amplifier 100K-				2022	2023
26.5GHz					
Log-periodic	EMCO	3146	9505-4081	27-Apr 2021	27-Apr
Antenna					2024
Horn Antenna	ETS	3115	29845	25-May 2021	25-May
					2024
Horn Antenna	ARA	SWH-28	1007	02-Nov 2021	02-Nov
					2024
Biconical	EMCO	3110B	9912-3337	18-Jan 2022	18-Jan 2024
Antenna					
Multi device	EMCO	2090	9908-1456	NCR	NCR
Controller					
RF Amplifier	MIT	50-8P	AFSX4	NCR	NCR
_					
LOD full	ETS	S81	SL 11643	NCR	NCR
anechoic Civil					
Chamber					
EMI Test	Rohde &	ESCI7	100724	20-Feb 2022	20-Feb
Receiver	Schwarz				2023





Instrument	Mfr.	Model	Serial No.	Last Calibration	Calibration Due
LNA Horn Antenna amplifier Ka band	OSR Electronics (Serge)	PE9850R- 20	J202021732	16-May 2022	16-May 2025
10 m RF cable	Commscope ORS (Serge)	0623 WBC- 400	G020132	25-May 2021	25-May 2022
35m coaxial cable for oats	EIM (Huber Suhner)	RG214- 11N(X2) RG214/U	0	22-Jun 2022	22-Jun 2023
EMC Analyzer	HP Agilent/ Keysight	8593EM	3826A00265	February 20, 2022	February 20, 2023
Antenna Mast	ETS	2070-2	9608-1497	NCR	NCR
Turntable	ETS	2087	-	NCR	NCR

Figure 45 Test Equipment Used







### 13 Emissions in Restricted Frequency Bands

#### 13.1 Test Specification

FCC, Part 15, Subpart C, Sections 247(d), 15.205, 15.209

#### 13.2 Test Procedure

(Temperature (22°C)/ Humidity (54%RH))

#### For measurements between 0.009-30MHz:

The E.U.T was tested inside the shielded room and placed on a non-metallic table, 0.8 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.

The frequency range 0.009MHz-30MHz was scanned.

#### For measurements between 30-1000MHz:

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization. The frequency range 30MHz -1000MHz was scanned and the list of the highest emissions was verified and updated accordingly.

#### For measurements between 1GHz-40GHz:

The E.U.T was tested inside the shielded room and placed on a non-metallic table, 1.5 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.

The frequency range 1GHz -40GHz was scanned.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.







#### 13.3 Test Limit

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c))

Frequency (MHz)	Field strength (microvolts/ meter)	Measurement distance (meters)	Field strength* (dBµV/m)	Field strength* (dBµV/m)@3m
0.009-0.490	2400/F (kHz)	300	48.5-13.8	128.5-73.8
0.490-1.705	24000/F (kHz)	30	33.8-23.0	73.8-63.0
1.705-30.0	30	30	29.5	69.5
30-88	100	3	40.0	40.0
88-216	150	3	43.5	43.5
216-960	200	3	46.0	46.0
Above 960	500	3	54.0	54.0

<sup>\*</sup>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. For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

#### 13.4 Test Results

JUDGEMENT: Passed

The EUT met the requirements of the FCC Part 15, Subpart C 209 specification.

For additional information see Figure 46.







# **Radiated Emission**

E.U.T Description Radar-Based, Outdoor Perimeter Security Sensor

Type SR150F

Serial Number: Not designated

Specification: FCC, Part 15, Subpart C, Sections 15.209, 15.205, 15.247(d)

Antenna Polarization: Horizontal/Vertical Frequency Range: 9kHz to 40.0 GHz

Protocol type: CW Detector: Peak, Average

Operation Frequency	Freq.	Pol.	Peak Reading	Peak Limit	Peak Margin	Average Reading	Average Limit	Average Margin
(MHz)	(MHz)	(H/V)	$(dB\mu V/m)$	$(dB\mu V/m)$	(dB)	$(dB\mu V/m)$	$(dB\mu V/m)$	(dB)
572( 0	11,452.0	V	59.4	74.0	-14.6	15.0	54.0	-39
5726.0	11,452.0	Н	59.8	74.0	-14.2	15.4	54.0	-38.6
5000 0	11,600.0	V	60.1	74.0	-13.9	15.7	54.0	-38.3
5800.0	11,600.0	Н	59.4	74.0	-14.6	15.0	54.0	-39.0
<b>5</b> 0.40.0	11,698.0	V	60.5	74.0	-13.5	16.1	54.0	-37.9
5849.0	11,698.0	Н	61.6	74.0	-12.4	17.2	54.0	-36.8

Figure 46. Radiated Emission Results

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

<sup>&</sup>quot;Peak Amp" includes correction factor.

<sup>\* &</sup>quot;Correction Factor" = Antenna Factor + Cable Loss- Low Noise Amplifier Gain







### 13.5 Test Equipment Used, Emissions in Restricted Frequency Bands

Active Loop   EMCO   6502   2950   05-Jul 2022   05-Jul 2023	Instrument	Mfr.	Model	Serial No.	Last	Calibratio
Antenna					Calibration	n Due
Low Noise Amplifier	1	EMCO	6502	2950	05-Jul 2022	05-Jul 2023
Amplifier   O411N313   2022   2023		Nordo	DDC	12	16 May	16 May
Filter Band pass 8-16 GHz         Serno         MFR0134 1-HI- 3816JJ-1         322 2022         16-May 2022         16-May 2023           Spectrum Analyzer         HP         8564E         3442A00275         23-Feb 2022         23-Feb 2022         2023           EMI Receiver         HP (Agilent)         8542E         3906A00276         22-Feb 2022         2023           RF Filter         HP (Agilent)         8542E         3705A00248         22-Feb 2022         2023           Wideband RF Amplifier 100K- 26.5GHz         OSR         -         May 16, 2022         2023           Log-periodic Antenna         EMCO         3146         9505-4081         27-Apr 2021         27-Apr 2021         2024           Horn Antenna         ETS         3115         29845         25-May 2021         25-May 2024         2024           Horn Antenna         ARA         SWH-28         1007         02-Nov 2021         2024           Biconical Antenna         EMCO         3110B         9912-3337         18-Jan 2022         18-Jan 2024           KF Amplifier         MIT         50-8P         AFSX4         NCR         NCR           LOD Semi anechoic Civil Chamber         ETS         S81         SL 11643         NCR         NCR		Narda		13	•	•
Sectrum		Samo		222	-	
Spectrum	_	Serilo		322	•	•
Spectrum	0-10 GHZ				2022	2023
Analyzer         HP (Agilent)         8542E         3906A00276         22-Feb 2022         2023           RF Filter         HP (Agilent)         8542E         3906A00276         22-Feb 2022         2023           RF Filter         HP (Agilent)         85420E         3705A00248         22-Feb 2022         2023           Wideband RF Amplifier 100K-26.5GHz         OSR         -         -         May 16, 2022         2023           Log-periodic Antenna         EMCO         3146         9505-4081         27-Apr 27-Apr 2021         2024           Horn Antenna         ETS         3115         29845         25-May 25-May 2021         2024           Horn Antenna         ARA         SWH-28         1007         02-Nov 2021         2024           Biconical Antenna         EMCO         3110B         9912-3337         18-Jan 2022         18-Jan 2024           Multi device Controller         EMCO         2090         9908-1456         NCR         NCR           LOD Semi anechoic Civil Chamber         ETS         S81         SL 11643         NCR         NCR           LOD Semi anechoic Civil Chamber         ESCI7         100724         20-Feb 20-	Spectrum	НР		3442A00275	23-Feb	23-Feb
EMI Receiver         HP (Agilent)         8542E         3906A00276         22-Feb 2022 2023         22-Feb 2022 2023           RF Filter         HP (Agilent)         85420E         3705A00248 22-Feb 2022 2023         22-Feb 2022 2023           Wideband RF Amplifier 100K-26.5GHz         OSR         -         -         May 16, 2022 2023           Log-periodic Antenna         EMCO         3146         9505-4081 27-Apr 2021 2024         27-Apr 2021 2024           Horn Antenna         ETS         3115         29845 25-May 2021 2024         25-May 2021 2024           Horn Antenna         ARA         SWH-28 1007 02-Nov 2021 2024         202-Nov 2021 2024           Biconical Antenna         EMCO         3110B 9912-3337 18-Jan 2022 18-Jan 2022 18-Jan 2024           Multi device Controller         EMCO         2090 9908-1456 NCR NCR         NCR           RF Amplifier         MIT         50-8P AFSX4 NCR NCR         NCR           LOD Semi anechoic Civil Chamber         ETS         S81 SL 11643 NCR NCR         NCR           EMI Test Receiver Schwarz         Rohde & Schwarz         ESCI7 100724 20-Feb 202-Feb 2023 2023         202-Feb 20	_ <del>*</del>		000.2	0.121100270		
RF Filter		HP (Agilent)	8542E	3906A00276		
Wideband RF Amplifier 100K- 26.5GHz         OSR         -         -         May 16, 2022         May 16, 2023           Log-periodic Antenna         EMCO         3146         9505-4081         27-Apr 2021         27-Apr 2024           Horn Antenna         ETS         3115         29845         25-May 2021         25-May 2024           Horn Antenna         ARA         SWH-28         1007         02-Nov 2021         2024           Biconical Antenna         EMCO         3110B         9912-3337         18-Jan 2022         18-Jan 2024           Multi device Controller         EMCO         2090         9908-1456         NCR         NCR           RF Amplifier         MIT         50-8P         AFSX4         NCR         NCR           LOD Semi anechoic Civil Chamber         ETS         S81         SL 11643         NCR         NCR           EMI Test Receiver         Rohde & Schwarz         ESCI7         100724         20-Feb 2022         2023           LNA Horn Antenna amplifier Ka band         OSR (Serge)         PE9850R- 2022         J20202         2025           10 m RF cable         Commscope         0623         G020132         25-May         25-May						
Wideband RF Amplifier 100K- 26.5GHz         OSR         -         -         May 16, 2022         May 16, 2023           Log-periodic Antenna         EMCO         3146         9505-4081         27-Apr 2021         27-Apr 2024           Horn Antenna         ETS         3115         29845         25-May 2021         25-May 2024           Horn Antenna         ARA         SWH-28         1007         02-Nov 2021         2024           Biconical Antenna         EMCO         3110B         9912-3337         18-Jan 2022         18-Jan 2024           Multi device Controller         EMCO         2090         9908-1456         NCR         NCR           RF Amplifier         MIT         50-8P         AFSX4         NCR         NCR           LOD Semi anechoic Civil Chamber         ETS         S81         SL 11643         NCR         NCR           EMI Test Receiver         Rohde & Schwarz         ESCI7         100724         20-Feb 2022         2023           LNA Horn Antenna amplifier Ka band         OSR (Serge)         PE9850R- 2022         J20202         2025           10 m RF cable         Commscope         0623         G020132         25-May         25-May	RF Filter	HP (Agilent)	85420E	3705A00248	22-Feb	22-Feb
Amplifier 100K-26.5GHz         2022         2023           Log-periodic Antenna         EMCO         3146         9505-4081         27-Apr 2021         2024           Horn Antenna         ETS         3115         29845         25-May 2021         2024           Horn Antenna         ARA         SWH-28         1007         02-Nov 2021         2024           Biconical Antenna         EMCO         3110B         9912-3337         18-Jan 2022         18-Jan 2024           Multi device Controller         EMCO         2090         9908-1456         NCR         NCR           RF Amplifier         MIT         50-8P         AFSX4         NCR         NCR           LOD Semi anechoic Civil Chamber         ETS         S81         SL 11643         NCR         NCR           EMI Test Receiver         Rchabarz         Schwarz         2022         2023         2022           LNA Horn Antenna amplifier Ka band         OSR         PE9850R- 2022         16-May 2022         2025           Ka band         Commscope         0623         G020132         25-May         25-May					2022	2023
26.5GHz         Log-periodic Antenna         EMCO         3146         9505-4081         27-Apr 2021         2024           Horn Antenna         ETS         3115         29845         25-May 2021         2024           Horn Antenna         ARA         SWH-28         1007         02-Nov 2021         2024           Biconical Antenna         EMCO         3110B         9912-3337         18-Jan 2022         18-Jan 2024           Multi device Controller         EMCO         2090         9908-1456         NCR         NCR           RF Amplifier         MIT         50-8P         AFSX4         NCR         NCR           LOD Semi anechoic Civil Chamber         ETS         S81         SL 11643         NCR         NCR           EMI Test Receiver         Rohde & Schwarz         ESCI7         100724         20-Feb 2022         2023           LNA Horn Antenna amplifier Ka band         OSR Electronics (Serge)         PE9850R- 2020         2022         2025         2025           10 m RF cable         Commscope         0623         G020132         25-May         25-May         25-May	Wideband RF	OSR	-	-	May 16,	May 16,
Log-periodic Antenna         EMCO         3146         9505-4081         27-Apr 2021         2024           Horn Antenna         ETS         3115         29845         25-May 2021         2024           Horn Antenna         ARA         SWH-28         1007         02-Nov 2021         2024           Biconical Antenna         EMCO         3110B         9912-3337         18-Jan 2022         18-Jan 2024           Multi device Controller         EMCO         2090         9908-1456         NCR         NCR           RF Amplifier         MIT         50-8P         AFSX4         NCR         NCR           LOD Semi anechoic Civil Chamber         ETS         S81         SL 11643         NCR         NCR           EMI Test Receiver         Rohde & Schwarz         ESCI7         100724         20-Feb 20-Feb 2022         2023           LNA Horn Antenna amplifier Ka band         Electronics (Serge)         7         1202021732         16-May 16-May 16-May 2022         2025           10 m RF cable         Commscope         0623         G020132         25-May         25-May         25-May					2022	2023
Antenna         ETS         3115         29845         25-May 2021         2024           Horn Antenna         ARA         SWH-28         1007         02-Nov 2021         2024           Biconical Antenna         EMCO         3110B         9912-3337         18-Jan 2022         18-Jan 2024           Multi device Controller         EMCO         2090         9908-1456         NCR         NCR           RF Amplifier         MIT         50-8P         AFSX4         NCR         NCR           LOD Semi anechoic Civil Chamber         ETS         S81         SL 11643         NCR         NCR           EMI Test Receiver         Rohde & Schwarz         ESCI7         100724         20-Feb 20-Feb 2022         2023           LNA Horn Antenna amplifier Ka band         Electronics (Serge)         16-May 2022         16-May 2025         2025           10 m RF cable         Commscope         0623         G020132         25-May         25-May						
Horn Antenna         ETS         3115         29845         25-May 2021         2024           Horn Antenna         ARA         SWH-28         1007         02-Nov 2021         2024           Biconical Antenna         EMCO         3110B         9912-3337         18-Jan 2022         18-Jan 2024           Multi device Controller         EMCO         2090         9908-1456         NCR         NCR           RF Amplifier         MIT         50-8P         AFSX4         NCR         NCR           LOD Semi anechoic Civil Chamber         ETS         S81         SL 11643         NCR         NCR           EMI Test Receiver         Rohde & Schwarz         ESCI7         100724         20-Feb 20-Feb 2022         2023           LNA Horn Antenna amplifier Ka band         OSR (Serge)         PE9850R- 202         1202021732         16-May 2022         2025           10 m RF cable         Commscope         0623         G020132         25-May         25-May		EMCO	3146	9505-4081		
Horn Antenna	Antenna					
Horn Antenna         ARA         SWH-28         1007         02-Nov 2021         02-Nov 2024           Biconical Antenna         EMCO         3110B         9912-3337         18-Jan 2022         18-Jan 2024           Multi device Controller         EMCO         2090         9908-1456         NCR         NCR           RF Amplifier         MIT         50-8P         AFSX4         NCR         NCR           LOD Semi anechoic Civil Chamber         ETS         S81         SL 11643         NCR         NCR           EMI Test Receiver         Rohde & Schwarz         ESCI7         100724         20-Feb 20-Feb 20-Feb 2022         2023           LNA Horn Antenna amplifier Ka band         OSR Electronics (Serge)         J202021732         16-May 16-May 2022         2025           10 m RF cable         Commscope         0623         G020132         25-May         25-May	Horn Antenna	ETS	3115	29845	•	•
Biconical Antenna         EMCO         3110B         9912-3337         18-Jan 2022         18-Jan 2024           Multi device Controller         EMCO         2090         9908-1456         NCR         NCR           RF Amplifier         MIT         50-8P         AFSX4         NCR         NCR           LOD Semi anechoic Civil Chamber         ETS         S81         SL 11643         NCR         NCR           EMI Test Receiver         Rohde & ESCI7         100724         20-Feb 20-Feb 20-Feb 2023         2022         2023           LNA Horn Antenna amplifier Ka band         Electronics (Serge)         20         702021732         16-May 16-May 2022         2025           10 m RF cable         Commscope         0623         G020132         25-May         25-May						
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Multi device ControllerEMCO20909908-1456NCRNCRRF AmplifierMIT50-8PAFSX4NCRNCRLOD Semi anechoic Civil ChamberETSS81SL 11643NCRNCREMI Test ReceiverRohde & SchwarzESCI710072420-Feb 202220-Feb 20222023LNA Horn Antenna amplifier Ka bandOSR (Serge)PE9850R- 20J20202173216-May 202216-May 202216-May 202510 m RF cableCommscope0623G02013225-May25-May		EMCO	3110B	9912-3337	18-Jan 2022	18-Jan 2024
ControllerMIT50-8PAFSX4NCRNCRLOD Semi anechoic Civil ChamberETSS81SL 11643NCRNCREMI Test ReceiverRohde & SchwarzESCI710072420-Feb 20-Feb 20222023LNA Horn Antenna amplifier Ka bandOSR PE9850R- 20J20202173216-May 16-May 202216-May 2025I om RF cableCommscope0623G02013225-May25-May						
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LOD Semi anechoic Civil Chamber         ETS         S81         SL 11643         NCR         NCR           EMI Test Receiver         Rohde & Schwarz         ESCI7         100724         20-Feb 20-Feb 2022         2023           LNA Horn Antenna amplifier Ka band         OSR PE9850R- 20         J202021732         16-May 16-May 2022         16-May 2022           10 m RF cable         Commscope         0623         G020132         25-May         25-May						
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anechoic Civil Chamber  EMI Test Receiver Schwarz  LNA Horn Antenna amplifier Ka band  Receiver Chamber  Rohde & ESCI7 Schwarz  ESCI7 Schwarz  LOO724 Schwarz  DSR PE9850R- 2022 PE9850R- 2022 PE9850R- 2022 PE9850R- 2022 Schwary  PE9850R- 2022 Schwary  Die Homay 2022 Schwary  Die Homay 2022 Schwary  Die Homay 2025 Schwary  Die Homay 2021 Die Homay 2022 Die Homay 2025 Schwary Die Homay 2025 Die Homay 2021 Die Homay 2022 Die Homay 2023 Die Homay 2025	TOD G	Ema	001	GT 11642	MCD	NGD
Chamber         Rohde & ESCI7         100724         20-Feb 202         20-Feb 2023           Receiver         Schwarz         1202021732         16-May 16-May 2022         16-May 2022         2025           LNA Horn Antenna amplifier Ka band         Electronics (Serge)         20         2022         2025           Ka band         (Serge)         6020132         25-May         25-May		ETS	S81	SL 11643	NCR	NCR
EMI Test         Rohde & Schwarz         ESCI7         100724         20-Feb 2022         20-Feb 2023           LNA Horn         OSR Antenna amplifier Ka band         PE9850R- 2020         J202021732         16-May 2022         16-May 2025           Ka band         (Serge)         G020132         25-May         25-May						
Receiver         Schwarz         2022         2023           LNA Horn         OSR         PE9850R- J202021732         16-May 2022         16-May 2025           Antenna amplifier Ka band         (Serge)         20         2022         2025           10 m RF cable         Commscope         0623         G020132         25-May         25-May		D -1-1-0	ECC17	100724	20 E-1	20 E-1
LNA Horn OSR PE9850R- J202021732 16-May 2022 2025 Ka band (Serge) Commscope 0623 G020132 25-May			ESCI/	100/24		
Antenna amplifier Ka band (Serge) 20 2025 2025 2025 2025 2025 2025 2026 2026			DEOSEOD	1202021722		
Ka band         (Serge)         G020132         25-May           10 m RF cable         Commscope         0623         G020132         25-May         25-May				J202021/32	•	•
10 m RF cable Commscope 0623 G020132 25-May 25-May	<u> </u>		20		2022	2023
		<u> </u>	0623	G020132	25-May	25-May
	10 III KI Caulc	ORS (Serge)	WBC-400	3020132	2021	2022





Instrument	Mfr.	Model	Serial No.	Last Calibration	Calibratio n Due
35m coaxial cable for oats	EIM (Huber Suhner)	RG214- 11N(X2) RG214/U	0	22-Jun 2022	22-Jun 2023
EMC Analyzer	HPAgilent/Ke ysight	8593EM	3826A00265	February 20, 2022	February 20, 2023
Antenna Mast	ETS	2070-2	9608-1497	NCR	NCR
Turntable	ETS	2087	-	NCR	NCR

Figure 47 Test Equipment Used







# 14 Average Factor Calculation

- 1. Pulse period = 1 (worst scenario)
- 2. Pulse duration = 1 (worst scenario)
- 3. Burst duration = 0.3 msec
- 4. Average Factor =  $20 \log \left[ \frac{\text{Pulse duration}}{\text{Pulse period}} \times \frac{\text{burst duration}}{100 \text{msec}} \times \right]$

Num of burst within 100msec = 20log [1\*(0.3\*2/100)] = -44.4 dB

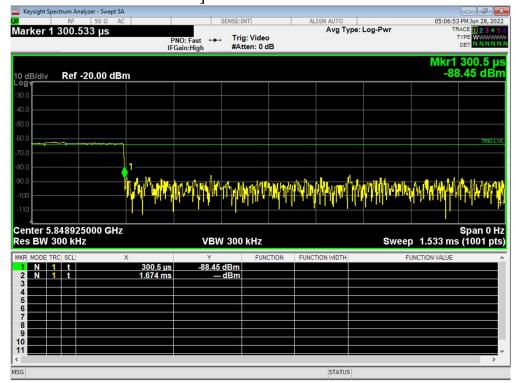


Figure 48 — Burst Duration =0.3ms





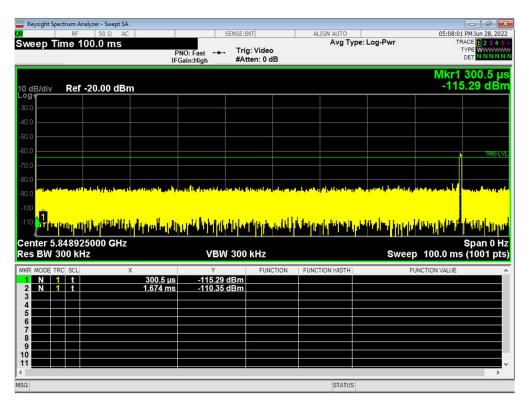


Figure 49. Number of Bursts in 100msec=2

### 14.1 Test Equipment Used, Average Factor

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
EMI Receiver	R&S	ESCI7	100724	February 20, 2022	February 20, 2023
Horn Antenna	ETS	3115	6142	May 25, 2021	May 25, 2024
RF Cable	Commscope ORS	0623 WBC-400	G020133	May 16, 2022	May 16, 2023
Full Anechoic Civil Chamber	ETS	S81	SL 11643	NCR	NCR

Figure 50 Test Equipment Used





# 15 Antenna Gain/Information

The antenna gain is 9 dBi, patch.

# 16 R.F Exposure/Safety

See a separate file.







# 17 Appendix A - Correction Factors

### 17.1 ITL #1911: OATS RF Cable

Frequency (MHz)	Cable Loss (dB)	Frequency (MHz)	Cable Loss (dB)
1.00	0.50	450.00	5.83
10.00	1.00	500.00	6.33
20.00	1.34	550.00	6.67
30.00	1.50	600.00	6.83
50.00	1.83	650.00	7.17
100.00	2.67	700.00	7.66
150.00	3.17	750.00	7.83
200.00	3.83	800.00	8.16
250.00	4.17	850.00	8.50
300.00	4.50	900.00	8.83
350.00	5.17	950.00	8.84
400.00	5.50	1000.00	9.00

#### 17.2 ITL #1840: Semi-Anechoic Chamber RF Cable

Frequency	Cable Loss
(MHz)	(dB)
1,000.0	-1.40
1,500.0	-1.70
2,000.0	-2.00
2,500.0	-2.30
3,000.0	-2.60
3,500.0	-2.80
4,000.0	-3.10
4,500.0	-3.30
5,000.0	-3.60
5,500.0	-3.70
6,000.0	-4.00
6,500.0	-4.40
7,000.0	-4.7
7,500.0	-4.80
8,000.0	-5.00
8,500.0	-5.10
9,000.0	-5.60
9,500.0	-5.80

Frequency	Cable Loss
(MHz)	(dB)
10,000.0	-6.00
10,500.0	-6.20
11,000.0	-6.20
11,500.0	-6.00
12,000.0	-6.00
12,500.0	-6.10
13,000.0	-6.30
13,500.0	-6.50
14,000.0	-6.70
14,500.0	-7.00
15,000.0	-7.30
15,500.0	-7.50
16,000.0	-7.60
16,500.0	-8.00
17,000.0	-8.00
17,500.0	-8.10
18,000.0	-8.20







### 17.3 ITL # 1075: Active Loop Antenna

Frequency	MAF	
(MHz)	(dBs/m)	AF (dB/m)
0.01	-33.10	18.40
0.02	-37.20	14.30
0.03	-38.20	13.30
0.05	-39.80	11.70
0.10	-40.10	11.40
0.20	-40.30	11.20
0.30	-40.30	11.20
0.50	-40.30	11.20
0.70	-40.30	11.20
1.00	-40.10	11.40
2.00	-40.00	11.50

Frequency	MAF	AF
(MHz)	(dBs/m)	(dB/m)
3.00	-40.00	11.50
4.00	-40.10	11.40
5.00	-40.20	11.30
6.00	-40.40	11.10
7.00	-40.40	11.10
8.00	-40.40	11.10
9.00	-40.50	11.00
10.00	-40.50	11.00
20.00	-41.50	10.00
30.00	-43.50	8.00

### 17.4 ITL #1356: Biconical Antenna

Frequency (MHz)	AF (dB/m)	
30.00	13.00	
35.00	10.89	
40.00	10.59	
45.00	10.63	
50.00	10.12	
60.00	9.26	
70.00	7.74	
80.00	6.63	

Frequency (MHz)	AF (dB/m)
90.00	8.23
100.00	11.12
120.00	13.16
140.00	13.07
160.00	14.80
180.00	16.95
200.00	17.17

### 17.5 ITL # 1349: Log Periodic Antenna

Frequency (MHz)	AF (dB/m)
200.00	11.58
250.00	12.04
300.00	14.76
400.00	15.55
500.00	17.85
600.00	18.66
700.00	20.87
800.00	21.15
900.00	22.32
1000.00	24.22







#### 17.6 ITL # 1352: 1-18 GHz Horn Antenna

Frequency (GHz)	AF (dB/m)	Frequency (GHz)	AF (dB/m)
0.75	25.00	9.50	38.00
1.00	23.50	10.00	38.50
1.50	26.00	10.50	38.50
2.00	29.00	11.00	38.50
2.50	27.50	11.50	38.50
3.00	30.00	12.00	38.00
3.50	31.50	12.50	38.50
4.00	32.50	13.00	40.00
4.50	32.50	13.50	41.00
5.00	33.00	14.00	40.00
5.50	35.00	14.50	39.00
6.00	36.50	15.00	38.00
6.50	36.50	15.50	37.50
7.00	37.50	16.00	37.50
7.50	37.50	16.50	39.00
8.00	37.50	17.00	40.00
8.50	38.00	17.50	42.00
9.00	37.50	18.00	42.50

#### 17.7 ITL # 1353: 18-26.5 GHz Horn Antenna

Frequency (MHz)	Measured antenna factor (dB/m) <sup>1</sup>	Frequency (MHz)	Measured antenna factor (dB/m) <sup>1</sup>
18,000.00	32.40	22,500.00	33.00
18,500.00	32.00	23,000.00	33.10
19,000.00	32.30	23,500.00	33.80
19,500.00	32.40	24,000.00	33.50
20,000.00	32.30	24,500.00	33.50
20,500.00	32.80	25,000.00	33.80
21,000.00	32.80	25,500.00	33.90
21,500.00	32.70	26,000.00	34.20
22,000.00	33.10	26,500.00	34.70

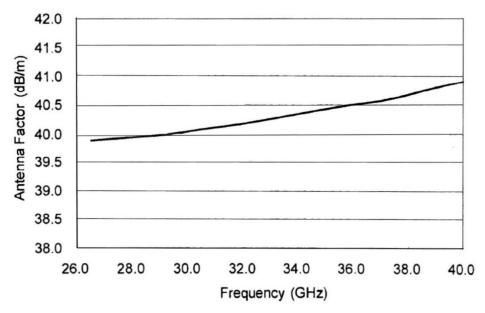
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 $<sup>^1</sup>$  The antenna factor shall be added to the receiver's reading in  $dB\mu V,$  to obtain field strength in  $dB\mu$  V/m





#### 17.1 ITL # 1777: 26.5-40 GHz Horn Antenna



**End of Test Report**