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DATE: 23 December 2019

I.T.L. (PRODUCT TESTING) LTD.

FCC/IC Radio Test Report

For

Orpak Systems Ltd.

Equipment under test:

Tag Reader

TR500
(13.56 MHz Transceiver)

Tested by: _____
M. Zohar

Approved by: _____
D. Shidlowsky

Measurement/Technical Report for

Orpak Systems Ltd.

Tag Reader

TR500

FCC ID: W8F800927160

IC: 8264A-800927160

This report concerns:	Original Grant:	X
	Class I Change:	
	Class II Change:	
Equipment type:	FCC: DXX - Part 15 Low Power Communication Device Transmitter	
	IC: Low Power Transmitter General Field Limits (9 kHz-30MHz)	
Limits used:	47CFR15 Section 15.225, RSS 210 Issue 9, August 2016, Amendment November 2017, RSS Gen Issue 5, April 2018	

Measurement procedure used is ANSI C.63.10 2013

Application for Certification
prepared by:
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Applicant for this device:
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1. General Information

1.1 Administrative Information

Manufacturer:	Orpak Systems Ltd.
Manufacturer's Address:	31 Lechi St. P.O.B. 1461 Bnei-Brak, 51114 Israel Tel: +972-3-577-6868 Fax: +972-3-579-6310
Manufacturer's Representative:	Yair Elul
Equipment Under Test (E.U.T):	Tag Reader
Product Marketing Name (PMN):	TR500
Equipment Part No.:	Not designated
HVIN:	C
Date of Receipt of E.U.T:	November 05, 2019
Start of Test:	November 05, 2019
End of Test:	November 10, 2019
Test Laboratory Location:	I.T.L (Product Testing) Ltd. 1 Batsheva St., Lod ISRAEL 7120101
Test Specifications:	FCC Part 15 Subpart C, Section 15.225 RSS 210 Issue 9, August 2016, Amendment November 2017, RSS Gen Issue 5, April 2018

1.2 List of Accreditations

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), FCC Designation No. IL1005.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. Department of Innovation, Science and Economic Development (ISED) Canada, CAB identifier: IL1002

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.

1.3 Product Description

The TR500 is a compact standalone reader unit for tags intended for vehicle or driver tag identification in gas stations and other applications. The TR500 includes a Security Application Module (SAM) used to handle encrypted tags. The TR500 is installed within easy reach for customers wishing to refuel, and it transmits information to the station automation system over an Ethernet or RS-485 cable. The tag reader supports authorization via contactless MiFare cards & tags as well as 125kHz tags.

Working voltage	15VDC
Mode of operation	Transceiver
Assigned Frequency Range	13.110-14.010 MHz
Operation Frequency Range	13.56MHz

1.4 Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.10: 2013 and RSS Gen Issue 5, April 2018. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.5 Test Facility

Emissions tests were performed at I.T.L.'s testing facility in Lod, Israel. I.T.L.'s EMC Laboratory is accredited by A2LA, certificate No. 1152.01 and FCC Designation No. IL1005.

1.6 Measurement Uncertainty

Conducted Emission

Conducted Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4)
0.15 – 30 MHz:
Expanded Uncertainty (95% Confidence, K=2):
± 3.44 dB

Radiated Emission

Radiated Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4) for open site:
30-1000MHz:
Expanded Uncertainty (95% Confidence, K=2):
± 4.96 dB

1 GHz to 6 GHz
Expanded Uncertainty (95% Confidence, K=2):
±5.19 dB

>6 GHz
Expanded Uncertainty (95% Confidence, K=2):
±5.51 dB

2. System Test Configuration

2.1 Justification

1. The E.U.T contains an LF 125 kHz and HF 13.56MHz transmitters.
2. The evaluation was performed with the E.U.T in wall mounted installation position.
3. Evaluation was performed with a typical AC/DC power supply.
4. Conducted Emission from AC Line test was performed with both transmitters transmitting continuously as the “worst case”.

2.2 EUT Exercise Software

No special exercise software was needed.

2.3 Special Accessories

AC/DC power supply details:
Manufacturer: Touch Electronics
Model: SA06-24S12R-U
S/N: R0008130037

Laptop details:
Manufacturer: Lenovo
Model: X1 Carbon
S/N: N/A

2.4 Equipment Modifications

No modifications were needed in order to achieve compliance.

2.5 Configuration of Tested System

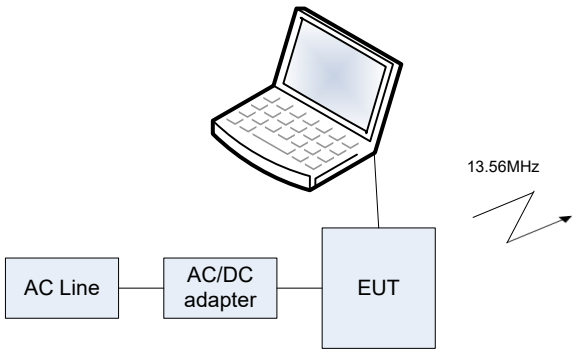

Figure 1. Configuration of Tested System

Note: Laptop used to provide network link only. No network connection during the tests.

3. Conducted & Radiated Measurement Test Set-Up Photos

Figure 2. Conducted Emission Test

Figure 3. Frequency Stability

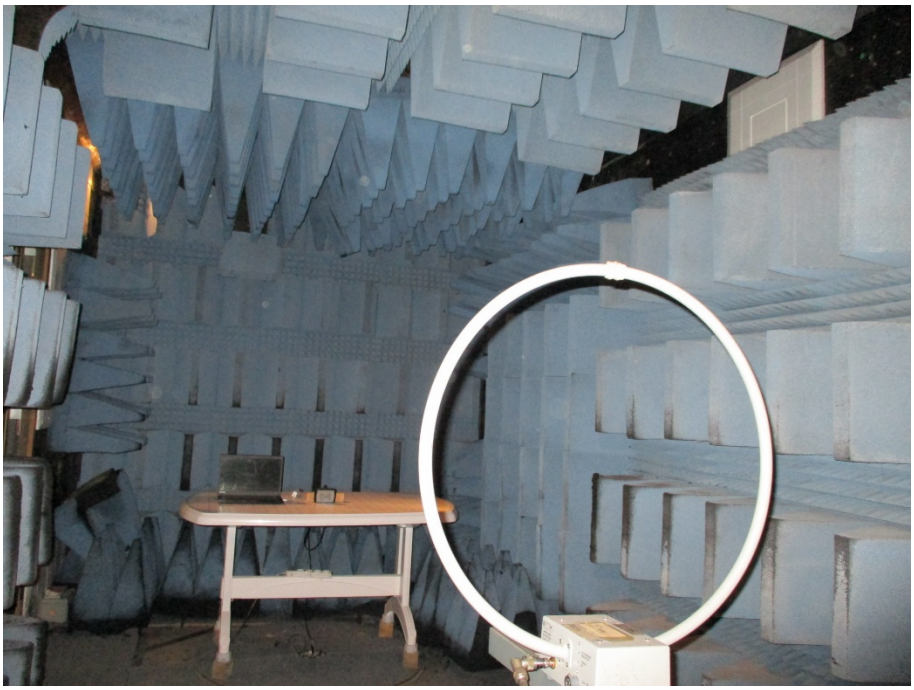

Figure 4. Field Strength of Fundamental

Figure 5. Radiated Emission 30MHz-150MHz

4. Conducted Emission From AC Mains

4.1 Test Specification

FCC Part 15, Subpart C, Section 15.207

RSS Gen Issue 5, Section 8.8

4.2 Test Procedure

(Temperature (20°C)/ Humidity (58%RH))

The E.U.T operation mode and test setup are as described in Section 2 of this report. In order to minimize background noise interference, the conducted emission testing was performed inside a shielded room, with the E.U.T placed on a 0.8 meter high wooden table, 0.4 meter from the room's vertical wall. In the case of a floor-standing E.U.T., it was placed on the horizontal ground plane.

The E.U.T was powered from 115 V AC / 60 Hz via 50 Ohm / 50 µHn Line Impedance Stabilization Network (LISN) on the phase and neutral lines. The LISN's were grounded to the shielded room ground plane (floor), and were kept at least 0.8 meters from the nearest boundary of the E.U.T.

The center of the E.U.T.'s AC cable was folded back and forth, in order to form a bundle less than 0.40 meters and a total cable length of 1 meter.

The effect of varying the position of the cables was investigated to find the configuration that produces maximum emission. The configuration tested is shown in the photograph*, Figure 2. Conducted Emission Test.*

The emission voltages at the LISN's outputs were measured using a computerized receiver, complying with CISPR 16 requirements. The specification limits are loaded to the receiver and are displayed on the receiver's spectrum display.

A frequency scan between 0.15 and 30 MHz was performed at 9 kHz I.F. band width, using peak detection.

The spectral components having the highest level on each line were measured using a quasi-peak and average detector.

4.3 Test Limit

Frequency of emission (MHz)	**Conducted limit (dBµV)**	
	Quasi-peak	Average
0.15-0.5	66.0 to 56.0*	56.0 to 46.0*
0.5-5.0	56.0	46.0
5.0-30.0	60.0	50.0

* Decreases with the logarithm of the frequency.

4.4 Test Results

JUDGEMENT: Passed by 2.54 dB

The margin between the emission levels and the specification limit is, in the worst case, 2.54dB for the phase line at 7.158 MHz and 2.59 dB at 21.478 MHz for the neutral line.

The EUT met the F.C.C. Part 15, Subpart C and RSS Gen Issue 5, Section 8.8 specification requirements.

The details of the highest emissions are given in *Figure 6* to *Figure 9.*

Conducted Emission

Specification:	FCC Part 15, Subpart C
	RSS Gen Issue 5, Section 8.8
Lead:	Phase
Detectors: :	Quasi-peak, Average
Voltage supply type:	AC/DC

EDIT PEAK LIST (Final Measurement Results)

Trace1: CE22BQP
Trace2: CE22BAP
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1	Quasi Peak	206 kHz	41.55	-21.80
2	Average	206 kHz	35.53	-17.83
2	Average	414 kHz	36.31	-11.25
1	Quasi Peak	422 kHz	42.16	-15.24
1	Quasi Peak	446 kHz	40.95	-15.99
2	Average	454 kHz	40.24	-6.55
2	Average	1.178 MHz	26.60	-19.39
1	Quasi Peak	1.242 MHz	35.27	-20.72
1	Quasi Peak	1.286 MHz	35.14	-20.85
2	Average	2.074 MHz	25.82	-20.17
2	Average	2.13 MHz	19.65	-26.34
1	Quasi Peak	2.158 MHz	34.55	-21.44
1	Quasi Peak	3.834 MHz	32.37	-23.62
2	Average	3.95 MHz	23.23	-22.76
1	Quasi Peak	7.158 MHz	50.15	-9.84
2	Average	7.158 MHz	47.45	-2.54
1	Quasi Peak	13.562 MHz	74.71	14.71
2	Average	13.562 MHz	72.70	22.70
1	Quasi Peak	21.478 MHz	47.36	-12.63
2	Average	21.478 MHz	47.24	-2.75

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Figure 6. Detectors: Peak, Quasi-peak, Average

Note: QP Delta/Av Delta 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.

Conducted Emission

Specification:	FCC Part 15, Subpart C
	RSS Gen Issue 5, Section 8.8
Lead:	Phase
Detectors:	Peak, Average
Voltage supply type:	AC/DC

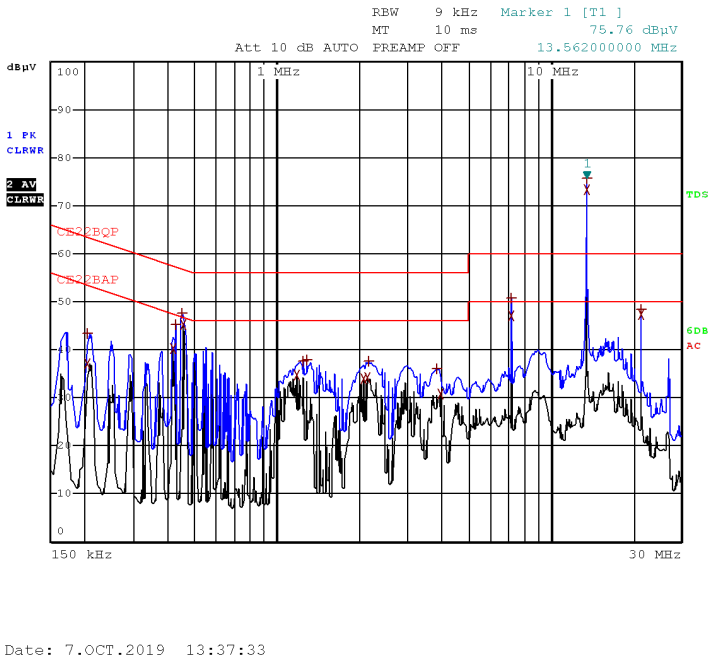

Figure 7. Detectors: Peak, Quasi-peak, Average

Conducted Emission

Specification:	FCC Part 15, Subpart C
	RSS Gen Issue 5, Section 8.8
Lead:	Neutral
Detectors:	Quasi-peak, Average
Voltage supply type:	AC/DC

EDIT PEAK LIST (Final Measurement Results)

Trace1: CE22BQP
Trace2: CE22BAP
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1	Quasi Peak	250 kHz	37.96	-23.79
2	Average	250 kHz	32.04	-19.70
2	Average	410 kHz	31.83	-15.81
1	Quasi Peak	418 kHz	40.71	-16.77
1	Quasi Peak	446 kHz	39.06	-17.88
2	Average	450 kHz	34.96	-11.91
2	Average	1.222 MHz	26.38	-19.61
1	Quasi Peak	1.242 MHz	35.27	-20.72
2	Average	1.27 MHz	26.53	-19.46
1	Quasi Peak	1.286 MHz	35.26	-20.73
1	Quasi Peak	2.158 MHz	34.75	-21.24
2	Average	2.158 MHz	27.54	-18.45
2	Average	3.738 MHz	25.81	-20.18
1	Quasi Peak	3.754 MHz	31.05	-24.94
1	Quasi Peak	7.158 MHz	48.50	-11.49
2	Average	7.158 MHz	46.28	-3.71
1	Quasi Peak	13.562 MHz	74.88	14.88
2	Average	13.562 MHz	73.06	23.06
1	Quasi Peak	21.478 MHz	47.43	-12.56
2	Average	21.478 MHz	47.40	-2.59

Date: 7.OCT.2019 13:54:32

Figure 8. Detectors: Peak, Quasi-peak, Average

Note: QP Delta/Av Delta 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.

Conducted Emission

Specification:	FCC Part 15, Subpart C
	RSS Gen Issue 5, Section 8.8
Lead:	Neutral
Detectors:	Peak, Average
Voltage supply type:	AC/DC

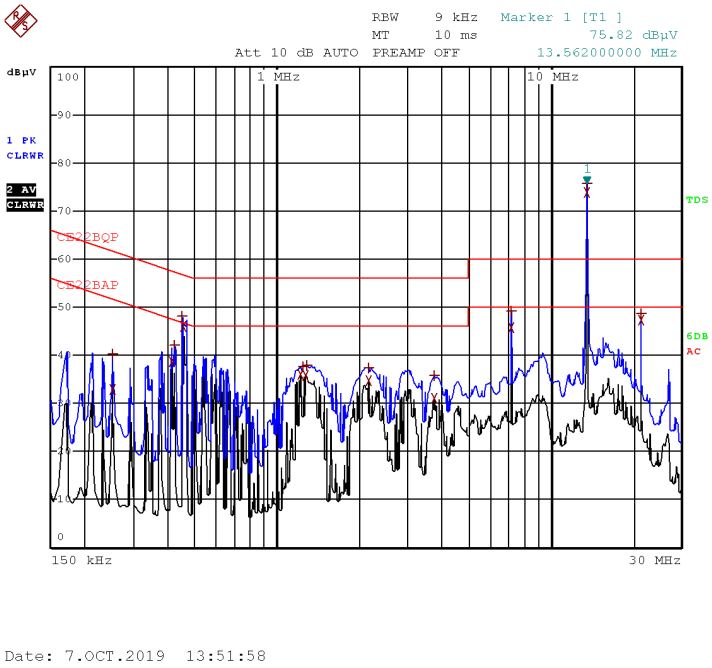

Figure 9 Detectors: Peak, Quasi-peak, Average

Note: the exceeded peak is the fundamental transmission at 13.56MHz

4.5 Test Equipment Used; Conducted Emission from AC Mains

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
LISN	Fischer	FCC-LISN-25A	127	September 8, 2019	September 30, 2020
Transient Limiter	HP	11947A	3107A01308	September 16, 2019	September 30, 2020
EMI Receiver	Rohde & Schwarz	ESCI7	100724	February 27, 2019	February 28, 2020
Cable CE Chamber 3M + 3M	Testline 18 + RJ214	11556	-	March 31, 2019	March 31, 2020

Figure 10 Test Equipment Used

5. Field Strength of Fundamental

5.1 Test Specification

Part 15, Subpart C, Section 15.225(a-c)

RSS 210 Issue 9, Annex B, Section B.6

5.2 Test Procedure

(Temperature (20°C)/ Humidity (58%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 placed in the chamber on a non-conductive table, 0.8 meters above the ground.
The EMI receiver was set to the E.U.T. Fundamental Frequency and Peak Detection.
The distance between the E.U.T. and test antenna was 3 meters.

The turntable and antenna were adjusted for maximum level reading on the EMI receiver.

5.3 Test Limit

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency band	Field strength	Measurement distance	Field strength @30m	Field strength @3m*
(MHz)	(microvolts/meter)	(meters)	(dBµV/m)	(dBµV/m)
13.553-13.567	15,848.0	30	84.0	124.0
13.410-13.553	334.0	30	50.4	90.4
13.567-13.710				
13.110-13.410	106.0	30	40.5	80.5
13.710-14.010				
Up to 13.110	According 15.209/ RSS Gen			
From 14.010				

* Field strength @3m =40 log(30m/3m)=40

5.4 Test Results

Frequency (MHz)	Polarity (V/H)	Peak Reading (dBµV/m)	Lowest Mask Limit (dBµV/m)	Margin (dB)
13.56	V	52.0	80.5	-28.5
13.56	H	60.0	80.5	-20.5

The EUT met the FCC Part 15, Subpart C, Section 15.209 and RSS 210 Issue 9, Annex B, Section B.6 requirements.

JUDGEMENT: Passed by 20.5dB

The details of the highest emissions are given in *Figure 11* to *Figure 12*.

Field Strength of Fundamental

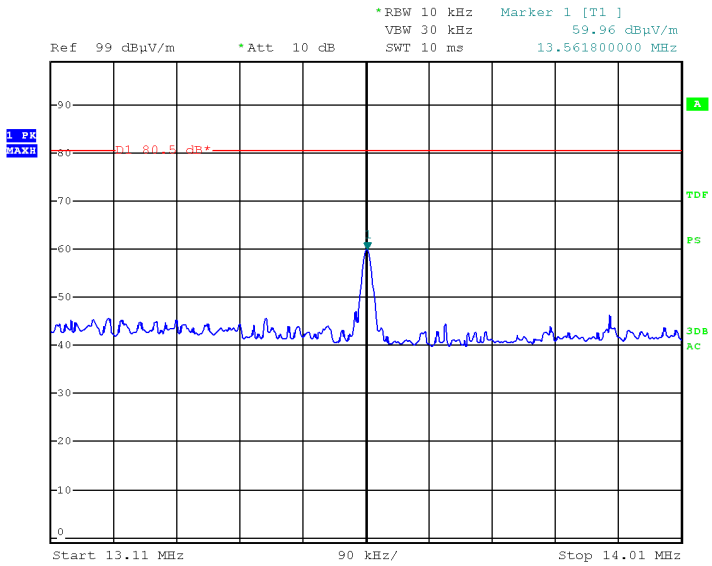

Figure 11. Field Strength of Fundamental, Horizontal

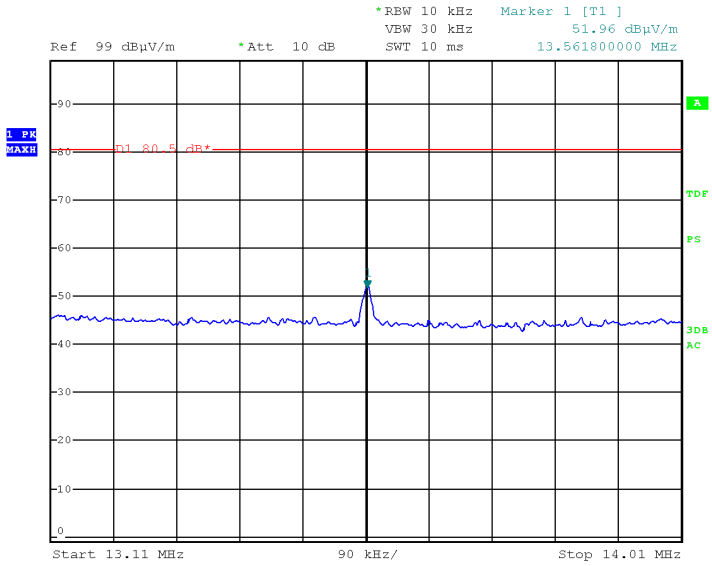

Figure 12. Field Strength of Fundamental, Vertical

5.5 Test Instrumentation Used; Field Strength of Fundamental

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
EMI Receiver	R&S	ESCI7	100724	February 27, 2019	February 28, 2020
Loop Antenna	EMCO	6502	9506- 2950	February 5, 2019	February 28, 2021
RF Cable	Commscope ORS (Serge)	0623 WBC-400	G020132	December 24, 2018	December 31, 2019
Semi Anechoic Chamber	ETS	S81	SL 11643	NCR	NCR

Figure 13. Test Equipment Used

6. Radiated Emission, 9 kHz – 150 MHz

6.1 Test Specification

Part 15, Subpart C, Sections 225(d), 209(a)

RSS Gen Issue 5, Section 8.9

6.2 Test Procedure

(Temperature (29°C)/ Humidity (56%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-30.0MHz:

The E.U.T was tested inside the shielded room at a distance of 3 meters and the E.U.T was placed on a non-metallic table, 1.5 meters above the ground. The frequency range 0.009MHz-30MHz was scanned. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.

The emissions were measured at a distance of 3 meters.

For measurements between 30.0MHz-150.0MHz:

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, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.

The emissions were measured at a distance of 3 meters.

6.3 FCC Test Limit

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

*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.

6.4 IC Test Limit

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Magnetic Field strength (microampere/meter)	Measurement distance (meters)	Magnetic Field strength (dBµA/m)	Magnetic Field strength* (dBµA/m)@3m
0.009-0.490	6.37/F(kHz)	300	-3.0-(-37.7)	77.0-42.2
0.490-1.705	63.7/F(kHz)	30	-17.7-(-28.5)	22.3-11.4
1.705-30.0	0.08	30	-21.9	18.0
Frequency (MHz)	**Field strength (microvolts/meter)**	**Measurement distance (meters)**	**Field strength (dBµV/m)**	**Field strength* (dBµV/m)@3m**
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

*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.

6.5 Test Results

JUDGEMENT: Passed

The EUT met the requirements of the F.C.C. Part 15, Subpart C, Section 209 and RSS Gen Issue 5, Section 8.9 specification.

No emissions were detected above the EMI receiver noise level which is at least 6dB below the limit.

6.6 Test Instrumentation Used; Radiated Measurements

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
EMI Receiver	R&S	ESCI7	100724	February 27, 2019	February 28, 2020
EMI Receiver	HP	8542E	3906A00276	February 28, 2019	February 28, 2020
RF Filter Section	HP	85420E	3705A00248	February 28, 2019	February 28, 2020
Active Loop Antenna	EMCO	6502	9506-2950	February 5, 2019	February 28, 2021
Biconical Antenna	EMCO	3110B	9912-3337	May 21, 2019	May 30, 2020
OATS RF Cable	EIM (Huber Suhner)	RG214-11N(X2) RG214/U	-	May 26, 2019	May 30, 2020

Figure 14. Test Equipment Used

6.7 Field Strength Calculation

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors" data disk, using the following equation:

$$FS = RA + AF + CF$$

FS: Field Strength [dBµv/m]
RA: Receiver Amplitude [dBµv]
AF: Receiving Antenna Correction Factor [dB/m]
CF: Cable Attenuation Factor [dB]

Example: FS = 30.7 dBµV (RA) + 14.0 dB (AF) + 0.9 dB (CF) = 45.6 dBµV

No external pre-amplifiers are used.

7. Occupied Bandwidth

7.1 Test Specification

Part 2, Section 2.1049
RSS Gen Issue 5, Section 6.7

7.2 Test Procedure

(Temperature (22°C)/ Humidity (60%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 placed in the chamber on a non-conductive table, 0.8 meters above the ground.

The distance between the E.U.T. and test antenna was 3 meters.
The transmitter unit was operated with normal modulation. The RBW set to the range of 1% to 5% of the OBW. The span was set to ~ 3 times the OBW.
99% occupied bandwidth function was set on.

7.3 Test Limit

N/A

7.4 Test Results

Frequency	Result
(MHz)	(kHz)
13.56	10.98

Figure 15. Bandwidth Test Results

JUDGEMENT: Passed

See additional information in *Figure 16*.

Occupied Bandwidth

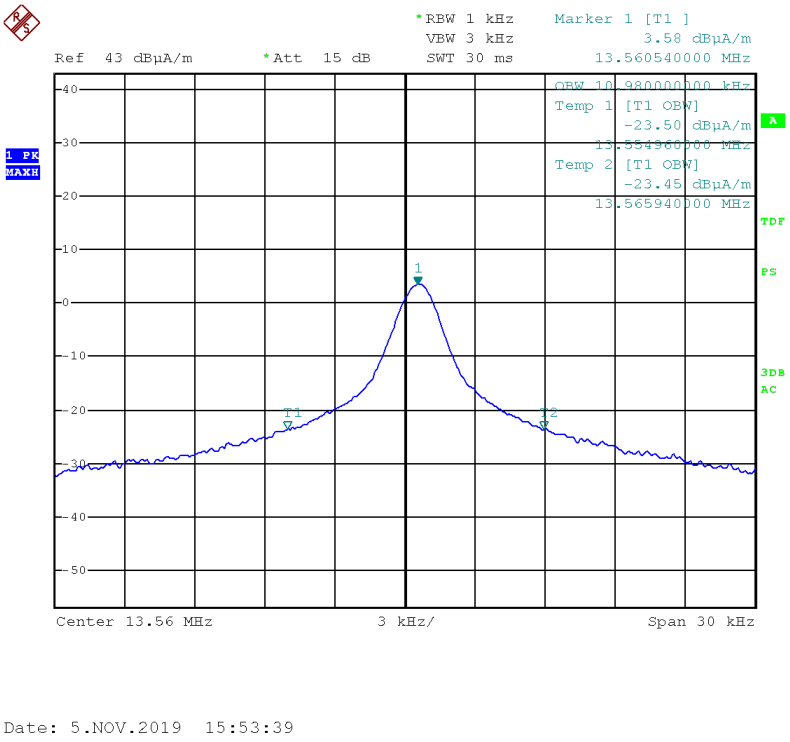

Figure 16 Occupied Bandwidth

7.5 Test Equipment Used; Occupied Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	R&S	FSL6	100194	March 24, 2019	March 31, 2020
Loop Antenna	EMCO	6502	9506- 2950	February 5, 2019	February 28, 2021
RF Cable	Commscope ORS (Serge)	0623 WBC-400	G020132	December 24, 2018	December 31, 2019
Semi Anechoic Chamber	ETS	S81	SL 11643	NCR	NCR

Figure 17 Test Equipment Used

8. Frequency Stability

8.1 Test Specification

Part 15, Subpart C, Sections 225(e)
RSS Gen Issue 5, Section 6.11

8.2 Test Procedure

(Temperature (20°C)/ Humidity (58%RH))

The E.U.T operation mode and test setup are as described in Section 2.

The E.U.T. was placed inside a temperature chamber. The power to the AC/DC adapter was supplied by a variac .The E.U.T. was operated from 132.2VAC, 115.0VAC and 97.7VAC at normal temperature and the chamber temperature was set to +25°C.

The spectrum analyzer was set to 10.0 kHz span and 1.0 kHz RBW, and 1.0 kHz VBW, counter function was set on.

The carrier frequency was measured and recorded after at least 20 minutes of exposing the E.U.T. to the temperature.

8.3 Test Limit

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency: 0.01*(13.56M/100) = ±1356Hz

8.4 Test Results

The E.U.T met the requirements of Part 15, Subpart C, Sections 225(e) and RSS Gen Issue 5, Section 6.11specifications.

The details of the results are given in *Figure 18.*

Frequency Stability

Temperature (°C)	Voltage (VAC)	Frequency (kHz)	Drift (kHz)
+25.0	97.7	13,560.447	+0.14
	115.0	**13,560.433**	**-**
	132.2	13,560.422	-0.11
-20.0	115.0	13,560.400	-0.33
-10.0	115.0	13,560.462	+0.29
0.0	115.0	13,560.438	+0.05
+10.0	115.0	13,560.476	+0.43
+20.0	115.0	13,560.480	+0.47
+30.0	115.0	13,560.499	+0.66
+40.0	115.0	13,560.500	+0.67
+50.0	115.0	13,560.511	+0.78

Figure 18 Frequency Stability Results

8.5 Test Instruments Used; Frequency Stability

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration Date	Next Calibration Due
Spectrum Analyzer	R&S	FSL6	100194	March 24, 2019	March 31, 2020
Environmental Chamber	THERMOTRON CORP	SM 32C Mini Max	25-1030	NCR	NCR
Variable Voltage Transformer	Variac Voltage Co.	-	-	NCR	NCR

Figure 19 Test Instruments Used Frequency Stability

9. APPENDIX B - CORRECTION FACTORS

9.1 Correction factors for for RF OATS Cable

Frequency (MHz)	loss (dB)
30.0	1.3
50.0	1.7
100.0	2.6
200.0	3.7
300.0	4.7
400.0	5.5
500.0	6.3
600.0	7.0
700.0	7.6
800.0	8.4
900.0	9.0
1000.0	9.6

9.2 Correction factors for RF CABLE for Anechoic Chamber

FREQ (MHz)	LOSS (dB)
1000.0	1.5
2000.0	2.1
3000.0	2.7
4000.0	3.1
5000.0	3.5
6000.0	4.1
7000.0	4.6
8000.0	4.9
9000.0	5.7
10000.0	5.7
11000.0	6.1
12000.0	6.1
13000.0	6.2
14000.0	6.7
15000.0	7.4
16000.0	7.5
17000.0	7.9
18000.0	8.1
19000.0	8.8
20000.0	9.1

9.3 Correction factors for ACTIVE LOOP ANTENNA

F(MHz)	AF(dB/m)
0.01	18.4
0.02	14.3
0.03	13.3
0.05	11.7
0.1	11.4
0.2	11.2
0.3	11.2
0.5	11.2
0.7	11.2
1	11.4
2	11.5
3	11.5
4	11.4
5	11.3
6	11.1
7	11.1
8	11.1
9	11
10	11
20	10
30	8

9.4 Correction factors for Log Periodic Antenna

Frequency [MHz]	AF [dB/m]
200	11.58
250	12.04
300	14.76
400	15.55
500	17.85
600	18.66
700	20.87
800	21.15
900	22.32
1000	24.22

9.5 Correction factors for Biconical Antenna

Frequency [MHz]	AF [dB/m]
30	13.00
35	10.89
40	10.59
45	10.63
50	10.12
60	9.26
70	7.74
80	6.63
90	8.23
100	11.12
120	13.16
140	13.07
160	14.80
180	16.95
200	17.17