



**Date: 20 September 2022**

**I.T.L. Product Testing Ltd.  
FCC Radio Test Report**

**for**

**Nexite Ltd.**

**Equipment under test:**

**Radio Frequency Identification System**

**Reader 1.1**

Tested by:

M. Zohar

Approved by: I. Mansky

pp. I. Cohen:

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## Measurement/Technical Report for

# Nexite Ltd.

## Radio Frequency Identification System

### Reader 1.1

FCC ID: 2A6MX13EA2A6MX

This report concerns: Original Grant

Equipment type: FCC, Part 15, Subpart C, FHSS

Limits used: 47CFR, Section 15.247

Measurement procedures used: FCC Public Notice DA-00-705, ANSI C63.10: 2013.

#### Prepared by:

R. Ezrah  
I.T.L. Product Testing Ltd.  
1 Bat Sheva St., Lod 7116002, Israel  
Email: rame@itlglobal.org

#### Applicant:

Nir Halfon  
Nexite Ltd.  
126 Yigal Alon St., Tel Aviv 6744332, Israel  
Email: nir@nexite.io



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## 1. General Information

### 1.1 Administrative Information

Manufacturer: Nexite Ltd.  
Manufacturer's Address: 126 Yigal Alon, Tel Aviv 6744332, Israel  
Tel: +972-54-4804649  
Manufacturer's Representative: Nir Halfon  
Equipment Under Test (E.U.T): Radio Frequency Identification System  
Equipment Model: Reader 1.1  
Equipment Serial No.: Not designated  
Date of Receipt of E.U.T: May 08, 2022  
Start of Test: May 08, 2022  
End of Test: August 04, 2022  
Test Laboratory Location: I.T.L. (Product Testing) Ltd.  
1 Bat Sheva St., Lod 7120101  
ISRAEL  
Test Specifications: 47CFR15 Section 15.247

### 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. 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 E.U.T. is a Radio Frequency Identification System that transmits RF in the frequency band 865 - 868 MHz and contains a BLE receiver.

Type of Equipment													
<input checked="" type="checkbox"/>	Standalone (Equipment with/without its own control provisions)												
<input type="checkbox"/>	Combined (Equipment where radio part is fully integrated with another type of equipment)												
<input type="checkbox"/>	Plug in card (Equipment intended for a variety of host systems)												
Intended Use			Condition of use										
<input checked="" type="checkbox"/>	Fixed		Always of distance >2m from the people										
<input type="checkbox"/>	Mobile		Always of distance >20cm from the people										
<input type="checkbox"/>	Portable		Always of distance <20cm to human body										
Assigned frequency band			FCC 15.247 – 902 – 928MHz										
Operational frequencies			902.5 – 927.5MHz										
Maximum rated output power			At transmitter 50Ω RF output connector [dBm]	30dBm									
			Effective Radiated Power (for equipment without RF connector)	N/A									
Antenna Connection													
<input type="checkbox"/>	Unique Coupling	<input checked="" type="checkbox"/>	Standard Connection	<input type="checkbox"/>	Integral	<input checked="" type="checkbox"/>	With temporary RF connector						
						<input type="checkbox"/>	Without temporary RF connector						
Antenna Gain(peak)			5.5 dBi (8.5 dBiC)										
Operating channel bandwidth			N/A (CW)										
Type of modulation			N/A (CW)										
Bit rate			N/A (CW)										
Maximum transmitter duty cycle			100%										
Transmitter power source													
<input checked="" type="checkbox"/>	AC		Nominal rated voltage	230V AC (VIA PoE supplied 54V DC)									
<input type="checkbox"/>	DC		Nominal rated voltage										
<input type="checkbox"/>	Battery		Nominal rated voltage										
POE injector details			Manufactury :D-LINK model: DPE-301GI										
AC/DC power supply details			Manufactury :Shenzhen Gospell Digital Technology model: GO753-540-060										

### 1.4 Test Methodology

Radiated testing was performed according to the procedures in KDB 558074 D01 v05, ANSI C63.10: 2013 a. Radiated testing was performed at an antenna to E.U.T. distance of three meters.

### 1.5 Test Facility

Emission 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 its FCC Designation number is 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):

± 3.6 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 RFID transmitter at the frequency band 902-928MHz
2. Testing was performed using conducted method, while the E.U.T. was connected to a spectrum analyzer via a 40dB external attenuator.
3. For radiated spurious emission tests, the E.U.T. was evaluated at the “worst case” radiation installation position orientation (Y axis).

### 2.2 E.U.T. Exercise Software

No special exercise software was used.

### 2.3 Special Accessories

No special accessories were needed in order to achieve compliance.

### 2.4 Equipment Modifications

No modifications were needed in order to achieve compliance.

### 2.5 Configuration of Tested System

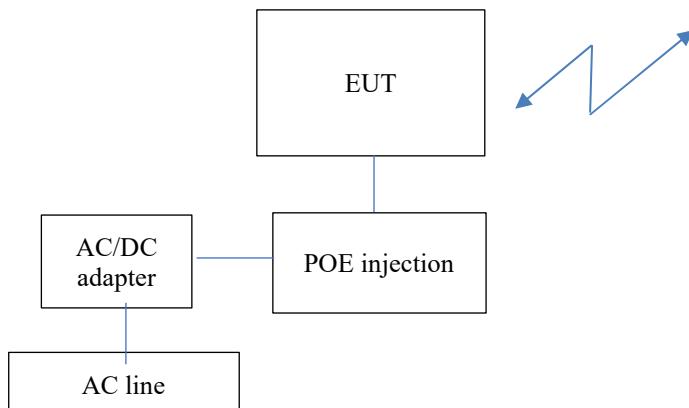
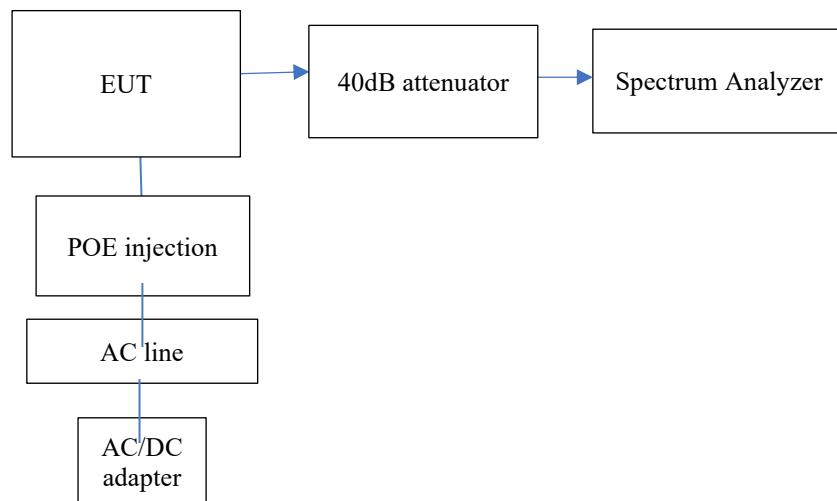


Figure 1. Radiated Test Setup



**Figure 2. Conducted Test Set-Up**



### 3. Conducted and Radiated Measurement Test Setup Photos

See a separate file.



## 4. Conducted Emission from AC Mains

### 4.1 Test Specification

FCC Part 15, Subpart C, Section 15.207  
RSS Gen, Issue 5, Clause 8.8

### 4.2 Test Procedure

(Temperature (22°C)/ Humidity (56%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  $\mu$ Hn 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 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.

The E.U.T was evaluated in TX operation mode.

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 (dB $\mu$ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\* Decreases with the logarithm of the frequency.



#### 4.4 Test Results

JUDGEMENT: Passed by -1.30 dB

The margin between the emission levels and the specification limit is, in the worst case, -1.97 dB for the phase line at 8.154 MHz and -1.30 dB at 8.154 MHz for the neutral line.

The E.U.T. met the F.C.C. Part 15, Subpart C specification requirements.

The details of the highest emissions are given in *Figure 3* to *Figure 6*.



## Conducted Emission

E.U.T Description: Radio Frequency Identification System  
Type: Reader 1.1  
Serial Number: Not designated

Specification: FCC Part 15, Subpart C;  
RSS Gen, Issue 5, Clause 8.8  
Lead: Phase  
Detectors: Peak, Quasi-peak, Average  
Power Operation: AC/DC Adaptor

EDIT PEAK LIST (Final Measurement Results)					
Trace1:	CE22BQP	Trace2:	CE22BAP	Trace3:	---
		TRACE	FREQUENCY	LEVEL dB $\mu$ V	DELTA LIMIT dB
1	Quasi Peak	166 kHz		39.26	-25.89
2	Average	166 kHz		20.64	-34.51
1	Quasi Peak	426 kHz		25.93	-31.39
2	Average	426 kHz		19.80	-27.53
2	Average	478 kHz		31.15	-15.21
1	Quasi Peak	482 kHz		36.09	-20.21
1	Quasi Peak	874 kHz		32.05	-23.94
2	Average	874 kHz		31.88	-14.11
1	Quasi Peak	2.038 MHz		38.34	-17.65
2	Average	2.038 MHz		37.83	-8.16
1	Quasi Peak	3.494 MHz		34.23	-21.76
2	Average	3.494 MHz		32.28	-13.71
1	Quasi Peak	3.786 MHz		35.88	-20.12
2	Average	3.786 MHz		33.72	-12.27
1	Quasi Peak	8.154 MHz		49.85	-10.14
2	Average	8.154 MHz		48.02	-1.97
1	Quasi Peak	11.354 MHz		30.40	-29.59
2	Average	11.354 MHz		25.05	-24.94
1	Quasi Peak	24.022 MHz		30.28	-29.71
2	Average	24.022 MHz		29.23	-20.76

Date: 8.MAY.2022 12:25:08

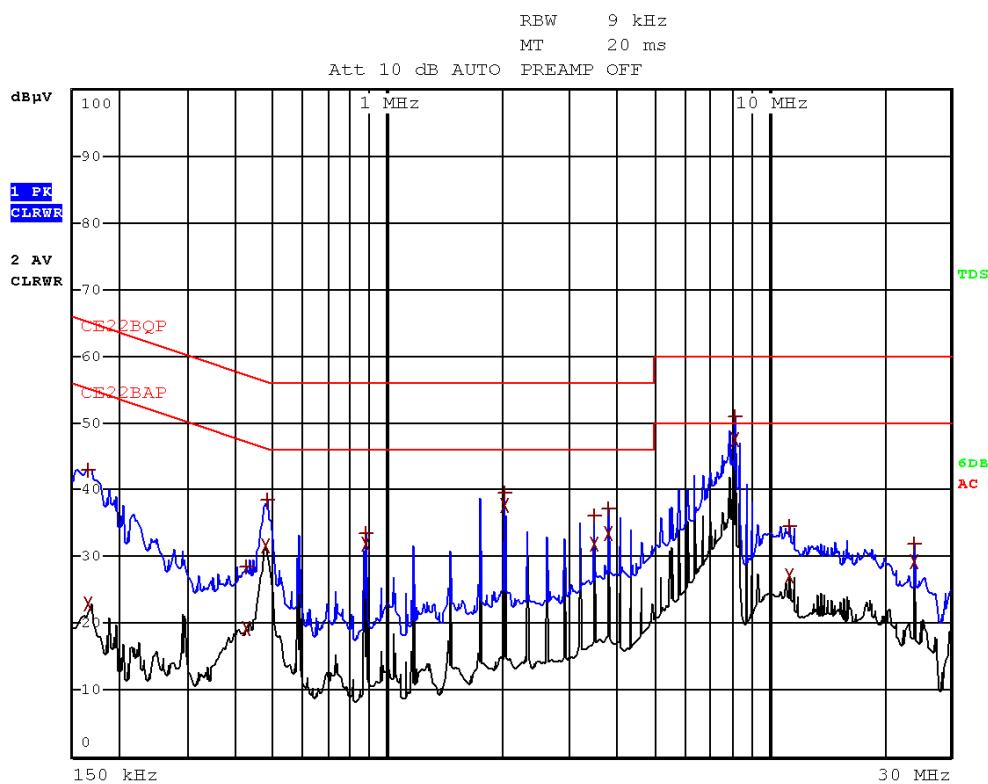
**Figure 3. Detectors: Peak, Quasi-peak, Average**

*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

E.U.T Description      Radio Frequency Identification System  
Type                      Reader 1.1  
Serial Number:           Not designated  
  
Specification:           FCC Part 15, Subpart C;  
                            RSS Gen, Issue 5, Clause 8.8  
Lead:                      Phase  
Detectors:                Peak, Quasi-peak, Average  
Power Operation           AC/DC Adapter



Date: 8.MAY.2022 12:23:45

**Figure 4. Detectors: Peak, Quasi-peak, Average**



## Conducted Emission

E.U.T Description      Radio Frequency Identification System  
Type                      Reader 1.1  
Serial Number:           Not designated

Specification:           FCC Part 15, Subpart C;  
                            RSS Gen, Issue 5, Clause 8.8  
Lead:                      Neutral  
Detectors:                Peak, Quasi-peak, Average  
Power Operation           AC/DC Adapter

EDIT PEAK LIST (Final Measurement Results)					
Trace1:	CE22BQP				
Trace2:	CE22BAP				
Trace3:	---				
	TRACE	FREQUENCY	LEVEL dB $\mu$ V	DELTA	LIMIT dB
1	Quasi Peak	154 kHz	39.76	-26.01	
2	Average	190 kHz	18.62	-35.40	
1	Quasi Peak	426 kHz	27.06	-30.26	
2	Average	426 kHz	21.28	-26.04	
2	Average	482 kHz	31.16	-15.14	
1	Quasi Peak	486 kHz	35.90	-20.32	
1	Quasi Peak	874 kHz	32.65	-23.34	
2	Average	874 kHz	32.26	-13.73	
1	Quasi Peak	2.038 MHz	38.70	-17.29	
2	Average	2.038 MHz	37.95	-8.04	
1	Quasi Peak	3.494 MHz	34.82	-21.17	
2	Average	3.494 MHz	32.58	-13.41	
1	Quasi Peak	3.786 MHz	36.58	-19.41	
2	Average	3.786 MHz	34.27	-11.72	
1	Quasi Peak	8.154 MHz	50.53	-9.46	
2	Average	8.154 MHz	48.69	-1.30	
1	Quasi Peak	11.066 MHz	31.69	-28.30	
2	Average	11.358 MHz	26.93	-23.06	
1	Quasi Peak	24.022 MHz	32.03	-27.96	
2	Average	24.022 MHz	31.77	-18.22	

Date: 8.MAY.2022 12:30:26

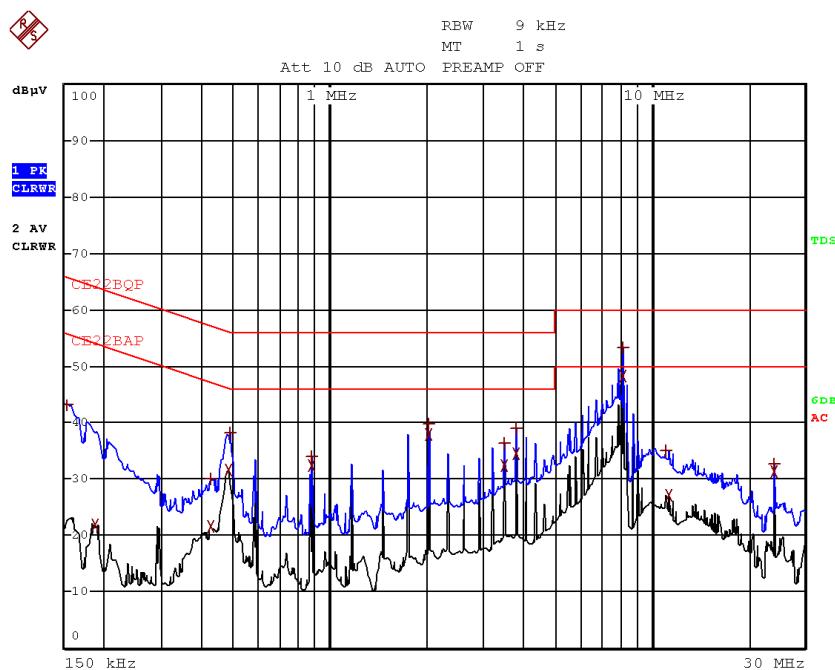
**Figure 5. Detectors: Peak, Quasi-peak, Average**

**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

E.U.T Description      Radio Frequency Identification System  
Type                      Reader 1.1  
Serial Number:           Not designated  
  
Specification:           FCC Part 15, Subpart C;  
                            RSS Gen, Issue 5, Clause 8.8  
Lead:                      Neutral  
Detectors:                Peak, Quasi-peak, Average  
Power Operation           AC/DC Adapter



Date: 8.MAY.2022 12:29:18

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



#### 4.5 *Test Equipment Used; Conducted Emission*

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
LISN	Fischer	FCC-LISN-25A	127	4-Nov-22	4-Nov-23
Transient Limiter	HP	11947A	3107A03041	14-Sep-21	14-Sep-22
EMI Receiver	Rohde & Schwarz	ESCI7	100724	20-Feb-22	20-Feb-23
RF CABLE	Suhner	-	-	13-Jul-21	13-Aug-22

**Figure 7 Test Equipment Used**



## 5. 20dB Minimum Bandwidth

### 5.1 Test Specification

FCC, Part 15, Subpart C, Section 15.247(a)(1)

### 5.2 Test Procedure

(Temperature (20°C)/ Humidity (51%RH))

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable. The transmitter unit operated with normal modulation.

The spectrum analyzer was set to the following parameters:

Span = ~ 2 to 3 times the 20 dB bandwidth, centered on a hopping channel

RBW  $\geq$  1% of the 20 dB bandwidth

Detector Function: Peak, Trace: Maximum Hold.

### 5.3 Test Limit

The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

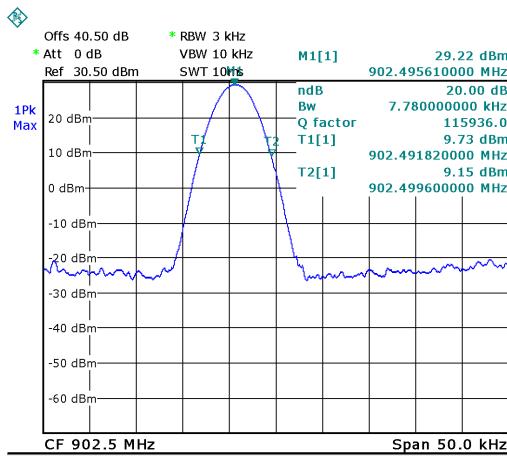
### 5.4 Test Results

Operation Frequency (MHz)	Bandwidth Reading (kHz)
902.8	7.78
915.2	7.78
927.2	7.88

**Figure 8 Test Results**

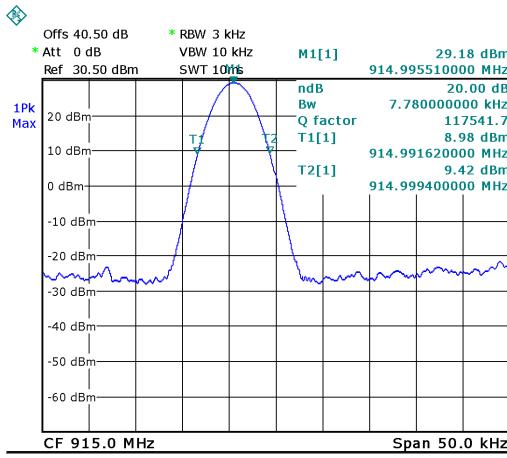
JUDGEMENT: Passed

For additional information see *Figure 9* to *Figure 11*.



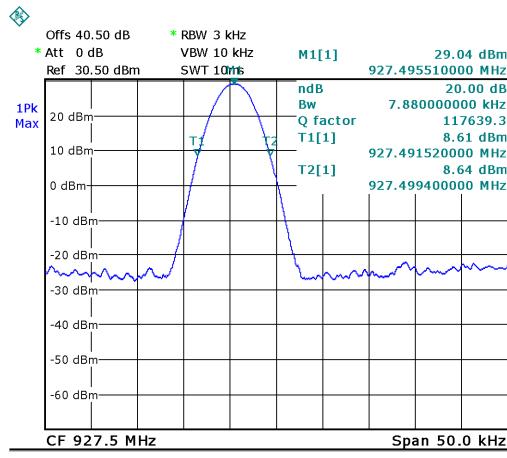
Date: 22.MAY.2022 10:15:22

Figure 9. 902.5MHz



Date: 22.MAY.2022 10:17:22

Figure 10. 915.0MHz



Date: 22.MAY.2022 10:18:54

Figure 11. 927.5MHz



## 5.5 Test Equipment Used, 20 dB Minimum Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	HP	8564E	3442A00275	23-Feb-22	23-Feb-23
30dB Attenuator	MCL	BW-S30W5	533	16-May-22	16-May-23
Low Loss Cable	Huber Suhner	Sucoflex	27504/4PEA	16-May-22	16-May-23

Figure 12 Test Equipment Used



## 6. Occupied Bandwidth

### 6.1 Test Specification

FCC, Part 15, Subpart C, Section 2.1048

### 6.2 Test Procedure

(Temperature (20°C)/ Humidity (51%RH))

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable. The transmitter unit operated with normal modulation.

The spectrum analyzer was set to the following parameters:

Span between 1.5 times and 5.0 times the OBW.

RBW in the range of 1% to 5% of the OBW.

Detector Function: Peak, Trace: Maximum Hold.

99% occupied bandwidth function set on.

### 6.3 Test Limit

N/A

### 6.4 Test Results

Operation Frequency (MHz)	Bandwidth Reading (kHz)
902.5	6.587
915	6.587
927.5	6.587

Figure 13 Test Results

JUDGEMENT: Passed

For additional information see *Figure 14* to *Figure 16*.

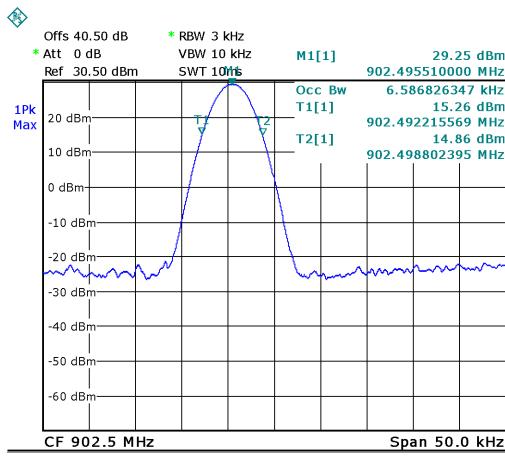


Figure 14. 902.5MHz

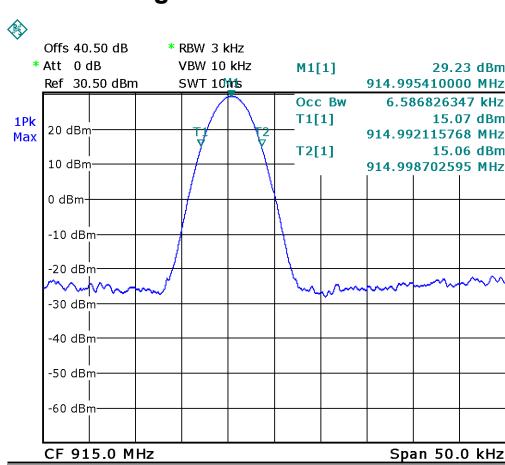


Figure 15. 915MHz

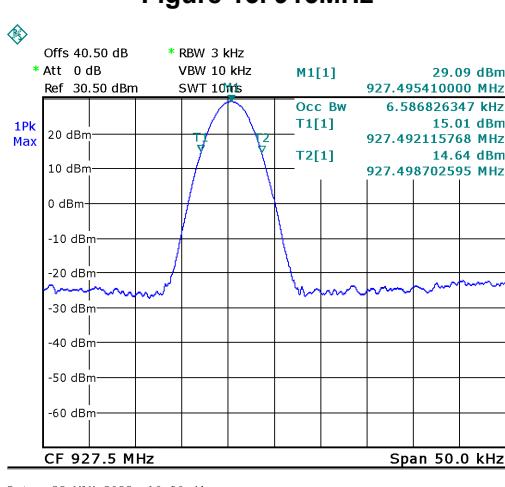


Figure 16. 927.5MHz



## 6.5 Test Equipment Used, Occupied Bandwidth

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	HP	8564E	3442A00275	23-Feb-22	23-Feb-23
30dB Attenuator	MCL	BW-S30W5	533	16-May-22	16-May-23
Low Loss Cable	Huber Suhner	Sucoflex	27504/4PEA	16-May-22	16-May-23

Figure 17 Test Equipment Used



## 7. Number of Hopping Frequencies

### 7.1 Test Specification

FCC, Part 15, Subpart C Section 15.247(a)(1)(iii)

### 7.2 Test Procedure

(Temperature (20°C)/ Humidity (51%RH))

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable.

The E.U.T. was set to hopping mode.

The spectrum analyzer was set to the following parameters:

Band of Operation: 902.0-928.0 MHz

RBW: 30 kHz, VBW: 100 kHz

Detector Function: Peak, Trace: Maximum Hold

### 7.3 Test Limit

20 dB bandwidth	hopping frequencies
<250kHz	$\geq 50$
$\geq 250\text{kHz}$	$\geq 25$

### 7.4 Test Results

Number of Hopping Frequencies	Limit
249	$\geq 50$

Figure 18 Test Results

JUDGEMENT: Passed

For additional information see *Figure 19* to *Figure 21*.

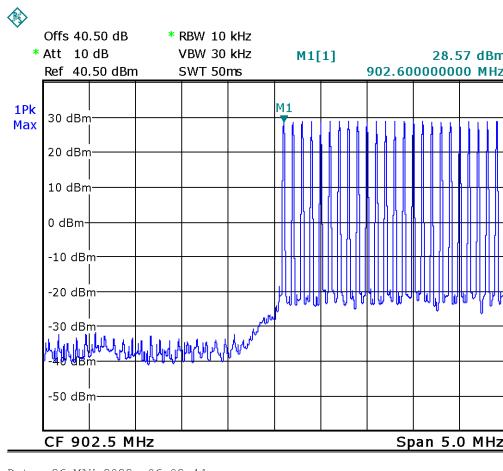


Figure 19. Number of Channels, 900MHz – 905MHz

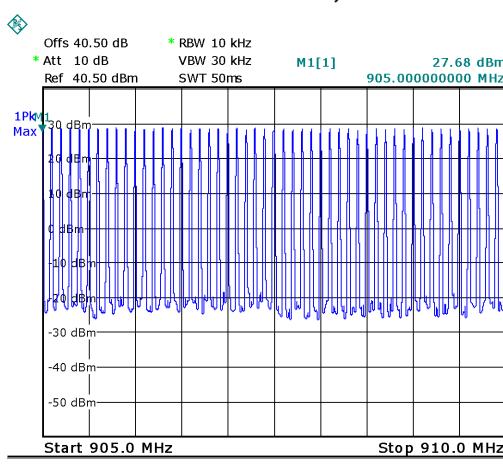


Figure 20. Number of Channels, 905MHz – 910MHz

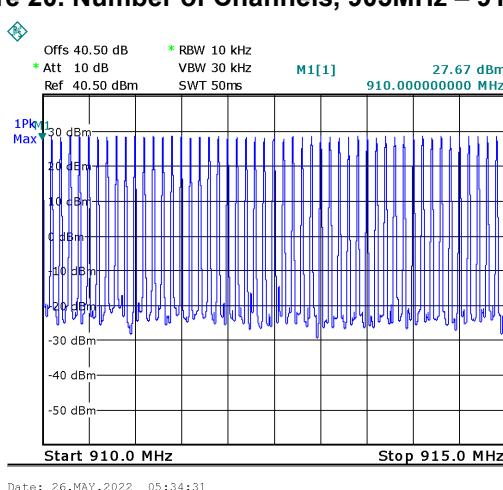


Figure 21. Number of Channels, 910MHz – 915MHz

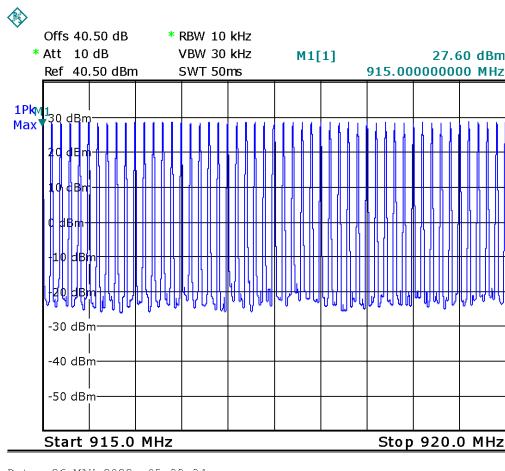


Figure 22. Number of Channels, 915MHz – 920MHz

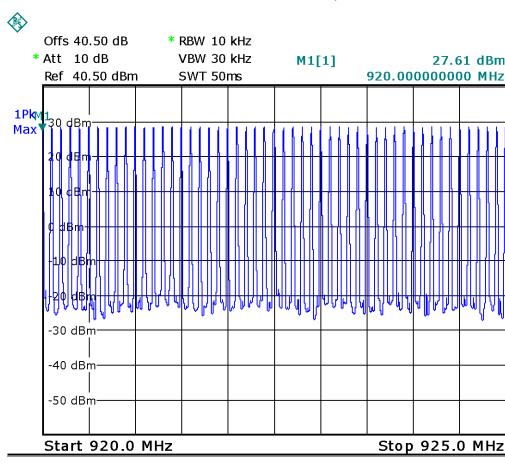


Figure 23. Number of Channels, 920MHz – 925MHz

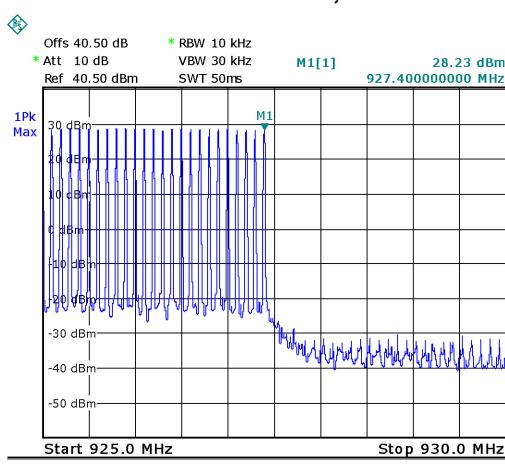


Figure 24. Number of Channels, 925MHz – 930MHz



## 7.5 Test Equipment Used, Number of Hopping Frequencies

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	HP	8564E	3442A00275	23-Feb-22	23-Feb-23
30dB Attenuator	MCL	BW-S30W5	533	16-May-22	16-May-23
Low Loss Cable	Huber Suhner	Sucoflex	27504/4PEA	16-May-22	16-May-23

Figure 25 Test Equipment Used



## 8. Channel Frequency Separation

### 8.1 Test Specification

FCC, Part 15, Subpart C, 15.247(a) (1)

### 8.2 Test Procedure

(Temperature (20°C)/ Humidity (51%RH))

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable.

The E.U.T. was set to hopping mode.

The spectrum analyzer was set to the following parameters:

Span = wide enough to capture two adjacent channels,  $RBW \geq 1\%$  of the span  
Detector Function: Peak, Trace: Maximum Hold.

### 8.3 Test Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

### 8.4 Test Results

Channel Frequency Separation (kHz)	Limit (kHz)
100.0	>25

Figure 26 Test Results

JUDGEMENT: Passed

For additional information see *Figure 27*.

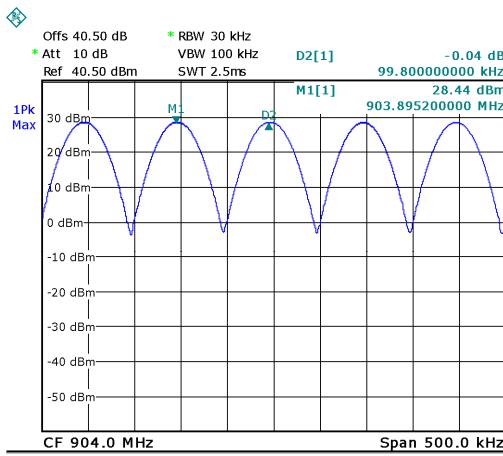


Figure 27. Channel Frequency Separation

## 8.5 Test Equipment Used, Channel Frequency Separation Test

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	HP	8564E	3442A00275	23-Feb-22	23-Feb-23
30dB Attenuator	MCL	BW-S30W5	533	16-May-22	16-May-23
Low Loss Cable	Huber Suhner	Sucoflex	27504/4PEA	16-May-22	16-May-23

Figure 28 Test Equipment Used



## 9. Peak Output Power

### 9.1 Test Specification

FCC Part 15, Subpart C: section 15.247(b)(1)

### 9.2 Test Procedure

(Temperature (20°C)/ Humidity (51%RH))

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable (total loss= 40.5dB).

The spectrum analyzer was set to the following parameters:

Span = ~5 times the 20 dB bandwidth, centered on a hopping channel RBW  $\geq$  of the 20 dB bandwidth of the emission being measured

Detector Function: Peak, Trace: Maximum Hold.

### 9.3 Test Limit

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels, and 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels (the limits above apply to antenna gain up to 6dBi).

### 9.4 Test Results

Operation Frequency (MHz)	Power (dBm)	Power (mW)	Limit (mW)	Margin (mW)
902.5	29.2	827.9	1000.0	172.1
915.0	29.2	829.9	1000.0	170.1
927.5	29.0	799.8	1000.0	200.2

Figure 29 Power Output Test Results

JUDGEMENT: Passed

For additional information see *Figure 30* to *Figure 32*.

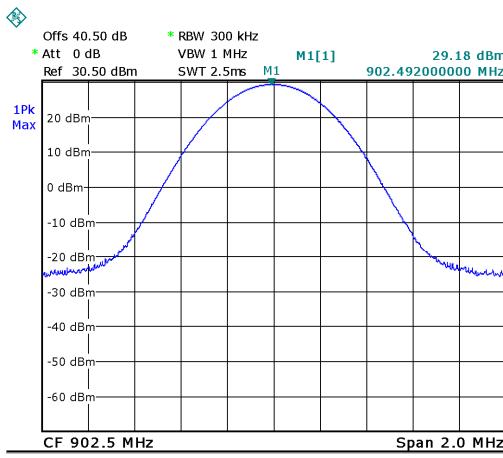


Figure 30. 902.5MHz

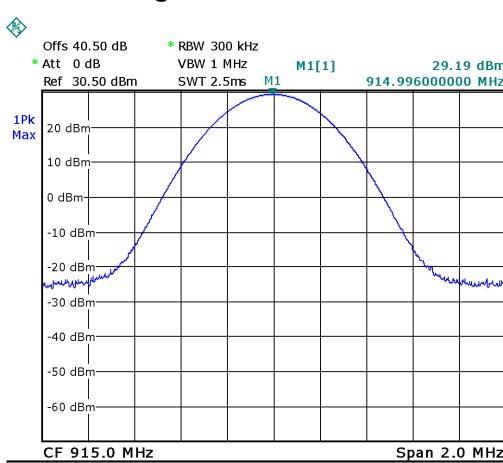


Figure 31. 915MHz

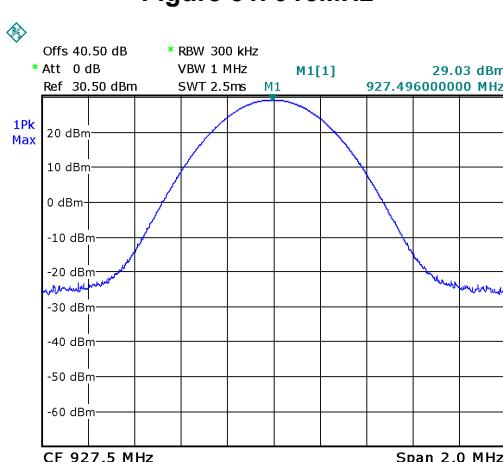


Figure 32. 927.5MHz



## 9.5 Test Equipment Used, Peak Output Power

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	HP	8564E	3442A00275	23-Feb-22	23-Feb-23
30dB Attenuator	MCL	BW-S30W5	533	16-May-22	16-May-23
Low Loss Cable	Huber Suhner	Sucoflex	27504/4PEA	16-May-22	16-May-23

Figure 33 Test Equipment Used.



## 10. Dwell Time on Each Channel

### 10.1 Test Specification

FCC Part 15, Part C, Section 15.247(a)(1)(iii)

### 10.2 Test Procedure

(Temperature (20°C)/ Humidity (51%RH))

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable.

The spectrum analyzer was set to the following parameters:

Span = zero span, centered on a hopping channel,  $RBW \geq 1\text{MHz}$

Detector Function: Peak, Trace: Maximum Hold

### 10.3 Test Limit

For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period

### 10.4 Test Results

JUDGEMENT: Passed

The E.U.T met the requirements of the FCC Part 15, Section 15.247(d).

Additional information of the results is given in *Figure 34* to *Figure 35*

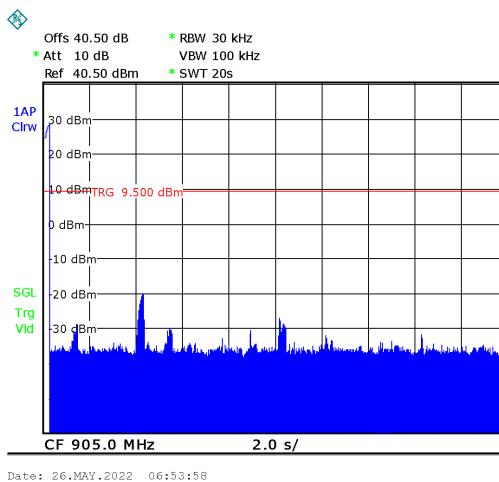


Figure 34 Number of Bursts in 20 sec: 1

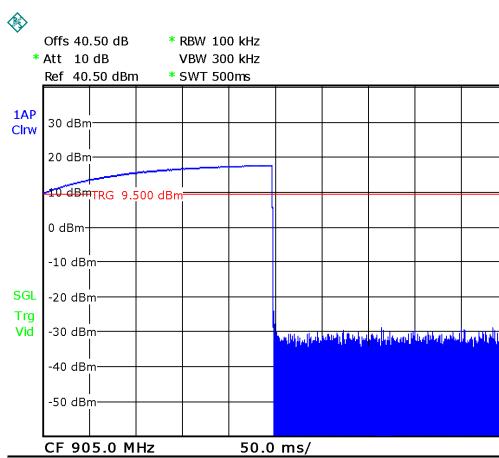


Figure 35 Burst Duration = 250msec

Dwell Time= 1\*250m=250m < 400msec

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

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	HP	8564E	3442A00275	23-Feb-22	23-Feb-23
30dB Attenuator	MCL	BW-S30W5	533	16-May-22	16-May-23
Low Loss Cable	Huber Suhner	Sucoflex	27504/4PEA	16-May-22	16-May-23

Figure 36 Test Equipment Used



## 11. Band Edge

### 11.1 Test Specification

FCC Part 15, Section 15.247(d)

### 11.2 Test Procedure

(Temperature (20°C)/ Humidity (51%RH))

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable.

The transmitter unit operated in 2 modes: hopping enabled and hopping disabled. The RBW was set to 100 kHz.

The EMI receiver was adjusted to the transmission channel at the maximum level. The display line was set to 20 dBc and the EMC analyzer was set to the band edge frequencies.

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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

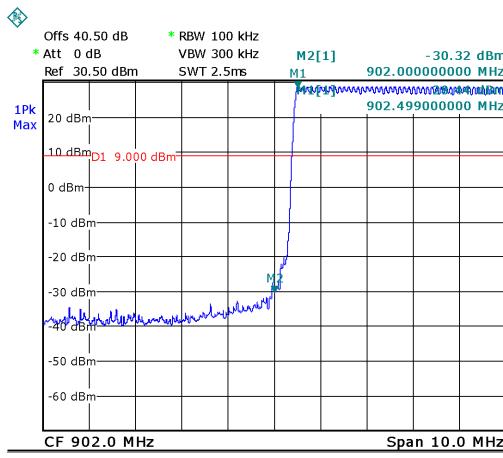
### 11.4 Test Results

Mode	Operation Frequency (MHz)	Band Edge Frequency (MHz)	Spectrum Level (dBm)	Limit (dBm)	Margin (dB)
Hopping	902.5	902.0	-30.32	8.44	38.76
	927.5	928.0	-33.01	8.34	41.35
Non-Hopping	902.5	902.0	-23.48	9.21	32.69
	927.5	928.0	-26.28	9.04	35.32

Figure 37 Band Edge Test Results

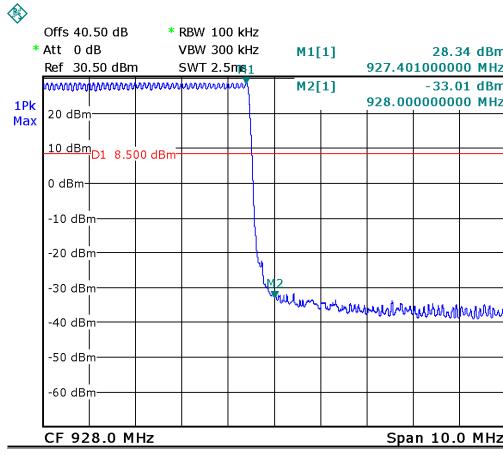
JUDGEMENT: Passed

For additional information see *Figure 38* to *Figure 41*.



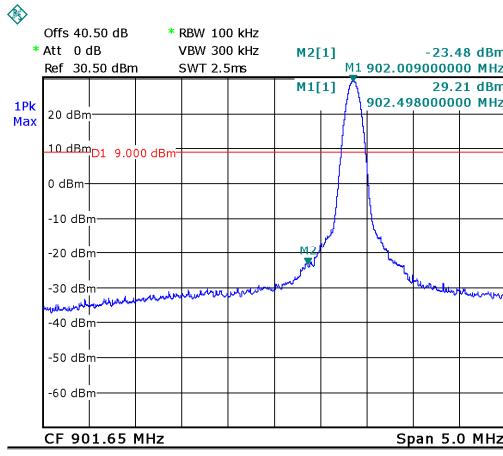
Date: 22.MAY.2022 12:14:37

**Figure 38 Hopping, Band Edge Low**



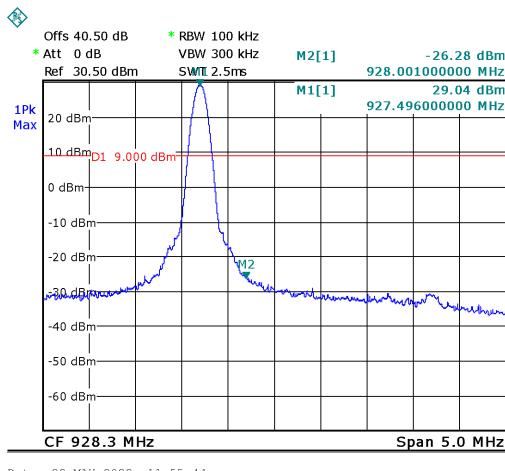
Date: 22.MAY.2022 12:37:57

**Figure 39 Hopping, Band Edge High**



Date: 22.MAY.2022 11:58:29

**Figure 40 Non-hopping, Band Edge Low**



Date: 22.MAY.2022 11:55:44

Figure 41 Non-hopping, Band Edge High

## 11.5 Test Equipment Used, Band Edge

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	HP	8564E	3442A00275	23-Feb-22	23-Feb-23
30dB Attenuator	MCL	BW-S30W5	533	16-May-22	16-May-23
Low Loss Cable	Huber Suhner	Sucoflex	27504/4PEA	16-May-22	16-May-23

Figure 42 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 (20°C)/ Humidity (52%RH))

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

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through an external attenuator and an appropriate coaxial cable (max total loss=42.0 dB).

Special attention was taken to prevent Spectrum Analyzer RF input overload.

RBW was set to 100 kHz, 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 E.U.T. met the requirements of the F.C.C. Part 15, Subpart C, Section 247 (d)

For additional information see *Figure 43* to *Figure 45*.

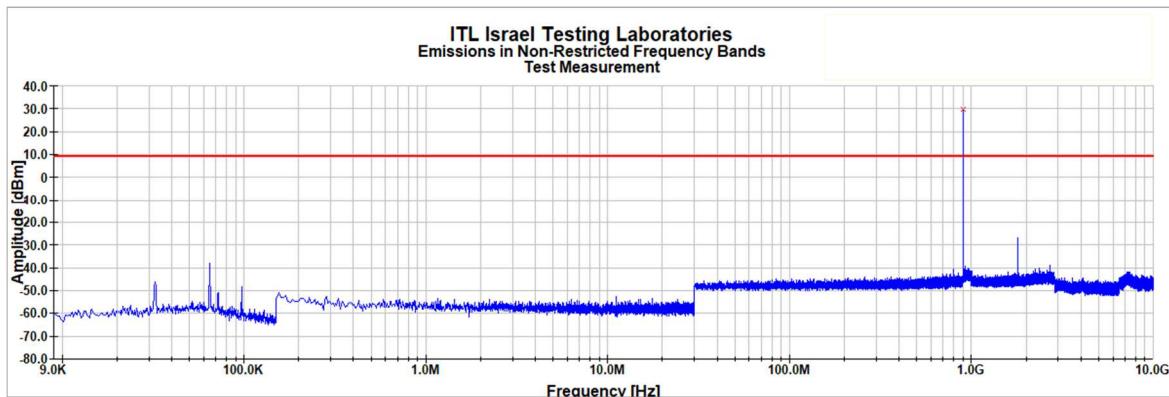


Figure 43 Conducted Spurious Emission - 902.5 MHz

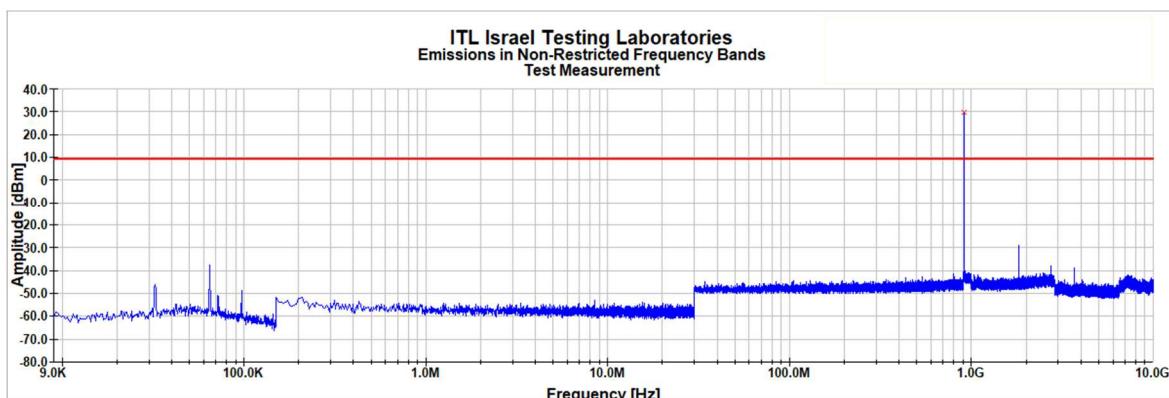


Figure 44 Conducted Spurious Emission - 915 MHz

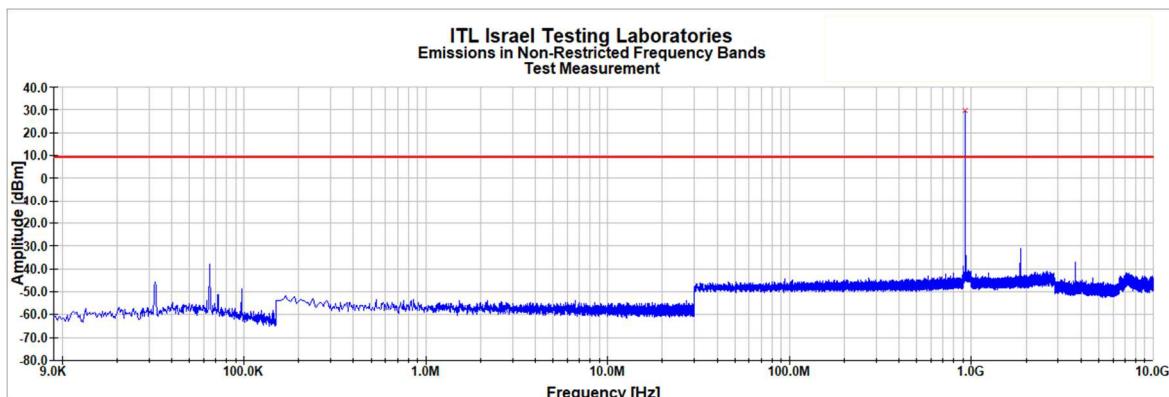


Figure 45 Conducted Spurious Emission – 927.5 MHz

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

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	HP	8564E	3442A00275	23-Feb-22	23-Feb-23



Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
30dB Attenuator	MCL	BW-S30W5	533	16-May-22	16-May-23
Low Loss Cable	Huber Suhner	Sucoflex	27504/4PEA	16-May-22	16-May-23

**Figure 46 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 (56%RH))

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

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

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, 0.8 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-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 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 frequency range 30.0MHz -1.0GHz was scanned and the list of the highest emissions was verified and updated accordingly.

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.

#### For measurements between 1.0GHz-10.0GHz:

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 1.0GHz -10.0GHz 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.

### 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* (dB $\mu$ V/m)	Field strength* @3m (dB $\mu$ V/m)
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



Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)	Field strength* (dB $\mu$ V/m)	Field strength* @3m (dB $\mu$ V/m)
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.

### 13.4 Test Results

JUDGEMENT: Passed

The E.U.T. met the requirements of the FCC, Part 15, Subpart C, Section 209 specification.

For additional information see *Figure 47* and *Figure 48*.



## Radiated Emission

E.U.T Description: Radio Frequency Identification System  
Type: Reader 1.1  
Serial Number: Not designated

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

Antenna Polarization: Horizontal/ Vertical  
Modulation: N/A(CW)

Frequency Range: 9 kHz to 10.0 GHz  
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)
902.5	1,805.0	V	49.3	74.0	-24.7	48.5	54.0	-5.5
	1,805.0	H	49.1	74.0	-24.9	48.1	54.0	-5.9
9150	1,830.0	V	50.5	74.0	-23.5	48.9	54.0	-5.1
	1,830.0	H	49.8	74.0	-24.2	49.0	54.0	-5.0
927.5	1,855.0	V	49.0	74.0	-25.0	48.6	54.0	-5.4
	1,855.0	H	49.3	74.0	-24.7	48.9	54.0	-5.1

**Figure 47. 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.

“Peak Amp” includes correction factor.

\* “Correction Factor” = Antenna Factor + Cable Loss- Low Noise Amplifier Gain

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

Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
EMI Receiver	Rohde & Schwarz	ESCI7	100724	20-Feb-22	20-Feb-23
EMI Receiver	HP	8542E	3906A00276	22-Feb-22	22-Feb-23
RF Filter Section	HP	85420E	3705A00248	22-Feb-22	22-Feb-23



Instrument	Manufacturer	Model	Serial No.	Last Calibration Date	Next Calibration Due
Spectrum Analyzer	HP	8564E	3442A00275	23-Feb-22	23-Feb-23
Active Loop Antenna	EMCO	6502	2950	5-Jul-22	5-Jul-23
Biconical Antenna	EMCO	3110B	9912-3337	18-Jan-22	18-Jan-24
Log Periodic Antenna	EMCO	3146	9505-4081	April 27, 2021	April 27, 2024
Horn Antenna	ETS	3115	29845	May 25, 2021	May 25, 2024
MicroWave System Amplifier	HP	83006A	3104A00589	August 23, 2020	August 23, 2021
RF Cable Chamber	Commscope ORS	0623 WBC-400	G020133	16-May-2022	16- May-2023
RF Cable Oats	EIM	RG214-11N(X2)		22-Jun-22	22-Jun-23
Filter Band Pass 4-20 GHz	Meuro	MFL040120H50	902252	16-May-22	16-May-23
Semi Anechoic Civil Chamber	ETS	S81	SL 11643	NCR	NCR
Antenna Mast	ETS	2070-2	9608-1497	NCR	NCR
Turntable	ETS	2087	-	NCR	NCR
Mast & Table Controller	ETS/EMCO	2090	9608-1456	NCR	NCR

Figure 48 Test Equipment Used



## 14. Antenna Gain/Information

The antenna gain is 5.5 dBi



## 15. Appendix A - Correction Factors

### 15.1 For ITL #1911 OATS RF Cable

Frequency (MHz)	Cable Loss (dB)	Frequency (MHz)	Cable Loss (dB)
1.0	0.5	450.00	5.83
10.00	1.0	500.00	6.33
20.00	1.34	550.00	6.67
30.00	1.5	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	8.5
300.00	4.5	900.00	8.83
350.00	5.17	950.00	8.84
400.00	5.5	1000.00	9.0



## 15.2 For ITL #1840 Anechoic Chamber RF Cable

Frequency (MHz)	Cable Loss (dB)	Frequency (MHz)	Cable Loss (dB)
1000.0	-1.4	10000.0	-6.0
1500.0	-1.7	10500.0	-6.2
2000.0	-2.0	11000.0	-6.2
2500.0	-2.3	11500.0	-6.0
3000.0	-2.6	12000.0	-6.0
3500.0	-2.8	12500.0	-6.1
4000.0	-3.1	13000.0	-6.3
4500.0	-3.3	13500.0	-6.5
5000.0	-3.6	14000.0	-6.7
5500.0	-3.7	14500.0	-7.0
6000.0	-4.0	15000.0	-7.3
6500.0	-4.4	15500.0	-7.5
7000.0	-4.7	16000.0	-7.6
7500.0	-4.8	16500.0	-8.0
8000.0	-5.0	17000.0	-8.0
8500.0	-5.1	17500.0	-8.1
9000.0	-5.6	18000.0	-8.2
9500.0	-5.8		



### 15.3 For ITL # 1075 Active Loop Antenna

Frequency (MHz)	MAF (dBs/m)	AF (dB/m)
0.01	-33.1	18.4
0.02	-37.2	14.3
0.03	-38.2	13.3
0.05	-39.8	11.7
0.1	-40.1	11.4
0.2	-40.3	11.2
0.3	-40.3	11.2
0.5	-40.3	11.2
0.7	-40.3	11.2
1	-40.1	11.4
2	-40.0	11.5
3	-40.0	11.5
4	-40.1	11.4
5	-40.2	11.3
6	-40.4	11.1
7	-40.4	11.1
8	-40.4	11.1
9	-40.5	11.0
10	-40.5	11.0
20	-41.5	10.0
30	-43.5	8.0



## 15.4 For ITL #1356 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



### 15.5 For ITL # 1349 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

### 15.6 For ITL # 1352 1-18 GHz Horn Antenna

Frequency (MHz)	AF (dB/m)	Frequency (MHz)	AF (dB/m)
0.75	25	9.5	38
1.0	23.5	10.0	38.5
1.5	26.0	10.5	38.5
2.0	29.0	11.0	38.5
2.5	27.5	11.5	38.5
3.0	30.0	12.0	38.0
3.5	31.5	12.5	38.5
4.0	32.5	13.0	40.0
4.5	32.5	13.5	41.0
5.0	33.0	14.0	40.0
5.5	35.0	14.5	39.0
6.0	36.5	15.0	38.0
6.5	36.5	15.5	37.5
7.0	37.5	16.0	37.5
7.5	37.5	16.5	39.0



Frequency (MHz)	AF (dB/m)	Frequency (MHz)	AF (dB/m)
8.0	37.5	17.0	40.0
8.5	38.0	17.5	42.0
9.0	37.5	18.0	42.5

## 15.7 For ITL # 1353 18-26.5 GHz Horn Antenna

### CALIBRATION DATA

#### 3 m distance

Frequency MHZ	Measured antenna factor dB/m
18000	32.4
18500	32.0
19000	32.3
19500	32.4
20000	32.3
20500	32.8
21000	32.8
21500	32.7
22000	33.1
22500	33.0
23000	33.1
23500	33.8
24000	33.5
24500	33.5
25000	33.8
25500	33.9
26000	34.2
26500	34.7

<sup>1)</sup> The antenna factor shall be added to receiver reading in dB $\mu$ V to obtain field strength in dB $\mu$ V/m.

**End of Test Report**