

Limited Test report

341240-3TRFWL

Date of issue: March 28, 2018

Applicant:

MEPS Real-Time Inc.

Product:

Rev-1 RFID Reader

Model: IG-REV-1

Model variant: N/A

FCC ID: SOA-REV

IC Registration number: 22150-REV

Specifications:

◆ **FCC 47 CFR Part 15 Subpart C, §15.247**

Operation in the 902–928 MHz, 2400–2483.5 MHz, 5725–5850 MHz

◆ **RSS-247, Issue 2, February 2017**

Digital Transmission Systems (DTSSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

Test location

Company name	Nemko USA, Inc.
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City	Carlsbad
State	California
Postal code	92008
Country	USA
Telephone	+1 760 444 3500
Website	www.nemko.com
FCC Site Number	Test Firm Registration Number: 392943 Designation Number: US5058
ISED Test Site	2040B-3

Tested by	Nikolay Shtin
Reviewed by	Juan Manuel Gonzalez, EMC & Wireless Business Development Manager
Review date	March 28, 2018
Reviewer signature	

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko USA's ISO/IEC 17025 accreditation.

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Section 1. Report summary

1.1 Applicant and manufacturer

Company name	MEPS Real-Time Inc.
Address	6451 El Camino Real Suite C
City	Carlsbad
State	CA
Postal/Zip code	92009
Country	U.S.A.

1.2 Test specifications

FCC 47 CFR Part 15, Subpart C, Clause 15.247	Operation in the 902–928 MHz, 2400–2483.5 MHz, 5725–5850 MHz
RSS-247, Issue 2, February 2017	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

1.3 Test methods

ANSI C64.3-2014	American National Standard for Methods of Measurement of Radio- Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

1.4 Statement of compliance

In the configuration tested, the EUT was found compliant .

Limited testing was completed against some relevant requirements of the test standard due to new bent monopole RFID antennas designed by MEPS. Results obtained indicate that the product under test complies with the requirements tested. The test results relate only to the items tested and the full radio test data can be find in Impinj's Speedway original certification (FCC ID: TWYIPJREV)

See "Summary of test results" for full details.

1.5 Exclusions

None

1.6 Test report revision history

Revision #	Details of changes made to test report
TRF	Original report issued
1TRF	Add 99% OBW
2TRF	Replace Module by RFID Reader,Added FCC/ISED #,Corrected Section 2.2,2.3, P7 listed 1W/Spurious from new antenna/2.2dBi antenna gain, P12 revise equipment list to add >18GHz horn antenna.
3TRF	Correct Emissions Designator in section 3.3 to G1D

Section 2. Summary of test results

2.1 FCC Part 15 Subpart C, general requirements test results

Part	Test description	Verdict
§15.207(a)	Conducted limits ¹	Pass
§15.31(e)	Variation of power source	Not tested
§15.203	Antenna requirement	Pass ¹
§15.205	Restricted bands of operation	Pass

Notes: ¹ The RFID Reader utilizes four bent monopole RFID antennas positioned to provide complete coverage in the final host. The transmission is performed sequentially (no more than one antenna transmitting at the time).

2.2 FCC Part 15 Subpart C, intentional radiators test results

Part	Test description	Verdict
§15.247(a)(1)	20 dB bandwidth of the hopping channel	Not tested
§15.247(a)(1)(i)	Frequency hopping systems operating in the 902–928 MHz band	Not tested
§15.247(a)(1)(ii)	Frequency hopping systems operating in the 5725–5850 MHz band	Not applicable
§15.247(a)(1)(iii)	Frequency hopping systems operating in the 2400–2483.5 MHz band	Not applicable
§15.247(a)(2)	Minimum 6 dB bandwidth for systems using digital modulation techniques	Not applicable
§15.247(b)(1)	Maximum peak output power of frequency hopping systems operating in the 2400–2483.5 MHz band and 5725–5850 MHz band	Not applicable
§15.247(b)(2)	Maximum peak output power of Frequency hopping systems operating in the 902–928 MHz band	Not tested
§15.247(b)(3)	Maximum peak output power of systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands	Not applicable
§15.247(c)(1)	Fixed point-to-point operation with directional antenna gains greater than 6 dBi	Not applicable
§15.247(c)(2)	Transmitters operating in the 2400–2483.5 MHz band that emit multiple directional beams	Not applicable
§15.247(d)	Spurious emissions	Pass
§15.247(e)	Power spectral density for digitally modulated devices	Not applicable
§15.247(f)	Time of occupancy for hybrid systems	Not applicable

2.3 IC RSS-GEN, Issue 4, test results

Part	Test description	Verdict
7.1.2	Receiver radiated emission limits ¹	Not applicable
7.1.3	Receiver conducted emission limits ¹	Not applicable
8.2	Power Line Conducted Emissions Limits for Licence-Exempt Radio Apparatus	Pass
8.10	Restricted Frequency Bands	Pass

Notes: ¹ According to sections 5.2 and 5.3 of RSS-Gen, Issue 4 the EUT does not have a stand-alone receiver neither scanner receiver, therefore exempt from receiver requirements.

EUT is a FHSS in the 902-928 MHz band previously certified by Impinj's model Speedway with original certifications: FCC ID: TWYIPJREV IC ID:6324A-IPJREV

2.4 IC RSS-247, Issue 2, test results

Part	Test description	Verdict
5.1	Frequency hopping systems (FHSs)	
5.1 (1)	Bandwidth of a frequency hopping channel	Not tested
5.1 (2)	Minimum channel spacing for frequency hopping systems	Not tested
5.1 (3)	Frequency hopping systems operating in the 902–928 MHz band	Not tested
5.1 (4)	Frequency hopping systems operating in the 2400–2483.5 MHz band	Not applicable
5.1 (5)	Frequency hopping systems operating in the 5725–5850 MHz band	Not applicable
5.2	Digital modulation systems	
5.2 (1)	Minimum 6 dB bandwidth	Not applicable
5.2 (2)	Maximum power spectral density	Not applicable
5.3	Hybrid systems	
5.3 (1)	Digital modulation turned off	Not applicable
5.3 (2)	Frequency hopping turned off	Not applicable
5.4	Transmitter output power and e.i.r.p. requirements	
5.4 (1)	Frequency hopping systems operating in the 902–928 MHz band	Not tested
5.4 (2)	Frequency hopping systems operating in the 2400–2483.5 MHz band	Not applicable
5.4 (3)	Frequency hopping systems operating in the 5725–5850 MHz	Not applicable
5.4 (4)	Systems employing digital modulation techniques	Not applicable
5.4 (5)	Point-to-point systems in 2400–2483.5 MHz and 5725–5850 MHz band	Not applicable
5.4 (6)	Transmitters which operate in the 2400–2483.5 MHz band with multiple directional beams	Not applicable
5.5	Unwanted Emissions	Pass

Notes: EUT is a FHSS in the 902-928 MHz band previously certified by Impinj's as model Speedway with original certifications: FCC ID: TWYIPJREV IC ID:6324A-IPJREV

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	November 13, 2017
Nemko sample ID number	340896

3.2 EUT information

Product name	Rev-1 RFID Reader
Model	IG-REV-1
Model variant	N/A
Serial number	Eng. Sample

3.3 Technical information

Applicant IC company number	22150
IC UPN number	REV
All used IC test site(s) Reg. number	2040B-3
RSS number and Issue number	RSS-247, Issue 2
Frequency band	902-928 MHz
Frequency Min (MHz)	902.75
Frequency Max (MHz)	927.25
RF power Min (W), Conducted/ERP/EIRP	N/A
RF power Max (W), Conducted /ERP/EIRP	30dBm or 1 W
Field strength, Units @ distance	N/A
Measured BW (kHz) (99%)	492.5 kHz
Calculated BW (kHz), as per TRC-43	N/A
Type of modulation	ASK
Emission classification (F1D, G1D, D1D)	G1D
Transmitter spurious, Units @ distance	42.4 dBuV/m at 3m (QP) "3.6dB Margin" @ 519.9955 MHz (Unit Tx at low channel 902.75MHz)
Power requirements	100-240VAC, 50/60Hz and provides 24 VDC to the system.
Antenna information	The EUT is professionally installed.
Antennas	2.2dBi (ethertronics, Four bent monopole)

3.4 Product description and theory of operation

The EUT is a 902.75-927.25MHz FHSS radio RFID reader.

3.5 EUT exercise details

Depends on test cases, the EUT is set either to fixed channel (L/M/H) at max power. The Rev-1 RFID Reader was tested with the new 4 bent monopole antennas (2.3dBi gain).

3.6 EUT setup diagram

Please refer to separate photo exhibit for details.

3.7 EUT sub assemblies

Table 3.7-1: EUT sub assemblies

Description	Brand name	Model/Part number	Serial number
Antenna 2.3 dBi bent monopole	Ethertronics	RFID0900-ANT-5	N/A

Section 4. Engineering considerations

4.1 Modifications incorporated in the EUT

N/A

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5. Test conditions

5.1 Atmospheric conditions

Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	860–1060 mbar

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages $\pm 5\%$, for which the equipment was designed.

Section 6. Measurement uncertainty

6.1 Uncertainty of measurement

Measurement uncertainty budgets for the tests are detailed below. Measurement uncertainty calculations assume a coverage factor of $K = 2$ with 95% certainty.

Test name	Measurement uncertainty, dB
All antenna port measurements	0.55
Conducted spurious emissions	1.13
Radiated spurious emissions	3.78
AC power line conducted emissions	3.55

Section 7. Test equipment

7.1 Test equipment list

Table 7.1-1: Radiated disturbance equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMC Test Receiver	Rohde & Schwarz	ESU 40	E1121	1 yr.	4-28-2018
Antenna, Bilog	Schaffner-Chase	CBL6111D	1763	2 yr.	11-28-2018
Antenna, Horn	EMCO	3115	1033	1 yr.	7-27-2018
Antenna, Horn	EMCO	3116	E1013	2yr	02-18-2018

Notes: None

Table 7.1-2: Conducted disturbance at mains port equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
EMI Test Receiver 9kHz to 7GHz	Rohde & Schwarz	ESCI 7	E1026	5/23/2017	5/23/2018
Two Line V-Network	Rohde & Schwarz	ENV216	E1019	6/27/2017	6/27/2018

Notes: None

Table 7.1-3: Antenna conducted port equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.

Notes: None

Table 7.1-4: Radiated/Conducted disturbance test software details

Manufacturer of Software	Details
Rohde-Schwarz	EMC 32 V10.0

Notes: None

Section 8. Testing data

8.1 FCC 15.247(d) and RSS-247 5.5 Spurious (out-of-band) emissions

8.1.1 Definitions and limits

FCC:

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, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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)).

IC:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section 5.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

(a) Fundamental components of modulation of licence-exempt radio apparatus shall not fall within the restricted bands except for apparatus complying under RSS-287;

(b) Unwanted emissions that fall into restricted bands shall comply with the limits specified in RSS-Gen; and

(c) Unwanted emissions that do not fall within the restricted frequency bands shall comply either with the limits specified in the applicable RSS or with those specified in this RSS-Gen.

Table 8.3-1: FCC §15.209 and RSS-Gen – Radiated emission limits

Frequency, MHz	Field strength of emissions		Measurement distance, m
	µV/m	dBµV/m	
0.009–0.490	2400/F	$67.6 - 20 \times \log_{10}(F)$	300
0.490–1.705	24000/F	$87.6 - 20 \times \log_{10}(F)$	30
1.705–30.0	30	29.5	30
30–88	100	40.0	3
88–216	150	43.5	3
216–960	200	46.0	3
above 960	500	54.0	3

Notes: In the emission table above, the tighter limit applies at the band edges.

For frequencies above 1 GHz the limit on peak RF emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test

Table 8.3-2: IC restricted frequency bands

MHz	MHz	MHz	GHz
0.090–0.110	12.51975–12.52025	399.9–410	5.35–5.46
2.1735–2.1905	12.57675–12.57725	608–614	7.25–7.75
3.020–3.026	13.36–13.41	960–1427	8.025–8.5
4.125–4.128	16.42–16.423	1435–1626.5	9.0–9.2
4.17725–4.17775	16.69475–16.69525	1645.5–1646.5	9.3–9.5
4.20725–4.20775	16.80425–16.80475	1660–1710	10.6–12.7
5.677–5.683	25.5–25.67	1718.8–1722.2	13.25–13.4
6.215–6.218	37.5–38.25	2200–2300	14.47–14.5
6.26775–6.26825	73–74.6	2310–2390	15.35–16.2
6.31175–6.31225	74.8–75.2	2655–2900	17.7–21.4
8.291–8.294	108–138	3260–3267	22.01–23.12
8.362–8.366	156.52475–156.52525	3332–3339	23.6–24.0
8.37625–8.38675	156.7–156.9	3345.8–3358	31.2–31.8

8.41425–8.41475	240–285	3500–4400	36.43–36.5
12.29–12.293	322–335.4	4500–5150	Above 38.6

Note: Certain frequency bands listed in Table 8.3-2 and above 38.6 GHz are designated for low-power licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in this Standard

Table 8.3-3: FCC restricted frequency bands

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	Above 38.6
13.36–13.41			

8.1.2 Test summary

Test date	December 14, 2017	Temperature	22 °C
Test engineer	Nikolay Shtin	Air pressure	1004mbar
Verdict	Pass	Relative humidity	49%

8.1.3 Observations, settings and special notes

The spectrum was searched from 30 MHz to the 10th harmonic.
EUT was set to transmit continuously.
Radiated measurements were performed at a distance of 3 m.
Since fundamental power was tested using average method, the spurious emissions limit is –30 dBc/100 kHz

Spectrum analyser settings for radiated measurements within restricted bands below 1 GHz:

Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Detector mode:	Peak
Trace mode:	Max Hold

Spectrum analyser settings for peak radiated measurements within restricted bands above 1 GHz:

Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Detector mode:	Peak
Trace mode:	Max Hold

Spectrum analyser settings for average radiated measurements within restricted bands above 1 GHz:

Resolution bandwidth:	1 MHz
Video bandwidth:	10 Hz
Detector mode:	Peak
Trace mode:	Max Hold

Spectrum analyzer settings for conducted spurious emissions measurements:

Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Detector mode:	Peak
Trace mode:	Max Hold

8.1.4 Test data

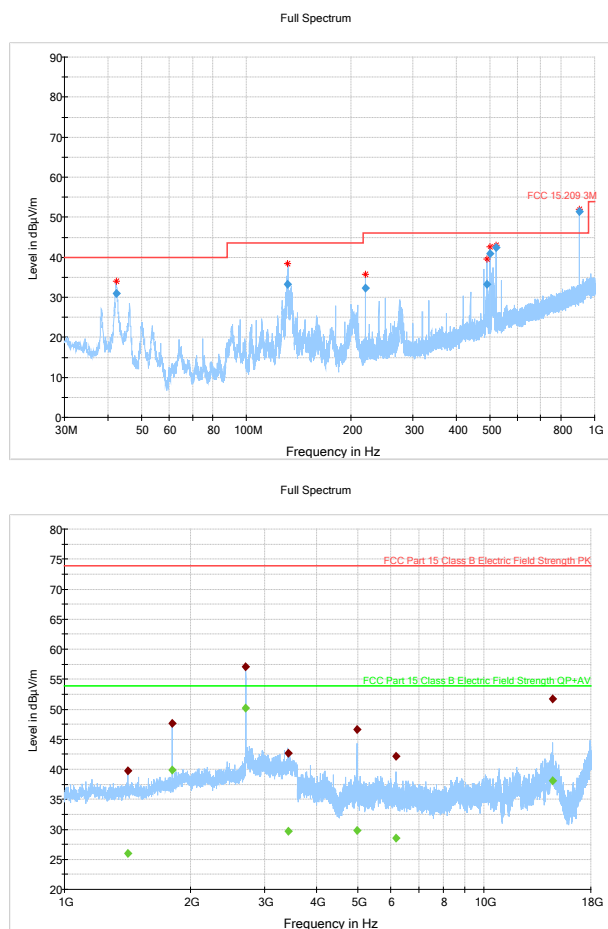


Figure 8.3.1: Radiated spurious emissions, low channel.

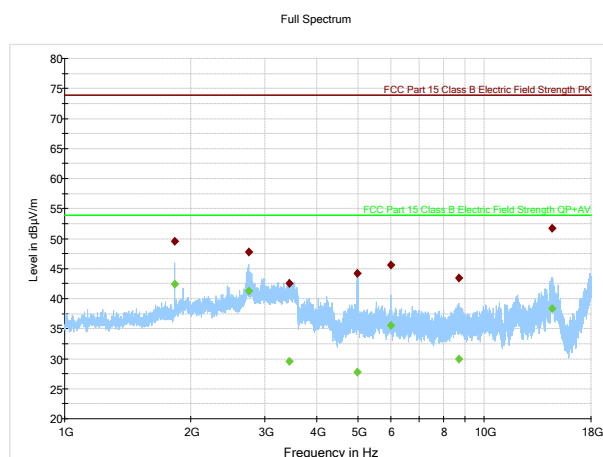


Figure 8.3.2: Radiated spurious emissions, mid channel.

Note.- Peaks within 902-928MHz are transmitter fundamentals. The 30MHz-1GHz Range was prescanned in the 3 channels finding that Low channel was the worst case scenario and presented in this report.
No emissions detected above 18GHz (noise floor only)

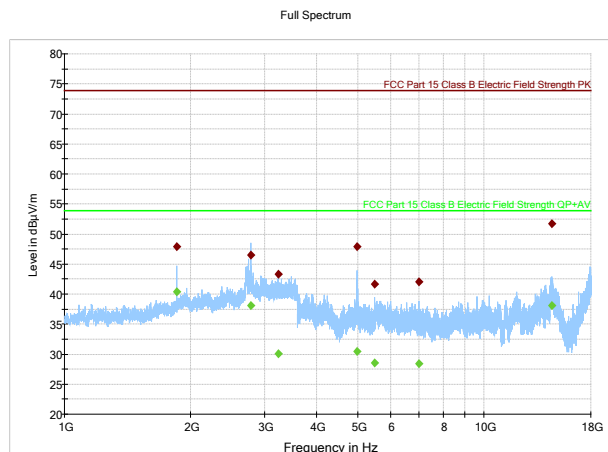


Figure 8.3.3: Radiated spurious emissions, high channel.

Note.- Peaks within 902-928MHz are transmitter fundamentals. The 30MHz-1GHz Range was prescanned in the 3 channels finding that Low channel was the worst case scenario and presented in this report.
No emissions detected above 18GHz (noise floor only)

Table 8.3-4: Radiated field strength measurement results for low channel.

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
42.359000	30.91	40.00	9.09	5000.0	120.000	114.0	V	103.0	14.3
131.119000	33.25	43.50	10.25	5000.0	120.000	116.7	H	42.0	14.4
219.983000	32.33	46.00	13.67	5000.0	120.000	125.4	V	160.0	13.0
490.022500	33.24	46.00	12.76	5000.0	120.000	127.0	H	192.0	22.9
499.973500	40.96	46.00	5.04	5000.0	120.000	111.2	V	26.0	23.3
519.995500	42.40	46.00	3.60	5000.0	120.000	147.0	H	245.0	23.7
902.717500	Fundamental								

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1416.266667	39.73	---	73.90	34.17	5000.0	1000.000	325.7	V	353.0	-0.3
1416.266667	---	25.94	53.90	27.96	5000.0	1000.000	325.7	V	353.0	-0.3
1805.533333	47.70	---	73.90	26.20	5000.0	1000.000	255.7	H	0.0	1.2
1805.533333	---	39.87	53.90	14.03	5000.0	1000.000	255.7	H	0.0	1.2
2708.233333	---	50.24	53.90	3.66	5000.0	1000.000	107.4	H	343.0	4.0
2708.233333	57.11	---	73.90	16.79	5000.0	1000.000	107.4	H	343.0	4.0
3411.300000	42.72	---	73.90	31.18	5000.0	1000.000	332.5	V	348.0	6.2
3411.300000	---	29.69	53.90	24.21	5000.0	1000.000	332.5	V	348.0	6.2
4981.700000	46.67	---	73.90	27.23	5000.0	1000.000	282.1	V	146.0	11.2
4981.700000	---	29.84	53.90	24.06	5000.0	1000.000	282.1	V	146.0	11.2
6166.433333	---	28.53	53.90	25.37	5000.0	1000.000	321.3	H	56.0	15.0
6166.433333	42.17	---	73.90	31.73	5000.0	1000.000	321.3	H	56.0	15.0
14601.266667	---	38.05	53.90	15.85	5000.0	1000.000	352.8	H	0.0	28.6
14601.266667	51.76	---	73.90	22.14	5000.0	1000.000	352.8	H	0.0	28.6

Table 8.3-5: Radiated field strength measurement results for Mid channel.

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1829.500000	49.49	---	73.90	24.41	5000.0	1000.000	218.5	H	222.0	1.5
1829.500000	---	42.42	53.90	11.48	5000.0	1000.000	218.5	H	222.0	1.5
2744.100000	---	41.24	53.90	12.66	5000.0	1000.000	109.4	H	274.0	4.2
2744.100000	47.81	---	73.90	26.09	5000.0	1000.000	109.4	H	274.0	4.2
3426.366667	42.49	---	73.90	31.41	5000.0	1000.000	401.4	H	192.0	6.2
3426.366667	---	29.55	53.90	24.35	5000.0	1000.000	401.4	H	192.0	6.2
4980.033333	---	27.76	53.90	26.14	5000.0	1000.000	107.8	V	206.0	11.1
4980.033333	44.24	---	73.90	29.66	5000.0	1000.000	107.8	V	206.0	11.1
5999.833333	---	35.59	53.90	18.31	5000.0	1000.000	224.8	V	41.0	14.7
5999.833333	45.63	---	73.90	28.27	5000.0	1000.000	224.8	V	41.0	14.7
8697.266667	---	29.88	53.90	24.02	5000.0	1000.000	360.7	H	184.0	20.4
8697.266667	43.43	---	73.90	30.47	5000.0	1000.000	360.7	H	184.0	20.4
14533.533333	---	38.37	53.90	15.53	5000.0	1000.000	249.3	H	252.0	28.9
14533.533333	51.77	---	73.90	22.13	5000.0	1000.000	249.3	H	252.0	28.9

Table 8.3-6: Radiated field strength measurement results for High channel.

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1854.433333	47.92	---	73.90	25.98	5000.0	1000.000	98.0	H	203.0	1.9
1854.433333	---	40.40	53.90	13.50	5000.0	1000.000	98.0	H	203.0	1.9
2781.900000	---	38.15	53.90	15.75	5000.0	1000.000	107.6	H	302.0	4.5
2781.900000	46.45	---	73.90	27.45	5000.0	1000.000	107.6	H	302.0	4.5
3237.266667	---	30.12	53.90	23.78	5000.0	1000.000	404.7	V	147.0	5.8
3237.266667	43.34	---	73.90	30.56	5000.0	1000.000	404.7	V	147.0	5.8
4991.366667	47.93	---	73.90	25.97	5000.0	1000.000	286.0	V	155.0	11.2
4991.366667	---	30.45	53.90	23.45	5000.0	1000.000	286.0	V	155.0	11.2
5482.133333	---	28.50	53.90	25.40	5000.0	1000.000	399.9	H	245.0	13.1
5482.133333	41.71	---	73.90	32.19	5000.0	1000.000	399.9	H	245.0	13.1
6999.100000	42.03	---	73.90	31.87	5000.0	1000.000	236.7	V	334.0	17.3
6999.100000	---	28.44	53.90	25.46	5000.0	1000.000	236.7	V	334.0	17.3
14554.066667	51.76	---	73.90	22.14	5000.0	1000.000	317.0	H	116.0	28.8
14554.066667	---	38.15	53.90	15.75	5000.0	1000.000	317.0	H	116.0	28.8

Table 8.3-7: Radiated Band Edges and power verification for Low and High channel.

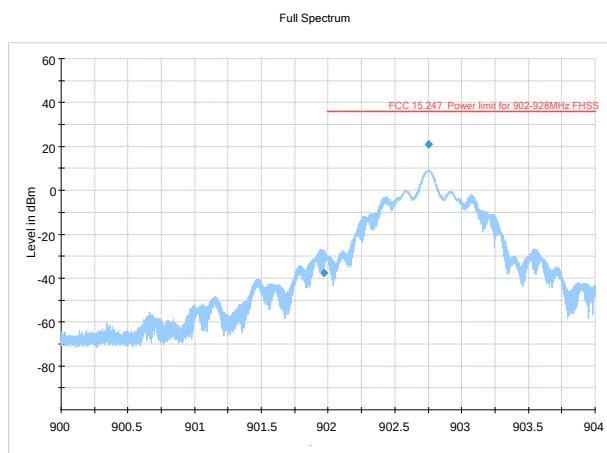


Figure 8.1.4: Low Band Edge Measurement

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
901.970000	-37.67	0.92	38.59	100.000	189.0	V	10.0	-67.0
902.755200	20.92	36.00	15.08	100.000	190.7	V	9.0	-66.9

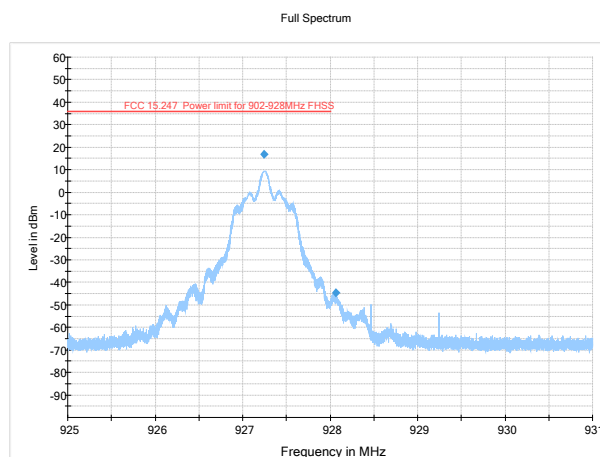


Figure 8.1.5: High Band Edge Measurement

Frequency (MHz)	RMS (dBm)	Limit (dBm)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
927.243500	16.99	36.00	19.01	100.000	105.7	V	50.0	-66.2
928.068000	-44.57	-3.01	41.56	100.000	129.0	V	0.0	-66.2

8.2 15.207(a) AC power line conducted emissions limits

8.2.1 Definitions and limits

Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

The conducted emissions shall be measured with a 50 Ω /50 μ H line impedance stabilization network (LISN).

Table 8.6-1: Conducted emissions limit

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

Note: * - Decreases with the logarithm of the frequency.

8.2.2 Test summary

Test date	December 14, 2017	Temperature	22 °C
Test engineer	Enrique Hernandez	Air pressure	1004mbar
Verdict	Pass	Relative humidity	49%

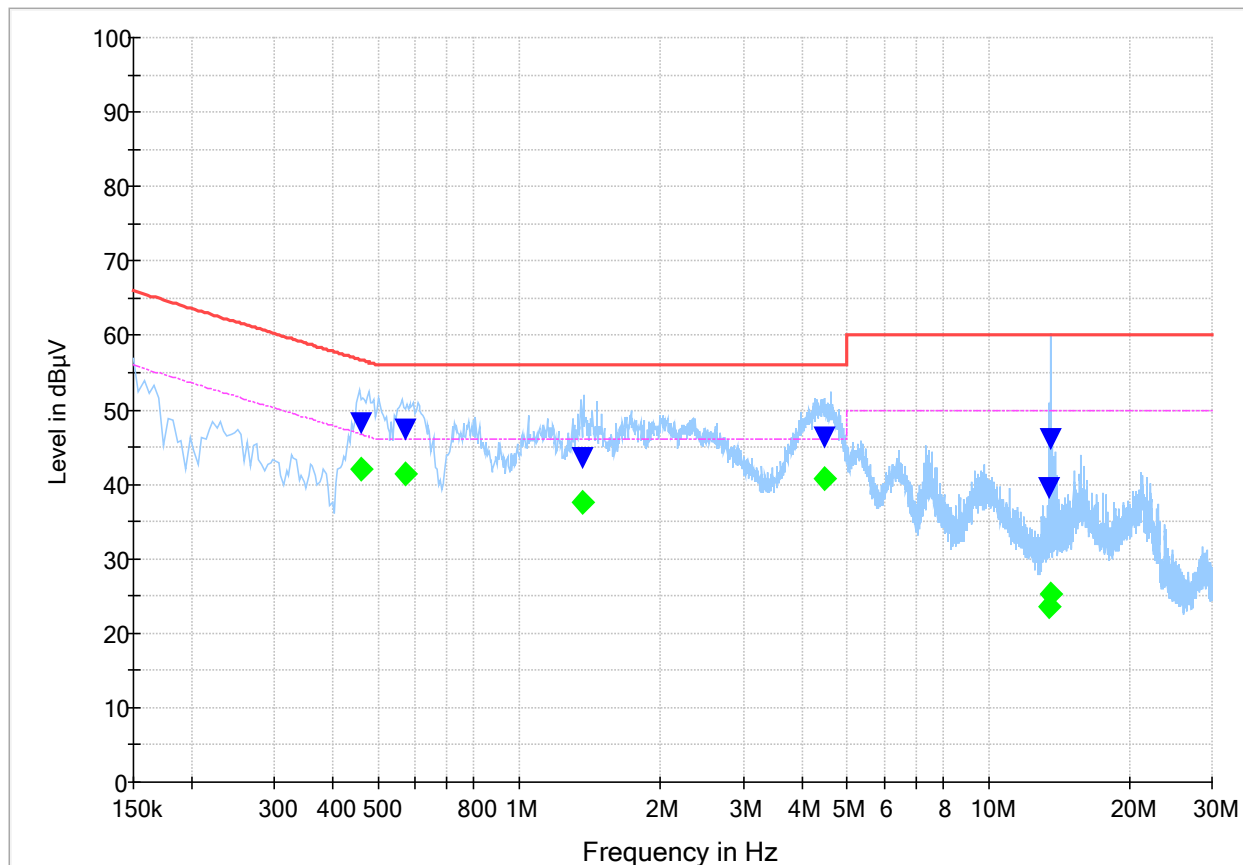
8.2.3 Observations, settings and special notes

EUT tested in worst case configuration and transmitting in Low Channel (902.75MHz).

Test receiver settings:

Frequency span	150 kHz to 30 MHz
Detector mode	Peak and Average (preview mode); Quasi-Peak (final measurements)
Resolution bandwidth	9 kHz
Video bandwidth	30 kHz
Trace mode	Max Hold
Measurement time	1000 ms

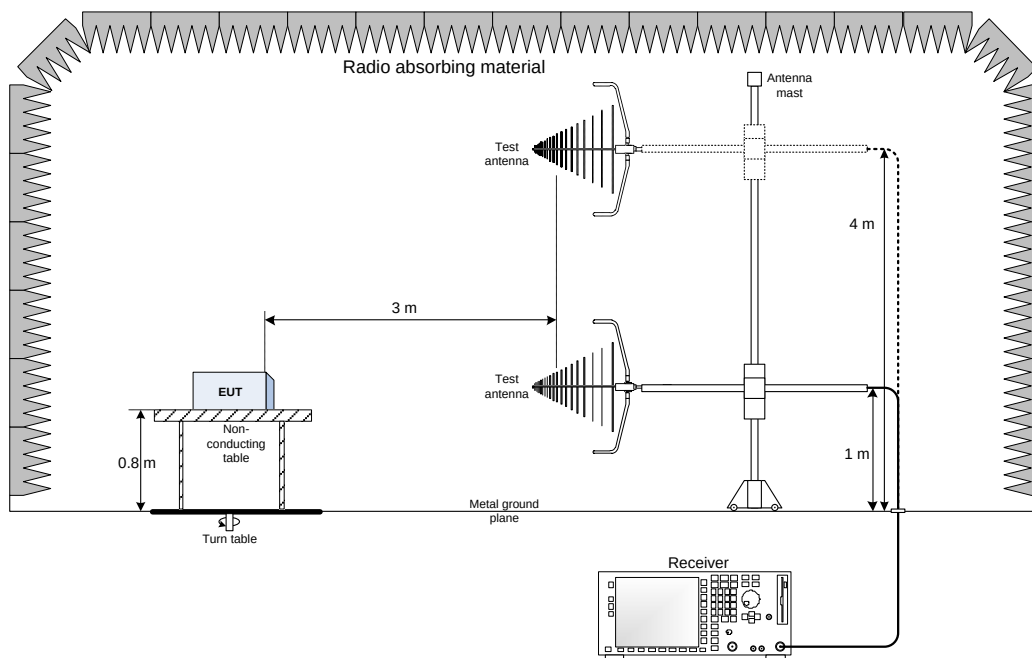
Full Spectrum



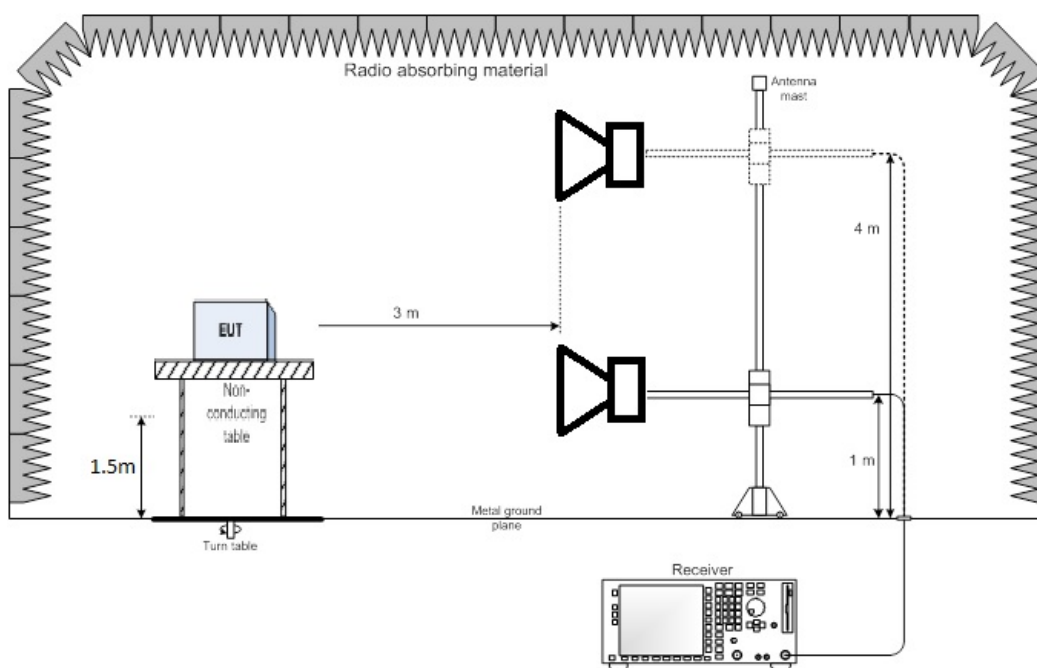
Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.460500	---	42.01	46.68	4.68	5000.0	9.000	L1	ON	19.5
0.460500	48.25	---	56.68	8.44	5000.0	9.000	L1	ON	19.5
0.568500	---	41.48	46.00	4.52	5000.0	9.000	L1	ON	19.5
0.568500	47.33	---	56.00	8.67	5000.0	9.000	L1	ON	19.5
1.360500	---	37.63	46.00	8.37	5000.0	9.000	L1	ON	19.5
1.360500	43.50	---	56.00	12.50	5000.0	9.000	L1	ON	19.5
4.464500	---	40.67	46.00	5.33	5000.0	9.000	N	ON	19.5
4.464500	46.33	---	56.00	9.67	5000.0	9.000	N	ON	19.5
13.480500	39.58	---	60.00	20.42	5000.0	9.000	L1	ON	19.7
13.480500	---	23.50	50.00	26.50	5000.0	9.000	L1	ON	19.7
13.580500	46.01	---	60.00	13.99	5000.0	9.000	L1	ON	19.7
13.580500	---	25.30	50.00	24.70	5000.0	9.000	L1	ON	19.7

Section 9. Block diagrams of test set-ups

9.1 Radiated emissions set-up



30-1000MHz Setup



Above 1GHz Setup

End of Report