HERMON LABORATORIES

ELECTRICAL TESTING
0839.01

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PARTIAL TEST REPORT

ACCORDING TO:

FCC 47CFR part 15 subpart C §15.247 (FHSS),
RSS-247 Issue 2:2017

FOR:

Visonic Ltd.

Magnetic Contact

Model: MC-302E P9M0

FCC ID: WP3MC309PG2

This report is in conformity with ISO/ IEC 17025. The "A2LA Accredited" symbol endorsement applies only to the tests and calibrations that are listed in the scope of Hermon Laboratories accreditation. The test results relate only to the items tested. This test report shall not be reproduced in any form except in full with the written approval of Hermon Laboratories Ltd.

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1 Applicant information

Client name:	Visonic Ltd.
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Telephone:	+972 3645 6832
Fax:	+972 3645 6788
E-mail:	zuri.rubin@jci.com
Contact name:	Mr. Zuri Rubin

2 Equipment under test attributes

Product name:	Magnetic Contact
Product type:	Transceiver
Model(s):	MC-302E P9M0
Serial number:	NA
Hardware version:	90-210047
Software release:	JS-703905
Receipt date	02-Feb-22

3 Manufacturer information

Manufacturer name:	Visonic Ltd.
Address:	24 Habarzel street, Tel Aviv 69710, Israel
Telephone:	+972 3645 6832
Fax:	+972 3645 6788
E-Mail:	zuri.rubin@jci.com
Contact name:	Mr. Zuri Rubin

4 Test details

Project ID:	46081
Location:	Hermon Laboratories Ltd. P.O. Box 23, Binyamina 3055001, Israel
Test started:	01-Apr-22
Test completed:	08-Apr-22
Test specification(s):	FCC 47CFR part 15 subpart C §15.247 (FHSS), RSS-247 Issue 2:2017

5 Tests summary

Test	Status
Transmitter characteristics	
FCC section 15.247(a)1/ RSS-247 section 5.1(c), 20 dB bandwidth	Not required
FCC section 15.247(a)1/ RSS-247 section 5.1(b), Frequency separation	Not required
FCC section 15.247(a)1/ RSS-247 section 5.1(c), Number of hopping frequencies	Not required
FCC section 15.247(a)1/ RSS-247 section 5.1(c), Average time of occupancy	Not required
FCC section 15.247(b) / RSS-247 section 5.4(a), Peak output power	Pass*
FCC section 15.247(d) / RSS-247 section 5.5, Radiated spurious emissions	Pass*
FCC section 15.247(d) / RSS-247 section 5.5, Emissions at band edges	Not required
FCC section 15.247(i)5/ RSS-102 section 2.5, RF exposure	Pass, the exhibit to the application of certification is provided*
FCC section 15.203/ RSS-Gen section 6.8, Antenna requirements	Not required
FCC section 15.207(a) / RSS-Gen section 8.8, Conducted emission	Not required
Unintentional emissions	
FCC section 15.107/ICES-003, Section 6.1, Class B, Conducted emission at AC power port	Not required
FCC section 15.109/ RSS-Gen section 7.3 /ICES-003, Section 6.2, Class B, Radiated emission	Not required

The EUT were certified by FCC under FCC ID: WP3MC309PG2. The EUT was revised with the following changes:

1. Moved the LED place in the PCB.
2. Using of 2 outputs instead of 3.
3. New plastic.
4. New SW for support an enhanced encrypted key, over-the-air firmware upgrade, device lock down and lockable sensors.
5. Adding Flash Memory.

*The relevant tests were performed to support Application for Class II permissive changes certification.

This test report supersedes the previously issued test report identified by Doc ID: VISRAD_FCC.46081_31270

Testing was completed against all relevant requirements of the test standard. The results obtained indicate that the product under test complies in full with the requirements tested.
The test results relate only to the items tested. Pass/ fail decision was based on nominal values.

	Name and Title	Date	Signature
Tested by:	Mrs. E. Pitt, test engineer, EMC & Radio	01-Apr-22 – 08-Apr-22	
Reviewed by:	Mrs. S. Peysahov Sheynin, test engineer, EMC & Radio	05-May-22	
Approved by:	Mr. M. Nikishin, group leader, EMC & Radio	25-May-22	

6 EUT description

Note: The following data in this clause is provided by the customer and represents his sole responsibility

6.1 General information

The EUT is a fully supervised PowerG magnetic contact device. It includes a built-in reed switch that opens upon removal of a magnet placed near it, The EUT is equipped with an integral antenna and is powered by 3V internal battery.

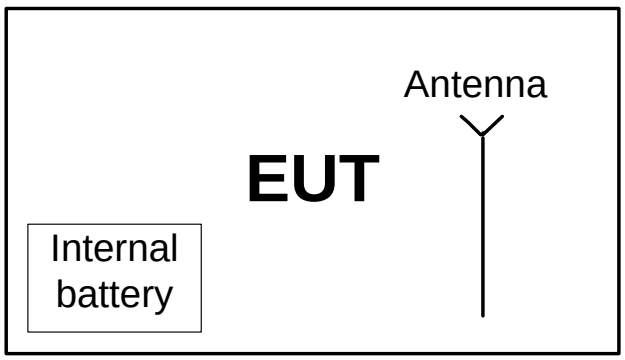
The purpose for this test report is the compliance with minor modification that was made relatively to original test report VISRAD_FCC.31270, issued by Hermon Laboratories.

The new model MC-302E P9M0, that was tested in the present test report have identical RF part configuration and differenced only with HW redesign of PCB, new plastic and SW that will support a new future as stated in manufacturer's declarations (refer to Appendix F of the test report).

6.2 Changes made in EUT

No changes were implemented in the EUT during the testing.

6.3 Test configuration



6.4 Transmitter characteristics

Type of equipment	
X	Stand-alone (Equipment with or without its own control provisions)
	Combined equipment (Equipment where the radio part is fully integrated within another type of equipment)
	Plug-in card (Equipment intended for a variety of host systems)

Intended use		**Condition of use**
	fixed	Always at a distance more than 2 m from all people
X	mobile	Always at a distance more than 20 cm from all people
	portable	May operate at a distance closer than 20 cm to human body

Assigned frequency ranges	902 – 928 MHz
Operating frequencies	912.750 – 919.106 MHz

Maximum rated output power	At transmitter 50 Ω RF output connector	dBm
	Peak output power	14.6 dBm

Is transmitter output power variable?	X	No			
		Yes		continuous variable	
				stepped variable with stepsize	dB
			minimum RF power		dBm
			maximum RF power		dBm

Antenna connection				
unique coupling	standard connector	X	integral	with temporary RF connector
				X without temporary RF connector

Antenna/s technical characteristics			
Type	Manufacturer	Model number	Gain
Integral	Visonic	Built-In Helical Antenna	2 dBi

Transmitter aggregate data rate/s	50 kbps
Type of modulation	GFSK
Modulating test signal (baseband)	PRBS

Transmitter power source					
X	Battery	**Nominal rated voltage**	3.0 V	Battery type	CR123A
	DC	**Nominal rated voltage**			
	AC mains	**Nominal rated voltage**		Frequency	

Common power source for transmitter and receiver	X yes	no

Spread spectrum technique used	X	Frequency hopping (FHSS)
		Digital transmission system (DTS)
		Hybrid

Spread spectrum parameters for transmitters tested per FCC 15.247 only		
FHSS	Total number of hops	50
	Bandwidth per hop	109.97 kHz
	Max. separation of hops	131.2 kHz

Test specification:	Section 15.247(b), RSS-247 section 5.4(1), Peak output power		
Test procedure:	ANSI C63.10, section 7.8.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	01-Apr-22 - 06-Apr-22		
Temperature: 21 ºC	Relative Humidity: 43 %	Air Pressure: 1012 hPa	Power: 3 VDC
Remarks:			

7 Transmitter tests according to 47CFR part 15 subpart C and RSS-247 requirements

7.1 Peak output power

7.1.1 General

This test was performed to measure the maximum peak output power radiated by transmitter. Specification test limits are given in Table 7.1.1.

Table 7.1.1 Peak output power limits

Assigned frequency range, MHz	Peak output power*		Equivalent field strength limit @ 3m, dB(µV/m)*	Maximum antenna gain, dBi
	W	dBm		
902.0 – 928.0	**0.25 (<50 hopping channels)**	**24.0(<50 hopping channels)**	**125.2 (<50 hopping channels)**	6.0*
	1.0 (≥50 hopping channels)	**30.0 (≥50 hopping channels)**	**131.2 (≥50 hopping channels)**	
2400.0 – 2483.5	0.125 (<75 hopping channels)	21.0(<75 hopping channels)	122.2 (<75 hopping channels)	
	1.0 (≥75 hopping channels)	30.0 (≥75 hopping channels)	131.2 (≥75 hopping channels)	
5725.0 – 5850.0	1.0	30.0	131.2	

*- Equivalent field strength limit was calculated from the peak output power as follows: E=sqrt(30×P×G)/r, where P is peak output power in Watts, r is antenna to EUT distance in meters and G is transmitter antenna gain in dBi.
**- The limit is provided in terms of conducted RF power at the antenna connector. If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power limit shall be reduced below the stated value as follows:

- by 1 dB for every 3 dB that the directional gain of antenna exceeds 6 dBi for fixed point-to-point transmitters operate in 2400-2483.5 MHz band;
- without any corresponding reduction for fixed point-to-point transmitters operate in 5725-5850 MHz band;
- by the amount in dB that the directional gain of antenna exceeds 6 dBi for the rest of transmitters.

7.1.2 Test procedure

7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and its proper operation was checked.

7.1.2.2 The EUT was adjusted to produce maximum available to end user RF output power.

7.1.2.3 The frequency span of spectrum analyzer was set approximately 5 times wider than 20 dB bandwidth of the EUT and the resolution bandwidth was set wider than 20 dB bandwidth of the EUT. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna height was swept in both vertical and horizontal polarizations.

7.1.2.4 The maximum field strength of the EUT carrier frequency was measured as provided in Table 7.1.2 and associated plots.

7.1.2.5 The maximum peak output power was calculated from the field strength of carrier as follows:

$$P = (E \times d)^2 / (30 \times G),$$

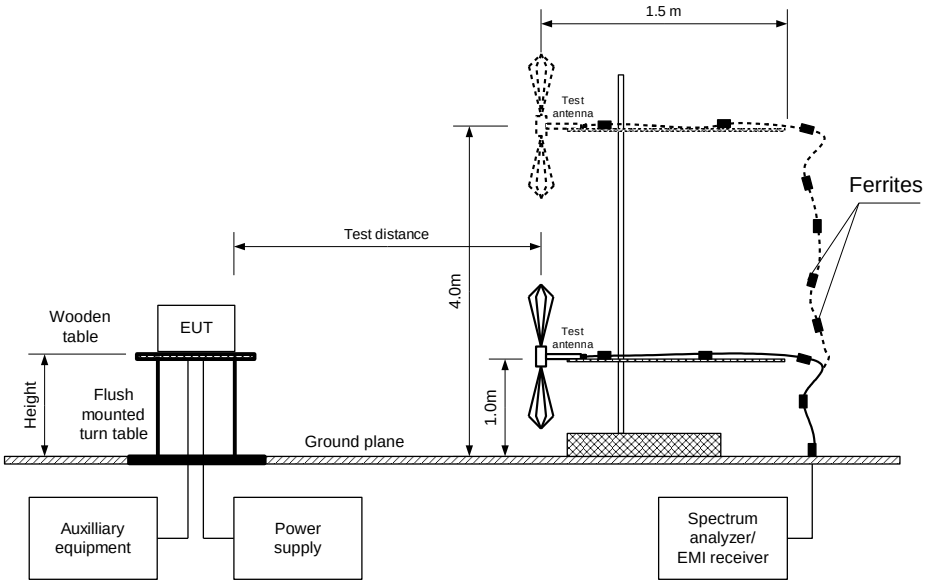
where P is the peak output power in W, E is the field strength in V/m, d is the test distance and G is the transmitter numeric antenna gain over an isotropic radiator.
The above equation was converted in logarithmic units for 3 m test distance:

Peak output power in dBm = Field strength in dB(µV/m) - Transmitter antenna gain in dBi – 95.2 dB

7.1.2.6 The worst test results (the lowest margins) were recorded in Table 7.1.2.

Test specification:	Section 15.247(b), RSS-247 section 5.4(1), Peak output power		
Test procedure:	ANSI C63.10, section 7.8.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	01-Apr-22 - 06-Apr-22		
Temperature: 21 ºC	Relative Humidity: 43 %	Air Pressure: 1012 hPa	Power: 3 VDC
Remarks:			

Figure 7.1.1 Setup for carrier field strength measurements



Test specification:	**Section 15.247(b), RSS-247 section 5.4(1), Peak output power**		
Test procedure:	ANSI C63.10, section 7.8.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	01-Apr-22 - 06-Apr-22		
Temperature: 21 ºC	**Relative Humidity:** 43 %	**Air Pressure:** 1012 hPa	**Power:** 3 VDC
Remarks:			

Table 7.1.2 Peak output power test results

ASSIGNED FREQUENCY:	902-928 MHz
TEST DISTANCE:	3 m
TEST SITE:	Semi anechoic chamber
EUT HEIGHT:	0.8 m
DETECTOR USED:	Peak
MODULATION:	GFSK
BIT RATE:	50 kbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
DETECTOR USED:	Peak
FREQUENCY HOPPING:	Disabled

Frequency, MHz	Field strength, dB(µV/m)	Antenna polarization	Antenna height, m	Azimuth, degrees*	EUT antenna gain, dBi	Peak output power, dBm**	Limit, dBm	Margin, dB***	Verdict
912.750	111.3	Horizontal	1.1	0	2	14.1	30	-15.9	Pass
915.863	111.4	Horizontal	1.1	0	2	14.2	30	-15.8	Pass
919.106	111.8	Horizontal	1.1	0	2	14.6	30	-15.4	Pass

*****- EUT front panel refer to 0 degrees position of turntable.
******- Peak output power was calculated from the field strength of carrier as follows: $P = (E \times d)^2 / (30 \times G)$,
where P is the peak output power in W, E is the field strength in V/m, d is the test distance in meters and G is the transmitter numeric antenna gain over an isotropic radiator. The above equation was converted in logarithmic units for 3 m test distance: *Peak output power in dBm = Field strength in dB(µV/m) - Transmitter antenna gain in dBi – 95.2 dB*
***- Margin = Peak output power – specification limit.

Reference numbers of test equipment used

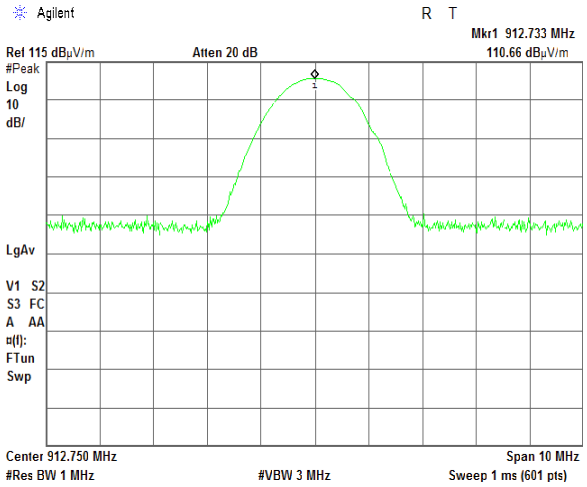
HL 3818	HL 3903	HL 5902	HL 604				

Full description is given in Appendix A.

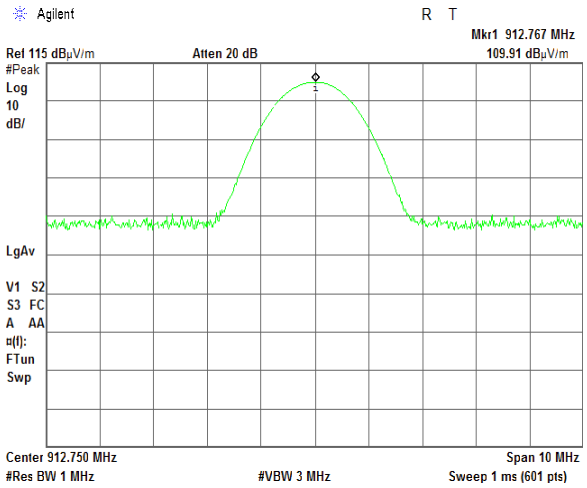
Test specification:	Section 15.247(b), RSS-247 section 5.4(1), Peak output power		
Test procedure:	ANSI C63.10, section 7.8.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	01-Apr-22 - 06-Apr-22		
Temperature: 21 ºC	Relative Humidity: 43 %	Air Pressure: 1012 hPa	Power: 3 VDC
Remarks:			

Plot 7.1.1 Field strength of carrier at low frequency

EUT POSITION: X
ANTENNA POLARIZATION: Vertical and Horizontal



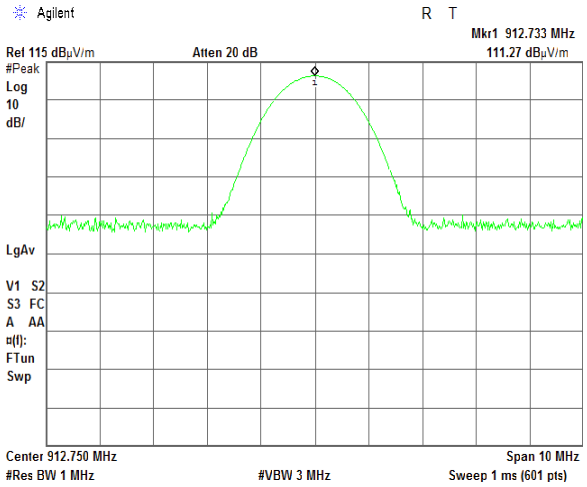
EUT POSITION: Y
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(b), RSS-247 section 5.4(1), Peak output power		
Test procedure:	ANSI C63.10, section 7.8.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	01-Apr-22 - 06-Apr-22		
Temperature: 21 ºC	Relative Humidity: 43 %	Air Pressure: 1012 hPa	Power: 3 VDC
Remarks:			

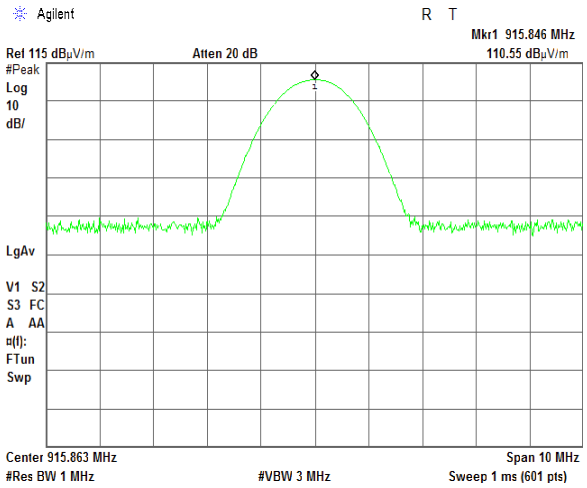
Plot 7.1.2 Field strength of carrier at low frequency (continuation)

EUT POSITION: Z
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.1.3 Field strength of carrier at mid frequency

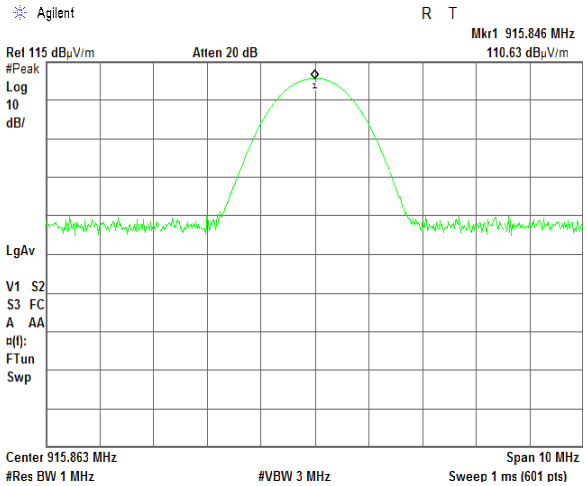
EUT POSITION: X
ANTENNA POLARIZATION: Vertical and Horizontal



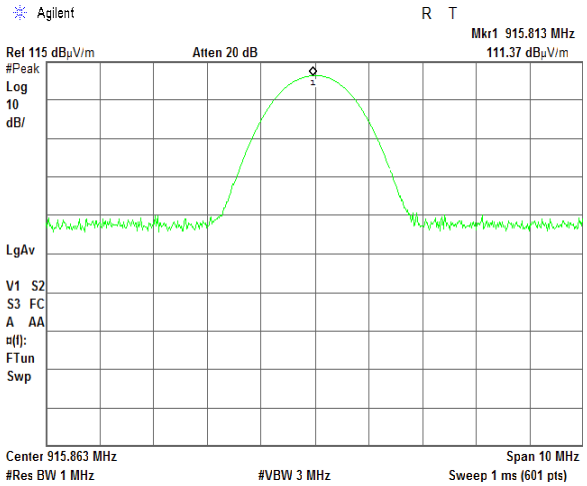
Test specification:	Section 15.247(b), RSS-247 section 5.4(1), Peak output power		
Test procedure:	ANSI C63.10, section 7.8.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	01-Apr-22 - 06-Apr-22		
Temperature: 21 ºC	Relative Humidity: 43 %	Air Pressure: 1012 hPa	Power: 3 VDC
Remarks:			

Plot 7.1.4 Field strength of carrier at mid frequency (continuation)

EUT POSITION: Y
ANTENNA POLARIZATION: Vertical and Horizontal



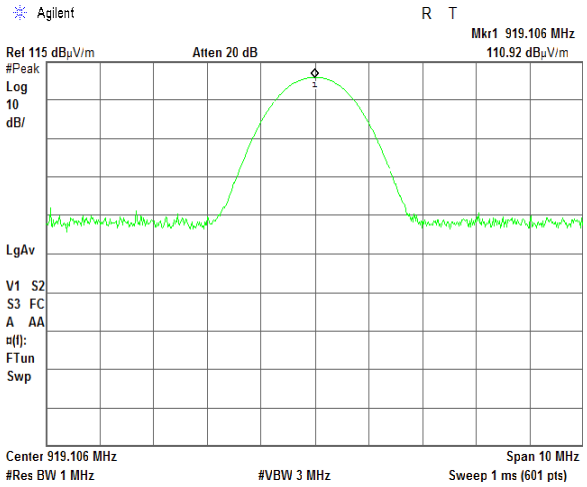
EUT POSITION: Z
ANTENNA POLARIZATION: Vertical and Horizontal



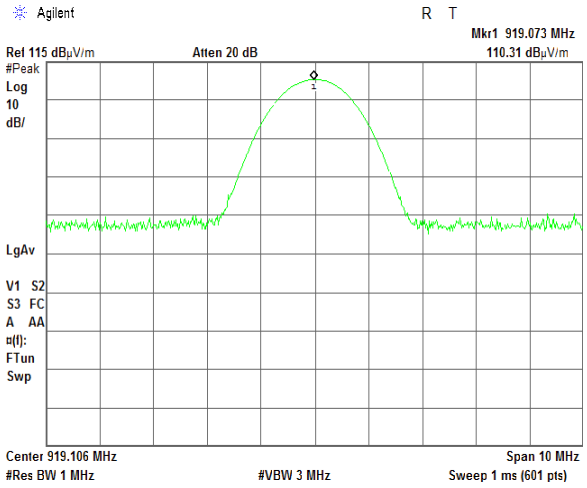
Test specification:	Section 15.247(b), RSS-247 section 5.4(1), Peak output power		
Test procedure:	ANSI C63.10, section 7.8.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	01-Apr-22 - 06-Apr-22		
Temperature: 21 ºC	Relative Humidity: 43 %	Air Pressure: 1012 hPa	Power: 3 VDC
Remarks:			

Plot 7.1.3 Field strength of carrier at high frequency

EUT POSITION: X
ANTENNA POLARIZATION: Vertical and Horizontal



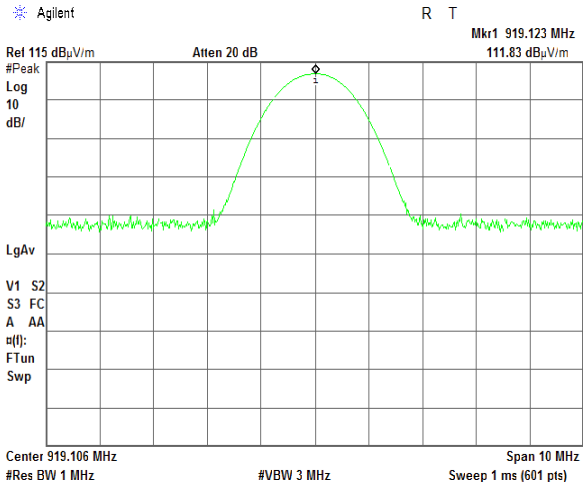
EUT POSITION: Y
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	**Section 15.247(b), RSS-247 section 5.4(1), Peak output power**		
Test procedure:	ANSI C63.10, section 7.8.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	01-Apr-22 - 06-Apr-22		
Temperature: 21 ºC	**Relative Humidity:** 43 %	**Air Pressure:** 1012 hPa	**Power:** 3 VDC
Remarks:			

Plot 7.1.5 Field strength of carrier at high frequency (continuation)

EUT POSITION: Z
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(d), RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10, sections 6.5, 6.6		
Test mode:	Compliance	Verdict:	PASS
Date(s):	01-Apr-22 - 08-Apr-22		
Temperature: 21 ºC	Relative Humidity: 53 %	Air Pressure: 1012 hPa	Power: 3 VDC
Remarks:			

7.2 Field strength of spurious emissions

7.2.1 General

This test was performed to measure field strength of spurious emissions from the EUT. Specification test limits are given in Table 7.2.1.

Table 7.2.1 Radiated spurious emissions limits

Frequency, MHz	Field strength at 3 m within restricted bands, dB(μV/m)***			Attenuation of field strength of spurious versus carrier outside restricted bands, dBc***
	Peak	Quasi Peak	Average	
0.009 – 0.090	148.5 – 128.5	NA	128.5 – 108.5**	20.0
0.090 – 0.110	NA	108.5 – 106.8**	NA	
0.110 – 0.490	126.8 – 113.8	NA	106.8 – 93.8**	
0.490 – 1.705	NA	73.8 – 63.0**	NA	
1.705 – 30.0*		69.5		
30 – 88		40.0		
88 – 216		43.5		
216 – 960		46.0		
960 - 1000		54.0		
1000 – 10thharmonic	74.0	NA	54.0	

*- The limit for 3 m test distance was calculated using the inverse square distance extrapolation factor as follows:

$$Lim_{S2} = Lim_{S1} + 40 \log (S_1/S_2),$$

where S_1 and S_2 – standard defined and test distance respectively in meters.

**- The limit decreases linearly with the logarithm of frequency.

*** - The field strength limits applied from the lowest radio frequency generated in the device, without going below 9 kHz up to the tenth harmonic of the highest fundamental frequency.

7.2.2 Test procedure for spurious emission field strength measurements in 9 kHz to 30 MHz band

7.2.2.1 The EUT was set up as shown in Figure 7.2.1, energized and the performance check was conducted.

7.2.2.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna was rotated around its vertical axis.

7.2.2.3 The worst test results (the lowest margins) were recorded and shown in the associated plots.

7.2.3 Test procedure for spurious emission field strength measurements above 30 MHz

7.2.3.1 The EUT was set up as shown in Figure 7.2.2, Figure 1.1.3, energized and the performance check was conducted.

7.2.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal.

7.2.3.3 The worst test results (the lowest margins) were recorded and shown in the associated plots.

Test specification:	Section 15.247(d), RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10, sections 6.5, 6.6		
Test mode:	Compliance	Verdict:	PASS
Date(s):	01-Apr-22 - 08-Apr-22		
Temperature: 21 ºC	Relative Humidity: 53 %	Air Pressure: 1012 hPa	Power: 3 VDC
Remarks:			

Figure 7.2.1 Setup for spurious emission field strength measurements below 30 MHz

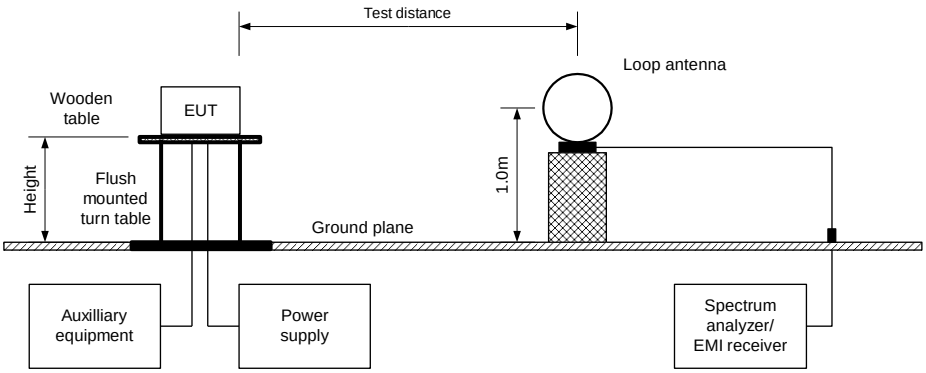
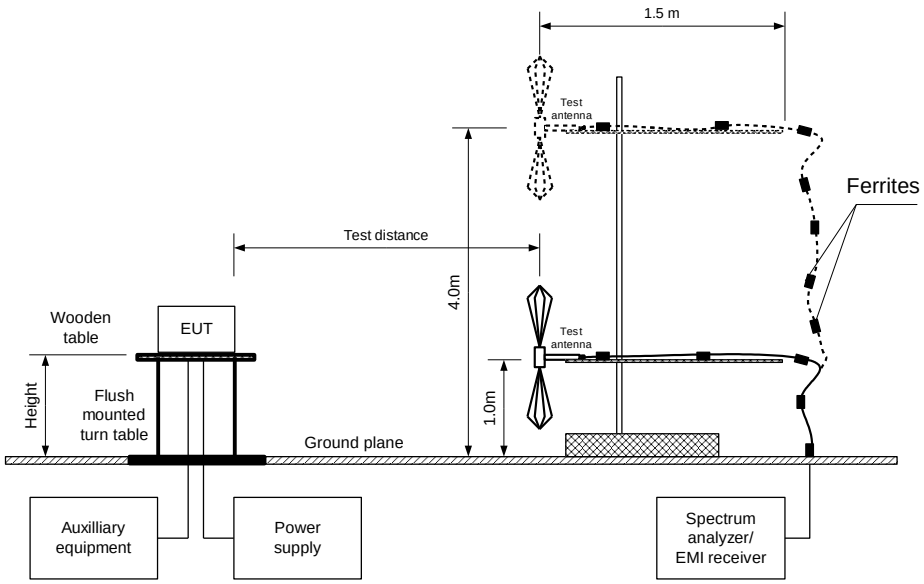
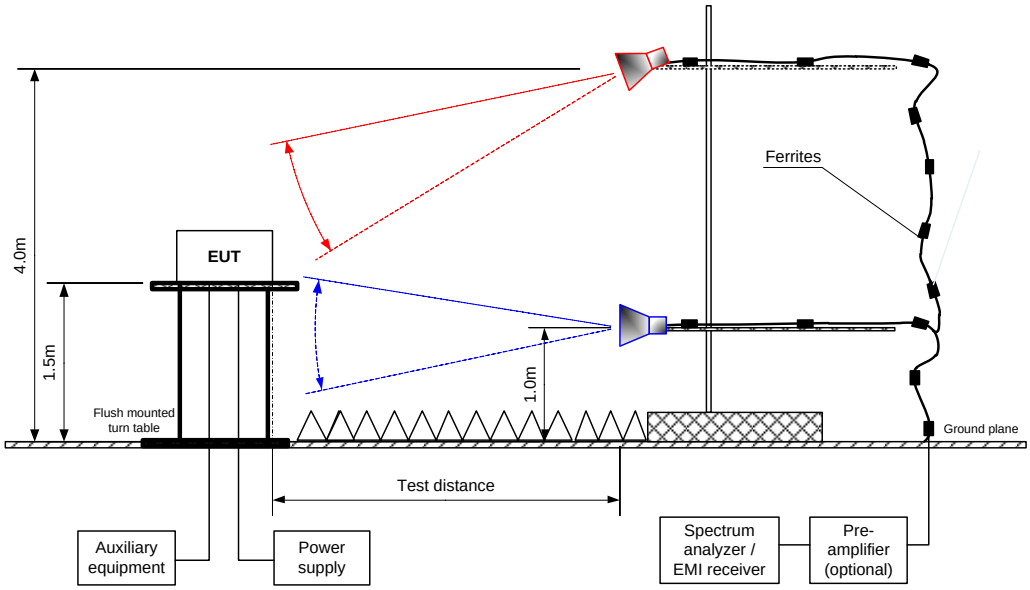


Figure 7.2.2 Setup for spurious emission field strength measurements from 30 to 1000 MHz



Test specification:	Section 15.247(d), RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10, sections 6.5, 6.6		
Test mode:	Compliance	Verdict:	PASS
Date(s):	01-Apr-22 - 08-Apr-22		
Temperature: 21 ºC	Relative Humidity: 53 %	Air Pressure: 1012 hPa	Power: 3 VDC
Remarks:			

Figure 7.2.3 Setup for spurious emission field strength measurements above1000 MHz



Test specification:	**Section 15.247(d), RSS-247 section 5.5, Radiated spurious emissions**		
Test procedure:	ANSI C63.10, sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	01-Apr-22 - 08-Apr-22		
Temperature: 21 ºC	**Relative Humidity:** 53 %	**Air Pressure:** 1012 hPa	**Power:** 3 VDC
Remarks:			

Table 7.2.2 Field strength of emissions outside restricted bands

ASSIGNED FREQUENCY: 902-928 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 -9200MHz
TEST DISTANCE: 3 m
MODULATION: GFSK
BIT RATE: 50 Kbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
DETECTOR USED: Peak
TEST ANTENNA TYPE: Active loop (9 kHz – 30 MHz)
Biconilog (30 MHz – 1000 MHz)
Double ridged guide (above 1000 MHz)
FREQUENCY HOPPING: Disabled

Frequency, MHz	Field strength of spurious, dB(µV/m)	Antenna polarization	Antenna height, m	Azimuth, degrees*	Field strength of carrier, dB(µV/m)	Attenuation below carrier, dBc	Limit, dBc	Margin, dB**	Verdict
Low carrier frequency									
1825.500	49.4	Horizontal	1.6	5	111.3	61.9	20.0	-41.9	Pass
6389.250	50.7	Vertical	1.0	120		60.6		-40.6	
Mid carrier frequency									
1831.726	47.8	Horizontal	1.9	20	111.4	63.6	20.0	-43.6	Pass
6411.041	50.4	Vertical	1.0	113		61.0		-41.0	
High carrier frequency									
1838.212	46.8	Horizontal	1.6	180	111.8	65.0	20.0	-45.0	Pass
6433.742	47.3	Vertical	1.3	-80		64.5		-44.5	

*****- EUT front panel refers to 0 degrees position of turntable.
******- Margin = Specification limit- attenuation below carrier.

Test specification:	Section 15.247(d), RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10, sections 6.5, 6.6		
Test mode:	Compliance	Verdict:	PASS
Date(s):	01-Apr-22 - 08-Apr-22		
Temperature: 21 ºC	Relative Humidity: 53 %	Air Pressure: 1012 hPa	Power: 3 VDC
Remarks:			

Table 7.2.3 Field strength of spurious emissions above 1 GHz within restricted bands

ASSIGNED FREQUENCY: 902-928 MHz
INVESTIGATED FREQUENCY RANGE: 1000 – 9200 MHz
TEST DISTANCE: 3 m
MODULATION: GFSK
BIT RATE: 50 Kbps
TRANSMITTER OUTPUT POWER SETTINGS: Maximum
DETECTOR USED: Peak
RESOLUTION BANDWIDTH: 1 MHz
TEST ANTENNA TYPE: Double ridged guide
FREQUENCY HOPPING: Disabled

Frequency, MHz	Antenna		Azimuth, degrees*	Peak field strength			Average field strength				Verdict
	Polarization	Height, m		Measured, dB(μV/m)	Limit, dB(μV/m)	Margin, dB**	Measured, dB(μV/m)	Calculated, dB(μV/m)	Limit, dB(μV/m)	Margin, dB***	
Low carrier frequency											
2738.25	Vertical	1.0	83	55.4	74.0	-18.6	55.4	27.4	54.0	-26.6	Pass
3651.00	Vertical	1.6	-170	43.7	74.0	-30.3	43.7	15.7	54.0	-38.3	
4563.75	Horizontal	1.9	71	51.3	74.0	-22.7	51.3	23.3	54.0	-30.7	
8214.75	Horizontal	1.9	84	48.6	74.0	-25.4	48.6	20.6	54.0	-33.4	
9127.50	Horizontal	1.6	90	48.0	74.0	-26.0	48.0	20.0	54.0	-34.0	
Mid carrier frequency											
2747.589	Vertical	1.4	75	56.4	74.0	-17.6	56.4	28.4	54.0	-25.6	Pass
3663.452	Vertical	1.3	-142	42.7	74.0	-31.3	42.7	14.7	54.0	-39.3	
4579.315	Horizontal	1.9	60	50.9	74.0	-23.1	50.9	22.9	54.0	-31.1	
7326.904	Horizontal	1.2	-100	46.4	74.0	-27.6	46.4	18.4	54.0	-35.6	
8242.767	Horizontal	1.0	92	50.8	74.0	-23.2	50.8	22.8	54.0	-31.2	
High carrier frequency											
2757.318	Vertical	1.3	-111	56.8	74.0	-17.2	56.8	28.8	54.0	-25.2	Pass
3676.424	Vertical	1.0	23	44.2	74.0	-29.8	44.2	16.2	54.0	-37.8	
4595.530	Horizontal	1.6	-126	49.8	74.0	-24.2	49.8	21.8	54.0	-32.2	
7352.848	Horizontal	1.0	-101	47.5	74.0	-26.5	47.5	19.5	54.0	-34.5	
8271.954	Horizontal	2.2	145	44.2	74.0	-29.8	44.2	16.2	54.0	-37.8	

*****- EUT front panel refers to 0 degrees position of turntable.
******- Margin = Measured field strength - specification limit.
***- Margin = Calculated field strength - specification limit,
where Calculated field strength = Measured field strength + average factor.

Table 7.2.4 Average factor calculation

Transmission pulse		Transmission burst		Transmission train duration, ms	Average factor, dB
Duration, ms	Period, s	Duration, ms	Period, ms		
4	256	NA	NA	NA	-28

*- Average factor was calculated as follows

for pulse train shorter than 100 ms:

$$Average\ factor = 20 \times \log_{10}\left(\frac{Pulse\ duration}{Pulse\ period} \times \frac{Burst\ duration}{Train\ duration} \times Number\ of\ bursts\ within\ pulse\ train\right)$$

for pulse train longer than 100 ms:

$$Average\ factor = 20 \times \log_{10}\left(\frac{Pulse\ duration}{Pulse\ period} \times \frac{Burst\ duration}{100\,ms} \times Number\ of\ bursts\ within\ 100\,ms\right)$$

Test specification:	**Section 15.247(d), RSS-247 section 5.5, Radiated spurious emissions**		
Test procedure:	ANSI C63.10, sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	01-Apr-22 - 08-Apr-22		
Temperature: 21 ºC	**Relative Humidity:** 53 %	**Air Pressure:** 1012 hPa	**Power:** 3 VDC
Remarks:			

Table 7.2.5 Field strength of spurious emissions below 1 GHz within restricted bands

ASSIGNED FREQUENCY:	902-928 MHz
INVESTIGATED FREQUENCY RANGE:	0.009 – 1000 MHz
TEST DISTANCE:	3 m
MODULATION:	GFSK
MODULATING SIGNAL:	PRBS
BIT RATE:	50 kbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
RESOLUTION BANDWIDTH:	0.2 kHz (9 kHz – 150 kHz) 9.0 kHz (150 kHz – 30 MHz) 120 kHz (30 MHz – 1000 MHz)
VIDEO BANDWIDTH:	> Resolution bandwidth
TEST ANTENNA TYPE:	Active loop (9 kHz – 30 MHz) Biconilog (30 MHz – 1000 MHz)
FREQUENCY HOPPING:	Disabled

Frequency, MHz	**Peak emission, dB(µV/m)**	**Quasi-peak**			**Antenna polarization**	**Antenna height, m**	**Turn-table position**, degrees**	**Verdict**
		Measured emission, dB(µV/m)	**Limit, dB(µV/m)**	**Margin, dB***				
Low carrier frequency								
No spurious emissions were found								Pass
Mid carrier frequency								
No spurious emissions were found								Pass
High carrier frequency								
No spurious emissions were found								Pass

*****- Margin = Measured emission - specification limit.
******- EUT front panel refer to 0 degrees position of turntable.

Reference numbers of test equipment used

HL 3903	HL 604	HL 4933	HL 4339	HL 4360	HL 5902		

Full description is given in Appendix A.

Test specification:	Section 15.247(d), RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10, sections 6.5, 6.6		
Test mode:	Compliance	Verdict:	PASS
Date(s):	01-Apr-22 - 08-Apr-22		
Temperature: 21 ºC	Relative Humidity: 53 %	Air Pressure: 1012 hPa	Power: 3 VDC
Remarks:			

Table 7.2.6 Restricted bands according to FCC section 15.205

MHz	MHz	MHz	MHz	MHz	GHz
0.09 - 0.11	8.37625 - 8.38675	73 - 74.6	399.9 - 410	2690 - 2900	10.6 - 12.7
0.495 - 0.505	8.41425 - 8.41475	74.8 - 75.2	608 - 614	3260 - 3267	13.25 - 13.4
2.1735 - 2.1905	12.29 - 12.293	108 - 121.94	960 - 1240	3332 - 3339	14.47 - 14.5
4.125 - 4.128	12.51975 - 12.52025	123 - 138	1300 - 1427	3345.8 - 3358	15.35 - 16.2
4.17725 - 4.17775	12.57675 - 12.57725	149.9 - 150.05	1435 - 1626.5	3600 - 4400	17.7 - 21.4
4.20725 - 4.20775	13.36 - 13.41	156.52475 - 156.52525	1645.5 - 1646.5	4500 - 5150	22.01 - 23.12
6.215 - 6.218	16.42 - 16.423	156.7 - 156.9	1660 - 1710	5350 – 5460	23.6 - 24
6.26775 - 6.26825	16.69475 - 16.69525	162.0125 - 167.17	1718.8 - 1722.2	7250 - 7750	31.2 - 31.8
6.31175 - 6.31225	16.80425 - 16.80475	167.72 - 173.2	2200 - 2300	8025 – 8500	36.43 - 36.5
8.291 - 8.294	25.5 - 25.67	240 - 285	2310 - 2390	9000 - 9200	Above 38.6
8.362 - 8.366	37.5 - 38.25	322 - 335.4	2483.5 - 2500	9300 - 9500	

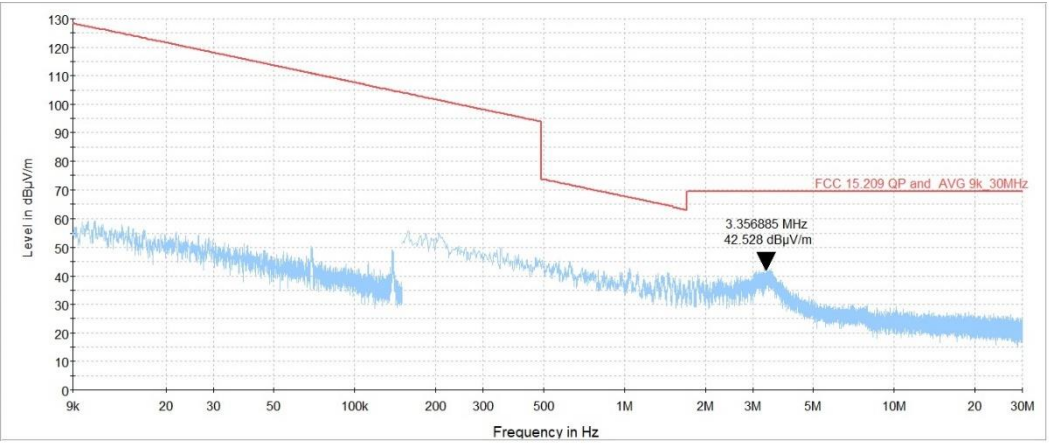
Table 7.2.7 Restricted bands according to RSS-Gen

MHz	MHz	MHz	MHz	MHz	GHz
0.09 - 0.11	8.291 - 8.294	16.80425 - 16.80475	399.9 - 410	3260 - 3267	10.6 - 12.7
2.1735 - 2.1905	8.362 - 8.366	25.5 - 25.67	608 - 614	3332 – 3339	13.25 - 13.4
3.020 – 3.026	8.37625 - 8.38675	37.5 - 38.25	960 – 1427	3345.8 – 3358	14.47 – 14.5
4.125 – 4.128	8.41425 - 8.41475	73 - 74.6	1435 – 1626.5	3500 – 4400	15.35 – 16.2
4.17725 – 4.17775	12.29 – 12.293	74.8 - 75.2	1645.5 – 1646.5	4500 – 5150	17.7 – 21.4
4.20725 – 4.20775	12.51975 – 12.52025	108 – 138	1660 - 1710	5350 – 5460	22.01 – 23.12
5.677 – 5.683	12.57675 – 12.57725	156.52475 – 156.52525	1718.8 - 1722.2	7250 - 7750	23.6 - 24
6.215 - 6.218	13.36 – 13.41	156.7 - 156.9	2200 - 2300	8025 – 8500	31.2 - 31.8
6.26775 - 6.26825	16.42 - 16.423	240 - 285	2310 - 2390	9000 - 9200	36.43 - 36.5
6.31175 - 6.31225	16.69475 - 16.69525	322 - 335.4	2655 - 2900	9300 - 9500	Above 38.6

Test specification:	Section 15.247(d), RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10, sections 6.5, 6.6		
Test mode:	Compliance	Verdict:	PASS
Date(s):	01-Apr-22 - 08-Apr-22		
Temperature: 21 ºC	Relative Humidity: 53 %	Air Pressure: 1012 hPa	Power: 3 VDC
Remarks:			

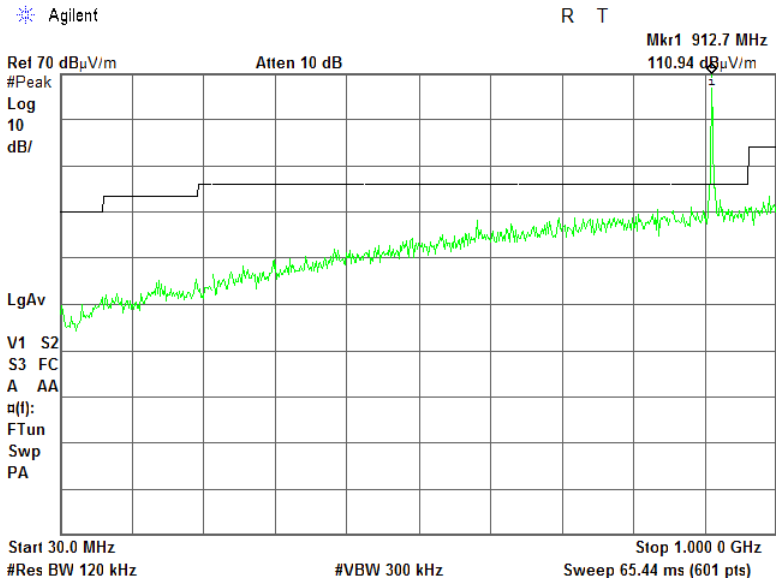
Plot 7.2.1 Radiated emission measurements from 9 kHz to 30 MHz at the low, mid, high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m



Plot 7.2.2 Radiated emission measurements from 30 to 1000 MHz at the low carrier frequency

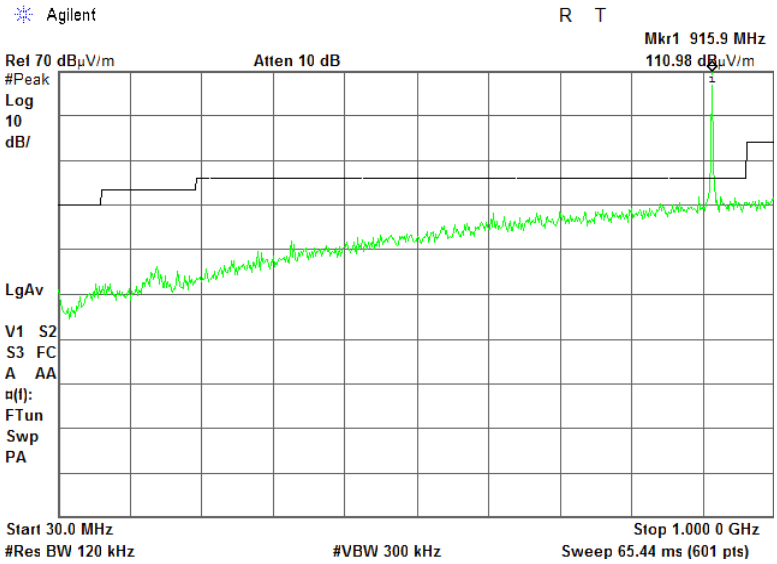
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	**Section 15.247(d), RSS-247 section 5.5, Radiated spurious emissions**		
Test procedure:	ANSI C63.10, sections 6.5, 6.6		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	01-Apr-22 - 08-Apr-22		
Temperature: 21 ºC	**Relative Humidity:** 53 %	**Air Pressure:** 1012 hPa	**Power:** 3 VDC
Remarks:			

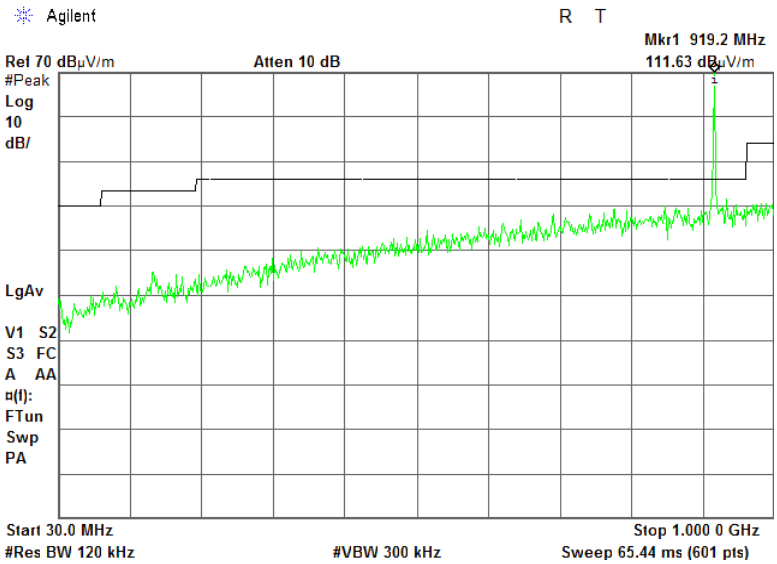
Plot 7.2.3 Radiated emission measurements from 30 to 1000 MHz at the mid carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.2.4 Radiated emission measurements from 30 to 1000 MHz at the high carrier frequency

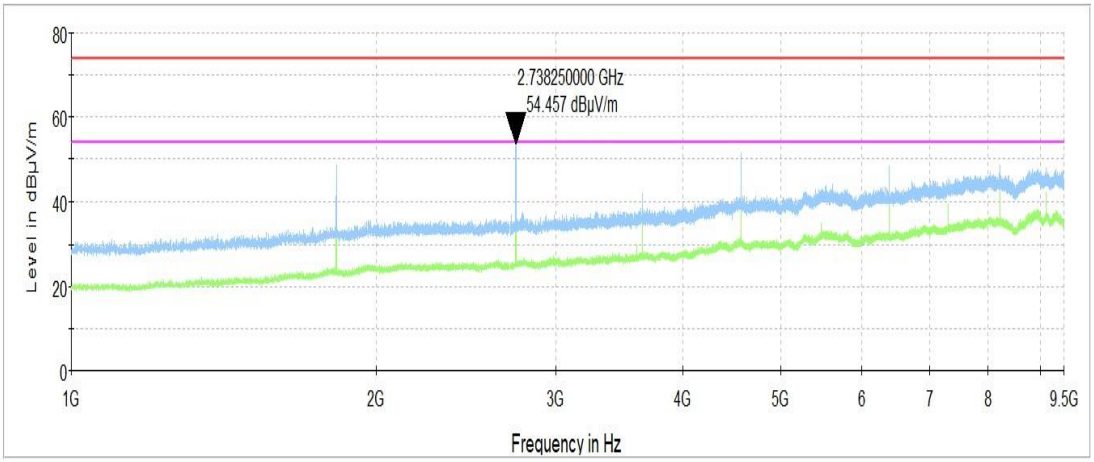
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(d), RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10, sections 6.5, 6.6		
Test mode:	Compliance	Verdict:	PASS
Date(s):	01-Apr-22 - 08-Apr-22		
Temperature: 21 ºC	Relative Humidity: 53 %	Air Pressure: 1012 hPa	Power: 3 VDC
Remarks:			

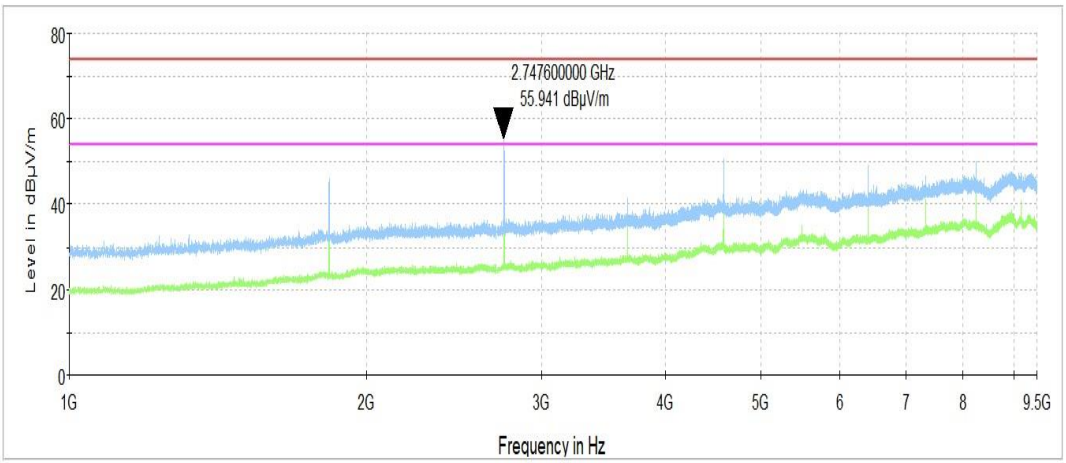
Plot 7.2.5 Radiated emission measurements from 1000 to 9500 MHz at the low carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 7.2.6 Radiated emission measurements from 1000 to 9500 MHz at the mid carrier frequency

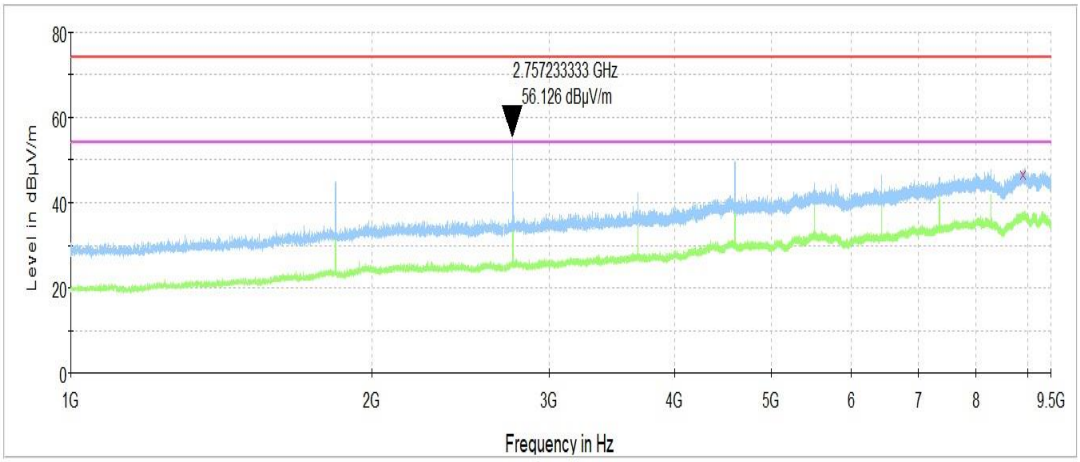
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Section 15.247(d), RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10, sections 6.5, 6.6		
Test mode:	Compliance	Verdict:	PASS
Date(s):	01-Apr-22 - 08-Apr-22		
Temperature: 21 ºC	Relative Humidity: 53 %	Air Pressure: 1012 hPa	Power: 3 VDC
Remarks:			

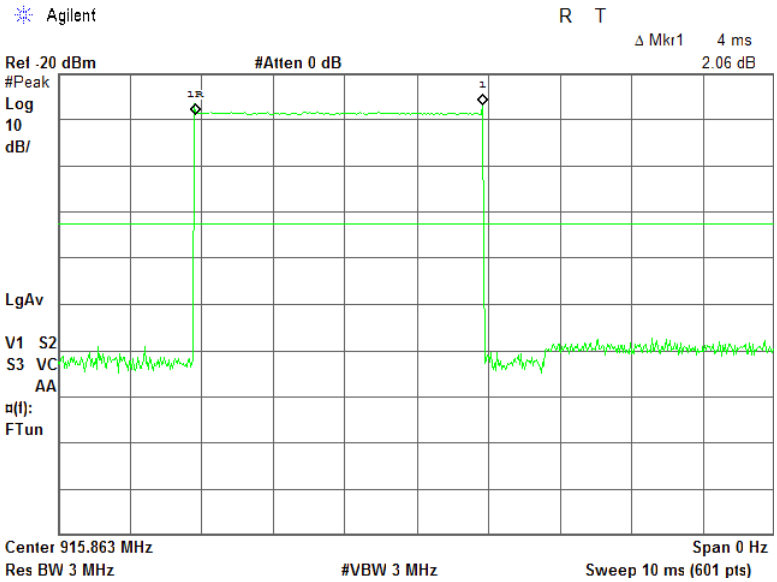
Plot 7.2.7 Radiated emission measurements from 1000 to 9500 MHz at the high carrier frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal

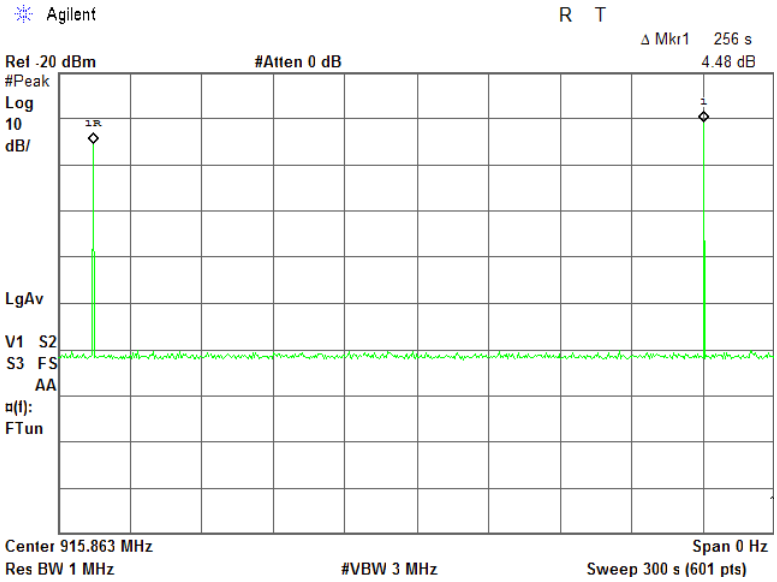


Test specification:	Section 15.247(d), RSS-247 section 5.5, Radiated spurious emissions		
Test procedure:	ANSI C63.10, sections 6.5, 6.6		
Test mode:	Compliance	Verdict:	PASS
Date(s):	01-Apr-22 - 08-Apr-22		
Temperature: 21 ºC	Relative Humidity: 53 %	Air Pressure: 1012 hPa	Power: 3 VDC
Remarks:			

Plot 7.2.8 Transmission pulse duration



Plot 7.2.9 Transmission pulse period



8 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	11-May-21	11-May-22
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY48250288	02-Aug-21	02-Aug-22
3903	Microwave Cable Assembly, 40.0 GHz, 1.5 m, SMA/SMA	Huber-Suhner	SUCOFLEX 102A	1226/2A	06-Apr-21	06-Apr-22
4339	High pass Filter, 50 Ohm, 1000 to 18000 MHz, SMA-FM / SMA-M	Micro-Tronics	HPM50115-02	001	15-Jun-21	15-Jun-23
4360	EMI Test Receiver, 20 Hz to 40 GHz.	Rohde & Schwarz	ESU40	100322	13-Jan-22	13-Jan-23
4933	Active Horn Antenna, 1 GHz to 18 GHz	COM-POWER CORPORATION	AHA-118	701046	13-Jan-22	13-Jan-23
5902	RF cable, 18 GHz, 6.0m, N-type	Huber-Suhner	SF126EA/11N/11N/6000	NA	16-Jan-22	16-Jan-23

9 APPENDIX B Test equipment correction factors

HL 0604: Antenna BiconiLog Log-Periodic/T Bow-TIE
EMCO, model 3141, serial number 9611-1011

Frequency, MHz	Antenna factor, dB/m		
	Measured	Last	Deviation
30	12.1	12.6	-0.5
35	9.1	9.5	-0.4
40	8.0	8.3	-0.3
45	8.3	8.6	-0.3
50	9.0	9.1	-0.1
60	10.5	10.7	-0.2
70	11.4	11.3	0.1
80	12.3	12.2	0.1
90	13.4	13.2	0.2
100	13.0	13.0	0.0
120	11.4	11.4	0.0
140	12.5	12.4	0.1
160	14.9	14.8	0.1
180	14.4	14.0	0.4
200	13.7	13.9	-0.2
250	16.3	16.4	-0.1
300	17.2	17.5	-0.3
400	19.8	20.2	-0.4
500	22.0	22.4	-0.4
600	24.3	24.5	-0.2
700	25.8	25.6	0.2
800	26.9	26.6	0.3
900	27.3	28.0	-0.7
1000	28.5	29.3	-0.8

The antenna factor shall be added to receiver reading in dBµV to obtain field strength in dBµV/m.

HL 4933: Active Horn Antenna
COM-POWER CORPORATION, model: AHA-118, s/n 701046

Frequency, MHz	Measured antenna factor (with preamplifier), dB/m
1000	-16.1
1500	-15.1
2000	-10.9
2500	-11.9
3000	-11.1
3500	-10.6
4000	-8.6
4500	-8.3
5000	-5.9
5500	-5.7
6000	-3.3
6500	-4.0
7000	-2.2
7500	-1.7
8000	1.1
8500	-0.8
9000	-1.5
9500	-0.2

Frequency, MHz	Measured antenna factor (with preamplifier), dB/m
10000	1.8
10500	1.0
11000	0.3
11500	-0.5
12000	3.1
12500	1.4
13000	-0.3
13500	-0.4
14000	2.5
14500	2.2
15000	1.9
15500	0.5
16000	2.1
16500	1.2
17000	0.6
17500	3.1
18000	4.2

The antenna factor shall be added to receiver reading in dBμV to obtain field strength in dBμV/m.

10 APPENDIX C Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Conducted carrier power at RF antenna connector	Below 12.4 GHz: ± 1.7 dB 12.4 GHz to 40 GHz: ± 2.3 dB
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Occupied bandwidth	± 8.0 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 3 m measuring distance Horizontal polarization Vertical polarization	 Biconilog antenna: ± 5.3 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.3 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 6.0 dB Biconical antenna: ± 5.7 dB Log periodic antenna: ± 6.0 dB Double ridged horn antenna: ± 6.0 dB

Hermon Laboratories is accredited by A2LA for calibration according to present requirements of ISO/IEC 17025 and NCSL Z540-1. The accreditation is granted to perform calibration of parameters that are listed in the Scope of Hermon Laboratories Accreditation.

Hermon Laboratories calibrates its reference and transfer standards by calibration laboratories accredited to ISO/IEC 17025 by a mutually recognized Accreditation Body or by a recognized national metrology institute. All reference and transfer standards used in the calibration system are traceable to national or international standards.

In-house calibration of all test and measurement equipment is performed on a regular basis according to Hermon Laboratories calibration procedures, manufacturer calibration/verification procedures or procedures defined in the relevant standards. The Hermon Laboratories test and measurement equipment is calibrated within the tolerances specified by the manufacturers and/or by the relevant standards.

11 APPENDIX D Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, Radio, Safety, Environmental and Telecommunication testing facility.
Hermon Laboratories is recognized and accredited by the Federal Communications Commission (USA) for relevant parts of Code of Federal Regulations 47 (CFR 47), Test Firm Registration Number is 927748, Designation Number is IL1001; Recognized by Innovation, Science and Economic Development Canada for wireless and terminal testing (ISED), ISED #2186A, CAB identifier is IL1001; Certified by VCCI, Japan (the registration numbers for OATS are R-10808 for RE measurements below 1 GHz, G-20112 for RE measurements above 1 GHz, R-11082 for anechoic chamber for RE measurements below 1 GHz, G-10869 for RE measurements above 1 GHz, C-10845 for conducted emissions site and T-11606 for conducted emissions at telecommunication ports).
The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing, environmental simulation and calibration (for exact scope please refer to Certificate No. 839.01, 839.03 and 839.04).

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Telephone: +972 4628 8001
Fax: +972 4628 8277
e-mail: mail@hermonlabs.com
website: www.hermonlabs.com

Person for contact: Mr. Michael Nikishin, EMC&Radio group manager

12 APPENDIX E Specification references

FCC 47CFR part 15: 2020	Radio Frequency Devices
ANSI C63.10: 2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
RSS-247 Issue 2: 2017	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence- Exempt Local Area Network (LE-LAN) Devices
RSS-Gen Issue 5 with_amendment_1_2: 2021	General Requirements and Information for the Certification of Radiocommunication Equipment

13 APPENDIX F Manufacturer's declaration

Visonic
A Tyco International Company

Visonic Ltd.
24 Habarzel Street
P.O.Box 22020
Tel-Aviv 69710, Israel

Tele: +972 3 645 6789
Fax: +972 3 645 6788
www.visonic.com

Declaration of Identity

We, the undersigned,

Company: Visonic Ltd
Address: 24 Habarzel Street
Country: Israel
Telephone number: +972 3 6456 789
Fax number: +972 3 6456 788

Declare under our sole responsibility that the following equipment:

Brand/Item	Type/Model	Short Product description
Johnson Controls	MC-302E P9M0	PG+ Wired Input Door/Window Magnetic Contact, 915MHz

Is electronically/electrically identical to the following equipment:

Brand/Item	Type/Model	Short Product description
TYCO	MC-309 PG2	PowerG Wireless Magnetic Contact Device with Hardwired Inputs, 915MHz

The differences are: moved LED place in the PCB, reduce to two hardwired inputs instead of three, Flash added, new plastic enclosure design, addition of some new supplementary SW features.

28/04/2022

Zuri Rubin

Certification Manager - Visonic

14 APPENDIX G Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
AM	amplitude modulation
AVRG	average (detector)
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μV)	decibel referred to one microvolt
dB(μV/m)	decibel referred to one microvolt per meter
dB(μA)	decibel referred to one microampere
DC	direct current
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
k	kilo
kHz	kilohertz
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μs	microsecond
NA	not applicable
NB	narrow band
OATS	open area test site
Ω	Ohm
PM	pulse modulation
PS	power supply
ppm	part per million (10^{-6})
QP	quasi-peak
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt
WB	wideband

END OF DOCUMENT