HERMON LABORATORIES

ELECTRICAL TESTING
0839.01

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TEST REPORT

ACCORDING TO: FCC CFR 47 PART 15 subpart C, section 15.231(a)

FOR:

Reactive Target System Ltd.

RTS Transmitter

Model number: TAM

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1 Applicant information

Client name:	Reactive Target System Ltd.
Address:	43 Yakov Olamy Street, Moshav Mishmar Hashiva 50297, Israel
Telephone:	+972.3.960.3399
Fax:	+972.3.960.3312
E-mail:	mikealon@017.net.il
Contact name:	Mr. Michael Alon

2 Equipment under test attributes

Product name:	RTS Transmitter
Model number:	TAM
Serial number:	Prototype
Hardware version:	E
Software release:	1.24
Receipt date:	4/10/2011

3 Manufacturer information

Manufacturer name:	Reactive Target System Ltd.
Address:	43 Yakov Olamy Street, Moshav Mishmar Hashiva 50297, Israel
Telephone:	+972.3.960.3399
Fax:	+972.3.960.3312
E-mail:	Avishay@rts-ip.com
Contact name:	Mr. Avishay Zur

4 Test details

Project ID:	21920
Location:	Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started:	4/10/2011
Test completed:	4/17/2011
Test specification:	FCC Part 15, subpart C, §15.231(a)

5 Tests summary

Test	Status
Transmitter characteristics	
Section 15.231(a), Periodic operation requirements	Pass
Section 15.231(b), Field strength of emissions	Pass
Section 15.231(c), Occupied bandwidth	Pass
Section 15.207(a), Conducted emission	Not required
Section 15.203, Antenna requirement	Pass

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	April 17, 2011	
Reviewed by:	Ms. N. Averin, certification engineer	April 20, 2011	
Approved by:	Mr. M. Nikishin, EMC and radio group leader	May 2, 2011	

6 EUT description

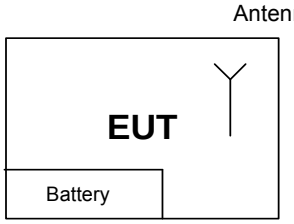
6.1 General information

The EUT, RTS Transmitter is a specialized device that detects and transmits an on-target bullet hit. When a target is hit by a bullet, the EUT is activated and transmits a short burst of data packet containing information related to the hit. The EUT operates at 915 MHz, is equipped with an integral antenna and is powered from 3V Lithium internal battery.

6.2 Operating frequencies

Source	Frequency, MHz		
Clock	4	10	NA
Tx	915	NA	NA

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)						
Operating frequency		915 MHz					
Maximum rated output power		Maximum field strength				87.97 dB(µV/m) at 3 m test distance	
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							
X	unique coupling (soldered)	standard connector		integral	with temporary RF connector		
					without temporary RF connector		
Type of modulation		FSK					
Transmitter power source							
X	Battery	**Nominal rated voltage**	3 VDC	Battery type	Lithium		
	DC	**Nominal rated voltage**	VDC				
	AC mains	**Nominal rated voltage**	VAC	Frequency	Hz		
Common power source for transmitter and receiver				yes	X	no	

Test specification:	Section 15.231(a), Periodic operation requirements		
Test procedure:	Supplier declaration		
Test mode:	Compliance	Verdict:	PASS
Date:	4/13/2011		
Temperature: 23 ºC	Air Pressure: 1016 hPa	Relative Humidity: 40 %	Power Supply: 3V battery
Remarks:			

7 Transmitter tests according to FCC 47CFR part 15 subpart C requirements

7.1 Periodic operation requirements

7.1.1 General

The EUT was verified for compliance with periodic operation requirements listed below:

- Continuous transmissions such as voice, video and the radio control of toys are not permitted;
- A manually operated transmitter shall employ switch that will automatically deactivate the transmitter within not more than 5 seconds of being released;
- A transmitter activated automatically shall cease transmission within 5 seconds after activation;
- Periodic transmissions, excluding polling or supervision transmissions, at regular predetermined intervals are not permitted;
- Total duration of polling or supervision transmissions, including data, to determine system integrity in security or safety applications shall not exceed 2 seconds per hour;
- Transmission of set-up information for security systems may exceed the transmission duration limits of 5 seconds, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.

The rationale for compliance with the above requirements was either test results or supplier declaration. The summary of results is provided in Table 7.1.1.

7.1.2 Test procedure for transmitter shut down test

7.1.2.1 The EUT was set up as shown in Figure 7.1.1.

7.1.2.2 The spectrum analyzer center frequency was adjusted to the EUT carrier, span set to zero and video triggered for transmission.

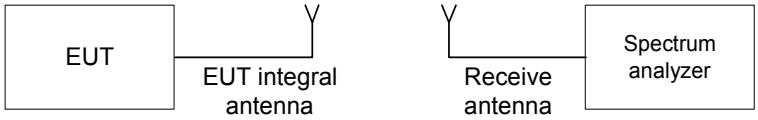
7.1.2.3 The transmitter was activated automatically.

7.1.2.4 The transmission time was captured and shown in Plot 7.1.1.

7.1.3 Test procedure for measurements of polling / supervision transmission duration

7.1.3.1 The EUT has not polling / supervision transmission as provided in Table 7.1.2 and Appendix G of the test report.

Figure 7.1.1 Setup for transmitter shut down test



Test specification:	**Section 15.231(a), Periodic operation requirements**		
Test procedure:	Supplier declaration		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/13/2011		
Temperature: 23 ºC	**Air Pressure:** 1016 hPa	**Relative Humidity:** 40 %	**Power Supply:** 3V battery
Remarks:			

Table 7.1.1 Periodic operation requirements

Requirement	Rationale	Verdict
Continuous transmissions are not permitted	Supplier declaration	Comply
A manually operated transmitter shall be deactivated within not more than 5 seconds of switch being released	NA	NA
Transmitter activated automatically shall cease transmission within 5 seconds	Plot 7.1.1	Comply
Periodic transmissions at regular predetermined intervals are not permitted	Supplier declaration	Comply
Total duration of polling or supervision transmissions shall not exceed 2 seconds per hour	Supplier declaration	Comply
Transmission of set-up information for security systems may exceed the transmission duration limits of 5 seconds, provided such transmissions are under the control of a professional installer and do not exceed ten seconds after a manually operated switch is released or a transmitter is activated automatically. Such set-up information may include data.	Supplier declaration	Comply

Plot 7.1.1 Transmitter shut down test result

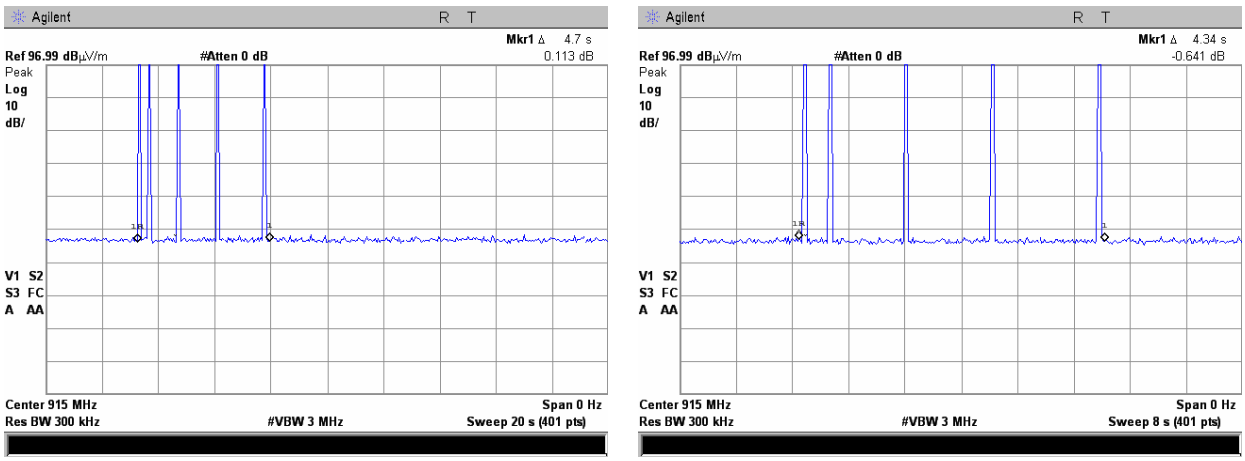


Table 7.1.2 Total duration of polling / supervision transmissions

Duration, ms	Repetition period, ms	Maximum number of transmissions within 1 hour	Total duration within 1 hour, ms
The EUT has not polling / supervision transmission, refer to Supplier Declaration (Appendix G of the test report).			

Reference numbers of test equipment used

HL 2909							

Full description is given in Appendix A.

Test specification:	Section 15.231(b), Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	4/17/2011		
Temperature: 23 ºC	Air Pressure: 1016 hPa	Relative Humidity: 40 %	Power Supply: 3V battery
Remarks:			

7.2 Field strength of emissions

7.2.1 General

This test was performed to measure field strength of fundamental and spurious emissions from the EUT. Specification test limits are given in Table 7.2.1 and Table 7.2.2.

Table 7.2.1 Radiated fundamental emission limits

Fundamental frequency, MHz	Field strength at 3 m, dB(μV/m)	
	Peak	Average
915	101.9	81.9

Table 7.2.2 Radiated spurious emissions limits

Frequency, MHz	Field strength at 3 m, dB(μV/m)				
	Within restricted bands			Outside restricted bands	
	Peak	Quasi Peak	Average	Peak	Average
0.009 – 0.090	148.5 – 128.5	NA	128.5 – 108.5**	81.9	61.9
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			
Above 1000	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.

Note 1: The fundamental emission limit in dB(μV/m) was calculated as follows:

$$Lim_{AVR} = 20 \times \log(56.81818 \times F - 6136.3636)$$ - within 130 – 174 MHz band;

$$Lim_{AVR} = 20 \times \log(41.6667 \times F - 7083.3333)$$ - within 260 – 470 MHz band,

where F is the carrier frequency in MHz.

The limit for spurious emissions was 20 dB lower than fundamental emission limit.

The above limits provided in terms of average values, peak limit was 20 dB above the average limit.

Note 2: The above 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.

Test specification:	Section 15.231(b), Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	4/17/2011		
Temperature: 23 ºC	Air Pressure: 1016 hPa	Relative Humidity: 40 %	Power Supply: 3V battery
Remarks:			

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 in Table 7.2.3, Table 7.2.5 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, 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 in Table 7.2.3, Table 7.2.5 and shown in the associated plots.

Test specification:	Section 15.231(b), Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	4/17/2011		
Temperature: 23 ºC	Air Pressure: 1016 hPa	Relative Humidity: 40 %	Power Supply: 3V battery
Remarks:			

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

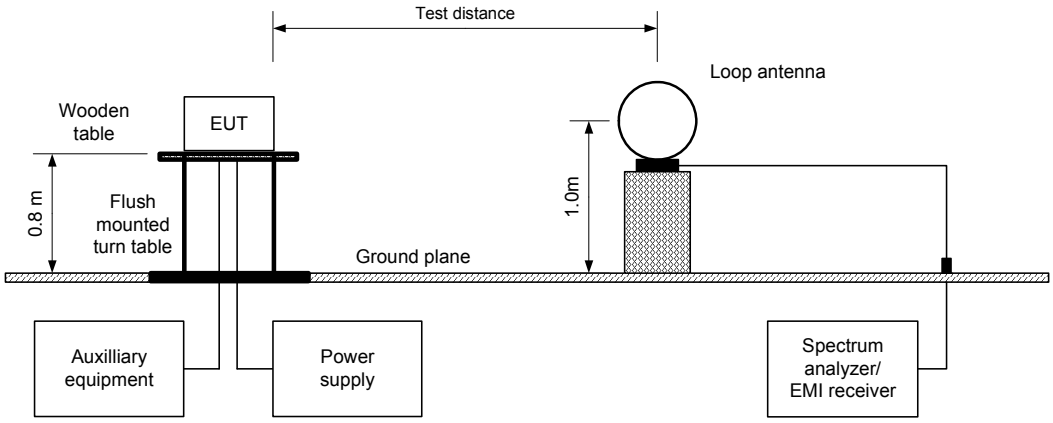
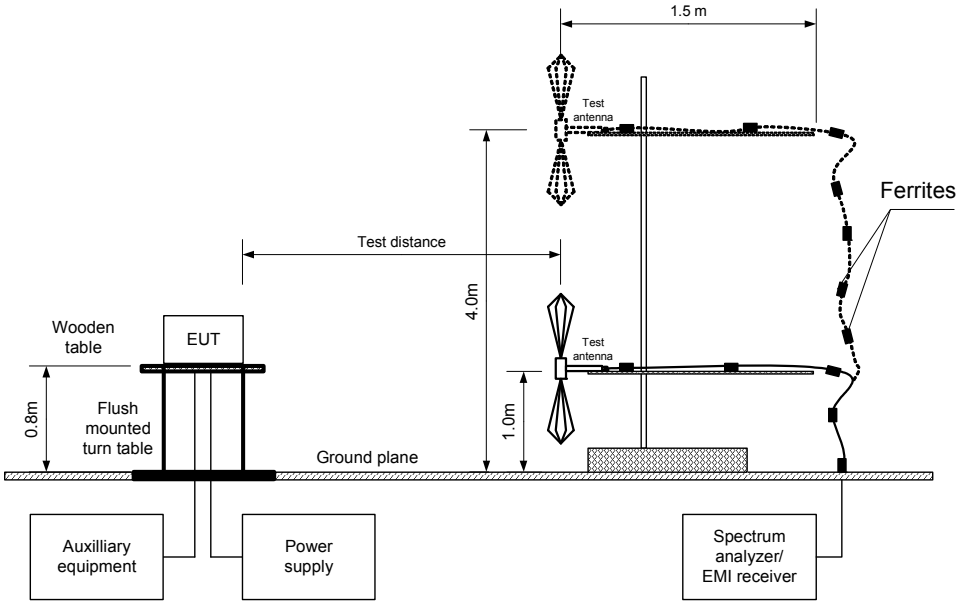


Figure 7.2.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	**Section 15.231(b), Field strength of emissions**		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	**Verdict:**	PASS
Date:	4/17/2011		
Temperature: 23 ºC	**Air Pressure:** 1016 hPa	**Relative Humidity:** 40 %	**Power Supply:** 3V battery
Remarks:			

Table 7.2.3 Field strength of fundamental emission, spurious emissions outside restricted bands and within restricted bands at frequencies above 1 GHz

TEST DISTANCE:	3 m
EUT POSITION:	3 orthogonal (X / Y / Z)
MODULATION:	FSK
BIT RATE:	2.4 kbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
DUTY CYCLE DURING TEST	100 %
INVESTIGATED FREQUENCY RANGE:	0.009 - 9160 MHz
DETECTOR USED:	Peak
RESOLUTION BANDWIDTH:	0.2 kHz (9 kHz – 150 kHz) 9.0 kHz (150 kHz – 30 MHz) 120 kHz (30 MHz – 1000 MHz) 1.0 MHz (above 1000 MHz)
VIDEO BANDWIDTH:	≥ Resolution bandwidth
TEST ANTENNA TYPE:	Active loop (9 kHz – 30 MHz) Biconical (30 MHz – 200 MHz) Log periodic (200 MHz – 1000 MHz) Biconilog (30 MHz – 1000 MHz) Double ridged guide (above 1000 MHz)

F, MHz	Antenna		Azimuth, degrees*	Peak field strength			Avr factor, dB	Average field strength			Verdict
	Pol.	Height, m		Measured, dB(µV/m)	Limit, dB(µV/m)	Margin, dB**		Measured, dB(µV/m)	Limit, dB(µV/m)	Margin, dB**	
Fundamental emission* **											
915.055	H	1.0	0	87.97	101.9	-13.93	-7.96	80.01	81.9	-1.89	Pass
Spurious emissions											
1833	H	1.1	0	51.97	81.9	-29.93	-7.96	44.01	61.9	-17.89	Pass
2745.203	H	1.1	0	46.57	74.0	-27.43	-7.96	38.61	54.0	-15.39	
3659.955	H	1.1	0	45.82	74.0	-28.18	-7.96	37.86	54.0	-16.14	

*****- EUT front panel refers to 0 degrees position of turntable.
******- Margin = dB below (negative if above) specification limit.
*** Max value was obtained in Z-axis orthogonal position

Table 7.2.4 Average factor calculation

Transmission pulse		Transmission burst		Transmission train duration, ms	Average factor, dB
Duration, ms	Period, ms	Duration, ms	Period, ms		
40.5	111	NA	NA	NA	-7.96

*- Average factor was calculated as follows

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

Average factor = 20*log (40.5/100) = -7.96 dB, where
Duration in 100 ms = 40.5 ms

Reference numbers of test equipment used

HL 0034	HL 0446	HL 1431	HL 1984	HL 2109	HL 2697	HL 2882	HL 2909
HL 3121	HL 3389						

Full description is given in Appendix A.

Test specification:	Section 15.231(b), Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	4/17/2011		
Temperature: 23 ºC	Air Pressure: 1016 hPa	Relative Humidity: 40 %	Power Supply: 3V battery
Remarks:			

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

TEST DISTANCE:	3 m
EUT POSITION:	3 orthogonal (X / Y / Z)
MODULATION:	FSK
BIT RATE:	2.4 kbps
TRANSMITTER OUTPUT POWER SETTINGS:	Maximum
INVESTIGATED FREQUENCY RANGE:	0.009 – 1000 MHz
DETECTOR USED:	Peak
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) Biconical (30 MHz – 200 MHz) Log periodic (200 MHz – 1000 MHz) Biconilog (30 MHz – 1000 MHz)

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*				
No emissions were found.								Pass

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

Table 7.2.6 Restricted bands

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	

Reference numbers of test equipment used

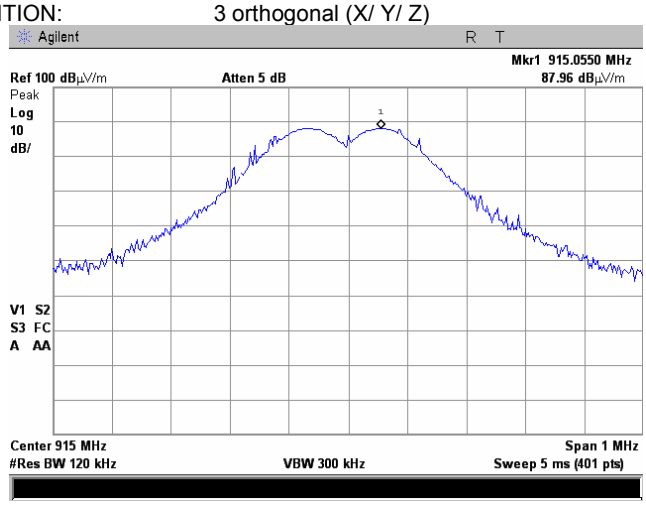
HL 0446	HL 0583	HL 1431	HL 1984	HL 2109	HL 2697	HL 2882	HL 2909
HL 3121	HL 3389						

Full description is given in Appendix A.

Test specification:	Section 15.231(b), Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	4/17/2011		
Temperature: 23 ºC	Air Pressure: 1016 hPa	Relative Humidity: 40 %	Power Supply: 3V battery
Remarks:			

Plot 7.2.1 Radiated emission measurements at the fundamental frequency

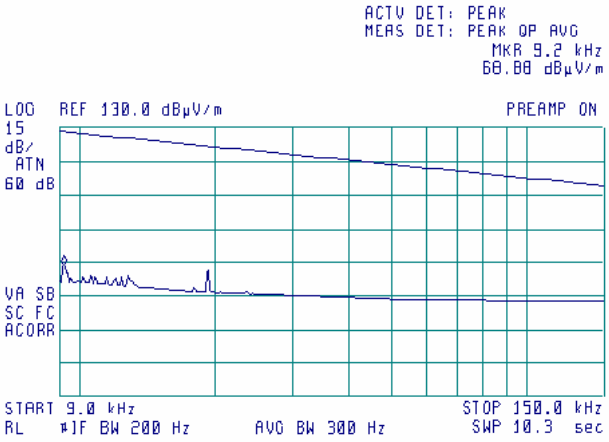
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: 3 orthogonal (X/ Y/ Z)



Test specification:	Section 15.231(b), Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	4/17/2011		
Temperature: 23 ºC	Air Pressure: 1016 hPa	Relative Humidity: 40 %	Power Supply: 3V battery
Remarks:			

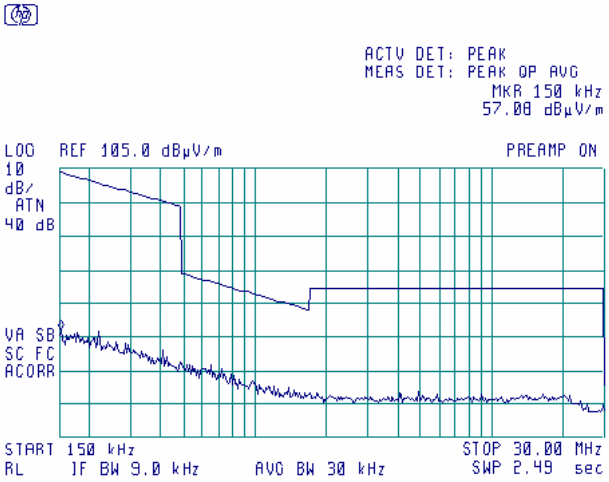
Plot 7.2.2 Radiated emission measurements from 9 to 150 kHz

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: 3 orthogonal (X/ Y/ Z)



Plot 7.2.3 Radiated emission measurements from 0.15 to 30 MHz

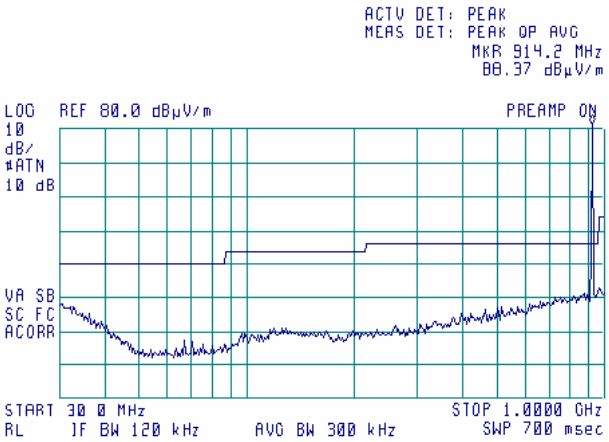
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: 3 orthogonal (X/ Y/ Z)



Test specification:	Section 15.231(b), Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	4/17/2011		
Temperature: 23 ºC	Air Pressure: 1016 hPa	Relative Humidity: 40 %	Power Supply: 3V battery
Remarks:			

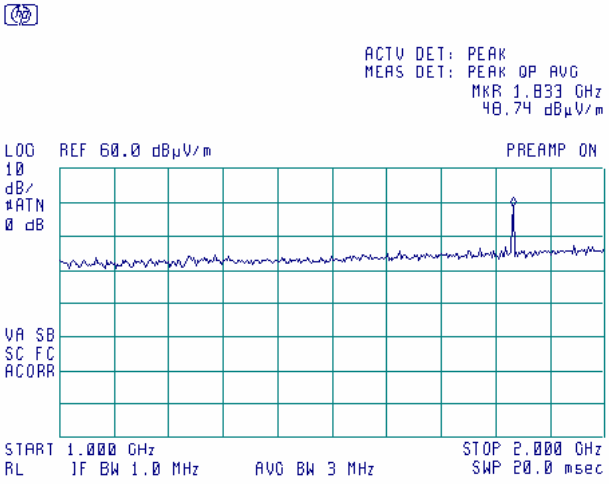
Plot 7.2.4 Radiated emission measurements from 30 to 1000 MHz

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
EUT POSITION: 3 orthogonal (X/ Y/ Z)



Plot 7.2.5 Radiated emission measurements from 1000 to 2000 MHz

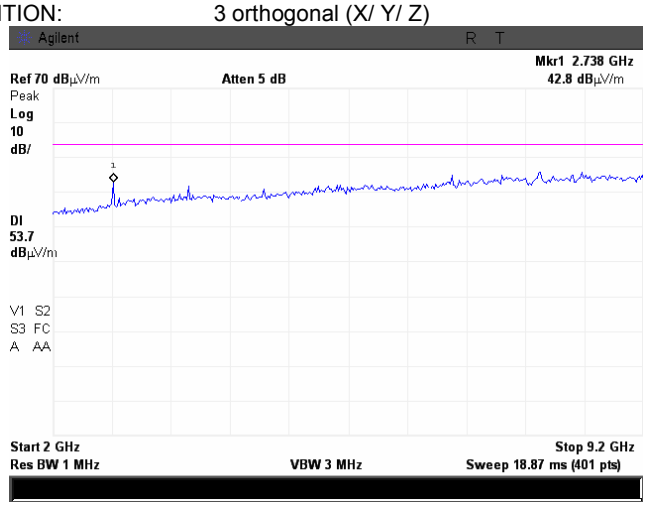
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
EUT POSITION: 3 orthogonal (X/ Y/ Z)



Test specification:	Section 15.231(b), Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	4/17/2011		
Temperature: 23 ºC	Air Pressure: 1016 hPa	Relative Humidity: 40 %	Power Supply: 3V battery
Remarks:			

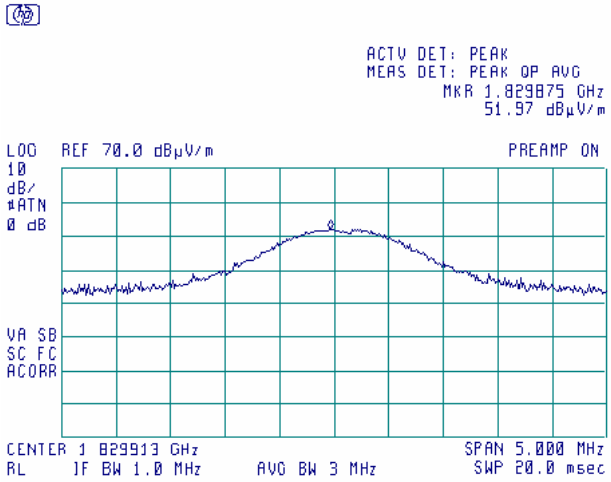
Plot 7.2.6 Radiated emission measurements from 2000 to 9200 MHz

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal
EUT POSITION: 3 orthogonal (X/ Y/ Z)



Plot 7.2.7 Radiated emission measurements at the second harmonic frequency

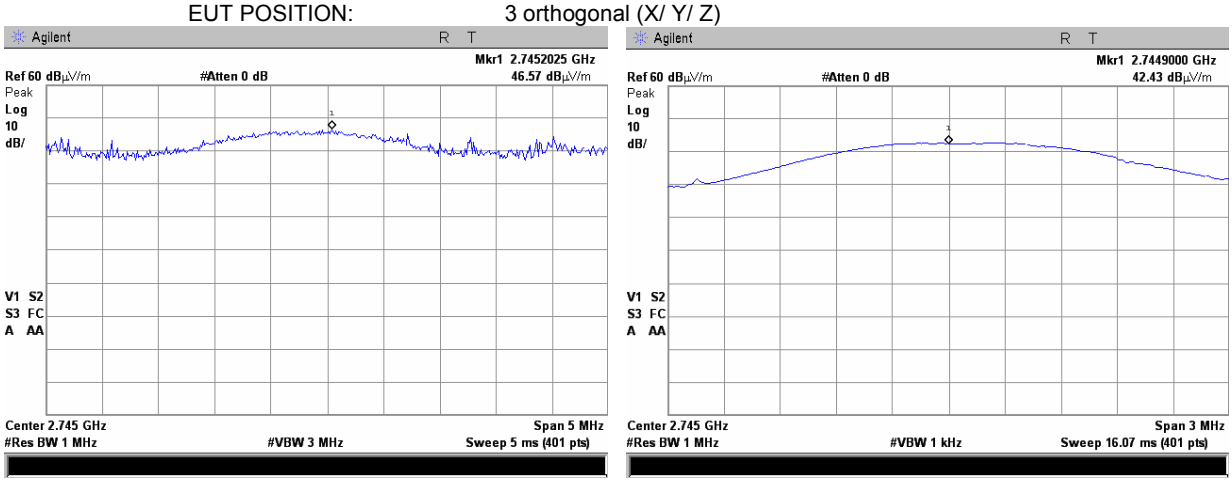
TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: 3 orthogonal (X/ Y/ Z)



Test specification:	Section 15.231(b), Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	4/17/2011		
Temperature: 23 ºC	Air Pressure: 1016 hPa	Relative Humidity: 40 %	Power Supply: 3V battery
Remarks:			

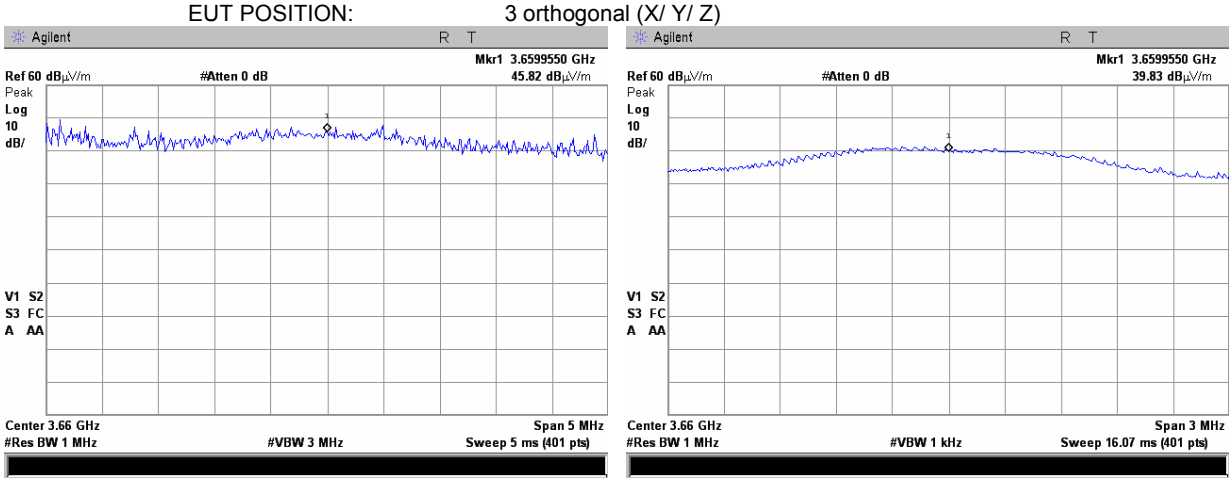
Plot 7.2.8 Radiated emission measurements at the third harmonic frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: 3 orthogonal (X/ Y/ Z)



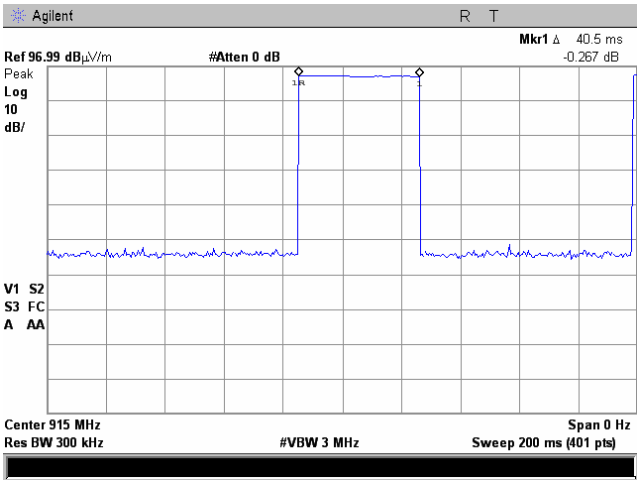
Plot 7.2.9 Radiated emission measurements at the fourth harmonic frequency

TEST SITE: OATS
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: 3 orthogonal (X/ Y/ Z)

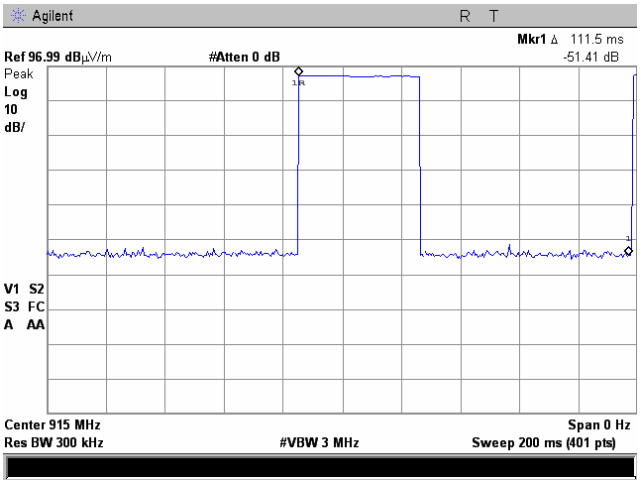


Test specification:	Section 15.231(b), Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date:	4/17/2011		
Temperature: 23 ºC	Air Pressure: 1016 hPa	Relative Humidity: 40 %	Power Supply: 3V battery
Remarks:			

Plot 7.2.10 Transmission pulse duration



Plot 7.2.11 Transmission pulse period



Test specification:	Section 15.231(c), Occupied bandwidth		
Test procedure:	ANSI C63.4, Section 13.1.7		
Test mode:	Compliance	Verdict:	PASS
Date:	4/13/2011		
Temperature: 23 ºC	Air Pressure: 1016 hPa	Relative Humidity: 40 %	Power Supply: 3V battery
Remarks:			

7.3 Occupied bandwidth test

7.3.1 General

This test was performed to measure transmitter occupied bandwidth. Specification test limits are given in Table 7.3.1. The test results are provided in Table 7.3.2 and associated plots.

Table 7.3.1 Occupied bandwidth limits

Assigned frequency, MHz	Modulation envelope reference points*, dBc	Maximum allowed bandwidth, % of the carrier frequency
70 - 900	20.0	0.25
Above 900		**0.50**

*- Modulation envelope reference points provided in terms of attenuation below modulated carrier.

7.3.2 Test procedure

7.3.2.1 The EUT was set up as shown in Figure 7.3.1, energized and its proper operation was checked.

7.3.2.2 The EUT was set to transmit modulated carrier.

7.3.2.3 The transmitter occupied bandwidth was measured with spectrum analyzer as frequency delta between reference points on modulation envelope and provided in Table 7.3.2 and associated plot.

Figure 7.3.1 Occupied bandwidth test setup

Test specification:	Section 15.231(c), Occupied bandwidth		
Test procedure:	ANSI C63.4, Section 13.1.7		
Test mode:	Compliance	Verdict:	PASS
Date:	4/13/2011		
Temperature: 23 ºC	Air Pressure: 1016 hPa	Relative Humidity: 40 %	Power Supply: 3V battery
Remarks:			

Table 7.3.2 Occupied bandwidth test results

DETECTOR USED:	Peak hold
RESOLUTION BANDWIDTH:	120 kHz
VIDEO BANDWIDTH:	300 kHz
MODULATION ENVELOPE REFERENCE POINTS:	20 dBc
MODULATION:	FSK
BIT RATE:	2.4 kbps

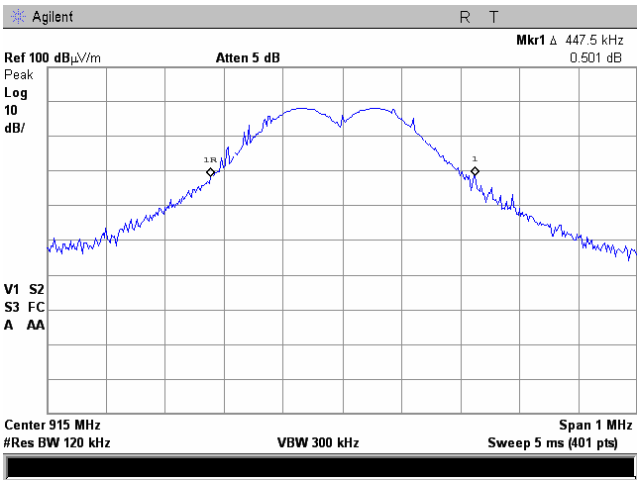
Carrier frequency, MHz	Occupied bandwidth, kHz	Limit		Margin, kHz	Verdict
		% of the carrier frequency	kHz		
915.055	447.5	0.5	4575.275	4127.775	Pass

Reference numbers of test equipment used

HL 0583	HL 2909	HL 3121						

Full description is given in Appendix A.

Plot 7.3.1 Occupied bandwidth test result



Test specification:	Section 15.203, Antenna requirement		
Test procedure:	Visual inspection / supplier declaration		
Test mode:	Compliance	Verdict:	PASS
Date:	4/13/2011		
Temperature: 23 ºC	Air Pressure: 1016 hPa	Relative Humidity: 40 %	Power Supply: 3V battery
Remarks:			

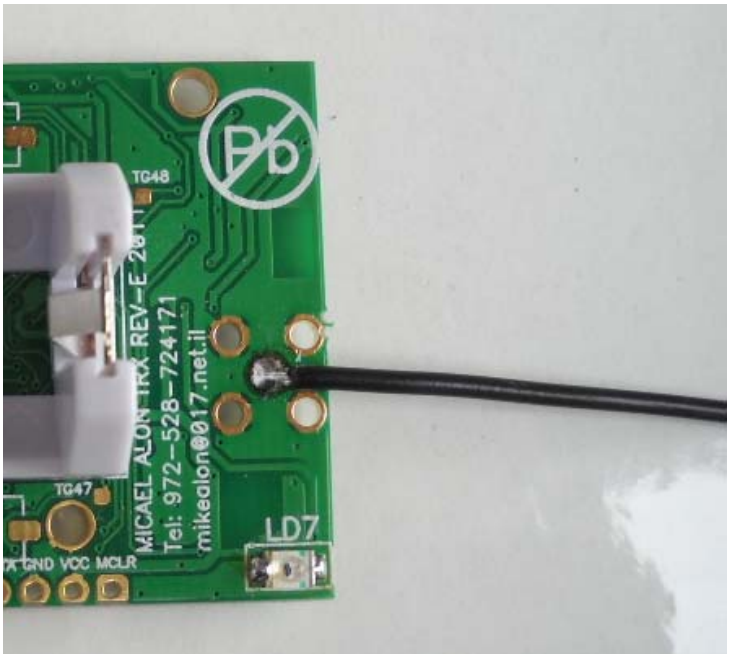
7.4 Antenna requirements

The EUT was verified for compliance with antenna requirements. A transmitter shall be designed to ensure that no antenna other than that furnished by the responsible party will be used with the device. It may be either permanently attached or employs a unique antenna connector for every antenna proposed for use with the EUT. This requirement does not apply to professionally installed transmitters.
The rationale for compliance with the above requirements was either visual inspection results or supplier declaration. The summary of results is provided in Table 7.4.1.

Table 7.4.1 Antenna requirements

Requirement	Rationale	Verdict
The transmitter antenna is permanently attached	Visual inspection	Comply
The transmitter employs a unique antenna connector	NA	
The transmitter requires professional installation	NA	

Photograph 7.4.1 Antenna assembly



8 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./Check	Due Cal./Check
0034	Antenna, Log Periodic, 200 - 1000 MHz	Electro-Metrics	LPA 25/30	1988	08-Apr-11	08-Apr-12
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	29-Jun-10	29-Jun-11
0583	Antenna, Log Periodic, 200 - 1000 MHz	Hermon Laboratories	LP 200/1000	035	23-Dec-09	23-Dec-11
1431	Receiver RF Section, 9 kHz-2.9 GHz, part of HL1430 system	Agilent Technologies	85422E	3080700262	25-Nov-10	25-Nov-11
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W	EMC Test Systems	3115	9911-5964	11-Jun-10	11-Jun-11
2109	Anechoic Chamber 6(L) x 5.5(W) x 2.95(H) m	Hermon Laboratories	AC-2	2109	10-Nov-10	10-Nov-11
2697	Antenna, 30 MHz - 3.0 GHz	Sunol Sciences. Corp. Pleasanton, California USA	JB3	A022805	11-Jan-11	11-Jan-12
2882	Cable, 18 GHz N-type, M-F, 3 m	Bird Electronic Corp.	TC-MNFN-3.0	211539001	03-Oct-10	03-Oct-11
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY41444762	07-May-10	07-May-11
3121	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	3121	01-Jan-11	01-Jan-12
3389	Microwave Cable Assembly, 26.5 GHz, 1.0 m, N type/N type	Suhner Sucoflex	104EA	3389	07-Feb-11	07-Feb-12

9 APPENDIX B Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility.
Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47), Registration Numbers 90624 for OATS and 90623 for the anechoic chamber; by Industry Canada for electromagnetic emissions (file numbers IC 2186A-1 for OATS, IC 2186A-2 for anechoic chamber, IC 2186A-3 for full-anechoic chamber for RE measurements above 1 GHz), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, G-27 for full-anechoic chamber for RE measurements above 1 GHz, C-845 for conducted emissions site, T-1606 for conducted emissions at telecommunication ports), has a status of a Telefication - Listed Testing Laboratory, Certificate No. L138/00. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing and environmental simulation (for exact scope please refer to Certificate No. 839.01). The FCC Designation Number is US1003.

Address: P.O. Box 23, Binyamina 30500, Israel.
Telephone: +972 4628 8001
Fax: +972 4628 8277
e-mail: mail@hermonlabs.com
website: www.hermonlabs.com

Person for contact: Mr. Alex Usoskin, CEO.

10 APPENDIX C Abbreviations and acronyms

A	ampere
AC	alternating current
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
OATS	open area test site
Ω	Ohm
PCB	printed circuit board
PM	pulse modulation
QP	quasi-peak
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt
VA	volt-ampere
WB	wideband

11 APPENDIX D Test equipment correction factors

Antenna factor
Active loop antenna
Model 6502, S/N 2857, HL 0446

Frequency, MHz	Magnetic antenna factor, dB	Electric antenna factor, dB
0.009	-32.8	18.7
0.010	-33.8	17.7
0.020	-38.3	13.2
0.050	-41.1	10.4
0.075	-41.3	10.2
0.100	-41.6	9.9
0.150	-41.7	9.8
0.250	-41.6	9.9
0.500	-41.8	9.8
0.750	-41.9	9.7
1.000	-41.4	10.1
2.000	-41.5	10.0
3.000	-41.4	10.2
4.000	-41.4	10.1
5.000	-41.5	10.1
10.000	-41.9	9.6
15.000	-41.9	9.6
20.000	-42.2	9.3
25.000	-42.8	8.7
30.000	-44.0	7.5

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μV) to convert it into field intensity in dB(μV/m).

Log Periodic antenna factor

Hermon Laboratories, model LP-200/1000, serial number 035

Log Periodic antenna LP-200/1000(s/n 035), HL 0583

Frequency, MHz	Antenna factor, dB/m		
	Measured	Historical in-house data	Deviation
200	12.0	11.8	0.2
250	12.5	12.8	-0.3
300	14.5	14.6	-0.1
350	15.7	15.2	0.4
400	16.0	16.6	-0.6
450	16.7	16.8	-0.1
500	18.1	18.3	-0.2
550	18.2	18.7	-0.5
600	18.8	19.4	-0.7
650	20.1	20.2	-0.1
700	21.8	21.1	0.7
750	21.4	21.7	-0.3
800	21.4	21.9	-0.4
850	22.4	22.9	-0.6
900	22.8	23.5	-0.8
950	23.4	23.2	0.1
1000	24.6	25.9	-1.2

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μV) to convert it into field intensity in dB(μV/m).

Antenna calibration
Sunol Sciences Inc., model JB3, serial number A022805, HL 2697

Frequency, MHz	Antenna factor, dB(1/m)
30	22.7
35	18.4
40	14.5
45	10.9
50	8.3
60	7.9
70	9.0
80	9.3
90	9.7
100	11.2
120	14.4
140	13.7
160	13.8
180	11.8
200	12.8
250	12.3
300	13.4
400	16.0
500	17.7
600	18.1
700	20.7
800	21.1
900	22.2
1000	23.1
1100	24.2
1200	25.1
1300	25.1
1400	25.8
1500	26.3
1600	27.6
1700	28.1
1800	27.9
1900	28.1
2000	28.3
2500	31.9
3000	34.0

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μV) to obtain field strength in dB(μV/m).

Antenna factor
Double-ridged wave guide horn antenna
Model 3115, S/N 9911-5964, HL1984

Frequency, MHz	Antenna factor, dB(1/m)
1000.0	24.7
1500.0	25.7
2000.0	27.6
2500.0	28.9
3000.0	31.2
3500.0	32.0
4000.0	32.5
4500.0	32.7
5000.0	33.6
5500.0	35.1
6000.0	35.4
6500.0	34.9
7000.0	36.1
7500.0	37.8
8000.0	38.0
8500.0	38.1
9000.0	39.1
9500.0	38.3
10000.0	38.6
10500.0	38.2
11000.0	38.7
11500.0	39.5
12000.0	40.0
12500.0	40.4
13000.0	40.5
13500.0	41.1
14000.0	41.6
14500.0	41.7
15000.0	38.7
15500.0	38.2
16000.0	38.8
16500.0	40.5
17000.0	42.5
17500.0	45.9
18000.0	49.4

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μV) to convert it into field intensity in dB(μV/m).

Cable loss
Cable coaxial, Bird, 18 GHz, N-type, M-F, model TC-MNFN-3.0, S/N 211539 001, HL 2882

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.08	3900	1.52	9400	2.45	14400	3.14
15	0.09	4000	1.54	9500	2.47	14500	3.15
20	0.11	4100	1.56	9600	2.50	14600	3.15
30	0.13	4200	1.58	9700	2.51	14700	3.17
40	0.15	4400	1.62	9800	2.52	14800	3.17
50	0.17	4500	1.65	9900	2.54	14900	3.18
60	0.19	4600	1.66	10000	2.55	15000	3.19
70	0.20	4700	1.69	10100	2.56	15100	3.21
80	0.21	4900	1.72	10300	2.63	15200	3.20
90	0.23	5000	1.75	10400	2.62	15300	3.23
100	0.24	5100	1.75	10500	2.63	15400	3.25
150	0.29	5200	1.79	10600	2.65	15500	3.28
200	0.33	5400	1.82	10700	2.65	15600	3.29
300	0.40	5500	1.86	10800	2.67	15700	3.30
400	0.47	5700	1.90	10900	2.69	15800	3.33
500	0.52	5800	1.89	11000	2.70	16000	3.34
600	0.57	6000	1.95	11100	2.73	16100	3.30
700	0.62	6100	1.94	11200	2.74	16200	3.33
800	0.67	6200	2.00	11300	2.77	16300	3.35
1000	0.74	6300	2.00	11400	2.79	16400	3.33
1100	0.78	6400	2.00	11500	2.79	16500	3.38
1200	0.81	6500	2.07	11700	2.82	16600	3.35
1300	0.85	6700	2.07	11800	2.86	16700	3.39
1400	0.89	6800	2.10	11900	2.86	16800	3.37
1500	0.92	6900	2.09	12000	2.88	16900	3.38
1600	0.95	7000	2.14	12100	2.89	17000	3.39
1700	0.98	7100	2.13	12200	2.89	17100	3.44
1800	1.01	7200	2.14	12300	2.96	17200	3.42
1900	1.04	7400	2.17	12400	2.91	17300	3.44
2000	1.06	7500	2.18	12500	2.92	17400	3.45
2100	1.09	7600	2.18	12700	2.95	17500	3.45
2200	1.12	7700	2.22	12800	2.94	17600	3.45
2300	1.14	7800	2.21	12900	2.96	17700	3.45
2500	1.20	8000	2.27	13000	2.98	17800	3.47
2600	1.22	8100	2.28	13100	3.00	17900	3.45
2700	1.24	8200	2.33	13200	3.00	18000	3.45
2800	1.27	8300	2.32	13300	3.06		
2900	1.30	8400	2.34	13400	3.16		
3000	1.32	8600	2.36	13500	3.05		
3200	1.37	8700	2.37	13600	3.06		
3300	1.40	8800	2.38	13800	3.07		
3400	1.42	8900	2.39	13900	3.09		
3500	1.43	9000	2.41	14000	3.09		
3700	1.48	9200	2.44	14100	3.09		
3800	1.50	9300	2.44	14200	3.14		

Microwave Cable Assembly, 18 GHz, 6.4 m, SMA – SMA, Huber-Suhner, model: 198-9155-00, s/n 3121 (HL 3121)
Calibration data

No.	Parameter	SET, MHz	Measured, dB	Deviation, dB	Tolerance, dB	Meas. Uncert., dB
1	Insertion loss	10.0	0.11	NA	NA	+0.12 / -0.12
2		30	0.17	NA	NA	+0.12 / -0.12
3		50	0.22	NA	NA	+0.12 / -0.12
4		100	0.31	NA	NA	+0.12 / -0.12
5		200	0.46	NA	NA	+0.12 / -0.12
6		300	0.57	NA	NA	+0.12 / -0.12
7		400	0.65	NA	NA	+0.12 / -0.12
8		500	0.73	NA	NA	+0.12 / -0.12
9		600	0.80	NA	NA	+0.14 / -0.14
10		700	0.87	NA	NA	+0.14 / -0.14
11		800	0.94	NA	NA	+0.14 / -0.14
12		900	0.99	NA	NA	+0.14 / -0.14
13		1000	1.05	NA	NA	+0.14 / -0.15
14		1100	1.11	NA	NA	+0.14 / -0.15
15		1200	1.16	NA	NA	+0.14 / -0.15
16		1300	1.22	NA	NA	+0.14 / -0.15
17		1400	1.26	NA	NA	+0.14 / -0.15
18		1500	1.32	NA	NA	+0.14 / -0.15
19		1600	1.35	NA	NA	+0.14 / -0.15
20		1700	1.40	NA	NA	+0.14 / -0.15
21		1800	1.44	NA	NA	+0.14 / -0.15
22		1900	1.49	NA	NA	+0.14 / -0.15
23		2000	1.53	NA	NA	+0.14 / -0.15
24		2100	1.56	NA	NA	+0.14 / -0.15
25		2200	1.61	NA	NA	+0.14 / -0.15
26		2300	1.64	NA	NA	+0.14 / -0.15
27		2400	1.68	NA	NA	+0.14 / -0.15
28		2500	1.71	NA	NA	+0.14 / -0.15
29		2600	1.76	NA	NA	+0.14 / -0.15
30		2700	1.79	NA	NA	+0.14 / -0.15
31		2800	1.84	NA	NA	+0.14 / -0.15
32		2900	1.86	NA	NA	+0.14 / -0.15
33		3000	1.90	NA	NA	+0.14 / -0.15

Microwave Cable Assembly, 18 GHz, 6.4 m, SMA – SMA, Huber-Suhner, model: 198-9155-00, s/n 3121 (HL 3121)
Calibration data (continued)

No.	Parameter	SET, MHz	Measured, dB	Deviation, dB	Tolerance, dB	Meas. Uncert., dB
34	Insertion loss	3100	1.93	NA	NA	+0.14 / -0.15
35		3200	1.95	NA	NA	+0.14 / -0.15
36		3300	1.99	NA	NA	+0.14 / -0.15
37		3400	2.02	NA	NA	+0.14 / -0.15
38		3500	2.06	NA	NA	+0.14 / -0.15
39		3600	2.08	NA	NA	+0.14 / -0.15
40		3700	2.11	NA	NA	+0.14 / -0.15
41		3800	2.13	NA	NA	+0.14 / -0.15
42		3900	2.17	NA	NA	+0.14 / -0.15
43		4000	2.18	NA	NA	+0.14 / -0.15
44		4100	2.24	NA	NA	+0.26 / -0.28
45		4200	2.25	NA	NA	+0.26 / -0.28
46		4300	2.30	NA	NA	+0.26 / -0.28
47		4400	2.30	NA	NA	+0.26 / -0.28
48		4500	2.35	NA	NA	+0.26 / -0.28
49		4600	2.35	NA	NA	+0.26 / -0.28
50		4700	2.38	NA	NA	+0.26 / -0.28
51		4800	2.41	NA	NA	+0.26 / -0.28
52		4900	2.45	NA	NA	+0.26 / -0.28
53		5000	2.48	NA	NA	+0.26 / -0.28
54		5100	2.49	NA	NA	+0.26 / -0.28
55		5200	2.51	NA	NA	+0.26 / -0.28
56		5300	2.55	NA	NA	+0.26 / -0.28
57		5400	2.55	NA	NA	+0.26 / -0.28
58		5500	2.60	NA	NA	+0.26 / -0.28
59		5600	2.60	NA	NA	+0.26 / -0.28
60		5700	2.67	NA	NA	+0.26 / -0.28
61		5800	2.68	NA	NA	+0.26 / -0.28
62		5900	2.70	NA	NA	+0.26 / -0.28
63		6000	2.70	NA	NA	+0.26 / -0.28
64		6100	2.75	NA	NA	+0.26 / -0.28
65		6200	2.76	NA	NA	+0.26 / -0.28
66		6300	2.78	NA	NA	+0.26 / -0.28
67		6400	2.80	NA	NA	+0.26 / -0.28
68		6500	2.86	NA	NA	+0.26 / -0.28
69		6600	2.86	NA	NA	+0.26 / -0.28

Microwave Cable Assembly, 18 GHz, 6.4 m, SMA – SMA, Huber-Suhner, model: 198-9155-00, s/n 3121 (HL 3121)
Calibration data (continued)

No.	Parameter	SET, MHz	Measured, dB	Deviation, dB	Tolerance, dB	Meas. Uncert., dB
70	Insertion loss	6700	2.86	NA	NA	+0.26 / -0.28
71		6800	2.88	NA	NA	+0.26 / -0.28
72		6900	2.91	NA	NA	+0.26 / -0.28
73		7000	2.94	NA	NA	+0.26 / -0.28
74		7100	2.98	NA	NA	+0.26 / -0.28
75		7200	3.01	NA	NA	+0.26 / -0.28
76		7300	3.00	NA	NA	+0.26 / -0.28
77		7400	3.01	NA	NA	+0.26 / -0.28
78		7500	3.05	NA	NA	+0.26 / -0.28
79		7600	3.05	NA	NA	+0.26 / -0.28
80		7700	3.14	NA	NA	+0.26 / -0.28
81		7800	3.15	NA	NA	+0.26 / -0.28
82		7900	3.15	NA	NA	+0.26 / -0.28
83		8000	3.17	NA	NA	+0.26 / -0.28
84		8100	3.21	NA	NA	+0.26 / -0.28
85		8200	3.22	NA	NA	+0.26 / -0.28
86		8300	3.26	NA	NA	+0.26 / -0.28
87		8400	3.28	NA	NA	+0.26 / -0.28
88		8500	3.30	NA	NA	+0.26 / -0.28
89		8600	3.32	NA	NA	+0.26 / -0.28
90		8700	3.30	NA	NA	+0.26 / -0.28
91		8800	3.35	NA	NA	+0.26 / -0.28
92		8900	3.35	NA	NA	+0.26 / -0.28
93		9000	3.40	NA	NA	+0.26 / -0.28
94		9100	3.39	NA	NA	+0.26 / -0.28
95		9200	3.42	NA	NA	+0.26 / -0.28
96		9300	3.40	NA	NA	+0.26 / -0.28
97		9400	3.44	NA	NA	+0.26 / -0.28
98		9500	3.44	NA	NA	+0.26 / -0.28
99		9600	3.48	NA	NA	+0.26 / -0.28
100		9700	3.47	NA	NA	+0.26 / -0.28
101		9800	3.49	NA	NA	+0.26 / -0.28
102		9900	3.49	NA	NA	+0.26 / -0.28
103		10000	3.51	NA	NA	+0.26 / -0.28
104		10100	3.57	NA	NA	+0.26 / -0.28
105		10200	3.59	NA	NA	+0.26 / -0.28

Microwave Cable Assembly, 18 GHz, 6.4 m, SMA – SMA, Huber-Suhner, model: 198-9155-00, s/n 3121 (HL 3121)
Calibration data (continued)

No.	Parameter	SET, MHz	Measured, dB	Deviation, dB	Tolerance, dB	Meas. Uncert., dB
106	Insertion loss	10300	3.61	NA	NA	+0.26 / -0.28
107		10400	3.61	NA	NA	+0.26 / -0.28
108		10500	3.61	NA	NA	+0.26 / -0.28
109		10600	3.61	NA	NA	+0.26 / -0.28
110		10700	3.70	NA	NA	+0.26 / -0.28
111		10800	3.74	NA	NA	+0.26 / -0.28
112		10900	3.75	NA	NA	+0.26 / -0.28
113		11000	3.76	NA	NA	+0.26 / -0.28
114		11100	3.78	NA	NA	+0.26 / -0.28
115		11200	3.78	NA	NA	+0.26 / -0.28
116		11300	3.85	NA	NA	+0.26 / -0.28
117		11400	3.85	NA	NA	+0.26 / -0.28
118		11500	3.90	NA	NA	+0.26 / -0.28
119		11600	3.89	NA	NA	+0.26 / -0.28
120		11700	3.98	NA	NA	+0.26 / -0.28
121		11800	3.94	NA	NA	+0.26 / -0.28
122		11900	4.06	NA	NA	+0.26 / -0.28
123		12000	4.00	NA	NA	+0.26 / -0.28
124		12100	4.10	NA	NA	+0.26 / -0.28
125		12200	4.04	NA	NA	+0.26 / -0.28
126		12300	4.18	NA	NA	+0.26 / -0.28
127		12400	4.12	NA	NA	+0.26 / -0.28
128		12500	4.14	NA	NA	+0.45 / -0.5
129		12600	4.20	NA	NA	+0.45 / -0.5
130		12700	4.23	NA	NA	+0.45 / -0.5
131		12800	4.27	NA	NA	+0.45 / -0.5
132		12900	4.17	NA	NA	+0.45 / -0.5
133		13000	4.28	NA	NA	+0.45 / -0.5
134		13100	4.19	NA	NA	+0.45 / -0.5
135		13200	4.32	NA	NA	+0.45 / -0.5
136		13300	4.21	NA	NA	+0.45 / -0.5
137		13400	4.28	NA	NA	+0.45 / -0.5
138		13500	4.26	NA	NA	+0.45 / -0.5
139		13600	4.31	NA	NA	+0.45 / -0.5
140		13700	4.28	NA	NA	+0.45 / -0.5
141		13800	4.34	NA	NA	+0.45 / -0.5

Microwave Cable Assembly, 18 GHz, 6.4 m, SMA – SMA, Huber-Suhner, model: 198-9155-00, s/n 3121 (HL 3121)
Calibration data (continued)

No.	Parameter	SET, MHz	Measured, dB	Deviation, dB	Tolerance, dB	Meas. Uncert., dB
142	Insertion loss	13900	4.31	NA	NA	+0.45 / -0.5
143		14000	4.30	NA	NA	+0.45 / -0.5
144		14100	4.37	NA	NA	+0.45 / -0.5
145		14200	4.39	NA	NA	+0.45 / -0.5
146		14300	4.40	NA	NA	+0.45 / -0.5
147		14400	4.44	NA	NA	+0.45 / -0.5
148		14600	4.36	NA	NA	+0.45 / -0.5
149		14700	4.39	NA	NA	+0.45 / -0.5
150		14800	4.39	NA	NA	+0.45 / -0.5
151		14900	4.44	NA	NA	+0.45 / -0.5
152		15000	4.45	NA	NA	+0.45 / -0.5
153		15100	4.47	NA	NA	+0.45 / -0.5
154		15200	4.44	NA	NA	+0.45 / -0.5
155		15300	4.48	NA	NA	+0.45 / -0.5
156		15400	4.51	NA	NA	+0.45 / -0.5
157		15500	4.50	NA	NA	+0.45 / -0.5
158		15600	4.53	NA	NA	+0.45 / -0.5
159		15700	4.53	NA	NA	+0.45 / -0.5
160		15800	4.60	NA	NA	+0.45 / -0.5
161		15900	4.62	NA	NA	+0.45 / -0.5
162		16000	4.72	NA	NA	+0.45 / -0.5
163		16100	4.72	NA	NA	+0.45 / -0.5
164		16200	4.69	NA	NA	+0.45 / -0.5
165		16300	4.75	NA	NA	+0.45 / -0.5
166		16400	4.75	NA	NA	+0.45 / -0.5
167		16500	4.82	NA	NA	+0.45 / -0.5
168		16600	4.81	NA	NA	+0.45 / -0.5
169		16700	4.92	NA	NA	+0.45 / -0.5
170		16800	4.87	NA	NA	+0.45 / -0.5
171		16900	4.97	NA	NA	+0.45 / -0.5
172		17000	4.91	NA	NA	+0.45 / -0.5
173		17100	4.97	NA	NA	+0.45 / -0.5
174		17200	4.92	NA	NA	+0.45 / -0.5
175		17300	4.95	NA	NA	+0.45 / -0.5
176		17400	4.92	NA	NA	+0.45 / -0.5
177		17500	4.93	NA	NA	+0.45 / -0.5
178		17600	4.95	NA	NA	+0.45 / -0.5
179		17700	5.00	NA	NA	+0.45 / -0.5
180		17800	5.05	NA	NA	+0.45 / -0.5
181		17900	4.97	NA	NA	+0.45 / -0.5
182		18000	4.97	NA	NA	+0.45 / -0.5

Cable loss
Microwave Cable Assembly, 26.5 GHz, 1.0 m, N type/N type, Suhner Sucoflex, model 104EA, S/N 3389
HL 3389

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	-0.16	4100	0.68	9600	1.03	14600	1.35
15	-0.02	4300	0.71	9700	1.03	14700	1.35
20	0.01	4400	0.71	9800	1.02	14800	1.32
30	0.04	4500	0.72	9900	1.00	14900	1.30
50	0.06	4600	0.73	10000	0.99	15000	1.31
60	0.07	4700	0.73	10100	0.99	15100	1.30
70	0.08	4800	0.73	10200	0.98	15200	1.30
80	0.09	4900	0.74	10400	0.96	15300	1.31
90	0.10	5000	0.73	10500	0.95	15400	1.31
100	0.10	5200	0.73	10600	0.93	15500	1.31
200	0.15	5300	0.73	10700	0.91	15600	1.31
300	0.18	5400	0.75	10800	0.92	15700	1.32
400	0.21	5500	0.77	10900	0.95	15800	1.33
500	0.23	5600	0.80	11000	0.97	15900	1.34
600	0.25	5800	0.79	11200	0.98	16000	1.34
700	0.27	5900	0.79	11300	0.98	16100	1.34
800	0.29	6000	0.79	11500	0.96	16200	1.33
900	0.30	6200	0.82	11600	0.95	16300	1.33
1000	0.32	6300	0.82	11700	0.95	16400	1.33
1200	0.35	6400	0.85	11800	0.97	16500	1.31
1300	0.37	6500	0.84	11900	0.99	16600	1.29
1400	0.38	6600	0.84	12000	0.99	16700	1.27
1500	0.40	6800	0.85	12100	1.01	16800	1.28
1600	0.40	6900	0.84	12300	1.06	16900	1.29
1700	0.41	7000	0.85	12400	1.07	17000	1.32
1800	0.42	7100	0.87	12500	1.08	17100	1.35
2000	0.48	7200	0.89	12600	1.11	17200	1.36
2100	0.49	7300	0.91	12700	1.13	17300	1.40
2300	0.51	7500	0.97	12900	1.15	17400	1.42
2400	0.52	7600	0.98	13000	1.16	17500	1.40
2500	0.53	7700	1.01	13100	1.18	17600	1.39
2600	0.54	7900	1.01	13200	1.21	17700	1.36
2700	0.55	8000	1.02	13300	1.23	17800	1.35
2800	0.57	8100	1.04	13400	1.26	17900	1.35
2900	0.58	8200	1.05	13500	1.26	18000	1.35
3000	0.59	8300	1.05	13600	1.30		
3100	0.59	8400	1.05	13700	1.29		
3200	0.60	8500	1.05	13800	1.31		
3400	0.61	8600	1.05	13900	1.33		
3500	0.62	8800	1.03	14000	1.35		
3600	0.62	8900	1.03	14100	1.36		
3700	0.62	9000	1.03	14200	1.35		
3800	0.63	9100	1.03	14300	1.36		
3900	0.65	9300	1.03	14400	1.34		
4000	0.67	9500	1.02	14500	1.34		

12 APPENDIX E Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Conducted emissions with LISN	9 kHz to 150 kHz: ± 3.9 dB 150 kHz to 30 MHz: ± 3.8 dB
Radiated emissions at 10 m measuring distance Horizontal polarization Vertical polarization	 Biconilog antenna: ± 5.0 dB Biconical antenna: ± 5.0 dB Log periodic antenna: ± 5.1 dB Double ridged horn antenna: ± 5.3 dB Biconilog antenna: ± 5.5 dB Biconical antenna: ± 5.5 dB Log periodic antenna: ± 5.6 dB Double ridged horn antenna: ± 5.8 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
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
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %
Occupied bandwidth	± 8.0 %

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.

13 APPENDIX F Specification references

FCC 47CFR part 15: 2009	Radio Frequency Devices.
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2003	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.

END OF TEST REPORT

14 APPENDIX G Supplier Declaration

Supplier Declaration – RTS Transmitter

Introduction

The RTS Transmitter is a specialized device that detects and transmits an on-target bullet hit. When a target is hit by a bullet, the RTS Transmitter is activated and transmits a short burst of data packet containing information related to the hit.

Additional operation behavior

- The RTS Transmitter only transmits a data packet for a very short time (about 40ms).
- The RTS Transmitter is activated and transmits only when the target is hit. It transmits for very short period of times and is unable to perform continuous transmission.
- The RTS Transmitter does not transmit unless triggered by an on-target hit. The RTS Transmitter does not transmit at pre-defined intervals, or respond to polling, or perform supervision transmission. Hence, the total duration of polling or supervision transmissions is zero seconds in an hour.
- Once done transmitting the hit data, the RTS Transmitter will cease transmitting and will deactivate automatically.
- Transmission cycle, which includes 5 repetitions 40ms bursts, takes less than 5 seconds. The RTS Transmitter transmits the first repetition at the beginning when activated and will than transmits the other four repetitions by picking random time within less than 5 seconds following the first transmission.
- The RTS Transmitter has no setup mode.

Reactive Target System Ltd.

By: _____

Name: Avishay Zur

Title: President

Date: April 14, 2011

END OF DOCUMENT