

TEST REPORT

ACCORDING TO: FCC CFR 47 Part 15 subpart C, section 15.231 and subpart B
RSS-210 issue 8 Annex 1, ICES-003 Issue 5:2012

FOR:

TriplePlus Ltd.

**Controller/Repeater units of
Water leakage security system**

Models: NWL-CTALEN-5-01

NWL-CTVLVE-1-01

NWL-CTVLVE-6-01

NWL-CTVLVE-3-01

NWL-RPVLVE-1-01

FCC ID:2AFOINWLCONRPT

IC:20798-NWLCONTRPT

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.
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1 Applicant information

Client name: Triple Plus Ltd.
Address: 5 Hamada street, Yokneam 2069200, Israel
Telephone: +972 72 211 7711
E-mail: itzik.marchand@tripleplus.io
Contact name: Mr. Itzik Marchand

2 Equipment under test attributes

Product name: Controller/Repeater units of Water leakage security system
Product type: Transceiver
Model(s): NWL-CTALEN-5-01 (controller) S/N 01, NWL-RPVLVE-1-01 (repeater) S/N 01
Hardware version: 2
Software release: 4.0
Receipt date 06-Sep-15

3 Manufacturer information

Manufacturer name: Triple Plus Ltd.
Address: 5 Hamada street, Yokneam 2069200, Israel
Telephone: +972 72 211 7711
E-Mail: itzik.marchand@tripleplus.io
Contact name: Mr. Itzik Marchand

4 Test details

Project ID: 27395
Location: Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started: 08-Sep-15
Test completed: 17-Sep-15
Test specification(s): FCC 47CFR part 15, subpart C, §15.231 and subpart B;
RSS-210 issue 8 Annex 1, RSS-Gen issue 4, ICES-003 issue 5:2012




5 Tests summary

Test	Status
Transmitter characteristics	
FCC Part 15, Section 231(a) / RSS-210, Section A1.1.5, Periodic operation requirements	Pass
FCC Part 15, Section 231(a) / RSS-210, Section A1.1.5, Field strength of emissions	Pass
FCC Part 15, Section 231(c) / RSS-210, Section A1.1.3, Occupied bandwidth	Pass
FCC Part 15, Section 207 / RSS-Gen, Section 8.8, Conducted emission	Pass
FCC Part 15, Section 203 / RSS-Gen, Section 8.3, Antenna requirements	Pass
Unintentional emissions	
FCC Part 15, Section 107 / ICES-003, Section 6.1 class B, Conducted emission at AC power port	Pass
FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2/ ICES-003, Section 6.2 class B, Radiated emission	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.

This test report supersedes the previously issued test report identified by Doc ID:TRIRAD_FCC.27395.

	Name and Title	Date	Signature
Tested by:	Mrs. E. Pitt, test engineer	September 17, 2015	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	January 13, 2016	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	January 13, 2016	

6 EUT description

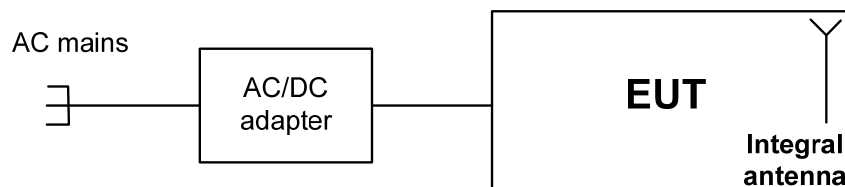
6.1 General information

The EUT is a part of NWL water leakage system. The Controller (models NWL-CTALEN-5-01, NWL-CTVLVE-1-01, NWL-CTVLVE-6-01, NWL-CTVLVE-3-01) receives inputs from the various peripheral elements and sends required commands/instructions to the shut off unit and Repeater (model NWL-RPVLVE-1-01) unit. The repeater function is implemented in the device by receiving, demodulation, recognition and retransmission of the recognized messages only.

The both units comprise the same PCB with Tx/Rx@433MHz and differed only with plastic enclosure. The EUT is powered by 5 V DC from AC/DC adapter and utilizes the integral antenna.

According to the manufacturer's declaration of identity provided in Appendix G, the EUT models are electronically/ electrically/mechanically identical, the difference is in the power supply source, so, only models NWL-CTALEN-5-01 (controller) and NWL-RPVLVE-1-01 (repeater) were fully tested.

6.2 Test configuration



6.3 Support and test equipment

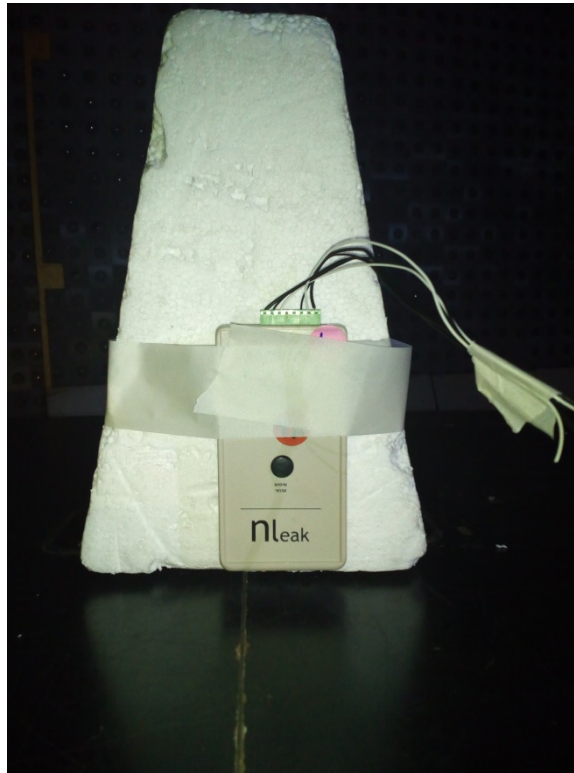
Description	Manufacturer	Model number	Serial number
120VAC / 5VDC adapter	GEC (China)	GS2T-006-050-B1	NA

6.4 Changes made in EUT

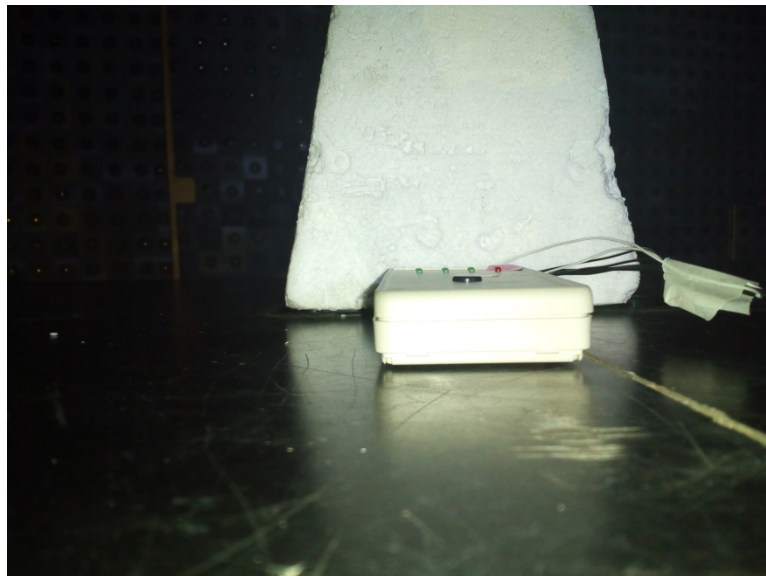
No changes were implemented in the EUT during testing.

6.5 EUT test positions

Photograph 6.5.1 EUT in vertical position



Photograph 6.5.2 EUT in horizontal position



6.6 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 frequencies		433.85 MHz			
Maximum rated output power		At transmitter 50 Ω RF output connector		dBm	
		Field strength at 3 m distance		93.3 dB(μ V/m) -peak 69.0 dB(μ V/m)-average	
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
				X	with temporary RF connector without temporary RF connector
Antenna/s technical characteristics					
Type		Manufacturer		Model number	
Internal		Triple Plus		Rigide	
Type of modulation		2GFSK			
Transmitter aggregate data rate/s		50 kbps			
Transmitter power source					
	Battery	Nominal rated voltage		Battery type	Lithium
X	DC	Nominal rated voltage		5 VDC via AC/DC adapter	
	AC mains	Nominal rated voltage		VAC	Frequency
Common power source for transmitter and receiver					
				X	yes
					no

Test specification:		FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements	
Test procedure:		Supplier declaration	
Test mode:		Compliance	Verdict: PASS
Date(s):		10-Sep-15	
Temperature: 26.5 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 5 VDC
Remarks:			

7 Transmitter tests according to 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 either manually or automatically. Once manually operated transmitter was activated, the switch was immediately released.

7.1.2.4 The transmission time was captured and shown in Plot 7.1.1, Plot 7.1.4.

7.1.3 Test procedure for measurements of polling / supervision transmission duration

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

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

7.1.3.3 The transmission time was captured and shown in Plot 7.1.2, Plot 7.1.3, Plot 7.1.5, Plot 7.1.6.

Figure 7.1.1 Setup for transmitter shut down test

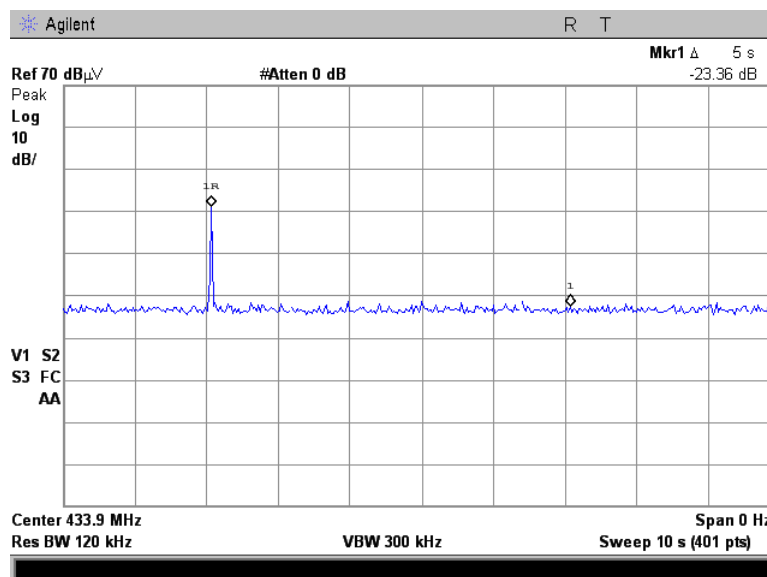


Test specification:	FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements		
Test procedure:	Supplier declaration		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Sep-15		
Temperature: 26.5 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 120 VAC
Remarks: Controller			

Table 7.1.1 Periodic operation requirements of Controller

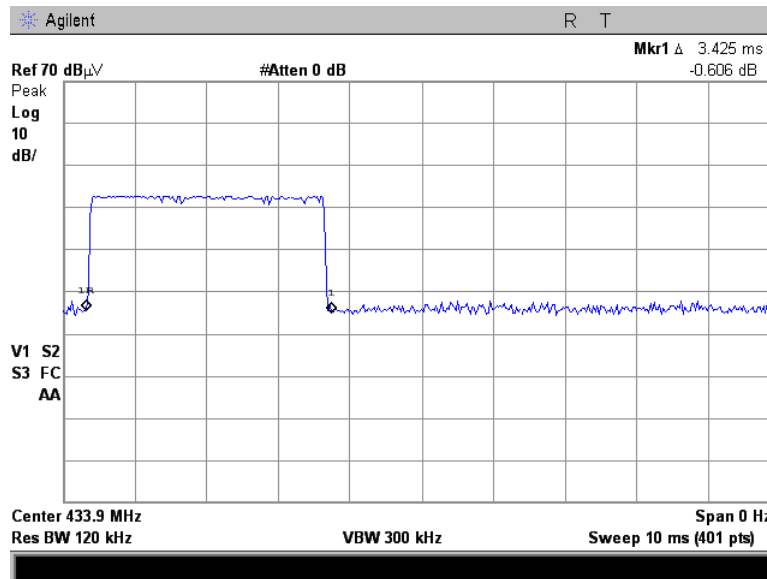
Requirement	Rationale	Verdict
Continuous transmissions are not permitted	Supplier declaration	Comply
A manually operated transmitter shall be deactivated within not more than 5 seconds of switch being released	NA	NA
Transmitter activated automatically shall cease transmission within 5 seconds	Plot 7.1.1	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	Plot 7.1.2, Plot 7.1.3	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 of Controller

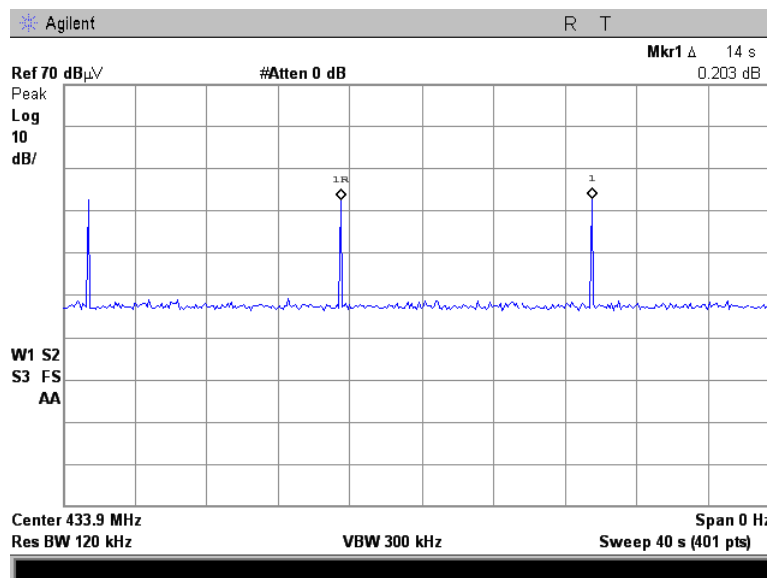


Test specification:		FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements	
Test procedure:		Supplier declaration	
Test mode:		Compliance	Verdict: PASS
Date(s):		10-Sep-15	
Temperature: 26.5 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 120 VAC
Remarks: Controller			

Plot 7.1.2 Polling / supervision transmission duration of Controller



Plot 7.1.3 Polling / supervision transmission period of Controller





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Test specification:		FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements	
Test procedure:		Supplier declaration	
Test mode:		Compliance	Verdict: PASS
Date(s):		10-Sep-15	
Temperature: 26.5 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 120 VAC
Remarks: Controller			

Table 7.1.2 Total duration of polling / supervision transmissions of Controller

Duration, ms	Repetition period, ms	Maximum number of transmissions within 1 hour	Total duration within 1 hour, ms
3.425	14000	257.1429	880.7143

Reference numbers of test equipment used

HL 2909	HL 3810						
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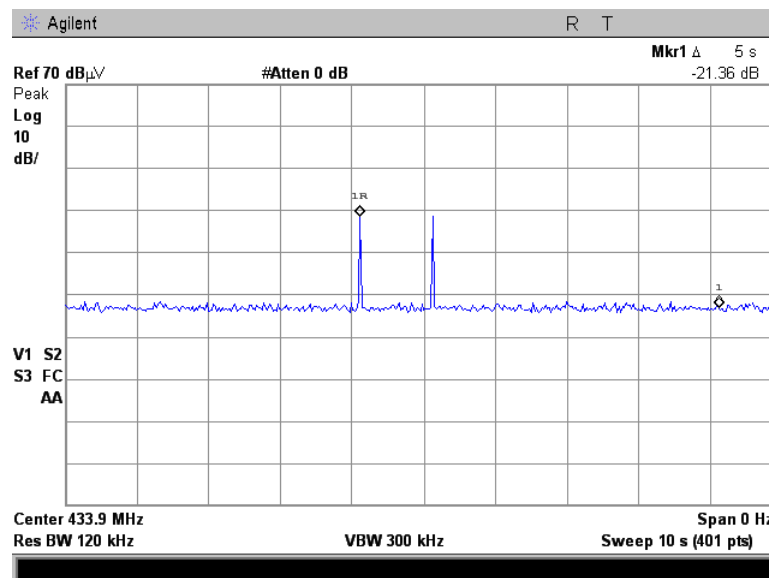
Full description is given in Appendix A.

Test specification:	FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements		
Test procedure:	Supplier declaration		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Sep-15		
Temperature: 26.5 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 120 VAC
Remarks: Repeater			

Table 7.1.3 Periodic operation requirements of Repeater

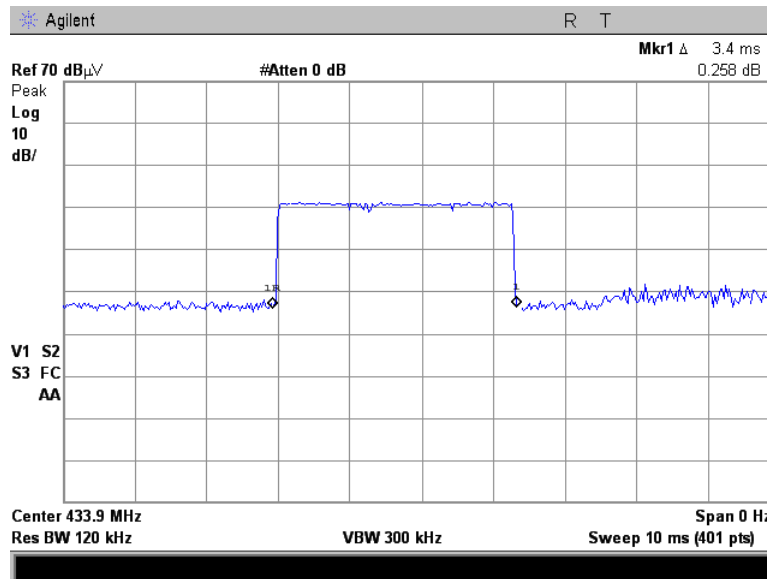
Requirement	Rationale	Verdict
Continuous transmissions are not permitted	Supplier declaration	Comply
A manually operated transmitter shall be deactivated within not more than 5 seconds of switch being released	NA	NA
Transmitter activated automatically shall cease transmission within 5 seconds	Plot 7.1.4	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	Plot 7.1.5, Plot 7.1.6	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 7.1.4 Transmitter shut down test result of Repeater

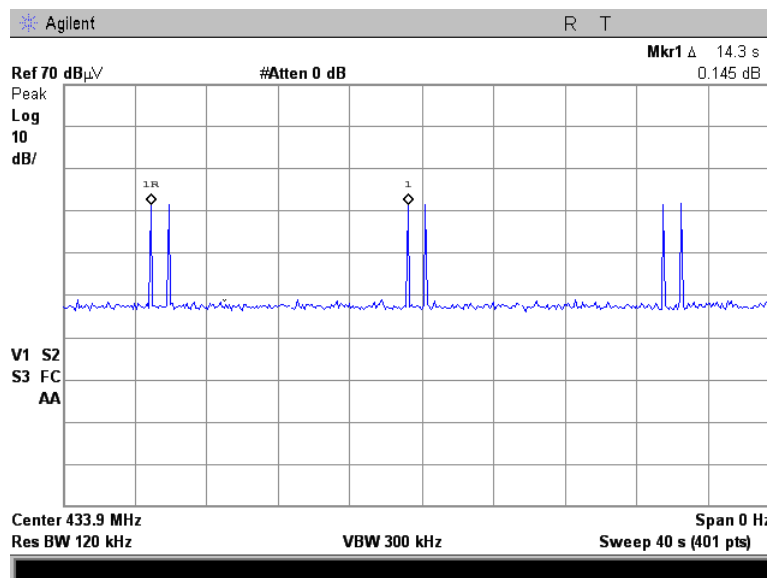


Test specification:		FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements	
Test procedure:		Supplier declaration	
Test mode:		Compliance	Verdict: PASS
Date(s):		10-Sep-15	
Temperature: 26.5 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 120 VAC
Remarks: Repeater			

Plot 7.1.5 Polling / supervision transmission duration of Repeater



Plot 7.1.6 Polling / supervision transmission period of Repeater





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Test specification:	FCC Part 15, Section 231(a) / RSS-210, Section A1.1.1, Periodic operation requirements		
Test procedure:	Supplier declaration		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Sep-15		
Temperature: 26.5 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 120 VAC
Remarks: Repeater			

Table 7.1.4 Total duration of polling / supervision transmissions of Repeater

Duration, ms	Repetition period, ms	Maximum number of transmissions within 1 hour	Total duration within 1 hour, ms
3.4	14300	503.5	1712

Reference numbers of test equipment used

HL 2909	HL 3810						
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Full description is given in Appendix A.



Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	08-Sep-15		
Temperature: 25 °C	Air Pressure: 1005 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

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
433.85	100.8	80.8

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**	80.8	60.8
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:

$$\text{Lim}_{S_2} = \text{Lim}_{S_1} + 40 \log(S_1/S_2),$$

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:

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

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

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:		FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions	
Test procedure:		ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date(s):		08-Sep-15	
Temperature: 25 °C	Air Pressure: 1005 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

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 measurements were performed in typical EUT positions.

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

7.2.2.4 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

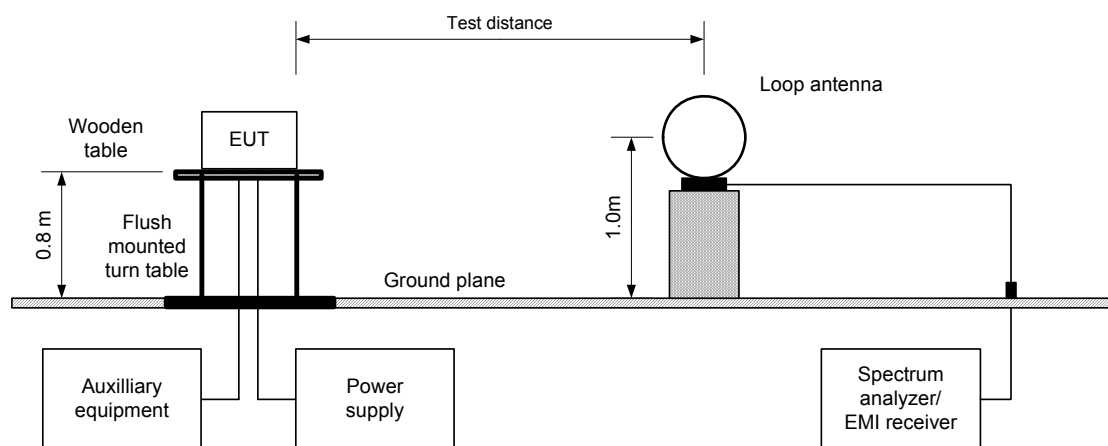
7.2.3.1 The EUT was set up as shown in Figure 7.2.2, energized and the performance check was conducted.

7.2.3.2 The measurements were performed in typical EUT positions.

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

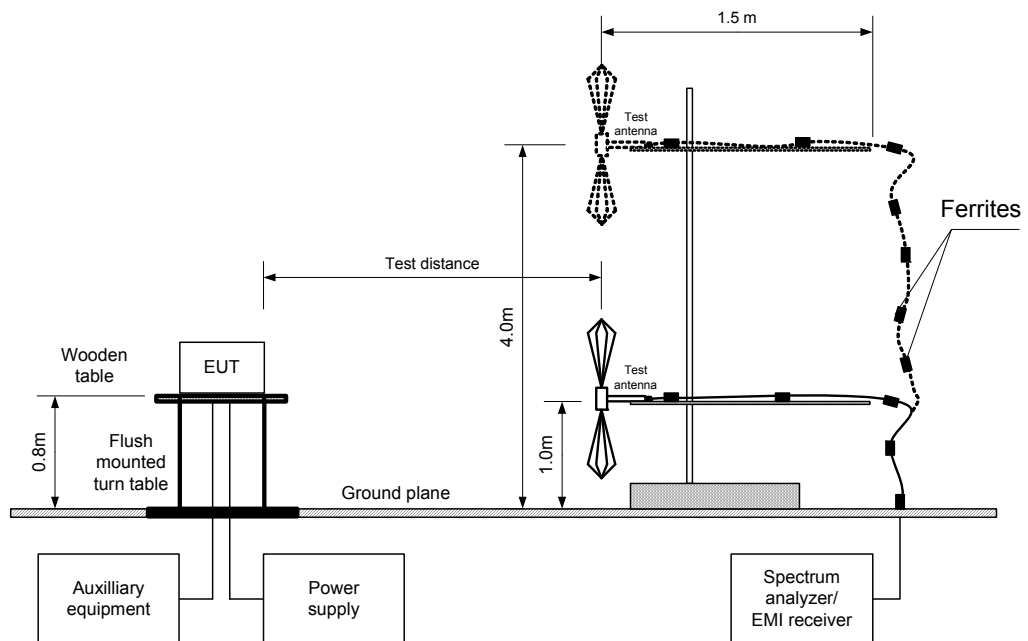
7.2.3.4 The worst test results (the lowest margins) were recorded in Table 7.2.3, Table 7.2.5 and shown in the associated plots..

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



Test specification:		FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions	
Test procedure:		ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date(s):		08-Sep-15	
Temperature: 25 °C	Air Pressure: 1005 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

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



Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	08-Sep-15		
Temperature: 25 °C	Air Pressure: 1005 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

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: Vertical/ Horizontal
MODULATION: 2GFSK
BIT RATE: 50 kbps
INVESTIGATED FREQUENCY RANGE: 0.009 - 4500 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)
Biconilog (30 MHz – 1000 MHz)
Double ridged guide (above 1000 MHz)

F, MHz	Antenna		Azimuth, degrees*	Peak field strength			Average field strength				Verdict
	Pol.	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**	
Fundamental emission***											
433.85	Hor.	1.1	30	98.3	100.8	-2.5	98.3	69.0	80.8	-11.2	Pass
Spurious emissions											
39.36	Ver.	1.0	0	43.2	80.8	-37.6	10.2	NA	60.8	-50.6	Pass
54.60	Ver.	1.1	0	26.6	80.8	-54.2	4.0	NA	60.8	-56.8	
411.00	Hor.	1.1	0	37.1	80.8	-43.7	15.9	NA	60.8	-44.9	
867.70	Hor.	1.0	45	43.3	80.8	-37.3	43.3	14.0	60.8	-46.8	

*- EUT front panel refers to 0 degrees position of turntable.

** - Margin, dB = Measured (calculated) value, dB(μV/m) - Limit, dB(μV/m)

*** Max value was obtained in EUT vertical 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		
3425	14030	NA	NA	NA	-29.3

*- Average factor was calculated as follows

for pulse train shorter than 100 ms:

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

for pulse train longer than 100 ms:

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

Reference numbers of test equipment used

HL 0446	HL 0521	HL 0604	HL 1984	HL 4275	HL 4353	HL 4722	
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Full description is given in Appendix A.



HERMON LABORATORIES

Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	08-Sep-15		
Temperature: 25 °C	Air Pressure: 1005 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

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

TEST DISTANCE: 3 m
 EUT POSITION: Vertical/ Horizontal
 MODULATION: 2GFSK
 BIT RATE: 50 kbps
 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*				
134.4	35.5	30.2	43.5	-13.3	Vertical	1.0	70	Pass

*- Margin = Measured emission - specification limit.

** - EUT front panel refer to 0 degrees position of turntable.

Reference numbers of test equipment used

HL 0446	HL 0521	HL 0604	HL 4275	HL 4353	HL 4722		
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Full description is given in Appendix A.

Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions				
Test procedure:	ANSI C63.4, Section 13.1.4				
Test mode:	Compliance	Verdict: PASS			
Date(s):	08-Sep-15				
Temperature: 25 °C	Air Pressure: 1005 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC		
Remarks: Controller/Repeater					

Table 7.2.6 Restricted bands according to FCC 15, Section 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	12.290 - 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	16.420 - 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	

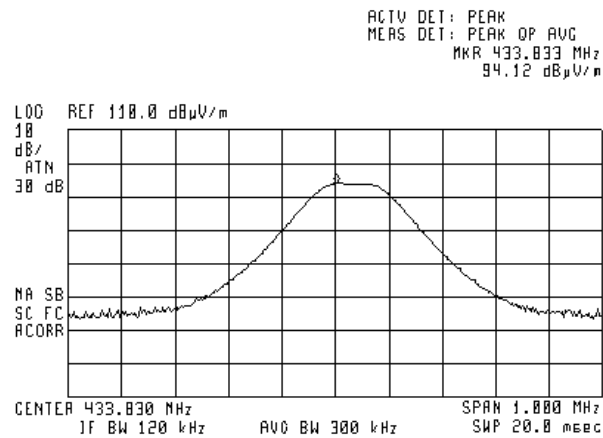
Table 7.2.7 Restricted bands according to RSS-Gen, Table 3

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 - 2.190	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	12.290 - 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 - 24.0
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:		FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions	
Test procedure:		ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date(s):		08-Sep-15	
Temperature: 25 °C	Air Pressure: 1005 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

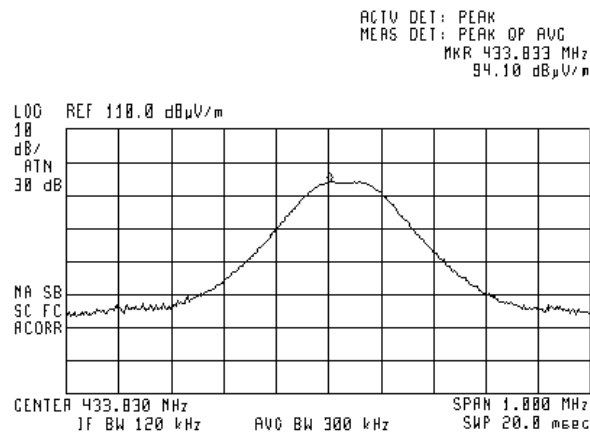
Plot 7.2.1 Radiated emission measurements at the fundamental frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Vertical
INPUT VOLTAGE: Unom ; 115%Unom; 85% Unom



Plot 7.2.2 Radiated emission measurements at the fundamental frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Horizontal
INPUT VOLTAGE: Unom ; 115%Unom; 85% Unom

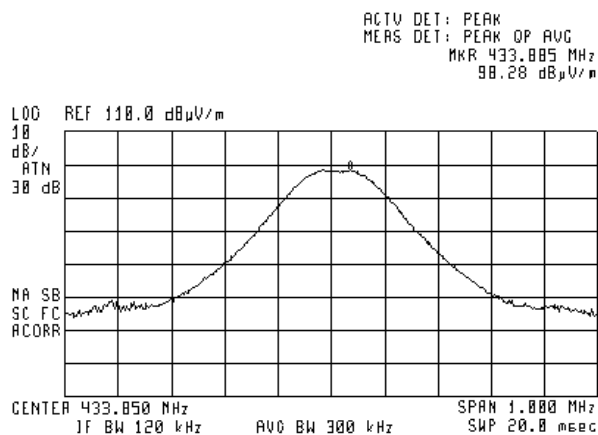


Test specification:		FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions	
Test procedure:		ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date(s):		08-Sep-15	
Temperature: 25 °C	Air Pressure: 1005 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

Plot 7.2.3 Radiated emission measurements at the fundamental frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: Vertical
INPUT VOLTAGE: Unom ; 115%Unom; 85% Unom

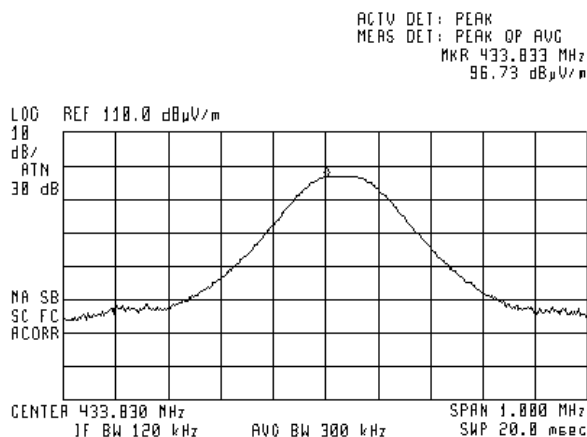
(32)



Plot 7.2.4 Radiated emission measurements at the fundamental frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Horizontal
EUT POSITION: Horizontal
INPUT VOLTAGE: Unom ; 115%Unom; 85% Unom

(32)



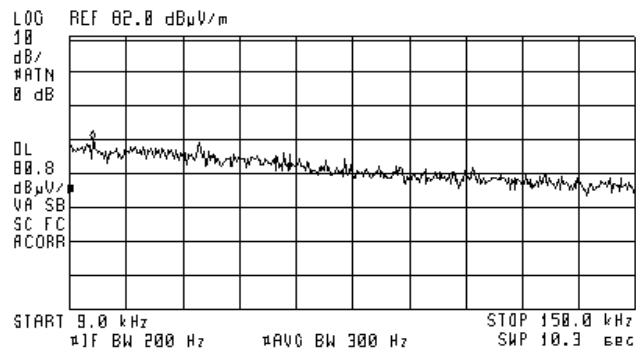
Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	08-Sep-15		
Temperature: 25 °C	Air Pressure: 1005 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

Plot 7.2.5 Radiated emission measurements from 9 to 150 kHz

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Vertical



ACTV DET: PEAK
MERS DET: PEAK QP AVG
MKR 14.6 kHz
51.75 dBµV/m

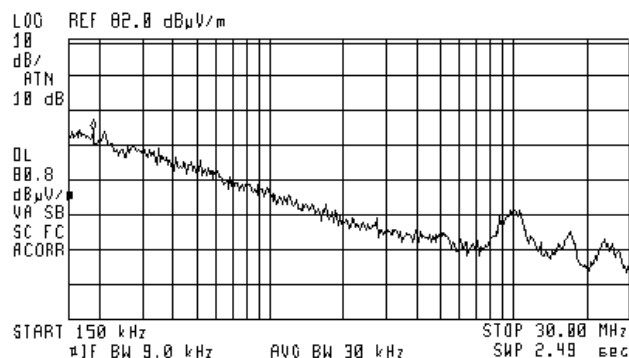


Plot 7.2.6 Radiated emission measurements from 0.15 to 30 MHz

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Vertical



ACTV DET: PEAK
MERS DET: PEAK QP AVG
MKR 190 kHz
56.46 dBµV/m



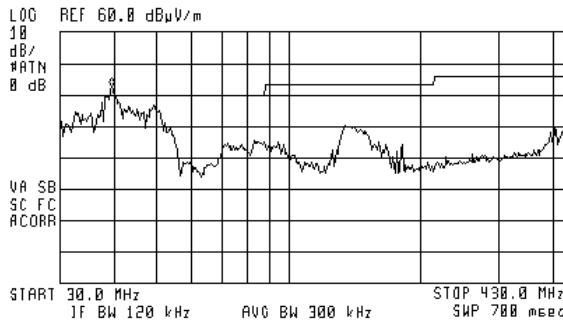
Test specification:		FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions	
Test procedure:		ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date(s):		08-Sep-15	
Temperature: 25 °C	Air Pressure: 1005 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

Plot 7.2.7 Radiated emission measurements from 30 to 1000 MHz

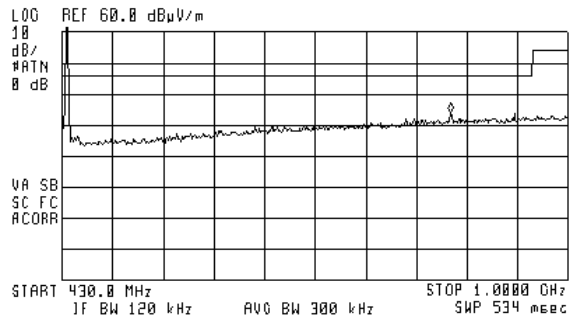
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT POSITION: Vertical
ANTENNA POLARIZATION: Vertical



ACTV DET: PEAK
MERS DET: PEAK OP AVG
MKR 39.6 MHz
42.62 dBμV/m



ACTV DET: PEAK
MERS DET: PEAK OP AVG
MKR 867.5 MHz
34.19 dBμV/m

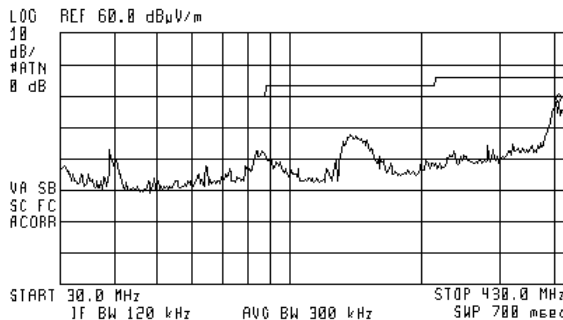


Plot 7.2.8 Radiated emission measurements from 30 to 1000 MHz

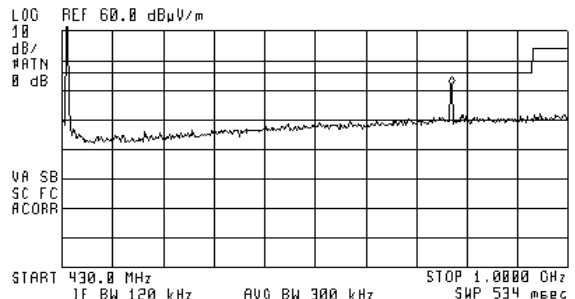
TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
EUT POSITION: Vertical
ANTENNA POLARIZATION: Horizontal



ACTV DET: PEAK
MERS DET: PEAK OP AVG
MKR 400.0 MHz
37.71 dBμV/m



ACTV DET: PEAK
MERS DET: PEAK OP AVG
MKR 868.9 MHz
41.69 dBμV/m





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Report ID: TRIRAD_FCC.27395_rev1.docx

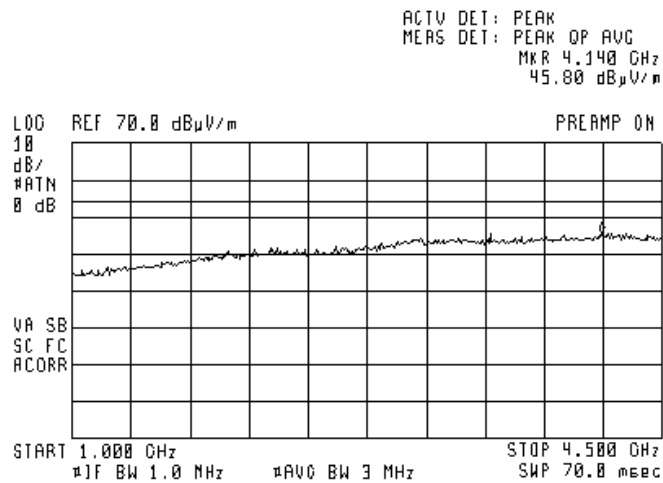
Date of Issue: 13-Jan-16

Test specification:		FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions	
Test procedure:		ANSI C63.4, Section 13.1.4	
Test mode:		Compliance	Verdict: PASS
Date(s):		08-Sep-15	
Temperature: 25 °C	Air Pressure: 1005 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

Plot 7.2.9 Radiated emission measurements from 1000 to 4500 MHz

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Vertical

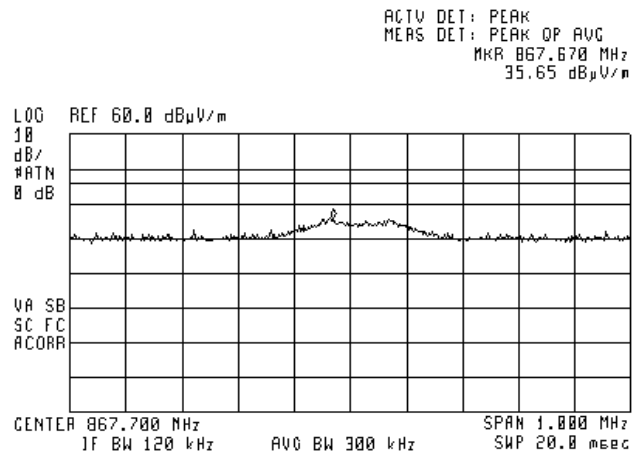
42



Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	08-Sep-15		
Temperature: 25 °C	Air Pressure: 1005 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

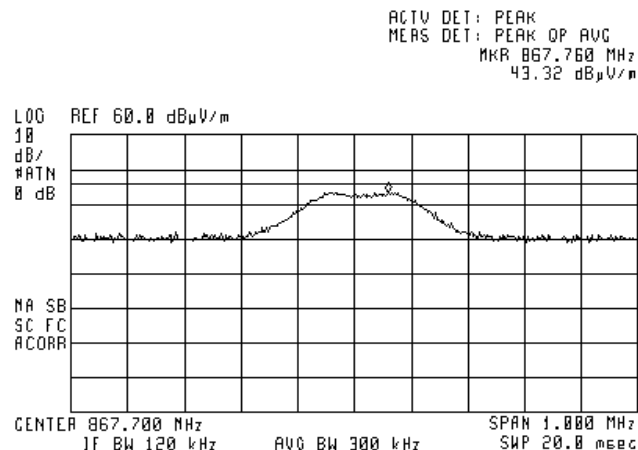
Plot 7.2.10 Radiated emission measurements at the second harmonic frequency

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical
EUT POSITION: Vertical



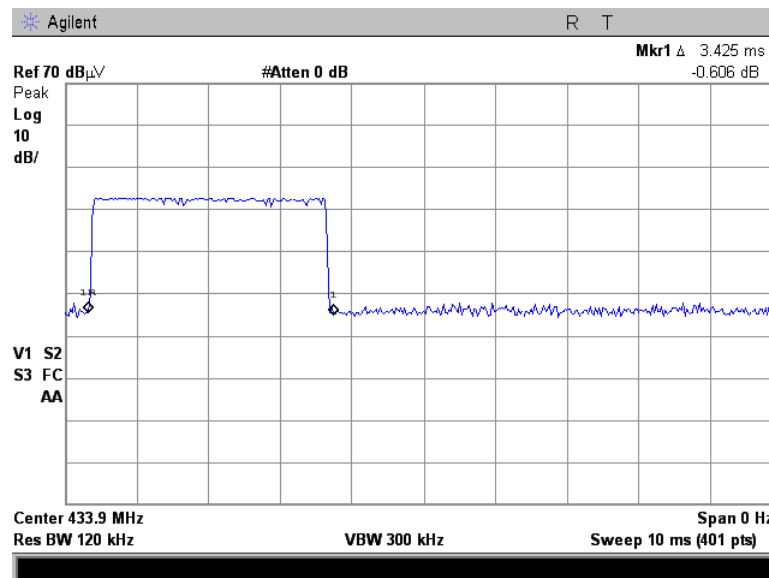
Plot 7.2.11 Radiated emission measurements at the second harmonic frequency

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

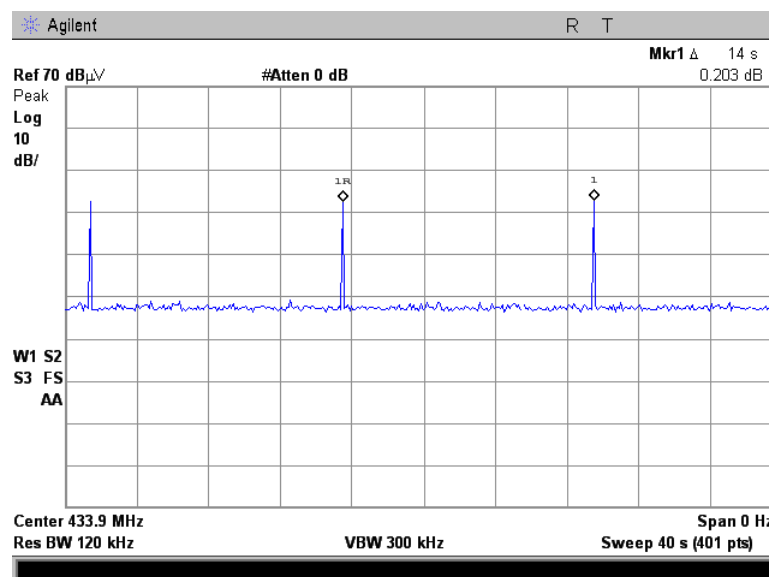


Test specification:	FCC Part 15, Section 231(b) / RSS-210, Section A1.1.2, Field strength of emissions		
Test procedure:	ANSI C63.4, Section 13.1.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	08-Sep-15		
Temperature: 25 °C	Air Pressure: 1005 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

Plot 7.2.12 Transmission pulse duration



Plot 7.2.13 Transmission pulse period



Test specification:		FCC Part 15, Section 231(c) / RSS-210, Section A1.1.3, Occupied bandwidth	
Test procedure:		ANSI C63.4, Section 13.1.7	
Test mode:		Compliance	Verdict: PASS
Date(s):		10-Sep-15	
Temperature: 26.5 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 120 VAC
Remarks: Contoller/Repeater			

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.

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 the associated plot.

Figure 7.3.1 Occupied bandwidth test setup





Test specification:		FCC Part 15, Section 231(c) / RSS-210, Section A1.1.3, Occupied bandwidth	
Test procedure:		ANSI C63.4, Section 13.1.7	
Test mode:		Compliance	Verdict: PASS
Date(s):		10-Sep-15	
Temperature: 26.5 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 120 VAC
Remarks: Contoller/Repeater			

Table 7.3.2 Occupied bandwidth test results

DETECTOR USED: Peak hold
 RESOLUTION BANDWIDTH: 10 kHz
 VIDEO BANDWIDTH: 30 kHz
 MODULATION: 2GFSK
 BIT RATE: 50 kbps

MODULATION ENVELOPE REFERENCE POINTS: 20 dBc

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit		Margin, kHz	Verdict
		% of the carrier frequency	kHz		
433.85	111.37	0.25	1084.60	-973.23	Pass

MODULATION ENVELOPE REFERENCE POINTS: 99 %

Carrier frequency, MHz	Occupied bandwidth, kHz	Limit		Margin, kHz	Verdict
		% of the carrier frequency	kHz		
433.85	95.59	0.25	1084.60	-989.0	Pass

Reference numbers of test equipment used

HL 2909	HL 3810						
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Full description is given in Appendix A.



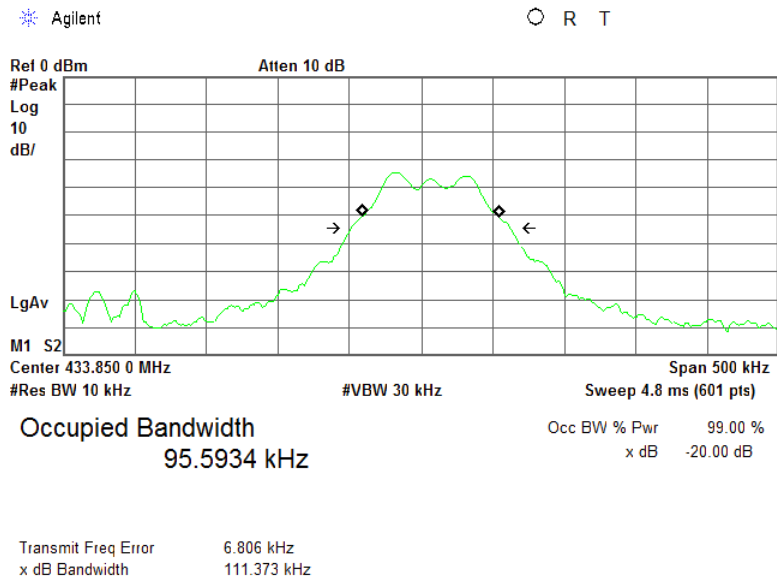
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Report ID: TRIRAD_FCC.27395_rev1.docx

Date of Issue: 13-Jan-16

Test specification:		FCC Part 15, Section 231(c) / RSS-210, Section A1.1.3, Occupied bandwidth	
Test procedure:		ANSI C63.4, Section 13.1.7	
Test mode:		Compliance	Verdict: PASS
Date(s):		10-Sep-15	
Temperature: 26.5 °C	Air Pressure: 1009 hPa	Relative Humidity: 38 %	Power Supply: 120 VAC
Remarks: Contoller/Repeater			

Plot 7.3.1 Occupied bandwidth test result



Test specification:		FCC Part 15, Section 207 / RSS-Gen, Section 7.2.2, Conducted emission	
Test procedure:		ANSI C63.4, Section 13.1.3	
Test mode:		Compliance	Verdict: PASS
Date(s):		17-Sep-15	
Temperature: 24 °C	Air Pressure: 1008 hPa	Relative Humidity: 55 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

7.4 Conducted emissions

7.4.1 General

This test was performed to measure common mode conducted emissions at the power port. Specification test limits are given in Table 7.4.1.

Table 7.4.1 Limits for conducted emissions

Frequency, MHz	Class B limit, dB(μ V)	
	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*
0.5 - 5.0	56	46
5.0 - 30	60	50

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

7.4.2 Test procedure

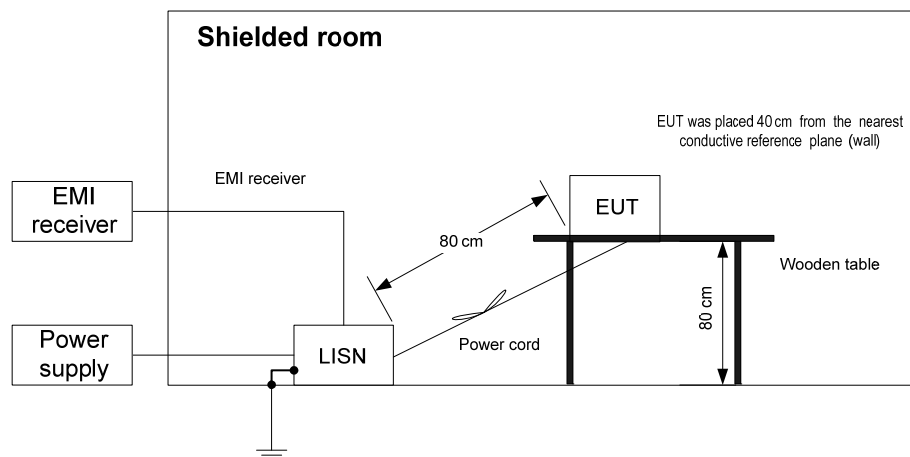
7.4.2.1 The EUT was set up as shown in Figure 7.4.1 and associated photographs, energized and the performance check was conducted.

7.4.2.2 The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer while unused coaxial connector of the LISN was terminated with 50 Ohm.

7.4.2.3 The position of the device cables was varied to determine maximum emission level.

7.4.2.4 The worst test results (the lowest margins) were recorded in Table 7.4.2 and shown in the associated plots.

Figure 7.4.1 Setup for conducted emission measurements, table-top equipment





Test specification:		FCC Part 15, Section 207 / RSS-Gen, Section 7.2.2, Conducted emission	
Test procedure:		ANSI C63.4, Section 13.1.3	
Test mode:		Compliance	Verdict: PASS
Date(s):		17-Sep-15	
Temperature: 24 °C	Air Pressure: 1008 hPa	Relative Humidity: 55 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

Table 7.4.2 Conducted emission test results

LINE: AC mains
 EUT OPERATING MODE: Transmit
 EUT SET UP: TABLE-TOP
 TEST SITE: SHIELDED ROOM
 FREQUENCY RANGE: 150 kHz - 30 MHz
 RESOLUTION BANDWIDTH: 9 kHz

Frequency, MHz	Peak emission, dB(μV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*		
0.16	47.11	39.09	65.51	-26.42	12.93	55.51	-42.58	L1	Pass
0.18	45.77	37.74	64.54	-26.80	13.58	54.54	-40.96		
0.20	44.35	35.86	63.65	-27.79	15.48	53.65	-38.17		
0.24	42.64	33.44	62.12	-28.68	21.93	52.12	-30.19		
0.56	38.93	36.13	56.00	-19.87	18.28	46.00	-27.72		
0.16	46.97	39.35	65.51	-26.16	10.00	55.51	-45.51	L2	Pass
0.18	45.66	37.18	64.54	-27.36	9.98	54.54	-44.56		
0.23	42.08	33.19	62.50	-29.31	10.34	52.50	-42.16		
1.00	33.55	28.00	56.00	-28.00	16.83	46.00	-29.17		
1.10	36.36	28.78	56.00	-27.22	20.52	46.00	-25.48		

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

HL 0447	HL 0787	HL 1425	HL 1513	HL 3612			
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Full description is given in Appendix A.

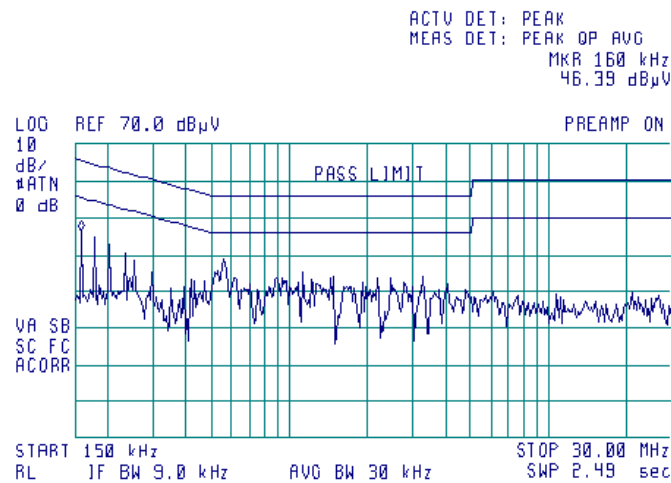


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Test specification:		FCC Part 15, Section 207 / RSS-Gen, Section 7.2.2, Conducted emission	
Test procedure:		ANSI C63.4, Section 13.1.3	
Test mode:		Compliance	Verdict: PASS
Date(s):		17-Sep-15	
Temperature: 24 °C	Air Pressure: 1008 hPa	Relative Humidity: 55 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

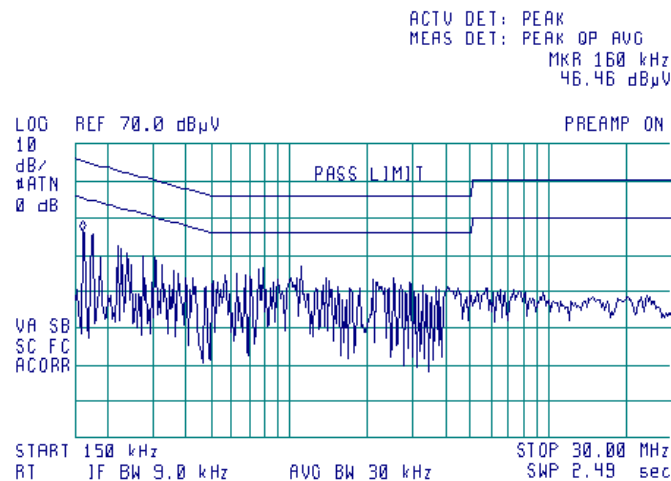
Plot 7.4.1 Conducted emission measurements

LINE: L1
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Plot 7.4.2 Conducted emission measurements

LINE: L2
EUT OPERATING MODE: Transmit
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK





Test specification:		FCC Part 15, Section 203 / RSS-Gen, Section 7.1.4, Antenna requirements	
Test procedure:		Visual inspection / supplier declaration	
Test mode:		Compliance	Verdict:
Date(s):			
Temperature: °C	Air Pressure: hPa	Relative Humidity: %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

7.5 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 7.5.1.

Table 7.5.1 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	

Test specification:	FCC Part 15, Section 107 / ICES-003, Section 6.1, Class B, Conducted emission at AC power port		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3 / CISPR 22		
Test mode:	Compliance	Verdict:	PASS
Date(s):	17-Sep-15		
Temperature: 24 °C	Air Pressure: 1008 hPa	Relative Humidity: 55 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

8 Unintentional emissions

8.1 Conducted emissions

8.1.1 General

This test was performed to measure common mode conducted emissions at the power port. Specification test limits are given in Table 8.1.1.

Table 8.1.1 Limits for conducted emissions

Frequency, MHz	Class B limit, dB(μV)		Class A limit, dB(μV)	
	QP	AVRG	QP	AVRG
0.15 - 0.5	66 - 56*	56 - 46*	79	66
0.5 - 5.0	56	46	73	60
5.0 - 30	60	50	73	60

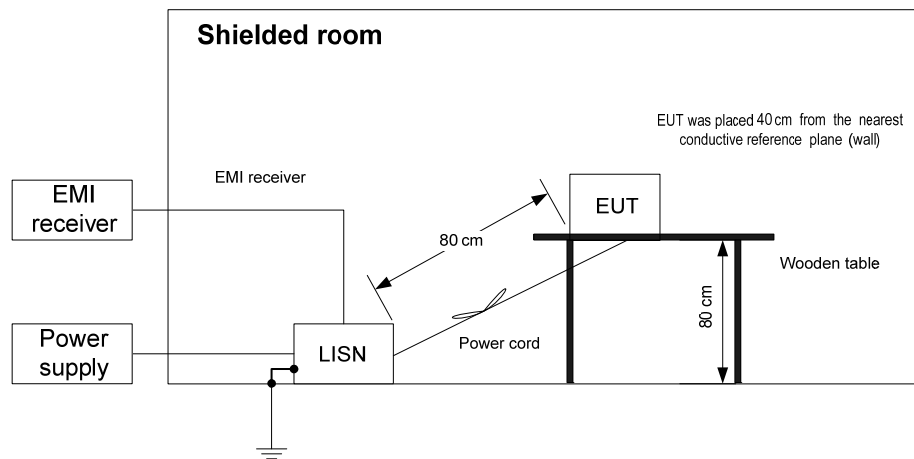
* - The limit decreases linearly with the logarithm of frequency.

8.1.2 Test procedure

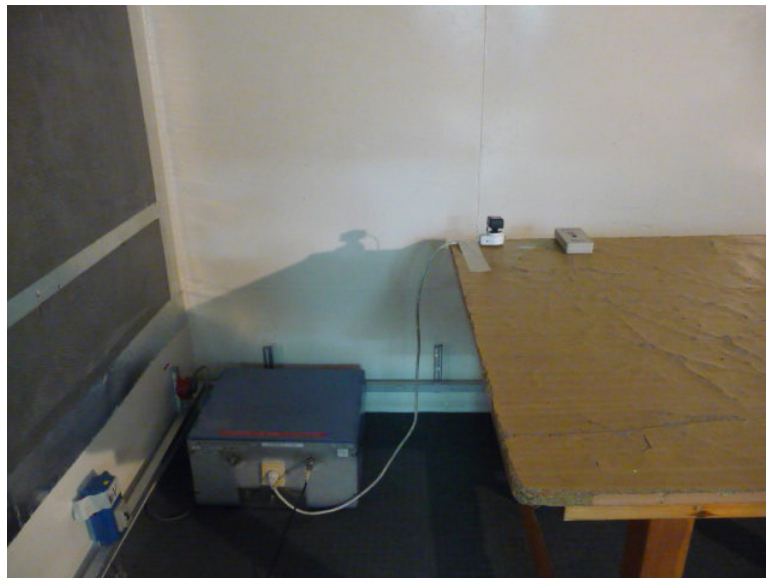
- 8.1.2.1 The EUT was set up as shown in Figure 7.4.1 Figure 8.1.1 and associated photograph, energized and the performance check was conducted.
- 8.1.2.2 The measurements were performed at power terminals with the LISN, connected to a spectrum analyzer while unused coaxial connector of the LISN was terminated with 50 Ohm.
- 8.1.2.3 The position of the device cables was varied to determine maximum emission level.
- 8.1.2.4 The worst test results (the lowest margins) were recorded in Table 8.1.2 and shown in the associated plots.

Test specification:		FCC Part 15, Section 107 / ICES-003, Section 6.1, Class B, Conducted emission at AC power port	
Test procedure:		ANSI C63.4, Sections 11.5 and 12.1.3 / CISPR 22	
Test mode:	Compliance	Verdict:	PASS
Date(s):	17-Sep-15		
Temperature: 24 °C	Air Pressure: 1008 hPa	Relative Humidity: 55 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

Figure 8.1.1 Setup for conducted emission measurements, table-top equipment



Photograph 8.1.1 Setup for conducted emission measurements





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Test specification:		FCC Part 15, Section 107 / ICES-003, Section 6.1, Class B, Conducted emission at AC power port	
Test procedure:		ANSI C63.4, Sections 11.5 and 12.1.3 / CISPR 22	
Test mode:	Compliance	Verdict:	PASS
Date(s):	17-Sep-15		
Temperature: 24 °C	Air Pressure: 1008 hPa	Relative Humidity: 55 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

Table 8.1.2 Conducted emission test results

LINE: AC mains
EUT SET UP: TABLE-TOP
TEST SITE: SHIELDED ROOM
FREQUENCY RANGE: 150 kHz - 30 MHz
RESOLUTION BANDWIDTH: 9 kHz

Frequency, MHz	Peak emission, dB(μV)	Quasi-peak			Average			Line ID	Verdict
		Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*	Measured emission, dB(μV)	Limit, dB(μV)	Margin, dB*		
0.16	47.11	39.09	65.51	-26.42	12.93	55.51	-42.58	L1	Pass
0.18	45.77	37.74	64.54	-26.80	13.58	54.54	-40.96		
0.20	44.35	35.86	63.65	-27.79	15.48	53.65	-38.17		
0.24	42.64	33.44	62.12	-28.68	21.93	52.12	-30.19		
0.56	38.93	36.13	56.00	-19.87	18.28	46.00	-27.72		
0.16	46.97	39.35	65.51	-26.16	10.00	55.51	-45.51	L2	Pass
0.18	45.66	37.18	64.54	-27.36	9.98	54.54	-44.56		
0.23	42.08	33.19	62.50	-29.31	10.34	52.50	-42.16		
1.00	33.55	28.00	56.00	-28.00	16.83	46.00	-29.17		
1.10	36.36	28.78	56.00	-27.22	20.52	46.00	-25.48		

*- Margin = Measured emission - specification limit.

Reference numbers of test equipment used

HL 0447	HL 0787	HL 1425	HL 1513	HL 3612			
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Full description is given in Appendix A.

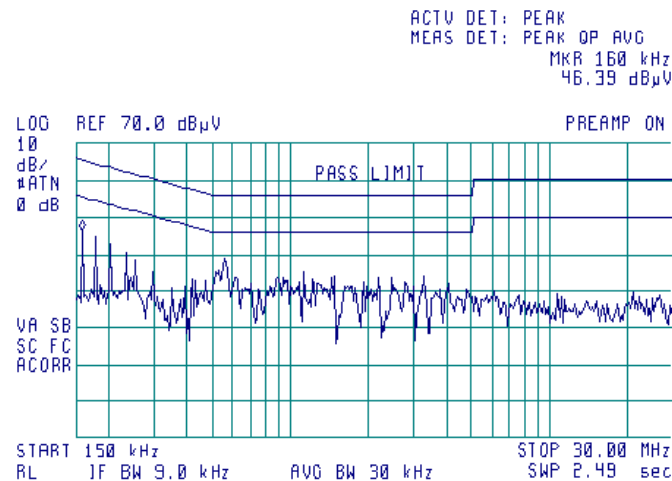


HERMON LABORATORIES

Test specification:	FCC Part 15, Section 107 / ICES-003, Section 6.1, Class B, Conducted emission at AC power port		
Test procedure:	ANSI C63.4, Sections 11.5 and 12.1.3 / CISPR 22		
Test mode:	Compliance	Verdict:	PASS
Date(s):	17-Sep-15		
Temperature: 24 °C	Air Pressure: 1008 hPa	Relative Humidity: 55 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

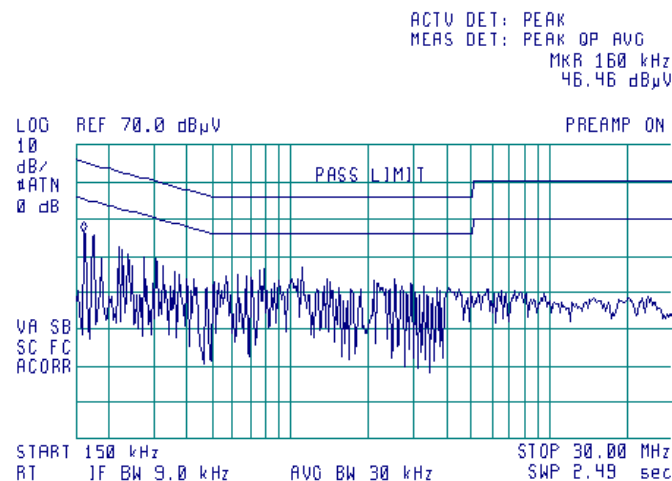
Plot 8.1.1 Conducted emission measurements

LINE: L1
LIMIT: Class B
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Plot 8.1.2 Conducted emission measurements

LINE: L2
LIMIT: Class B
LIMIT: QUASI-PEAK, AVERAGE
DETECTOR: PEAK



Test specification:	FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4 / RSS-Gen, Section 4.10 / CISPR 22		
Test mode:	Compliance	Verdict:	PASS
Date(s):	08-Sep-15		
Temperature: 25 °C	Air Pressure: 1005 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

8.2 Radiated emission measurements

8.2.1 General

This test was performed to measure radiated emissions from the EUT enclosure. Specification test limits are given in Table 8.2.1, in Table 8.2.2.

Table 8.2.1 Radiated emission limits according to FCC Part 15, Section 109 and ICES-003, Section 6.2

Frequency, MHz	Class B limit, dB(μV/m)		Class A limit, dB(μV/m)	
	10 m distance	3 m distance	10 m distance	3 m distance
30 - 88	29.5*	40.0	39.0	49.5*
88 - 216	33.0*	43.5	43.5	54.0*
216 - 960	35.5*	46.0	46.4	56.9*
960 - 5 th harmonic**	43.5*	54.0	49.5	60.0*

* - The limit for test distance other than specified was calculated using the inverse linear distance extrapolation factor as follows: $\text{Lim}_{S_2} = \text{Lim}_{S_1} + 20 \log(S_1/S_2)$, where S_1 and S_2 – standard defined and test distance respectively in meters.

Table 8.2.2 Radiated emission limits according to RSS-Gen, Section 7.1.2

Frequency, MHz	Field strength limit at 3 m test distance, dB(μV/m)
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
960 - 5 th harmonic**	54.0

** - harmonic of the highest frequency the EUT generates, uses, operates or tunes to.

8.2.2 Test procedure

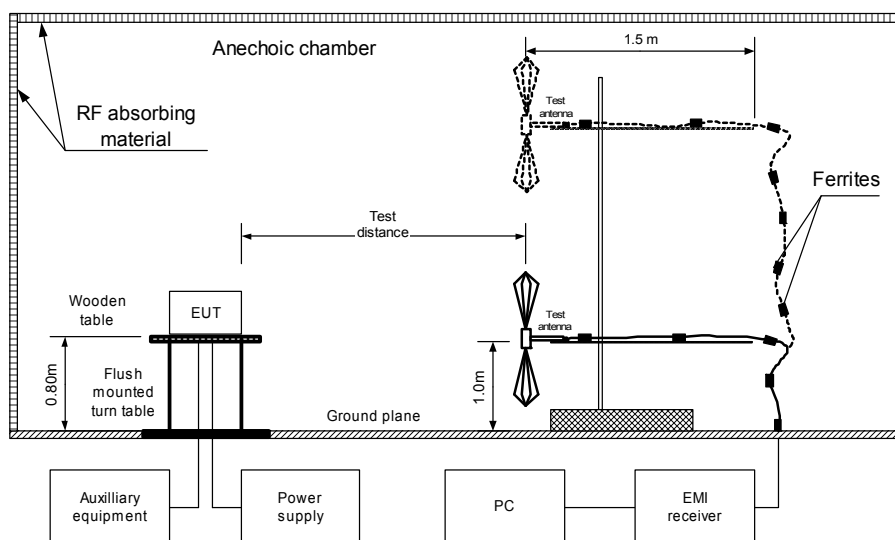
8.2.2.1 The EUT was set up as shown in Figure 8.2.1 and associated photographs, energized and the performance check was conducted.

8.2.2.2 The specified frequency range was investigated with biconilog antenna connected to EMI receiver. To find maximum radiation the turntable was rotated 360°, the measuring antenna height was changed from 1 to 4 m, its polarization was switched from vertical to horizontal and the EUT cables position was varied.

8.2.2.3 The worst test results (the lowest margins) were provided in the associated tables and plots.

Test specification:		FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Radiated emission	
Test procedure:		ANSI C63.4, Sections 11.6 and 12.1.4 / RSS-Gen, Section 4.10 / CISPR 22	
Test mode:		Compliance	Verdict: PASS
Date(s):		08-Sep-15	
Temperature: 25 °C	Air Pressure: 1005 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

Figure 8.2.1 Setup for radiated emission measurements in anechoic chamber, table-top equipment



Photograph 8.2.1 Setup for radiated emission measurements, general view



Test specification:		FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Radiated emission	
Test procedure:		ANSI C63.4, Sections 11.6 and 12.1.4 / RSS-Gen, Section 4.10 / CISPR 22	
Test mode:	Compliance	Verdict:	PASS
Date(s):	08-Sep-15		
Temperature: 25 °C	Air Pressure: 1005 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

Photograph 8.2.2 Setup for radiated emission measurements, EUT cabling





HERMON LABORATORIES

Test specification:	FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4 / RSS-Gen, Section 4.10 / CISPR 22		
Test mode:	Compliance	Verdict:	PASS
Date(s):	08-Sep-15		
Temperature: 25 °C	Air Pressure: 1005 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

Table 8.2.3 Radiated emission test results

EUT SET UP: TABLE-TOP
LIMIT: Class B
EUT OPERATING MODE: Stand-by / Receive
TEST SITE: SEMI ANECHOIC CHAMBER
TEST DISTANCE: 3 m

DETECTORS USED: PEAK / QUASI-PEAK
FREQUENCY RANGE: 30 MHz – 1000 MHz
RESOLUTION BANDWIDTH: 120 kHz

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*				
39.38	42.2	28.1	40.0	-11.9	Vertical	1	0	Pass
49.5	38.0	30.3	40.0	-9.7	Vertical	1	0	
71.73	27.0	17.7	40.0	-22.3	Vertical	1	0	

DETECTORS USED: PEAK / AVERAGE
FREQUENCY RANGE: 1000 MHz – 2500 MHz
RESOLUTION BANDWIDTH: 1000 kHz

RECESSION BANDWIDTH:				1000 KHz			Antenna polarization	Antenna height, m	Turn-table position**, degrees	Verdict
Frequency, MHz	Peak			Average						
	Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	Measured emission, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*				
No signals 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 0446	HL 0521	HL 0604	HL 1984	HL 4275	HL 4353	HL 4722	
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Full description is given in Appendix A.

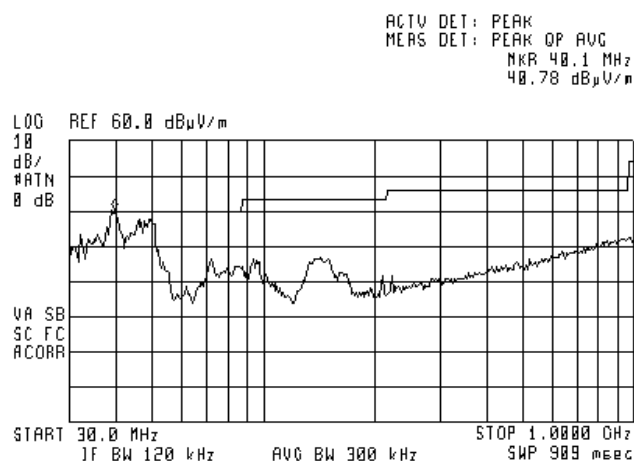


HERMON LABORATORIES

Test specification:	FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4 / RSS-Gen, Section 4.10 / CISPR 22		
Test mode:	Compliance	Verdict:	PASS
Date(s):	08-Sep-15		
Temperature: 25 °C	Air Pressure: 1005 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

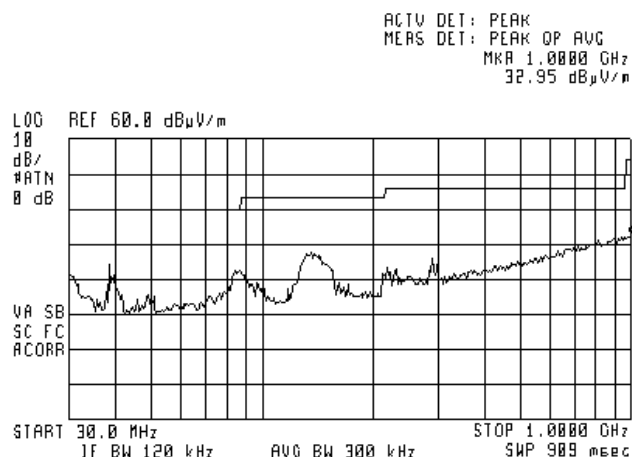
Plot 8.2.1 Radiated emission measurements in 30 - 1000 MHz range, vertical antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Stand-by /Receive



Plot 8.2.2 Radiated emission measurements in 30 - 1000 MHz range, horizontal antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Stand-by /Receive



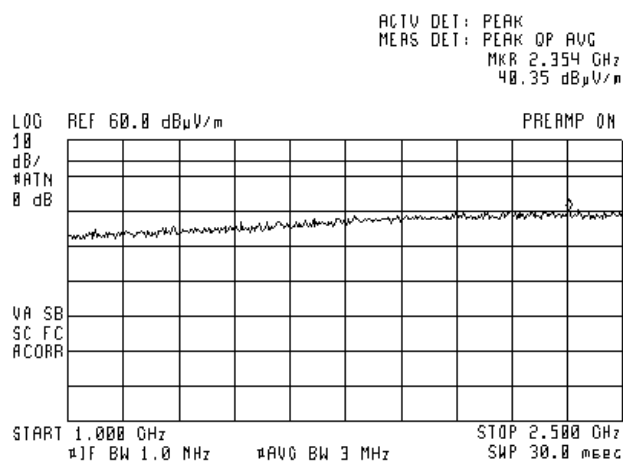


HERMON LABORATORIES

Test specification:	FCC Part 15, Section 109 / RSS-Gen, Section 7.1.2 / ICES-003, Radiated emission		
Test procedure:	ANSI C63.4, Sections 11.6 and 12.1.4 / RSS-Gen, Section 4.10 / CISPR 22		
Test mode:	Compliance	Verdict:	PASS
Date(s):	08-Sep-15		
Temperature: 25 °C	Air Pressure: 1005 hPa	Relative Humidity: 47 %	Power Supply: 120 VAC
Remarks: Controller/Repeater			

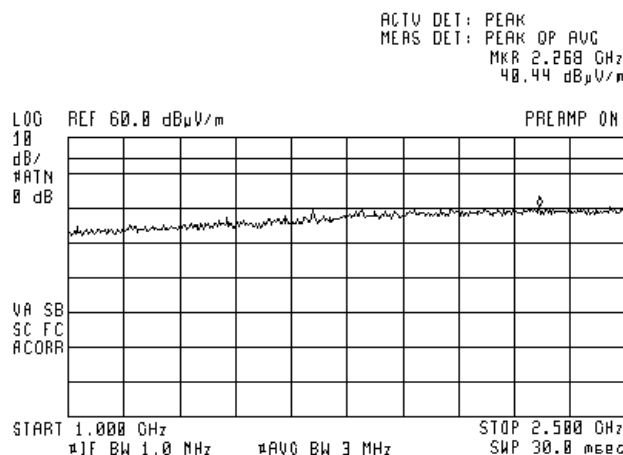
Plot 8.2.3 Radiated emission measurements in 1000 - 2500 MHz range, vertical antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Stand-by /Receive



Plot 8.2.4 Radiated emission measurements in 1000 - 2500 MHz range, horizontal antenna polarization

TEST SITE: Semi anechoic chamber
LIMIT: Class B
TEST DISTANCE: 3 m
EUT OPERATING MODE: Stand-by /Receive



9 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	13-Jan-15	13-Jan-16
0447	LISN, 16/2, 300V RMS, 50 Ohm/50 uH + 5 Ohm, STD CISPR 16-1	Hermon Laboratories	LISN 16 - 1	066	23-Oct-14	23-Oct-15
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	22-Oct-14	22-Oct-15
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	15-May-15	15-May-16
0787	Transient Limiter 9 kHz-200 MHz	Hewlett Packard	11947A	3107A018 77	13-Oct-15	13-Oct-16
1425	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1426, HL1427	Agilent Technologies	8542E	3710A002 22, 3705A002 04	24-Dec-14	24-Dec-15
1513	Cable RF, 8 m, BNC/BNC	Belden	M17/167 MIL-C-17	1513	08-Sep-15	08-Sep-16
1984	Antenna, Double-Ridged Waveguide Horn, 1 to 18 GHz, 300 W	EMC Test Systems	3115	9911-5964	17-Apr-15	17-Apr-16
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY414447 62	22-Feb-15	22-Feb-16
3612	Cable RF, 17.5 m, N type-N type	Teldor	RG-214/U	NA	07-Dec-14	07-Dec-15
3810	Near-Field Probe Set, Hand held, 6 probes	EMC Test Systems	7405	9706-3927	30-Dec-14	30-Dec-15
4275	Test Cable, DC-18 GHz, 1.8 m, SMA/M - N/M	Mini-Circuits	CBL-6FT-SMNM+	70050	20-Nov-14	20-Nov-15
4353	Low Loss Armored Test Cable, DC - 18 GHz, 6.2 m, N type-M/N type-M	MegaPhase	NC29-N1N1-244	12025101 003	15-Mar-15	15-Mar-16
4722	Low Loss Armored Test Cable, DC - 18 GHz, 6.2 m, N type-M/N type-M	MegaPhase	NC29-N1N1-244	51228701 001	31-Aug-15	31-Aug-16

10 APPENDIX B 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.

11 APPENDIX C 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 number IC 2186A-1 for OATS, certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, 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 IL1001.

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12 APPENDIX D Specification references

FCC 47CFR part 15: 2014	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: 2009	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
RSS-210 Issue 8: 2010	Low Power Licence- Exempt Radiocommunication Devices
RSS-Gen Issue 4: 2014	General Requirements and Information for the Certification of Radiocommunication Equipment
ICES-003 issue 5:2012	Information Technology Equipment (ITE) – Limits and methods of measurement

13 APPENDIX E Test equipment correction factors

Correction factor
Line impedance stabilization network
Model LISN 16 - 1
Hermon Laboratories, HL 0447

Frequency, kHz	Correction factor, dB
10	4.9
15	2.86
20	1.83
25	1.25
30	0.91
35	0.69
40	0.53
50	0.35
60	0.25
70	0.18
80	0.14
90	0.11
100	0.09
125	0.06
150	0.04

The correction factor in dB is to be added to meter readings of an interference analyzer or a spectrum analyzer.

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(μ V) to convert it into field strength in dB(μ V/m).

Antenna factor
Biconilog antenna EMCO Model 3141
Ser.No.1011, HL 0604

Frequency, MHz	Antenna factor, dB(1/m)	Frequency, MHz	Antenna factor, dB(1/m)	Frequency, MHz	Antenna factor, dB(1/m)
26	7.8	580	20.6	1320	27.8
28	7.8	600	21.3	1340	28.3
30	7.8	620	21.5	1360	28.2
40	7.2	640	21.2	1380	27.9
60	7.1	660	21.4	1400	27.9
70	8.5	680	21.9	1420	27.9
80	9.4	700	22.2	1440	27.8
90	9.8	720	22.2	1460	27.8
100	9.7	740	22.1	1480	28.0
110	9.3	760	22.3	1500	28.5
120	8.8	780	22.6	1520	28.9
130	8.7	800	22.7	1540	29.6
140	9.2	820	22.9	1560	29.8
150	9.8	840	23.1	1580	29.6
160	10.2	860	23.4	1600	29.5
170	10.4	880	23.8	1620	29.3
180	10.4	900	24.1	1640	29.2
190	10.3	920	24.1	1660	29.4
200	10.6	940	24.0	1680	29.6
220	11.6	960	24.1	1700	29.8
240	12.4	980	24.5	1720	30.3
260	12.8	1000	24.9	1740	30.8
280	13.7	1020	25.0	1760	31.1
300	14.7	1040	25.2	1780	31.0
320	15.2	1060	25.4	1800	30.9
340	15.4	1080	25.6	1820	30.7
360	16.1	1100	25.7	1840	30.6
380	16.4	1120	26.0	1860	30.6
400	16.6	1140	26.4	1880	30.6
420	16.7	1160	27.0	1900	30.6
440	17.0	1180	27.0	1920	30.7
460	17.7	1200	26.7	1940	30.9
480	18.1	1220	26.5	1960	31.2
500	18.5	1240	26.5	1980	31.6
520	19.1	1260	26.5	2000	32.0
540	19.5	1280	26.6		
560	19.8	1300	27.0		

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

Cable loss
Cable coaxial, RG-214/U, N type-N type, 17 m
Teldor, HL 3612

Frequency, MHz	Cable loss, dB
0.1	0.05
0.5	0.07
1	0.10
3	0.22
5	0.29
10	0.39
30	0.68
50	0.90
100	1.27
150	1.58
200	1.80
250	2.12
300	2.36
350	2.60
400	2.82
450	2.99
500	3.23
550	3.40
600	3.56
650	3.71
700	3.90
750	4.04
800	4.23
850	4.39
900	4.55
950	4.65
1000	4.79

Cable loss
Test cable, Mini-Circuits, S/N 70050, 18 GHz, 1.8 m, SMA/M - N/M
CBL-6FT-SMNM+, HL 4275

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.08	5000	1.71	10200	2.64	15400	3.46
30	0.11	5100	1.73	10300	2.65	15500	3.47
50	0.14	5200	1.75	10400	2.66	15600	3.52
100	0.21	5300	1.76	10500	2.67	15700	3.55
200	0.30	5400	1.77	10600	2.70	15800	3.55
300	0.37	5500	1.82	10700	2.71	15900	3.55
400	0.43	5600	1.84	10800	2.72	16000	3.61
500	0.49	5700	1.86	10900	2.73	16100	3.62
600	0.54	5800	1.86	11000	2.75	16200	3.63
700	0.58	5900	1.89	11100	2.77	16300	3.62
800	0.62	6000	1.94	11200	2.78	16400	3.66
900	0.66	6100	1.95	11300	2.80	16500	3.71
1000	0.70	6200	1.96	11400	2.82	16600	3.71
1100	0.74	6300	1.97	11500	2.83	16700	3.67
1200	0.78	6400	2.01	11600	2.84	16800	3.69
1300	0.81	6500	2.03	11700	2.86	16900	3.74
1400	0.84	6600	2.02	11800	2.88	17000	3.73
1500	0.88	6700	2.02	11900	2.89	17100	3.71
1600	0.91	6800	2.05	12000	2.90	17200	3.73
1700	0.94	6900	2.06	12100	2.92	17300	3.77
1800	0.97	7000	2.07	12200	2.93	17400	3.77
1900	1.00	7100	2.07	12300	2.94	17500	3.76
2000	1.02	7200	2.08	12400	2.96	17600	3.76
2100	1.05	7300	2.11	12500	2.98	17700	3.78
2200	1.07	7400	2.13	12600	2.99	17800	3.80
2300	1.10	7500	2.15	12700	3.01	17900	3.79
2400	1.13	7600	2.16	12800	3.03	18000	3.78
2500	1.15	7700	2.18	12900	3.05		
2600	1.18	7800	2.21	13000	3.07		
2700	1.20	7900	2.24	13100	3.09		
2800	1.24	8000	2.25	13200	3.12		
2900	1.26	8100	2.26	13300	3.13		
3000	1.28	8200	2.29	13400	3.14		
3100	1.30	8300	2.31	13500	3.16		
3200	1.33	8400	2.33	13600	3.18		
3300	1.36	8500	2.33	13700	3.19		
3400	1.37	8600	2.34	13800	3.21		
3500	1.39	8700	2.36	13900	3.23		
3600	1.42	8800	2.38	14000	3.25		
3700	1.45	8900	2.39	14100	3.26		
3800	1.46	9000	2.40	14200	3.27		
3900	1.48	9100	2.42	14300	3.30		
4000	1.50	9200	2.45	14400	3.32		
4100	1.53	9300	2.46	14500	3.33		
4200	1.55	9400	2.48	14600	3.34		
4300	1.57	9500	2.50	14700	3.36		
4400	1.59	9600	2.52	14800	3.39		
4500	1.61	9700	2.54	14900	3.40		
4600	1.64	9800	2.56	15000	3.41		
4700	1.66	9900	2.58	15100	3.41		
4800	1.67	10000	2.60	15200	3.44		
4900	1.69	10100	2.61	15300	3.46		

Cable loss
Low Loss Armored Test Cable, MegaPhase, 18 GHz, 6.2 m, N type-M/N type-M,
NC29-N1N1-244S/N 12025101 003,
HL 4353

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
50	0.20	9000	2.71
100	0.27	9500	2.81
300	0.47	10000	2.90
500	0.61	10500	2.97
1000	0.87	11000	3.06
1500	1.07	11500	3.13
2000	1.24	12000	3.20
2500	1.39	12500	3.26
3000	1.53	13000	3.34
3500	1.65	13500	3.39
4000	1.77	14000	3.47
4500	1.89	14500	3.54
5000	1.99	15000	3.62
5500	2.07	15500	3.69
6000	2.20	16000	3.76
6500	2.30	16500	3.83
7000	2.39	17000	3.86
7500	2.51	17500	3.94
8000	2.58	18000	4.02
8500	2.65		

Cable loss
Low Loss Armored Test Cable, MegaPhase, 18 GHz, 6.2 m, N type-M/N type-M,
NC29-N1N1-244, S/N 51228701001
HL 4722

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
50	0.22	9000	2.93
100	0.30	9500	3.06
300	0.52	10000	3.16
500	0.66	10500	3.20
1000	0.93	11000	3.34
1500	1.15	11500	3.39
2000	1.33	12000	3.48
2500	1.49	12500	3.55
3000	1.64	13000	3.66
3500	1.77	13500	3.75
4000	1.90	14000	3.76
4500	2.03	14500	3.87
5000	2.17	15000	3.98
5500	2.30	15500	4.01
6000	2.39	16000	4.14
6500	2.51	16500	4.15
7000	2.59	17000	4.32
7500	2.67	17500	4.36
8000	2.76	18000	4.38
8500	2.84		

14 APPENDIX F 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(μ V)	decibel referred to one microvolt
dB(μ V/m)	decibel referred to one microvolt per meter
dB(μ A)	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
μ s	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 TEST REPORT

15 APPENDIX G Manufacturer's declaration of identity



Declaration of Identity

We, the undersigned,

Company: Triple Plus

Address: 5 Hamada str. Yokneam

Country: Israel

Telephone number: +972-72-2211370

Fax number: +972-72-2211379

declare under our sole responsibility that the following equipment:

Brand/Item	Type/Model	Short Product description
NWL CNTRLR/RPTR	NWL-CTALEN-5-01	Controller of water leakage safety system

is electronically/electrically/mechanically identical to the following equipment (including Software/Hardware version(s)):

Brand/Item	Type/Model	Short Product description
NWL CNTRLR/RPTR	NWL-CTVLVE-6-01	Controller of water leakage safety system Different power supply source
NWL CNTRLR/RPTR	NWL-CTVLVE-3-01	Controller of water leakage safety system Different power supply source
NWL CNTRLR/RPTR	NWL-CTVLVE-1-01	Controller of water leakage safety system – without power supply
NWL CNTRLR/RPTR	NWL-RPVLVE-1-01	Repeater of water leakage safety system

1/12/2015

(signature)

Michael Isakov

CEO

Triple Plus Ltd.
514523281

(company stamp)

END OF DOCUMENT