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839.01
Electrical

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ELECTROMAGNETIC EMISSION TEST REPORT

ACCORDING TO 47CFR PART 15, SUBPART C § 15.209, 15.205 and SUBPART B

for

Baran Advanced Technologies (1986) Ltd.

EQUIPMENT UNDER TEST:

Proximity reader plus keypad

Model: ASPKB

Document ID: BARRAD_FCC.15281.doc
Date of Issue: October 02

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Contents

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1 Project information

Description of equipment under test

Test items	Proximity reader plus keypad
Manufacturer	Baran Advanced Technologies (1986) Ltd.
Type (Model)	ASPKB
Hardware revision	Ver.1
Software release	Ver.1
Equipment FCC code[1]	DSR

Applicant information

Applicant's responsible person	Mr. Raul Kafka, Project Manager
Company	Baran Advanced Technologies (1986) Ltd.
Address	8, Omarim street,
City	Omer
Postal code	84965
Country	Israel
Telephone number	+972 8 6200020
Telefax number	+972 8 6200021

Test performance

Project number:	15281
Location	Hermon Laboratories
Receipt date	September 22, 2002
Test performed	September 22, 2002
Purpose of test	Apparatus compliance verification in accordance with emission requirements
Test specifications	47CFR Part 15, §15.209, 15.205 and subpart B

[1] FCC Equipment codes – see Appendix D

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2 Summary of tests

The tests listed in the table below were performed. The EUT was found complying with the limits of 47CFR Part 15, §15.209, 15.205 and subpart B.

Parameter	Subclause	C	NC	NT	NA	Tested by	Date tested	Remarks
Intentional radiation, §15.209								
Field strength of emission	(a)	**C**				Mr. M. Feldman, test engineer	September 22, 2002	
Unintentional radiation, §15.107, §15.109								
Conducted emissions	15.107				**NA**			
Radiated emissions	15.109	**C**				Mr. M. Feldman, test engineer	September 22, 2002	

NOTE: C: The parameter is compliant with the requirements.
NC: The parameter is not compliant with the requirements.
NT: The parameter is not tested.
NA: The test of this parameter is not applicable.

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Parameter	Subclause	C	NC	NT	NA	Remarks
General conditions under Part 15						
The Intentional radiator operates at 125 kHz.	15.209	**C**				
The intentional radiator does not operate in the restricted bands of operation.	15.205	**C**				
The intentional radiator has permanently attached antenna or antenna that uses a unique coupling to the intentional radiator.	15.203	**C**				
The intentional radiator has a standard connector and must be professionally installed. To demonstrate that professional installation is required, the following three points must be addressed: (a) the application (or intended use) of the EUT; (b) the installation requirements of the EUT, and (c) the method by which the EUT will be marketed.	15.203				**NA**	
No antenna other than that furnished by the responsible party can be used with the device.	15.203				**NA**	
Antenna technical characteristics, as referred to in "Transmitter description" table in the test report	15.204	**C**				
NOTE: C: The parameter is compliant with the requirements. NC: The parameter is not compliant with the requirements. NT: The parameter is not tested. NA: The test of this parameter is not applicable.						

Test report prepared by: Ms. V. Mednikov, certification engineer

Test report approved by: Mr. A. Usoskin, QA manager

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3 EUT description

3.1 General description

The EUT, Everswitch proximity reader plus keypad, model ASPKB, is a transceiver intended for use in different applications. The device operates at 125 kHz and is powered by 5 to 12 V DC.

Local oscillator frequency is 3.579 MHz.

3.2 EUT test configuration

The EUT test configuration is shown in Figure 3.2.1.

Table 3.2.1 EUT ports and lines

Port type	Port description	Connector type	Quantity	Cable type description	Cable length, m	Connected to
Power	DC power	NA	2	Unshielded	1.5	DC PS
Signal (green & white)	Data	NA	2	Unshielded	1.5	open circuit
Signal (brown)	Led input	NA	1	Unshielded	1.5	open circuit
Signal (violet)	Housing GND	NA	1	Unshielded	1.5	open circuit
Signal (grey)	Tamper out	NA	1	Unshielded	1.5	open circuit
Signal (orange)	Buffer input	NA	1	Unshielded	1.5	open circuit
Signal (blue)	CCTV out	NA	1	Unshielded	1.5	open circuit

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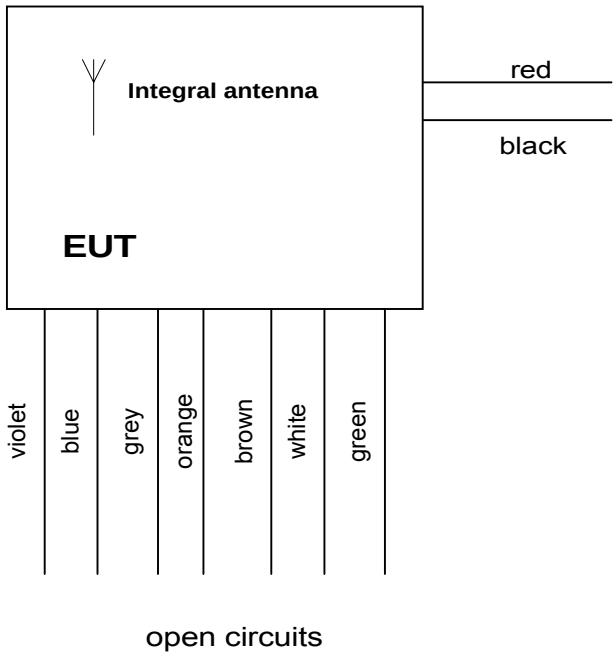
Figure 3.2.1 EUT test configuration



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3.3 Transmitter description

Type of equipment					
v	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)				
	Other:				
Operating frequency	125 kHz				
Transmitter aggregate data rate (bits per second)	NA				
Normal test signal	Transmits carrier				
Maximum rated output power					
At transmitter permanent external 50 Ω rf output connector (dBm)					
Effective radiated power (for equipment with integral antenna)	50 dB(μV/m)				
Is transmitter output power variable?	v	No			
		Yes		continuous variable	
				stepped variable	
				stepsize (dB):	
				minimum RF power (dBm):	
				maximum RF power (dBm):	

Transmitter power source							
	Battery	**Nominal rated voltage (VDC)**					
	Nickel Cadmium						
	Lithium						
	Other						
v	**DC**	**Nominal rated voltage (VDC)**	5 to 12				
	AC mains	**Nominal rated voltage (VAC)**					
Is there common power source for transmitter and receiver			v	yes		no	

Antenna technical characteristics						
		Type	**Manufacturer**	**Model number**	**Gain**	
Integral		with temporary RF connector				
	v	without temporary RF connector	Custom	STANDEX	NA	NA
External						
External antenna connection - NA						

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4 Tests results

4.1 Field strength of emission according to §15.209

METHOD OF MEASUREMENTS: ANSI 63.4 §13.1.4
DATE: September 22, 2002
RELATIVE HUMIDITY: 43 %
AMBIENT TEMPERATURE: 24 °C
TEST PERFORMED IN: ANECHOIC CHAMBER
DISTANCE BETWEEN ANTENNA AND EUT: 3 m
ANTENNA TYPE: LOOP

Peak detector

Carrier frequency, kHz	Field strength, dB(μV/m)	Limit[1], dB(μV/m)	Margin, dB	Reference to Plots in Appendix A
125.8	47.56	105.6	57.04	A1, A2
Measurement uncertainty, dB		±4		

[1] The limit is based on measurements employing an average detector according to §15.209(d).

LIMIT

Frequency, MHz	Limit dB(μV/m)	Measurement distance, m
0.009 – 0.490	67.60-20logF*	300**
0.490 – 1.705	87.60-20logF*	30**
1.705 - 30	29.5	30**
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960*	54.0	3

* F is frequency in kHz.

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

$Lim S_2 = Lim S_1 + 40 \log (S_1/S_2)$, where S_1 = 300 m or 30 m, S_2 = 3 m.

At 125 kHz frequency the limit was calculated:

$Lim_{3m} = 67.60 – 20 \log 125 + 40 \log (300/3) = 105.6$ dB(μV/m)

TEST EQUIPMENT USED:

HL 0446	HL 0465	HL 0521	HL 0589	HL 1004	HL 2009	

TEST PROCEDURE

The EUT was tested, being placed on a wooden 80 cm height table in each of three orthogonal planes in turn.

The loop antenna was positioned with its plane vertical. The loop center was 1 meter above the ground plane. To find maximum radiation the turntable was rotated 360° and the measuring antenna was rotated about its vertical axis.

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4.2 Unintentional radiated emissions test according to §15.109

METHOD OF MEASUREMENT: ANSI 63.4 §11.6 / ANSI 63.4 §12.1.4
TEST PERFORMED IN: ANECHOIC CHAMBER
DATE: September 22, 2002
RELATIVE HUMIDITY: 43 %
AMBIENT TEMPERATURE: 24 °C
DISTANCE BETWEEN ANTENNA AND EUT: 3 m
THE EUT WAS TESTED AS: TABLE-TOP

	The EUT highest used frequency (not including operating frequency), MHz	Upper frequency of measurement range, MHz
	Below 1.705	30
X	1.705 – 108	1000
	108 – 500	2000
	500 – 1000	5000
	Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

30 – 1000 MHz frequency range
Quasi-peak detector

Frequency, MHz	Antenna polarization	Turntable position, (°)	Radiated emission, dB (µV/m)	Limit, dB(µV/m)	Margin, dB	Reference to Plots in Appendix A
290.3945	V	346	29.86	46.00	16.14	A3
308.0561	V	309	33.55	46.00	12.45	A3
336.9831	H	35	37.90	46.00	8.10	A3
342.5639	H	175	35.58	46.00	10.42	A3
349.0578	H	354	31.57	46.00	14.43	A3
369.4384	H	180	26.82	46.00	19.18	A3
Measurement uncertainty, dB		+5.73 / -5.57				

TEST EQUIPMENT USED:

HL 0465	HL 0521	HL 0589	HL 0604	HL 1004	HL 2009	

LIMIT (§ 15.109)

Frequency, MHz	Class A equipment @ 10 m dB(µV/m)	Class B equipment @ 3 m dB(µV/m)
30 - 88	39.0	40
88 - 216	43.5	43.5
216 - 960	46.4	46
960 - 5000	49.5	54

TEST PROCEDURE

The EUT was tested, being placed on a wooden 80 cm height table.

To find maximum radiation the turntable was rotated 360°, measuring antenna height was changed from 1 to 4 m, and the antennas polarization was changed from vertical to horizontal.

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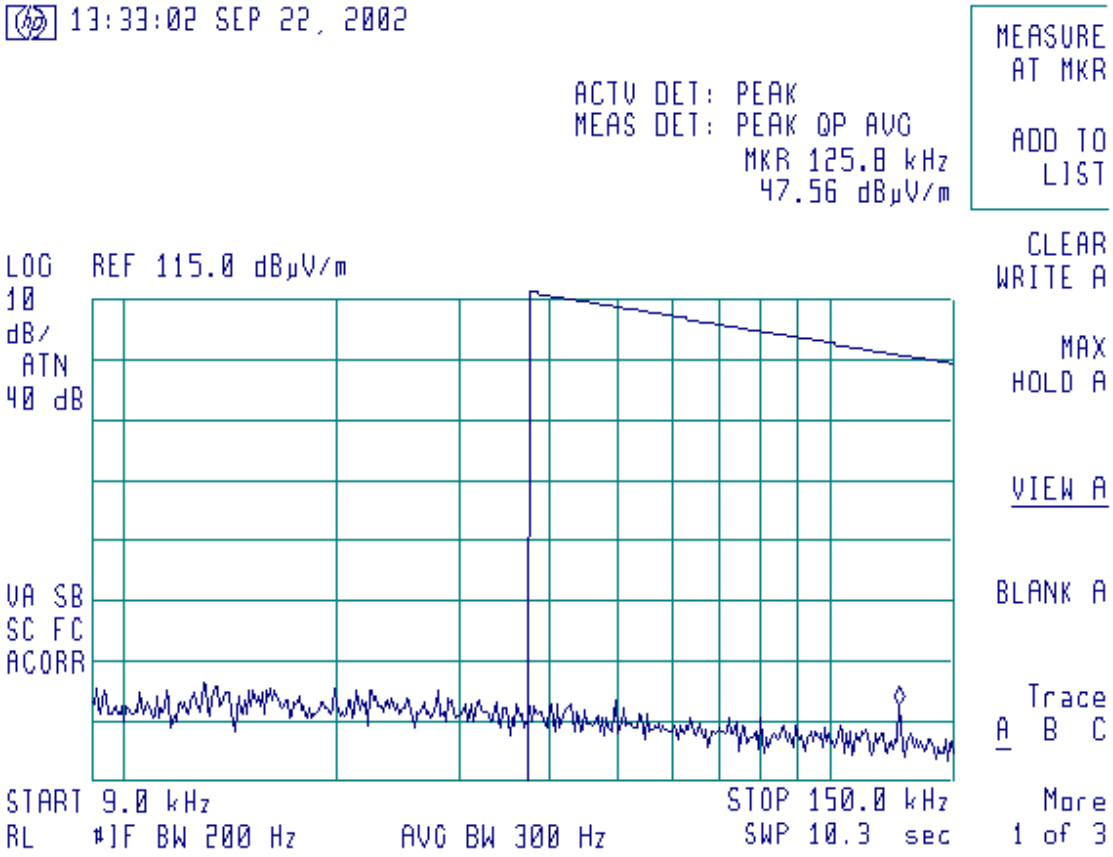
Appendix A Plots

Plot A1
Field strength of fundamental test result, 125 kHz carrier



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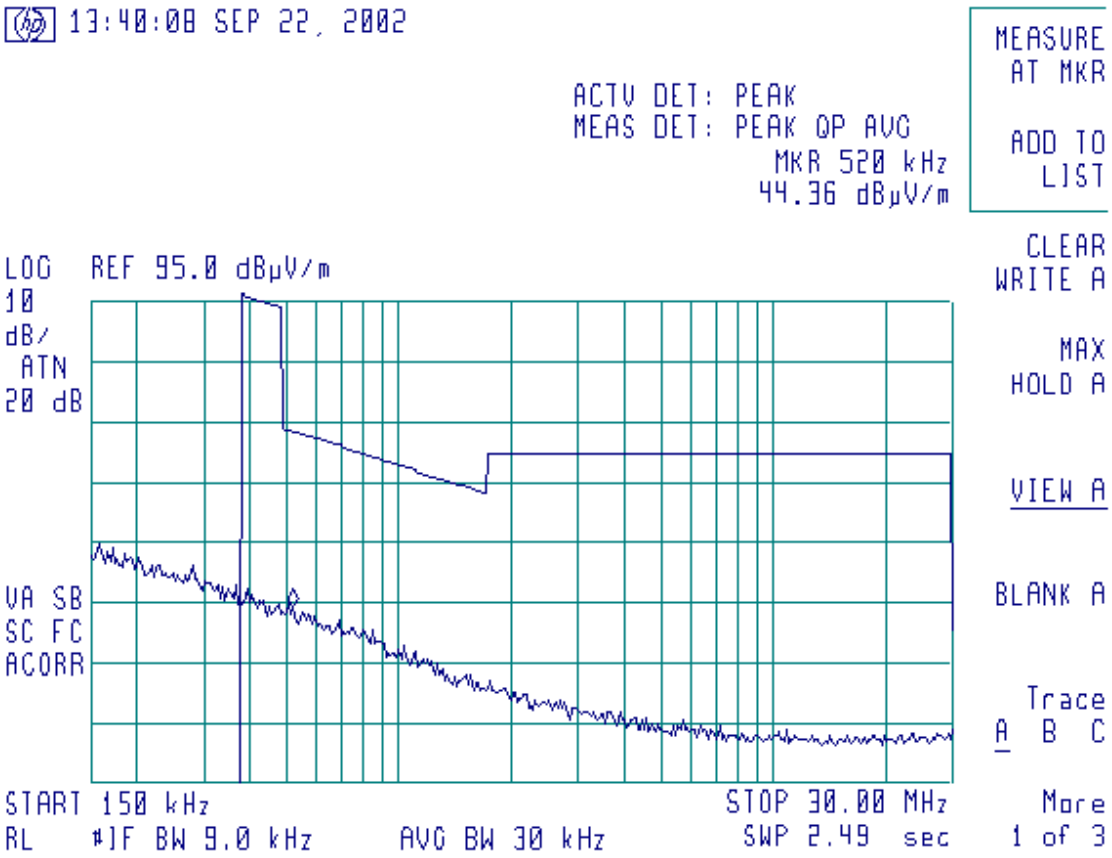
Plot A2
Field strength of emission test results



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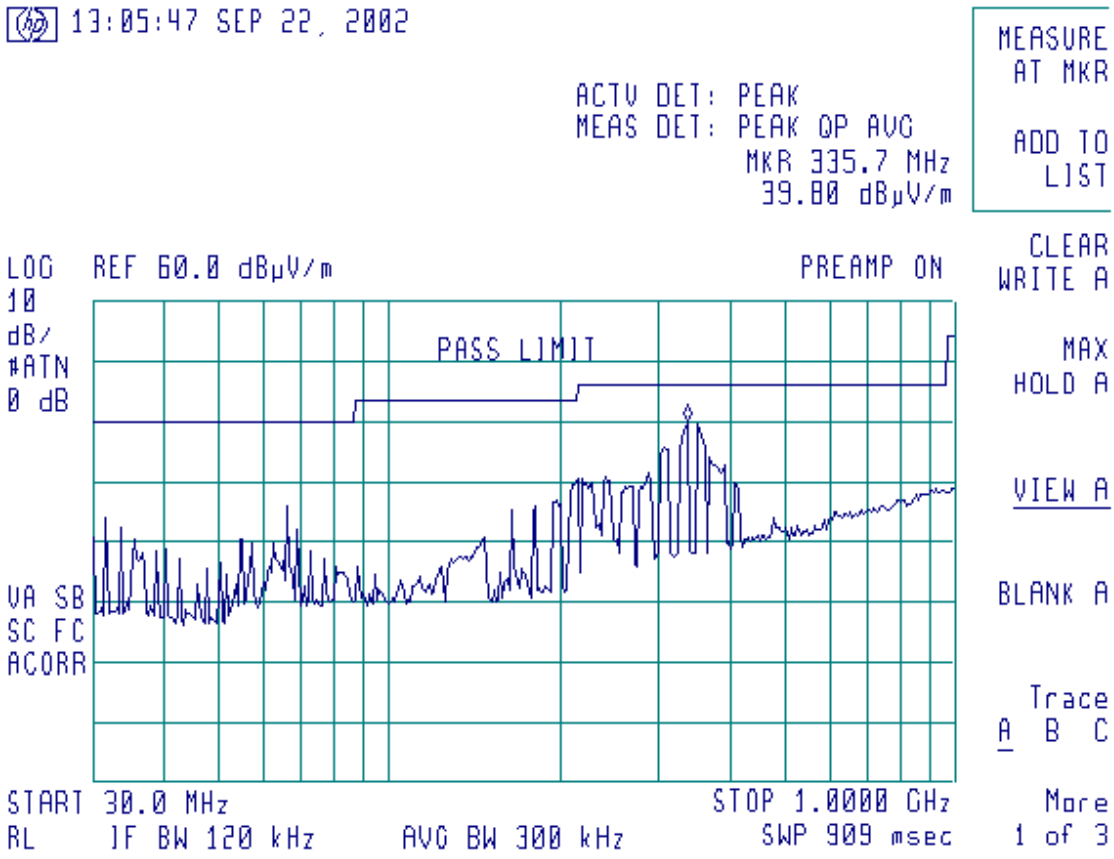
Plot A3
Unintentional radiated emissions test results

FREQUENCY RANGE: 30 – 1000 MHz



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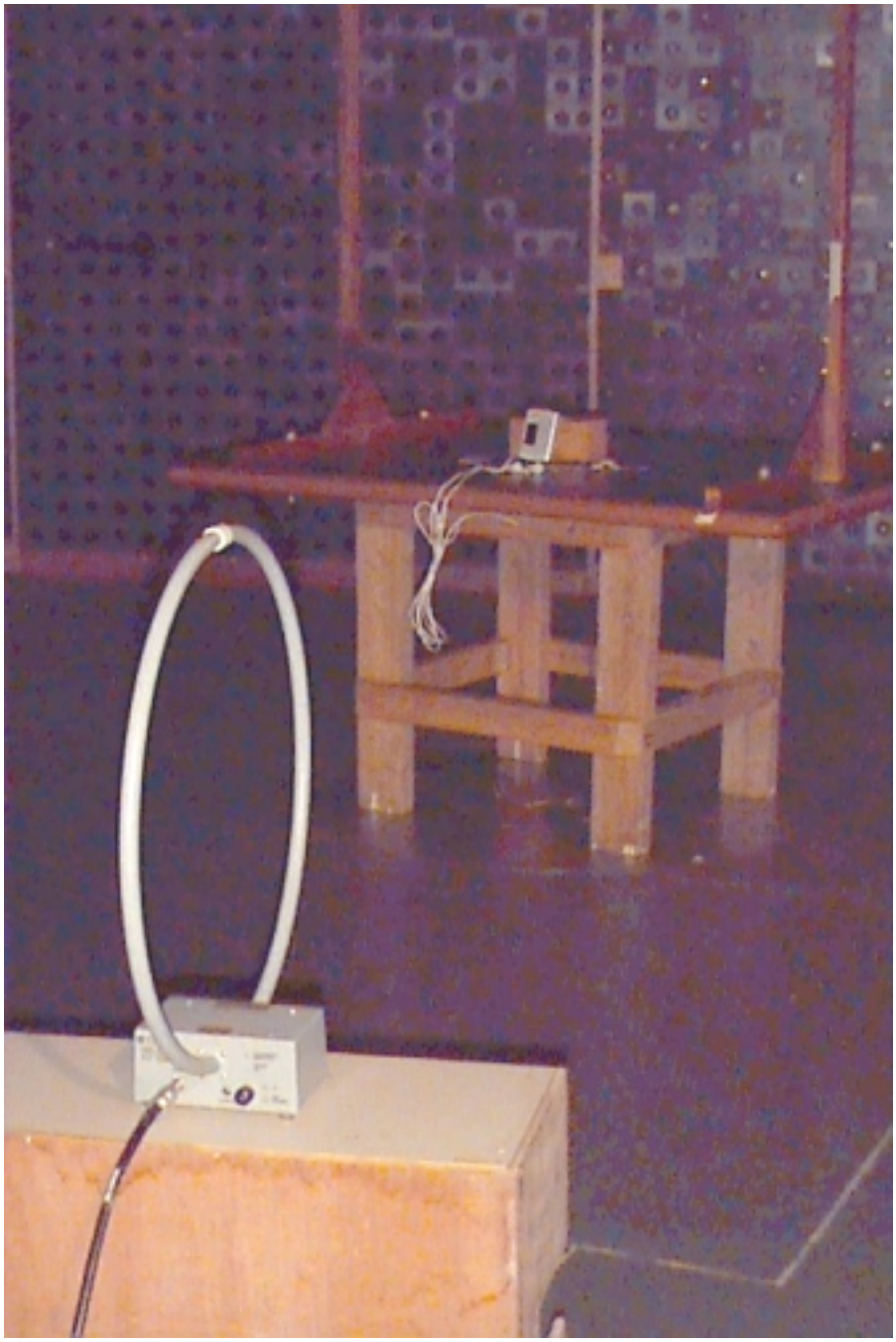
Appendix B Test setup photographs

Photograph 1 Radiated emission measurements test setup with loop antenna, 9 kHz – 30 MHz frequency range, anechoic chamber method



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Photograph 2 Radiated emission measurements test setup with biconilog antenna, 30 MHz – 1000 MHz frequency range, anechoic chamber method

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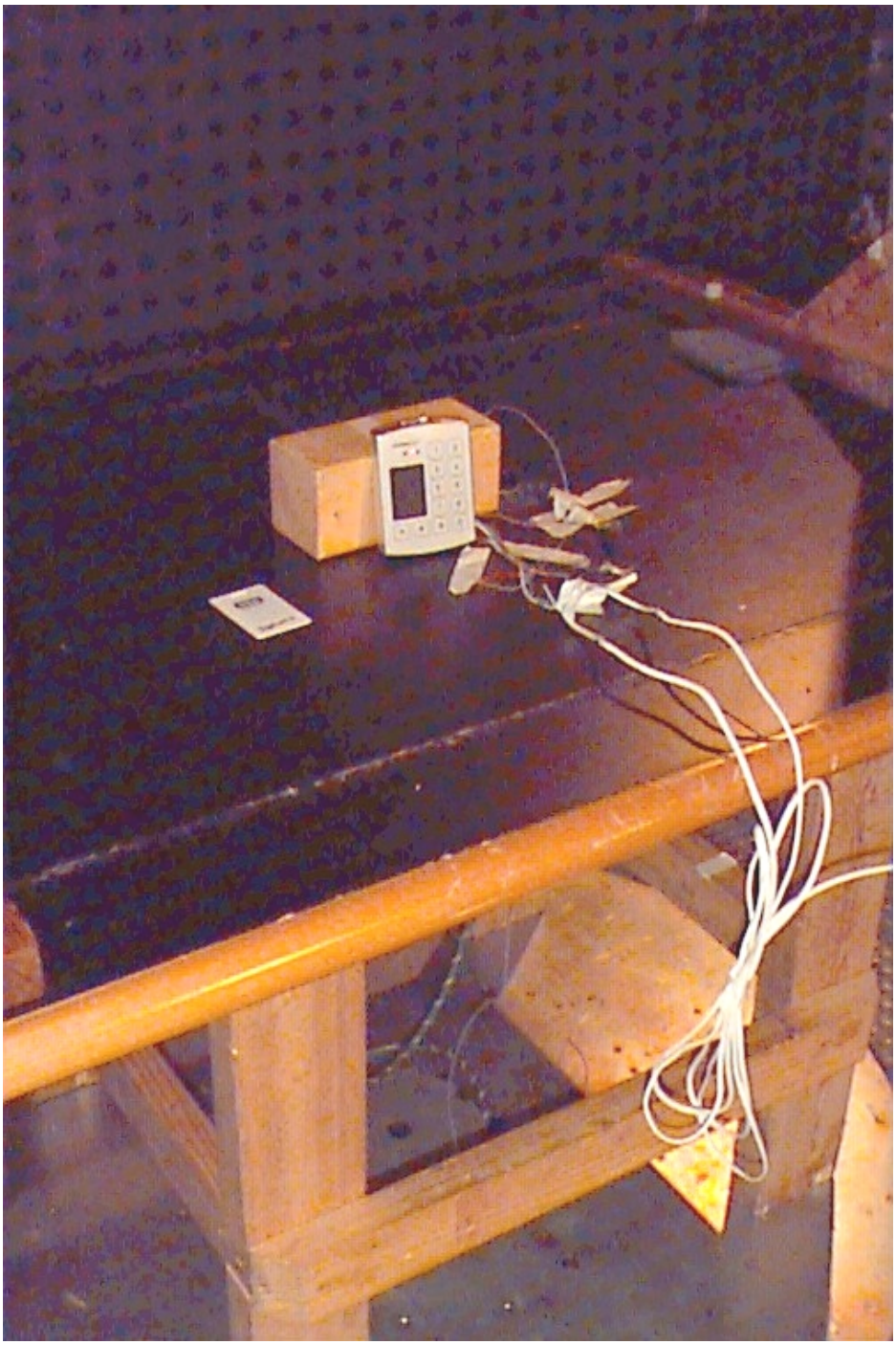
Photograph 3 Radiated emission measurements test setup, EUT view



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Appendix C Test equipment used for tests

HL Serial No.	Description	Manufacturer information			Due Calibr. Month/Year
		Name	Model No.	Serial No.	
0446	Active loop antenna 10 kHz-30 MHz	Electro-Mechanics	6502	2857	11/02
0465	Anechoic chamber 9 (L) x 6.5 (W) x 5.5 (H) m	Hermon Labs	AC-1	023	11/02
0521	Spectrum analyzer with RF filter section (EMI receiver 9 kHz - 6.5 GHz)	Hewlett Packard	8546A	0319	9/03
0589	Cable coaxial, GORE A2POL118.2, 3m	Hermon Labs	GORE-3	589	11/02
0604	Antenna biconilog log-periodic/T Bow-Tie, 26 - 2000 MHz	EMCO	3141	9611-1011	1/03
1004	Cable, coaxial ANDREW PSWJ4, 6 m	Hermon Labs	ANDREW-6	163	12/02
2009	Cable RF, 8 m	Alpha Wire	RG-214	C-56	12/02

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Appendix D General information

Test facility description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private EMC, Safety 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) and by Industry Canada for electromagnetic emissions (file numbers IC 2186-1 for OATS and IC 2186-2 for anechoic chamber), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, C-845 for conducted emissions site), assessed by TNO Certification EP&S (Netherlands) for a number of EMC, Telecommunications, Safety standards, and by AMTAC (UK) for safety of Medical Devices. 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).

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Person for contact: Mr. Alex Usoskin, QA manager.

Abbreviations and acronyms

The following abbreviations and acronyms are applicable to this test report:

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
EMC	electromagnetic compatibility
EUT	equipment under test
GHz	gigahertz
H	height
Hz	hertz
kHz	kilohertz
kV	kilovolt
L	length
m	meter
MHz	megahertz
NA	not applicable
QP	quasi-peak
RF	radio frequency
RE	radiated emission
rms	root mean square
s	second
V	volt
W	width

Specification references

47CFR part 15: 2001	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: 1992	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.

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FCC Equipment codes and descriptions

CYY	Communications Receiver used w/ P.15 transmitter
DCD	Part 15 Low Power transmitter Below 1705 kHz
DSC	Part 15 Security/Remote Control Transmitter
DSR	Part 15 Remote Control/Security Device Transceiver
DSS	Part 15 Spread Spectrum Transmitter
DXX	Part 15 Low Power Communication Device Transmitter
EAV	Part 15 Automatic Vehicle Identification System
ETB	Part 15 Cordless Telephone Base Transceiver
ETR	Part 15 Cordless Telephone Remote Transceiver
ETS	Part 15 Cordless telephone system
FAP	Part 15 Anti-Pilferage Device
FDS	Part 15 Field Disturbance Sensor
GAT	Part 15 Auditory Assistance Device (Transmitter)
HID	Part 15 TV Interface Device
JBC	Part 15 Class B Computing Device/ Personal Computer
JBP	Part 15 Class B Computing Device Peripheral
PUB	Part 15 Unlicensed PCS base station
PUE	Part 15 Unlicensed PCS portable Tx held to ear
PUF	Part 15 Unlicensed PCS portable Tx held to face
PUT	Part 15 Unlicensed PCS portable Tx worn on body

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Appendix E Test equipment correction factors

Antenna Factor
Active Loop Antenna
Model 6502
S/N 2857

Frequency, MHz	Antenna Factor, dB
0.009	-32.8
0.010	-33.8
0.020	-38.3
0.050	-41.1
0.075	-41.3
0.100	-41.6
0.150	-41.7
0.250	-41.6
0.500	-41.8
0.750	-41.9
1.000	-41.4
2.000	-41.5
3.000	-41.4
4.000	-41.4
5.000	-41.5
10.000	-41.9
15.000	-41.9
20.000	-42.2
25.000	-42.8
30.000	-44.0

Antenna factor is to be added to receiver meter reading in dB(μV) to convert to field intensity in dB(μV)/meter

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Antenna Factor
Biconilog Antenna EMCO Model 3141
Ser.No.1011

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

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

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Cable Coaxial, GORE A2P01POL118, 2.3 m, model:GORE-3, s/n 176 (HL 0589)
+ Cable Coaxial, ANDREW PSWJ4, 6m, model: ANDREW-6, s/n 163 (HL 1004)
Calibration data

No.	Parameter	SET, MHz	Measured, dB	Deviation, dB	Tolerance (Specification), dB	Meas. Uncert., dB	Notes
1	Insertion Loss	30	0.33	-	≤ 6.5	±0.12	
2		50	0.40	-			
3		100	0.57	-			
4		300	0.97	-			
5		500	1.25	-			
6		800	1.59	-			
7		1000	1.81	-			
8		1200	1.97	-			
9		1400	2.15	-			
10		1600	2.28	-			
11		1800	2.43	-			
12		2000	2.61	-			
13		2200	2.75	-			
14		2400	2.89	-			
15		2600	2.97	-			
16	Insertion Loss	2800	3.21	-	≤ 6.5	±0.12	
17		3000	3.32	-			
18		3300	3.47	-			
19		3600	3.62	-			
20		3900	3.84	-			
21		4200	3.92	-		±0.17	
22		4500	4.07	-			
23		4800	4.36	-			
24		5100	4.62	-			
25		5400	4.78	-			
26		5700	5.16	-			
27		6000	5.67	-			
28		6500	5.99	-			

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Cable RF, 8 m, model:RG-214, s/n C-56 (HL 2009)
Calibration data

No.	Parameter	SET, MHz	Measured, dB	Deviation	Tolerance (Specification)	Meas. Uncert., dB	Notes
1	Insertion Loss	1	0.10	NA	NA	±0.12	
2		10	0.14				
3		30	0.25				
4		50	0.34				
5		100	0.53				
6		300	0.99				
7		500	1.31				
8		800	1.73				
9		1000	1.98				
10		1100	2.11				
11		1200	2.21				
12		1300	2.35				
13		1400	2.46				
14		1500	2.55				
15		1600	2.68				
16		1700	2.78				
17		1800	2.88				
18		1900	2.98				
19		2000	3.09				