



Test Report No.8812365517 Rev.2

Applicant: ElmoTech Ltd.

Equipment Under Test:

Alcohol Monitoring Receiver

Model: MEMS 3000 GSM

From:

The Standards Institution of Israel

Industry Division

Electronics & Telematics Laboratory

EMC Branch



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Title: Test on Alcohol Monitoring Receiver

Model: MEMS 3000 GSM

Applicant:	ElmoTech Ltd.
Address:	2 Habarzel Street, POB 13236, Tel-Aviv, Israel
Sample for test selected by:	The customer
The date of tests:	2 & 26/11/2008

Description of Equipment

Under Test (EUT):	Alcohol Monitoring Receiver
Model:	MEMS 3000 GSM
Manufactured by:	ElmoTech Ltd.

Reference Documents:

- ❖ CFR 47 FCC: "Rules and Regulations":
Part 15. "Radio frequency devices",
Subpart B: Unintentional radiators (2007).

Test Results:

The EUT was found to be in compliance with the requirements of the standard FCC Part 15 Subpart B Class B (sections 15.101 and 15.109).

This Test Report contains 20 pages and may be used only in full.	This Test Report applies only to the specimen tested and may not be applied to other specimens of the same product.
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1. EUT Description and operation

Note: All the information below was supplied by the customer.

1.1. General description:

The Equipment Under Test (hereinafter: EUT) is a Alcohol Monitoring Receiver

The MEMS 3000 GSM is an electronic monitoring device that is designed for two purposes:

- Alcohol breath testing
- Offender presence monitoring

The MEMS 3000 GSM comprises a 318 MHz RF receiver, cellular modem, electro-chemical Breath Alcohol Tester (BAT) and a camera.

The offender monitored by the system is fitted with a bracelet transmitter that is received by the MEMS 3000 GSM. Violations to the offender's curfew schedule generate events that are uploaded to the central monitoring station via the cellular network.

Additionally, the offender is required to perform periodic alcohol breath tests. During the test, the offender is photographed and the image is transferred to the monitoring station along with the test results in order to verify the identity of the test subject.

EUT environmental conditions (in normal operation mode to give the confidence of compliance for the affected technical requirements):

Power supply: 12VDC.

The EUT is supplied through external AC / DC Adapter (hereinafter: PA): 100-240 VAC / 12 VDC and includes a 7.2V 4Ah NiMH backup battery pack.

Temp.: [5 - 40°] C.

Humidity: up to 93 %.RH Max.

The EUT dimensions: 28 x 28 x 24 cm approx.

The EUT block diagram is shown in Figure 1.

The EUT views can be found in Appendix 4.

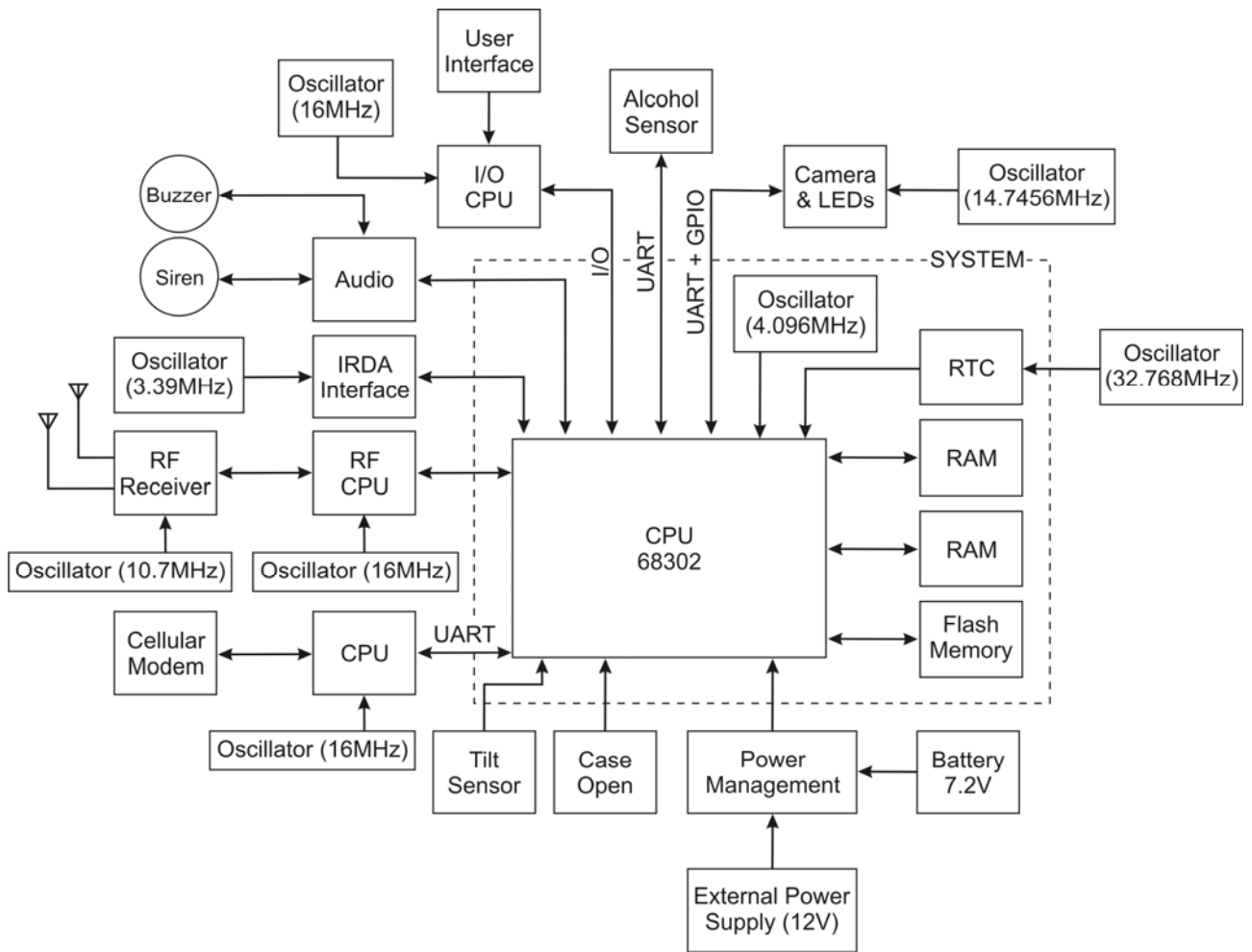


Figure 1. EUT block diagram

Note: All description in clauses below is provided by the manufacturer.

1.2. EUT's sub-assemblies list:

The EUT's sub-assemblies list is detailed in Table 1.

Table 1. Sub-assemblies list

Description (function)	Manufacturer	Model
Alcohol Monitoring Receiver includes:	ElmoTech Ltd.	MEMS 3000 GSM
Main Board	ElmoTech	CPU VBR 1.3
Cellular Modem card	ElmoTech	ADP 3Modems 1.4
Alcohol Sensor	ACS Corp.	BTI2 1.2
Digital Camera	ElmoTech	DIG CAM 1.1
Touch Panel	ElmoTech	KEY_B_V.1.2
Cellular Antenna	Galtronics	609903
Stern Antenna 318MHz	ElmoTech	30130102
Battery 7.2V 4Ah NIMH	GP	31130121
LEDs	ElmoTech	V1.5 LF 29011565 REV. - B00
RF Antenna 318MHz	Galtronics	30120201
RF Module	ElmoTech	RCV-1.2
External AC / DC Power Adaptor (PA) IN: 100 – 240 VAC, 1 A OUT: 12 VDC, 4 A	Adapter Tech	STD-1204, S/N 0729

1.3. EUT connectors list:

A list of the EUT connectors / cables is detailed in Table 2.

Table 2. Connectors / cables list

No.	Port description	Connector type	Type of Cable	Length (m)	No. of identical connectors
1	12 VDC power inlet	DC Jack	Unshielded DC power cord	2	1
2	120 VAC mains	Standard	Unshielded AC power cord	1.5	1

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Note: All description in clauses below is provided by the manufacturer.

1.4. EUT setup and operation:

The EUT was setup as shown in Figure # 2.

The EUT was placed on the table and was powered via external PA from 120 VAC mains.

The EUT was operated in Normal operation mode.

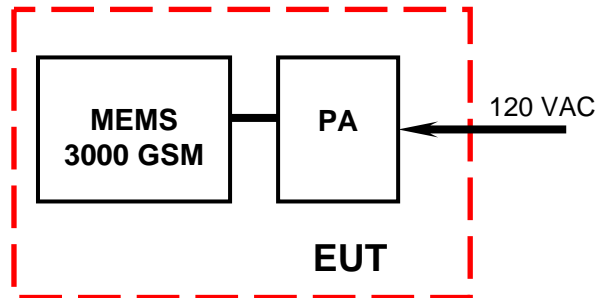


Figure # 2. Radiated and Conducted Emission test setup



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2. Test specification, Methods and Procedures

- ❖ CFR 47 FCC: "Rules and Regulations":
Part 15. "Radio frequency devices",
Subpart B: Unintentional radiators (2007).
- ❖ ANSI C63.4:2003: "American National Standard for Method of Measurement of
Radio Noise Emissions from Low Voltage Electrical and
Electronic Equipment in the Range 9 kHz to 40 GHz".

3. Additional deviations or exclusions from the test specifications

Not applicable.

4. Measurements, examinations and derived results

4.1. Location of the Test Site:

The Conducted Emission tests and the preliminary Radiated Tests were carried out in the EMC laboratory of the Standards Institution of Israel in Tel-Aviv.

The final Radiated Emission tests were conducted in an Open Area Test Site located at Kibbutz Native Halamed Hai in Emek HaEla, Israel.

4.2. Test condition:

Temperature: 21°C. Humidity: 51 %. Atmospheric pressure: 1010 mbar.

4.3. Emission tests:

- * For both Radiated and Conducted measurements, initial scans were made using a peak detector but still using the appropriate CISPR 16 (Quasi-Peak) detector IF bandwidth.
- * For conducted emissions, was set a tolerance limit of 6 dB below the specification limit. Levels above the tolerance limit were retested using a Quasi-Peak detector or an Average detector.
- * For Radiated Emissions, a tolerance limit of 10 dB below the specification limit was set. Levels above the tolerance limit were retested using the Quasi-Peak detector.
- * Unless otherwise stated, all the plots shown in Clause 4.5.4 are from scans where a peak detector was used.

4.4. Initial visual check and functional test:

An initial visual check was performed before testing.

No external damages were found.

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4.5. Conducted emission tests:

4.5.1. General:

The test was performed according to the requirements of standard FCC Part 15 Subpart B section 15.107.

4.5.2. Test Configuration:

The EUT was configured as described in clause 1.4.

The EUT was placed on a non-metallic table in a shielded chamber at 80 cm height above the shielded chamber floor and at 40 cm distance from the reference vertical ground plane.

4.5.3. Test procedure:

The EUT was operated according to clause 1.4.

An initial scan was performed. The final measurements were performed for emission that exceeded the tolerance limit.

Test equipment (EMI receiver) setup was as follow:

Initial scan:

Detector type	Peak
Mode	Max hold
Bandwidth	9 kHz
Step size	Continuous sweep
Sweep time	>100 msec

Measurements:

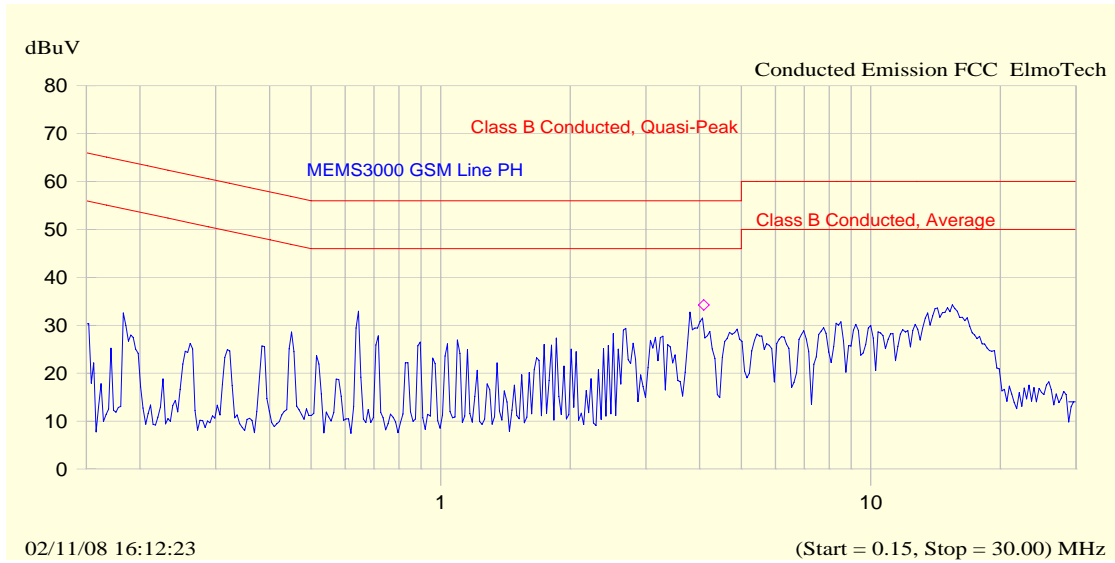
Detector type	Quasi-peak (CISPR)
Bandwidth	9 kHz
Observation	>15 seconds

4.5.4. Test results:

All received conducted emissions measured at 120 VAC mains to PA with QP detector were found at least 10 dB below FCC part 15 Subpart B Class B AVG limits.

Test Results and plots are shown below.

**Scans of conducted emission at 120 VAC mains to PA
Specified limits: Specified limits: FCC Part 15 Subpart B Class B**



Frequency MHz	Peak meas. dBuV	QP meas. dBuV	Avg Limit dBuV	QP-Avg Limit dB
0.650	33.1	32.1	46.0	-13.9
0.714	32.5	27.6	46.0	-18.4
3.961	34.4	32.3	46.0	-13.7
4.092	34.2	32.1	46.0	-13.9
4.611	33.6	32.5	46.0	-13.5
4.741	32.4	30.6	46.0	-15.4

Plot # 1. Tested line: PHASE



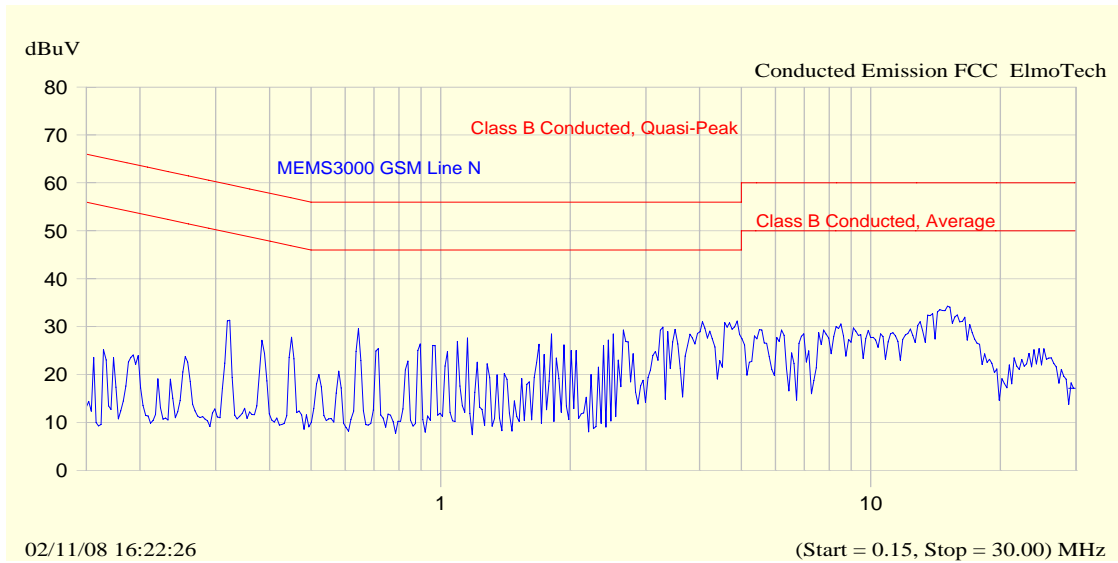
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**Scans of conducted emission at 120 VAC mains to PA
Specified limits: Specified limits: FCC Part 15 Subpart B Class B**



Frequency MHz	Peak meas. dBuV	QP meas. dBuV	Avg Limit dBuV	QP-Avg Limit dB
0.650	33.2	32.2	46.0	-13.8
1.105	28.5	27.3	46.0	-18.7
3.961	33.9	30.7	46.0	-15.3
4.092	31.4	30.8	46.0	-15.2
4.612	32.9	30.8	46.0	-15.2
15.015	35.0	32.7	50.0	-17.3

Plot # 2. Tested line: Neutral



4.6. Radiated emission test:

4.6.1. General:

The test was performed according to the requirements of standard FCC Part 15 Subpart B section 15.109.

4.6.2. Preliminary radiated emission tests:

Preliminary radiated measurements were performed in a semi-anechoic chamber at 3 meters distance.

The EUT was setup in its typical configurations and operated as detailed in clause 1.4.

The frequency spectrum was monitored.

The EUT configuration, the cable configuration and the operation mode that produced the maximum level of emission, were documented.

A list of frequencies to be tested was prepared.

4.6.3. Final measurements:

The final radiated measurements were performed at the Open Area Test Site.

The EUT was configured as described in clause 1.4. The EUT was arranged on a non-metallic table of 0.8 m height, placed on the turntable.

The photos of the test layout are presented in Appendix 4.

The frequency range from 30 MHz to 1 GHz was investigated.

The Bilog antenna 30 MHz-2 GHz was used.

The measurements were performed at each frequency at which the signal was 10 dB below the limit or less.

The level were maximized by initially rotating turntable through 360°, varying the antenna height between 1 m and 4 m, rerouting EUT cables and changing antenna polarization from vertical to horizontal. The measuring equipment settings were:

Initial scan:

Detector type	Peak
Mode	Max hold
Bandwidth	120 kHz
Step size	Continuous sweep
Sweep time	>1 seconds/MHz

Measurements:

Detector type	Quasi-peak (CISPR)
Bandwidth	120 kHz
Measurement time	20 seconds/MHz
Observation	>15 seconds

(For antenna and cable factors – see Appendix 3). Unless otherwise stated, the EUT was operated in the mode described in clause 1.4.

4.6.4. Radiated emission test results:

Test results are presented in Table 3 below.

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Table 3. Radiated emission test results
Specified limits: FCC Part 15 Subpart B Class B

Frequency (MHz)	Antenna Polariz.	Antenna Height (m)	Turn- table Angle (°)	Emission Level (see Note 2) (dB μ V/m)	Limit @3 m (dB μ V/m)	Margin (dB)	Results
81.9	V	1.00	49	28.1	40.0	11.9	Complies
155.7	V	1.00	79	26.9	43.5	16.6	Complies
163.8	V	1.00	110	25.8	43.5	17.7	Complies
311.3	H	3.30	355	29.5	46.0	16.5	Complies
319.5	H	3.30	5	31.2	46.0	14.8	Complies
364.0	H	2.70	287	31.9	46.0	14.1	Complies

Note 1: Emission level = E Reading (dB μ V) + Cable loss (dB) + Antenna Factor (dB/m) For Cable Loss and Antenna Factor refer to Appendix 2.

Note 2: The measurements were performed at 10 m distance and the results were extrapolated to 3 m distance.

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5. Compliance with specification

Test	Standard	Class/ Severity level	Test result
Conducted emission on mains terminal Frequency range: 150 kHz - 30 MHz	FCC Part 15 Subpart B section 15.107	Class B at 120 VAC mains to PA	Complies
Radiated emission Frequency range: 30 MHz – 1 GHz	FCC Part 15 Subpart B section 15.109	Class B	Complies

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6. Appendix 1: Test equipment used

All measurements equipment is on SII calibration schedule with a recalibration interval not exceeding once a year.

FCC Part 15 Subpart B

Instrument	Manufacturer	Model	SII No.	Last calibration date	Next calibration date
EMI Receiver	HP	8546A+85460A	4068	04/08	04/09
EMI Analyzer	HP	E7405A	4944	11/08	11/09
LISN 9 kHz – 30 MHz	FCC	LISN- 50/250-32-4-16	5023	09/08	09/09
Transient limiter 0.009-200 MHz	Agilent Techn	11947A	31074A3105	06/08	06/09
Biconilog Antenna 30 – 2000 MHz	Schaffner	CBL6112D	5866	09/08	09/09
Antenna Mast	R&S	HCM	3379	N/A	N/A
Metallic turntable	R&S	HCT12	3378	N/A	N/A
Positioning controller	R&S	HCC	3378	N/A	N/A
Impedance stabilization network	Schaffner	ISN T400	5375	06/08	06/09
RF current probe 0.01-500 MHz	Fischer Custom	F-52	53925	07/08	07/09
Common Mode Absorbing Device 30 MHz - 1000 MHz	TESEQ GmbH	CMAD 10	562978 / 562979	N/A	N/A

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7. Appendix 2: Measurement uncertainty

The test equipment has been calibrated according to its recommended procedures and is within the manufacturer's published limit of error.

The laboratory calibrates its standards by a third party (traceable to NIST, USA) on a regular basis according to equipment manufacturer requirements.

Test description	Expanded uncertainty
Conducted emissions	uncertainty at 95% confidence from 150 kHz to 30 MHz: 2 Uc (P) = ± 2.8 dB
Radiated emissions in the open field test site at 10 m measuring distance at 3 m measuring distance	uncertainty at 95% confidence Biconilog Antenna 2 Uc (E) = ± 4.18 dB 2 Uc (E) = ± 4.32 dB

8. Appendix 3: Antenna Factor and Cable Loss

Cable Loss (10m cable + Mast)

Point	Frequency (MHz)	Cable Loss (dB)	Point	Frequency (MHz)	Cable Loss (dB)
1	30	0.53	21	1000	3.68
2	50	0.75	22	1100	3.82
3	100	1.08	23	1200	4.07
4	150	1.39	24	1300	4.24
5	200	1.61	25	1400	4.43
6	250	1.752	26	1500	4.6
7	300	2.00	27	1600	4.7
8	350	2.15	28	1700	4.85
9	400	2.26	29	1800	4.98
10	450	2.383	30	1900	5.19
11	500	2.52	31	2000	5.34
12	550	2.606	32	2100	5.51
13	600	2.75	33	2200	5.69
14	650	2.856	34	2300	5.89
15	700	3.06	35	2400	6.07
16	750	3.201	36	2500	6.22
17	800	3.27	37	2600	6.28
18	850	3.38	38	2700	6.41
19	900	3.46	39	2800	6.53
20	950	3.55	40	2900	6.84



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Antenna Factor

For Bilog Antenna, Model Number: CBL 6112D, S/N: 23181

No.	f / MHz)	AF / dB/m	f / MHz)	AF / dB/m	f / MHz)	AF / dB/m	f / MHz)	AF / dB/m
1	30	17.90	170	9.40	530	17.70	1040	22.20
2	32	16.70	175	9.00	540	18.25	1060	22.50
3	34	15.55	180	8.50	550	18.60	1080	22.50
4	36	14.35	185	8.45	560	14.45	1100	22.40
5	38	13.30	190	8.60	570	18.40	1120	22.60
6	40	12.20	195	8.85	580	18.50	1140	22.45
7	42	11.05	200	8.95	590	18.60	1160	22.50
8	44	9.95	205	8.80	600	18.60	1180	22.40
9	46	8.90	210	8.50	610	18.80	1200	22.80
10	48	8.05	215	8.20	620	18.99	1220	22.95
11	50	7.30	220	8.50	630	19.05	1240	23.10
12	52	6.80	225	9.00	640	19.23	1260	23.40
13	54	6.45	230	9.65	650	19.10	1280	23.35
14	56	6.00	235	10.30	660	19.13	1300	23.62
15	58	5.70	240	11.00	670	19.04	1320	23.64
16	60	5.45	245	11.60	680	19.00	1340	23.86
17	62	5.30	250	12.00	690	19.17	1360	23.95
18	64	5.20	255	12.45	700	19.28	1380	23.90
19	66	5.30	260	12.85	710	19.25	1400	24.45
20	68	5.30	265	12.50	720	19.45	1420	24.74
21	70	5.35	270	12.45	730	19.75	1440	24.93
22	72	5.50	275	12.40	740	19.95	1460	25.03
23	74	5.80	280	12.55	750	20.07	1480	25.45
24	76	6.00	285	12.65	760	19.85	1500	25.30
25	78	6.60	290	12.75	770	19.80	1520	25.25
26	80	6.70	295	12.95	780	19.85	1540	25.36
27	82	7.15	300	13.00	790	19.95	1560	25.58
28	84	7.60	310	13.35	800	20.05	1580	25.50
29	86	8.10	320	13.75	810	20.10	1600	25.65
30	88	8.50	330	13.85	820	20.35	1620	25.60
31	90	8.90	340	14.10	830	20.40	1640	25.70
32	92	9.20	350	14.50	840	20.35	1660	25.83
33	94	9.75	360	14.70	850	20.46	1680	25.97
34	96	9.95	370	14.90	860	20.39	1700	26.10
35	98	10.20	380	15.10	870	20.29	1720	26.25
36	100	10.50	390	15.45	880	20.24	1740	26.04
37	105	11.25	400	16.00	890	20.35	1760	26.14
38	110	11.70	410	16.40	900	20.55	1780	26.20
39	115	11.70	420	16.70	910	20.45	1800	26.40
40	120	11.80	430	16.35	920	20.60	1820	26.64
41	125	11.80	440	16.30	930	20.60	1840	26.86
42	130	11.70	450	16.30	940	20.66	1860	27.12
43	135	11.35	460	16.70	950	20.88	1880	27.00
44	140	10.95	470	17.05	960	21.11	1900	27.25
45	145	10.35	480	17.20	970	20.93	1920	27.36
46	150	10.05	490	17.30	980	21.03	1940	27.68
47	155	9.70	500	17.40	990	21.05	1960	27.10
48	160	9.70	510	17.50	1000	21.10	1980	27.06
49	165	9.45	520	17.60	1020	21.40	2000	27.25

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9. Appendix 4: Test configuration photographs:

This appendix contains the following illustrations (photographs):



Photo # 1.
Radiated emission test setup
Front view

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Photo # 2.
Radiated emission test setup
Rear view

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Photo # 3.
Radiated emission test setup
EUT Front / Overall view

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Photo # 4.
EUT Rear view