Dipole antenna for SA-PCD adapter

SUHNER
DIPOLE ANTENNA 2.45 GHZ FOR WIRELESS COMMUNICATION

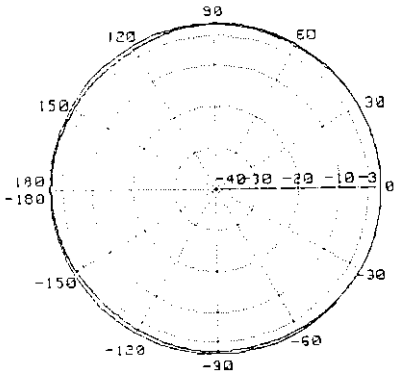
Type No. 9090.16.0001

Technical Data

Electrical properties	
Frequency range	2.4 – 2.5 GHz
Impedance	50 Ω
VSWR	≤ 2.0
Polarisation	vertical
Gain	1.8 dBi
Pattern	Omni
Permitted power on entrance	1 W (CW) at 25 °C
Standard connector	right angle MCX-male

Mechanical properties	
Length	79 mm
Connector case	ABS
Antenna case	ELVAX 550
Color	Pantone cool grey 11c
Operating temperature range	– 20 °C to + 65 °C

Radiation Pattern



horizontal

Data Sheet 02.95/Edition 1, 231GHA/st

HUBER+SUHNER AG
Radio Transmission Department
CH-9100 Herisau
☎ 071 53 41 11
FAX 071 53 45 90
Tx 88 27 29

—— Half-wave monopole antenna (integral) for SA-PCR adapter

GALTRONICS LTD.

REPORT FORM

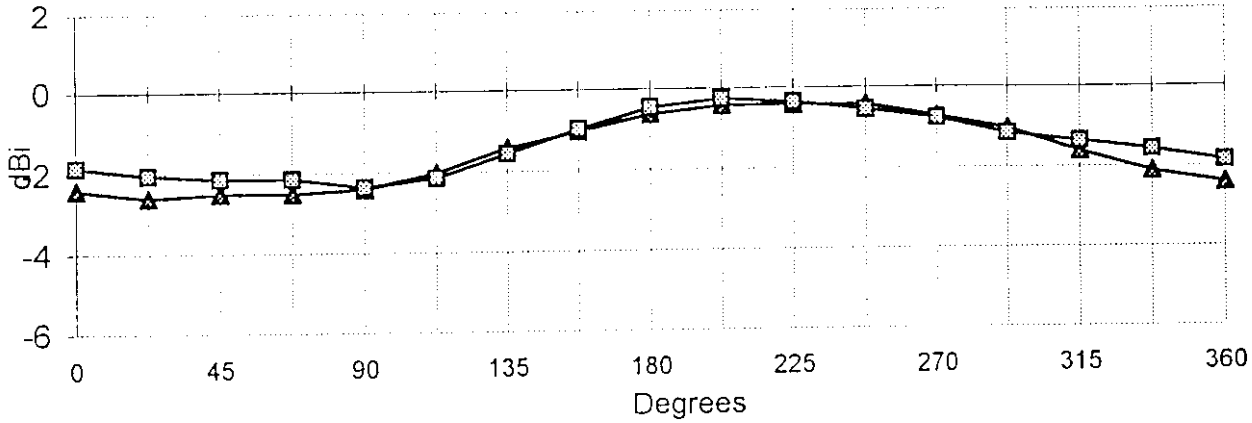
PART No.: 02-4368-73-416

PROJECT No.: NPR 041600

TITLE: GAIN TEST 07.05.98

Horizontal RADIATION PATTERN (Disket in horizontal position)

DUT: Antenna BreezeCom, Sample #2 (w/o plating) UP pos.

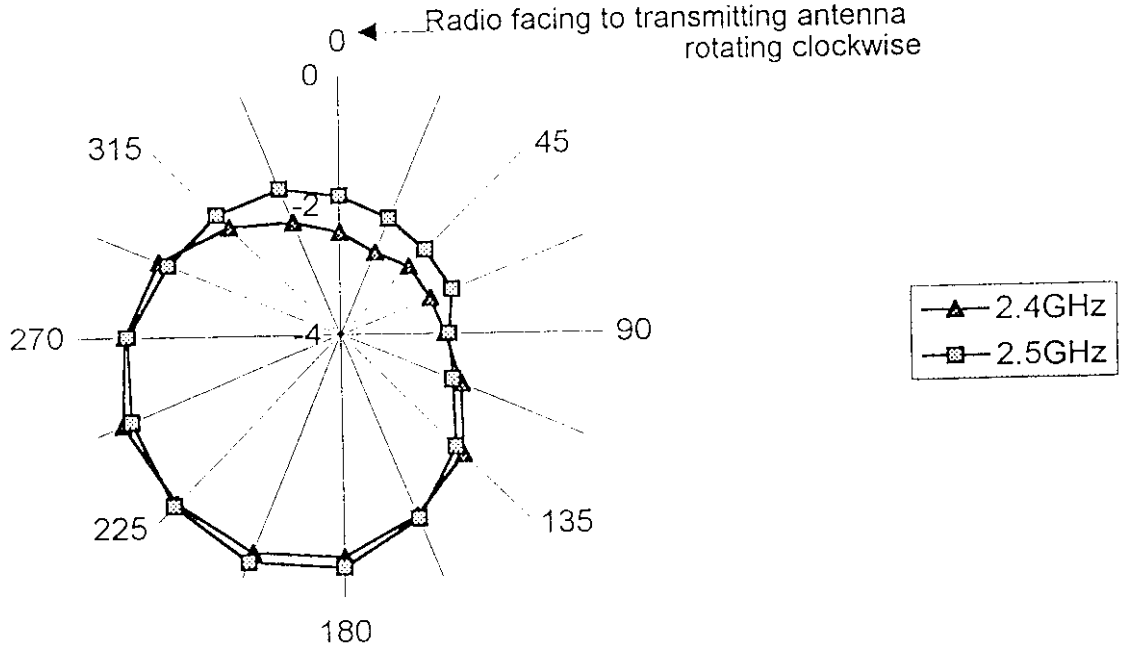


Test radio: PCMICA

Test frequency:

	Cor. factor	Best (dBi)	Avg (dBi):
2.4GHz	16.78	**-0.42**	**-1.44**
2.5GHz	17.04	**-0.26**	**-1.30**

:Measurement system calibrated by Horn # 19231 IL



index	0	3	6	9	12	15	18	21	24	27	30	33	36
40	27	30	33	36	39	42	45	48	51	54	57	60	63
41	16	19	22	25	28	31	34	37	40	43	46	49	52
42	59	62	65	68	71	74	77	80	4	7	10	13	16
43	43	46	49	52	55	58	61	64	67	70	73	76	79
44	76	79	3	6	9	12	15	18	21	24	27	30	33
45	34	37	40	43	46	49	52	55	58	61	64	67	70
46	72	75	78	2	5	8	11	14	17	20	23	26	29
47	11	14	17	20	23	26	29	32	35	38	41	44	47
48	60	63	66	69	72	75	78	2	5	8	11	14	17
49	80	4	7	10	13	16	19	22	25	28	31	34	37
50	47	50	53	56	59	62	65	68	71	74	77	80	4
51	22	25	28	31	34	37	40	43	46	49	52	55	58
52	75	78	2	5	8	11	14	17	20	23	26	29	32
53	66	69	72	75	78	2	5	8	11	14	17	20	23
54	41	44	47	50	53	56	59	62	65	68	71	74	77
55	15	18	21	24	27	30	33	36	39	42	45	48	51
56	35	38	41	44	47	50	53	56	59	62	65	68	71
57	67	70	73	76	79	3	6	9	12	15	18	21	24
58	52	55	58	61	64	67	70	73	76	79	3	6	9
59	58	61	64	67	70	73	76	79	3	6	9	12	15
60	44	47	50	53	56	59	62	65	68	71	74	77	80
61	50	53	56	59	62	65	68	71	74	77	80	4	7
62	17	20	23	26	29	32	35	38	41	44	47	50	53
63	7	10	13	16	19	22	25	28	31	34	37	40	43
64	19	22	25	28	31	34	37	40	43	46	49	52	55
65	8	11	14	17	20	23	26	29	32	35	38	41	44
66	69	72	75	78	2	5	8	11	14	17	20	23	26
67	51	54	57	60	63	66	69	72	75	78	2	5	8
68	42	45	48	51	54	57	60	63	66	69	72	75	78
69	3	6	9	12	15	18	21	24	27	30	33	36	39
70	30	33	36	39	42	45	48	51	54	57	60	63	66
71	57	60	63	66	69	72	75	78	2	5	8	11	14
72	37	40	43	46	49	52	55	58	61	64	67	70	73
73	55	58	61	64	67	70	73	76	79	3	6	9	12
74	26	29	32	35	38	41	44	47	50	53	56	59	62
75	46	49	52	55	58	61	64	67	70	73	76	79	3
76	53	56	59	62	65	68	71	74	77	80	4	7	10
77	40	43	46	49	52	55	58	61	64	67	70	73	76
78	32	35	38	41	44	47	50	53	56	59	62	65	68
79	48	51	54	57	60	63	66	69	72	75	78	2	5

Annex - Hopping Sequences (informative)

The following tables pertain to the hopping sequences for North America and ETSI.

Table B-1, Hopping Sequence Set 1

index	0	3	6	9	12	15	18	21	24	27	30	33	36
1	2	5	8	11	14	17	20	23	26	29	32	35	38
2	25	28	31	34	37	40	43	46	49	52	55	58	61
3	64	67	70	73	76	79	3	6	9	12	15	18	21
4	10	13	16	19	22	25	28	31	34	37	40	43	46
5	45	48	51	54	57	60	63	66	69	72	75	78	2
6	18	21	24	27	30	33	36	39	42	45	48	51	54
7	73	76	79	3	6	9	12	15	18	21	24	27	30
8	49	52	55	58	61	64	67	70	73	76	79	3	6
9	21	24	27	30	33	36	39	42	45	48	51	54	57
10	63	66	69	72	75	78	2	5	8	11	14	17	20
11	78	2	5	8	11	14	17	20	23	26	29	32	35
12	31	34	37	40	43	46	49	52	55	58	61	64	67
13	61	64	67	70	73	76	79	3	6	9	12	15	18
14	24	27	30	33	36	39	42	45	48	51	54	57	60
15	54	57	60	63	66	69	72	75	78	2	5	8	11
16	65	68	71	74	77	80	4	7	10	13	16	19	22
17	28	31	34	37	40	43	46	49	52	55	58	61	64
18	79	3	6	9	12	15	18	21	24	27	30	33	36
19	33	36	39	42	45	48	51	54	57	60	63	66	69
20	4	7	10	13	16	19	22	25	28	31	34	37	40
21	20	23	26	29	32	35	38	41	44	47	50	53	56
22	13	16	19	22	25	28	31	34	37	40	43	46	49
23	38	41	44	47	50	53	56	59	62	65	68	71	74
24	74	77	80	4	7	10	13	16	19	22	25	28	31
25	56	59	62	65	68	71	74	77	80	4	7	10	13
26	71	74	77	80	4	7	10	13	16	19	22	25	28
27	23	26	29	32	35	38	41	44	47	50	53	56	59
28	5	8	11	14	17	20	23	26	29	32	35	38	41
29	39	42	45	48	51	54	57	60	63	66	69	72	75
30	12	15	18	21	24	27	30	33	36	39	42	45	48
31	36	39	42	45	48	51	54	57	60	63	66	69	72
32	68	71	74	77	80	4	7	10	13	16	19	22	25
33	9	12	15	18	21	24	27	30	33	36	39	42	45
34	70	73	76	79	3	6	9	12	15	18	21	24	27
35	77	80	4	7	10	13	16	19	22	25	28	31	34
36	6	9	12	15	18	21	24	27	30	33	36	39	42
37	62	65	68	71	74	77	80	4	7	10	13	16	19
38	29	32	35	38	41	44	47	50	53	56	59	62	65
39	14	17	20	23	26	29	32	35	38	41	44	47	50

index	39	42	45	48	51	54	57	60	63	66	69	72	75
1	41	44	47	50	53	56	59	62	65	68	71	74	77
2	64	67	70	73	76	79	3	6	9	12	15	18	21
3	24	27	30	33	36	39	42	45	48	51	54	57	60
4	49	52	55	58	61	64	67	70	73	76	79	3	6
5	5	8	11	14	17	20	23	26	29	32	35	38	41
6	57	60	63	66	69	72	75	78	2	5	8	11	14
7	33	36	39	42	45	48	51	54	57	60	63	66	69
8	9	12	15	18	21	24	27	30	33	36	39	42	45
9	60	63	66	69	72	75	78	2	5	8	11	14	17
10	23	26	29	32	35	38	41	44	47	50	53	56	59
11	38	41	44	47	50	53	56	59	62	65	68	71	74
12	70	73	76	79	3	6	9	12	15	18	21	24	27
13	21	24	27	30	33	36	39	42	45	48	51	54	57
14	63	66	69	72	75	78	2	5	8	11	14	17	20
15	14	17	20	23	26	29	32	35	38	41	44	47	50
16	25	28	31	34	37	40	43	46	49	52	55	58	61
17	67	70	73	76	79	3	6	9	12	15	18	21	24
18	39	42	45	48	51	54	57	60	63	66	69	72	75
19	72	75	78	2	5	8	11	14	17	20	23	26	29
20	43	46	49	52	55	58	61	64	67	70	73	76	79
21	59	62	65	68	71	74	77	80	4	7	10	13	16
22	52	55	58	61	64	67	70	73	76	79	3	6	9
23	77	80	4	7	10	13	16	19	22	25	28	31	34
24	34	37	40	43	46	49	52	55	58	61	64	67	70
25	16	19	22	25	28	31	34	37	40	43	46	49	52
26	31	34	37	40	43	46	49	52	55	58	61	64	67
27	62	65	68	71	74	77	80	4	7	10	13	16	19
28	44	47	50	53	56	59	62	65	68	71	74	77	80
29	78	2	5	8	11	14	17	20	23	26	29	32	35
30	51	54	57	60	63	66	69	72	75	78	2	5	8
31	75	78	2	5	8	11	14	17	20	23	26	29	32
32	28	31	34	37	40	43	46	49	52	55	58	61	64
33	48	51	54	57	60	63	66	69	72	75	78	2	5
34	30	33	36	39	42	45	48	51	54	57	60	63	66
35	37	40	43	46	49	52	55	58	61	64	67	70	73
36	45	48	51	54	57	60	63	66	69	72	75	78	2
37	22	25	28	31	34	37	40	43	46	49	52	55	58
38	68	71	74	77	80	4	7	10	13	16	19	22	25
39	53	56	59	62	65	68	71	74	77	80	4	7	10

index	39	42	45	48	51	54	57	60	63	66	69	72	75
40	66	69	72	75	78	2	5	8	11	14	17	20	23
41	55	58	61	64	67	70	73	76	79	3	6	9	12
42	19	22	25	28	31	34	37	40	43	46	49	52	55
43	3	6	9	12	15	18	21	24	27	30	33	36	39
44	36	39	42	45	48	51	54	57	60	63	66	69	72
45	73	76	79	3	6	9	12	15	18	21	24	27	30
46	32	35	38	41	44	47	50	53	56	59	62	65	68
47	50	53	56	59	62	65	68	71	74	77	80	4	7
48	20	23	26	29	32	35	38	41	44	47	50	53	56
49	40	43	46	49	52	55	58	61	64	67	70	73	76
50	7	10	13	16	19	22	25	28	31	34	37	40	43
51	61	64	67	70	73	76	79	3	6	9	12	15	18
52	35	38	41	44	47	50	53	56	59	62	65	68	71
53	26	29	32	35	38	41	44	47	50	53	56	59	62
54	80	4	7	10	13	16	19	22	25	28	31	34	37
55	54	57	60	63	66	69	72	75	78	2	5	8	11
56	74	77	80	4	7	10	13	16	19	22	25	28	31
57	27	30	33	36	39	42	45	48	51	54	57	60	63
58	12	15	18	21	24	27	30	33	36	39	42	45	48
59	18	21	24	27	30	33	36	39	42	45	48	51	54
60	4	7	10	13	16	19	22	25	28	31	34	37	40
61	10	13	16	19	22	25	28	31	34	37	40	43	46
62	56	59	62	65	68	71	74	77	80	4	7	10	13
63	46	49	52	55	58	61	64	67	70	73	76	79	3
64	58	61	64	67	70	73	76	79	3	6	9	12	15
65	47	50	53	56	59	62	65	68	71	74	77	80	4
66	29	32	35	38	41	44	47	50	53	56	59	62	65
67	11	14	17	20	23	26	29	32	35	38	41	44	47
68	2	5	8	11	14	17	20	23	26	29	32	35	38
69	42	45	48	51	54	57	60	63	66	69	72	75	78
70	69	72	75	78	2	5	8	11	14	17	20	23	26
71	17	20	23	26	29	32	35	38	41	44	47	50	53
72	76	79	3	6	9	12	15	18	21	24	27	30	33
73	15	18	21	24	27	30	33	36	39	42	45	48	51
74	65	68	71	74	77	80	4	7	10	13	16	19	22
75	6	9	12	15	18	21	24	27	30	33	36	39	42
76	13	16	19	22	25	28	31	34	37	40	43	46	49
77	79	3	6	9	12	15	18	21	24	27	30	33	36
78	71	74	77	80	4	7	10	13	16	19	22	25	28
79	8	11	14	17	20	23	26	29	32	35	38	41	44

Table B-2, Hopping Sequence Set 2

index	1	4	7	10	13	16	19	22	25	28	31	34	37
1	3	6	9	12	15	18	21	24	27	30	33	36	39
2	26	29	32	35	38	41	44	47	50	53	56	59	62
3	65	68	71	74	77	80	4	7	10	13	16	19	22
4	11	14	17	20	23	26	29	32	35	38	41	44	47
5	46	49	52	55	58	61	64	67	70	73	76	79	3
6	19	22	25	28	31	34	37	40	43	46	49	52	55
7	74	77	80	4	7	10	13	16	19	22	25	28	31
8	50	53	56	59	62	65	68	71	74	77	80	4	7
9	22	25	28	31	34	37	40	43	46	49	52	55	58
10	64	67	70	73	76	79	3	6	9	12	15	18	21
11	79	3	6	9	12	15	18	21	24	27	30	33	36
12	32	35	38	41	44	47	50	53	56	59	62	65	68
13	62	65	68	71	74	77	80	4	7	10	13	16	19
14	25	28	31	34	37	40	43	46	49	52	55	58	61
15	55	58	61	64	67	70	73	76	79	3	6	9	12
16	66	69	72	75	78	2	5	8	11	14	17	20	23
17	29	32	35	38	41	44	47	50	53	56	59	62	65
18	80	4	7	10	13	16	19	22	25	28	31	34	37
19	34	37	40	43	46	49	52	55	58	61	64	67	70
20	5	8	11	14	17	20	23	26	29	32	35	38	41
21	21	24	27	30	33	36	39	42	45	48	51	54	57
22	14	17	20	23	26	29	32	35	38	41	44	47	50
23	39	42	45	48	51	54	57	60	63	66	69	72	75
24	75	78	2	5	8	11	14	17	20	23	26	29	32
25	57	60	63	66	69	72	75	78	2	5	8	11	14
26	72	75	78	2	5	8	11	14	17	20	23	26	29
27	24	27	30	33	36	39	42	45	48	51	54	57	60
28	6	9	12	15	18	21	24	27	30	33	36	39	42
29	40	43	46	49	52	55	58	61	64	67	70	73	76
30	13	16	19	22	25	28	31	34	37	40	43	46	49
31	37	40	43	46	49	52	55	58	61	64	67	70	73
32	69	72	75	78	2	5	8	11	14	17	20	23	26
33	10	13	16	19	22	25	28	31	34	37	40	43	46
34	71	74	77	80	4	7	10	13	16	19	22	25	28
35	78	2	5	8	11	14	17	20	23	26	29	32	35
36	7	10	13	16	19	22	25	28	31	34	37	40	43
37	63	66	69	72	75	78	2	5	8	11	14	17	20
38	30	33	36	39	42	45	48	51	54	57	60	63	66
39	15	18	21	24	27	30	33	36	39	42	45	48	51

index	1	4	7	10	13	16	19	22	25	28	31	34	37
40	28	31	34	37	40	43	46	49	52	55	58	61	64
41	17	20	23	26	29	32	35	38	41	44	47	50	53
42	60	63	66	69	72	75	78	2	5	8	11	14	17
43	44	47	50	53	56	59	62	65	68	71	74	77	80
44	77	80	4	7	10	13	16	19	22	25	28	31	34
45	35	38	41	44	47	50	53	56	59	62	65	68	71
46	73	76	79	3	6	9	12	15	18	21	24	27	30
47	12	15	18	21	24	27	30	33	36	39	42	45	48
48	61	64	67	70	73	76	79	3	6	9	12	15	18
49	2	5	8	11	14	17	20	23	26	29	32	35	38
50	48	51	54	57	60	63	66	69	72	75	78	2	5
51	23	26	29	32	35	38	41	44	47	50	53	56	59
52	76	79	3	6	9	12	15	18	21	24	27	30	33
53	67	70	73	76	79	3	6	9	12	15	18	21	24
54	42	45	48	51	54	57	60	63	66	69	72	75	78
55	16	19	22	25	28	31	34	37	40	43	46	49	52
56	36	39	42	45	48	51	54	57	60	63	66	69	72
57	68	71	74	77	80	4	7	10	13	16	19	22	25
58	53	56	59	62	65	68	71	74	77	80	4	7	10
59	59	62	65	68	71	74	77	80	4	7	10	13	16
60	45	48	51	54	57	60	63	66	69	72	75	78	2
61	51	54	57	60	63	66	69	72	75	78	2	5	8
62	18	21	24	27	30	33	36	39	42	45	48	51	54
63	8	11	14	17	20	23	26	29	32	35	38	41	44
64	20	23	26	29	32	35	38	41	44	47	50	53	56
65	9	12	15	18	21	24	27	30	33	36	39	42	45
66	70	73	76	79	3	6	9	12	15	18	21	24	27
67	52	55	58	61	64	67	70	73	76	79	3	6	9
68	43	46	49	52	55	58	61	64	67	70	73	76	79
69	4	7	10	13	16	19	22	25	28	31	34	37	40
70	31	34	37	40	43	46	49	52	55	58	61	64	67
71	58	61	64	67	70	73	76	79	3	6	9	12	15
72	38	41	44	47	50	53	56	59	62	65	68	71	74
73	56	59	62	65	68	71	74	77	80	4	7	10	13
74	27	30	33	36	39	42	45	48	51	54	57	60	63
75	47	50	53	56	59	62	65	68	71	74	77	80	4
76	54	57	60	63	66	69	72	75	78	2	5	8	11
77	41	44	47	50	53	56	59	62	65	68	71	74	77
78	33	36	39	42	45	48	51	54	57	60	63	66	69
79	49	52	55	58	61	64	67	70	73	76	79	3	6

index	40	43	46	49	52	55	58	61	64	67	70	73	76
1	42	45	48	51	54	57	60	63	66	69	72	75	78
2	65	68	71	74	77	80	4	7	10	13	16	19	22
3	25	28	31	34	37	40	43	46	49	52	55	58	61
4	50	53	56	59	62	65	68	71	74	77	80	4	7
5	6	9	12	15	18	21	24	27	30	33	36	39	42
6	58	61	64	67	70	73	76	79	3	6	9	12	15
7	34	37	40	43	46	49	52	55	58	61	64	67	70
8	10	13	16	19	22	25	28	31	34	37	40	43	46
9	61	64	67	70	73	76	79	3	6	9	12	15	18
10	24	27	30	33	36	39	42	45	48	51	54	57	60
11	39	42	45	48	51	54	57	60	63	66	69	72	75
12	71	74	77	80	4	7	10	13	16	19	22	25	28
13	22	25	28	31	34	37	40	43	46	49	52	55	58
14	64	67	70	73	76	79	3	6	9	12	15	18	21
15	15	18	21	24	27	30	33	36	39	42	45	48	51
16	26	29	32	35	38	41	44	47	50	53	56	59	62
17	68	71	74	77	80	4	7	10	13	16	19	22	25
18	40	43	46	49	52	55	58	61	64	67	70	73	76
19	73	76	79	3	6	9	12	15	18	21	24	27	30
20	44	47	50	53	56	59	62	65	68	71	74	77	80
21	60	63	66	69	72	75	78	2	5	8	11	14	17
22	53	56	59	62	65	68	71	74	77	80	4	7	10
23	78	2	5	8	11	14	17	20	23	26	29	32	35
24	35	38	41	44	47	50	53	56	59	62	65	68	71
25	17	20	23	26	29	32	35	38	41	44	47	50	53
26	32	35	38	41	44	47	50	53	56	59	62	65	68
27	63	66	69	72	75	78	2	5	8	11	14	17	20
28	45	48	51	54	57	60	63	66	69	72	75	78	2
29	79	3	6	9	12	15	18	21	24	27	30	33	36
30	52	55	58	61	64	67	70	73	76	79	3	6	9
31	76	79	3	6	9	12	15	18	21	24	27	30	33
32	29	32	35	38	41	44	47	50	53	56	59	62	65
33	49	52	55	58	61	64	67	70	73	76	79	3	6
34	31	34	37	40	43	46	49	52	55	58	61	64	67
35	38	41	44	47	50	53	56	59	62	65	68	71	74
36	46	49	52	55	58	61	64	67	70	73	76	79	3
37	23	26	29	32	35	38	41	44	47	50	53	56	59
38	69	72	75	78	2	5	8	11	14	17	20	23	26
39	54	57	60	63	66	69	72	75	78	2	5	8	11

index	40	43	46	49	52	55	58	61	64	67	70	73	76
40	67	70	73	76	79	3	6	9	12	15	18	21	24
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42	20	23	26	29	32	35	38	41	44	47	50	53	56
43	4	7	10	13	16	19	22	25	28	31	34	37	40
44	37	40	43	46	49	52	55	58	61	64	67	70	73
45	74	77	80	4	7	10	13	16	19	22	25	28	31
46	33	36	39	42	45	48	51	54	57	60	63	66	69
47	51	54	57	60	63	66	69	72	75	78	2	5	8
48	21	24	27	30	33	36	39	42	45	48	51	54	57
49	41	44	47	50	53	56	59	62	65	68	71	74	77
50	8	11	14	17	20	23	26	29	32	35	38	41	44
51	62	65	68	71	74	77	80	4	7	10	13	16	19
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53	27	30	33	36	39	42	45	48	51	54	57	60	63
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55	55	58	61	64	67	70	73	76	79	3	6	9	12
56	75	78	2	5	8	11	14	17	20	23	26	29	32
57	28	31	34	37	40	43	46	49	52	55	58	61	64
58	13	16	19	22	25	28	31	34	37	40	43	46	49
59	19	22	25	28	31	34	37	40	43	46	49	52	55
60	5	8	11	14	17	20	23	26	29	32	35	38	41
61	11	14	17	20	23	26	29	32	35	38	41	44	47
62	57	60	63	66	69	72	75	78	2	5	8	11	14
63	47	50	53	56	59	62	65	68	71	74	77	80	4
64	59	62	65	68	71	74	77	80	4	7	10	13	16
65	48	51	54	57	60	63	66	69	72	75	78	2	5
66	30	33	36	39	42	45	48	51	54	57	60	63	66
67	12	15	18	21	24	27	30	33	36	39	42	45	48
68	3	6	9	12	15	18	21	24	27	30	33	36	39
69	43	46	49	52	55	58	61	64	67	70	73	76	79
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72	77	80	4	7	10	13	16	19	22	25	28	31	34
73	16	19	22	25	28	31	34	37	40	43	46	49	52
74	66	69	72	75	78	2	5	8	11	14	17	20	23
75	7	10	13	16	19	22	25	28	31	34	37	40	43
76	14	17	20	23	26	29	32	35	38	41	44	47	50
77	80	4	7	10	13	16	19	22	25	28	31	34	37
78	72	75	78	2	5	8	11	14	17	20	23	26	29
79	9	12	15	18	21	24	27	30	33	36	39	42	45

Table B-3, Hopping Sequence Set 3

index	2	5	8	11	14	17	20	23	26	29	32	35	38
1	4	7	10	13	16	19	22	25	28	31	34	37	40
2	27	30	33	36	39	42	45	48	51	54	57	60	63
3	66	69	72	75	78	2	5	8	11	14	17	20	23
4	12	15	18	21	24	27	30	33	36	39	42	45	48
5	47	50	53	56	59	62	65	68	71	74	77	80	4
6	20	23	26	29	32	35	38	41	44	47	50	53	56
7	75	78	2	5	8	11	14	17	20	23	26	29	32
8	51	54	57	60	63	66	69	72	75	78	2	5	8
9	23	26	29	32	35	38	41	44	47	50	53	56	59
10	65	68	71	74	77	80	4	7	10	13	16	19	22
11	80	4	7	10	13	16	19	22	25	28	31	34	37
12	33	36	39	42	45	48	51	54	57	60	63	66	69
13	63	66	69	72	75	78	2	5	8	11	14	17	20
14	26	29	32	35	38	41	44	47	50	53	56	59	62
15	56	59	62	65	68	71	74	77	80	4	7	10	13
16	67	70	73	76	79	3	6	9	12	15	18	21	24
17	30	33	36	39	42	45	48	51	54	57	60	63	66
18	2	5	8	11	14	17	20	23	26	29	32	35	38
19	35	38	41	44	47	50	53	56	59	62	65	68	71
20	6	9	12	15	18	21	24	27	30	33	36	39	42
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23	40	43	46	49	52	55	58	61	64	67	70	73	76
24	76	79	3	6	9	12	15	18	21	24	27	30	33
25	58	61	64	67	70	73	76	79	3	6	9	12	15
26	73	76	79	3	6	9	12	15	18	21	24	27	30
27	25	28	31	34	37	40	43	46	49	52	55	58	61
28	7	10	13	16	19	22	25	28	31	34	37	40	43
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31	38	41	44	47	50	53	56	59	62	65	68	71	74
32	70	73	76	79	3	6	9	12	15	18	21	24	27
33	11	14	17	20	23	26	29	32	35	38	41	44	47
34	72	75	78	2	5	8	11	14	17	20	23	26	29
35	79	3	6	9	12	15	18	21	24	27	30	33	36
36	8	11	14	17	20	23	26	29	32	35	38	41	44
37	64	67	70	73	76	79	3	6	9	12	15	18	21
38	31	34	37	40	43	46	49	52	55	58	61	64	67
39	16	19	22	25	28	31	34	37	40	43	46	49	52

FCC requirements § 2.1033 (b)(6)

TEST MEASUREMENT REPORT

Contains 74 pages and follows this page.

index	2	5	8	11	14	17	20	23	26	29	32	35	38
40	29	32	35	38	41	44	47	50	53	56	59	62	65
41	18	21	24	27	30	33	36	39	42	45	48	51	54
42	61	64	67	70	73	76	79	3	6	9	12	15	18
43	45	48	51	54	57	60	63	66	69	72	75	78	2
44	78	2	5	8	11	14	17	20	23	26	29	32	35
45	36	39	42	45	48	51	54	57	60	63	66	69	72
46	74	77	80	4	7	10	13	16	19	22	25	28	31
47	13	16	19	22	25	28	31	34	37	40	43	46	49
48	62	65	68	71	74	77	80	4	7	10	13	16	19
49	3	6	9	12	15	18	21	24	27	30	33	36	39
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54	43	46	49	52	55	58	61	64	67	70	73	76	79
55	17	20	23	26	29	32	35	38	41	44	47	50	53
56	37	40	43	46	49	52	55	58	61	64	67	70	73
57	69	72	75	78	2	5	8	11	14	17	20	23	26
58	54	57	60	63	66	69	72	75	78	2	5	8	11
59	60	63	66	69	72	75	78	2	5	8	11	14	17
60	46	49	52	55	58	61	64	67	70	73	76	79	3
61	52	55	58	61	64	67	70	73	76	79	3	6	9
62	19	22	25	28	31	34	37	40	43	46	49	52	55
63	9	12	15	18	21	24	27	30	33	36	39	42	45
64	21	24	27	30	33	36	39	42	45	48	51	54	57
65	10	13	16	19	22	25	28	31	34	37	40	43	46
66	71	74	77	80	4	7	10	13	16	19	22	25	28
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72	39	42	45	48	51	54	57	60	63	66	69	72	75
73	57	60	63	66	69	72	75	78	2	5	8	11	14
74	28	31	34	37	40	43	46	49	52	55	58	61	64
75	48	51	54	57	60	63	66	69	72	75	78	2	5
76	55	58	61	64	67	70	73	76	79	3	6	9	12
77	42	45	48	51	54	57	60	63	66	69	72	75	78
78	34	37	40	43	46	49	52	55	58	61	64	67	70
79	50	53	56	59	62	65	68	71	74	77	80	4	7

index	41	44	47	50	53	56	59	62	65	68	71	74	77
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2	66	69	72	75	78	2	5	8	11	14	17	20	23
3	26	29	32	35	38	41	44	47	50	53	56	59	62
4	51	54	57	60	63	66	69	72	75	78	2	5	8
5	7	10	13	16	19	22	25	28	31	34	37	40	43
6	59	62	65	68	71	74	77	80	4	7	10	13	16
7	35	38	41	44	47	50	53	56	59	62	65	68	71
8	11	14	17	20	23	26	29	32	35	38	41	44	47
9	62	65	68	71	74	77	80	4	7	10	13	16	19
10	25	28	31	34	37	40	43	46	49	52	55	58	61
11	40	43	46	49	52	55	58	61	64	67	70	73	76
12	72	75	78	2	5	8	11	14	17	20	23	26	29
13	23	26	29	32	35	38	41	44	47	50	53	56	59
14	65	68	71	74	77	80	4	7	10	13	16	19	22
15	16	19	22	25	28	31	34	37	40	43	46	49	52
16	27	30	33	36	39	42	45	48	51	54	57	60	63
17	69	72	75	78	2	5	8	11	14	17	20	23	26
18	41	44	47	50	53	56	59	62	65	68	71	74	77
19	74	77	80	4	7	10	13	16	19	22	25	28	31
20	45	48	51	54	57	60	63	66	69	72	75	78	2
21	61	64	67	70	73	76	79	3	6	9	12	15	18
22	54	57	60	63	66	69	72	75	78	2	5	8	11
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31	77	80	4	7	10	13	16	19	22	25	28	31	34
32	30	33	36	39	42	45	48	51	54	57	60	63	66
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34	32	35	38	41	44	47	50	53	56	59	62	65	68
35	39	42	45	48	51	54	57	60	63	66	69	72	75
36	47	50	53	56	59	62	65	68	71	74	77	80	4
37	24	27	30	33	36	39	42	45	48	51	54	57	60
38	70	73	76	79	3	6	9	12	15	18	21	24	27
39	55	58	61	64	67	70	73	76	79	3	6	9	12

index	41	44	47	50	53	56	59	62	65	68	71	74	77
40	68	71	74	77	80	4	7	10	13	16	19	22	25
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47	52	55	58	61	64	67	70	73	76	79	3	6	9
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49	42	45	48	51	54	57	60	63	66	69	72	75	78
50	9	12	15	18	21	24	27	30	33	36	39	42	45
51	63	66	69	72	75	78	2	5	8	11	14	17	20
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54	3	6	9	12	15	18	21	24	27	30	33	36	39
55	56	59	62	65	68	71	74	77	80	4	7	10	13
56	76	79	3	6	9	12	15	18	21	24	27	30	33
57	29	32	35	38	41	44	47	50	53	56	59	62	65
58	14	17	20	23	26	29	32	35	38	41	44	47	50
59	20	23	26	29	32	35	38	41	44	47	50	53	56
60	6	9	12	15	18	21	24	27	30	33	36	39	42
61	12	15	18	21	24	27	30	33	36	39	42	45	48
62	58	61	64	67	70	73	76	79	3	6	9	12	15
63	48	51	54	57	60	63	66	69	72	75	78	2	5
64	60	63	66	69	72	75	78	2	5	8	11	14	17
65	49	52	55	58	61	64	67	70	73	76	79	3	6
66	31	34	37	40	43	46	49	52	55	58	61	64	67
67	13	16	19	22	25	28	31	34	37	40	43	46	49
68	4	7	10	13	16	19	22	25	28	31	34	37	40
69	44	47	50	53	56	59	62	65	68	71	74	77	80
70	71	74	77	80	4	7	10	13	16	19	22	25	28
71	19	22	25	28	31	34	37	40	43	46	49	52	55
72	78	2	5	8	11	14	17	20	23	26	29	32	35
73	17	20	23	26	29	32	35	38	41	44	47	50	53
74	67	70	73	76	79	3	6	9	12	15	18	21	24
75	8	11	14	17	20	23	26	29	32	35	38	41	44
76	15	18	21	24	27	30	33	36	39	42	45	48	51
77	2	5	8	11	14	17	20	23	26	29	32	35	38
78	73	76	79	3	6	9	12	15	18	21	24	27	30
79	10	13	16	19	22	25	28	31	34	37	40	43	46

ELECTROMAGNETIC EMISSIONS TEST REPORT

ACCORDING TO FCC Part 15 subpart C, §15.247 and subpart B

for

Breeze Wireless Communications Ltd.

EQUIPMENT UNDER TEST:

SA-PCD / SA-PCR

FCC ID: LKTESA-PC

Prepared by: _____
Mr. E. Shitrit, technical writer
Hermon Labs

Approved by: _____
Mr. A. Usoskin, QA manager
Hermon Labs

Approved by: _____
Dr. E. Usoskin, C.E.O.
Hermon Labs

Approved by: _____
Mr. Itzik Raiskin, project manager
Breezcom Ltd.

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ACCREDITED
839.01

Table 3.7.1 Radiated emission (modulated carrier) measurements test results with the integral antenna

TEST SPECIFICATION: FCC part 15 subpart C § 15.209(a)
COMPANY: Breezcom Ltd.
EUT: SA-PCD / SA-PCR
DATE: January 13, 1998
Relative Humidity: 68%
Ambient Temperature: 20°C

MEASUREMENTS PERFORMED AT 1 METRES DISTANCE

Freq. (GHz)	Detector Type	RBW/ VBW	Measured Result dB (μV)	Antenna Factor dB (1/m)	Cable loss dB	Average Factor dB	Radiated Emissions dB (μV/m)	Calculated Limit 1m dB (μV/m)	Spec. Margin dB	Pass/ Fail
4.804	Peak	1 MHz/ 1 MHz	39.9	34.5	1.4	-19.49	56.31	63.5	7.19	Pass
4.882	Peak	1 MHz/ 1 MHz	41.3	34.5	1.4	-19.49	57.71	63.5	5.79	Pass
4.960	Peak	1 MHz/ 1 MHz	39.9	34.9	1.4	-19.49	56.71	63.5	6.79	Pass

Notes to Table:

Antenna Type = Ridged guide horn
Antenna polarization = Vertical
Radiated Emission dB(μV/m) = Measured Results dB(μV) + Correction Factor dB(1/m) + Average Factor (During the measurements the received emissions were amplified)
Correction Factor = Antenna Factor + Cable Loss (for Antenna Factor and Cable Loss refer to Appendix B).
Average Factor = -19.49 dB (see Table 3.3.1).

Table Abbreviations:

RBW = Resolution Bandwidth
VBW = Video Bandwidth
Spec. Margin = Specification Margins = dB below (negative if above) specification limit.

Test Performed by:
Mrs. Eleonora Pitt, test engineer

Hermon Labs

Customer Representative Person:
Mr. Itzik Raiskin, project manager

Breezcom Ltd.

Description of equipment under test

Test items	Wireless LAN adapter-hopping transceiver FCC ID:LKTESA-PC
Manufacturer	Breeze Wireless Communications Ltd.
Serial Number	114, 106
Types (Models)	SA-PCD / SA-PCR
Receipt date	January 12, 1998

Applicant information

Applicant's representative	Mr. Itzik Raiskin, project manager
Applicant's responsible person	Mr. Itzik Raiskin, project manager
Company	Breeze Wireless Communications Ltd.
Address	Building 1, Atidim Industrial Park
PO Box	13139
Postal code	61131
City	Tel-Aviv
Country	Israel
Telephone number	+972-(0)3-645 6243
Telefax number	+972-(0)3-645 6290

Test performance

Project Number:	12688
Location	Hermon Laboratories
Test started	January 12, 1998
Test completed	January 14, 1998
Purpose of test	The EUT certification in accordance with CFR 47, part 2, §2.1033
Test specification(s)	FCC Part 15, Subpart C, §15.247, §§15.205, 15.209, 15.109

Through this report a point is used as the decimal separator and the thousands are counted with a comma.
This report is in conformity with EN 45001 and ISO GUIDE 25.
The test results relate only to the items tested.

Table of Contents

1 General Information

1.1 Abbreviations and Acronyms

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

AC	Alternating Current
AVRG	Average (Detector)
CE	Conducted Emissions
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μA)	decibel referred to one microampere
dB(μV)	decibel referred to one microvolt
dB(μV/m)	decibel referred to one microvolt per meter
DC	Direct Current
EMC	Electromagnetic Compatibility
EUT	Equipment Under Test
GHz	Gigahertz
FSK	frequency shift keying
H	Height
HL	Hermon Laboratories
HP	Hewlett Packard
Hz	Hertz
kHz	kilohertz
kV	kilovolt
L	length
LISN	Line Impedance Stabilization Network
m	meter
mm	millimeter
MHz	megahertz
MIL-STD	Military Standard
msec	millisecond
NA	Not Applicable
NARTE	National Association of Radio and Telecommunications Engineers, Inc.
nF	nanofarad
Ohm	Ohms
pF	picofarad
QP	Quasi-Peak (Detector)
RBW	Resolution Bandwidth
RF	Radio Frequency
RE	Radiated Emission
RMS	Root-Mean-Square
sec	second
V	volt
V/m	volt per meter
W	watt

1.2 Specification References

CFR 47 part 15: 1997	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.

1.3 EUT Description

The EUT is a Frequency Hopping Wireless LAN PCMCIA adapter operating in the 2.4 to 2.4835 GHz frequency band.
The EUT was tested in the following two options:

- SA-PCR with two integral retractable monopole antennas.
- SA-PCD with two non-standard connector interface and a dipole antenna.

Beside the antenna the SA-PCR and the SA-PCD are similar.

1.4 EUT Test Configuration

The test configuration is shown in Figures 1.1 to 1.3. Throughout the testing the PC desktop, HP Vectra, with control software was used.

Figure 1.1

The EUT test configuration, general

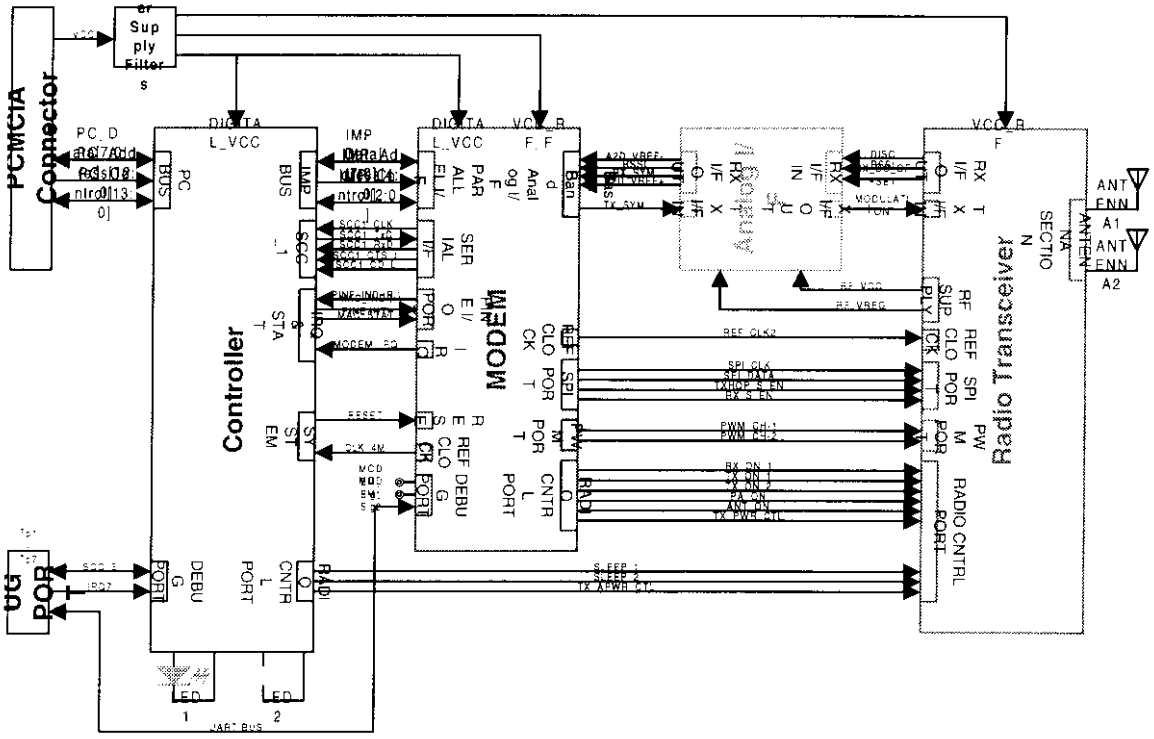


Figure 1.2

The EUT test configuration, radio part

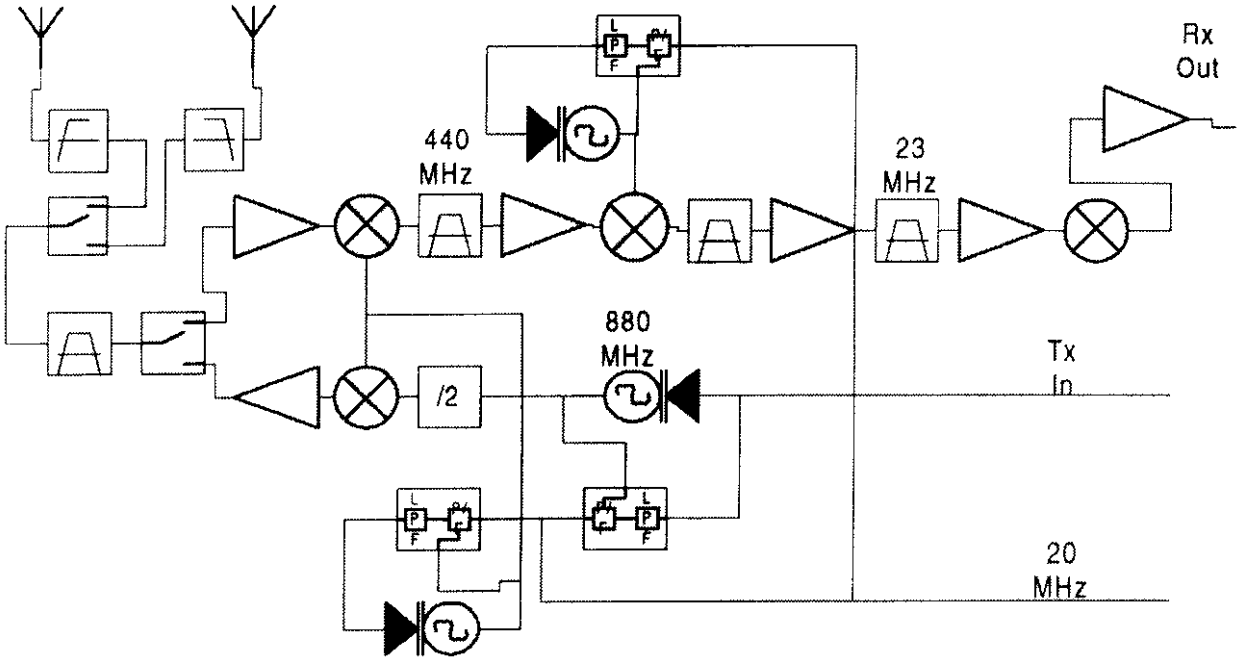
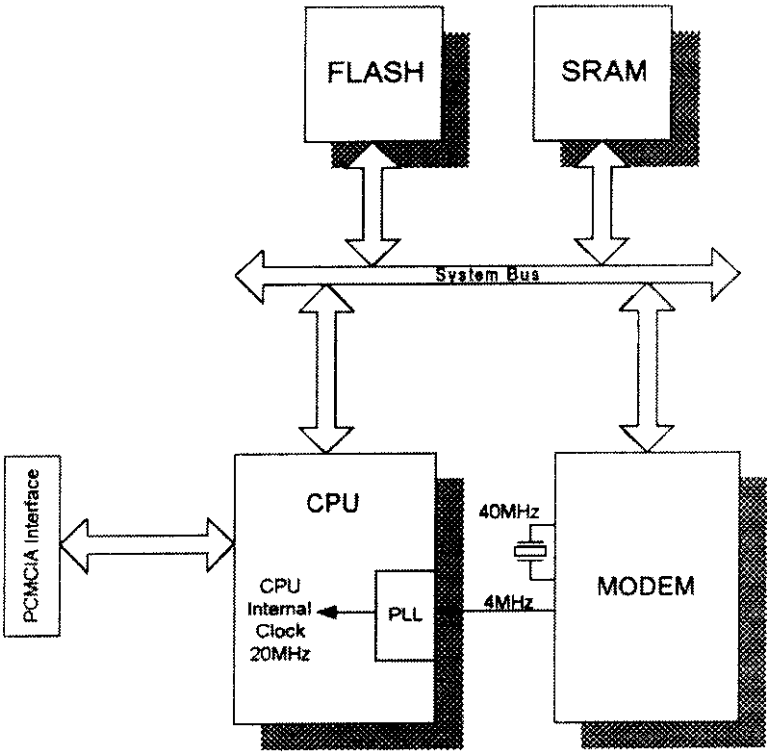


Figure 1.3

The EUT test configuration, digital part



1.5 Statement of Manufacturer

I, Itzik Raiskin, project manager of Breezcom Ltd., declare that the SA-PCD / SA-PCR, were tested on January 12 to 14, 1998 by Hermon Laboratories and which this test report applies to is identical of the equipment that will be marketed.

The term identical means identical within the variations that can be expected to arise as a result of quantity production technique.

Mr. Itzik Raiskin, project manager
Breezcom Ltd.

Signature: _____

Date: Jan 15, 1998

2 Test Facility Description

2.1 General

Tests were performed at Hermon Laboratories, 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), recognized by VDE (Germany) for witness test, certified by VCCI Registration No. R-263, C-266 (Japan), assessed by NMi Certin B.V. (Netherlands) for a number of EMC, Telecommunications and Safety standards, recognized by TUV Sudwest (Germany) for safety testing, and Assessed by AMTAC (UK) for safety of Medical Devices. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO GUIDE 25/EN 45001 for EMC, Telecommunications and Product Safety Information Technology Equipment (Certificate No. 839.01).

Address: PO Box 23, Binyamina 30550, Israel.
Telephone: +972-(0)6-628-8001
Fax: +972-(0)6-628-8277

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

2.2 Equipment Calibration

The test equipment has been calibrated according to its recommended procedures and is within the manufacturer's published limit of error. The standards and instruments used in the calibration system conform to the present requirements of MIL-STD-45662A.
The laboratory standards are calibrated by the third party (traceable to NIST, USA) on a regular basis according to equipment manufacturer requirements.

2.2.1 Uncertainty in Hermon Labs Measurements.

Conducted Emissions (95% Confidence)	9 KHz to 150 KHz : ± 2.18 dB Expanded uncertainty : ± 1.09 dB Combined standard uncertainty 150 KHz to 30 MHz : ± 2.42 dB Expanded uncertainty : ± 1.21 dB Combined standard uncertainty
Radiated Emissions (95% Confidence)	Biconical Antenna: 3m measuring distance : + 4.06 dB Expanded uncertainty : - 3.98 dB Expanded uncertainty : + 2.032 dB Combined standard uncertainty : - 1.99 dB Combined standard uncertainty 10m measuring distance : + 3.98 dB Expanded uncertainty : - 4.08 dB Expanded uncertainty : + 1.99 dB Combined standard uncertainty : - 2.04 dB Combined standard uncertainty Log periodic Antenna: 3m measuring distance : + 4.74 dB Expanded uncertainty : - 3.26 dB Expanded uncertainty : + 2.37 dB Combined standard uncertainty : - 1.63 dB Combined standard uncertainty 10m measuring distance : + 3.06 dB Expanded uncertainty : - 3.00 dB Expanded uncertainty

2.3 Laboratory Personnel

The four people of Hermon Laboratories that have participated in measurements and documentation preparation are: Dr. Edward Usoskin - C.E.O., Mr. Michael Feldman - test technician, Mrs. Eleonora Pitt - test engineer and Mr. Eran Shitrit - technical writer. Dr. E. Usoskin is an EMC specialist, certified by the National Association of Radio and Telecommunications Engineers (NARTE, USA.).
The Hermon Laboratories personnel that participated in this project have more than 70 years combined experience time in EMC measurements and electronic products design.

2.4 Statement of Qualification

The test measurement data supplied in this test measurement report having been received by me, is hereby duly certified. The following is a statement of my qualifications.
I am a Technician, have obtained 28 years experience in electronics and have been with Hermon Laboratories since 1995.

Name: Mr. Michael Feldman
Position: technician
Signature:
Date: April 12, 1998

The test measurement data supplied in this test measurement report having been received by me, is hereby duly certified. The following is a statement of my qualifications:
I am an Engineer, graduated from the University in 1974 with an MScEE degree, have obtained 24 years experience in EMC measurements and have been with Hermon Laboratories since 1991.

Name: Mrs. Eleonora Pitt
Position: Test Engineer
Signature:
Date: April 12, 1998

I hereby certify that this test measurement report was prepared by me and is hereby duly certified. The following is a statement of my qualifications.
I have learned in a technical school for four years, served in the army for three years and have been with Hermon Laboratories since April 1997.

Name: Mr. Eran Shitrit
Position: technical writer
Signature:
Date: April 12, 1998

I hereby certify that this test measurement report was prepared under my direction and that to the best of my knowledge and belief, the facts set in the report and accompanying technical data are true and correct.
The following is a statement of my qualifications.
I have a Ph.D. degree in electronics, have obtained more than 40 years of experience in EMC measurements and electronic product design and have been with Hermon Laboratories since 1986.
Also, I am an EMC engineer certified by the National Association of Radio and Telecommunications Engineers, Inc. (USA). The certificate no. is EMC-000623-NE, Senior Member.

Name: Dr. Edward Usoskin
Position: C.E.O.
Signature:
Date: April 12, 1998

3 Emission Measurements

3.1 Frequency hopping channels separation and hopping frequency usage test according to § 15.247

3.1.1 Definition of the test

This test was performed to prove that:
The EUT frequency hopping system uses at least 75 hopping frequencies
The EUT has hopping channel carrier frequencies separation by a minimum of 25 kHz or by the 20 dB bandwidth of the hopping channel, whichever is greater.

3.1.2 The test set-up configuration

The EUT RF output was connected to the spectrum analyzer through 20 dB attenuator as shown in Photograph 3.1.
The EUT was connected to the computer and the radio transmission was activated.
All the spectrum analyzer settings are shown in the plots.

3.1.3 Test results

The test results were recorded into Plots 3.1.1 to 3.1.5 the plots shows 79 channels which are greater than 75 channels. 0.960 MHz spacings between carriers, which are greater than 20 dB bandwidth spacing required by the standard. Upon this the EUT successfully passed this test.

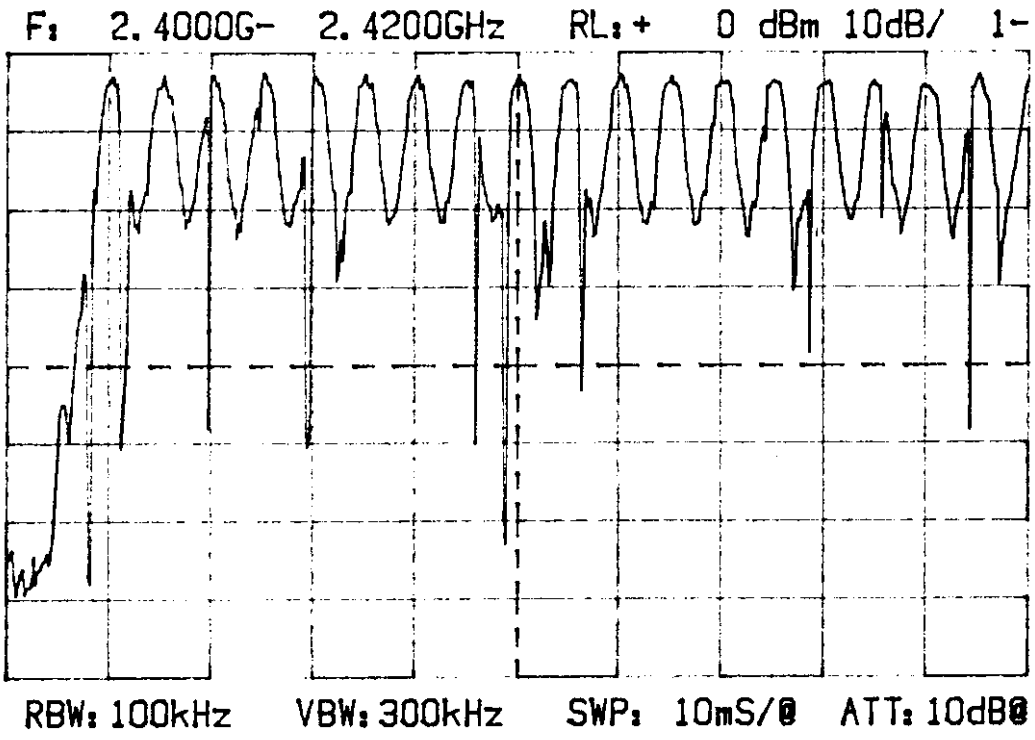
Reference numbers of test equipment used

HL 0025	HL 0054

Full description is given in Appendix A.

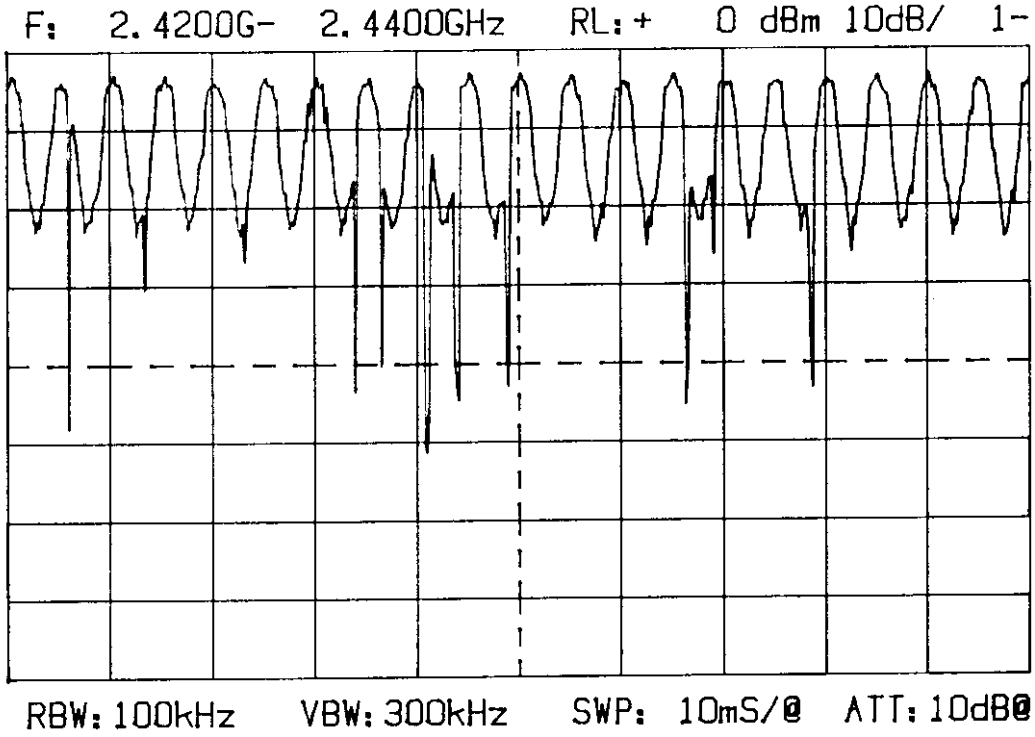
Plot 3.1.1

Hopping channels separation test results



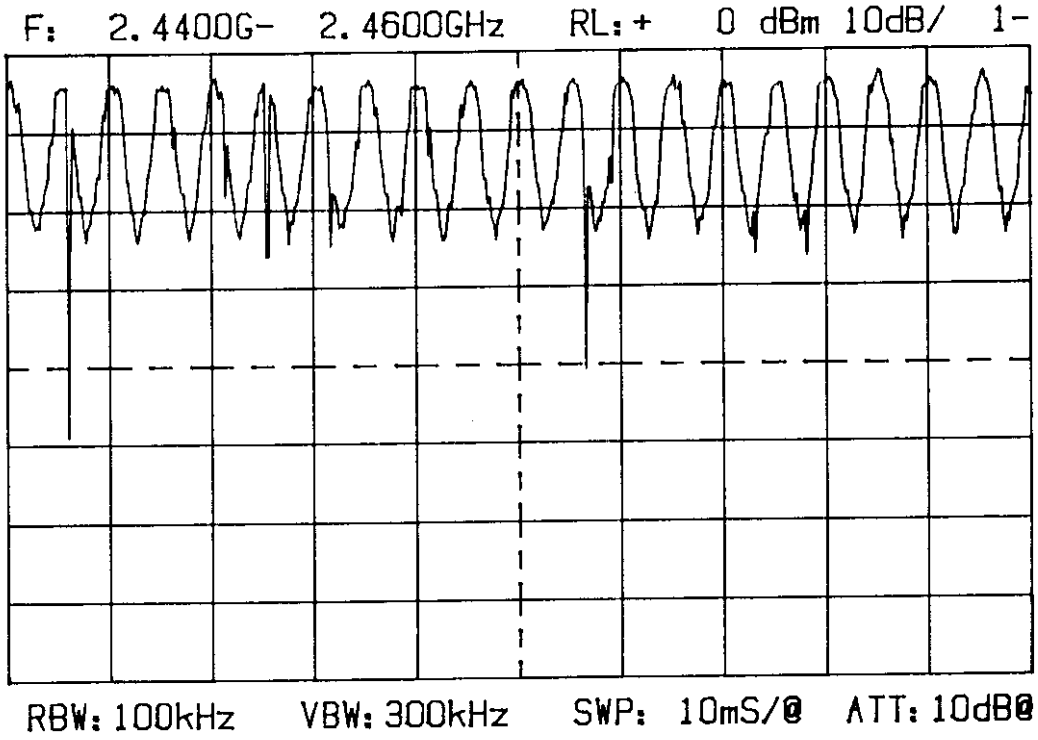
Plot 3.1.2

Hopping channels separation test results



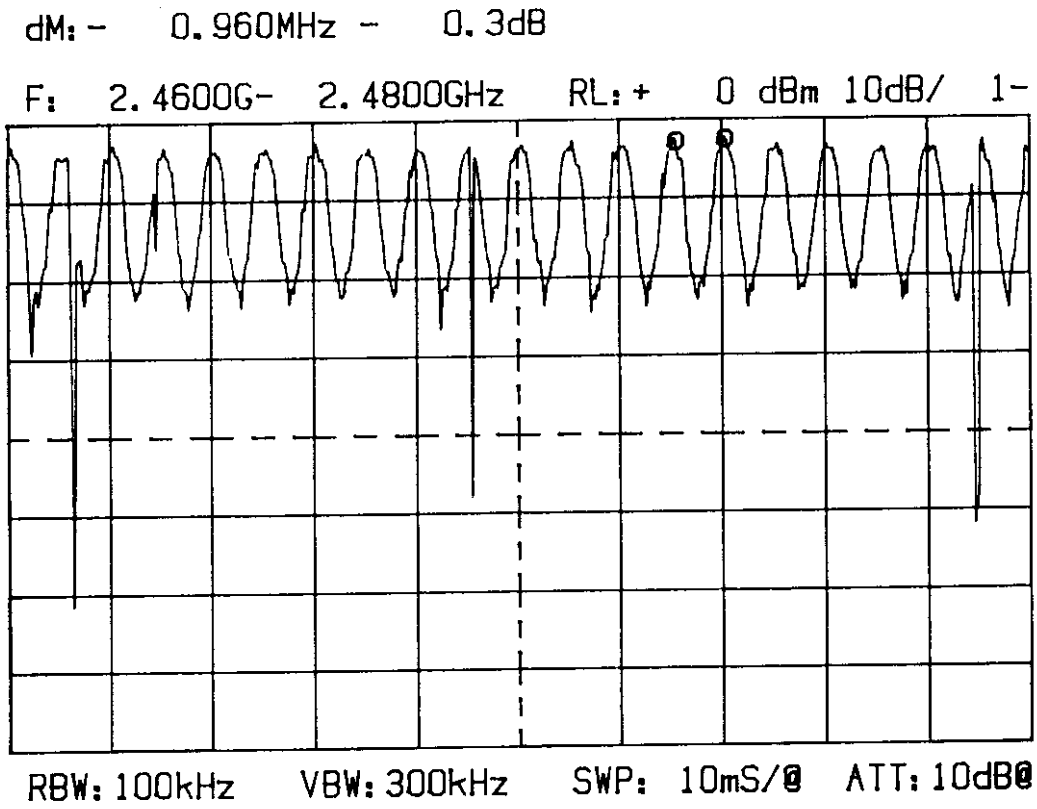
Plot 3.1.3

Hopping channels separation test results



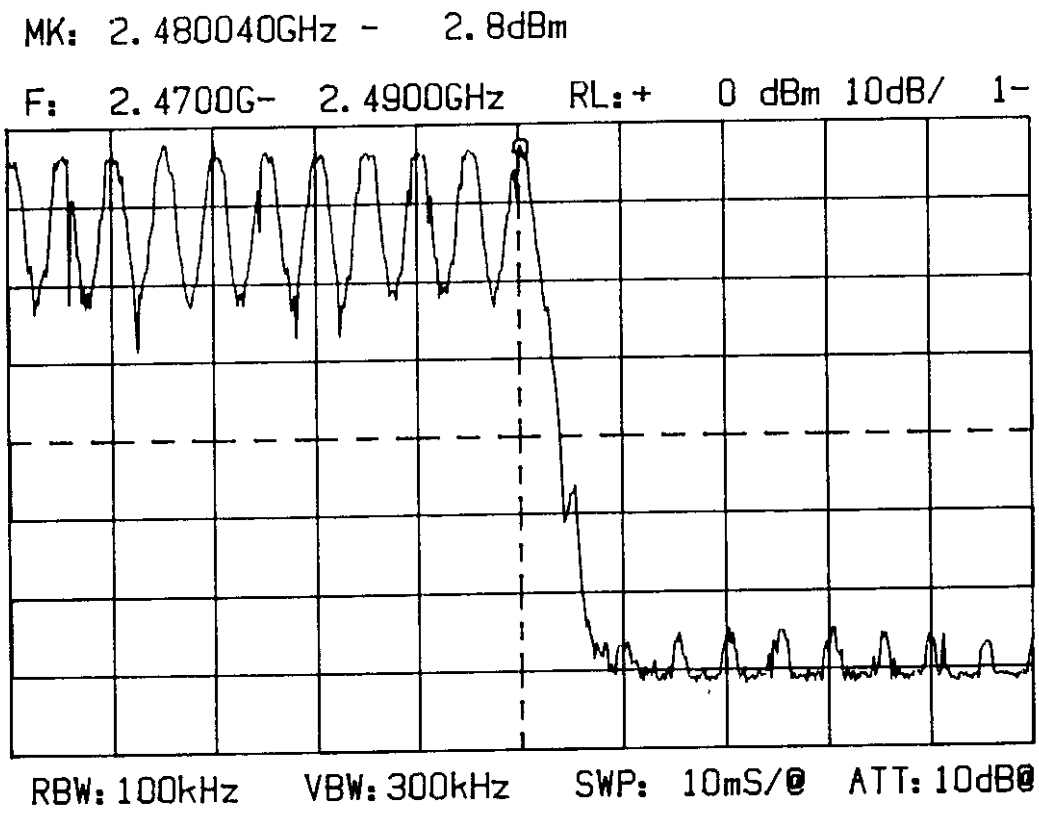
Plot 3.1.4

Hopping channels separation test results



Plot 3.1.5

Hopping channels separation test results



3.2 Occupied bandwidth test according to § 15.247

3.2.1 Definition of the test

This test was performed to prove that the maximum 20 dB bandwidth of the hopping channel is less than 1 MHz.

3.2.2 The test set-up configuration

The test setup was the same as in Test 3.1.

3.2.3 Test results

The measurements were performed in turn with 2FSK, 4FSK and 8FSK type of modulation. The occupied bandwidth measurement was performed for carrier (channel) frequency at low and high edges and at the middle of the 2.40 - 2.48 GHz frequency band (see Tables 3.2.1 to 3.2.3 below). Plots 3.2.1 to 3.2.9 that follow this page demonstrate the test results of the occupied bandwidth measurements. The spectrum analyzer settings are shown in plots.

Table 3.2.1 Occupied bandwidth test results with 2FSK type of modulation

Carrier Frequency (GHz)	Measured 20 dB BW MHz	Limit MHz	Result
2.402	0.830	1	Pass
2.441	0.900	1	Pass
2.480	0.890	1	Pass

Table 3.2.2 Occupied bandwidth test results with 4FSK type of modulation

Carrier Frequency (GHz)	Measured 20 dB BW MHz	Limit MHz	Result
2.402	0.890	1	Pass
2.441	0.900	1	Pass
2.480	0.920	1	Pass

Table 3.2.3 Occupied bandwidth test results with 8FSK type of modulation

Carrier Frequency (GHz)	Measured 20 dB BW MHz	Limit MHz	Result
2.402	0.910	1	Pass
2.441	0.910	1	Pass
2.480	0.970	1	Pass

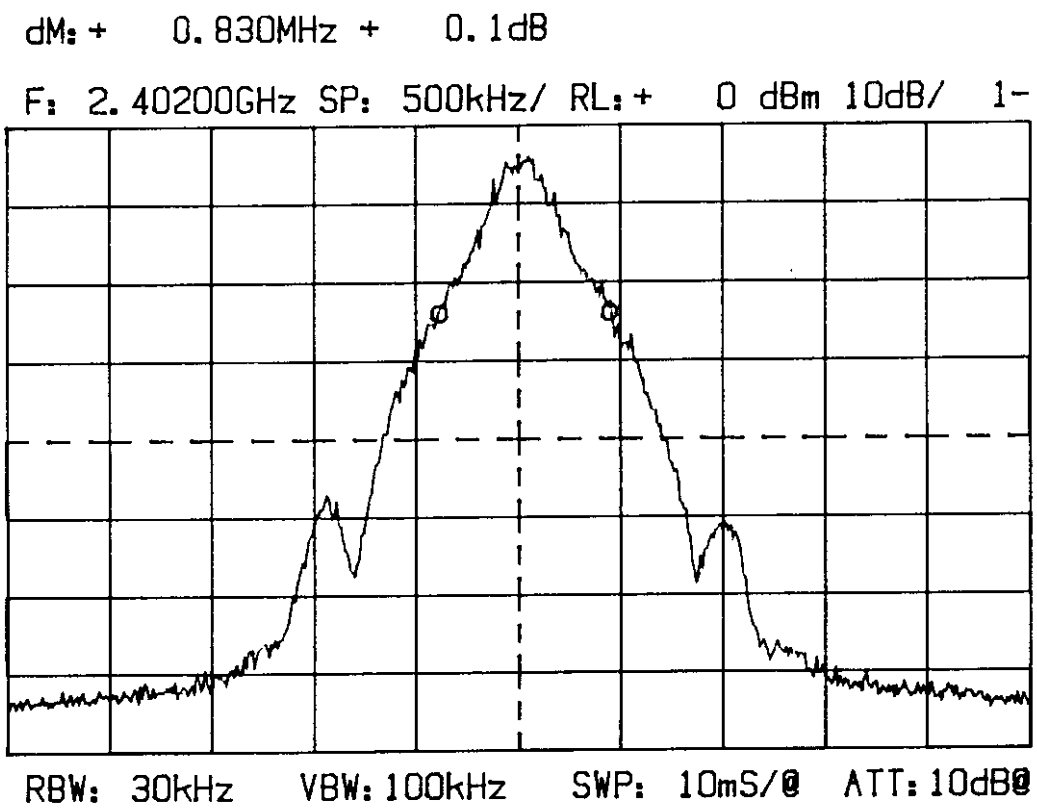
Reference numbers of test equipment used

HL 0025	HL 0054

Full description is given in Appendix A.

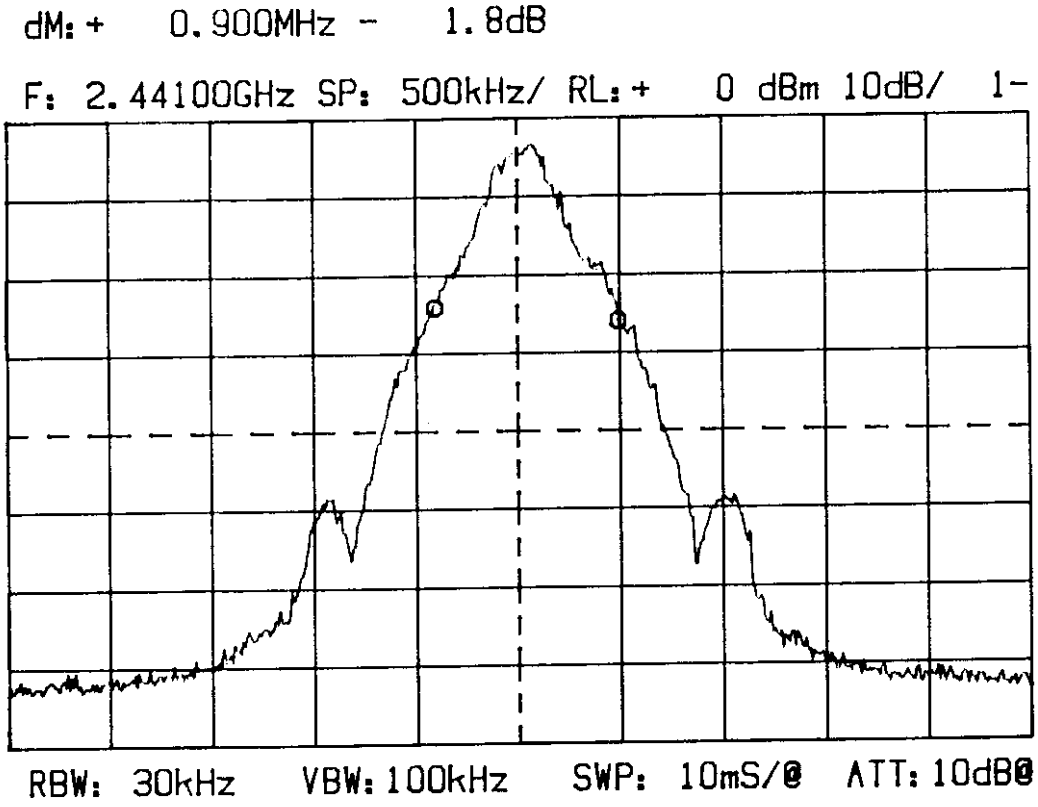
Plot 3.2.1

Occupied bandwidth test results with 2FSK type of modulation



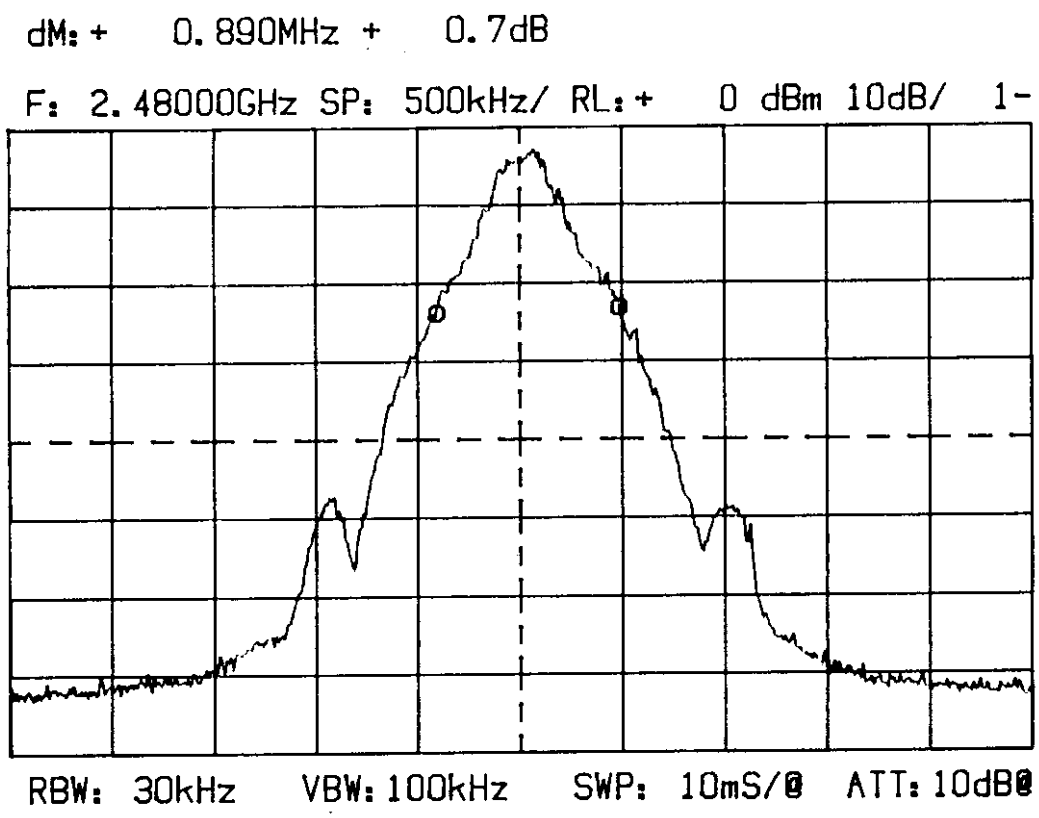
Plot 3.2.2

Occupied bandwidth test results with 2FSK type of modulation



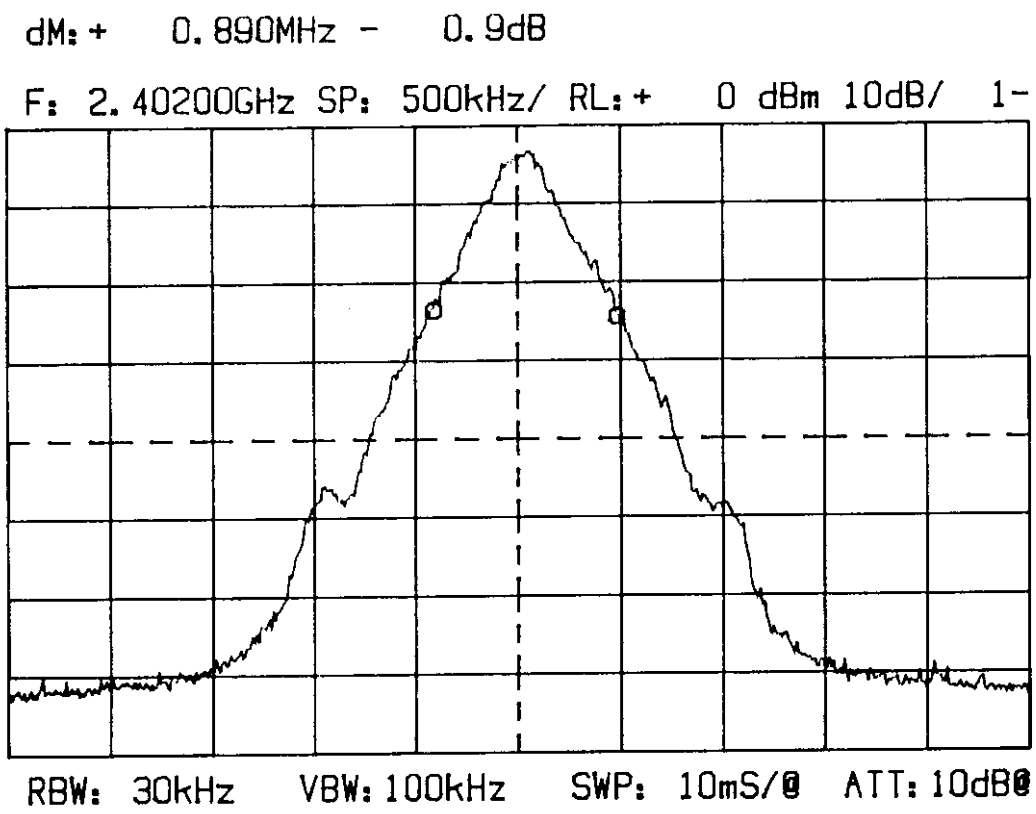
Plot 3.2.3

Occupied bandwidth test results with 2FSK type of modulation



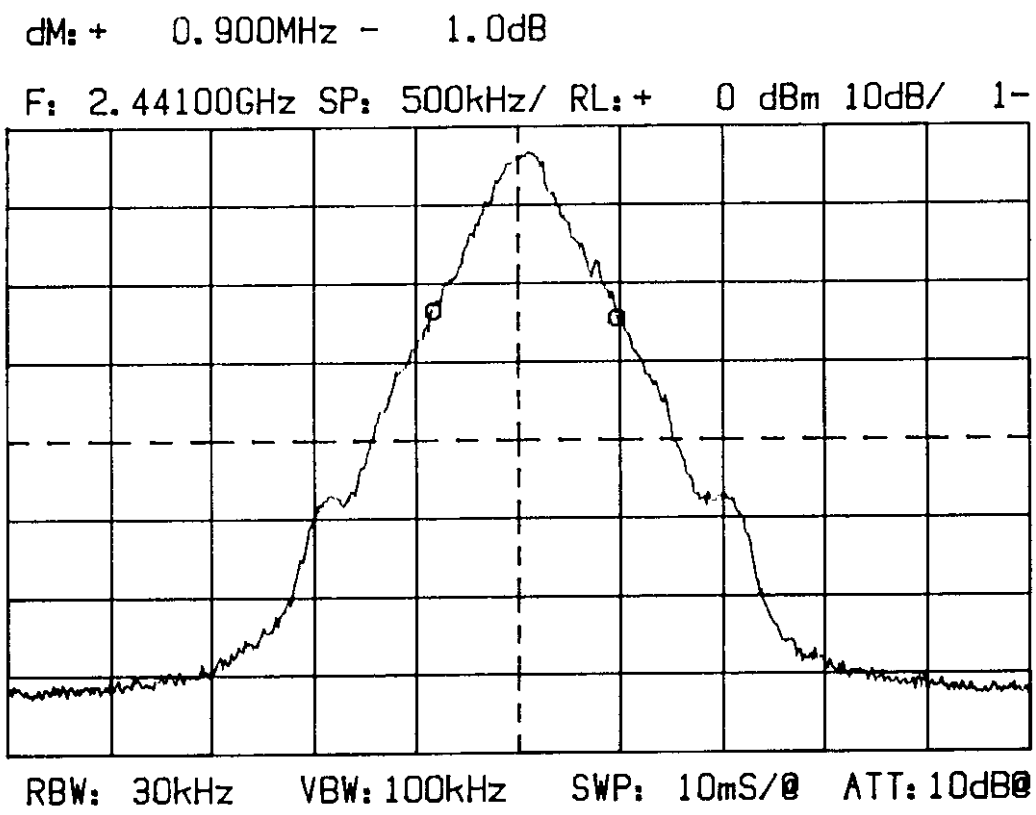
Plot 3.2.4

Occupied bandwidth test results with 4FSK type of modulation



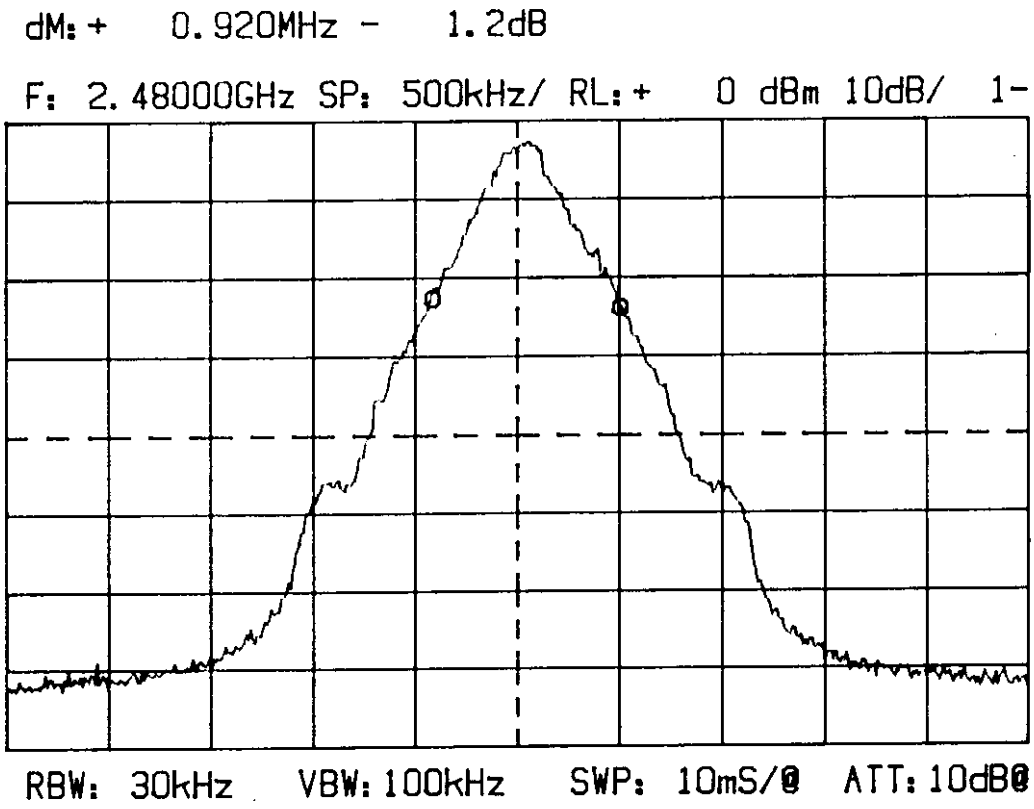
Plot 3.2.5

Occupied bandwidth test results with 4FSK type of modulation



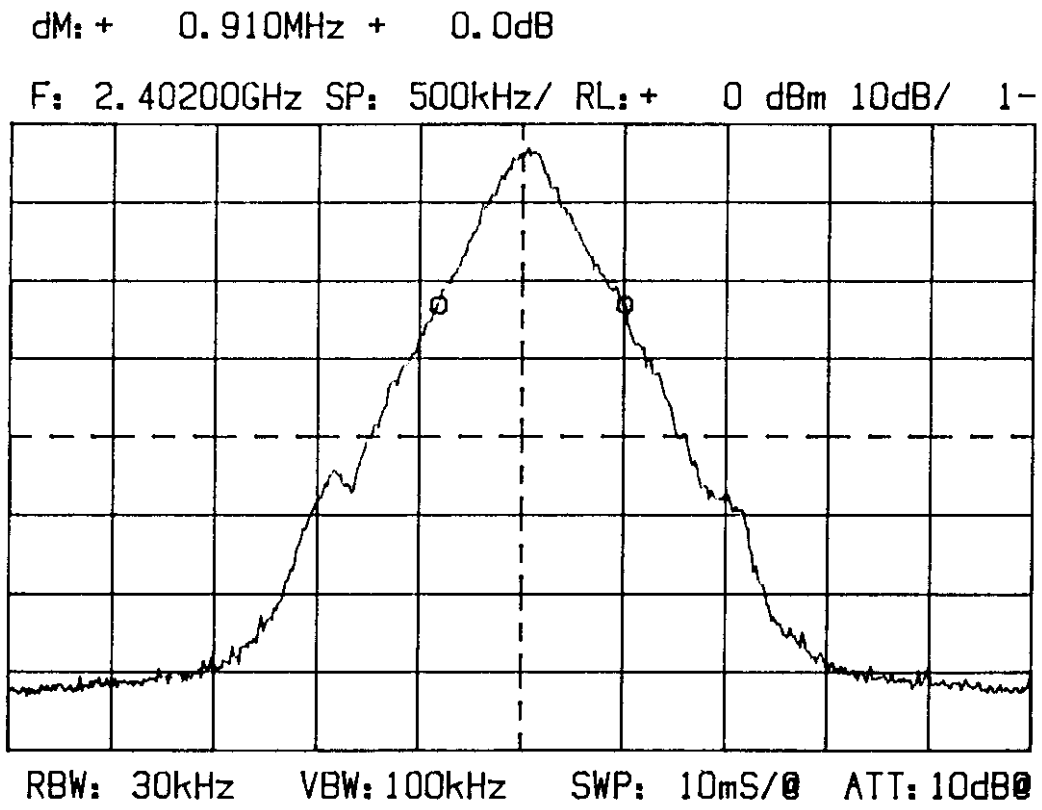
Plot 3.2.6

Occupied bandwidth test results with 4FSK type of modulation



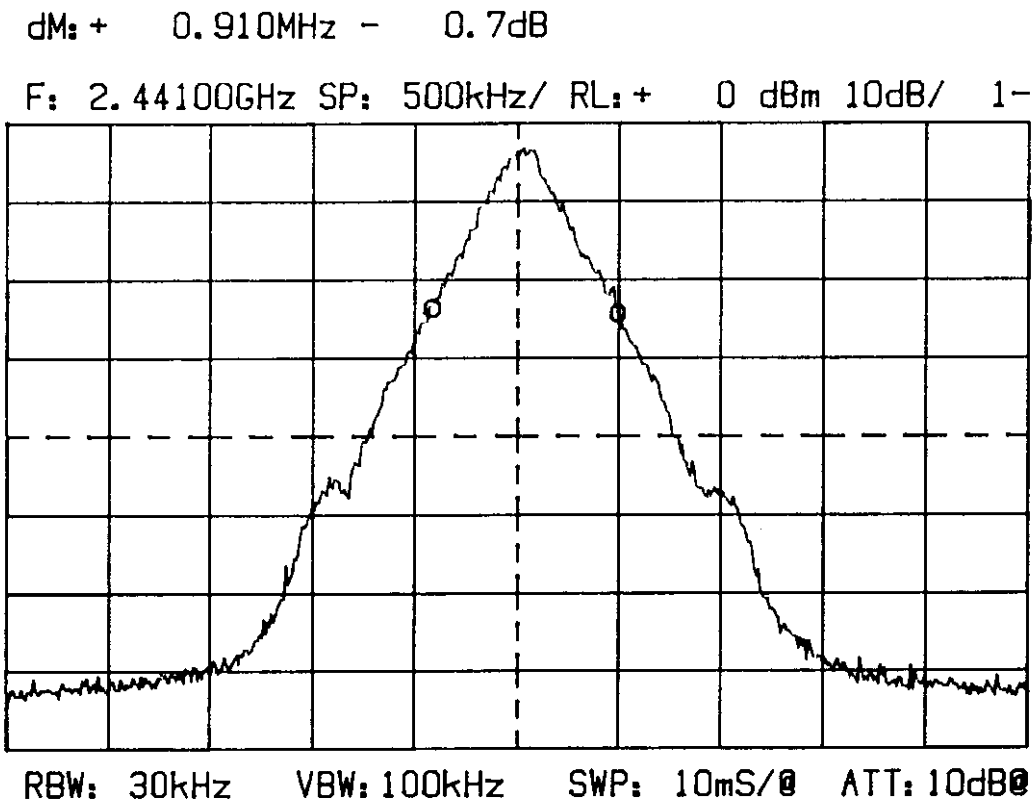
Plot 3.2.7

Occupied bandwidth test results with 8FSK type of modulation



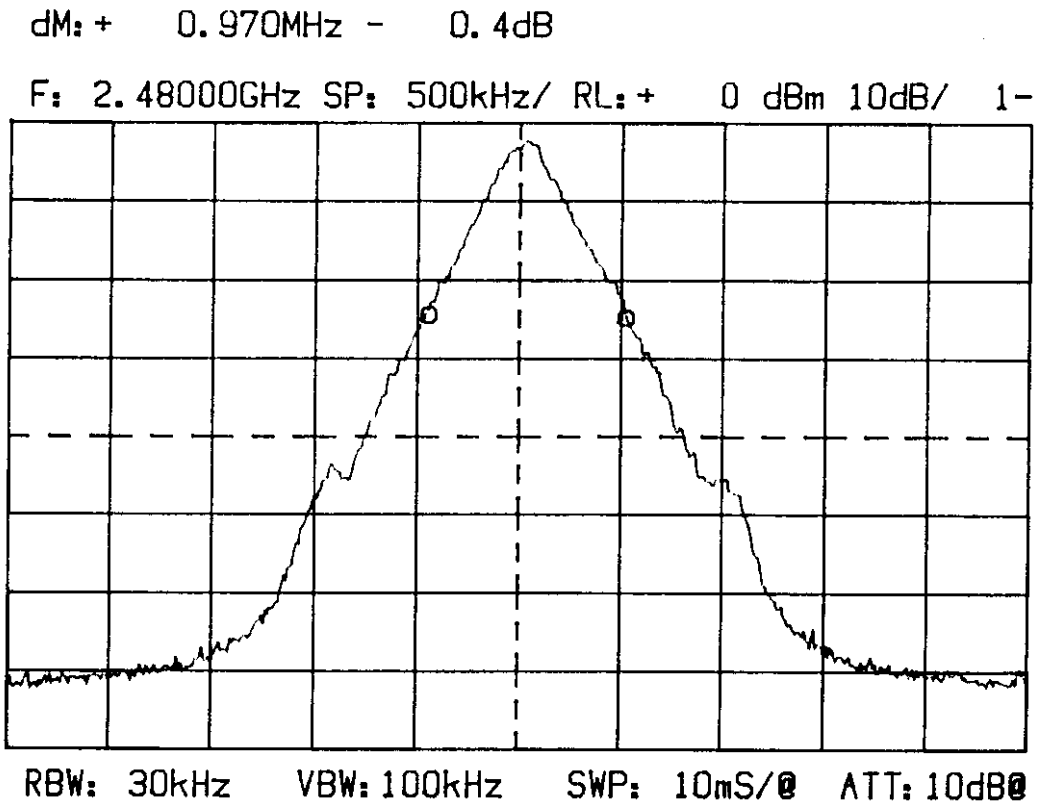
Plot 3.2.8

Occupied bandwidth test results with 8FSK type of modulation



Plot 3.2.9

Occupied bandwidth test results with 8FSK type of modulation



3.3 Average factor (duty cycle correction) test § 15.35

3.3.1 Definition of the test

The test was performed to define total time of transmitting energy occupancy during any 100 msec time interval.
This average factor is the actual transmission of the EUT during this 100 msec time interval.

3.3.2 Test results

The average factor is given in Table 3.3.1 below:

Dwell time		**20 msec**
Average packet length		**500 byte**
Average Tx duration		**2.12 msec**
Duration at 100 msec	**= average Tx duration * (100 / dwell time)**	**10.6 msec**
Duty cycle	**= (average Tx duration) / (dwell time)**	**0.106**
Averaging factor	**= 20 * LOG10 (calculated duty cycle)**	**-19.49 dB**

Note: the manufacturer supplied The EUT specification.

3.4 Maximum peak output power test according to § 15.247

3.4.1 Definition of the test

This test was performed to demonstrate that the maximum RF peak output power of the transmitter does not exceed one watt (30 dBm).

3.4.2 The test set-up configuration

The test setup was the same as in Test 3.1.

3.4.3 Test results

The three Plots 3.4.1 to 3.4.3 that follow this page show the maximum RF output power measured at 3 carrier (channel) frequencies (low, middle, high) with the 30 dB external to the spectrum analyzer attenuator, therefore 30 dB should be added to the plotted results. The calculation of the maximum peak output power is demonstrated in the next equation:

Measured power. + Cable loss + External attenuator = Max peak output power

Table 3.4 below gives measured output power in dBm.

Table 3.4
Transmitter output RF power test results

Frequency (GHz)	Measured power dBm	Cable loss dB	External attenuator dB	Max Peak output power dBm	Limit dB	Margin dB	Result
2.402	-11.2	0.5	30	19.3	30	10.7	Pass
2.441	-10.6	0.5	30	19.9	30	10.1	Pass
2.480	-11.1	0.5	30	19.4	30	10.6	Pass

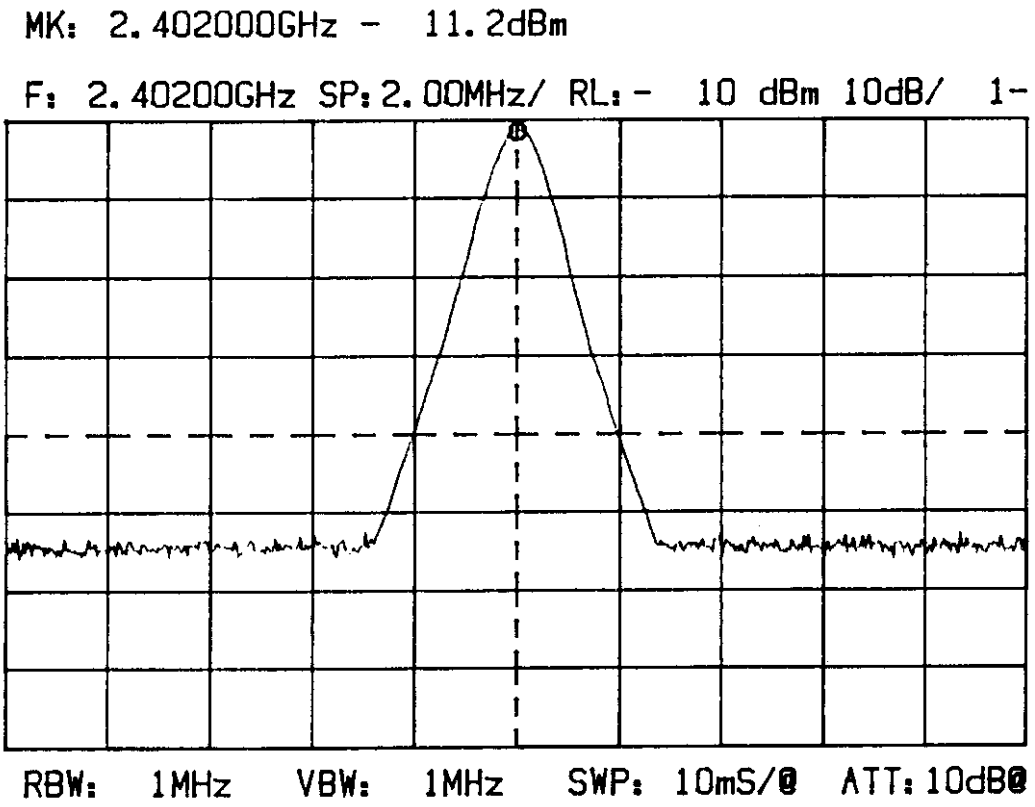
Reference numbers of test equipment used

HL 0025	HL 0056

Full description is given in Appendix A.

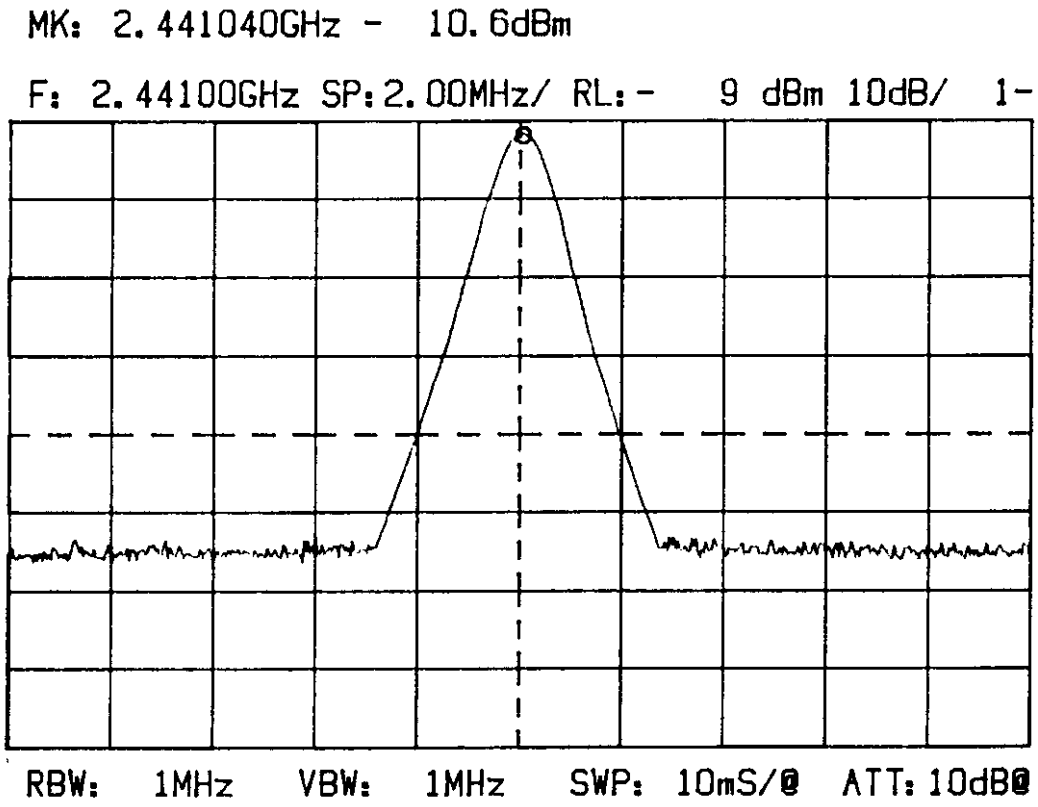
Plot 3.4.1

Maximum peak output power test results



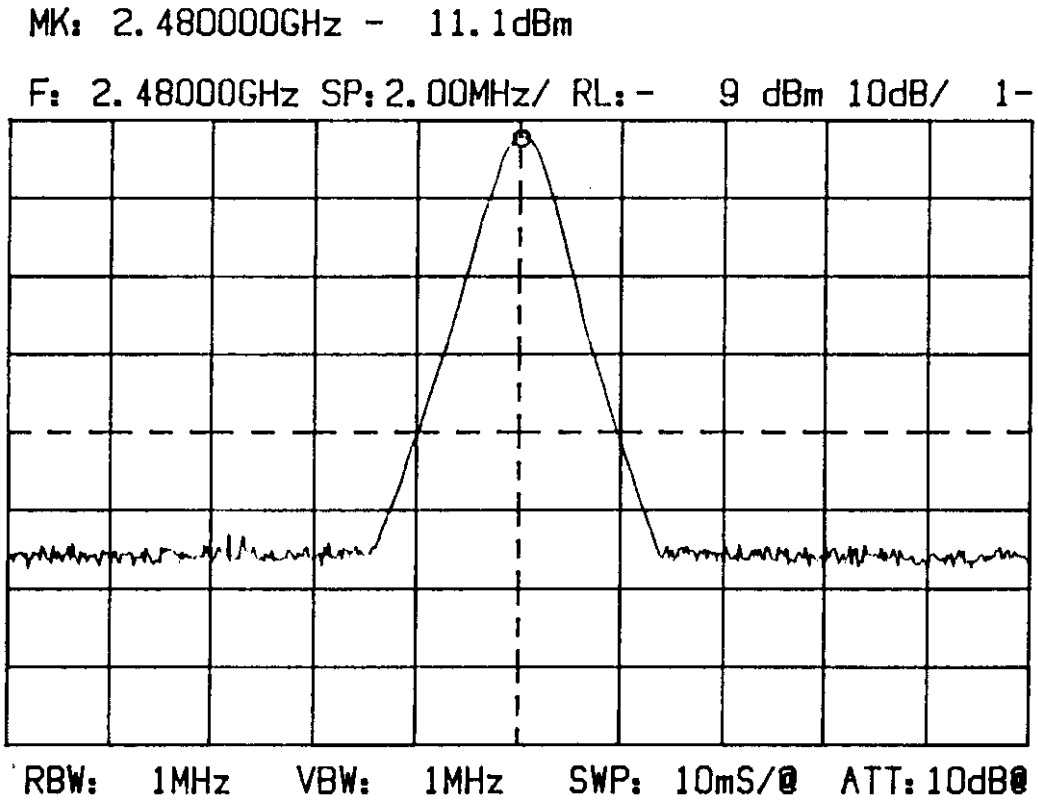
Plot 3.4.2

Maximum peak output power test results



Plot 3.4.3

Maximum peak output power test results



3.5 Out of band antenna conducted emissions test according to §15.247

3.5.1 Definition of the test

This test was performed to prove that the EUT out-of-band emissions in any 100 kHz bandwidth outside 2.402 to 2.480 GHz are at least 20 dB below maximum power content as measured in any 100 kHz bandwidth within the band that contains the highest level of the desired power.

3.5.2 The test set-up configuration

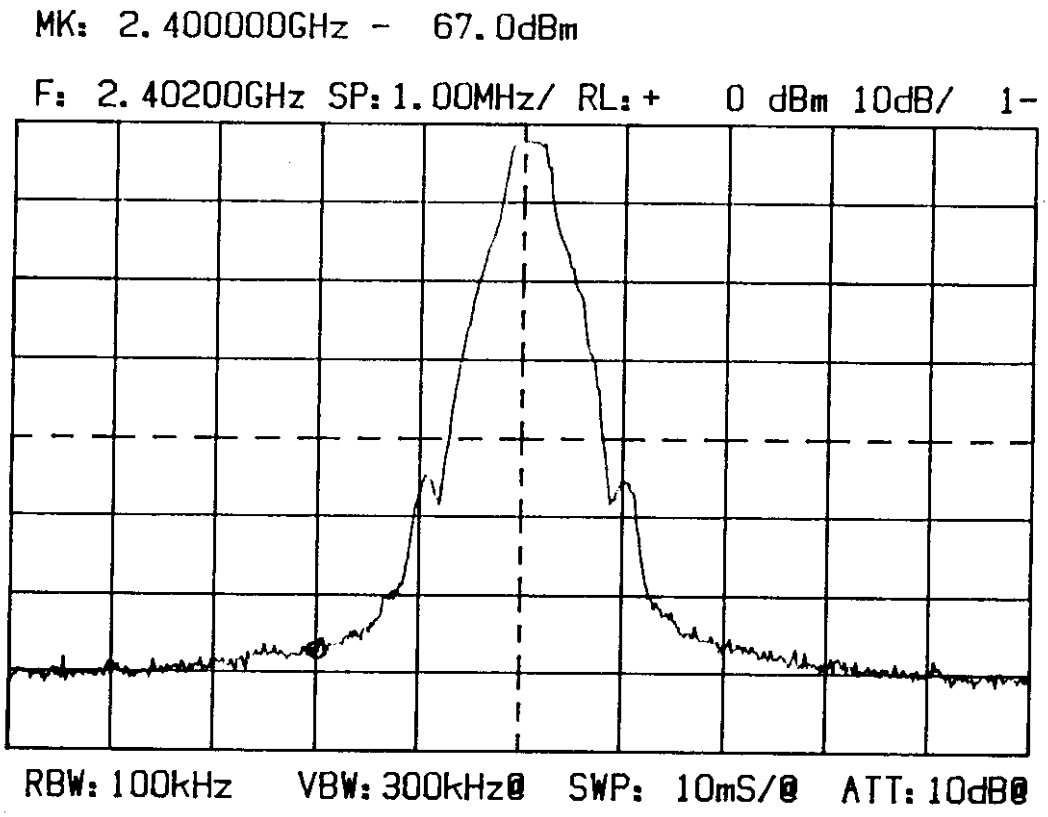
The test setup was the same as in Test 3.1.

3.5.3 Test results

The test was performed with transmitter operating at 3 carrier (channels) frequencies 2402, 2441 and 2480 MHz. The measurements were performed from 30 MHz to the 10^{th} harmonic. Plots 3.5.1 and 3.5.2 show the in-band signal (2.402 and 2.480 GHz). Plots 3.5.3 to 3.5.11 show that the out of bands measured signals were more than 20 dBc.

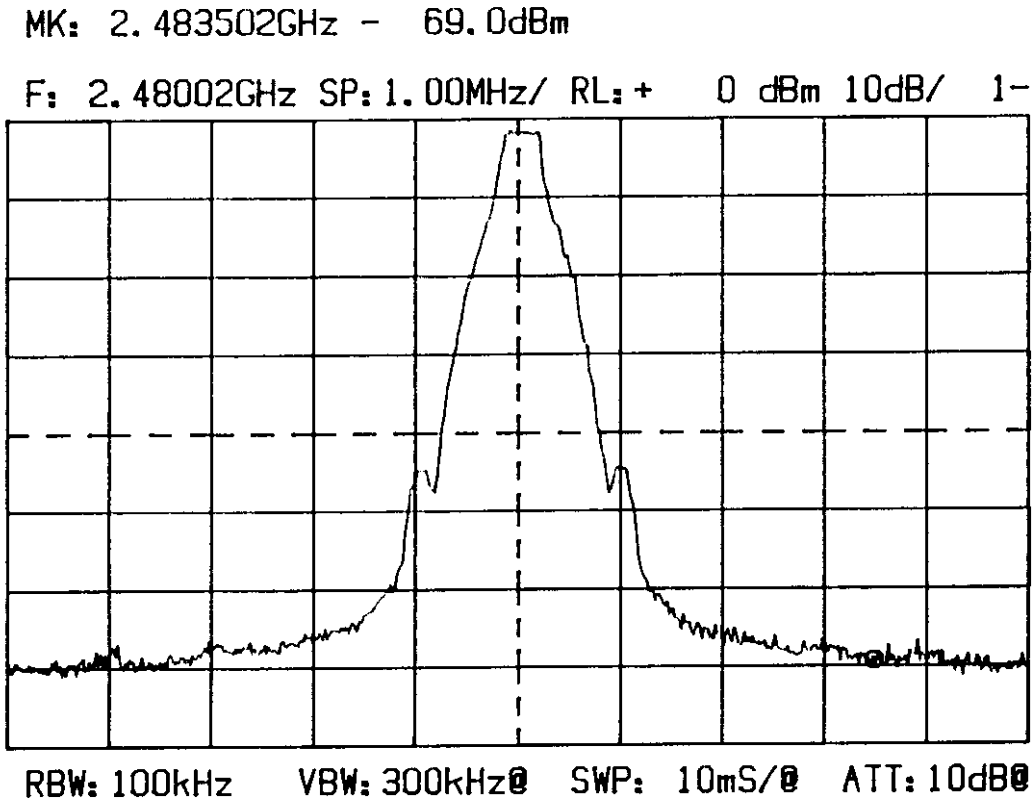
Plot 3.5.1

In band signal at frequency: 2.402 GHz



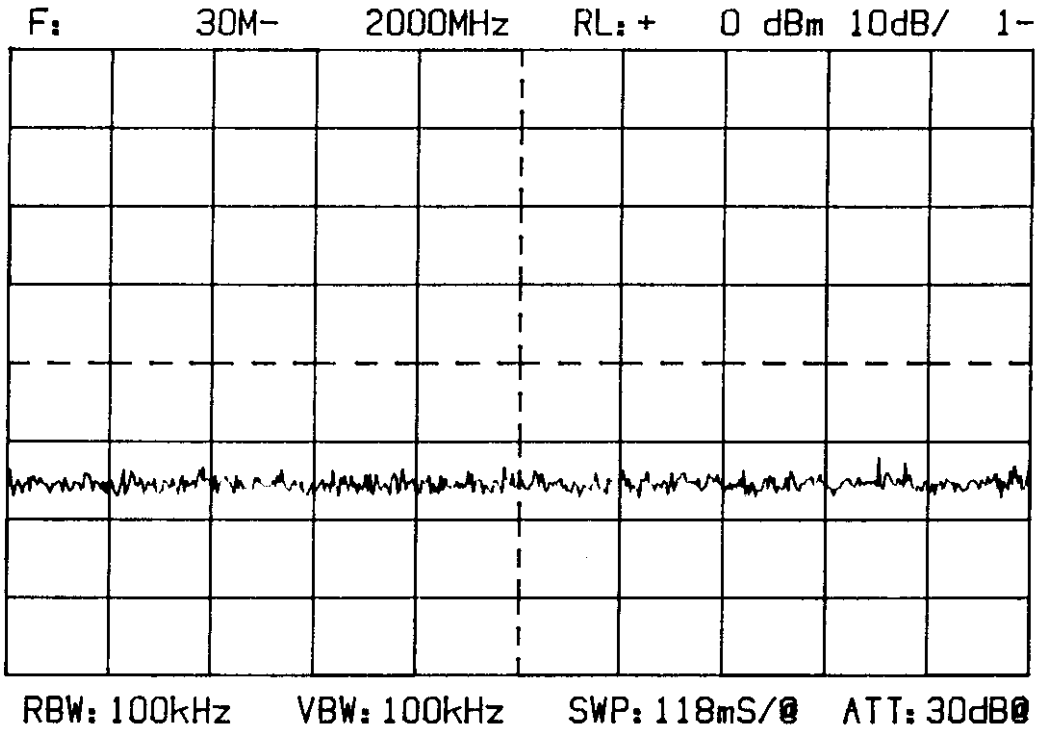
Plot 3.5.2

In band signal at frequency: 2.480 GHz



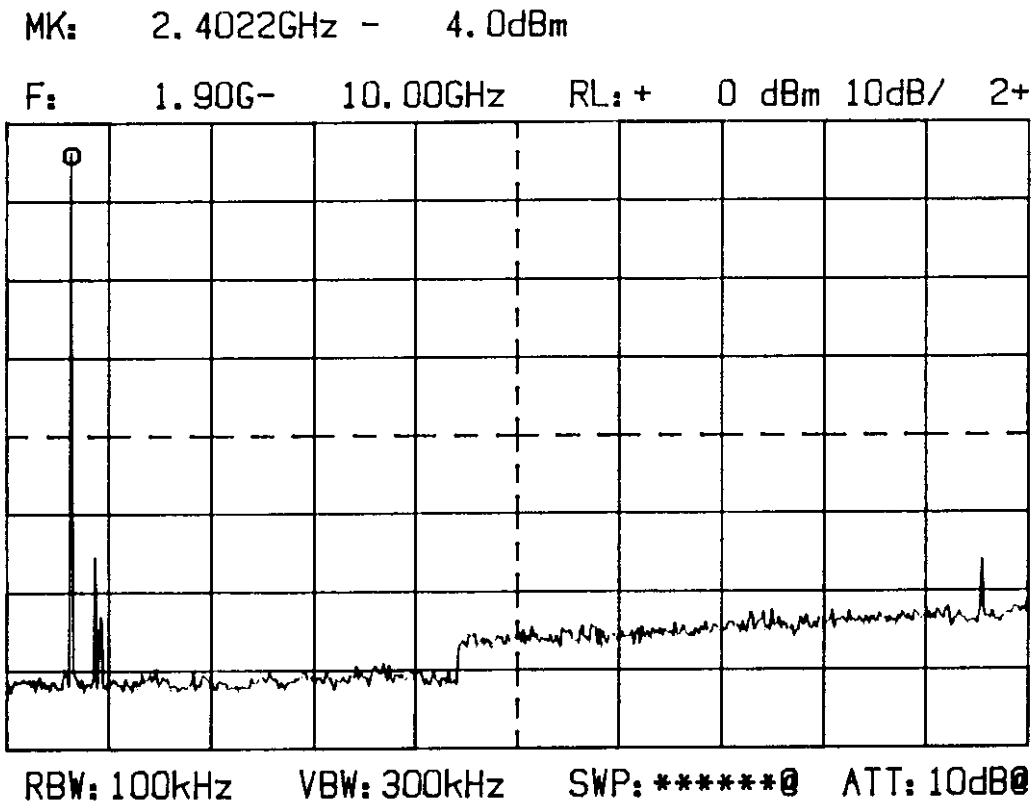
Plot 3.5.3

Out-of-band test results
Frequency: 2.402 GHz



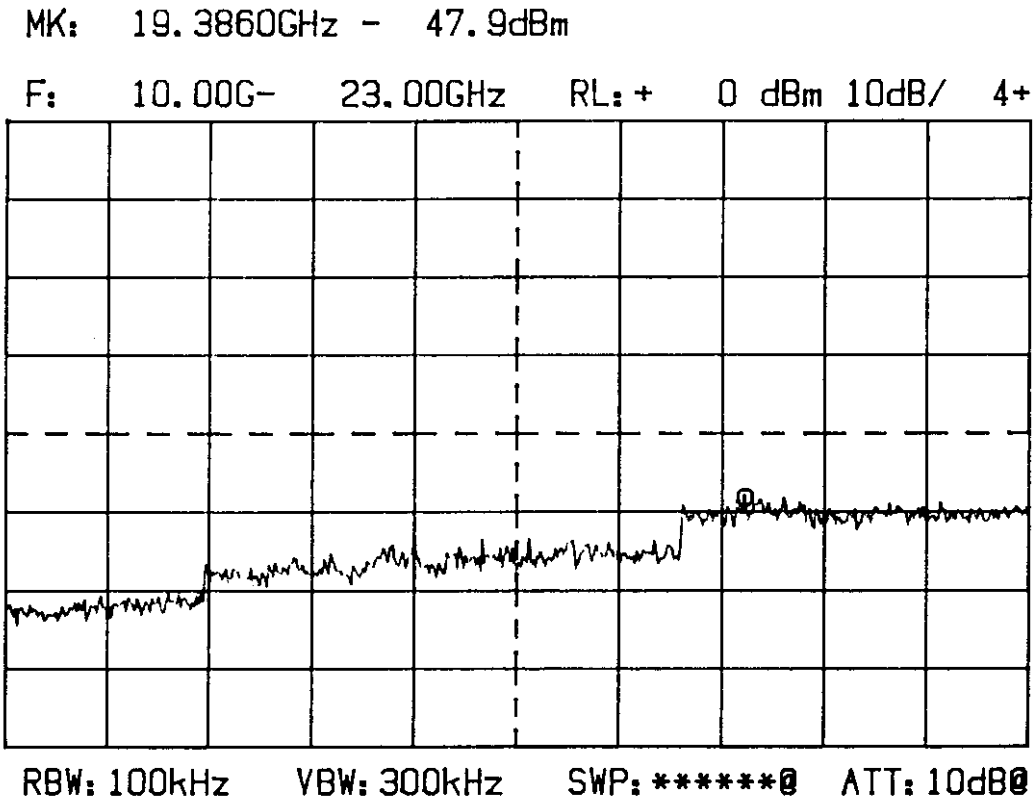
Plot 3.5.4

Out-of-band test results
Frequency: 2.402 GHz



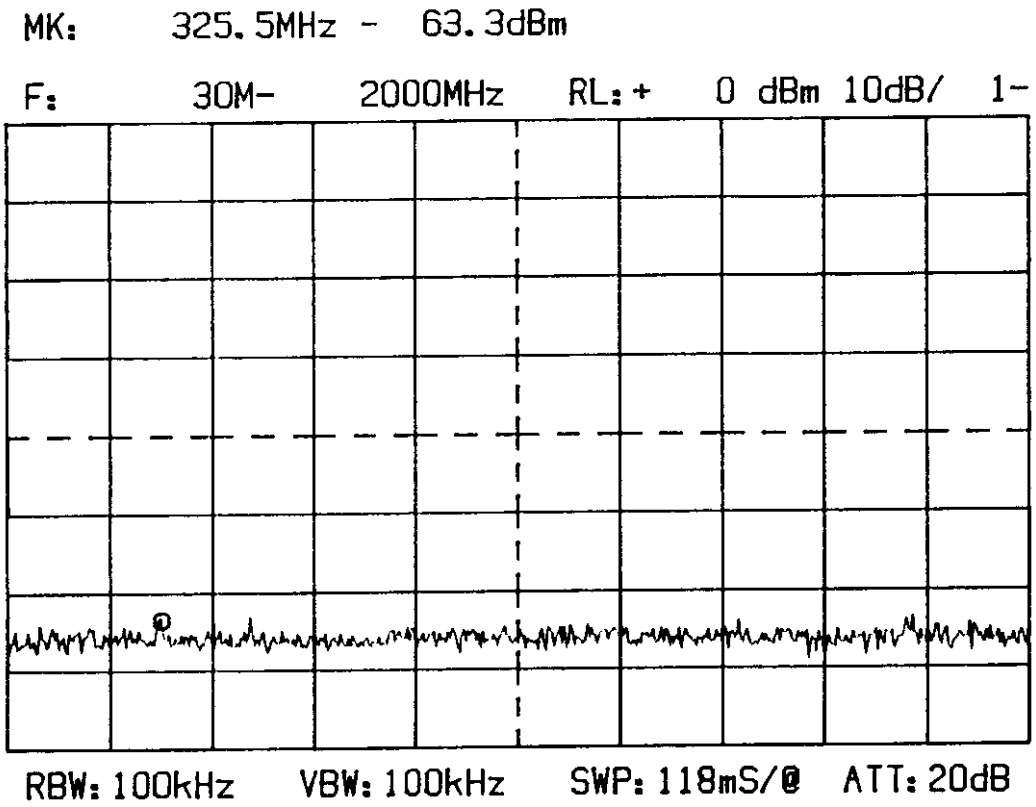
Plot 3.5.5

Out-of-band test results
Frequency: 2.402 GHz



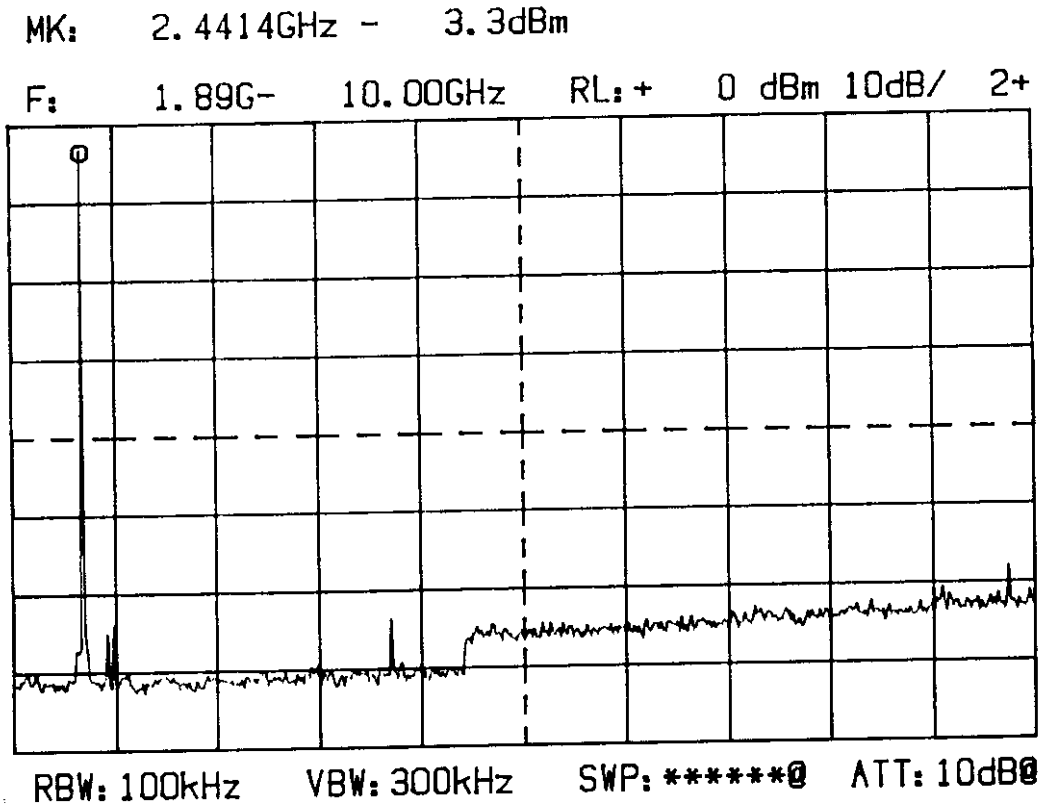
Plot 3.5.6

Out-of-band test results
Frequency: 2.441 GHz



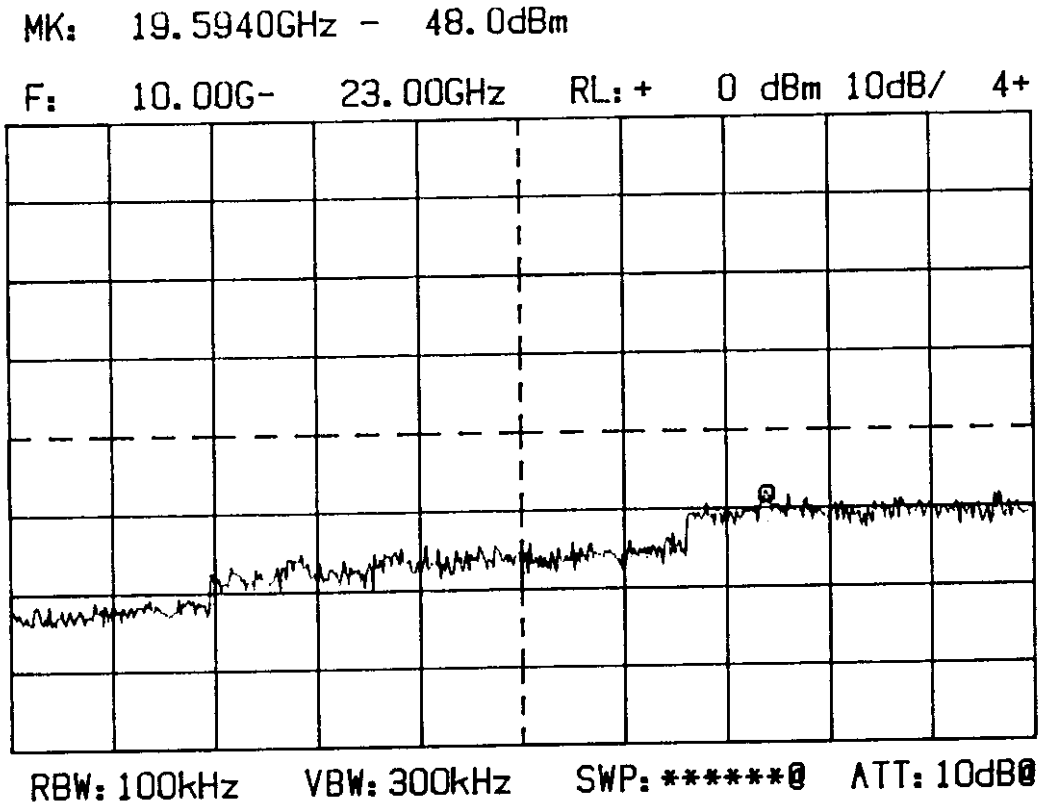
Plot 3.5.7

Out-of-band test results
Frequency: 2.441 GHz



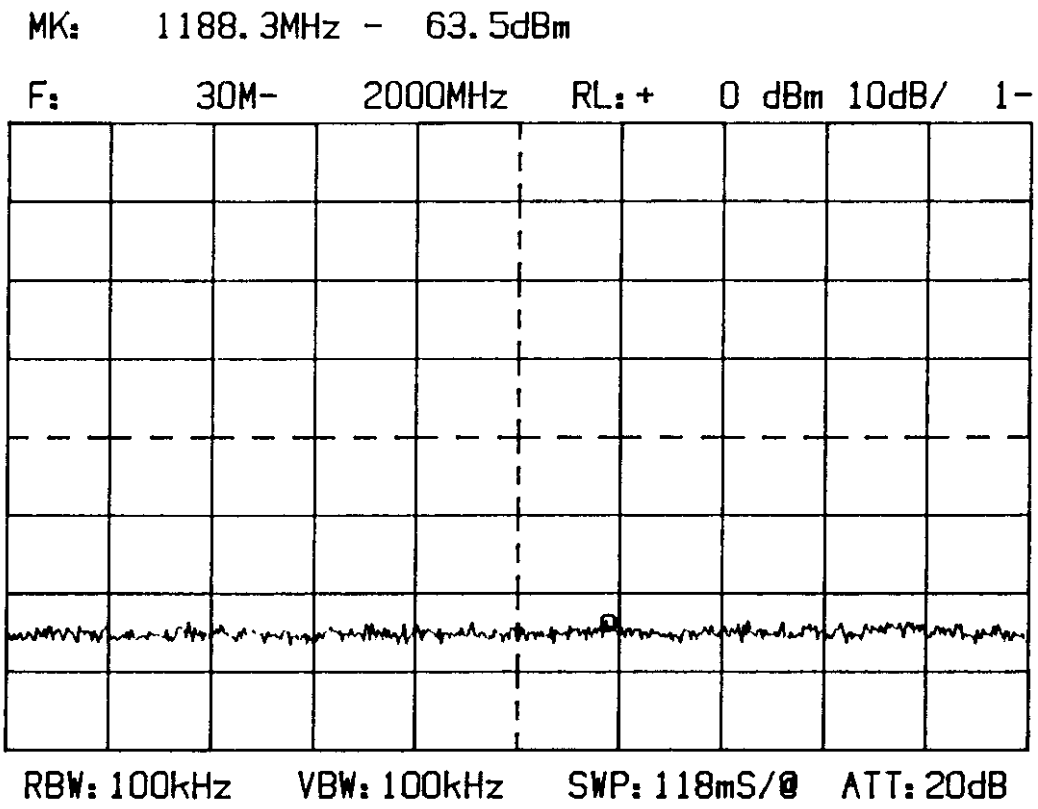
Plot 3.5.8

Out-of-band test results
Frequency: 2.441 GHz



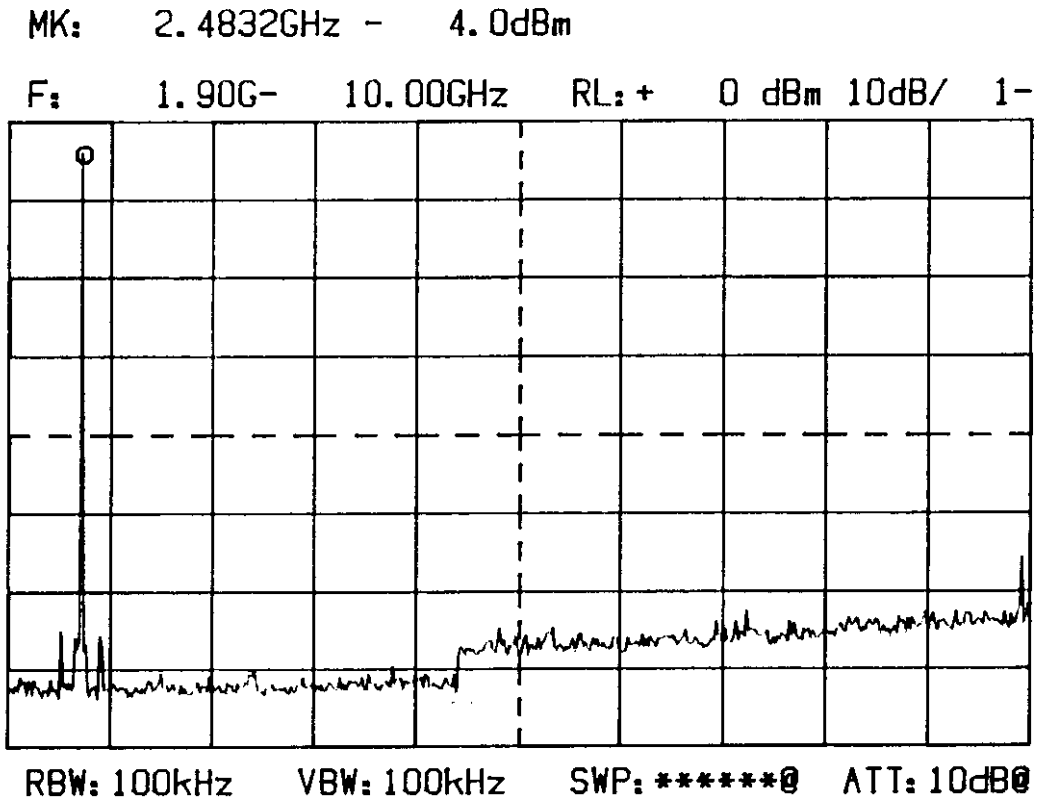
Plot 3.5.9

Out-of-band test results
Frequency: 2.480 GHz



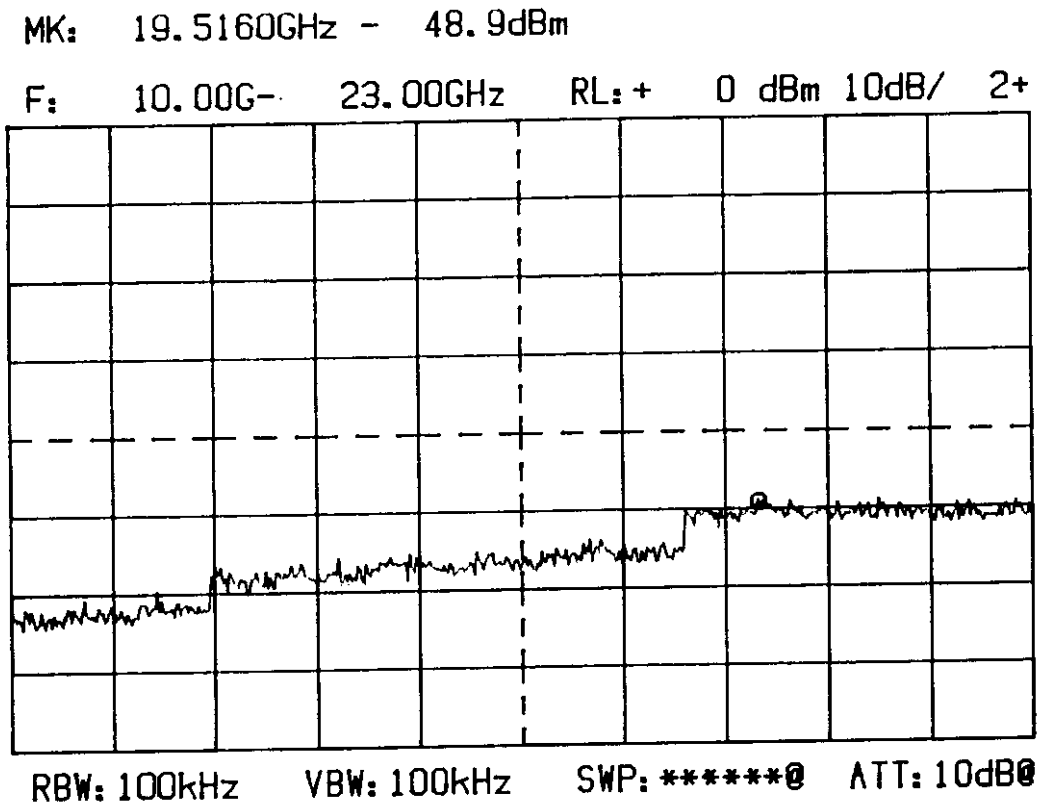
Plot 3.5.10

Out-of-band test results
Frequency: 2.480 GHz



Plot 3.5.11

Out-of-band test results
Frequency: 2.480 GHz



3.6 Average time of occupancy definition according to § 15.247

3.6.1 Definition

This parameter should be checked to prove that the average time of occupancy on any frequency is not greater than 0.4 seconds within any 30 second period.

3.6.2 Calculation

The average occupancy time was calculated from the following equation:

Number of channels = 79
Dwell time = 20 msec
Duty cycle = 0.106
Average time on each channel: 30 / 79 = 0.38 sec

Average occupancy time = average time on each channel X Tx duty cycle = 0.38 X 0.106 = 0.040 sec, which is less than the required 0.4 sec.

Note: the manufacturer supplied The EUT specification.

3.7 Radiated emissions test according to § 15.205, 15.209, 15.247

3.7.1 Definition of the test

This test was performed to measure radiated emissions except carriers generated by the transmitter.

3.7.2 The test set-up configuration

The radiated emissions measurements were performed with the Biconilog antenna at 3 meters test distance and with the Double Ridged Guide antennas at 1 meter test distance. The frequency range from 30 MHz to 18 GHz was investigated.

The EUT was installed on the 0.8 m high wooden table which was on the top of the metal turntable flush mounted with the ground plane. To find the maximum radiation measuring antenna height was changed from 1 to 4 m in 30 to 1000 MHz range, and from 0.8 to 2.5 m in 1 to 18 GHz range, the turntable was rotated 360° and the antennas polarization was changed from vertical to horizontal.

3.7.3 Test measurements results

The test was performed with transmitter operating with modulation at 3 carrier (channels) frequencies 2.401, 2.441 and 2.480 GHz with the integral antenna and with the D type antenna.
The average (duty cycle correction) factor was obtained from the test in par. 3.3 of this test report. The § 15.35 (b) peak limits (20 dB above average limits) were met since the measurements were performed with peak detector function and as been seen in Tables 3.7.1.- 3.7.4.
The test results with the integral antenna are brought in Table 3.7.1 and in Plots 3.7.1 to 3.7.3.
The test results with the D type antenna are brought in Table 3.7.2 and in Plots 3.7.4 to 3.7.6.
Emissions found in 30 - 1000 MHz range were due to the incorporated digital device and are brought in section 3.8 of this test report.
The 1m limit was calculated from the following equation:
1m limit = Specified 3 meter limit + 20 Log 3/1 = 54 + 9.5 = 63.5 dB (μV/m).

Reference numbers of test equipment used

HL 0025	HL 0041

Full description is given in Appendix A.

Table 3.7.1 Radiated emission (modulated carrier) measurements test results with the D type antenna

TEST SPECIFICATION: FCC part 15 subpart C § 15.209(a)
COMPANY: Breezcom Ltd.
EUT: SA-PCD / SA-PCR
DATE: January 13, 1998
Relative Humidity: 68%
Ambient Temperature: 20°C

MEASUREMENTS PERFORMED AT 1 METRES DISTANCE

Freq. (GHz)	Detector Type	RBW/ VBW	Measured Result dB (μV)	Antenna Factor dB (1/m)	Cable loss dB	Average Factor dB	Radiated Emissions dB (μV/m)	Calculated Limit 1m dB (μV/m)	Spec. Margin dB	Pass/ Fail
4.804	Peak	1 MHz/ 1 MHz	40.2	34.5	1.4	-19.49	56.61	63.5	6.89	Pass
4.882	Peak	1 MHz/ 1 MHz	39.4	34.5	1.4	-19.49	55.81	63.5	7.69	Pass
4.960	Peak	1 MHz/ 1 MHz	39.2	34.9	1.4	-19.49	56.01	63.5	7.49	Pass

Notes to Table:

Antenna Type = Ridged guide horn
Antenna polarization = Vertical
Radiated Emission dB(μV/m) = Measured Results dB(μV) + Correction Factor dB(1/m)- Amplifier Gain + Average Factor (During the measurements the received emissions were amplified)
Correction Factor = Antenna Factor + Cable Loss (for Antenna Factor and Cable Loss refer to Appendix B).
Average Factor = -19.49 dB (see Table 3.3.1).

Table Abbreviations:

RBW = Resolution Bandwidth
VBW = Video Bandwidth
Spec. Margin = Specification Margins = dB below (negative if above) specification limit.

Test Performed by:
Mrs. Eleonora Pitt, test engineer

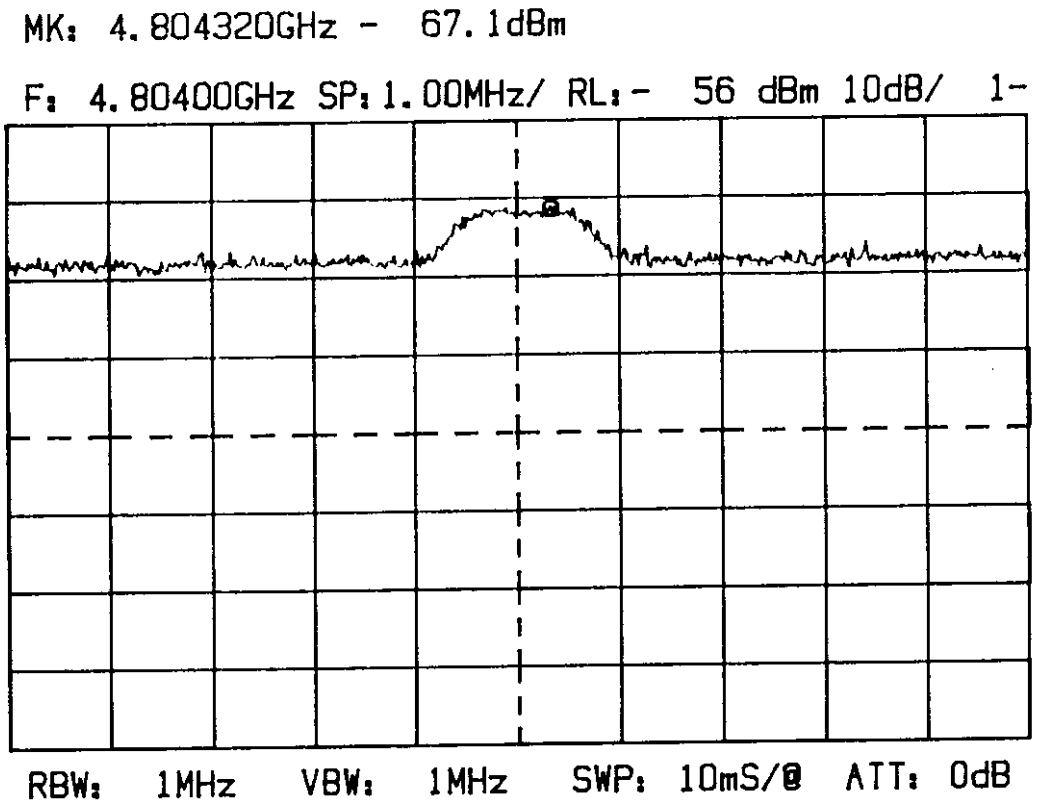
Hermon Labs

Customer Representative Person:
Mr. Itzik Raiskin, project manager

Breezcom Ltd.

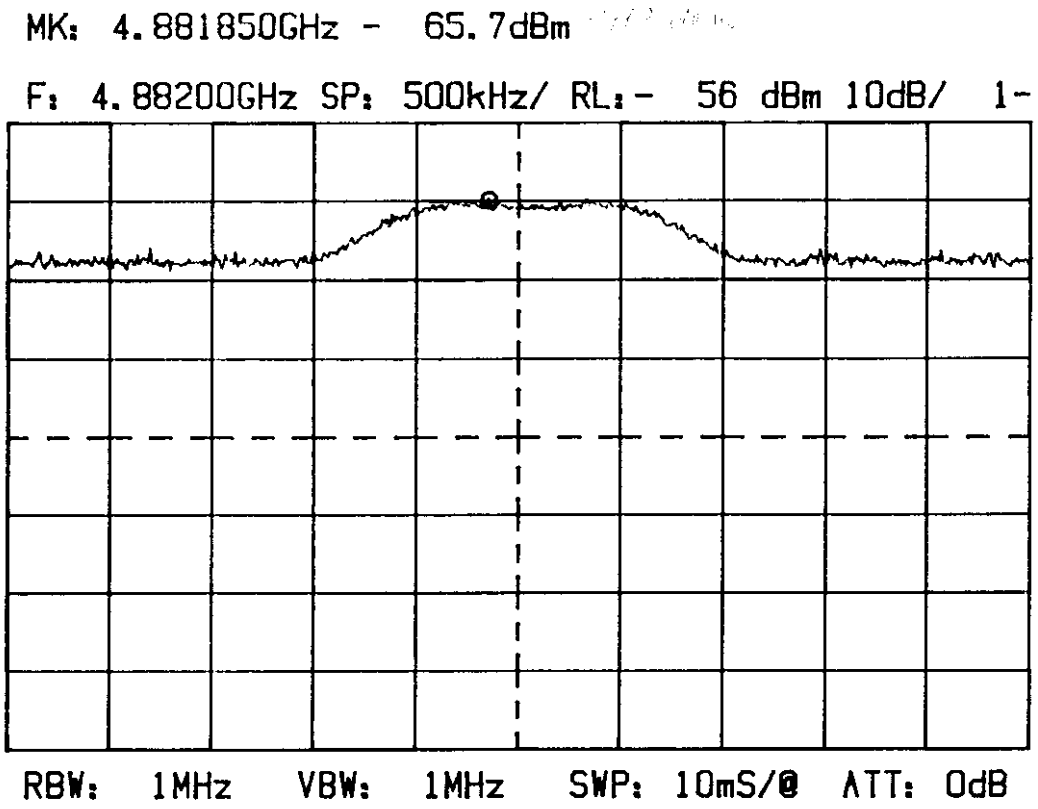
Plot 3.7.1

Radiated emission measurements test results with the integral antenna



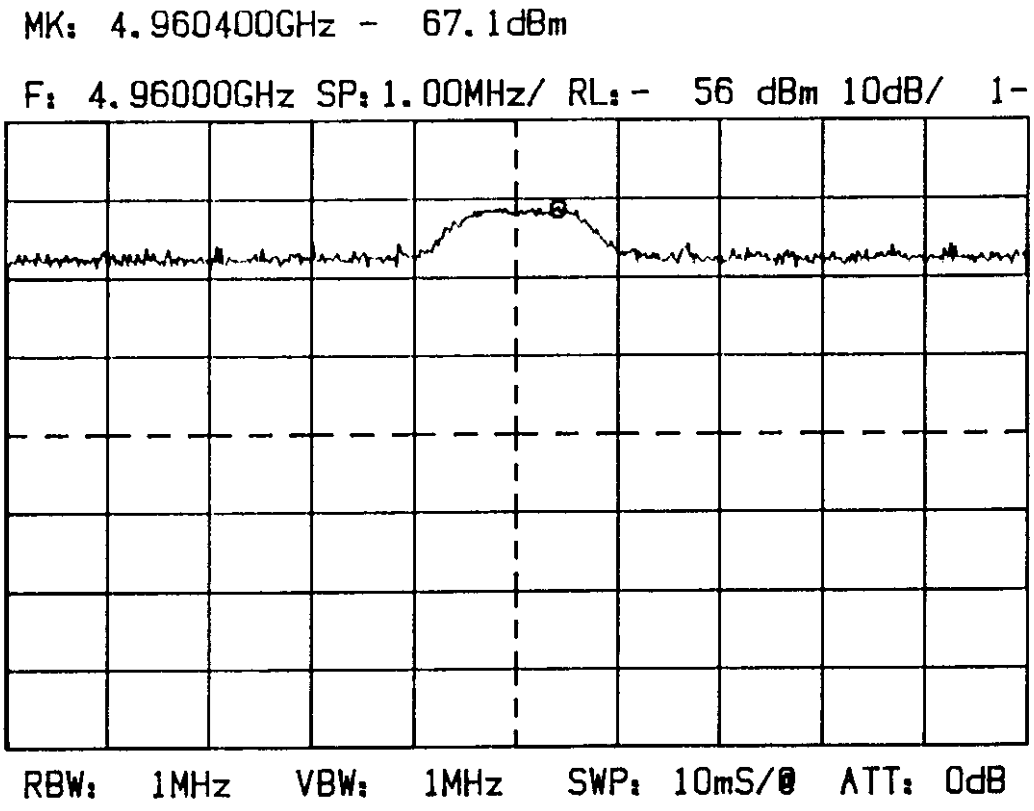
Plot 3.7.2

Radiated emission measurements test results with the integral antenna



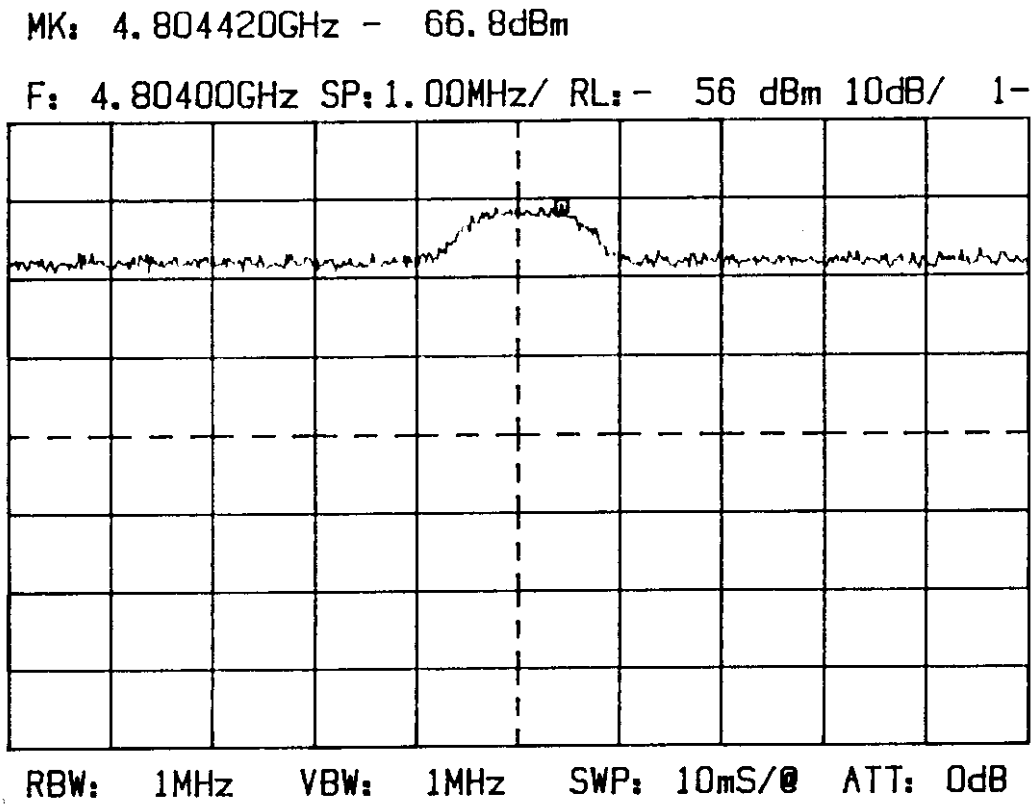
Plot 3.7.3

Radiated emission measurements test results with the integral antenna



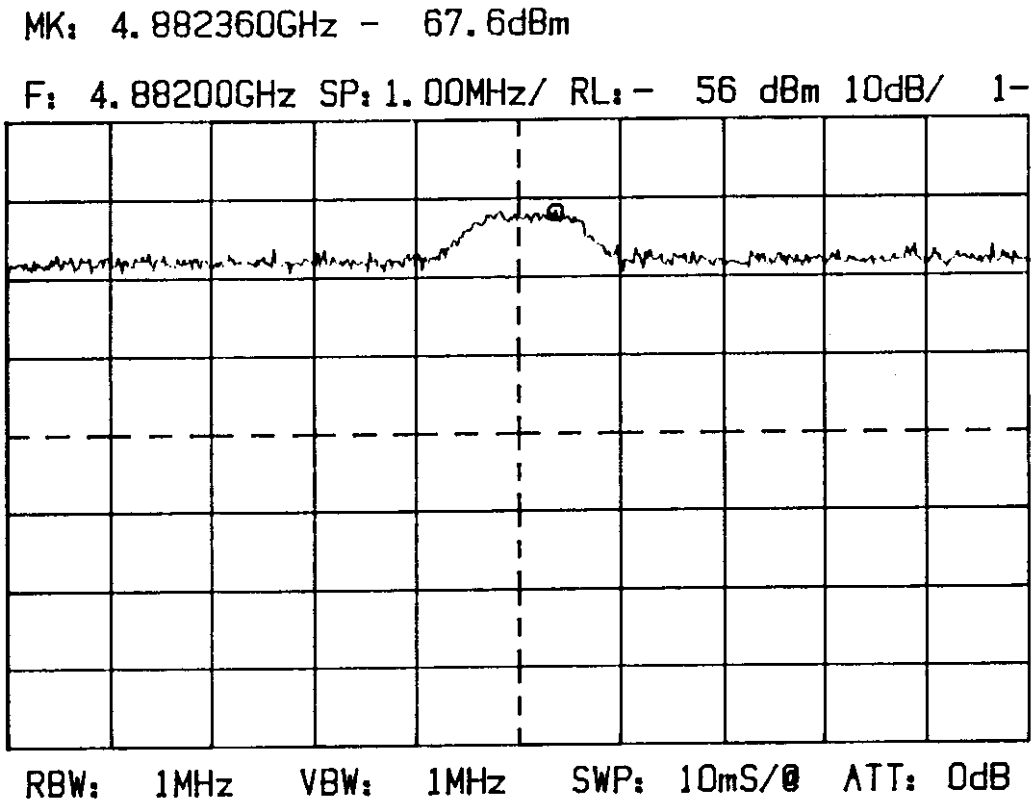
Plot 3.7.4

Radiated emission measurements test results with the D type antenna



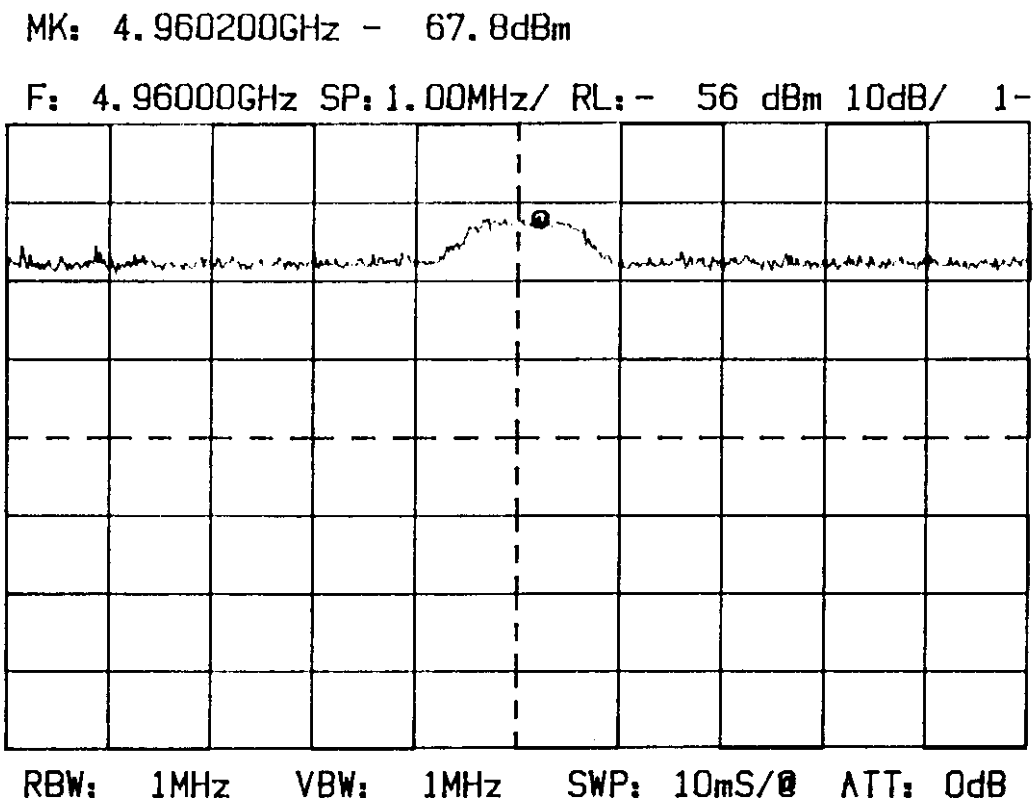
Plot 3.7.5

Radiated emission measurements test results with the D type antenna



Plot 3.7.6

Radiated emission measurements test results with the D type antenna



3.8 Unintentional Radiated emissions (class B digital device) test according to §15.109

3.8.1 Definition of the test

This test was performed to measure radiated emissions from the incorporated digital device of the EUT and also to verify the EUT full compliance with §15.109.

3.8.2 The test set-up configuration

The radiated emissions measurements of the EUT incorporated digital device in the frequency range from 30 MHz to 5 GHz were performed in the anechoic chamber at 3 meters measuring distance. The EUT was configured as shown in Figure 1.1, was placed on the wooden table as shown in Figure 3.8.1.
Biconilog and Double Ridged Guide antennas were used. To find maximum radiation the turntable was rotated 360°, the cables position was varied, the measuring antenna height changed from 1 to 4 m, and the antennas polarization was changed from vertical to horizontal. The EMI receiver settings were: RBW = 120 kHz, quasi-peak detector.

The results of measurements were recorded into Table 3.8.1.

The test results were recorded into table 3.8.1.

Reference numbers of test equipment used

HL 0038	HL 0041	HL 0275	HL 0287	HL 0465	HL 0521	HL 0604

Full description is given in Appendix A.

Table 3.8.1 Radiated Emission Measurements Test Results
frequency range 30 MHz - 1 GHz

TEST SPECIFICATION: FCC part 15 subpart B § 15.109
COMPANY: Breezcom Ltd.
EUT: SA-PCD / SA-PCR
DATE: January 14, 1998
RELATIVE HUMIDITY: 70%
AMBIENT TEMPERATURE: 24°C

MEASUREMENTS PERFORMED AT 3 METRES DISTANCE

Frequency (MHz)	Ant. Type	Ant. Pol.	Ant. Hgt. (m)	TT Pos. (°)	Radiated Emissions dB (µV/m)	Spec. Limit dB (µV/m)	Spec. Margin dB	Pass/ Fail
30.078	Biconilog	V	1	122	35.8	40.0	4.2	Pass
39.905	Biconilog	V	1	113	38.1	40.0	1.9	Pass
52.967	Biconilog	V	1	147	35.5	40.0	4.5	Pass
364.736	Biconilog	H	1	246	38.6	46.0	7.4	Pass
596.844	Biconilog	H	1	248	37.3	46.0	8.7	Pass
729.482	Biconilog	H	1	294	37.1	46.0	8.9	Pass

Notes to Table Calculations:

Measurements were performed with quasi-peak detector
Resolution bandwidth = 120 kHz
Ant. Pol. = Antenna polarization (V-vertical, H-horizontal)
Ant. Hgt. = Antenna height
TT Pos. = Turntable position in degrees, (EUT front panel = 0°)
Spec. Margin = Specification Margins = dB below (negative if above) specification limit.

Test performed by:
Mr. Michael Feldman, technician

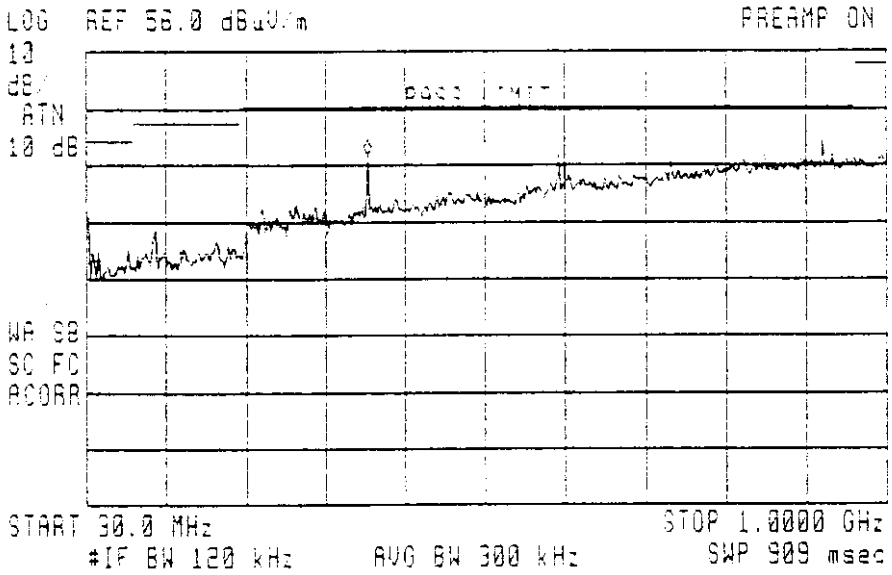
Hermon Labs

Customer representative person:
Mr. Itzik Raiskin, project manager

Breezcom Ltd.

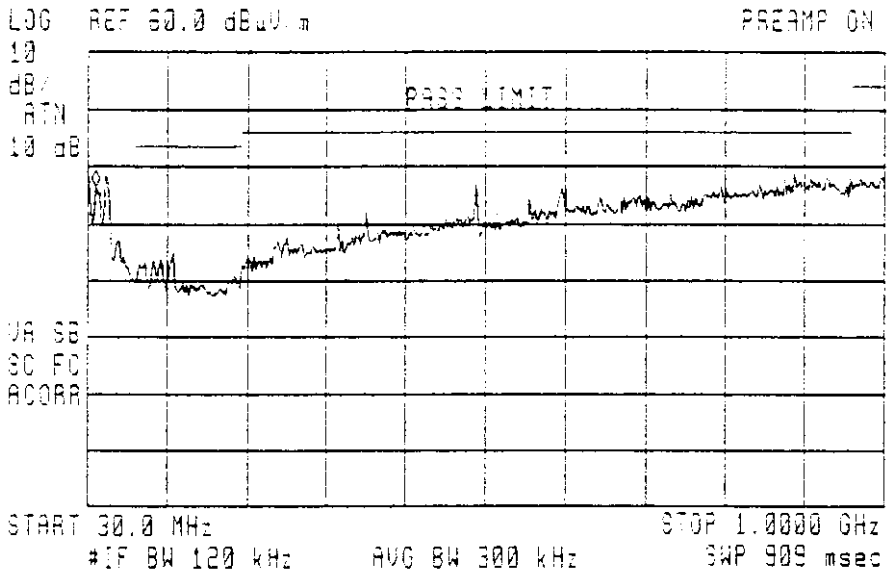
Plot 3.8.1

Radiated emission measurements test results in horizontal polarization



Plot 3.8.2

Radiated emission measurements test results in vertical polarization



Plot 3.8.3

Radiated emission measurements test results

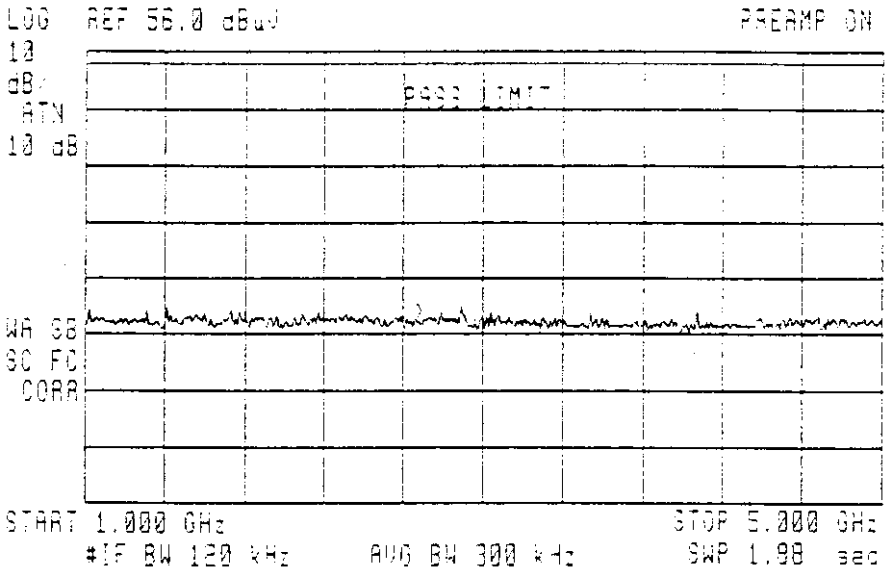
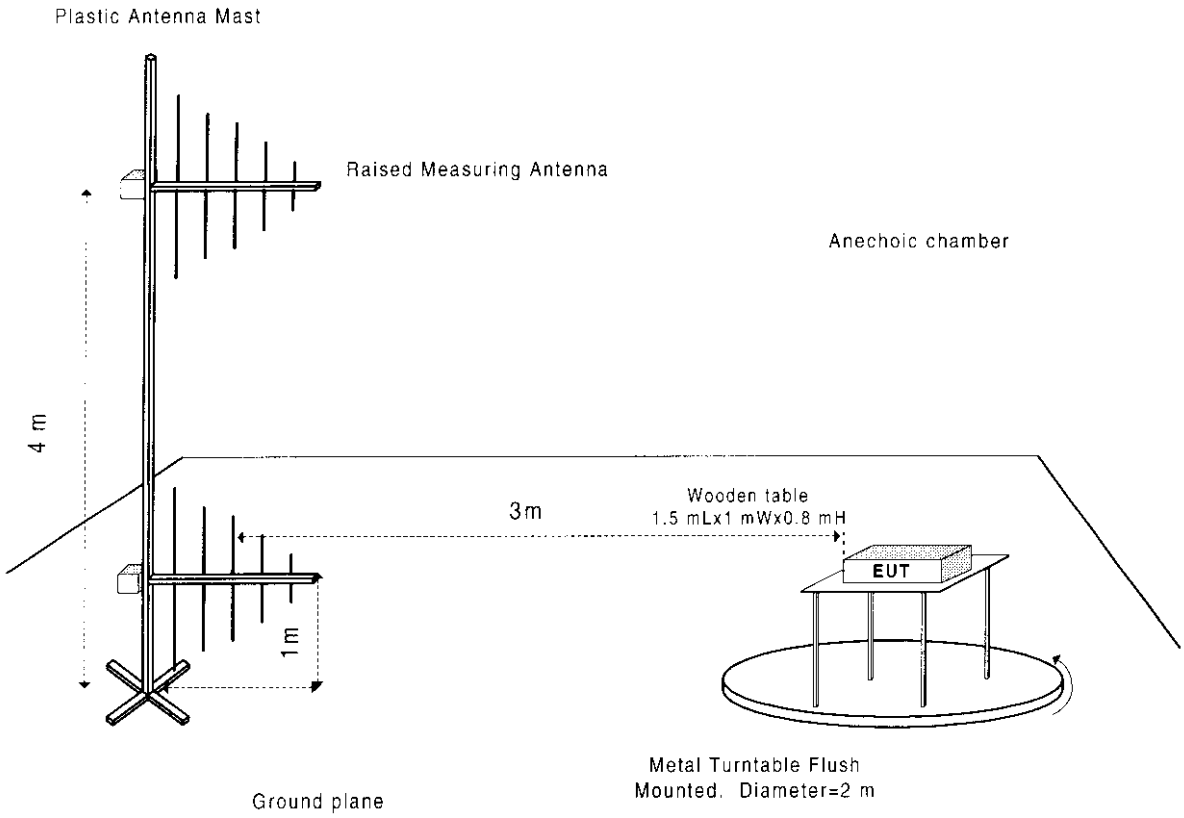


Figure 3.8.1

Radiated Emission Test Setup



4 Summary and Signatures

The SA-PCD / SA-PCR was found to be in compliance with the limits of FCC part 15 subpart C § 15.205, § 15.209 (a),§ 15.247 and Subpart B, § 15.109.

Test performed by:

Mr. Michael Feldman, technician

Mrs. Eleonora Pitt, test engineer

Approved by:

Dr. Edward Usoskin, C.E.O.

Responsible Person from Breezcom Ltd.

Mr. Itzik Raiskin, project manager

APPENDIX A - Test equipment and ancillaries used for tests

HL Serial No.	Serial No.	Description	Manufacturer	Model No.	Due Calibr.
0013	0194	RF Amplifier, 10 kHz-1 GHz	Electro-Metrics	BPA 1000	4/99
0025	5837	Spectrum Analyzer, 10 kHz-23 GHz	Anritsu	MS-710C	8/98
0026	3460	Spectrum Analyzer, 100 Hz-2.2 GHz	Anritsu	MS 2601A	8/98
0027	4838	Spectrum Analyzer, 50 Hz-2 GHz	Anritsu	MS-611A	10/98
0028	4147	Interference Analyzer, 9KHz-1GHz	Electro-Metrics	EMC 30MKIV	7/98
0032	3577	Biconical Antenna, 20-200 MHz	Electro-Metrics	BIA-25/30	4/99
0033	3185	Spiral Log Conical Antenna, 200-1000 MHz	Electro-Metrics	LCA-25/30	4/99
0034	1988	Log Periodic Antenna, 200 - 1000 MHz	Electro-Metrics	LPA 25/30	4/99
0038	0038	Antenna Mast, 1-4 m	Hermon Labs built	NA	NA
0040	0143	Remote Active Vertical Antenna, 0.01 - 100 MHz	Electro-Metrics	RVA 30	7/98
0041	2811	Ridged Guide Horn Antenna, 1-18 GHz	Electro-Metrics,	RGA 50/60	7/98
0054	2320	Attenuator, 50 Ohm, 2 W, 0 - 18 GHz, 20 dB	Hewlett Packard	8492A	6/98
0140	0206	Synthesized RF Signal Generator,10 kHz-1.05 Hz	Fluke	6061A	4/99
0147	0147	Surge Generator, 0-5 kV accord. EN 61000-4-5	Hermon Labs	NA	12/98
0163	1314	LISN, 9kHz-100MHz	Electro-Metrics	ANS-25/2	11/97
0174	1602	Isotropic Field Monitor, 10 kHz-1 GHz, 1-300V/m	Amplifier Research	FM1000	1/99
0185	1765	Graphics Plotter	Hewlett Packard	7475A	NA
0189	0028	RF Power Meter, 25 MHz - 1 GHz	Rhode & Schwarz	NAUS4	12/98
0270	0270	Tem Cell 60 x 50 x 50 cm	Hermon Labs	NA	NA
0275	0275	Wooden Table, 1.5 x 1.0 x 0.8	Hermon Labs	NA	NA
0287	0287	Metal Turntable Flash Mount	Hermon Labs	NA	NA
0301	2242	Absorbing Clamp, 30-1000 MHz	Robert Luthi Gmbh	MDS-21	2/99
0309	3681	Function Generator	Hewlett Packard	3310A	2/99

HL Serial No.	Serial No.	Description	Manufacturer	Model No.	Due Calibr.
0315	0548	Oscilloscope Meter, 50 MHz	Fluke	97	12/98
0327	9130	Tripod Non Metallic	Electro Metrics	TRP 125/136	NA
0349	2323	RF Amplifier, 10 kHz-220 MHz, 150 W	Amplifier Research	150L	11/98
0350	2601	E-Field Generator Antenna, 10 kHz-30 MHz	Amplifier Research	AT 3000	9/98
0358	2875	High Voltage Power Supply, 0-5 kV DC, 0-4 kV AC	Beckman	P-2B256	9/98
0375	0375	Injection Transformer	Hermon Labs	NA	5/98
0376	0376	RF Amplifier 500-1000 MHz, 120 W	Hermon Labs	AMP 0.5-1G 120 W	11/98
0378	0378	RF Amplifier, 1-1000 MHz	Hermon Labs	HL-0002	11/98
0400	0009	Loop Antenna 20 Hz- 2 MHz	Hermon Labs	200/560	2/99
0436	0436	Leakage and Breakdown Voltage Source	Hermon Labs built	HL-L8	12/97
0446	2857	Active Loop Antenna 10 kHz-30 MHz	Electro-Mechanics, 6502	6502	2/98
0447	0447	LISN, 300 V RMS, 16/2	Hermon Labs	NA	11/97
0465	0465	Anechoic Chamber 9 mL x 6.5 mW x 5.5 mH	Hermon Labs	NA	5/99
0466	0466	Shielded Room 3 mL x 3 mW x 2.4 mH	Hermon Labs	NA	5/99
0472	0472	Set-up for ESD accord. IEC 801-2	Hermon Labs	NA	4/99
0480	0916	Power Supply System 60V/50A/1000W	Hewlett Packard	6032	12/98
0483	1325	Oscilloscope Digitizing, 100 MHz	Hewlett Packard	54501A	04/99
0490	4733	High Voltage Tester	Slaughter	103/105-5	12/98
0511	0511	Generator ESD	Schaffner	NSG 435	4/99
0513	3009	Generator EFT/B	Schaffner	NSG 1025	4/99
0514	4916	Current Probe	Solar Electronics	Type 6741-1	12/98
0521	0319	Spectrum Analyzer with RF filter section (EMI Receiver 9 kHz - 6.5 GHz)	Hewlett Packard	8546A	7/98
0522	4300	Amplifier, 2-8 GHz LNA	MITEQ	AFDY020180 -85-WP	03/98

HL Serial No.	Serial No.	Description	Manufacturer	Model No.	Due Calibr.
0523	0523	Amplifier, 6-18 GHz LNA	MITEQ	AMT12407M	03/99
0557	080	Signal Generator	MARCONI Instruments	52023-002E	11/98
0604	1011	Antenna Log-Periodic/T Bow-Tie, 26 - 2000 MHz	EMCO	3141 BICONILOG	10/98
0608	041	Signal Generator	MARCONI Instruments	2023	1/99

APPENDIX B-Test Equipment Correction Factors

Antenna Factor
Double Ridged Guide Antenna
Electro-Metrics, Model RGA-50/60
Ser.No.2811

Frequency, MHz	Antenna Factor, dB(1/m)
1000	24.3
1500	25.4
2000	28.4
2500	29.2
3000	30.5
3500	31.6
4000	33.7
4500	32.2
5000	34.5
5500	34.5
6000	34.6
6500	35.3
7000	35.5
7500	35.9
8000	36.6
8500	37.3
9000	37.7
9500	37.7
10,000	38.2
10,500	38.5
11,000	39.0
11,500	40.1
12,000	40.2
12,500	39.3
13,000	39.9
13,500	40.6
14,000	41.1
14,500	40.5
15,000	39.9
15,500	37.8
16,000	39.1
16,500	41.1
17,000	41.7
17,500	45.1
18,000	44.3

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

Antenna Factor at 3m calibration
Biconilog Antenna EMCO Model 3141
Ser.No.1011

Frequency, MHz	Antenna Factor, dB(1/m)
26	7.8
28	7.8
30	7.8
40	7.2
60	7.1
70	8.5
80	9.4
90	9.8
100	9.7
110	9.3
120	8.8
130	8.7
140	9.2
150	9.8
160	10.2
170	10.4
180	10.4
190	10.3
200	10.6
220	11.6
240	12.4
260	12.8
280	13.7
300	14.7
320	15.2
340	15.4
360	16.1
380	16.4
400	16.6
420	16.7
440	17.0
460	17.7
480	18.1
500	18.5
520	19.1
540	19.5
560	19.8
580	20.6
600	21.3
620	21.5
640	21.2
660	21.4
680	21.9
700	22.2
720	22.2
740	22.1
760	22.3
780	22.6
800	22.7
820	22.9
840	23.1
860	23.4
880	23.8
900	24.1
920	24.1

Frequency, MHz	Antenna Factor, dB(1/m)
940	24.0
960	24.1
980	24.5
1000	24.9
1020	25.0
1040	25.2
1060	25.4
1080	25.6
1100	25.7
1120	26.0
1140	26.4
1160	27.0
1180	27.0
1200	26.7
1220	26.5
1240	26.5
1260	26.5
1280	26.6
1300	27.0
1320	27.8
1340	28.3
1360	28.2
1380	27.9
1400	27.9
1420	27.9
1440	27.8
1460	27.8
1480	28.0
1500	28.5
1520	28.9
1540	29.6
1560	29.8
1580	29.6
1600	29.5
1620	29.3
1640	29.2
1660	29.4
1680	29.6
1700	29.8
1720	30.3
1740	30.8
1760	31.1
1780	31.0
1800	30.9
1820	30.7
1840	30.6
1860	30.6
1880	30.6
1900	30.6
1920	30.7
1940	30.9
1960	31.2
1980	31.6
2000	32.0

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

FCC requirements § 2.1033 (b)(7)

DEVICE PHOTOGRAPHS

Contains 9 pages follows this page.