CETECOM Inc.

CETECOM Inc.

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Issued test report consists of 56 Pages

RECOGNIZED BY INDUSTRY CANADA

IC - 3925

Test report no.: 149B FCC/2001
FCC Part 15.247
FCC ID: B94C8925A
(HP Deskjet 995C with CSR Module)

Table of Contents

1   General information

1.1   Notes

The test results of this test report relate exclusively to the test item specified in 1.5. The CETECOM Inc. USA does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM Inc USA.

1.2   Testing laboratory

CETECOM Inc.

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E-mail: lothar.schmidt@cetecomusa.com
Internet: www.cetecom.com

1.3   Details of applicant

Name   : **Hewlett Packard Company**
Street   : **18110 SE 34th St.**
City   : **Vancouver, WA 98683**
Country   : **USA**
Telephone : **+1 360 212 0471**
Telefax   : **+1 360 212 7676**
Contact   : **Henry Benitez**
e-mail   : **Henry_benitez@hp.com**

1.4   Application details
Date of receipt of application   : 2001-04-11
Date of receipt of test item   : 2001-05-01
Date of test   : 2001-05-01/02

1.5   Test item
Manufacturer	:	applicant
Name of EUT	:	HP Deskjet 995C
Description	:	Bluetooth Wireless Printer using CSR (3Com) Module HP part # C8925-60032
Model No.	:	C8925A
Serial No.	:	N/A
FCC ID	:	B94C8925A

Additional informations: :
Frequency	:	2400 – 2483.5 MHz
Type of modulation	:	GFSK FHSS
Number of channels	:	79
Antenna	:	Integral
Power supply	:	100-240 VAC 50/60 Hz
Output power	:	-1.4 dBm
Extreme Temp. Limits	:	0°C - +60°C

1.6   Test standards: FCC Part 15 §15.247 measured according the FCC Public notice DA00-705

2   **Technical test**

2.1   **Summary of test results**

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

Technical responsibility for area of testing :

2000-05-17	**EMC& Radio**	**Lothar Schmidt**	
Date	Section	Name	Signature

2.2   Testreport

TEST REPORT

Testreport no. : 149B FCC/2001
FCC ID: B94C8925A
(HP Deskjet 995C with CSR Module)

CETECOM Inc.

TEST REPORT REFERENCE

LIST OF MEASUREMENTS

NOTE: Conducted Emissions as per § 15.107/207 are carried out and documented in the HP report 1580-E.

Antenna Gain   **SUBCLAUSE § 15.204**

The max gain is +1.74dBi

(measured effectiv radiated power – measured conducted power with a temporary RF-connector)

CARRIER FREQUENCY SEPERATION   §15.247(a)

```
         R&S      Marker 1 [T1]              RBW    30 kHz    RF Att   30 dB
                  Ref Lvl          -5.53 dBm  VBW   100 kHz
                  21.8 dBm    2.44002305 GHz  SWT   8.5 ms    Unit      dBm
```
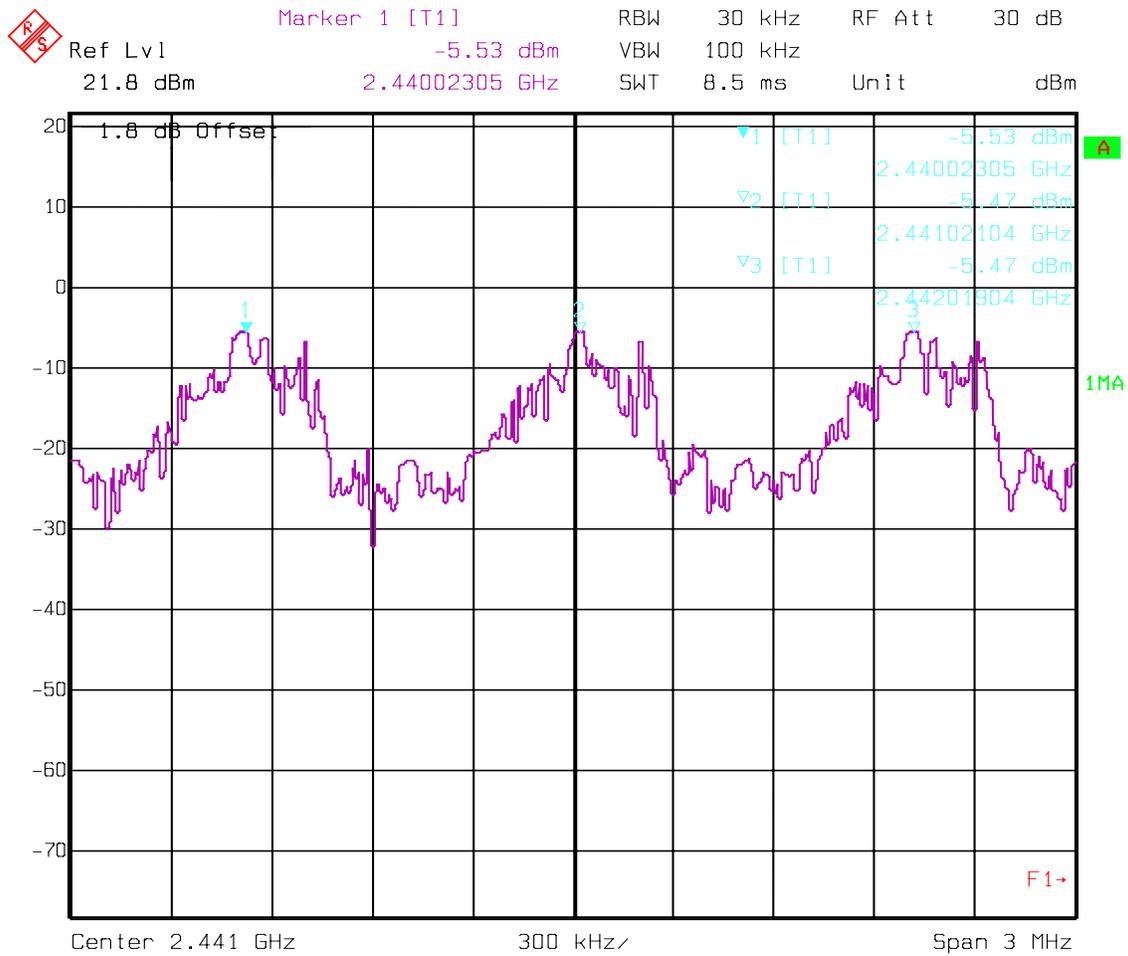


```
Center 2.441 GHz              300 kHz/              Span 3 MHz

Date:     2.MAY.01   13:05:51
```

NUMBER OF HOPPING CHANNELS   §15.247(a)

The number of hopping channels is 79 (see next 4 plots)
The right red line corresponds to the left red line from the next plot.

Plot 1:
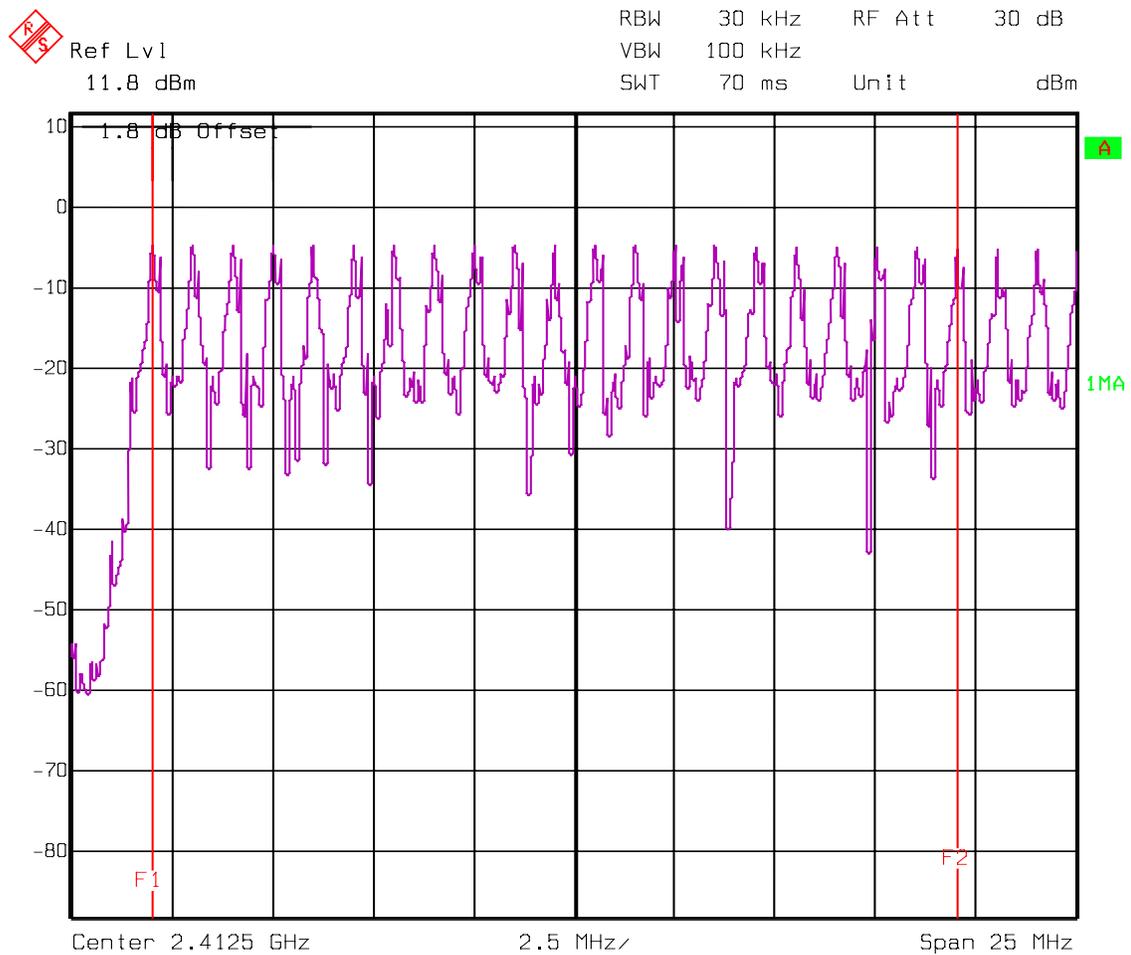

```
                                    RBW    30 kHz    RF Att    30 dB
       Ref Lvl                      VBW   100 kHz
         11.8 dBm                   SWT    70 ms    Unit        dBm

    10   1.8 dB Offset                                               A
     0
   -10                                                              1MA
   -20
   -30
   -40
   -50
   -60
   -70
   -80   F1                                                F2
       Center 2.4125 GHz        2.5 MHz/            Span 25 MHz
   Date:        2.MAY.01   13:13:49
```

Plot 2:
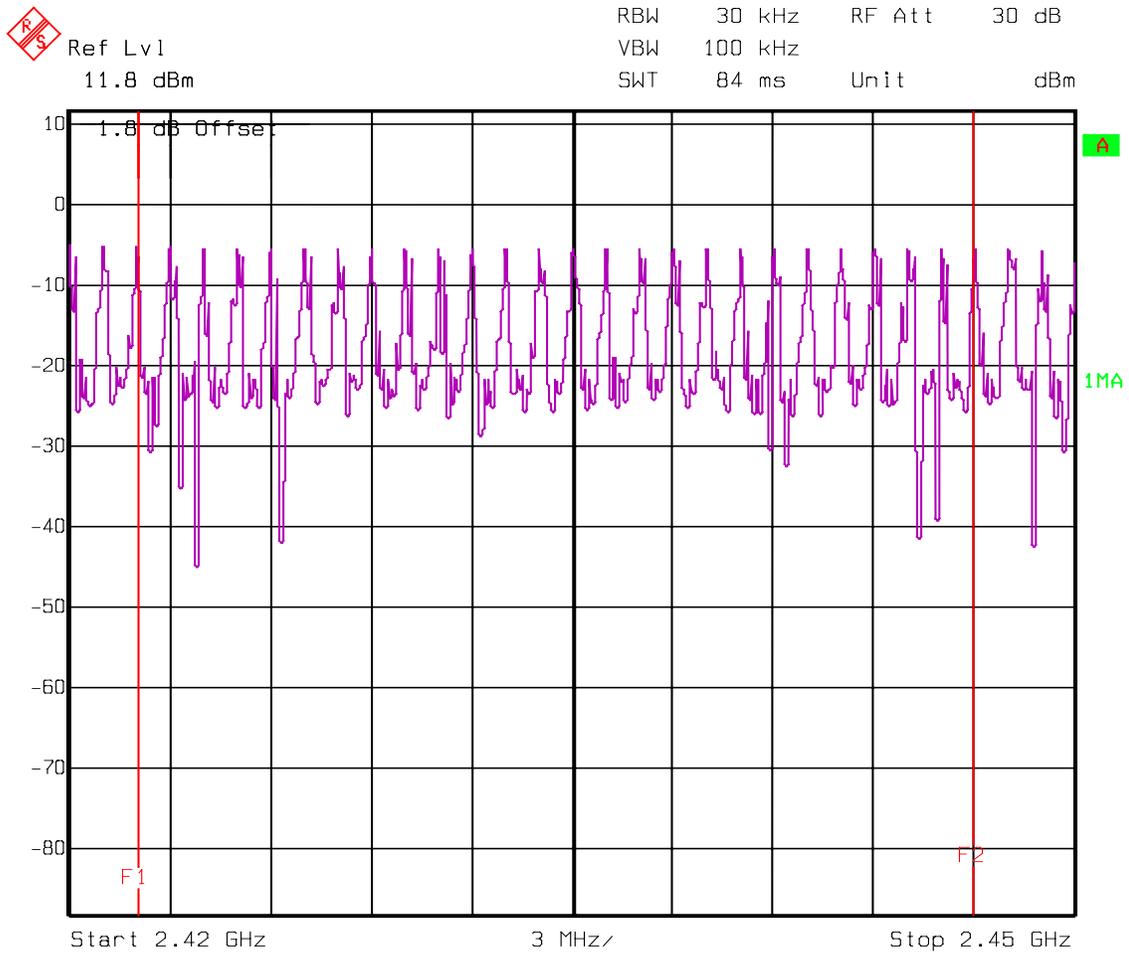

```
                                      RBW     30 kHz    RF Att     30 dB
     Ref Lvl                          VBW    100 kHz
      11.8 dBm                        SWT     84 ms    Unit        dBm

  10   1.8 dB Offset                                                        A

   0

 -10                                                                       1MA

 -20

 -30

 -40

 -50

 -60

 -70

 -80   F1                                                  F2

     Start 2.42 GHz             3 MHz/              Stop 2.45 GHz
  Date:      2.MAY.01   13:20:16
```

Plot 3:


```
                                          RBW    30 kHz    RF Att    30 dB
   Ref Lvl                                VBW   100 kHz
   11.8 dBm                               SWT    70 ms    Unit        dBm

 10   1.8 dB Offset                                                        A
  0
-10                                                                      1MA
-20
-30
-40
-50
-60
-70
-80
        F1                                                    F2
      Start 2.445 GHz          2.5 MHz/              Stop 2.47 GHz
Date:        2.MAY.01   13:25:59
```

Plot 4:

Ref Lvl	RBW 30 kHz	RF Att 30 dB
11.8 dBm	VBW 100 kHz	
	SWT 56 ms	Unit dBm

Start 2.465 GHz   2 MHz/   Stop 2.485 GHz
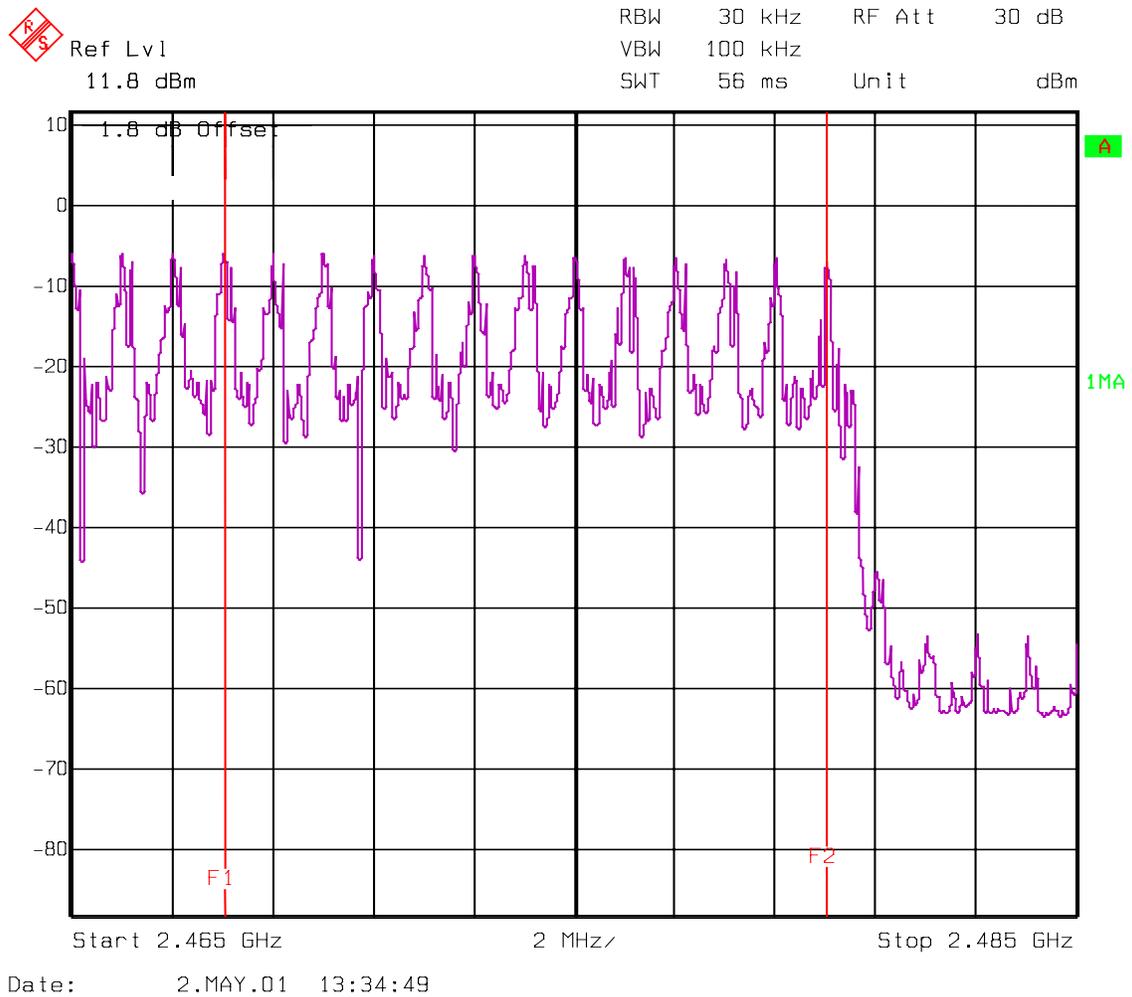
Date: 2.MAY.01   13:34:49
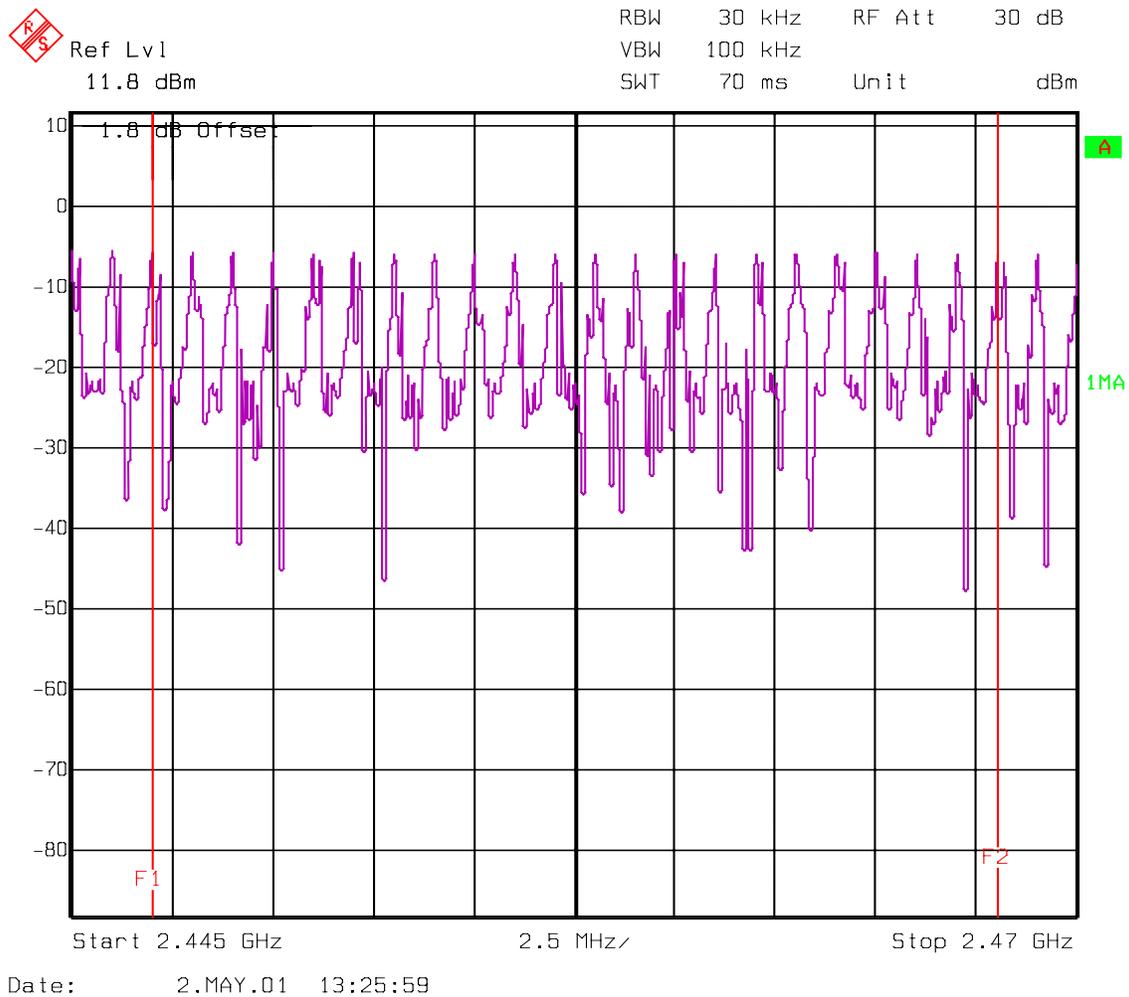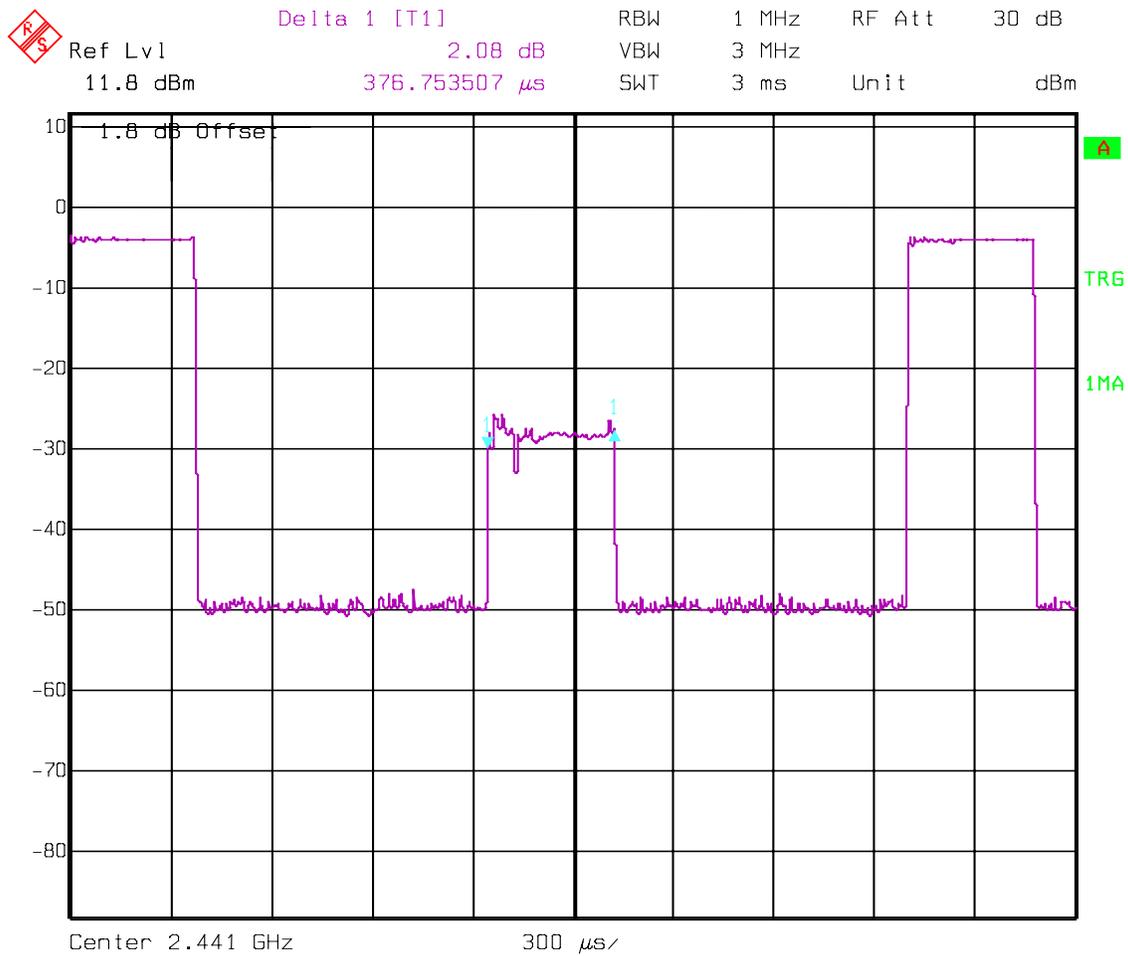
TIME OF OCCUPANCY (DWELL TIME) FOR DH1   §15.247(a)

The system makes worst case 1600 hops per second or 1 time slot has a length of 625µs with 79 channels. A DH1 Packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 800 hops per second with 79 channels. So you have each channel 10.13 times per second and so for 30 seconds you have 303.9 times of appearence .
Each Tx-time per appearence is 376.75 µs.
So we have 303.9 * 376.75 µs = 144.49 ms per 30 seconds.

```
            Delta 1 [T1]            RBW    1 MHz    RF Att    30 dB
  Ref Lvl                 2.08 dB   VBW    3 MHz
   11.8 dBm        376.753507 µs    SWT    3 ms     Unit        dBm
```



```
Center 2.441 GHz              300 µs/
Date:        2.MAY.01  13:48:32
```

TIME OF OCCUPANCY (DWELL TIME) FOR DH3   §15.247(a)

A DH3 Packets need 3 time slots for transmit and 1 for receicing, then the system makes worst case 400 hops per second with 79 channels. So you have each channel 5.1 times per second and so for 30 seconds you have 153 times of appearence .
Each Tx-time per appearence is 1.64 ms.
So we have 153 * 1.64 ms = 250.92 ms per 30 seconds.


```
                  Delta 1 [T1]          RBW    1 MHz    RF Att    30 dB
      Ref Lvl                  -1.80 dB  VBW    3 MHz
      11.8 dBm            1.643287 ms    SWT   10 ms    Unit       dBm
```

Center 2.441 GHz   1 ms/

Date: 2.MAY.01   13:44:43

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TIME OF OCCUPANCY (DWELL TIME) FOR DH5   §15.247(a)

At DH5 Packets you need 5 time slots for transmit and 1 for receicing,then the system makes worst case 266,7 hops per second with 79 channels. So you have each channel 3.36 times per second and so for 30 seconds you have 100,8 times of appearence .
Each tx-time per appearence is 2.88 ms.
<u>**So we have 100.8 * 2.88ms = 290.30 ms per 30 seconds.**</u>

SPECTRUM BANDWIDTH OF FHSS SYSTEM   **§15.247(a)**
20 dB bandwidth

TEST CONDITIONS		20 dB BANDWIDTH (kHz)		
Frequency (MHz)		**2402**	**2441**	**2481**
T_{nom}(23)°C	V_{nom}()V	953.90	993.98	945.89
Measurement uncertainty		±3dB		

RBW / VBW as provided in the "Measurement Guidelines'' (DA 00-705, March 30, 2000)
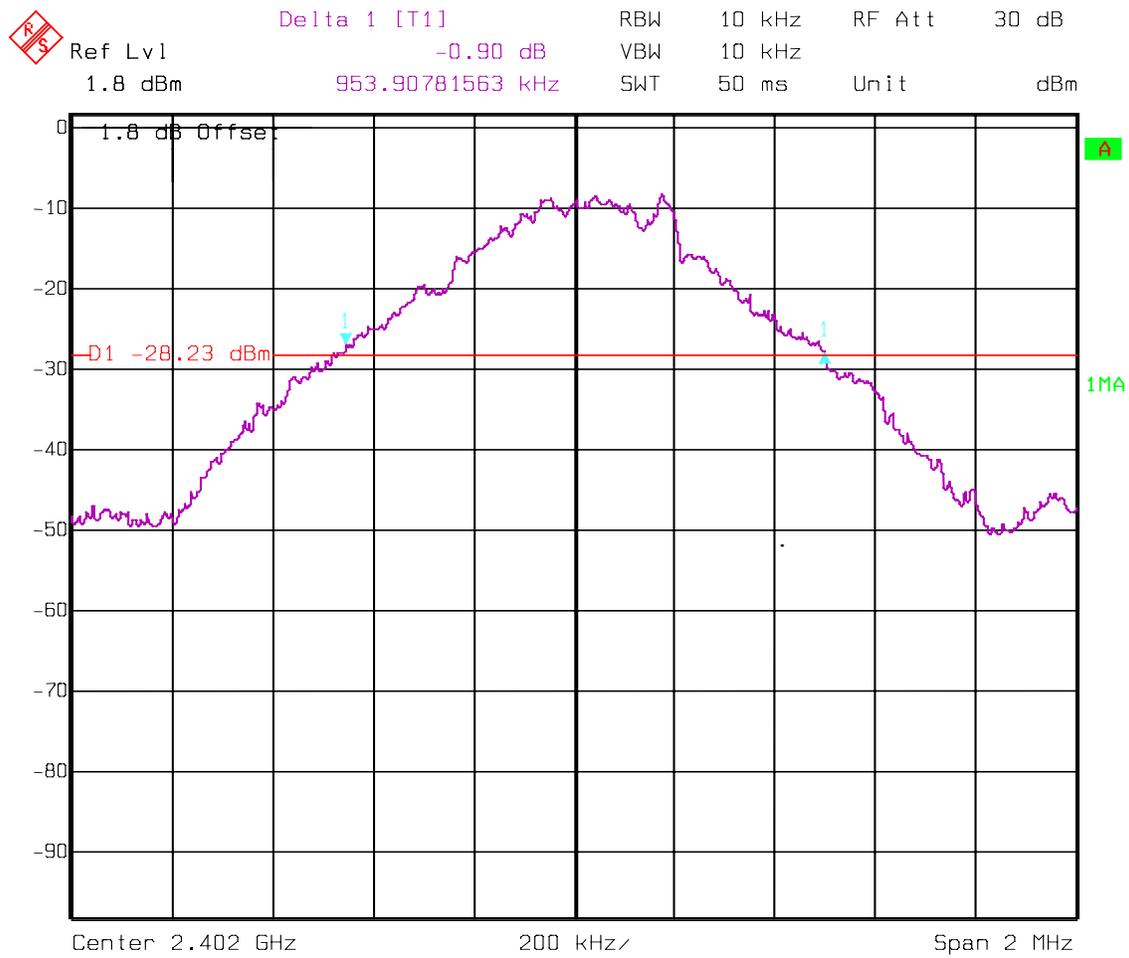
LIMIT   **SUBCLAUSE §15.247(a) (1)**

The maximum 20dB bandwith shall be at maximum 1000 KHz

SPECTRUM BANDWIDTH OF FHSS SYSTEM   §15.247(a)
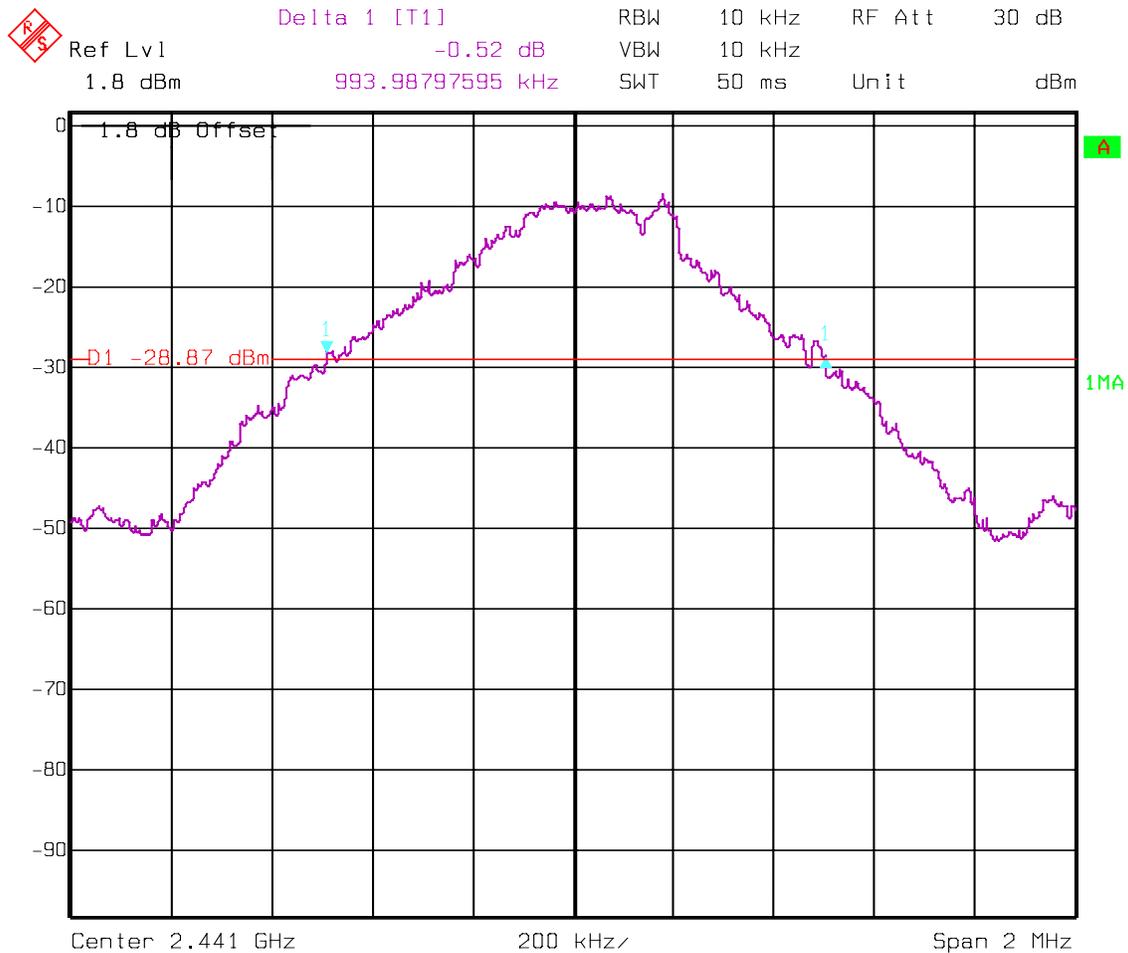## 20 dB bandwidth

Lowest Channel: 2402MHz

```
                    Delta 1 [T1]           RBW    10 kHz    RF Att    30 dB
     Ref Lvl                   -0.90 dB    VBW    10 kHz
     1.8 dBm          953.90781563 kHz     SWT    50 ms     Unit        dBm
```



```
  Center 2.402 GHz              200 kHz/              Span 2 MHz
Date:      3.MAY.01  12:40:24
```

SPECTRUM BANDWIDTH OF FHSS SYSTEM   §15.247(a)
20 dB bandwidth

Mid Channel: 2441MHz


```
                    Delta 1 [T1]            RBW    10 kHz    RF Att    30 dB
    Ref Lvl                    -0.52 dB     VBW    10 kHz
    1.8 dBm          993.98797595 kHz       SWT    50 ms     Unit         dBm

  0   1.8 dB Offset                                                          A
 -10
 -20
      D1 -28.87 dBm                                                         1MA
 -30
 -40
 -50
 -60
 -70
 -80
 -90
    Center 2.441 GHz              200 kHz/                    Span 2 MHz
    Date:      3.MAY.01  12:43:55
```

SPECTRUM BANDWIDTH OF FHSS SYSTEM   §15.247(a)
20 dB bandwidth

Highest Channel: 2481MHz

	Delta 1 [T1]		RBW	10 kHz	RF Att	30 dB
Ref Lvl		-0.49 dB	VBW	10 kHz		
1.8 dBm		945.89178357 kHz	SWT	50 ms	Unit	dBm

1.8 dB Offset

A

D1 -29.05 dBm

1MA

Center 2.481 GHz   200 kHz/   Span 2 MHz
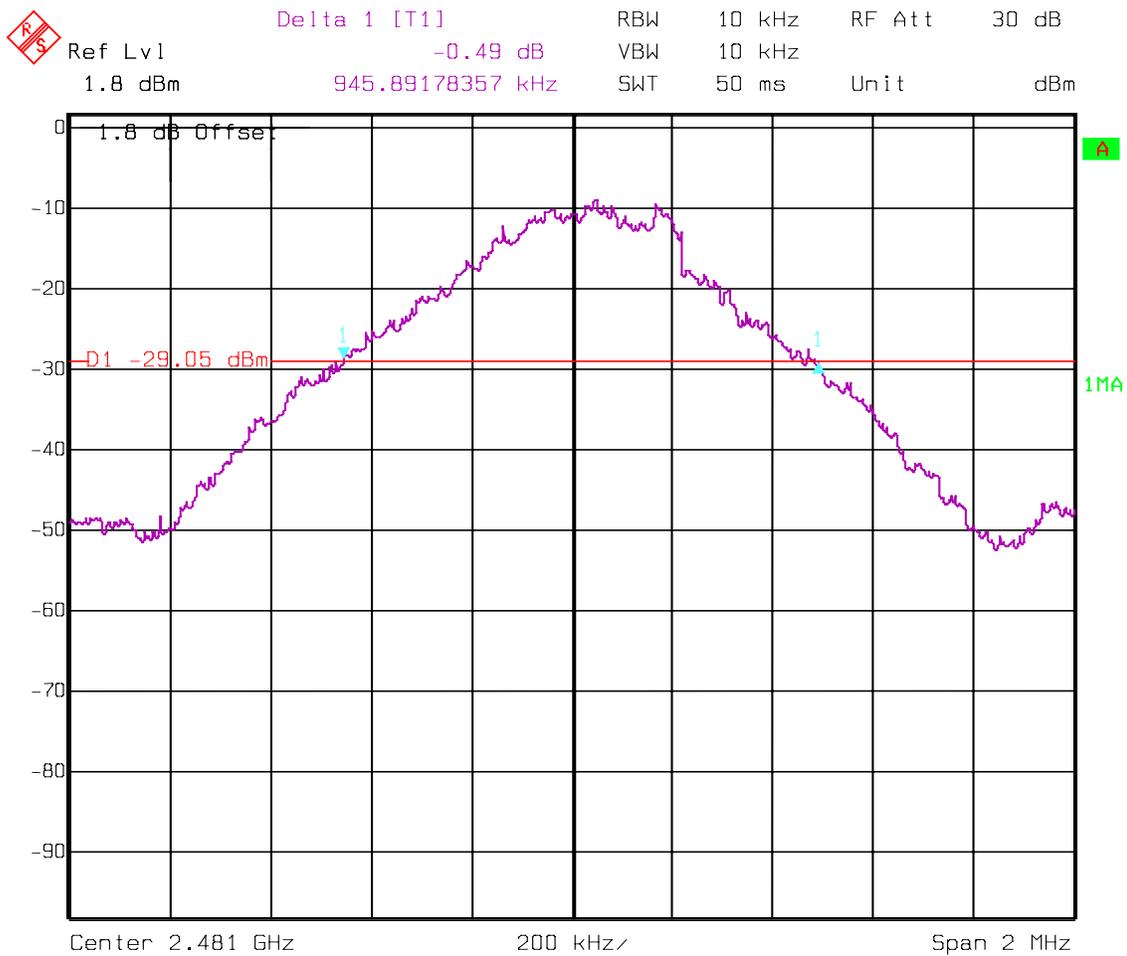
Date: 3.MAY.01 12:48:01

MAXIMUM PEAK OUTPUT POWER   **SUBCLAUSE § 15.247 (b) (1)**
(conducted)

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		**2402**	**2441**	**2481**
T_{nom}(23)°C	V_{nom}()V	**PK** -2.26	-2.96	-3.65
		AV -2.71	-3.35	-4.09
Maximum deviation from output power under extreme test conditions (dBc)		**-5.24 / -4.96 Pk/Av**	**-5.37 / -5.15 Pk/Av**	**-6.85 / -6.58 Pk/Av**
Measurement uncertainty		**±3dB**		

RBW / VBW : 3 MHz

LIMIT   **SUBCLAUSE § 15.247 (b) (1)**

Frequency range	RF power output
2400-2483.5 MHz	**1.0 Watt**

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Peak output power (conducted)   **§15.247 (b)**

Lowest Channel: 2402MHz

	Marker 1 [T1]	RBW	3 MHz	RF Att	30 dB
Ref Lvl	-2.26 dBm	VBW	3 MHz		
11.8 dBm	2.40209018 GHz	SWT	5 ms	Unit	dBm

Center 2.402 GHz   1 MHz/   Span 10 MHz
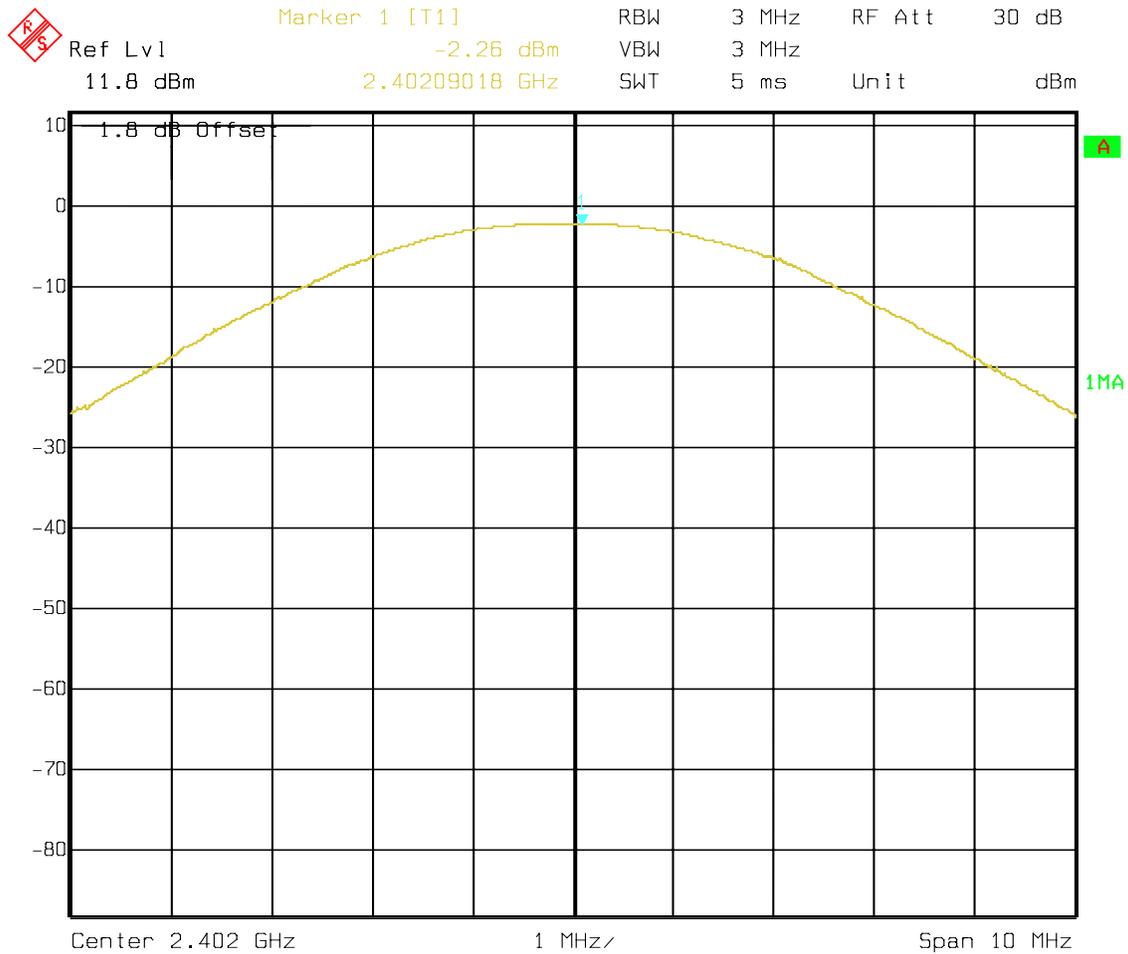
Date: 2.MAY.01   9:45:13

Peak output power (conducted)   **§15.247 (b)**

Mid Channel: 2441MHz
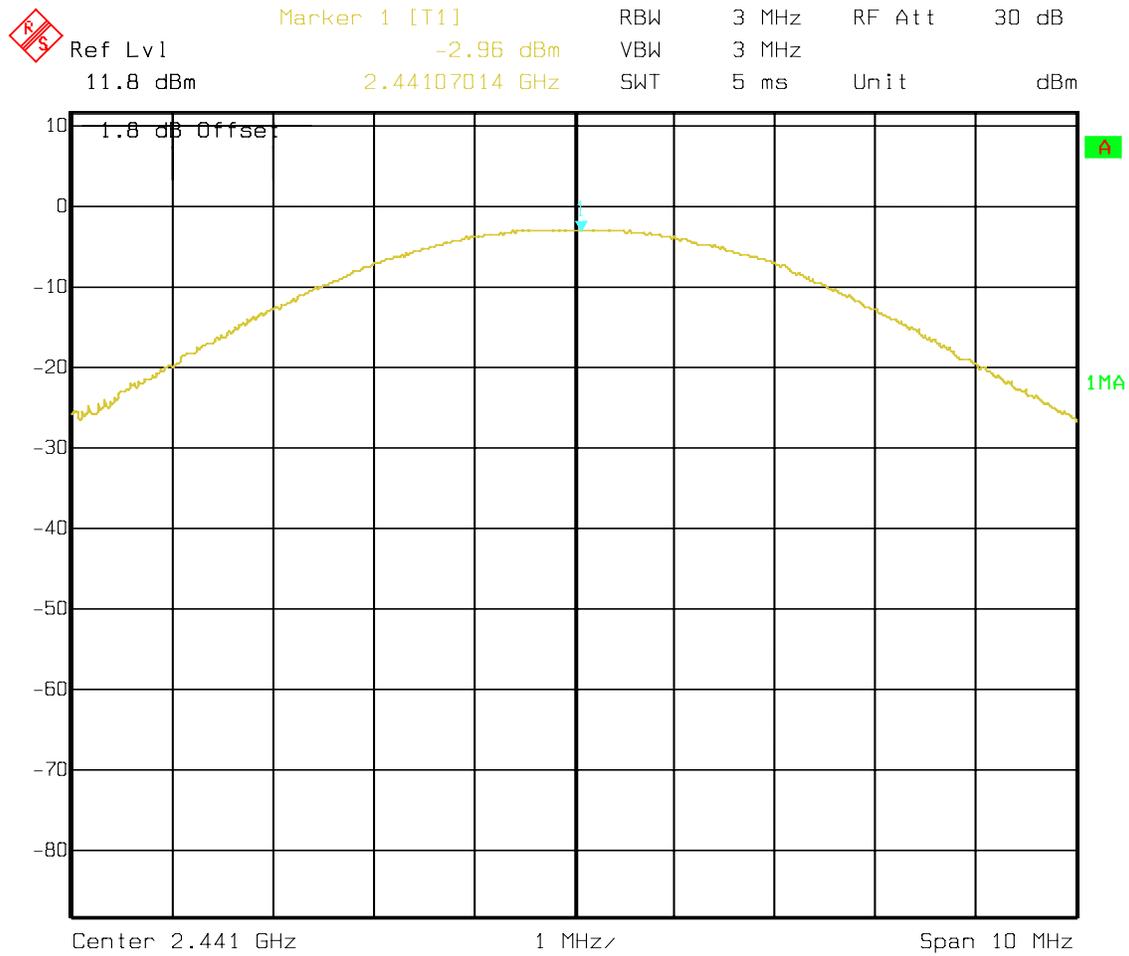

```
                         Marker 1 [T1]        RBW     3 MHz    RF Att     30 dB
      Ref Lvl                  -2.96 dBm      VBW     3 MHz
      11.8 dBm            2.44107014 GHz      SWT     5 ms     Unit        dBm

 10   1.8 dB Offset                                                              A
  0
-10
-20                                                                            1MA
-30
-40
-50
-60
-70
-80
      Center 2.441 GHz            1 MHz/                 Span 10 MHz
Date:        2.MAY.01  10:10:20
```

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Peak output power (conducted)   **§15.247 (b)**

Highest Channel: 2481MHz


```
                          Marker 1 [T1]          RBW    3 MHz    RF Att    30 dB
        Ref Lvl                      -3.65 dBm    VBW    3 MHz
        11.8 dBm             2.48109018 GHz       SWT    5 ms     Unit      dBm
```

Center 2.481 GHz   1 MHz/   Span 10 MHz
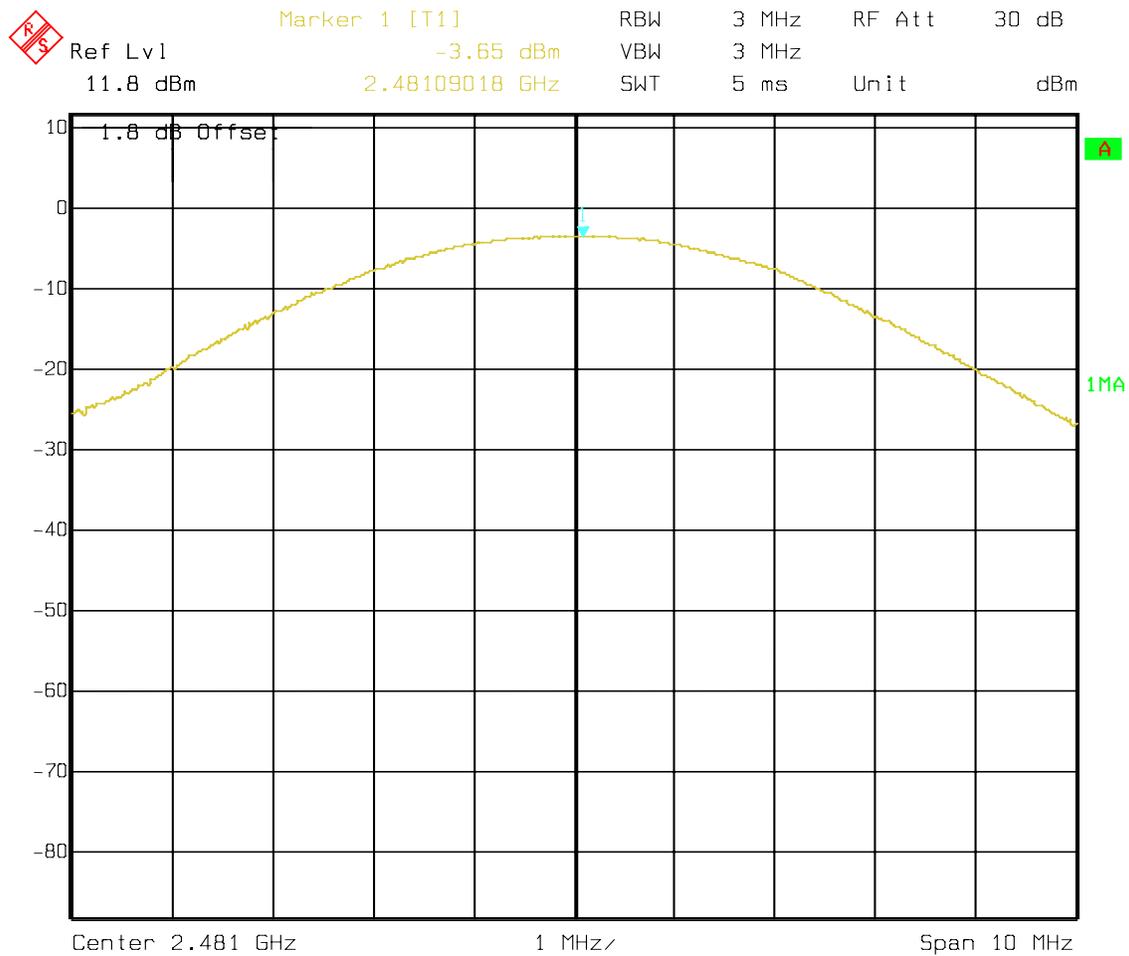
Date: 2.MAY.01 10:14:12

MAXIMUM PEAK OUTPUT POWER (RADIATED)   **SUBCLAUSE § 15.247 (b) (1)**

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		**2402**	**2441**	**2481**
T_{nom}(23)°C	V_{nom}(3.6)V	4.14	3.26	5.02
Measurement uncertainty		**±3dB**		

RBW/VBW : 3 MHz

Measured at a distance of 3m

LIMIT   **SUBCLAUSE § 15.247 (b) (1)**

Frequency range	RF power output
2400-2483.**5 MHz**	**1.0 Watt**

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Peak output power (Radiated)   **§15.247 (b) (1)**

Lowest Channel: 2402MHz

ANALYZER SETTINGS: RBW = 3MHz   VBW = 3MHz
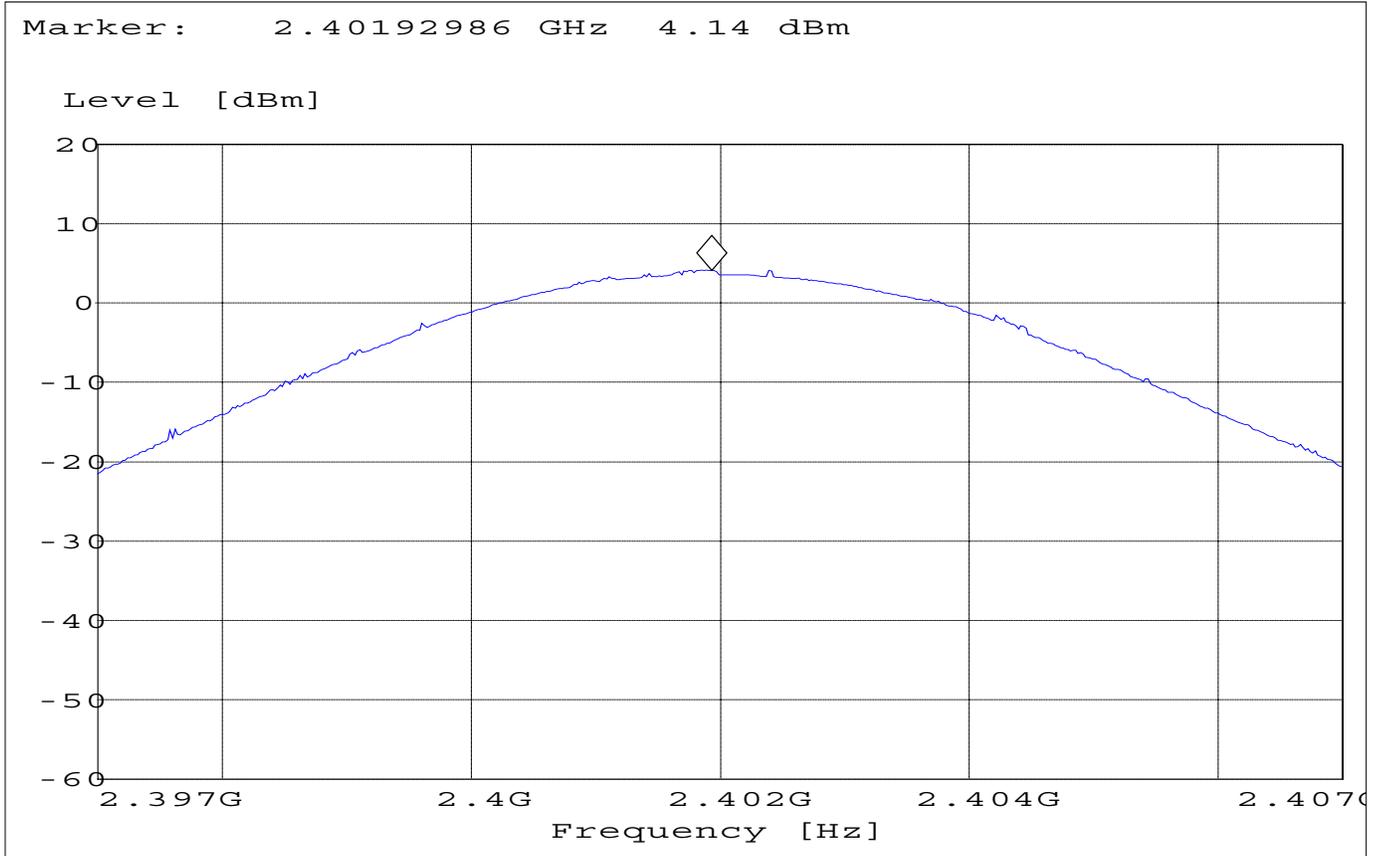
Peak output power (Radiated)   **§15.247 (b) (1)**

Mid Channel: 2441MHz

```
Marker:     2.402551102 GH  3.26 dBm    iBm

  Level  [dBm]
  20
  10
   0
 -10
 -20
 -30
 -40
 -50
 -60
     2.397G        2.4G        2.402G       2.404G        2.407G
                   Frequency  [Hz]
```
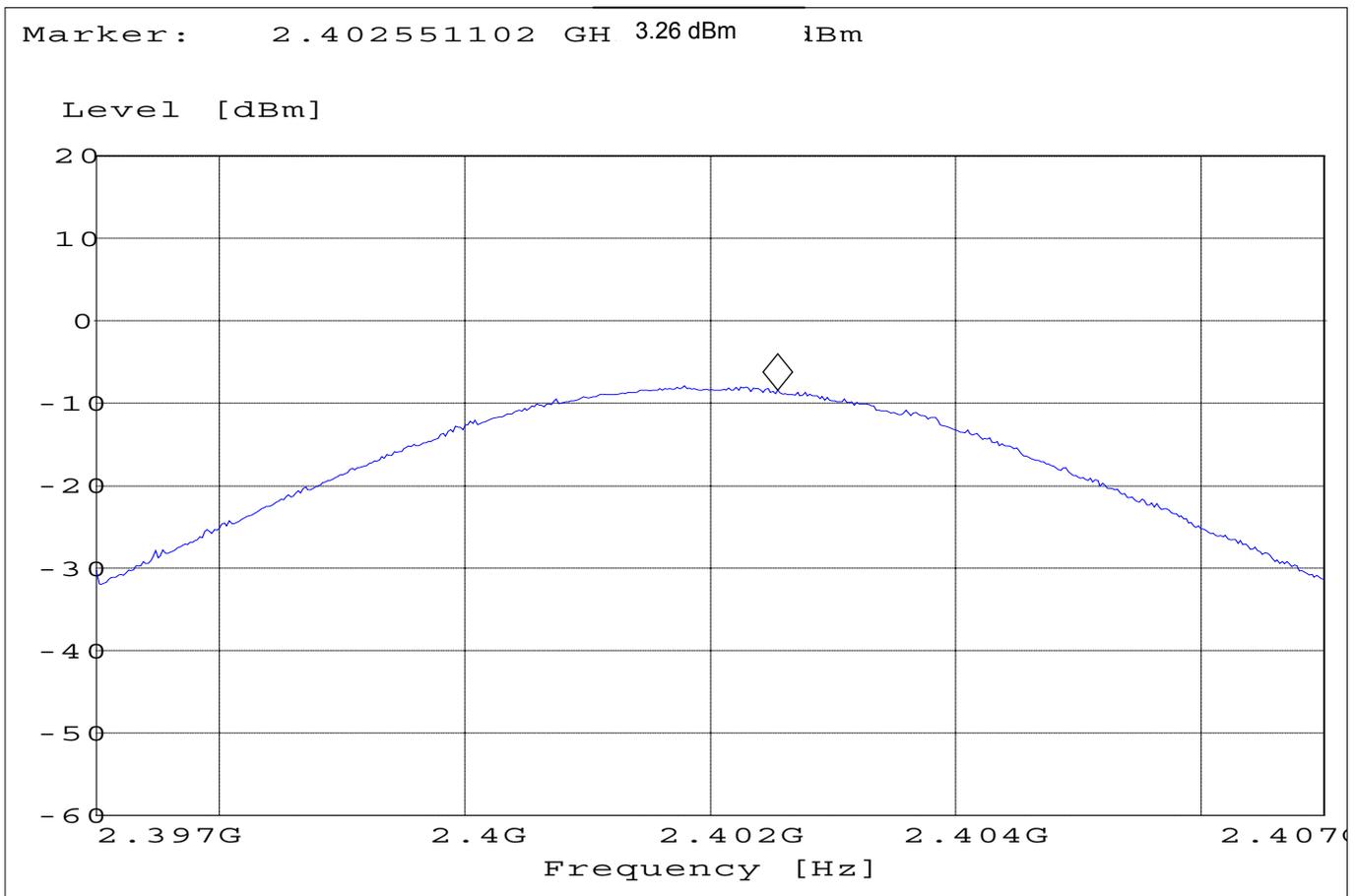
ANALYZER SETTINGS: RBW = 3MHz   VBW = 3MHz

Peak output power (Radiated)   **§15.247 (b) (1)**

Highest Channel: 2481MHz

```
Marker:     2.48111022 GHz   5.02 dBm

   Level  [dBm]
 20
 10
  0
-10
-20
-30
-40
-50
-60
   2.476G   2.478G      2.48G      2.482G      2.484G      2.486G
                    Frequency  [Hz]
```
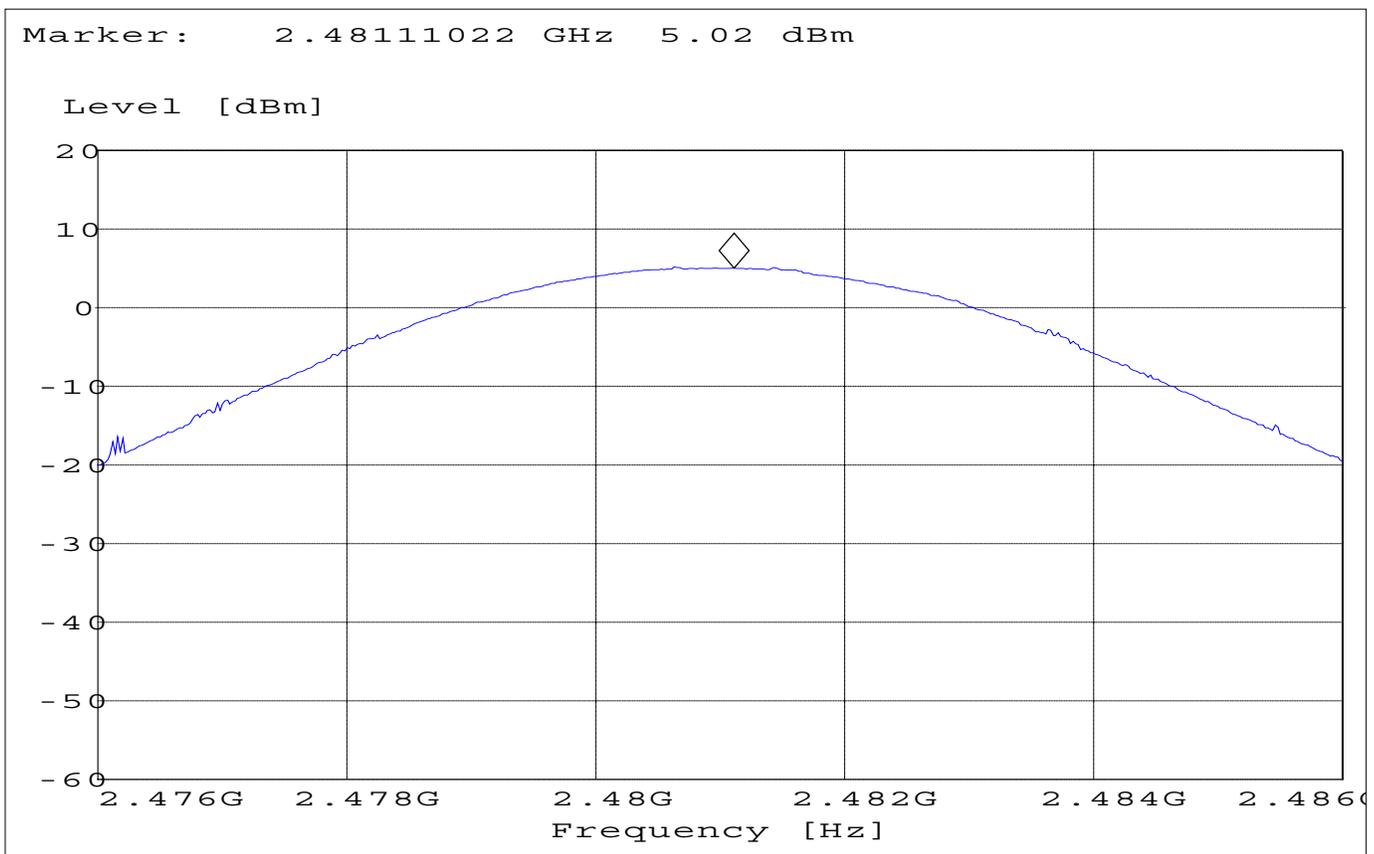
ANALYZER SETTINGS: RBW = 3MHz   VBW = 3MHz

BAND EDGE COMPLIANCE OF CONDUCTED EMISSIONS　　　　§15.247 (c)
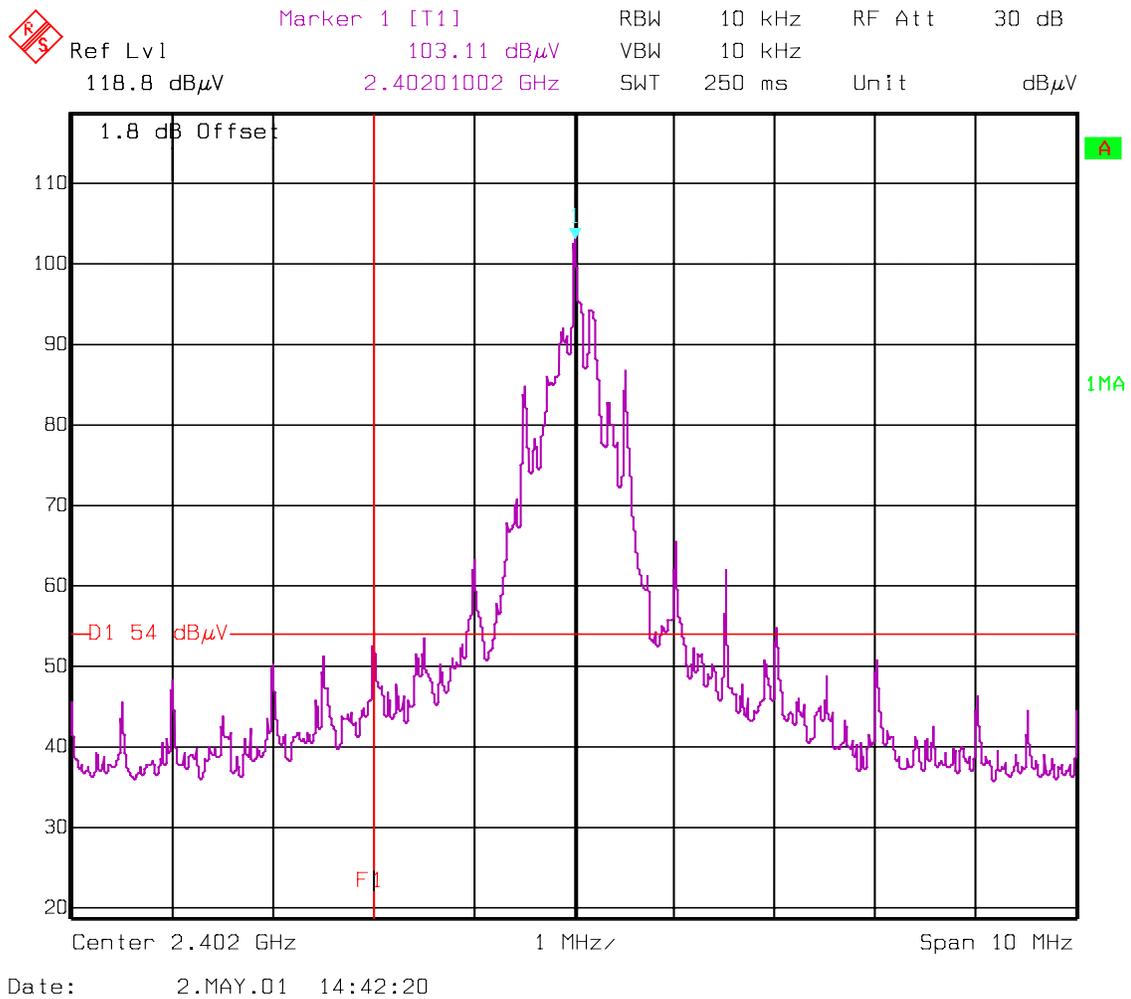
Low frequency section (hopping off)

Marker 1 [T1]　　　RBW　10 kHz　RF Att　30 dB
Ref Lvl　　　　103.11 dBµV　VBW　10 kHz
118.8 dBµV　　2.40201002 GHz　SWT　250 ms　Unit　dBµV

1.8 dB Offset

D1 54 dBµV

F1

Center 2.402 GHz　　　　1 MHz/　　　　Span 10 MHz
Date:　　2.MAY.01　14:42:20

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Band-edge compliance of conducted emissions   §15.247 (c)

Low frequency section (hopping on)

	Marker 1 [T1]	RBW	10 kHz	RF Att	30 dB
Ref Lvl	101.57 dBµV	VBW	10 kHz		
118.8 dBµV	2.40201002 GHz	SWT	250 ms	Unit	dBµV

1.8 dB Offset

D1 54 dBµV

F1

Center 2.402 GHz   1 MHz/   Span 10 MHz
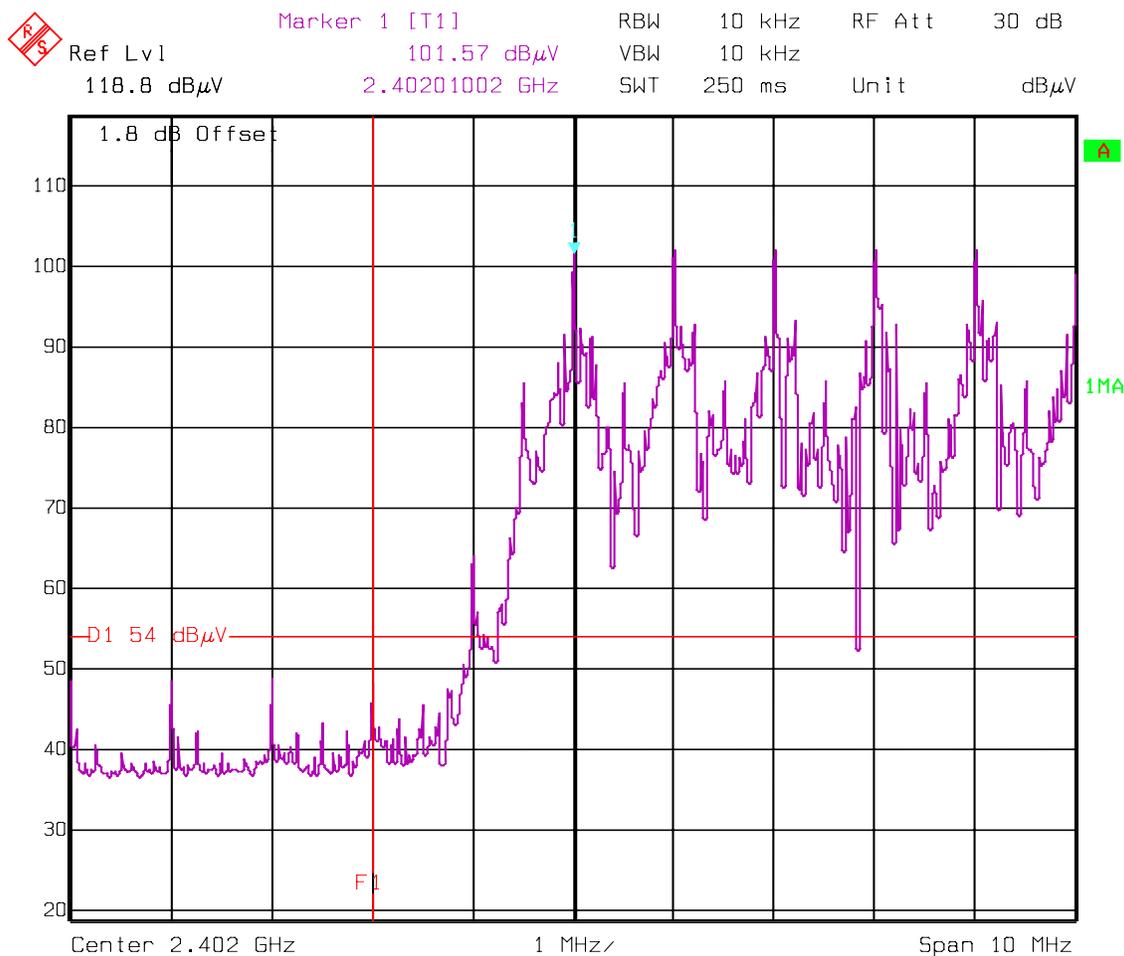
Date: 2.MAY.01   13:58:10

Band-edge compliance of conducted emissions   **§15.247 (c)**
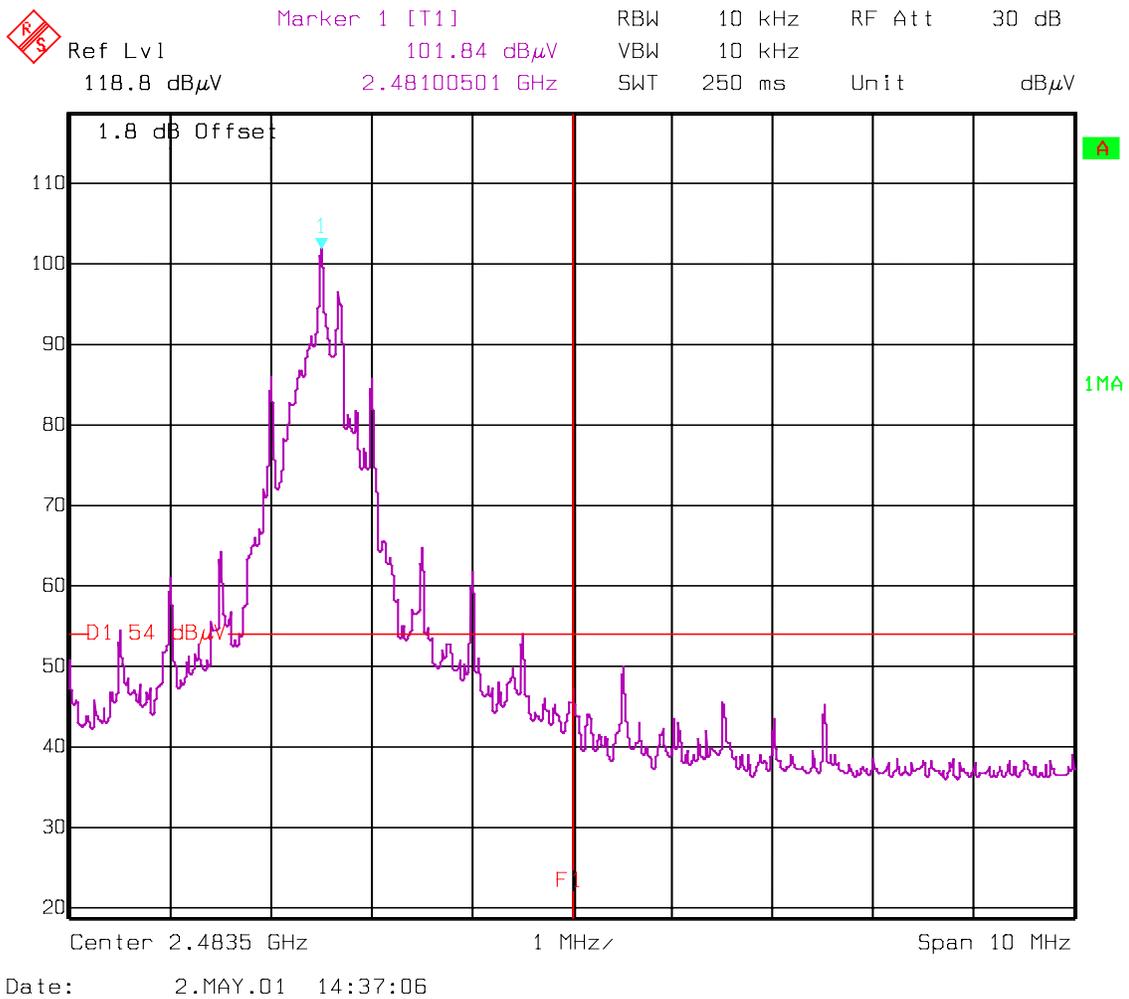
high frequency section (hopping off)


```
                              Marker 1 [T1]          RBW    10 kHz    RF Att    30 dB
       Ref Lvl                101.84 dBµV    VBW    10 kHz
       118.8 dBµV             2.48100501 GHz  SWT   250 ms    Unit      dBµV

        1.8 dB Offset                                                         A

  110

  100                                1

   90

   80

   70

   60

   D1 54 dBµV                                                                1MA

   50

   40

   30

   20
       Center 2.4835 GHz                    1 MHz/                 Span 10 MHz
  Date:        2.MAY.01   14:37:06
```

Band-edge compliance of conducted emissions   §15.247 (c)

high frequency section (hopping on)


```
        Marker 1 [T1]              RBW    10 kHz    RF Att    30 dB
Ref Lvl                99.84 dBµV  VBW    10 kHz
118.8 dBµV       2.48000301 GHz    SWT   250 ms    Unit      dBµV
```

Center 2.4835 GHz   1 MHz/   Span 10 MHz
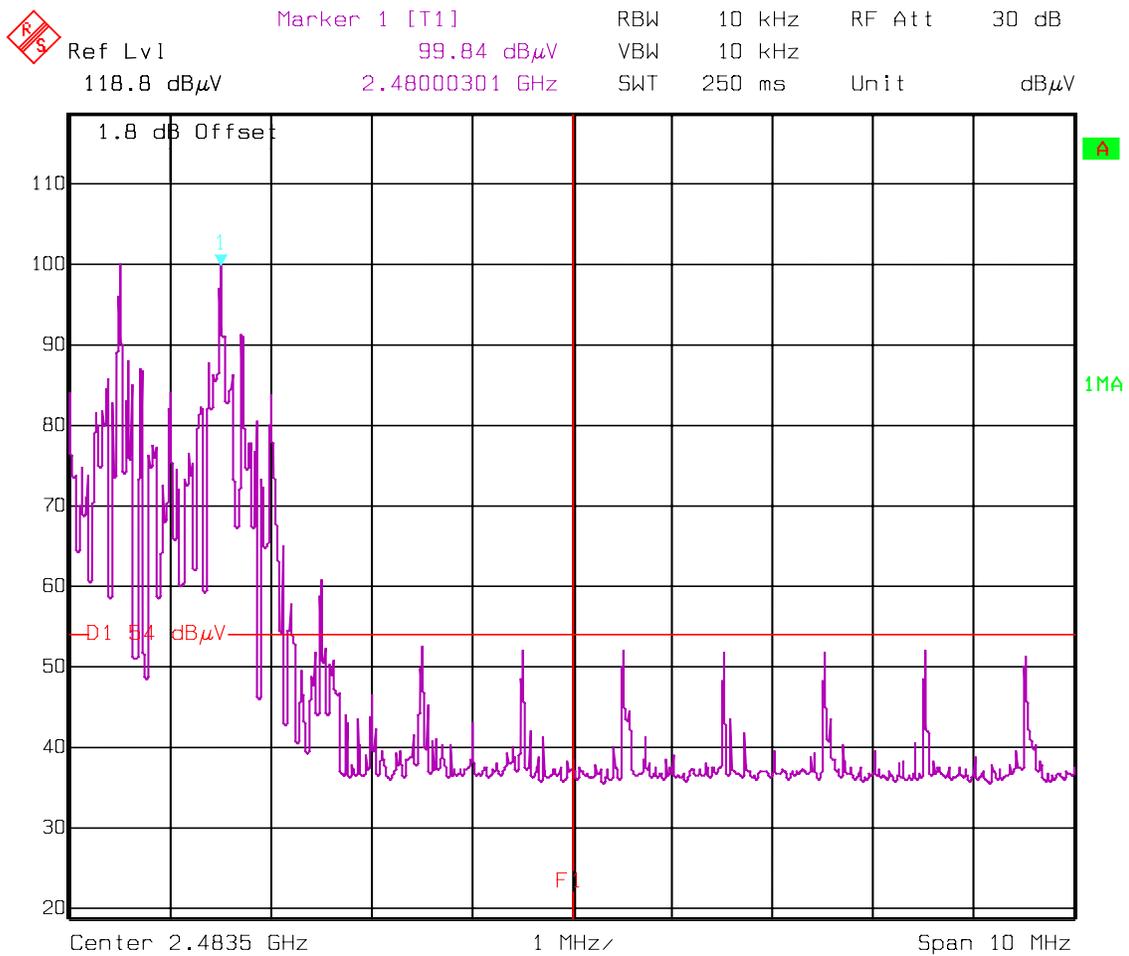
Date: 2.MAY.01 14:01:10

EMISSION LIMITATIONS- Conducted (Transmitter)   **§ 15.247 (c) (1)**

EMISSION LIMITATIONS					
f (MHz)			**limit max. allowed emmision power**	**actual attenuation below frequency of operation (dB)**	**results**
2402			**30 dBm**	**-**	**Operating frequency**
all peaks <<limit				**see plot**	**complies**
2441			**30 dBm**	**-**	**Operating frequency**
all peaks <<limit				**see plot**	**complies**
2481			**30 dBm**		**Operating frequency**
all peaks <<limit				**see plot**	**complies**
Measurement uncertainty		**± 3dB**			

LIMITS   **SUBCLAUSE § 15.247 (c)**

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
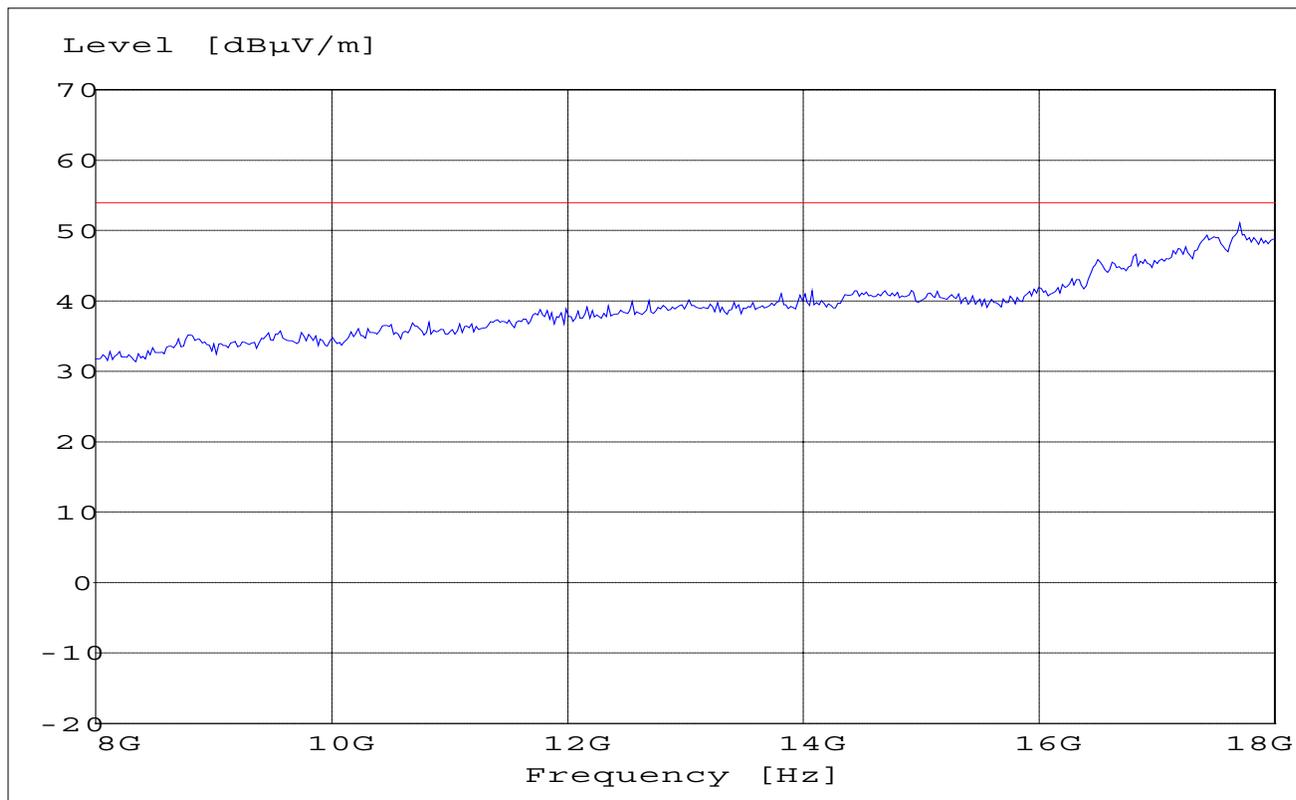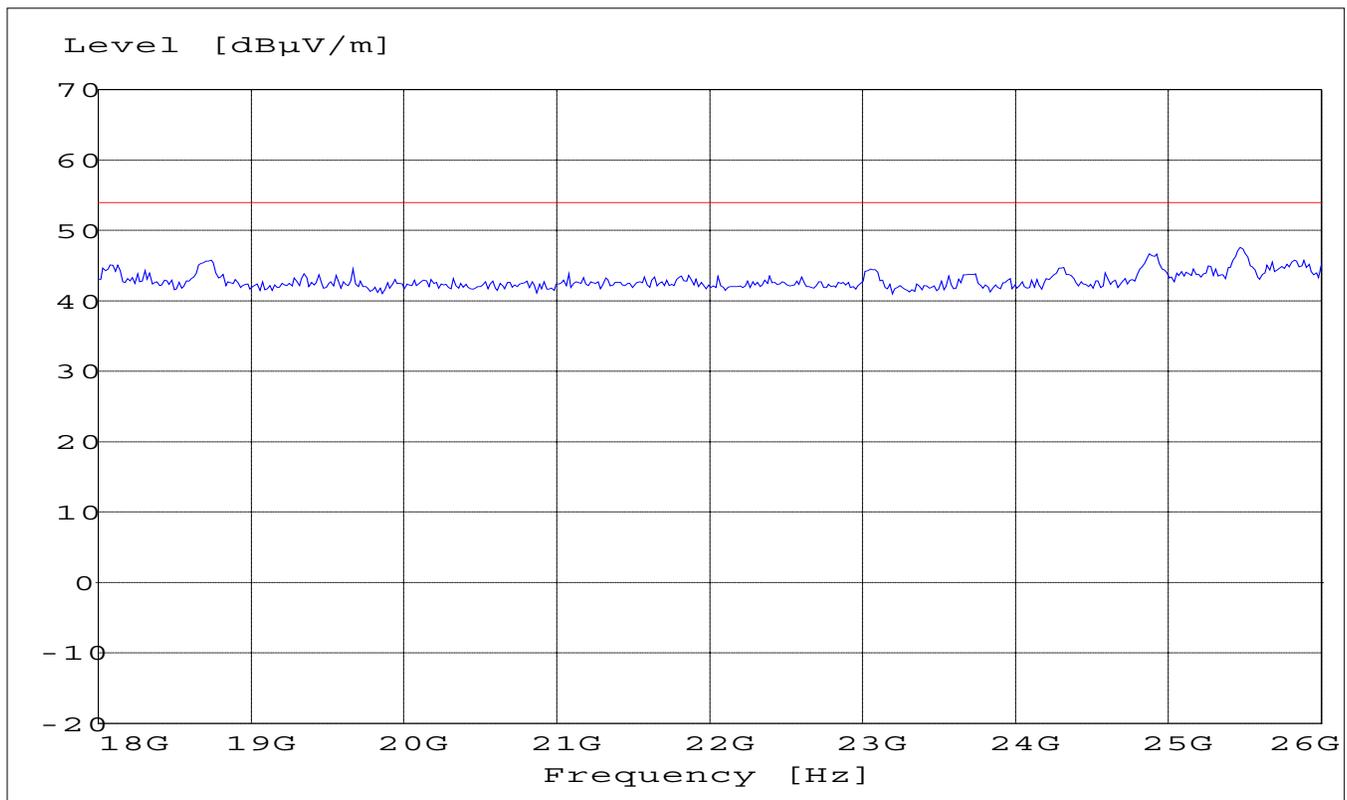
EMISSION LIMITATIONS - Conducted (Transmitter)   **§ 15.247 (c) (1)**
Lowest Channel: 1GHz - 26 GHz

	Marker 2 [T1]		RBW	100 kHz	RF Att	30 dB
Ref Lvl		-53.28 dBm	VBW	100 kHz		
11.8 dBm		4.80761523 GHz	SWT	6.4 s	Unit	dBm

1.8 dB Offset

▼2 [T1]   -53.28 dBm
4.80761523 GHz
▼1 [T1]   -49.35 dBm
3.60521042 GHz

A

D1 -23.11 dBm   1MA

Start 1 GHz   2.5 GHz/   Stop 26 GHz

Date: 2.MAY.01 14:25:36

EMISSION LIMITATIONS - Conducted (Transmitter)   § 15.247 (c) (1)
Mid Channel: 1GHz - 26 GHz

```
            Marker 1 [T1]              RBW   100 kHz   RF Att    30 dB
  Ref Lvl                  -51.89 dBm  VBW   100 kHz
   11.8 dBm        6.61122244 GHz      SWT    6.4 s    Unit       dBm

 10 ┌──1.8 dB Offset─┬──────┬──────┬──────┬──────┬──────┐        A
    │                │      │      │      │      │      │
  0 ├────────────────┼──────┼──────┼──────┼──────┼──────┤
    │  │             │      │      │      │      │      │
-10 ├──┤─────────────┼──────┼──────┼──────┼──────┼──────┤
    │  │             │      │      │      │      │      │
-20 ├──┤─────────────┼──────┼──────┼──────┼──────┼──────┤
  D1│-23.5 dBm       │      │      │      │      │      │     1MA
-30 ├──┤─────────────┼──────┼──────┼──────┼──────┼──────┤
    │  │             │      │      │      │      │      │
-40 ├──┤─────────────┼──────┼──────┼──────┼──────┼──────┤
    │  │             │      │      │      │      │      │
-50 ├──┤────────────\─┼──────┼──────┼──────┼──────┼──────┤
    │  │             │      │      │      │      │      │
-60 ├──┘─────────────┼──────┼──────┼──────┼──────┼──────┤
    │                │      │      │      │      │      │
-70 ├────────────────┼──────┼──────┼──────┼──────┼──────┤
    │                │      │      │      │      │      │
-80 ├────────────────┼──────┼──────┼──────┼──────┼──────┤
    │                │      │      │      │      │      │
    └────────────────┴──────┴──────┴──────┴──────┴──────┘
   Start 1 GHz              2.5 GHz/          Stop 26 GHz

 Date:      2.MAY.01   14:04:44
```

EMISSION LIMITATIONS - Conducted (Transmitter)   **§ 15.247 (c) (1)**
Highest Channel: 1GHz - 26 GHz
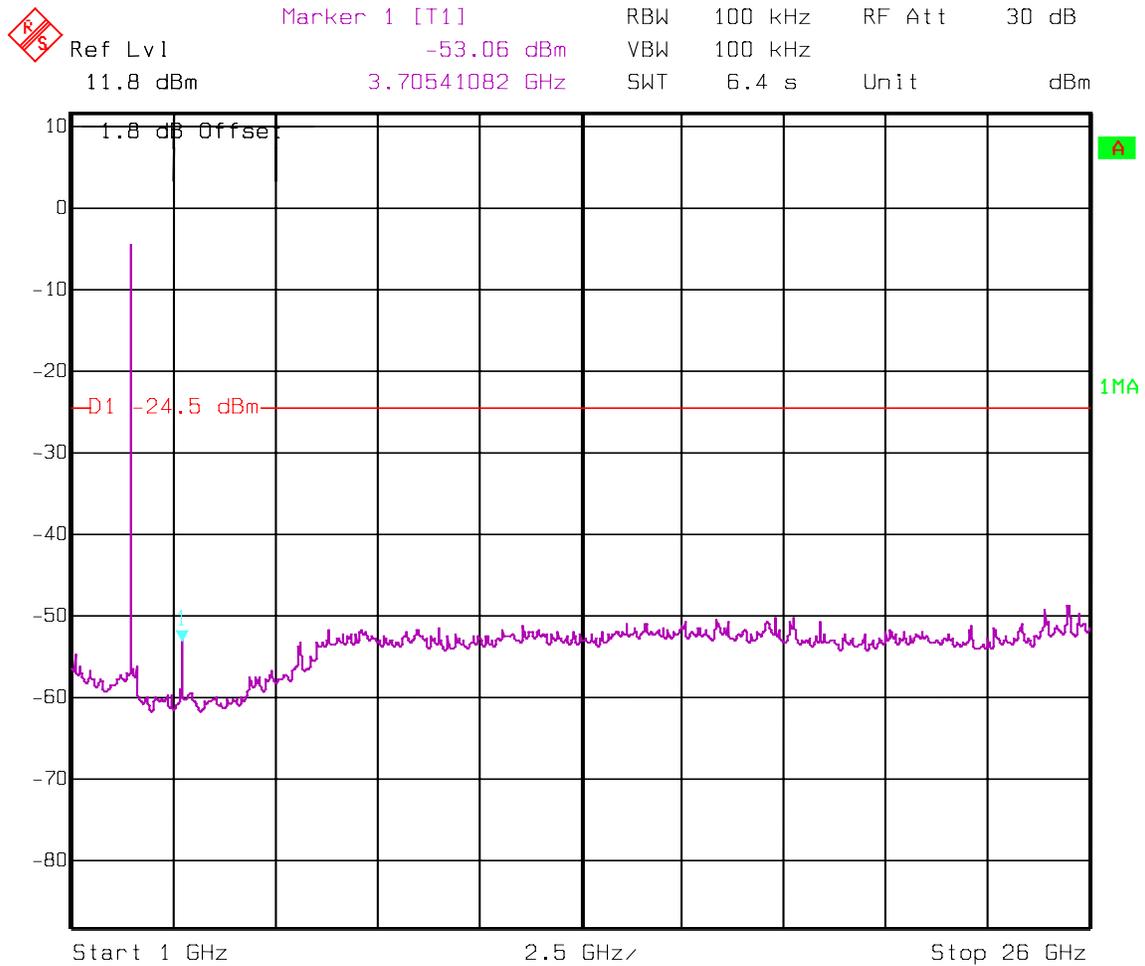

```
                        Marker 1 [T1]          RBW   100 kHz   RF Att    30 dB
     Ref Lvl                    -53.06 dBm     VBW   100 kHz
     11.8 dBm            3.70541082 GHz        SWT   6.4 s     Unit       dBm

  10  1.8 dB Offset                                                        A

   0

 -10

 -20                                                                     1MA

 D1  -24.5 dBm

 -30

 -40

 -50

 -60

 -70

 -80

     Start 1 GHz                 2.5 GHz/                    Stop 26 GHz
 Date:      2.MAY.01  14:27:03
```

EMISSION LIMITATIONS - Radiated (Transmitter)   **SUBCLAUSE § 15.247 (c) (1)**

NOTE: The spurious emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 18 and 26 GHz very short cable connections to the antenna was used to minimize the noise level. Channel 1: 2402 MHz; Channel 2: 2441 MHz; Channel 3: 2481 MHz

All measurements were against the limits for the restricted bands. Only in case of exceeding the limits it will be analyzed if it is outside a restricted band or not.
If it is outside the restricted bands the lower limits will apply and the relevant frequencies will be checked against these limits.

EMISSION LIMITATIONS - Radiated (Transmitter)   **SUBCLAUSE § 15.247 (c) (1)**

Lowest Channel: 1GHz – 8GHz

ANALYZER SETTINGS: RBW = 1MHz   VBW = 1MHz

Marker: 2.402805611 GHz 85.98 dBµV/m

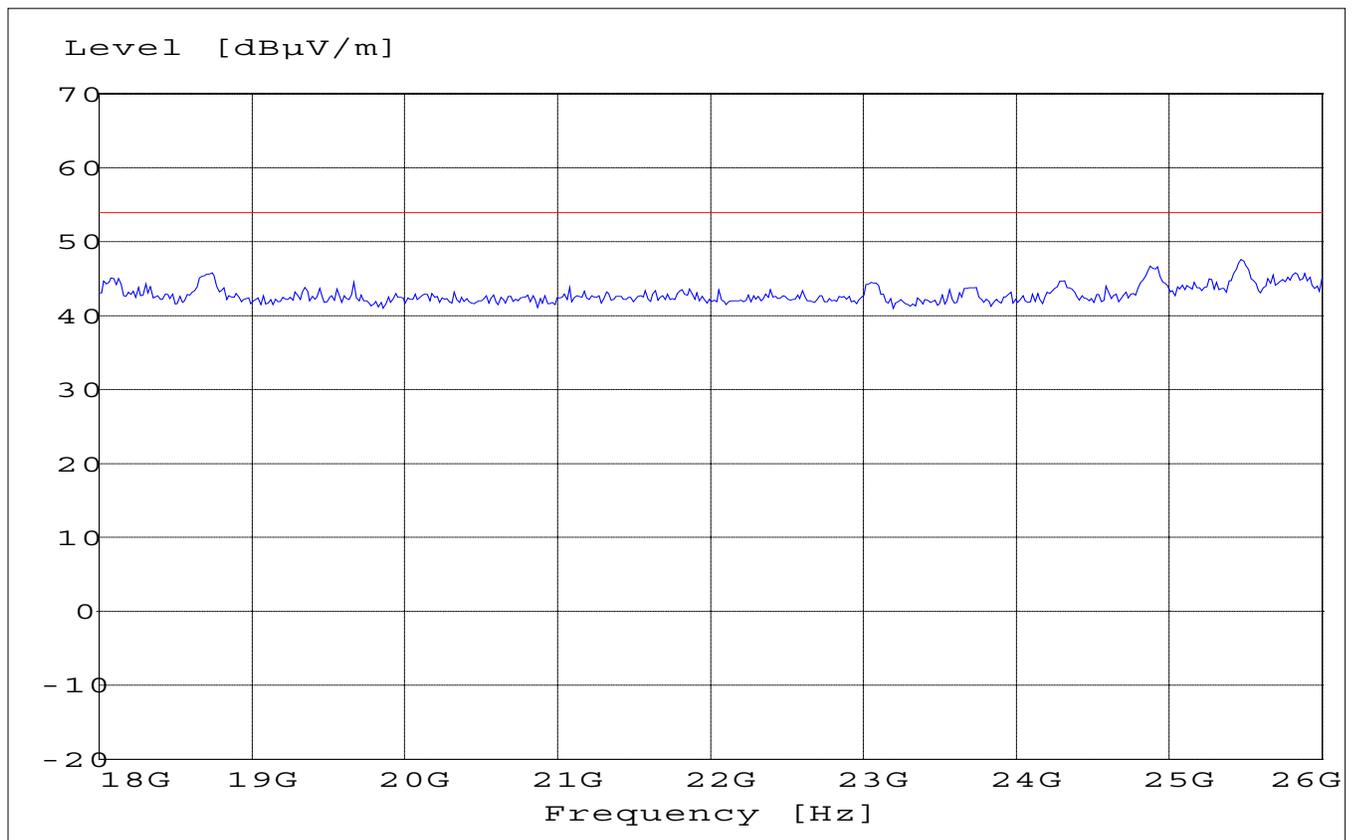**LIMITS**   **SUBCLAUSE § 15.247 (c)**
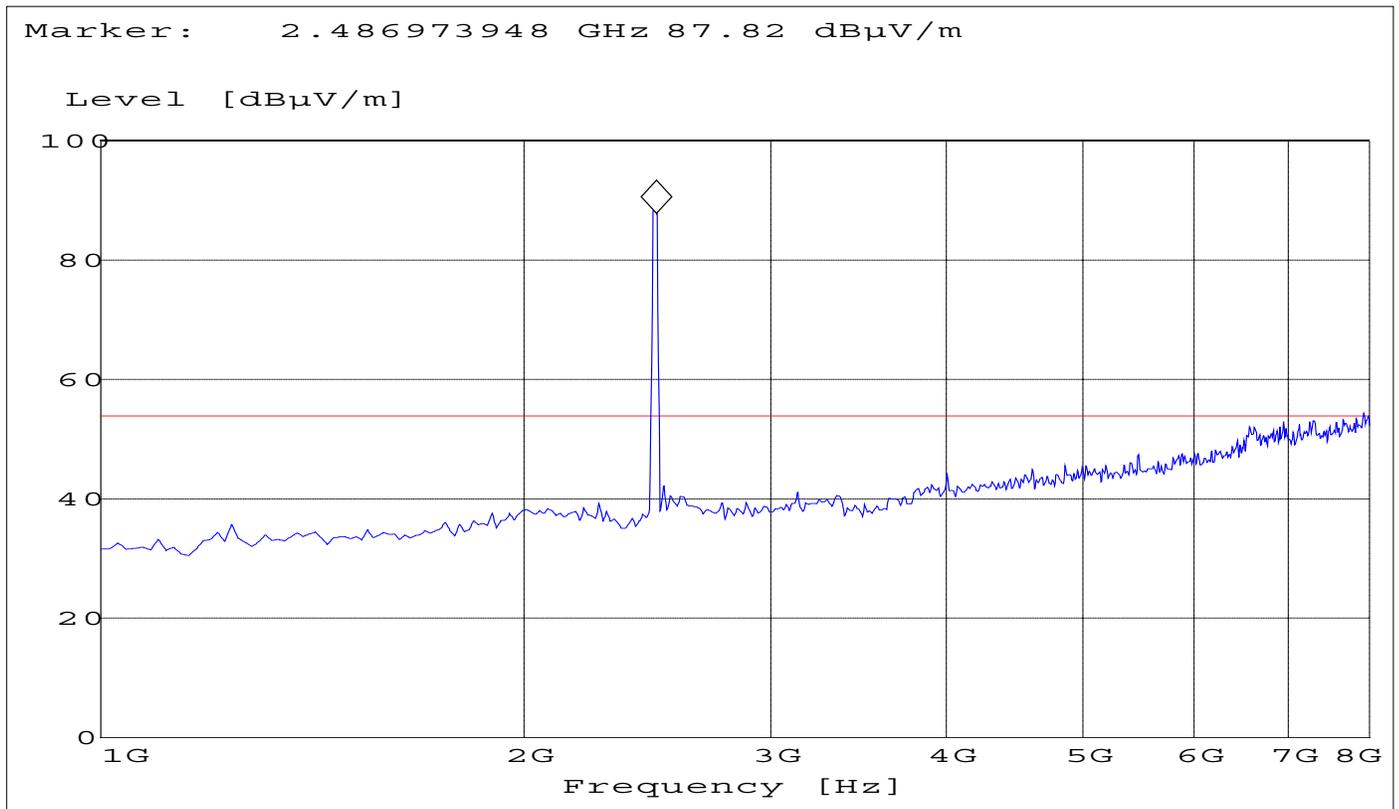
In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

EMISSION LIMITATIONS - Radiated (Transmitter)   **SUBCLAUSE § 15.247 (c) (1)**

Lowest Channel: 8GHz – 18GHz

ANALYZER SETTINGS: RBW = 1MHz   VBW = 1MHz

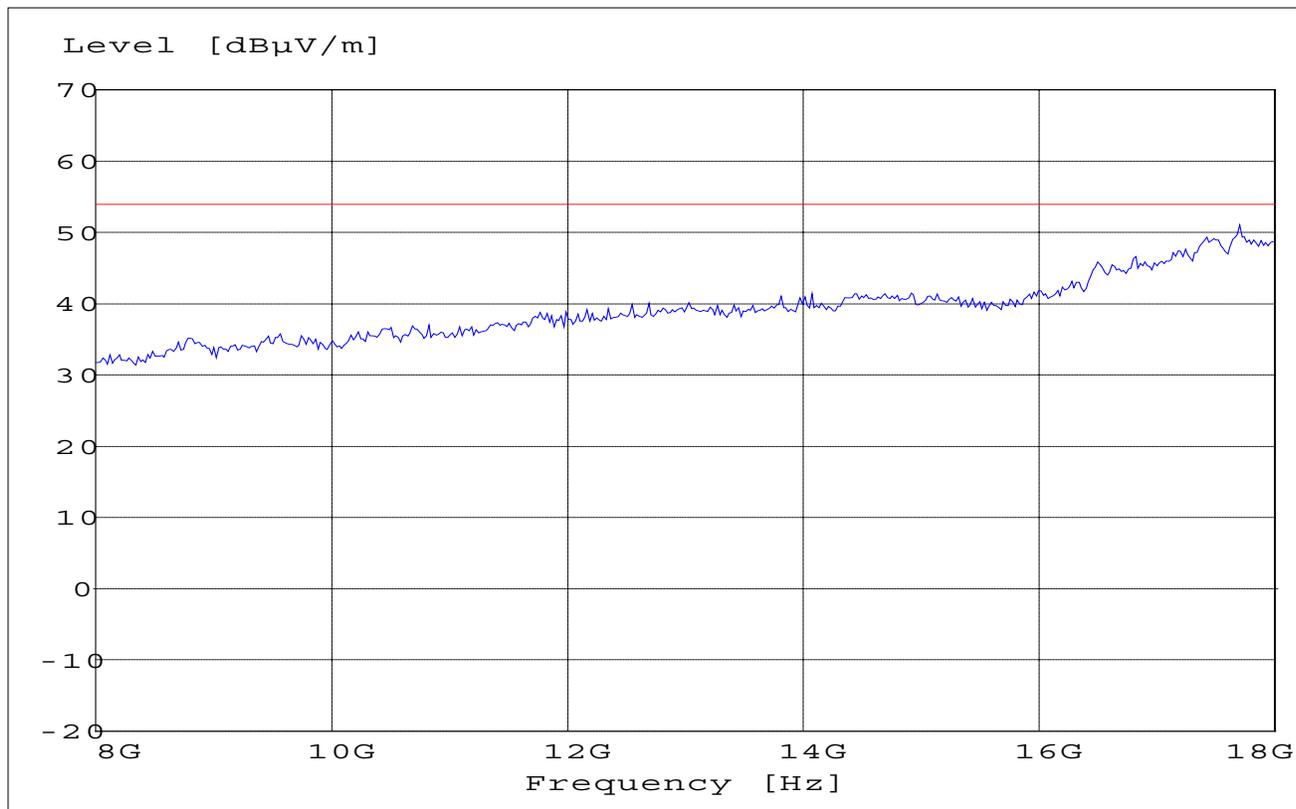**LIMITS**   **SUBCLAUSE § 15.247 (c)**

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

EMISSION LIMITATIONS - Radiated (Transmitter)   **SUBCLAUSE § 15.247 (c) (1)**

Lowest Channel: 18GHz – 26GHz

ANALYZER SETTINGS: RBW = 1MHz   VBW = 1MHz

LIMITS   **SUBCLAUSE § 15.247 (c)**

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

EMISSION LIMITATIONS - Radiated (Transmitter)   **SUBCLAUSE § 15.247 (c) (1)**

Mid Channel: 1GHz – 8GHz
NOTE: Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots following page no. 24

```
Marker:      2.44488978 GHz 83.26 dBµV/m

  Level [dBµV/m]
100
 80
 60
 40
 20
  0
   1G          2G          3G      4G     5G    6G   7G 8G
                    Frequency [Hz]
```

ANALYZER SETTINGS: RBW = 1MHz   VBW = 1MHz

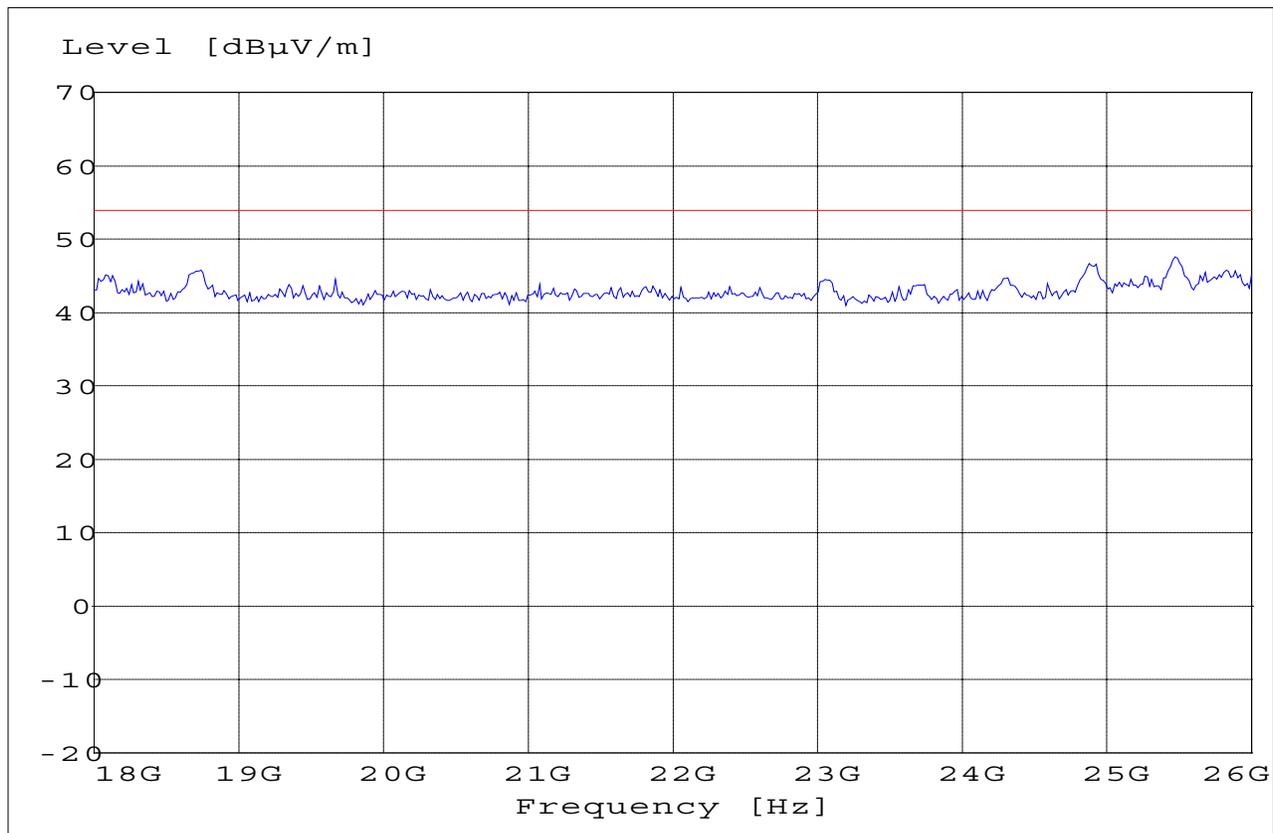**LIMITS**   **SUBCLAUSE § 15.247 (c)**

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

EMISSION LIMITATIONS - Radiated (Transmitter)   **SUBCLAUSE § 15.247 (c) (1)**

Mid Channel: 8GHz – 18GHz
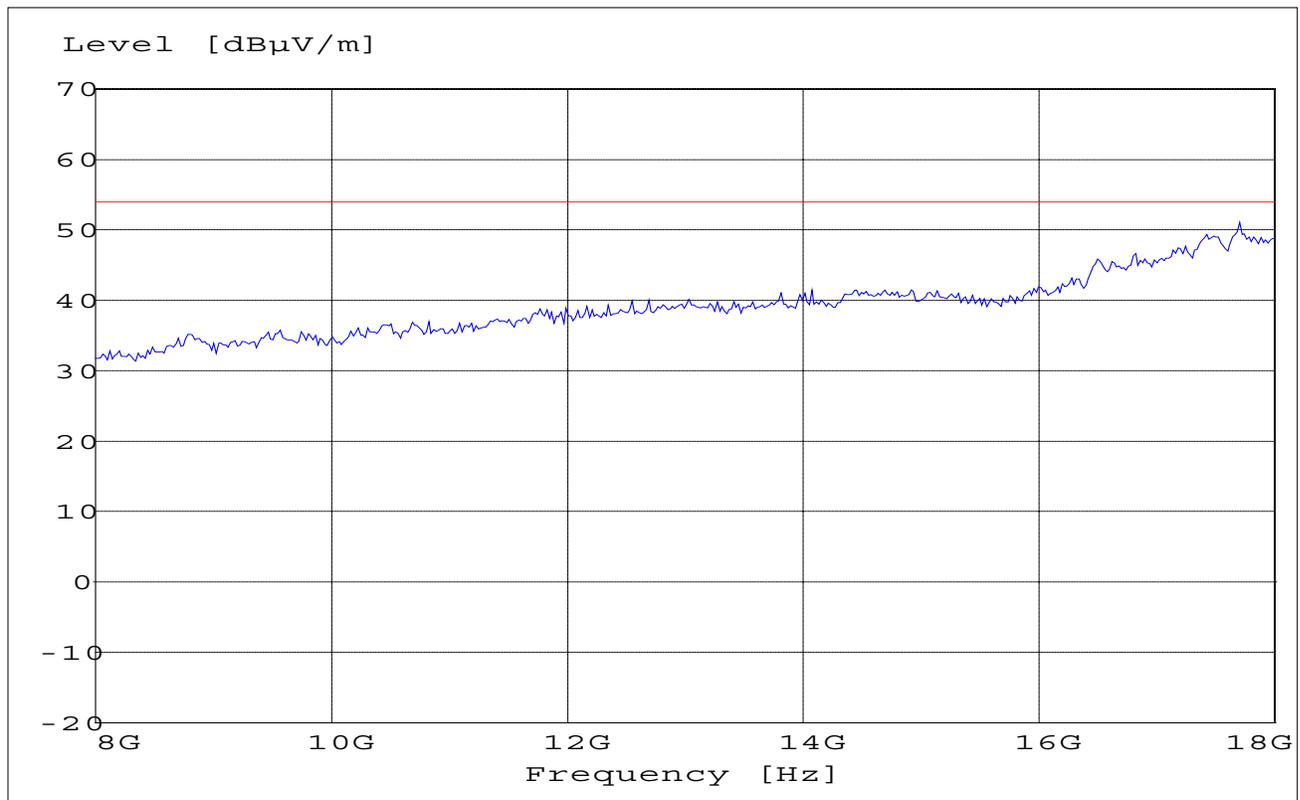
ANALYZER SETTINGS: RBW = 1MHz   VBW = 1MHz

LIMITS   **SUBCLAUSE § 15.247 (c)**

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

EMISSION LIMITATIONS - Radiated (Transmitter)   **SUBCLAUSE § 15.247 (c) (1)**

Mid Channel: 18GHz – 26GHz

ANALYZER SETTINGS: RBW = 1MHz   VBW = 1MHz

LIMITS   **SUBCLAUSE § 15.247 (c)**

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

EMISSION LIMITATIONS - Radiated (Transmitter)   **SUBCLAUSE § 15.247 (c) (1)**

Highest Channel: 1GHz – 8GHz

NOTE: Frequency resolution is not fine enough to show the exact frequency of the carrier, refer to plots following page no. 24

Marker: 2.486973948 GHz 87.82 dBµV/m

ANALYZER SETTINGS: RBW = 1MHz   VBW = 1MHz

LIMITS   **SUBCLAUSE § 15.247 (c)**

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

EMISSION LIMITATIONS - Radiated (Transmitter)   **SUBCLAUSE § 15.247 (c) (1)**

Highest Channel: 8GHz – 18GHz

ANALYZER SETTINGS: RBW = 1MHz   VBW = 1MHz

LIMITS   **SUBCLAUSE § 15.247 (c)**

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

EMISSION LIMITATIONS - Radiated (Transmitter)   **SUBCLAUSE § 15.247 (c) (1)**

Highest Channel: 18GHz – 26GHz

ANALYZER SETTINGS: RBW = 1MHz   VBW = 1MHz

LIMITS   **SUBCLAUSE § 15.247 (c)**

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

CETECOM Inc.

RECEIVER SPURIOUS RADIATION   **§ 15.209**

NOTE: The spurious emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 18 and 26 GHz very short cable connections to the antenna was used to minimize the noise level. Channel 1: 2402 MHz; Channel 2: 2441 MHz; Channel 3: 2481 MHz

Radiated

SPURIOUS EMISSIONS LEVEL (µV/m)								
2402 MHz			2442 MHz			2481 MHz		
f (MHz)	Detector	Level (µV/m)	f (MHz)	Detector	Level (µV/m)	f (MHz)	Detector	Level (µV/m)
all peaks <<limit								
Measurement uncertainty		±3 dB						

Limits   **SUBCLAUSE § 15.209**

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

RECEIVER SPURIOUS RADIATION   **§ 15.209**
1GHz – 8GHz (This plot is valid for all three channels)
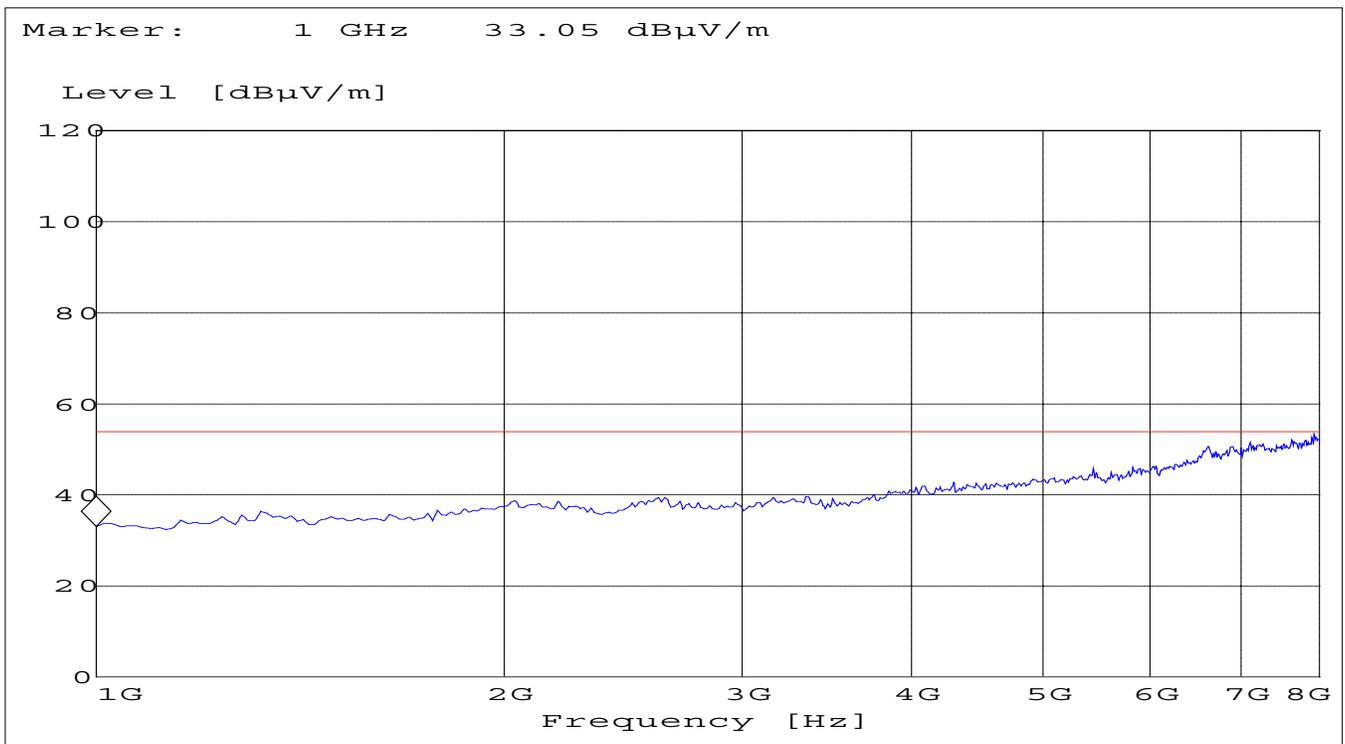
```
Marker:      1 GHz     33.05 dBµV/m

   Level  [dBµV/m]
  120
  100
   80
   60
   40
   20
    0
     1G          2G          3G       4G    5G    6G   7G 8G
               Frequency  [Hz]
```

ANALYZER SETTINGS: RBW = 1MHz   VBW = 1MHz

RECEIVER SPURIOUS RADIATION   **§ 15.209**
8GHz – 18GHz (This plot is valid for all three channels)

Level [dBµV/m]


```
70
60
50
40
30
20
10
 0
-10
-20
   8G      10G      12G      14G      16G      18G
            Frequency  [Hz]
```
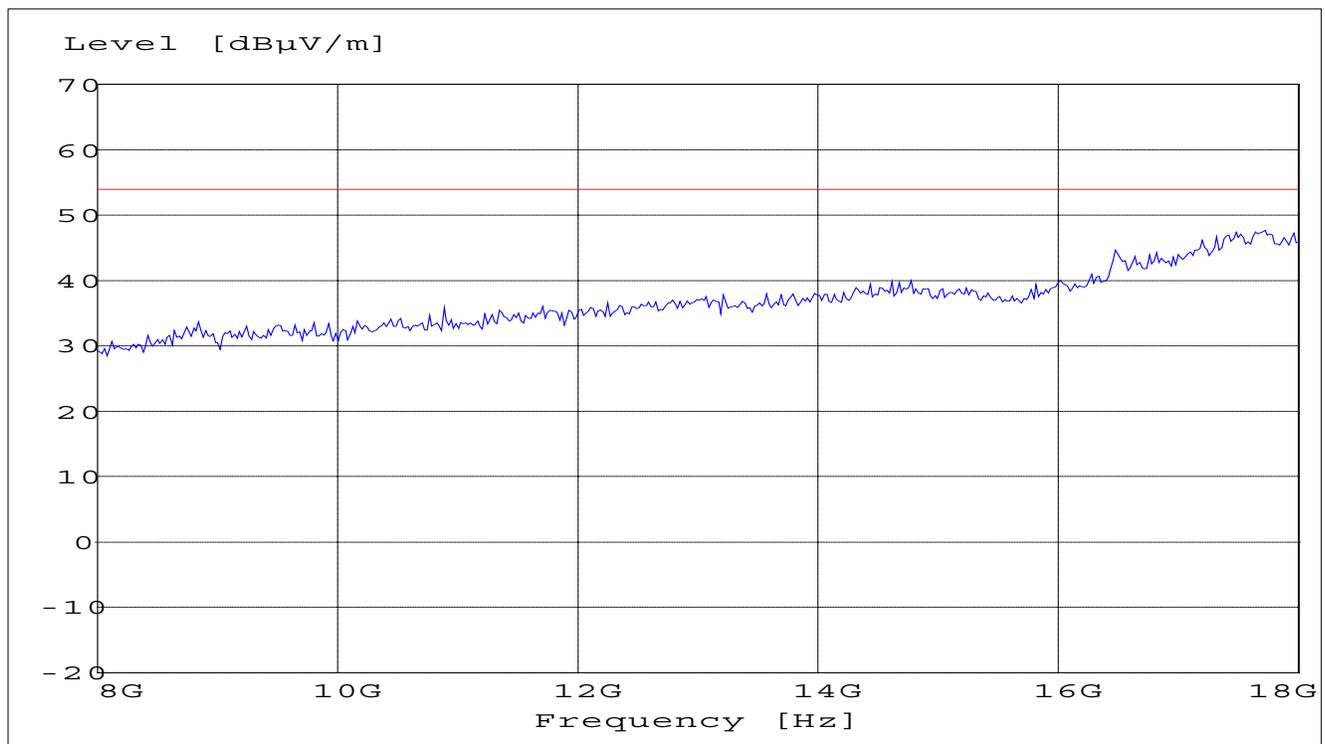
ANALYZER SETTINGS: RBW = 1MHz   VBW = 1MHz

RECEIVER SPURIOUS RADIATION   **§ 15.209**
18GHz – 26GHz (This plot is valid for all three channels)

ANALYZER SETTINGS: RBW = 1MHz   VBW = 1MHz

TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No	Instrument/Ancillary	Type	Manufacturer	Serial No.
01	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	826880/010
02	Signal Generator	SMY0	Rohde & Schwarz	836878/011
03	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02
04	Power Amlifier	250W1000	Amplifier Research	300031
05	Biconilog Antenna	3141	EMCO	0005-1186
06	Horn Antenna	SAS-200/571	AH Systems	325
07	Power Splitter	11667B	Hewlett Packard	645348
08	Climatic Chamber	VT4004	Votch	G1115
09	Pre-Amplifier	JS4-00102600	Miteq	00616
10	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30807
11	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30808

Test site
RADIATED EMISSIONS

**HewlettPackard
Deskjet 995C
Project No. 149B/2001**
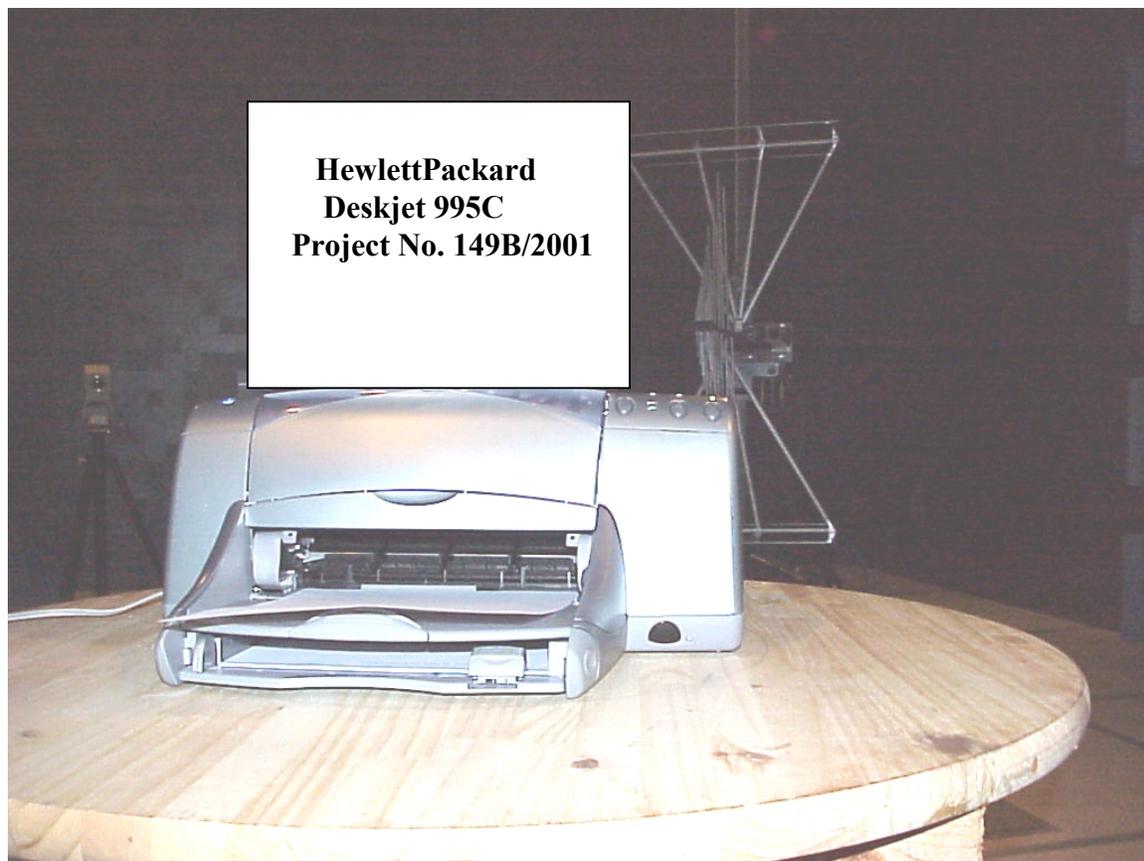
Photographs of the equipment

Photograph no.: 1

Photographs of the equipment

Photograph no.: 2

Extended cable length between module printer PCB for tempreature measurements. Only used for conducted measurements (module with SMA connector)
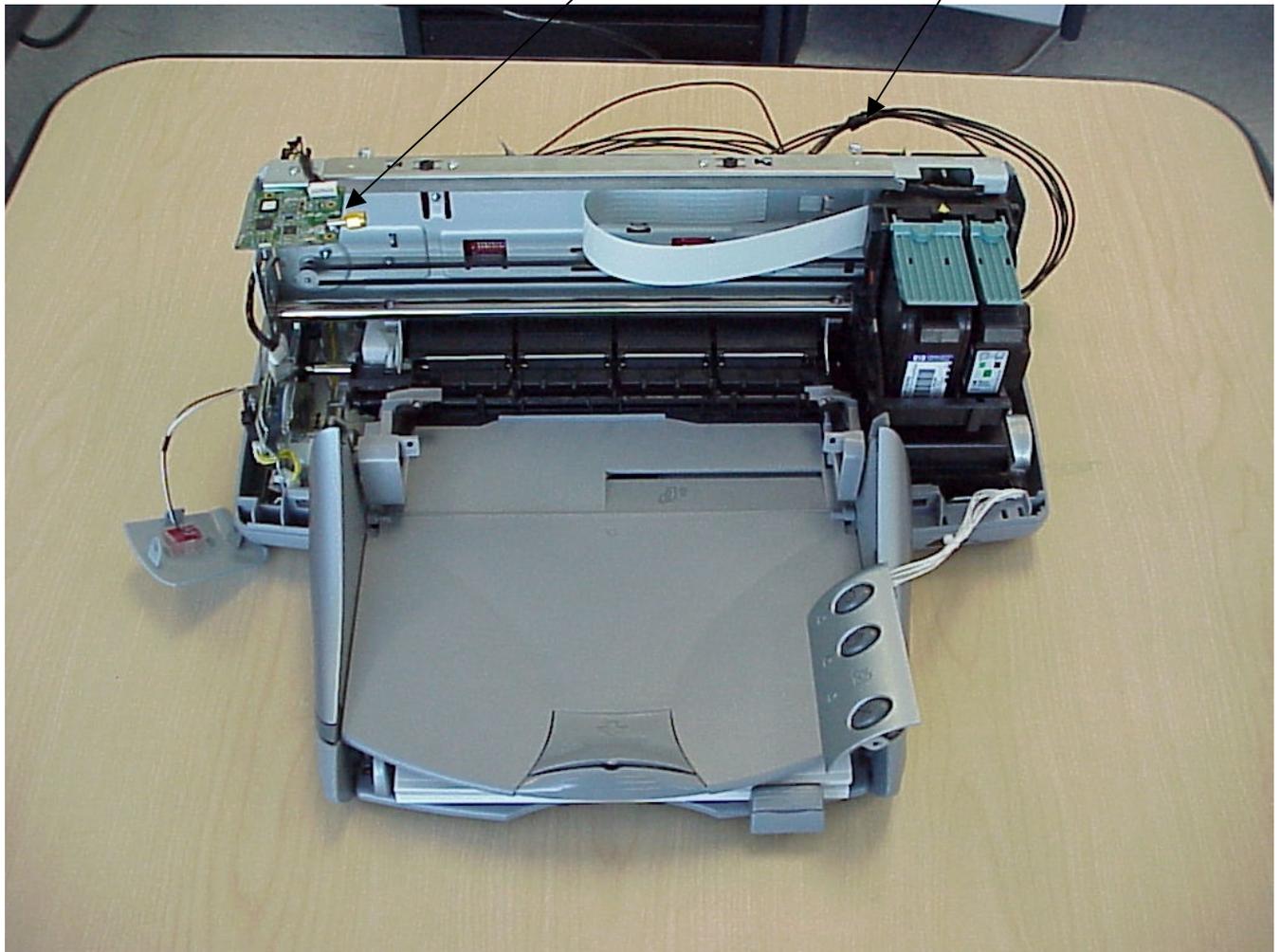
Photographs of the equipment

Photograph no.: 3
Module used for conductd measurements (top view with sheilding) The antenna is integrated on the board.
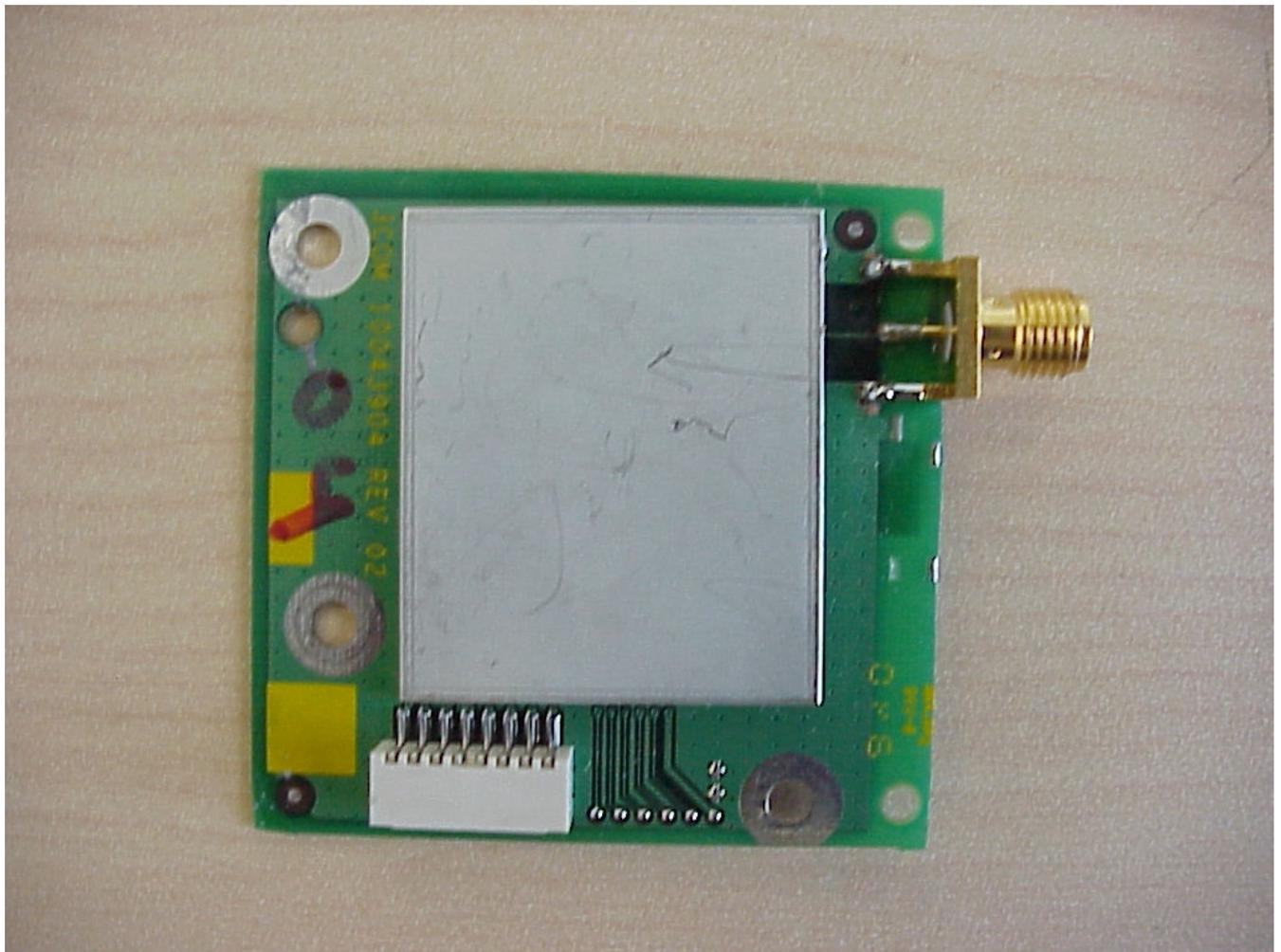
Photographs of the equipment

Photograph no.: 4
Module used for conductd measurements (top view without sheilding)
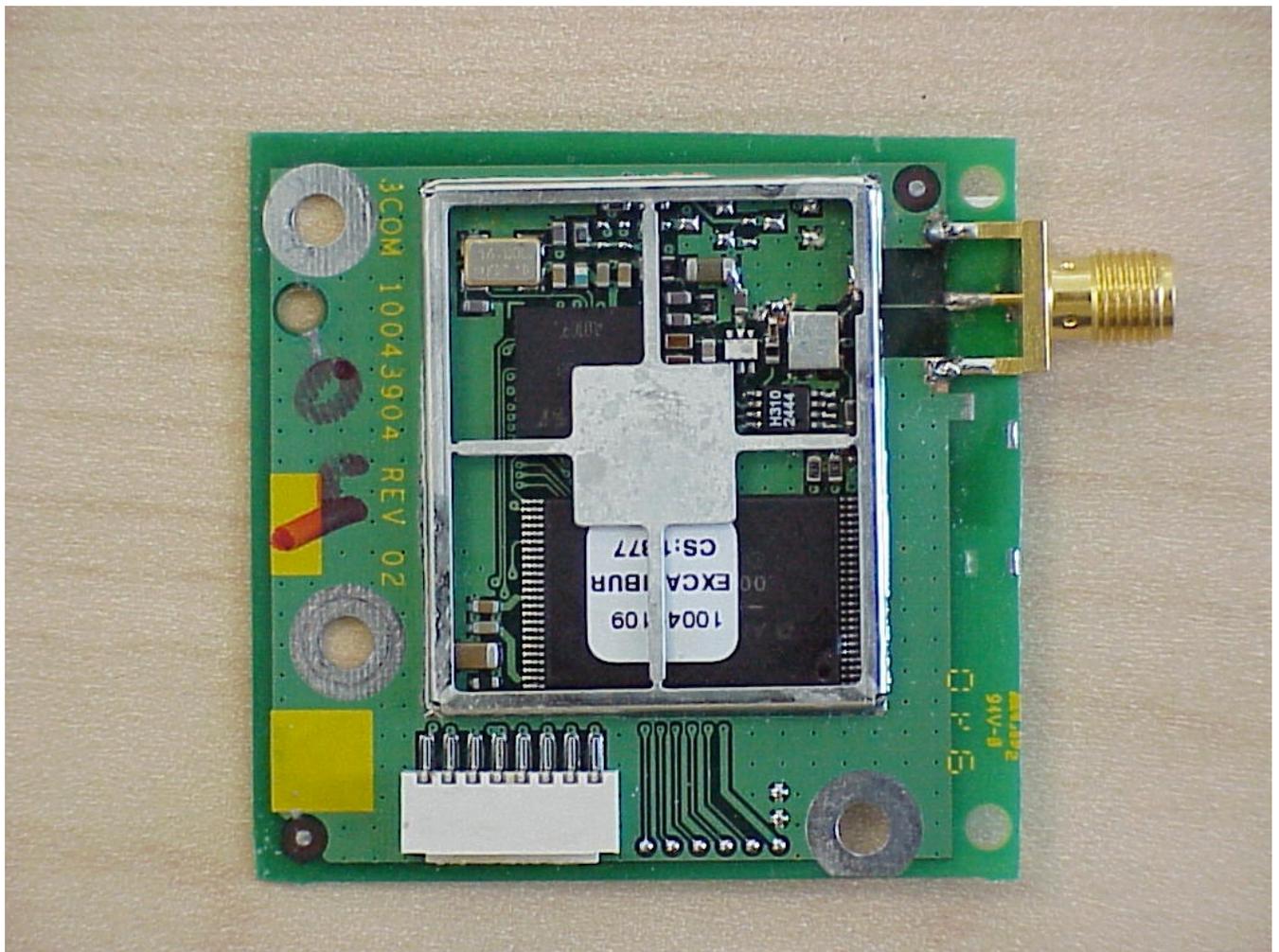
Photographs of the equipment

Photograph no.: 5
Module used for conductd measurements (bottom view)
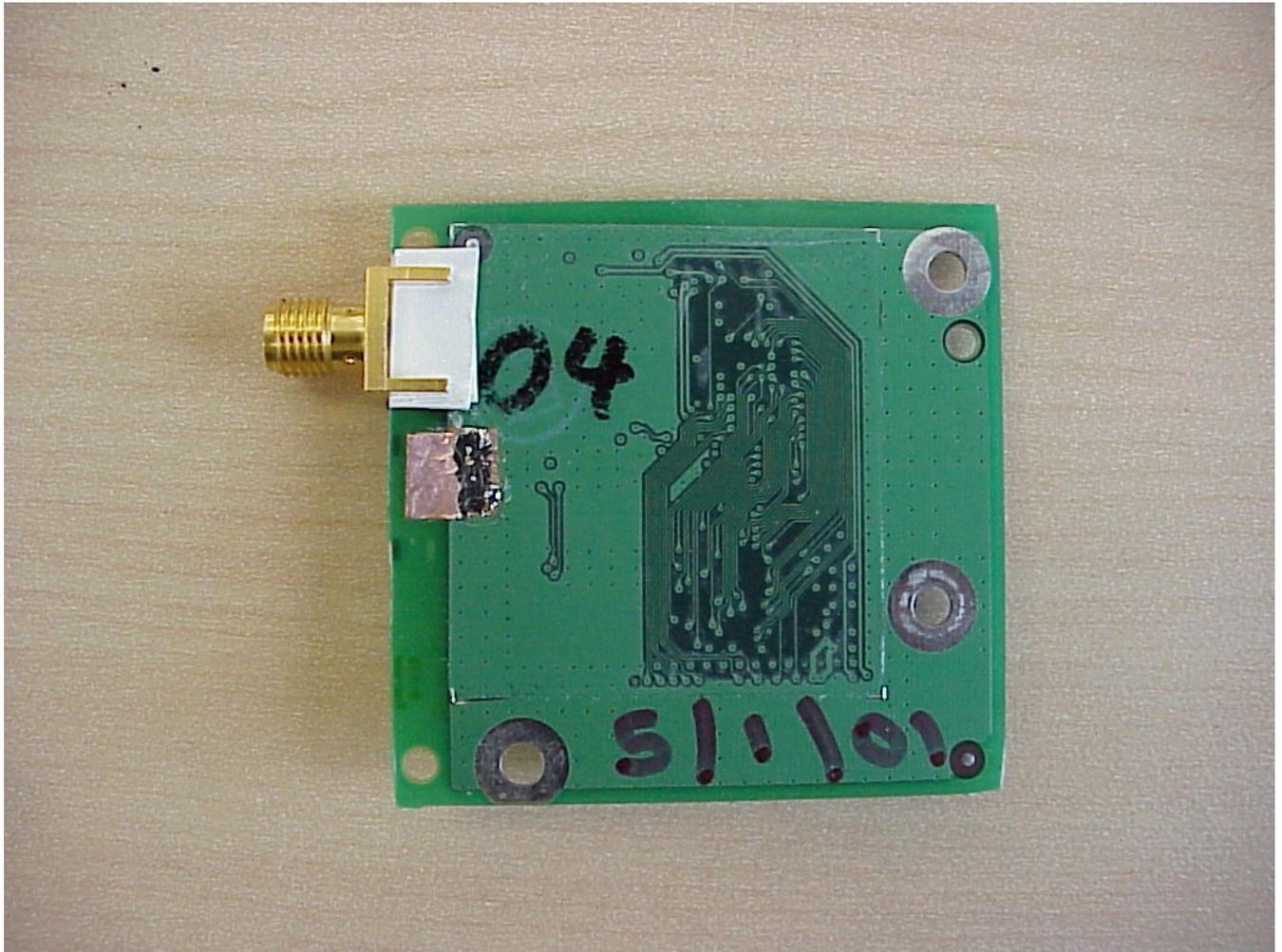
MEMORANDUM

Distribution: Peter Flittner, Robert Young, James Collier

cc:

Prepared By: Alex Busteed

Subject: Results of Processing Gain Tests for FCC Qualification

---

1   INTRODUCTION

This memo presents the results of the Processing Gain (PG) tests carried out for FCC qualification of the Cambridge Silicon Radio BC01B Bluetooth chip. The FCC states that the PG from a hybrid Bluetooth receiver must be greater than 17 dB when measured in accordance with the Continuous Wave (CW) jamming margin method. Testing of the BC01b has found the PG due to the DS section to be approximately 5 dB and the PG due to the FH part to be approximately 15 dB. It is therefore concluded that the BC01B complies with the FCC PG requirements for radio communication systems.

The rest of this paper outlines the PG measurement technique and discusses the test results. Appendix A contains a list of test equipment and Appendix B contains a printout of the measurement results.

2   METHOD

2.1   PG Definition

The Processing Gain from a frequency hopping communication system is derived from two parts, the FH section and the DS section. The PG due to FH is given by a simple equation and is constant. However measurement of the PG due to DS is a little more complex. One technique is to use the CW jamming margin method. This method measures PG due to DS using the following algorithm:

A CW signal generator is stepped in 50kHz increments across the passband of the system, recording at each point the generator level required to produce the 0.1% Packet Error Rate (PER). This is the jammer level. This level is then referenced to the output power of the intended Bluetooth signal and the Jammer to Signal Ratio JSR is thus calculated. The worst 4

JSR measurements are discarded and the worst remaining JSR is used to calculate the PG due to DS as follows:

$$G_p = SNR + JSR_{min} + L_{sys}$$

where G_p = the processing gain of the system, SNR = the signal to noise ratio required for 0.1% BER, JSR_{min} = minimum J/S ratio and L_{sys} = system losses.

2.2 PG Measurement Technique

Figure 1 provides an overview of the PG measurement technique. The measurement is performed in two parts, measurement of the system SNR and measurement of JSR_{min}.
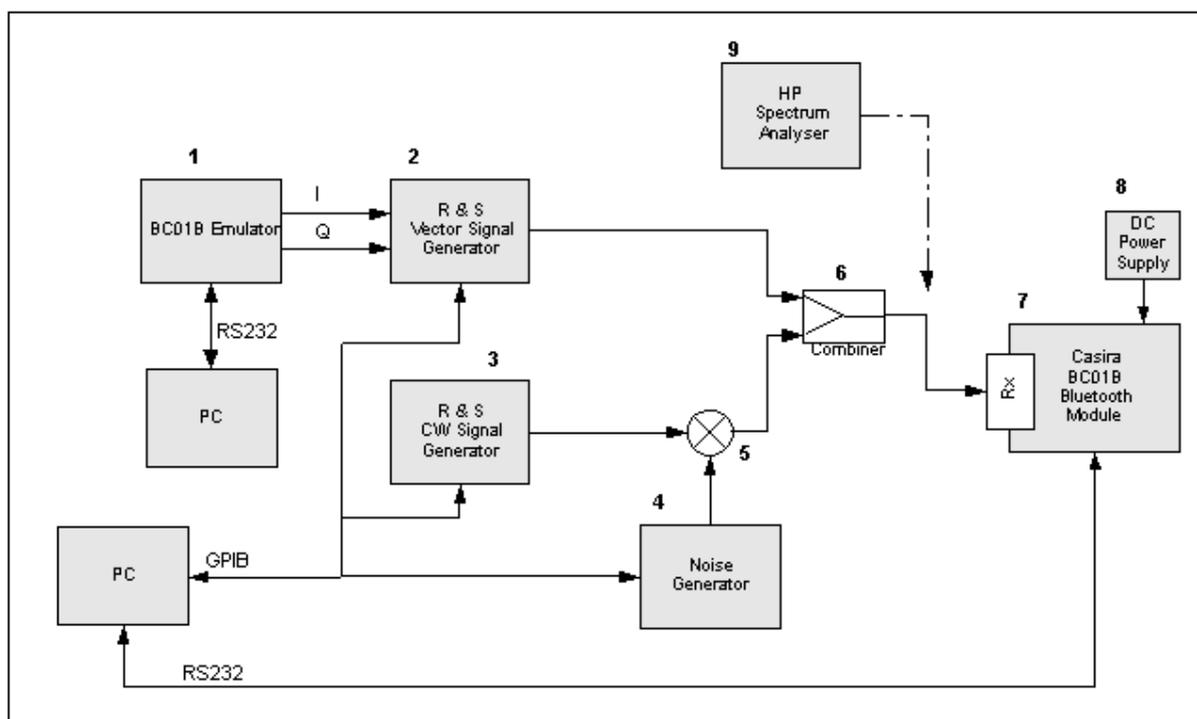
Figure 1: PG Measurement Technique

The system SNR is calculated using the following algorithm. Generate Bluetooth PRBS-9 packets using a BC01B emulator (1) and a Vector Signal Generator (2). Combine this signal with white noise of a constant level, which is generated using a noise source (4) and a CW Signal Generator (3). Then vary the level of the Bluetooth signal until the BER measured by the BC01B (7) is 0.1%. The resulting SNR is the signal level divided by the Noise level.

The JSR for a given jamming frequency is calculated using the following algorithm. Generate Bluetooth PRBS-9 packets using the BC01B emulator (1) and the Vector Signal Generator (2). Combine this signal with a constant CW tone at the jamming frequency using a CW Signal Generator (5) and a combiner (6). Then vary the level of the Bluetooth signal until the PER measured by the Casira Bluetooth Module (7) is 0.1%. The resulting JSR is the signal level divided by the jamming level.

3   RESULTS

3.1   Overview

The measurements found that the PG due to DS caused by the access code in page and inquiry mode is found to be approximately 5dB when the access code is a relatively random mixture of 1's and 0's. A random access code causes the most Inter Symbol Interference (ISI) and hence the worst PG for a hybrid system. Therefore only the results for this access code are used in the PG calculation.

The PG due to FH is given as

$$PG_{FH} = 10 \, log_{10} \, (number \, of \, frequency \, hops)$$

The number of hops in a Bluetooth system is 32, therefore the PG due to FH is approximately 15 dB. When this is added to the PG due to DS, the total PG for the BC01B is approximately 20 dB, above the minimum PG requirement for FCC qualification.

3.2   Detailed Results

Test Date: 17/11/00

Sample Time: 30 seconds

Access Code: c6967e

Signal Frequency: 2.432GHz

Receiver Sensitivity: -88.7 dBm

Jammer Signal Level: -85.7 dBm

Measured SNR: 18.8dB

System Losses: 2dB

To calculate processing gain, ignore the worst 20% of data points and then apply the following formula:

$$G_p = SNR + JSR_{min} + L_{sys}$$

Where G_p =   Processing Gain of the module
         SNR   =   signal to noise ratio of the module
         JS_{min} =   minimum J/S ratio after the worst 20% of J/S samples have been discarded
         L_{sys} =   System losses

A total of 20 samples were taken by stepping the jamming signal frequency offsets in 50kHz increments over the bandwidth of the receiver. The worst 4 samples were found at –500kHz, -450kHz, -400kHz and 500kHz and were discarded. The remaining minimum J/S ratio was found to be -15.4dB at an offset of +350kHz

Thus, the processing gain due to direct sequence spreading in page and inquiry mode is

$$G_p = 18.8 - 15.4 + 2 = 5.4dB$$

J/S ratio performance for Processing Gain FCC Testing
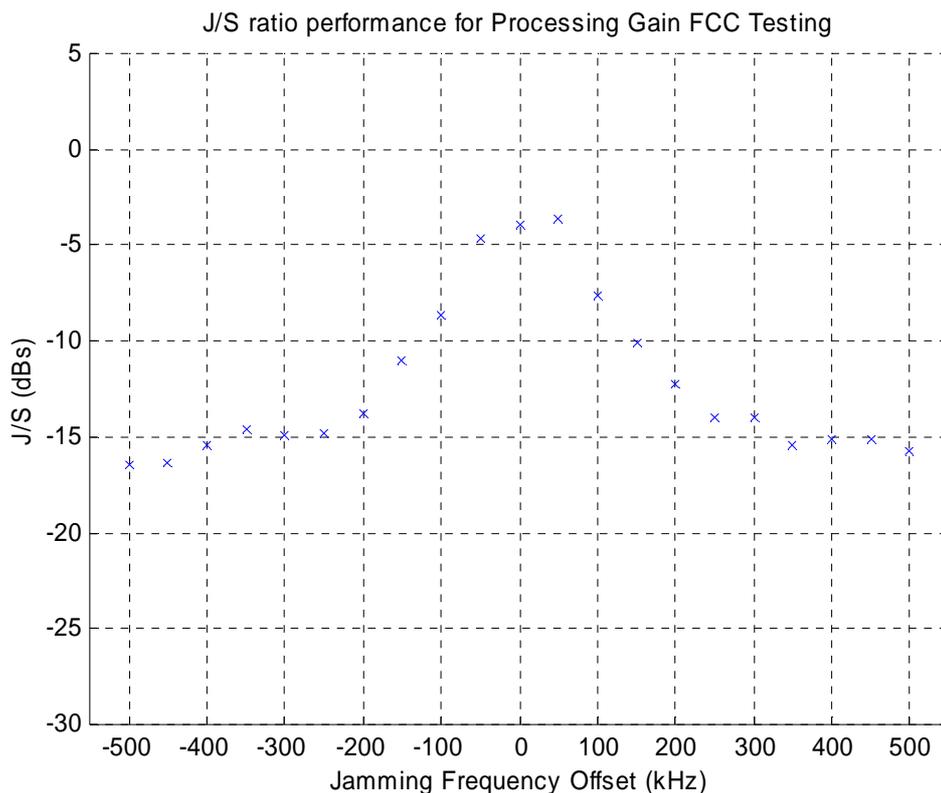
APPENDIX A - TEST EQUIPMENT LIST

Reference:	Instrument Type	Name
1	BlueCore Emulator Board	N/A
2	Vector Signal Generator	IFR2052
3	CW Signal Generator	IFR2025
4	White Noise Generator	HP33120A
5	RF Mixer	M8HC-7
6	RF Combiner	6 dB loss combiner
7	Bluetooth Motherboard and BC01B Module	Casira Development Kit
8	5V, 4A DC Power Supply	N/A
9	Spectrum Analyser	HP E4405B
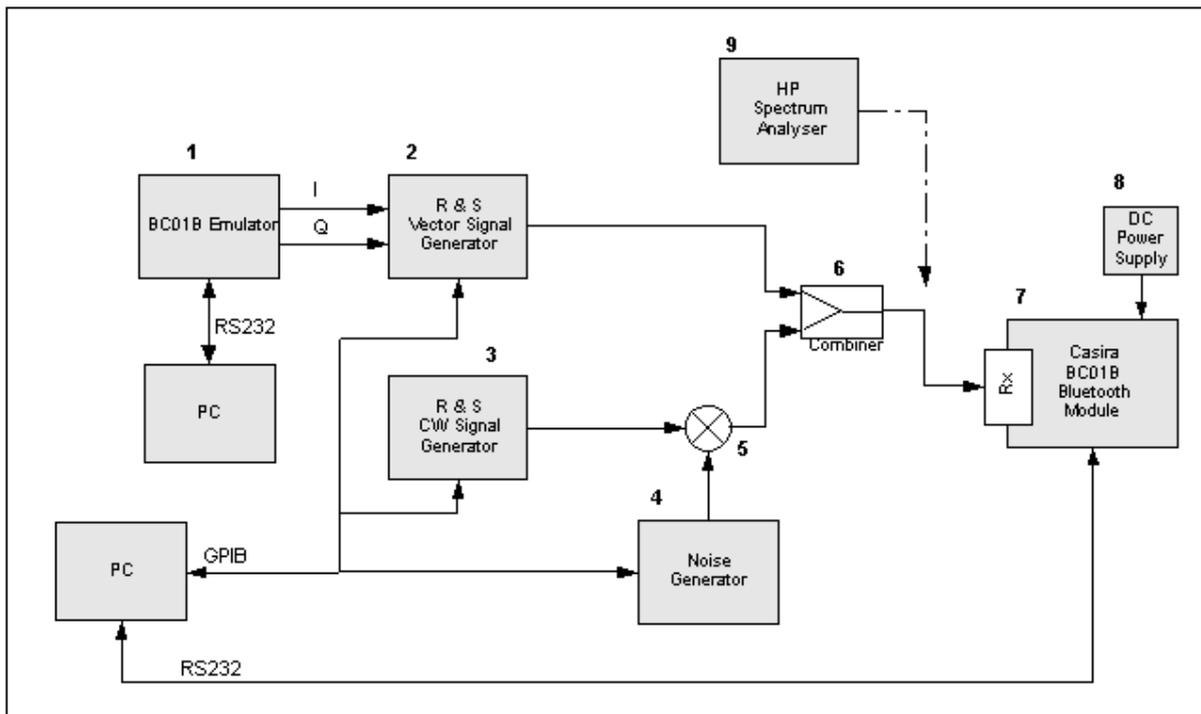
APPENDIX B - TEST RESULTS

Timestamp: 14:42.43, 16/11/2000
Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = -500 kHz

Level = -68.7 dBm BER = 0.03% PER = 0.01% SER1 = 0.01% SER2 = 0.01%
Level = -70.7 dBm BER = 0.32% PER = 0.79% SER1 = 0.79% SER2 = 0.79%
Level = -69.7 dBm BER = 0.11% PER = 0.18% SER1 = 0.18% SER2 = 0.18%
Level = -68.7 dBm BER = 0.04% PER = 0.03% SER1 = 0.02% SER2 = 0.02%
Level = -69.2 dBm BER = 0.06% PER = 0.05% SER1 = 0.05% SER2 = 0.05%
Level = -69.7 dBm BER = 0.11% PER = 0.16% SER1 = 0.16% SER2 = 0.16%
Level = -69.5 dBm BER = 0.09% PER = 0.11% SER1 = 0.11% SER2 = 0.11%
Level = -69.3 dBm BER = 0.07% PER = 0.05% SER1 = 0.05% SER2 = 0.05%

J/S = -16.50 dB (SER = 0.05%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = -450 kHz

Level = -69.2 dBm BER = 0.06% PER = 0.05% SER1 = 0.05% SER2 = 0.05%
Level = -71.2 dBm BER = 0.84% PER = 1.72% SER1 = 1.69% SER2 = 1.69%
Level = -70.2 dBm BER = 0.26% PER = 0.40% SER1 = 0.40% SER2 = 0.40%
Level = -69.2 dBm BER = 0.07% PER = 0.06% SER1 = 0.06% SER2 = 0.06%
Level = -69.7 dBm BER = 0.12% PER = 0.18% SER1 = 0.18% SER2 = 0.18%
Level = -69.5 dBm BER = 0.09% PER = 0.14% SER1 = 0.14% SER2 = 0.14%
Level = -69.3 dBm BER = 0.07% PER = 0.08% SER1 = 0.08% SER2 = 0.08%

J/S = -16.40 dB (SER = 0.08%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = -400 kHz

Level = -69.3 dBm BER = 0.04% PER = 0.02% SER1 = 0.02% SER2 = 0.02%
Level = -71.3 dBm BER = 0.44% PER = 0.72% SER1 = 0.71% SER2 = 0.71%
Level = -70.3 dBm BER = 0.13% PER = 0.11% SER1 = 0.11% SER2 = 0.11%
Level = -69.3 dBm BER = 0.04% PER = 0.01% SER1 = 0.01% SER2 = 0.01%
Level = -69.8 dBm BER = 0.08% PER = 0.03% SER1 = 0.02% SER2 = 0.02%
Level = -70.3 dBm BER = 0.13% PER = 0.10% SER1 = 0.10% SER2 = 0.10%

J/S = -15.40 dB (SER = 0.10%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = -350 kHz

Level = -70.3 dBm BER = 0.05% PER = 0.01% SER1 = 0.01% SER2 = 0.01%
Level = -72.3 dBm BER = 0.88% PER = 1.67% SER1 = 1.64% SER2 = 1.64%
Level = -71.3 dBm BER = 0.19% PER = 0.10% SER1 = 0.10% SER2 = 0.10%
Level = -70.3 dBm BER = 0.06% PER = 0.01% SER1 = 0.01% SER2 = 0.01%
Level = -70.8 dBm BER = 0.09% PER = 0.04% SER1 = 0.04% SER2 = 0.04%
Level = -71.3 dBm BER = 0.17% PER = 0.12% SER1 = 0.12% SER2 = 0.12%

Level = -71.1 dBm BER = 0.13% PER = 0.05% SER1 = 0.05% SER2 = 0.05%

J/S = -14.60 dB (SER = 0.05%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = -300 kHz

Level = -71.1 dBm BER = 0.03% PER = 0.15% SER1 = 0.15% SER2 = 0.15%
Level = -69.1 dBm BER = 0.00% PER = 0.00% SER1 = 0.00% SER2 = 0.00%
Level = -70.1 dBm BER = 0.01% PER = 0.00% SER1 = 0.00% SER2 = 0.00%
Level = -71.1 dBm BER = 0.03% PER = 0.19% SER1 = 0.19% SER2 = 0.19%
Level = -70.6 dBm BER = 0.02% PER = 0.04% SER1 = 0.04% SER2 = 0.04%
Level = -70.8 dBm BER = 0.02% PER = 0.09% SER1 = 0.09% SER2 = 0.09%

J/S = -14.90 dB (SER = 0.09%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = -250 kHz

Level = -70.8 dBm BER = 0.00% PER = 0.03% SER1 = 0.02% SER2 = 0.02%
Level = -72.8 dBm BER = 0.05% PER = 2.34% SER1 = 2.29% SER2 = 2.29%
Level = -71.8 dBm BER = 0.01% PER = 0.33% SER1 = 0.33% SER2 = 0.33%
Level = -70.8 dBm BER = 0.00% PER = 0.03% SER1 = 0.03% SER2 = 0.03%
Level = -71.3 dBm BER = 0.01% PER = 0.11% SER1 = 0.11% SER2 = 0.11%
Level = -71.1 dBm BER = 0.00% PER = 0.11% SER1 = 0.11% SER2 = 0.11%
Level = -70.9 dBm BER = 0.00% PER = 0.03% SER1 = 0.03% SER2 = 0.03%

J/S = -14.80 dB (SER = 0.03%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = -200 kHz

Level = -70.9 dBm BER = 0.00% PER = 0.00% SER1 = 0.00% SER2 = 0.00%
Level = -72.9 dBm BER = 0.00% PER = 0.34% SER1 = 0.34% SER2 = 0.34%
Level = -71.9 dBm BER = 0.00% PER = 0.07% SER1 = 0.07% SER2 = 0.07%
Level = -72.4 dBm BER = 0.00% PER = 0.15% SER1 = 0.15% SER2 = 0.15%
Level = -72.2 dBm BER = 0.00% PER = 0.12% SER1 = 0.12% SER2 = 0.12%
Level = -72.0 dBm BER = 0.00% PER = 0.05% SER1 = 0.05% SER2 = 0.05%

J/S = -13.80 dB (SER = 0.07%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = -150 kHz

Level = -71.9 dBm BER = 0.00% PER = 0.00% SER1 = 0.00% SER2 = 0.00%
Level = -73.9 dBm BER = 0.00% PER = 0.03% SER1 = 0.02% SER2 = 0.02%
Level = -75.9 dBm BER = 0.01% PER = 0.83% SER1 = 0.82% SER2 = 0.82%
Level = -74.9 dBm BER = 0.00% PER = 0.16% SER1 = 0.16% SER2 = 0.16%
Level = -73.9 dBm BER = 0.00% PER = 0.03% SER1 = 0.02% SER2 = 0.02%
Level = -74.4 dBm BER = 0.00% PER = 0.08% SER1 = 0.07% SER2 = 0.07%
Level = -74.9 dBm BER = 0.00% PER = 0.18% SER1 = 0.18% SER2 = 0.18%

Level = -74.7 dBm BER = 0.00% PER = 0.10% SER1 = 0.10% SER2 = 0.10%

J/S = -11.00 dB (SER = 0.10%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = -100 kHz

Level = -74.7 dBm BER = 0.00% PER = 0.00% SER1 = 0.00% SER2 = 0.00%
Level = -76.7 dBm BER = 0.00% PER = 0.05% SER1 = 0.05% SER2 = 0.05%
Level = -78.7 dBm BER = 0.01% PER = 2.05% SER1 = 2.01% SER2 = 2.01%
Level = -77.7 dBm BER = 0.00% PER = 0.30% SER1 = 0.30% SER2 = 0.30%
Level = -76.7 dBm BER = 0.00% PER = 0.06% SER1 = 0.06% SER2 = 0.06%
Level = -77.2 dBm BER = 0.00% PER = 0.13% SER1 = 0.12% SER2 = 0.12%
Level = -77.0 dBm BER = 0.00% PER = 0.08% SER1 = 0.07% SER2 = 0.07%

J/S = -8.70 dB (SER = 0.07%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = -50 kHz

Level = -77.0 dBm BER = 0.00% PER = 0.00% SER1 = 0.00% SER2 = 0.00%
Level = -79.0 dBm BER = 0.00% PER = 0.00% SER1 = 0.00% SER2 = 0.00%
Level = -81.0 dBm BER = 0.01% PER = 0.05% SER1 = 0.05% SER2 = 0.05%
Level = -83.0 dBm BER = 0.16% PER = 0.73% SER1 = 0.72% SER2 = 0.72%
Level = -82.0 dBm BER = 0.03% PER = 0.26% SER1 = 0.26% SER2 = 0.26%
Level = -81.0 dBm BER = 0.01% PER = 0.06% SER1 = 0.06% SER2 = 0.06%
Level = -81.5 dBm BER = 0.02% PER = 0.13% SER1 = 0.13% SER2 = 0.13%
Level = -81.3 dBm BER = 0.02% PER = 0.11% SER1 = 0.11% SER2 = 0.11%
Level = -81.1 dBm BER = 0.04% PER = 0.06% SER1 = 0.06% SER2 = 0.06%

J/S = -4.60 dB (SER = 0.06%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset =   +0 kHz

Level = -68.7 dBm BER = 0.00% PER = 0.00% SER1 = 0.00% SER2 = 0.00%
Level = -70.7 dBm BER = 0.00% PER = 0.00% SER1 = 0.00% SER2 = 0.00%
Level = -72.7 dBm BER = 0.00% PER = 0.00% SER1 = 0.00% SER2 = 0.00%
Level = -74.7 dBm BER = 0.00% PER = 0.00% SER1 = 0.00% SER2 = 0.00%
Level = -76.7 dBm BER = 0.00% PER = 0.00% SER1 = 0.00% SER2 = 0.00%
Level = -78.7 dBm BER = 0.00% PER = 0.00% SER1 = 0.00% SER2 = 0.00%
Level = -80.7 dBm BER = 0.01% PER = 0.00% SER1 = 0.00% SER2 = 0.00%
Level = -82.7 dBm BER = 0.04% PER = 0.04% SER1 = 0.03% SER2 = 0.03%
Level = -84.7 dBm BER = 7.51% PER = 48.26% SER1 = 27.11% SER2 = 28.05%
Level = -83.7 dBm BER = 0.31% PER = 1.01% SER1 = 0.86% SER2 = 0.86%
Level = -82.7 dBm BER = 0.05% PER = 0.24% SER1 = 0.18% SER2 = 0.18%
Level = -81.7 dBm BER = 0.01% PER = 0.00% SER1 = 0.00% SER2 = 0.00%
Level = -82.2 dBm BER = 0.02% PER = 0.13% SER1 = 0.10% SER2 = 0.10%
Level = -82.0 dBm BER = 0.02% PER = 2.31% SER1 = 2.24% SER2 = 2.24%
Level = -81.8 dBm BER = 0.02% PER = 0.06% SER1 = 0.05% SER2 = 0.05%

J/S = -3.90 dB (SER = 0.05%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = +50 kHz

Level = -81.8 dBm BER = 0.11% PER = 0.02% SER1 = 0.02% SER2 = 0.02%
Level = -83.8 dBm BER = 0.68% PER = 2.16% SER1 = 1.82% SER2 = 1.82%
Level = -82.8 dBm BER = 0.28% PER = 0.35% SER1 = 0.29% SER2 = 0.29%
Level = -81.8 dBm BER = 0.09% PER = 0.02% SER1 = 0.02% SER2 = 0.02%
Level = -82.3 dBm BER = 0.15% PER = 0.25% SER1 = 0.22% SER2 = 0.22%
Level = -82.1 dBm BER = 0.12% PER = 0.09% SER1 = 0.07% SER2 = 0.07%

J/S = -3.60 dB (SER = 0.07%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = +100 kHz

Level = -82.1 dBm BER = 1.55% PER = 15.88% SER1 = 13.44% SER2 = 13.51%
Level = -80.1 dBm BER = 0.28% PER = 5.78% SER1 = 5.47% SER2 = 5.47%
Level = -78.1 dBm BER = 0.03% PER = 0.09% SER1 = 0.09% SER2 = 0.09%

J/S = -7.60 dB (SER = 0.09%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = +150 kHz

Level = -78.1 dBm BER = 0.41% PER = 13.58% SER1 = 11.96% SER2 = 12.16%
Level = -76.1 dBm BER = 0.09% PER = 0.42% SER1 = 0.42% SER2 = 0.42%
Level = -74.1 dBm BER = 0.00% PER = 0.00% SER1 = 0.00% SER2 = 0.00%
Level = -75.1 dBm BER = 0.01% PER = 0.02% SER1 = 0.02% SER2 = 0.02%
Level = -76.1 dBm BER = 0.04% PER = 0.41% SER1 = 0.41% SER2 = 0.41%
Level = -75.6 dBm BER = 0.03% PER = 0.10% SER1 = 0.10% SER2 = 0.10%

J/S = -10.10 dB (SER = 0.10%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = +200 kHz

Level = -75.6 dBm BER = 0.26% PER = 7.53% SER1 = 7.00% SER2 = 7.00%
Level = -73.6 dBm BER = 0.02% PER = 0.17% SER1 = 0.17% SER2 = 0.17%
Level = -71.6 dBm BER = 0.00% PER = 0.00% SER1 = 0.00% SER2 = 0.00%
Level = -72.6 dBm BER = 0.00% PER = 0.03% SER1 = 0.03% SER2 = 0.03%
Level = -73.6 dBm BER = 0.02% PER = 0.14% SER1 = 0.14% SER2 = 0.14%
Level = -73.1 dBm BER = 0.01% PER = 0.04% SER1 = 0.04% SER2 = 0.04%
Level = -73.3 dBm BER = 0.01% PER = 0.05% SER1 = 0.05% SER2 = 0.05%
Level = -73.5 dBm BER = 0.03% PER = 0.09% SER1 = 0.09% SER2 = 0.09%

J/S = -12.20 dB (SER = 0.09%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = +250 kHz

Level = -73.5 dBm BER = 0.25% PER = 3.58% SER1 = 3.46% SER2 = 3.46%
Level = -71.5 dBm BER = 0.01% PER = 0.03% SER1 = 0.03% SER2 = 0.03%
Level = -72.5 dBm BER = 0.06% PER = 0.57% SER1 = 0.57% SER2 = 0.57%
Level = -72.0 dBm BER = 0.02% PER = 0.12% SER1 = 0.12% SER2 = 0.12%
Level = -71.5 dBm BER = 0.01% PER = 0.04% SER1 = 0.04% SER2 = 0.04%
Level = -71.7 dBm BER = 0.01% PER = 0.05% SER1 = 0.05% SER2 = 0.05%
Level = -71.9 dBm BER = 0.02% PER = 0.10% SER1 = 0.10% SER2 = 0.10%

J/S = -14.00 dB (SER = 0.05%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = +300 kHz

Level = -71.7 dBm BER = 0.08% PER = 0.10% SER1 = 0.10% SER2 = 0.10%

J/S = -14.00 dB (SER = 0.10%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = +350 kHz

Level = -71.7 dBm BER = 0.25% PER = 1.43% SER1 = 1.41% SER2 = 1.41%
Level = -69.7 dBm BER = 0.02% PER = 0.03% SER1 = 0.02% SER2 = 0.02%
Level = -70.7 dBm BER = 0.08% PER = 0.14% SER1 = 0.14% SER2 = 0.14%
Level = -70.2 dBm BER = 0.03% PER = 0.74% SER1 = 0.74% SER2 = 0.74%
Level = -69.7 dBm BER = 0.02% PER = 0.02% SER1 = 0.02% SER2 = 0.02%
Level = -69.9 dBm BER = 0.02% PER = 0.03% SER1 = 0.02% SER2 = 0.02%
Level = -70.1 dBm BER = 0.03% PER = 0.03% SER1 = 0.03% SER2 = 0.03%
Level = -70.3 dBm BER = 0.03% PER = 0.06% SER1 = 0.06% SER2 = 0.06%
Level = -70.5 dBm BER = 0.06% PER = 0.13% SER1 = 0.13% SER2 = 0.13%

J/S = -15.40 dB (SER = 0.06%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = +400 kHz

Level = -70.3 dBm BER = 0.07% PER = 0.05% SER1 = 0.05% SER2 = 0.05%
Level = -72.3 dBm BER = 1.28% PER = 4.62% SER1 = 4.42% SER2 = 4.42%
Level = -71.3 dBm BER = 0.24% PER = 0.48% SER1 = 0.47% SER2 = 0.47%
Level = -70.3 dBm BER = 0.06% PER = 0.06% SER1 = 0.06% SER2 = 0.06%
Level = -70.8 dBm BER = 0.12% PER = 0.15% SER1 = 0.15% SER2 = 0.15%
Level = -70.6 dBm BER = 0.11% PER = 0.08% SER1 = 0.08% SER2 = 0.08%

J/S = -15.10 dB (SER = 0.08%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = +450 kHz

Level = -70.6 dBm BER = 0.17% PER = 0.11% SER1 = 0.11% SER2 = 0.11%
Level = -68.6 dBm BER = 0.01% PER = 0.00% SER1 = 0.00% SER2 = 0.00%
Level = -69.6 dBm BER = 0.04% PER = 0.00% SER1 = 0.00% SER2 = 0.00%

Level = -70.6 dBm BER = 0.17% PER = 0.08% SER1 = 0.07% SER2 = 0.07%
Level = -71.6 dBm BER = 0.60% PER = 0.70% SER1 = 0.69% SER2 = 0.69%
Level = -71.1 dBm BER = 0.31% PER = 0.30% SER1 = 0.29% SER2 = 0.29%
Level = -70.6 dBm BER = 0.19% PER = 0.11% SER1 = 0.11% SER2 = 0.11%
Level = -70.1 dBm BER = 0.09% PER = 0.03% SER1 = 0.02% SER2 = 0.02%
Level = -70.3 dBm BER = 0.10% PER = 0.05% SER1 = 0.05% SER2 = 0.05%
Level = -70.5 dBm BER = 0.16% PER = 0.06% SER1 = 0.06% SER2 = 0.06%
Level = -70.7 dBm BER = 0.20% PER = 0.05% SER1 = 0.05% SER2 = 0.05%
Level = -70.9 dBm BER = 0.26% PER = 0.15% SER1 = 0.15% SER2 = 0.15%

J/S = -15.10 dB (SER = 0.07%)

Signal Freq = 2.432 GHz
Jammer Level   = -85.7 dBm
Jammer Offset = +500 kHz

Level = -68.7 dBm BER = 0.01% PER = 0.00% SER1 = 0.00% SER2 = 0.00%
Level = -70.7 dBm BER = 0.12% PER = 0.19% SER1 = 0.19% SER2 = 0.19%
Level = -69.7 dBm BER = 0.03% PER = 0.01% SER1 = 0.01% SER2 = 0.01%
Level = -70.2 dBm BER = 0.07% PER = 0.12% SER1 = 0.12% SER2 = 0.12%
Level = -70.0 dBm BER = 0.04% PER = 0.06% SER1 = 0.06% SER2 = 0.06%

J/S = -15.70 dB (SER = 0.06%)