

RADIO TEST REPORT

No. 0109217R2

EQUIPMENT UNDER TEST

Equipment : Bluetooth Local information Point
Type / model : blip C11
Manufacturer : Ericsson Microwave Systems AB
Tested by request of : Ericsson Microwave Systems AB

SUMMARY

The equipment complies with the requirements of radiated spurious emission according to the following standard.

FCC part 15.247 subpart C (1999)

Date of issue: March 8, 2001

Tested by: *Martin Gustafsson*
Martin Gustafsson

Approved by: *Annika Nyberger*
Annika Nyberger

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1. CLIENT INFORMATION

The EUT has been tested by request of

Company: Ericsson Microwave Systems AB
TS/U CTP
431 84 Mölndal

Name of contact: Hans Welén

2. EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment: Bluetooth Local Information Point
Type/Model: blip C11
Brand name: Ericsson Microwave Systems AB
Manufacturer: Ericsson Microwave Systems AB
Rating: AC/DC-adapter: 100 – 240 V AC 50-60 Hz

2.2 Additional information about the EUT

The EUT consists of the following units:

Units	Type
blip C11	BFM 90100/1 P3A 01W07 S 80 000232 01W07
Power supply	BML 162130/13R1B 047036820G

2.2.1 Transmitter technical characteristics.

Frequency range: 2400 – 2483,5 MHz
Supported specification: Bluetooth 1.0 B

2.2.2 Transmitter RF power characteristics:

Maximum rated transmitter output power: 0 dBm e.i.r.p
Antenna: Integrated
Transmitter output power is not variable.

2.2.3 Transmitter modulation

Modulation: FHSS, GFSK
Bit rate: 460 kbps

2.2.4 Power source

Power supply:

AC/DC-adapter: 100 – 240 V AC 50 – 60 Hz

Power consumption:

< 1,5 W

2.3 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not included as part of the testing and evaluation of the EUT.

Equipment
blip C11 "tester"

BFM 90199/1 P2A 01W07

Cables	Type	Length
Serial RS232	Shielded	3 m
Serial RS232	Shielded	10 m
Ethernet	Shielded cat 5	10 m

3. TEST SPECIFICATIONS

3.1 Standards

FCC Subpart C -- Intentional Radiators §15.247 for frequency hopping systems operating in the 2400 – 2483.5 MHz and 5725 – 5850 MHz.

3.2 Additions, deviations and exclusions from standards and accreditation

No additions, deviations or exclusions have been made from standards and accreditation.

4. TEST SUMMARY

The results in this report apply only to sample tested:

	Test	Result	Note
15.247(b)	Peak output power	Pass	
15.247(a)	20 dB Bandwidth	Pass	
15.247(a)	Carrier frequency separation	Pass	
15.247(a)	Number of hopping channels	Pass	
15.247(c)	Band edge compliance	Pass	
15.247(a)	Time of occupancy (dwell time)	Pass	

5. PEAK OUTPUT POWER

5.1 Operating environment

Temperature: 22 °C (15 - 35 °C)
Relative Humidity: 16 % (30 - 60 %)

5.2 Test set-up and test procedure

The EUT was connected to a laptop computer and a test program was used to set the EUT in the specified test mode. The measurement was performed while the EUT connected to a spectrum analyser.

5.3 Measurement uncertainty

Measurement uncertainty: ± 3 dB

5.4 Test equipment

Test site: Radio measuring facility

Equipment	Manufacturer	Type	SEMKO No.
Spectrum analyser:	HP	8593E	6661
Cable	Suhner	Sucoflex 104	5181
Synthesised CW generator:	HP	83712A	3148

5.5 Test protocol

Date of test: March 2, 2001

The EUT was set to TX mode and hopping off.

Spectrum analyser settings:

Span: 5 MHz
RBW: 1 MHz
VBW: 1 MHz
Detector: Peak
Trace: Max Hold

Test conditions	Output power (dBm)		
	F _{min} 2480 MHz	F _{max} 2402 MHz	Limit (dBm)
V _{min} 4,24 V	No RF signal	No RF signal	30
V _{nom} 5 V	0,93	0,5	30
V _{max} 5,75V	0,93	0,5	30

See plots of the measurements in appendix A

6. TX 20 DB BANDWIDTH

6.1 Operating environment

Temperature: 22 °C
Relative Humidity: 16 %

6.2 Test set-up and test procedure

The EUT was connected to a laptop computer and a test program was used to set the EUT in the specified test mode. The measurement was performed whit the EUT connected to a spectrum analyser.

6.3 Measurement uncertainty

Measurement uncertainty: ± 3 dB

6.4 Test equipment

Test site: Shielded room

Equipment	Manufacturer	Type	SEMKO No.
Spectrum analyser:	HP	8593E	6661
Cable	Suhner	Sucoflex 104	5181
Synthesised CW generator:	HP	83712A	3148

6.5 Test protocol

Date of test: March 2, 2001

The EUT was set to TX mode and hopping off.

Spectrum analyser settings:

Span: F_{min} 2401 – 2403, F_{max} 2479 - 2481

RBW: 30 kHz

VBW: 30 kHz

Detector: Peak

Trace: Max Hold

Test conditions	Frequency range (kHz)		
	F_{min}	F_{max}	Limit (MHz)
V_{min} 4,24 V	No RF signal	No RF signal	<1
V_{nom} 5 V	754	773	<1
V_{max} 5,75V	754	773	<1

See plots of the measurements in appendix A

7. CARRIER FREQUENCY SEPARATION

7.1 Operating environment

Temperature: 22 °C

Relative Humidity: 16 %

7.2 Test set-up and test procedure

The EUT was connected to a laptop computer and a test program was used to set the EUT in the specified test mode. The measurement was performed while the EUT connected to a spectrum analyser.

7.3 Measurement uncertainty

Measurement uncertainty: ± 3 dB

7.4 Test equipment

Test site: Shielded room

Equipment	Manufacturer	Type	SEMKO No.
Spectrum analyser:	HP	8593E	6661
Cable	Suhner	Sucoflex 104	5181
Synthesised CW generator:	HP	83712A	3148

7.5 Test protocol

Date of test: March 2, 2001

The EUT was set to TX mode and hopping on.

Spectrum analyser settings:

Span: 5 MHz

RBW: 100 kHz

VBW: 100 kHz

Detector: Peak

Trace: Max Hold

Test conditions	Frequency range (MHz)		
	F_{min}	F_{max}	Limit (kHz)
V_{nom} 5 V	1	1	>958

See plots of the measurements in appendix A

8. NUMBER OF HOPPING CHANNELS

8.1 Operating environment

Temperature: 22 °C
Relative Humidity: 16 %

8.2 Test set-up and test procedure

The EUT was connected to a laptop computer and a test program was used to set the EUT in the specified test mode. The measurement was performed while the EUT connected to a spectrum analyser.

8.3 Measurement uncertainty

Measurement uncertainty: ± 3 dB

8.4 Test equipment

Test site: Shielded room

Equipment	Manufacturer	Type	SEMKO No.
Spectrum analyser:	HP	8593E	6661
Cable	Suhner	Sucoflex 104	5181
Synthesised CW generator:	HP	83712A	3148

8.5 Test protocol

Date of test: March 2, 2001

The EUT was set to TX mode and hopping on.

Spectrum analyser settings:

Span: 102 MHz
RBW: 100 kHz
VBW: 100 kHz
Detector: Peak
Trace: Max Hold

Test conditions	Frequency range	
	No. of channels	Limit (no. of channels)
V_{nom} 5 V	79	>75

See plots of the measurements in appendix A

9. BAND EDGE COMPLIANCE

9.1 Operating environment

Temperature: 22 °C
Relative Humidity: 16 %

9.2 Test set-up and test procedure

The EUT was connected to a laptop computer and a test program was used to set the EUT in the specified test mode. The measurement was performed while the EUT was connected to a spectrum analyser.

9.3 Measurement uncertainty

Measurement uncertainty: ± 3 dB

9.4 Test equipment

Test site:	Shielded room		
Equipment	Manufacturer	Type	SEMKO No.
Spectrum analyser:	HP	8593E	6661
Cable	Suhner	Sucoflex 104	5181
Synthesised CW generator:	HP	83712A	3148

9.5 Test protocol

Date of test: March 5, 2001

The EUT was set to TX mode and hopping off and on.

Spectrum analyser settings:

Span: 5 MHz
RBW: 100 kHz
VBW: 100 kHz
Detector: Peak
Trace: Max Hold

Test conditions	Band edge compliance		
	F _{min} 2400 MHz	F _{max} 2483.5 MHz	Limit (dBc)
Hopping off	-61 dBc	-66 dBc	<-20
Hopping on	-58 dBc	-66 dBc	<-20

See plots of the measurements in appendix A

10. TIME OF OCCUPANCY (DWEELL TIME)

10.1 Operating environment

Temperature: 22 °C

Relative Humidity: 16 %

10.2 Test set-up and test procedure

The EUT was connected to a laptop computer and a test program was used to set the EUT in the specified test mode. The measurement was performed whit the EUT connected to a spectrum analyser.

10.3 Measurement uncertainty

Measurement uncertainty: ± 3 dB

10.4 Test equipment

Test site: Shielded room

Equipment	Manufacturer	Type	SEMKO No.
Spectrum analyser:	HP	8593E	6661
Cable	Suhner	Sucoflex 104	5181
Synthesised CW generator:	HP	83712A	3148

10.5 Test protocol

Date of test: March 5, 2001

The EUT was set to TX mode and hopping on, channel 1.

Spectrum analyser settings:

Span: 0 Hz

RBW: 1 MHz

VBW: 1 MHz

Detector: Peak

Trace: Max Hold

Duty cycle = 0,8 = T

Transmit time = 3 ms = D

Number of hopping times that channel 1 occurred in 30 s = 105 = n

Time for channel 1 to be active in 30 s = S

Formula: $S = (D \cdot n) / T$

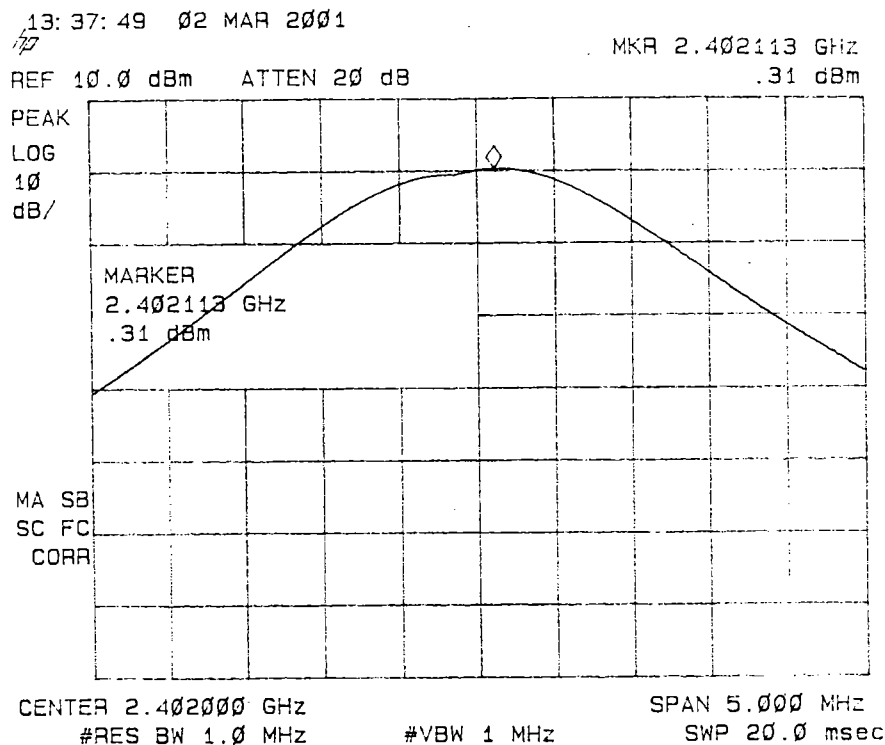
$S = (0,003 \cdot 89) / 0,8 = 0,334$ s

Limit: 0,4 s

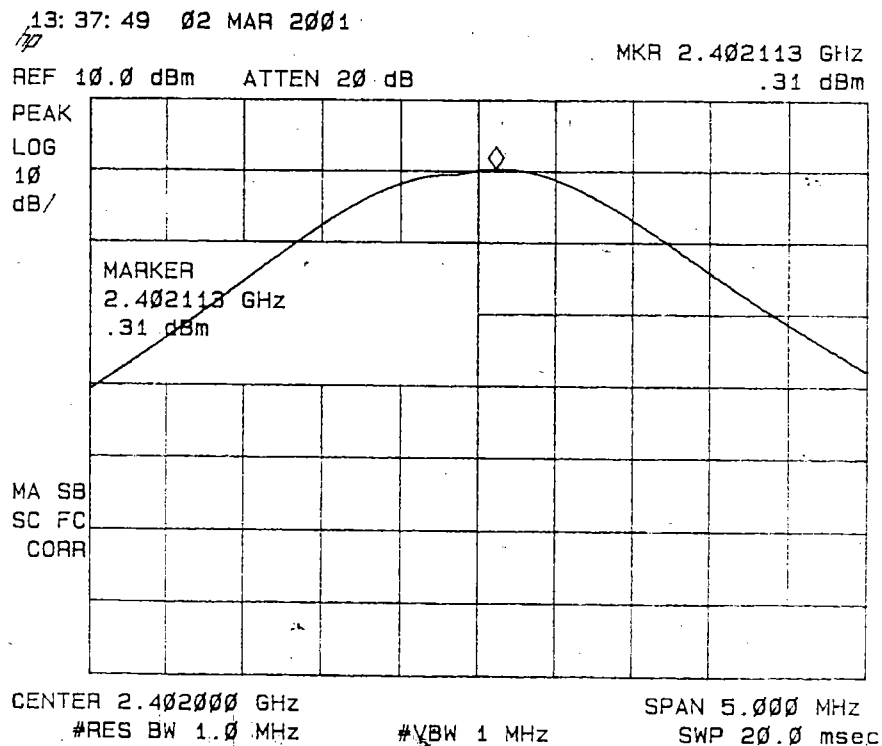
See plots of the measurements in appendix A

APPENDIX A

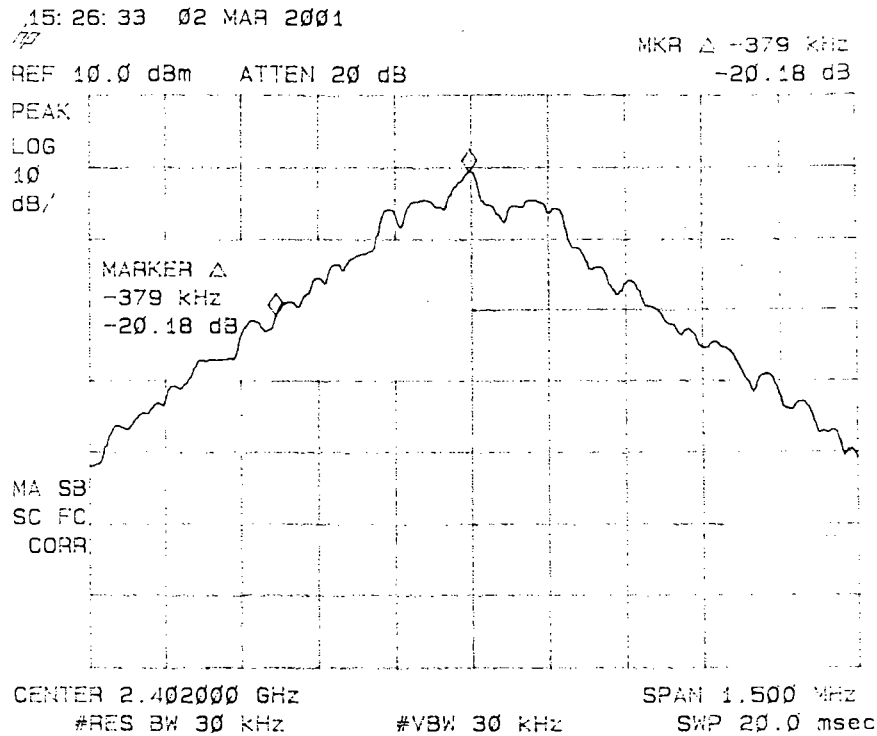
Peak output power at frequency 2402 MHz, +5 V DC



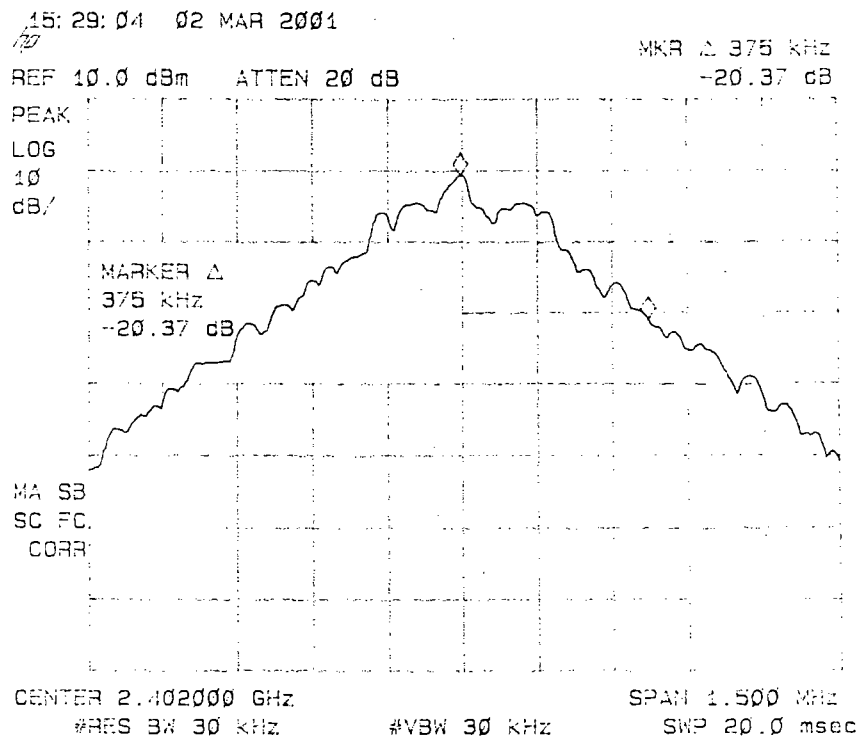
Peak output power at frequency 2402 MHz, +5,75 V DC



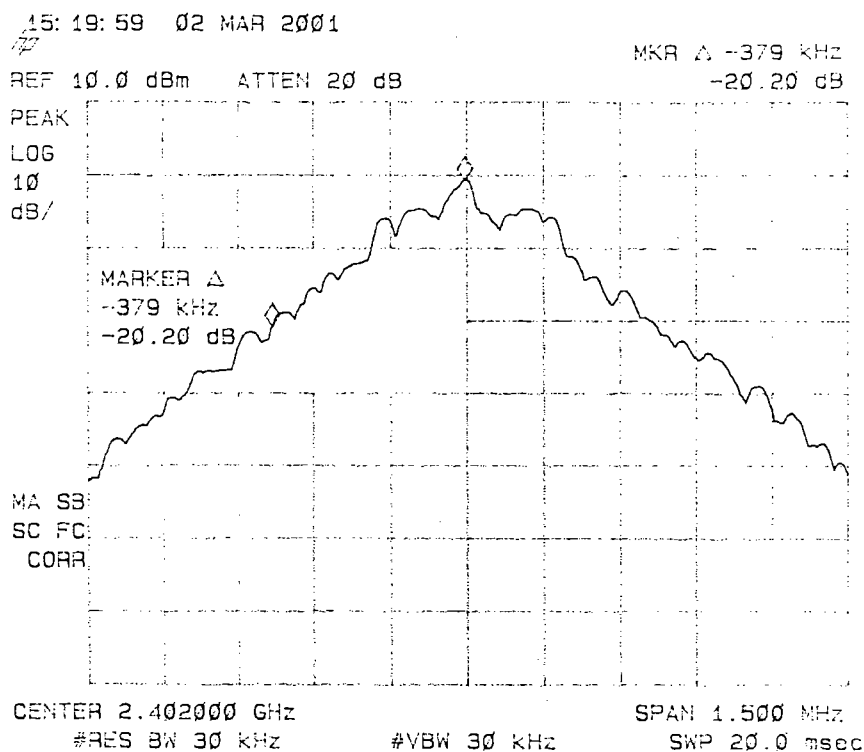
TX 20 dB Bandwidth low side 2402 MHz, +5 V DC



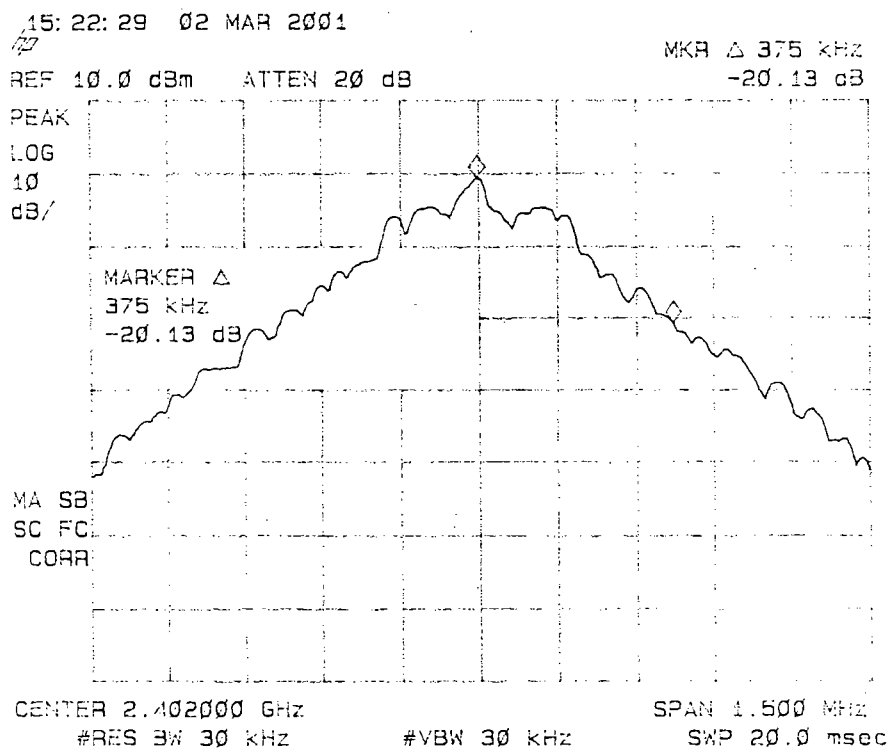
TX 20 dB Bandwidth high side 2402 MHz, +5 V DC



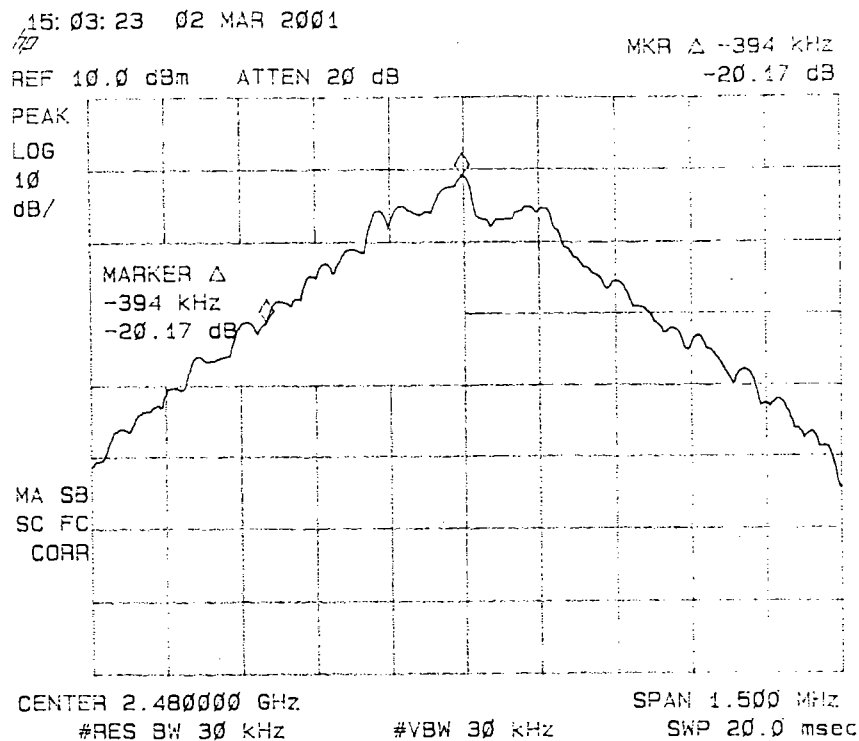
TX 20 dB Bandwidth low side 2402 MHz, +5,75 V DC



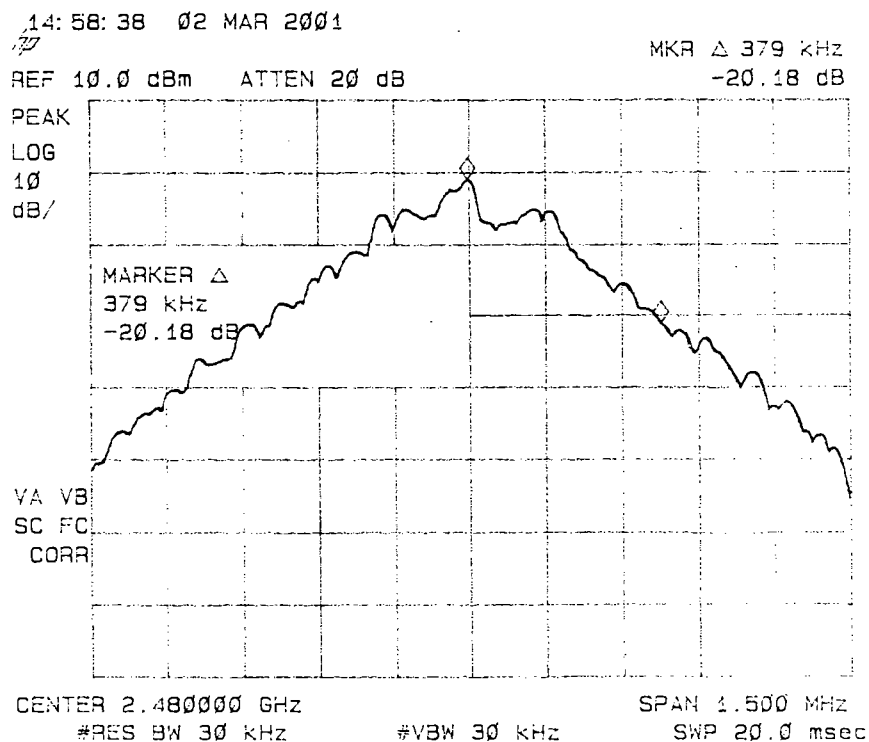
TX 20 dB Bandwidth high side 2402 MHz, +5,75 V DC



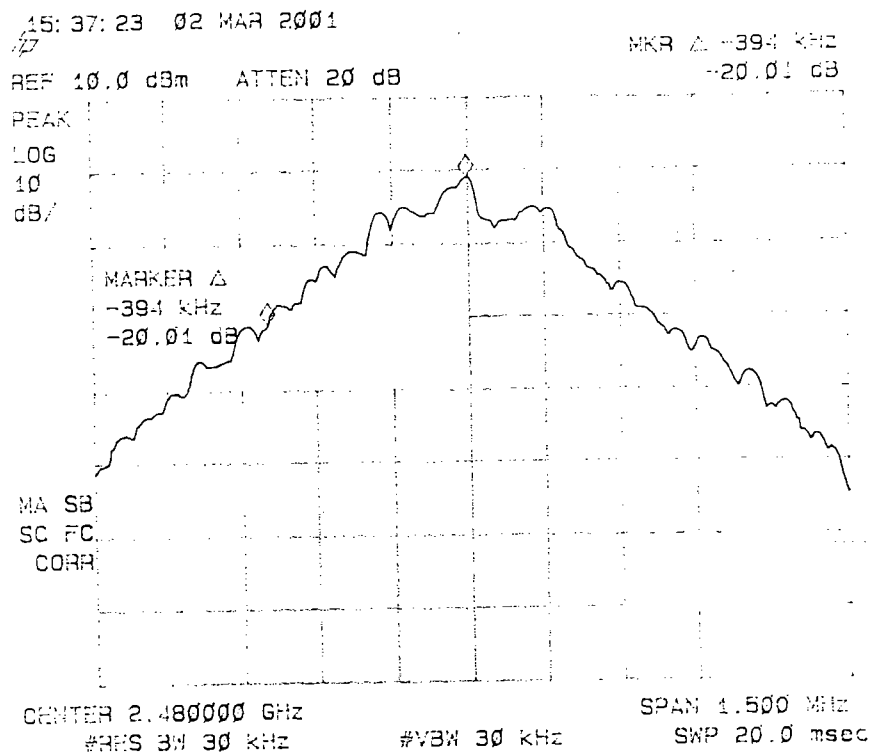
TX 20 dB Bandwidth low side 2480 MHz, +5 V DC



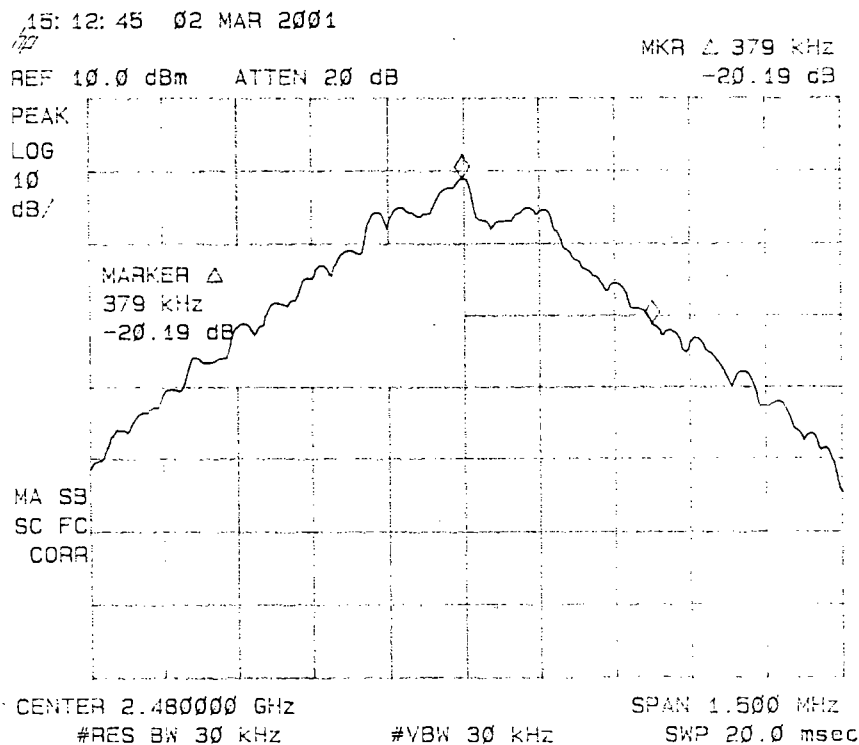
TX 20 dB Bandwidth high side 2480 MHz, +5 V DC



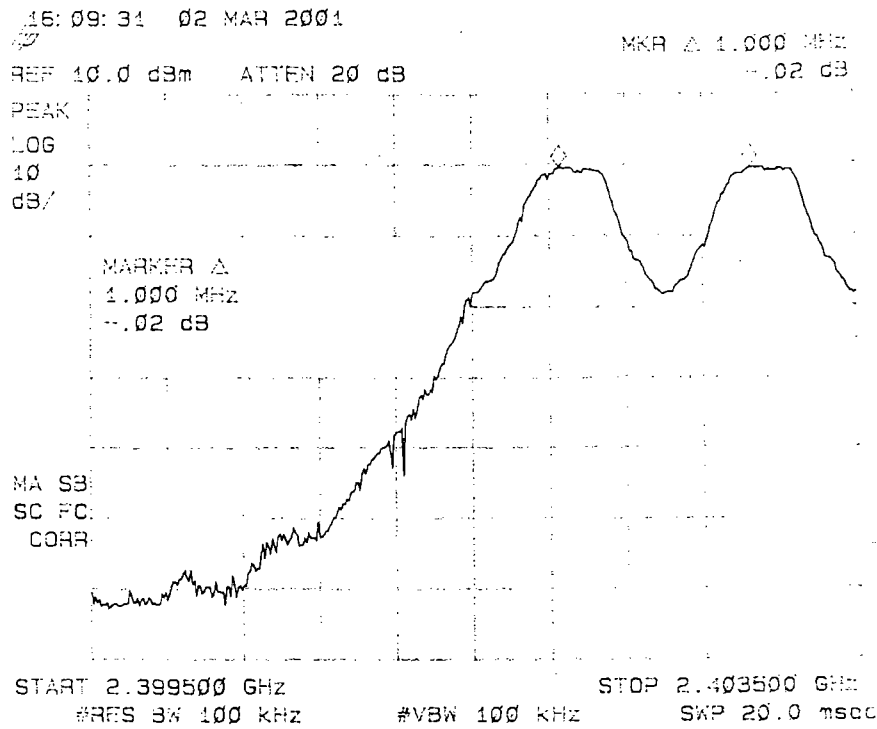
TX 20 dB Bandwidth low side 2480 MHz, +5,75 V DC



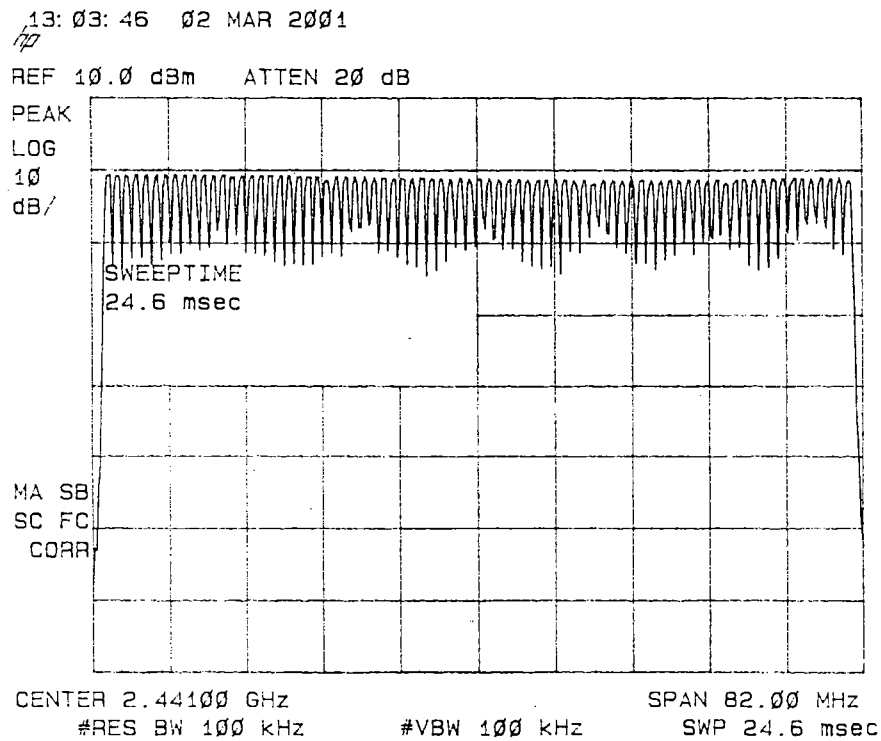
TX 20 dB Bandwidth high side 2480 MHz, +5,75 V DC



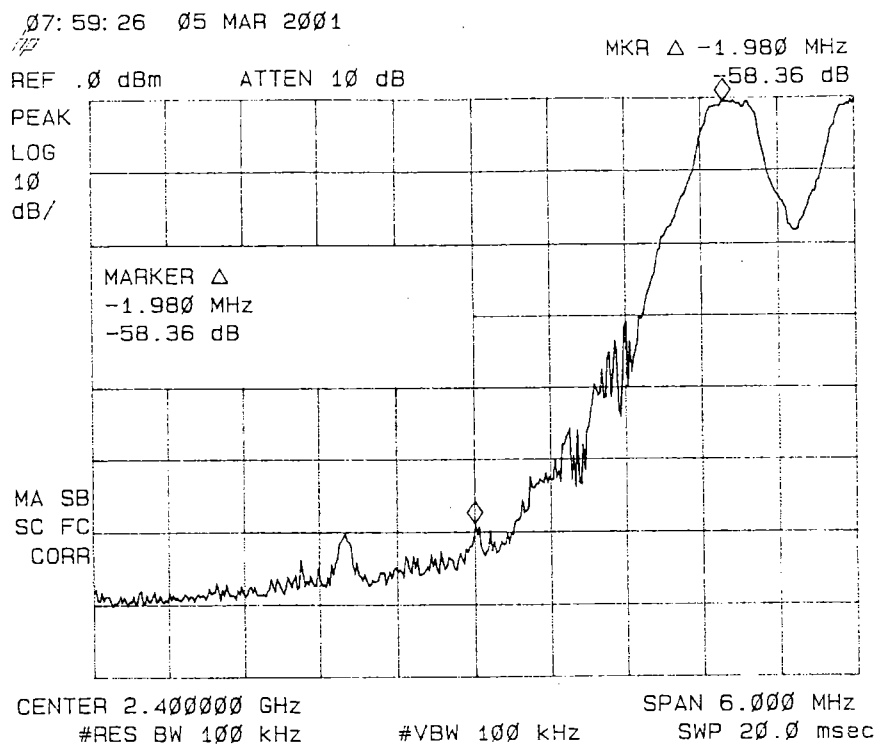
Carrier frequency separation



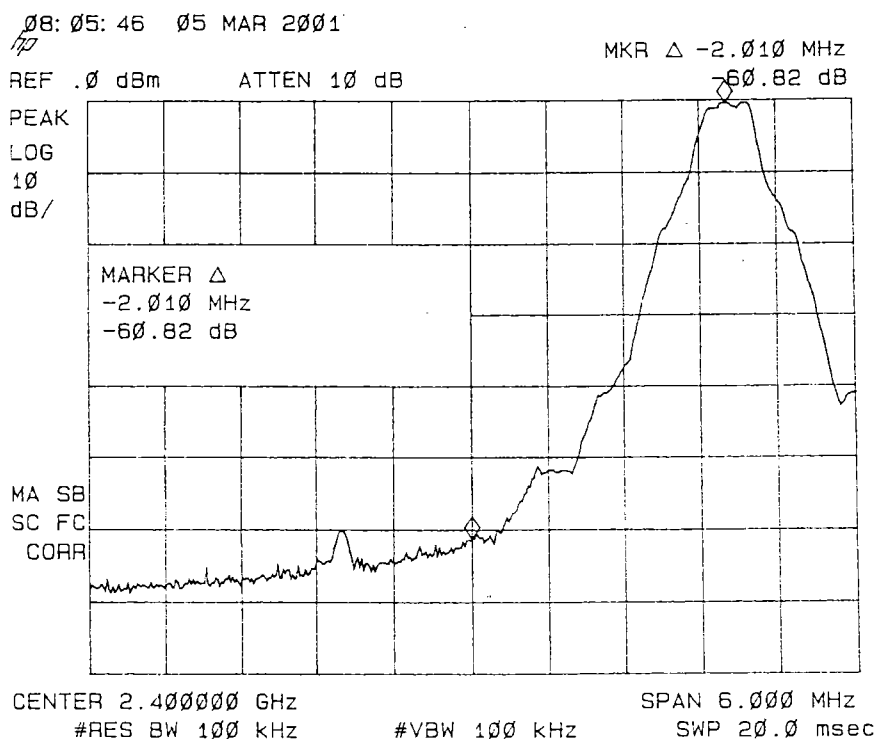
Number of hopping channels



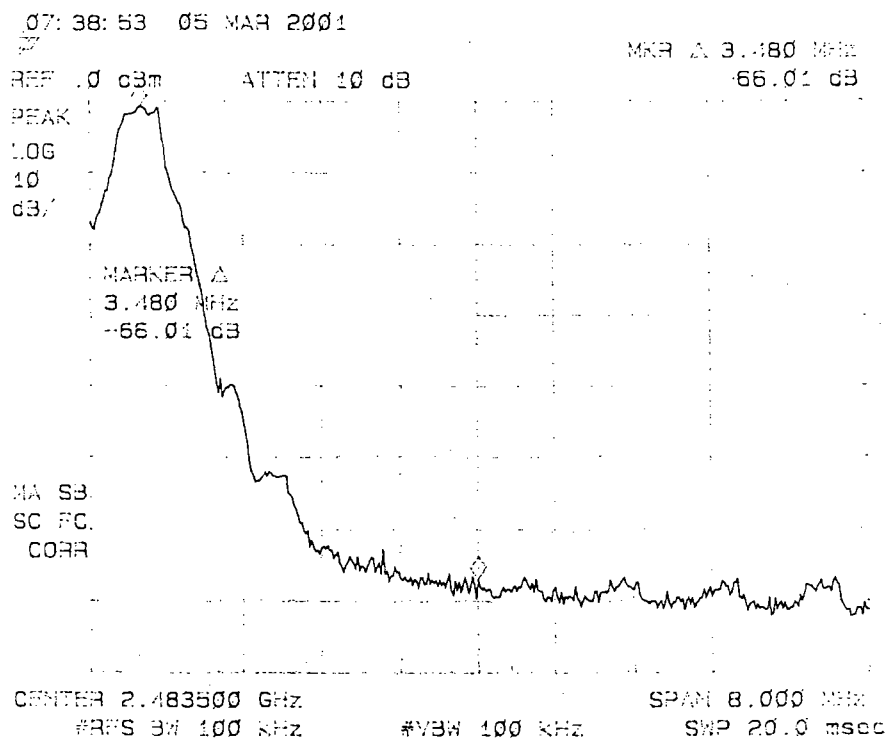
Band edge compliance measured at 2400 MHz, hopping on



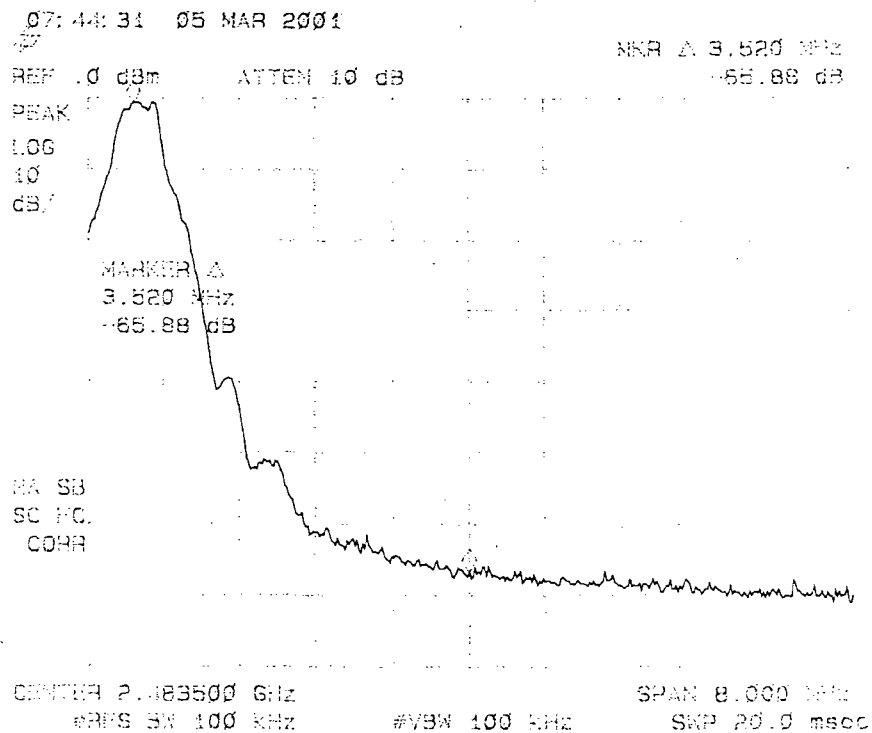
Band edge compliance measured at 2400 MHz, hopping off



Band edge compliance measured at 2483,5 MHz, hopping on



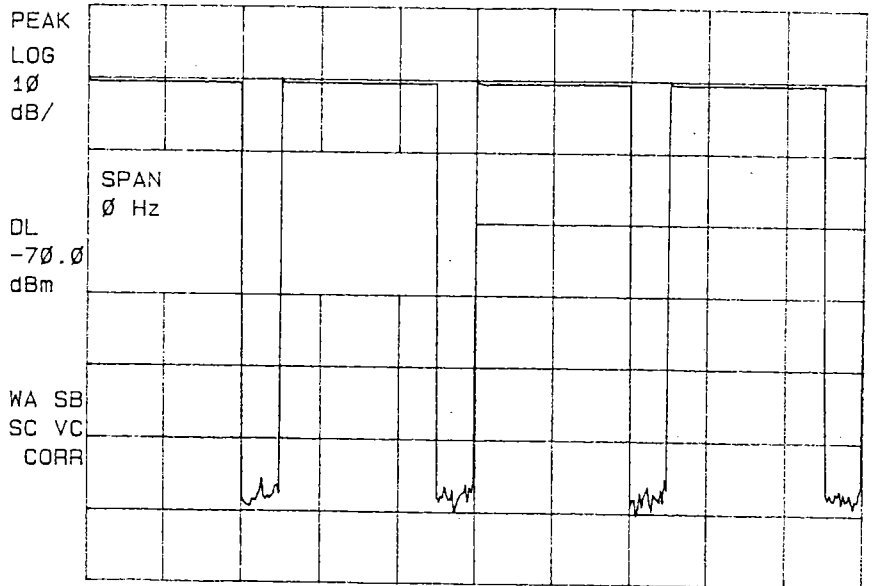
Band edge compliance measured at 2483,5 MHz, hopping off



Time of occupancy (dwell time)

09:37:55 05 MAR 2001

REF 10.0 dBm ATTN 20 dB



CENTER 2.402000 GHz

#RES BW 1.0 MHz

#VBW 1 MHz

SPAN 0 Hz

#SWP 15.0 msec