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CERTIFICATIO OF COMPLIANCE

LG Electronics Inc.

19-1, Cheongho-Ri, Jinwuy-Myun, Pyungtaik-Shi
Kyunggi-Do, KOREA 451-713

Dates of Tests: Jan. 19 ~ Feb. 8, 2004

Test Report S/N: DR50110402H

Test Site : DIGITAL EMC CO., LTD.

FCC ID

BEJNTLU20

APPLICANT

LG Electronics Inc.

FCC Classification	: DSSS / FHSS
Device name	: Notebook PC
Manufacturer	: LG Electronics Inc.
FCC ID	: BEJNTLU20
Model name	: LU20
Test Device Serial number	: Identical prototype
Standard(s)	: FCC Part 15.247 Subpart C; ANSI C-63.4-2001 CANADA RSS-210 Issue 5: Nov. 2001 / Amendment: Nov.2002 / Amendment 2: April 2003
Frequency Range	: 2412 ~ 2462 MHz (DSSS) 2402 ~ 2480 MHz (FHSS)
Max. Output power	: 47.1 mW / 16.73 dBm Conducted (DSSS) 2.0 mW / 3.00 dBm Conducted (FHSS)
Data of issue	: February 9, 2004

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.



NVLAP LAB CODE 200559-0

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1. General information's

This report contains the result of tests performed by:

DIGITAL EMC CO., LTD.

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Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competents of calibration and testing laboratory".
This laboratory is accredited by NVLAP for NVLAP Lab. Code : 200559-0.

Test operator: engineer

February 9, 2004

Won -Jong LEE



Data

Name

Signature

Report Reviewed By: manager

February 9, 2004

Dong -Min JUNG



Data

Name

Signature

Ordering party:

Company name : **LG Electronics Inc.**
Address : 19-1, Cheongho-Ri, Jinwuy-Myun,
Zip code : 451-713
City/town : Pyungtaik-Si, Kyunggi-Do
Country : Korea
Date of order : January 19, 2004

2. Information's about test item

BEJNTLU20

2.1 Equipment information

Equipment model no.	LU20
Type of equipment	Notebook PC
Frequency band	DSSS: 2412 ~ 2472 MHz FHSS: 2402 ~ 2480 MHz
WLAN Module	FCC ID: PD9WM3B2100
Bluetooth Module	Manufacturer: AMBIT / Model Name:T60M665
Type of Modulation	DSSS: DBPSK, DQPSK, CCK FHSS: GFSK, BT 0.5 ±1%
Type of antenna	Internal Film antenna
Power	AC ADAPTER(LG IBM) M/N:PA-1650-02L S/N: 3200478901 input: 100~240Vac, 1.6A, 50-60Hz Output: 18.5Vdc 3.5A Battery pack (LG IBM) M/N: LB12212A 11.1V Li-ion rechargeable Battery

2.2 Tested frequency

Frequency	DSSS	FHSS
Low frequency	2412MHz	2402MHz
Middle frequency	2437MHz	2441MHz
High frequency	2462MHz	2480MHz

2.3 Tested environment

Temperature	15 ~ 35 (°C)
Relative humidity content	20 ~ 75 %
Air pressure	86 ~ 103 kPa
Details of power supply	120 V / 60Hz (powered by power supply)

BEJNTLU20

2.4 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing

-> none

2.5 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
LCD Monitor	CT-150	R20110001B	Comtek
Keyboard	SDM4700UL	B354ALP0AJM00S	SamSung
Mouse	M-BD58	LZC12154214	Logitech
Mouse	MSW-35USB	N/A	A4TECH
Earphone/Mic	N/A	N/A	N/A
-	-	-	-

3. Test Result

3.1 Summary of tests

FCC Section(s) / RSS-210	Parameter	Limit	Test Condition	Status (note 1)
I. Transmit mode(Tx)				
15.247(a)(1)	Carrier Frequency Separation	> 25 kHz	Conducted	C
	Number of Hopping Frequencies	> 75 hops		C
	20 dB Bandwidth	< 1 MHz		C
	Dwell Time	0.4 seconds within a 30 second period per any frequency		C
15.247(a)(2)	6 dB Bandwidth	> 500 kHz		C
15.247(b)(1)	Transmitter Output Power	< 1Watt		C
15.247(c)	Band-edge (or Occupied BW for IC)	2400 < f < 2483.5 MHz		C
	Out of Band Emissions (Bandwidth at 20 dB blow)	The radiated emission to any 100 kHz of outband shall be at least 20dB below the highest inband spectral density.		C
15.247(d)	Transmitter Power Spectral Density	< 8dBm / 3kHz		C
15.205 15.209	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	< FCC 15.209 limits	Radiated	C
15.207	AC Conducted Emissions	EN 55022	Line Conducted	C
II. Receive mode(Rx)				
15.207	AC Conducted Emissions	EN 55022	Line Conducted	C
15.209	Occupied Band Width Out-of-Band Emissions (Band Width at 20dB below)	< FCC 15.209 limits	Radiated	C
Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable				

The sample was tested according to the following specification:

- FCC Parts 15.247; ANSI C-63.4-2001
- CANADA RSS-210 Issue 5: Nov. 2001 / Amendment: Nov.2002 / Amendment: April 2003

3.2 Transmitter requirements

3.2.1 Carrier Frequency Separation (FHSS)

Procedure:

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.

The spectrum analyzer is set to:

Span = 3 MHz (wide enough to capture the peaks of two adjacent channels)

RBW = 30 kHz (1% of the span or more) Sweep = auto

VBW = 30 kHz Detector function = peak

Trace = max hold

Measurement Data:

Frequency of marker #1 (MHz)	Frequency of marker #2 (MHz)	Test Results	
		Carrier Frequency Separation (MHz)	Result
2441.080	2442.130	1.050	Complies

- See next pages for actual measured spectrum plots.

Minimum Standard:

The EUT shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

Measurement Setup

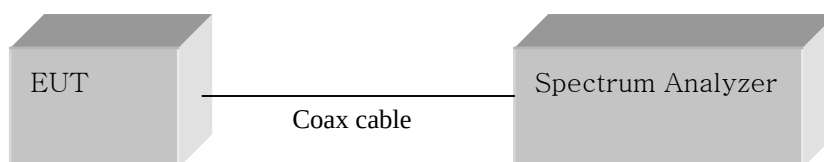
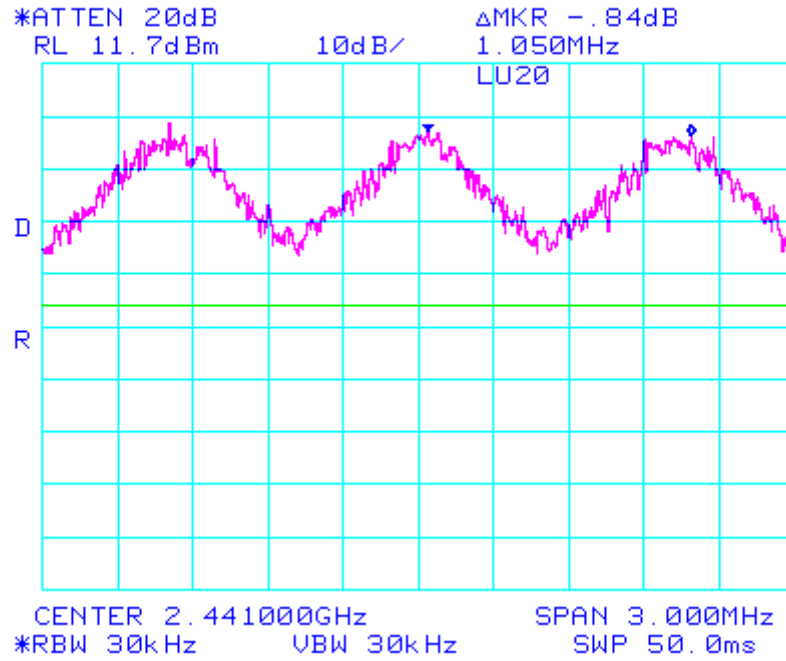


Figure 1: Measurement setup for the carrier frequency separation

TEST EQUIPMENT USED: 01, 19, 50

Carrier Frequency Separation



3.2.2 Number of Hopping Frequencies (FHSS)

Procedure:

The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

To get higher resolution, four frequency ranges within the 2400 ~ 2483.5 MHz FH band were examined.

The spectrum analyzer is set to:

Frequency range	1: Start = 2389.5MHz, Stop = 2414.5 MHz
	2: Start = 2414.5MHz, Stop = 2439.5 MHz
	3: Start = 2439.5MHz, Stop = 2464.5 MHz
	4: Start = 2464.5MHz, Stop = 2489.5 MHz
RBW = 300 kHz (1% of the span or more)	Sweep = auto
VBW = 300 kHz (VBW ≥ RBW)	Detector function = peak
Trace = max hold	Span = 25MHz

Measurement Data: Complies

Total number of Hopping Channels	79
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- See next pages for actual measured spectrum plots.

Minimum Standard:

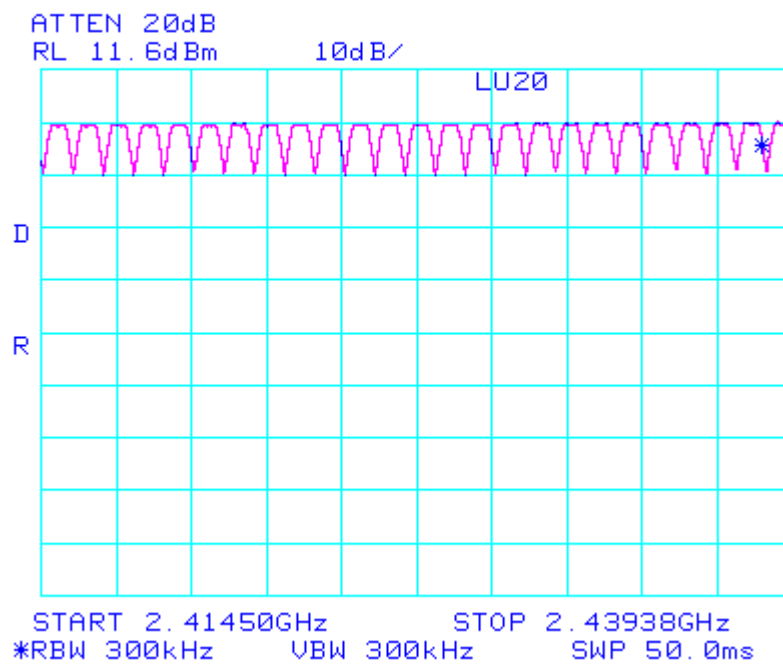
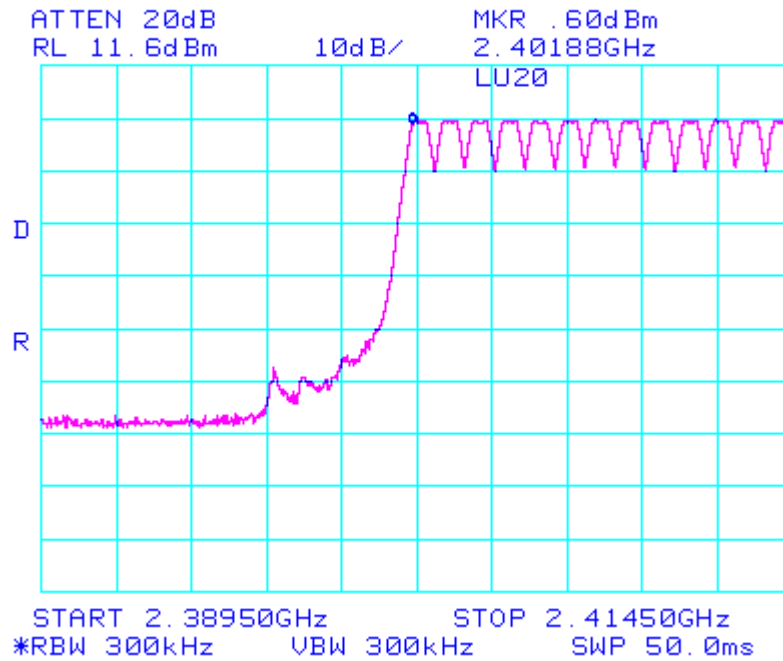
At least 75 hops

Measurement Setup

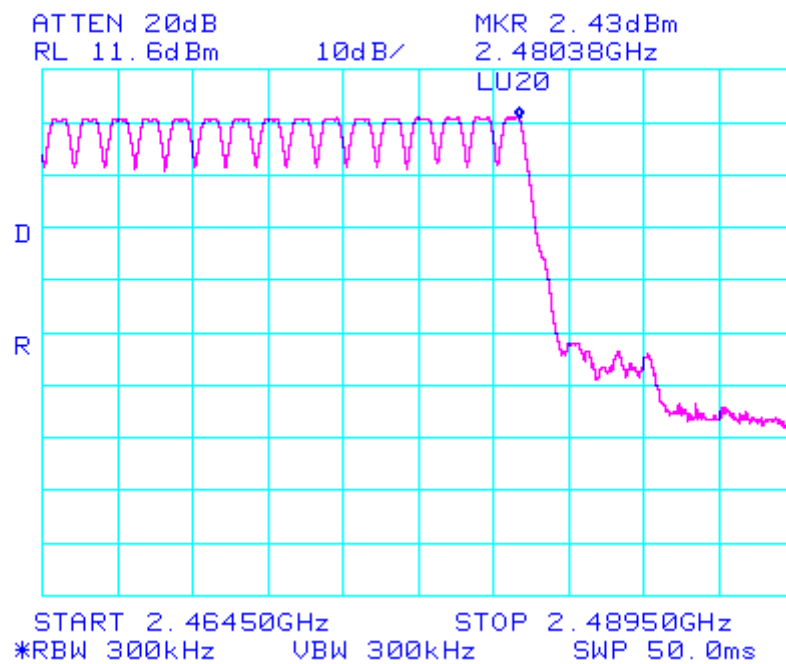
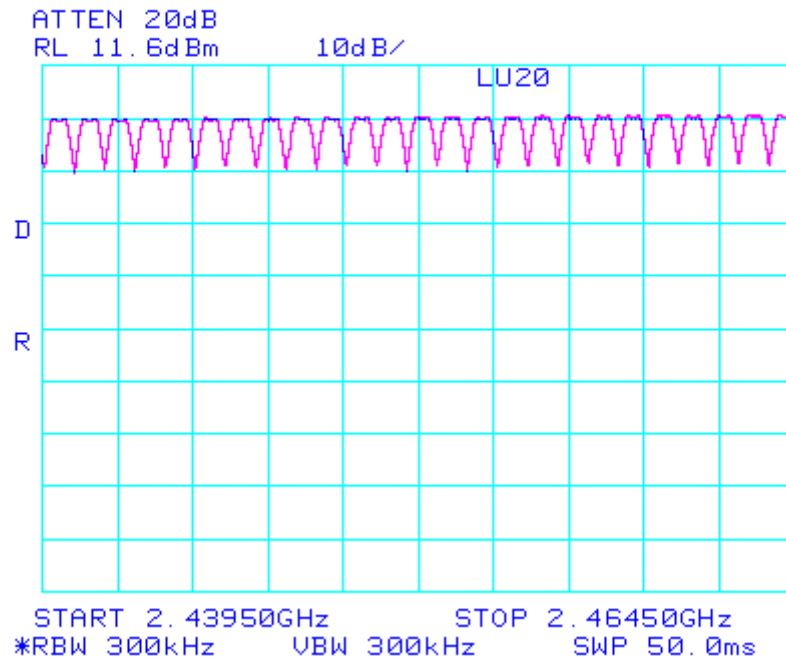
Same as the Chapter 3.2.1 (Figure 1)

TEST EQUIPMENT USED: 02, 19, 50

Number of Hopping Frequencies



Number of Hopping Frequencies



3.2.3 20 dB Bandwidth (FHSS)

Procedure:

The bandwidth at 20 dB below the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

Span = 2 MHz (approximately 2 or 3 times of the 20 dB bandwidth)

RBW = 10 kHz (1% of the 20dB bandwidth or more) Sweep = auto

VBW = 30 kHz ($VBW \geq RBW$) Detector function = peak

Trace = max hold

Measurement Data:

Frequency (MHz)	Channel No.	Test Results	
		Measured Bandwidth (MHz)	Result
2402	1	0.790	Complies
2441	40	0.787	Complies
2480	79	0.787	Complies

- See next pages for actual measured spectrum plots.

Minimum Standard:

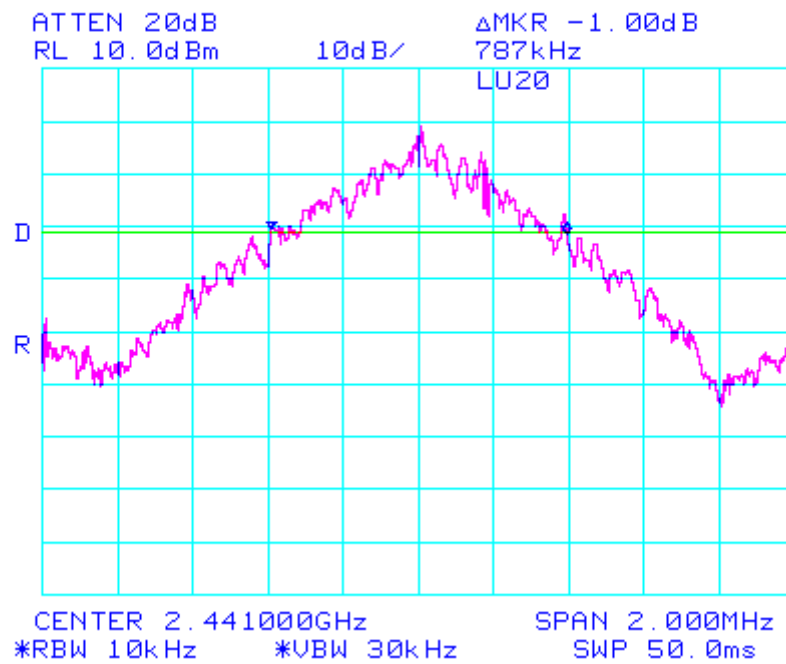
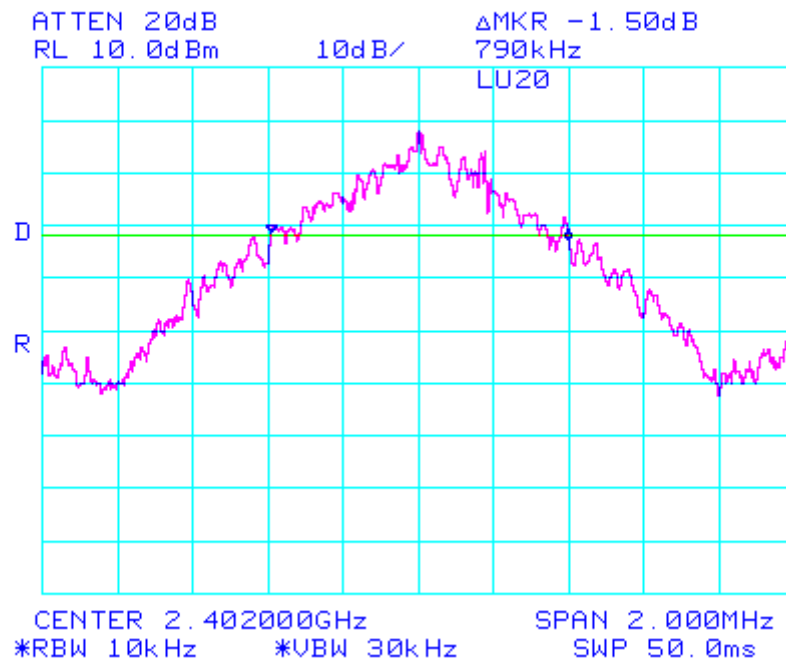
The transmitter shall have a maximum 20dB bandwidth of 1 MHz.

Measurement Setup

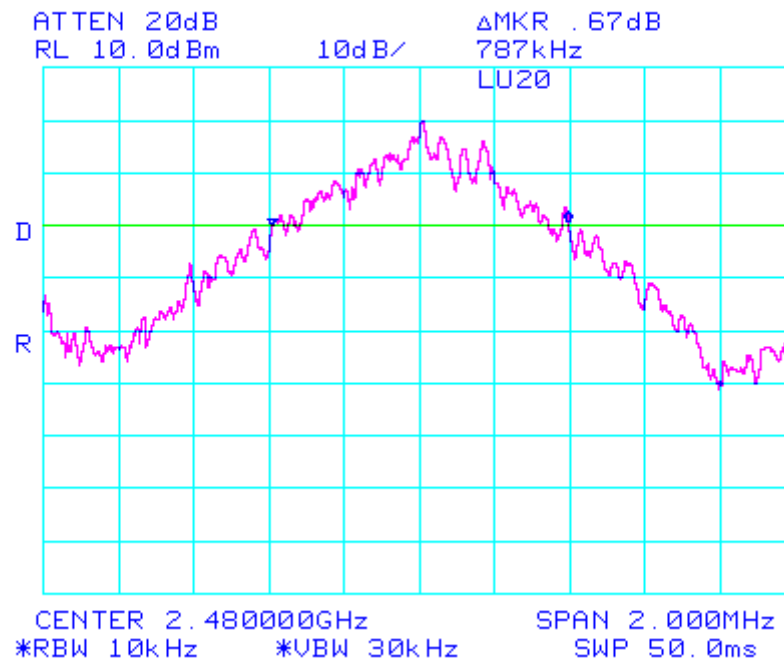
Same as the Chapter 3.2.1 (Figure 1)

TEST EQUIPMENT USED: 01, 19, 50.....

20 dB Bandwidth



20 dB Bandwidth



3.2.4 Time of Occupancy (Dwell Time)

Procedure:

The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to:

Center frequency = 2441 MHz

Span = zero

RBW = 1 MHz

VBW = 1 MHz (VBW $\geq$ RBW)

Trace = max hold

Detector function = peak

Measurement Data:

Packet Type	Burst duration in one hop (us)	Test Results	
		Dwell Time (ms)	Result
DH 1	420	134.446	Complies
DH 3	1463	235.777	Complies
DH 5	2943	313.400	Complies

- See next pages for actual measured spectrum plots.

Minimum Standard:

0.4 seconds within a 30 second period per any frequency

Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

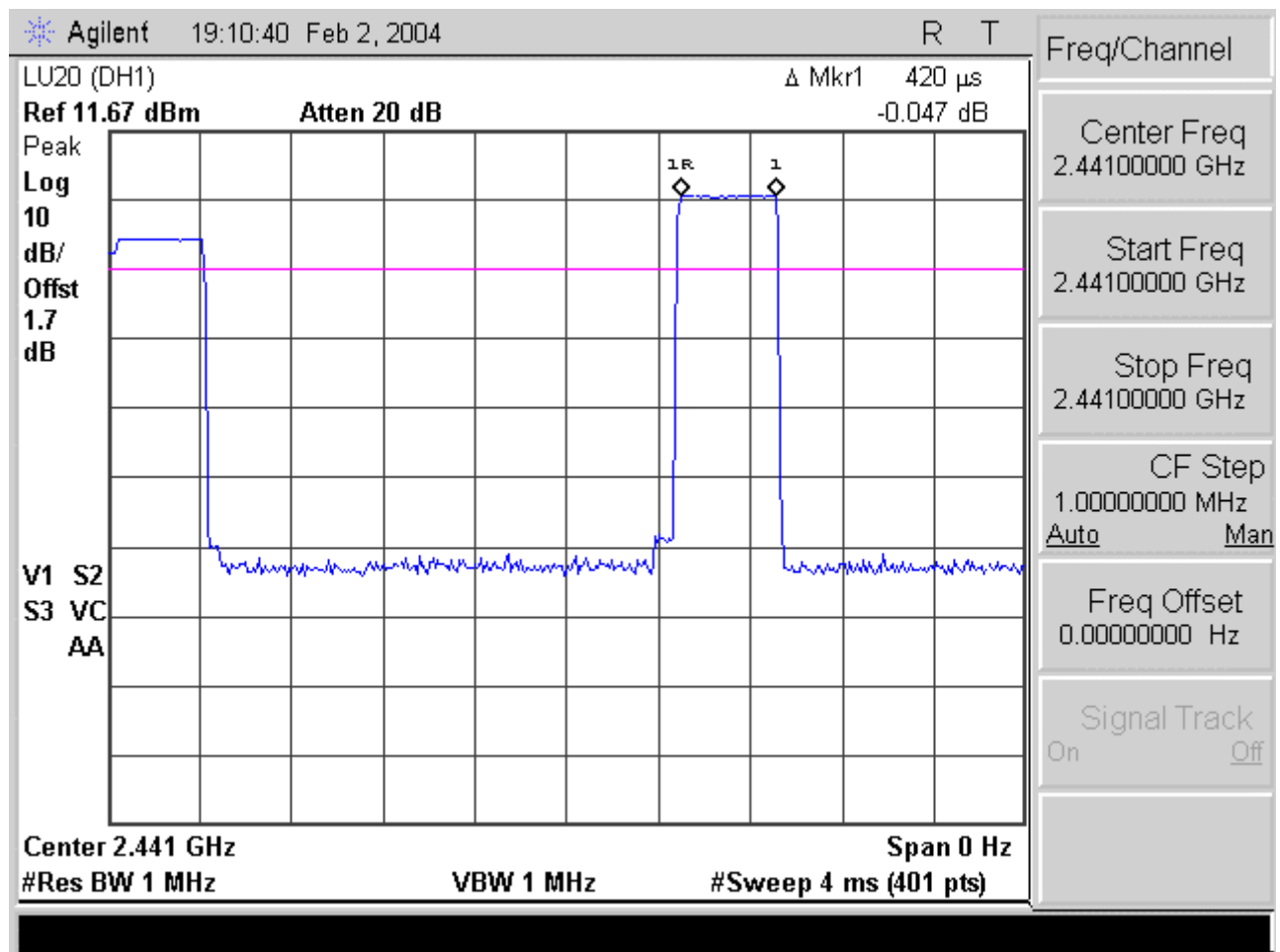
TEST EQUIPMENT USED: 01, 19, 50.....

Time of Occupancy for PACKET Type DH 1

The system makes worst case 1600 hops per second or 1 time slot has a length of 625 us with 79 channels. A DH 1 Packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case $1600/2 = 800$ hops per second with 79 channels. So you have each channel $800/79 = 10.13$ times per second and so for a period of $0.4 \times 79 = 31.6$ seconds you have $10.13 \times 31.6 = 320.11$ times of appearance.

Each Tx-time per appearance is 420 us

So we have $320.11 \times 420 \text{ us} = 134.446 \text{ ms}$ per 31.6 seconds.

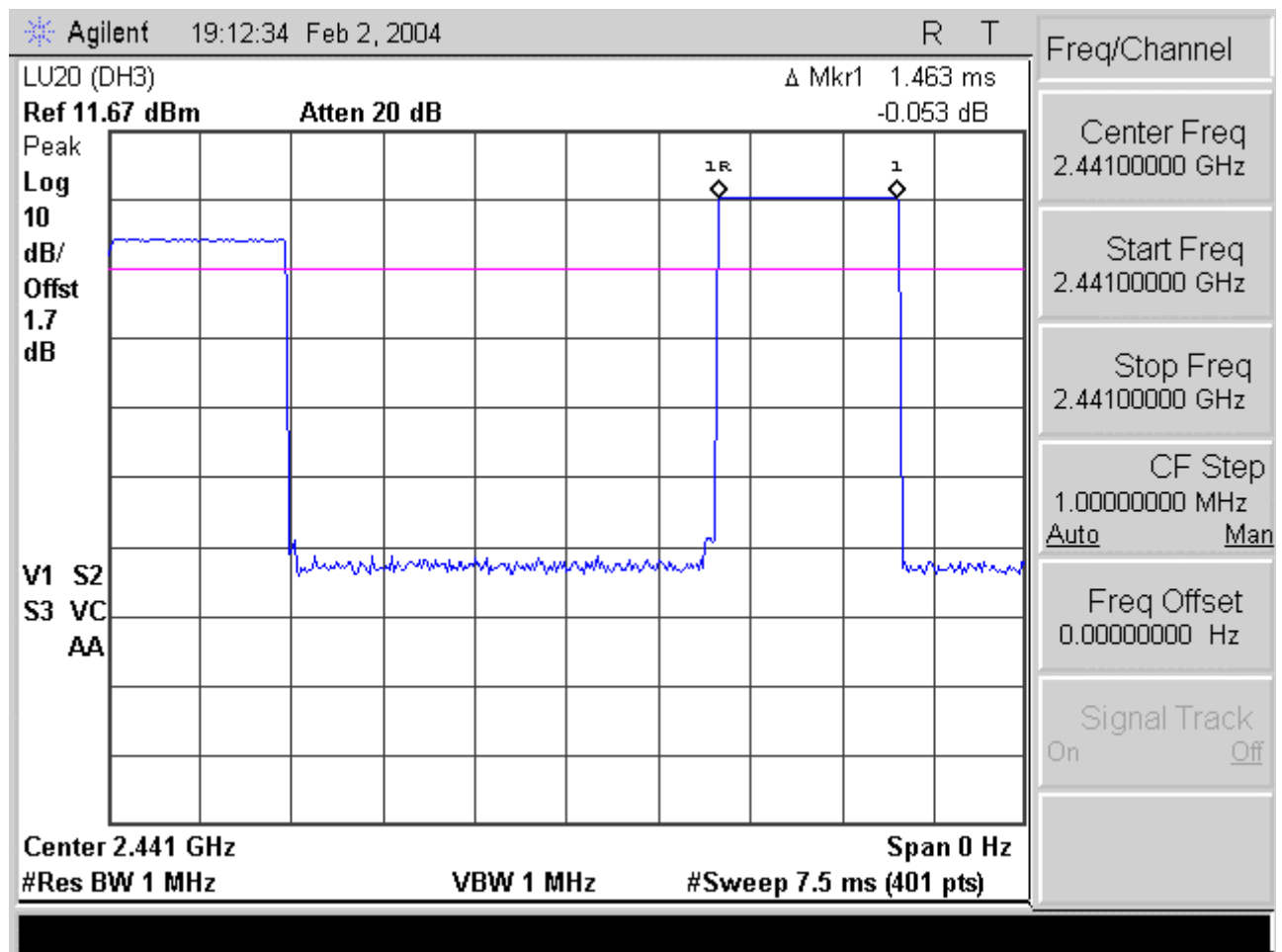


Time of Occupancy for PACKET Type DH 3

The system makes worst case 1600 hops per second or 1 time slot has a length of 625 us with 79 channels. A DH 3 Packet need 3 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case $1600/4 = 400$ hops per second with 79 channels. So you have each channel $400/79 = 5.1$ times per second and so for a period of $0.4 \times 79 = 31.6$ seconds you have $5.1 \times 31.6 = 161.16$ times of appearance.

Each Tx-time per appearance is 1.463 ms

So we have $161.16 \times 1.463 \text{ ms} = 235.777 \text{ ms}$ per 31.6 seconds.

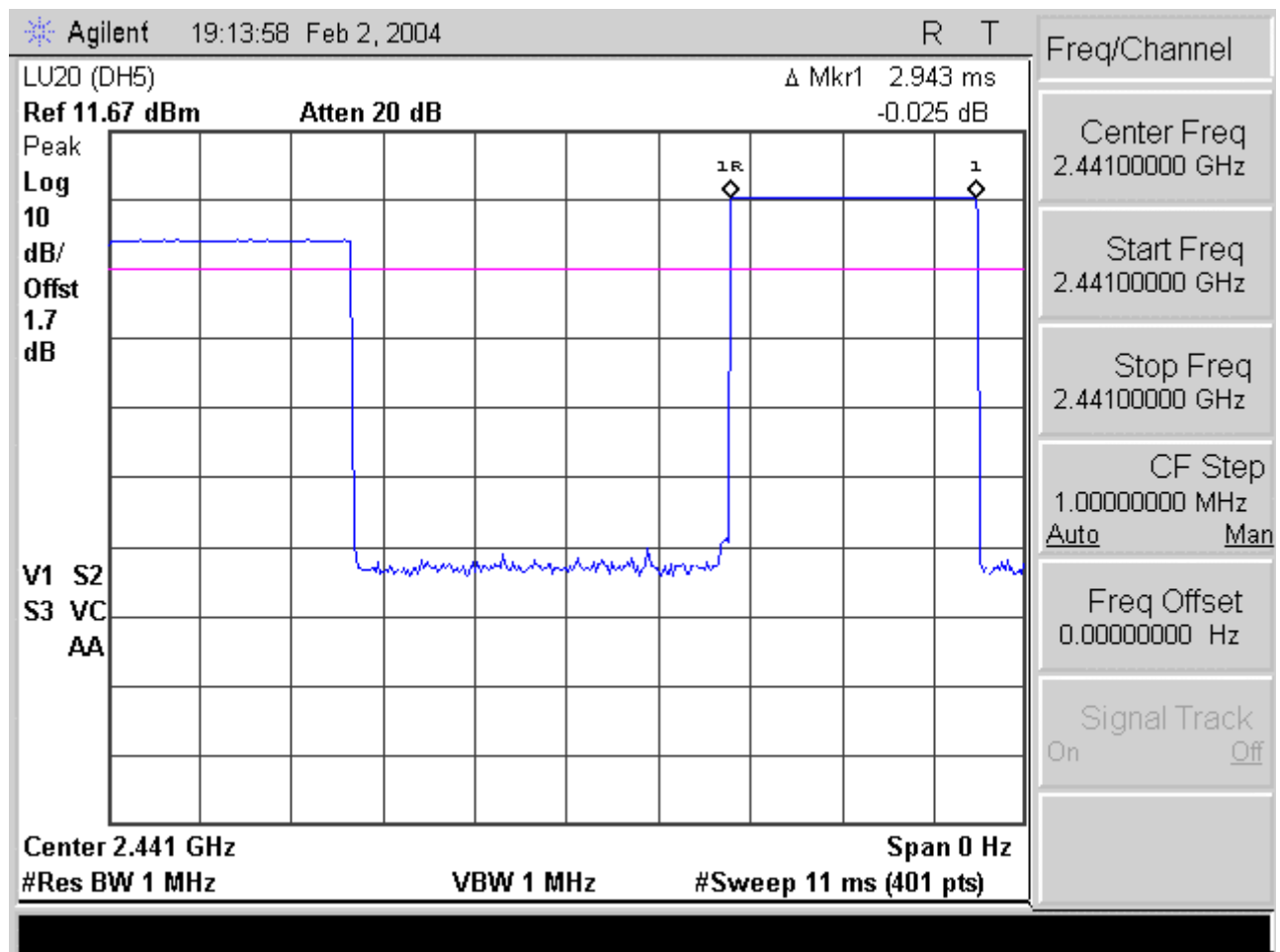


Time of Occupancy for PACKET Type DH 5

The system makes worst case 1600 hops per second or 1 time slot has a length of 625 us with 79 channels. A DH 5 Packet need 5 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case $1600/6 = 266.67$ hops per second with 79 channels. So you have each channel $266.67/79 = 3.37$ times per second and so for a period of $0.4 \times 79 = 31.6$ seconds you have $3.37 \times 31.6 = 106.49$ times of appearance.

Each Tx-time per appearance is 2.943 ms

So we have $106.49 \times 2.943 \text{ ms} = 313.400 \text{ ms}$ per 31.6 seconds.



3.2.5 6 dB Bandwidth (DSSS)

Procedure:

The bandwidth at 6 dB below the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal at the highest, middle and the lowest available channels.

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 6dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 6 dB bandwidth of the emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

Span = 30 MHz (approximately 2 or 3 times of the 6 dB bandwidth)

RBW = 100 kHz (1% of the 20dB bandwidth or more) Sweep = auto

VBW = 100 kHz (VBW $\geq$ RBW) Detector function = peak

Trace = max hold

Measurement Data:

Frequency (MHz)	Channel No.	Test Results	
		Measured Bandwidth (MHz)	Result
2412	1	8.98	Complies
2437	6	8.35	Complies
2462	11	6.18	Complies

- See next pages for actual measured spectrum plots.

Minimum Standard:

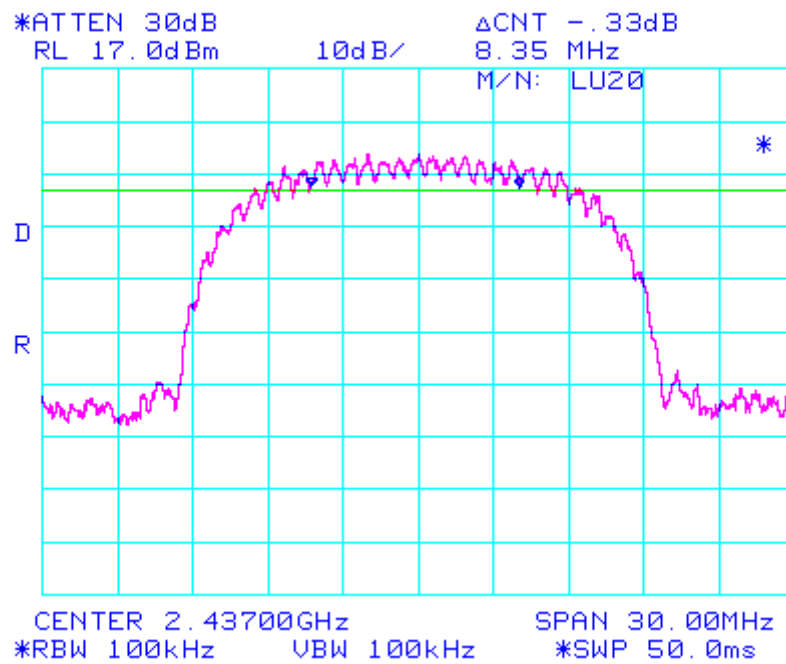
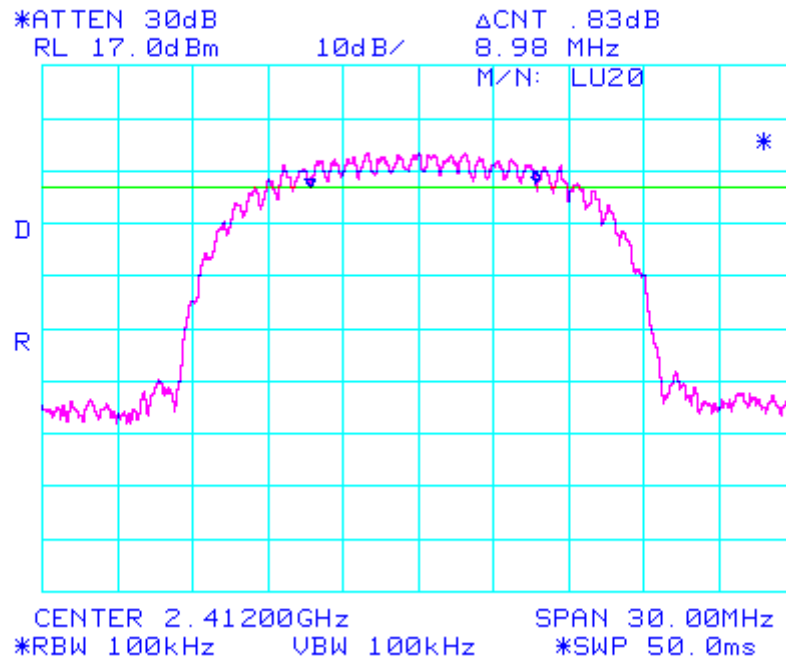
The minimum 6 dB bandwidth shall be at least 500 kHz

Measurement Setup

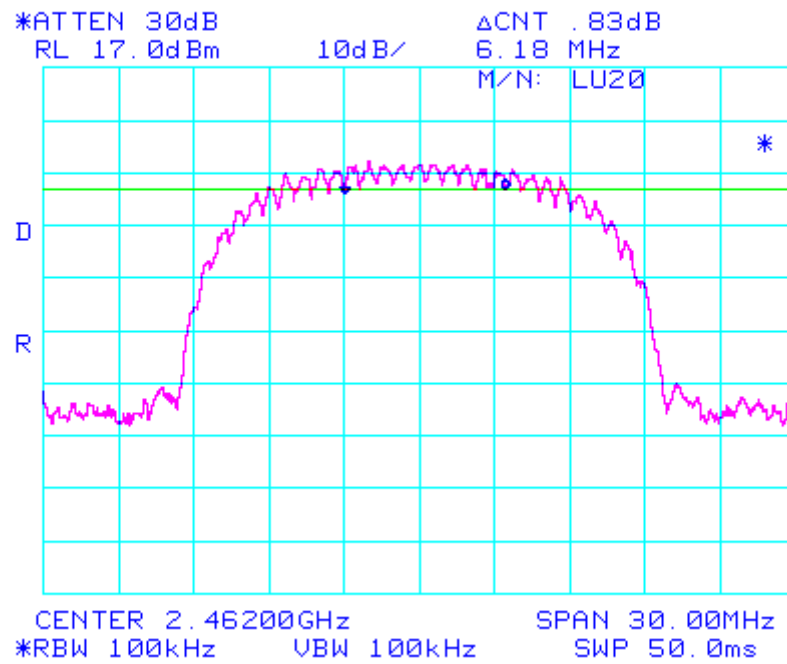
Same as the Chapter 3.2.1 (Figure 1)

TEST EQUIPMENT USED: 01, 19, 50

6 dB Bandwidth



6 dB Bandwidth



3.2.6 Peak Output Power (FHSS)

Procedure:

The peak output power was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

Span = 5 MHz (approximately 5 times of the 20 dB bandwidth)

RBW = 1 MHz (greater than the 20dB bandwidth of the emission being measured)

VBW = 1 MHz (VBW $\geq$ RBW)

Detector function = peak

Trace = max hold

Sweep = auto

Measurement Data:

Frequency (MHz)	Ch.	Test Results		
		dBm	W	Result
2402	1	1.17	0.00131	Complies
2441	40	1.67	0.00147	Complies
2480	79	3.00	0.00200	Complies

- See next pages for actual measured spectrum plots.

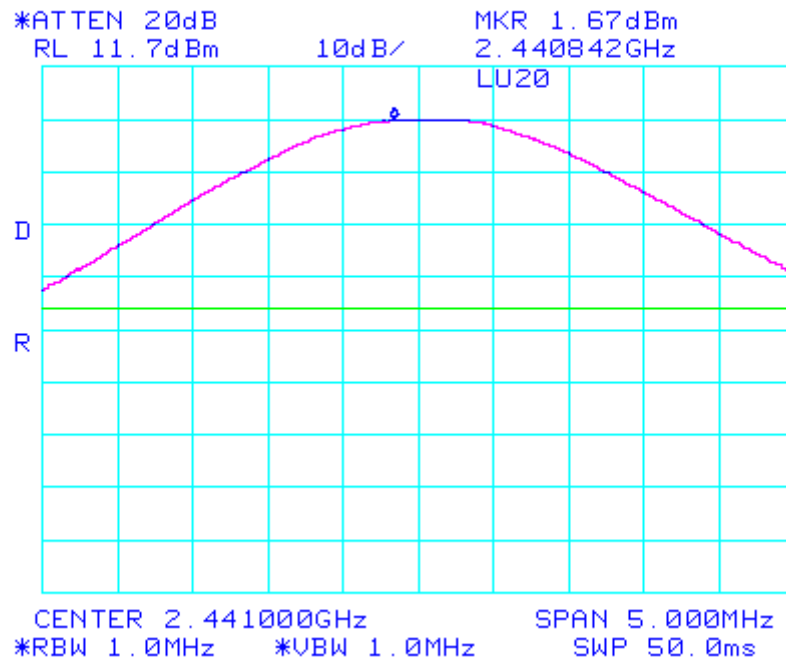
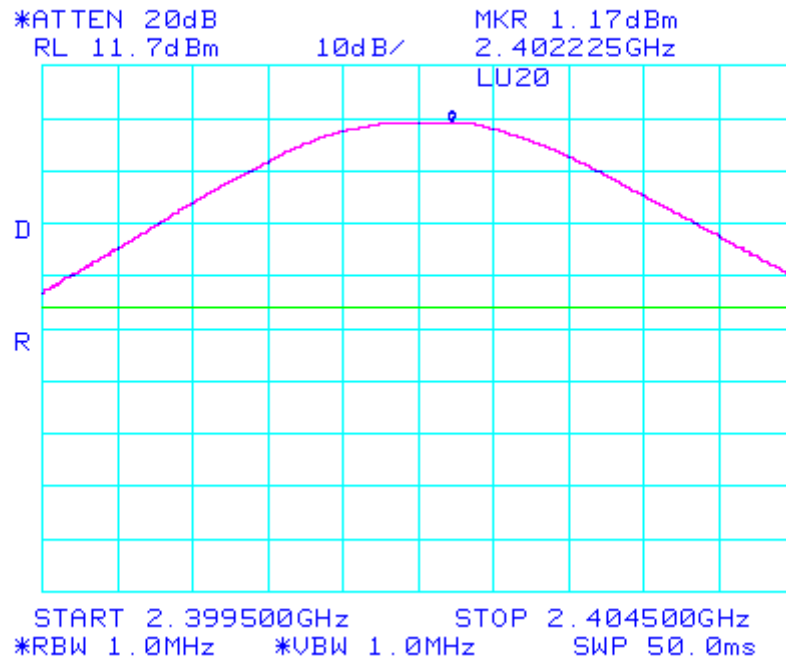
Minimum Standard:	< 1W
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Measurement Setup

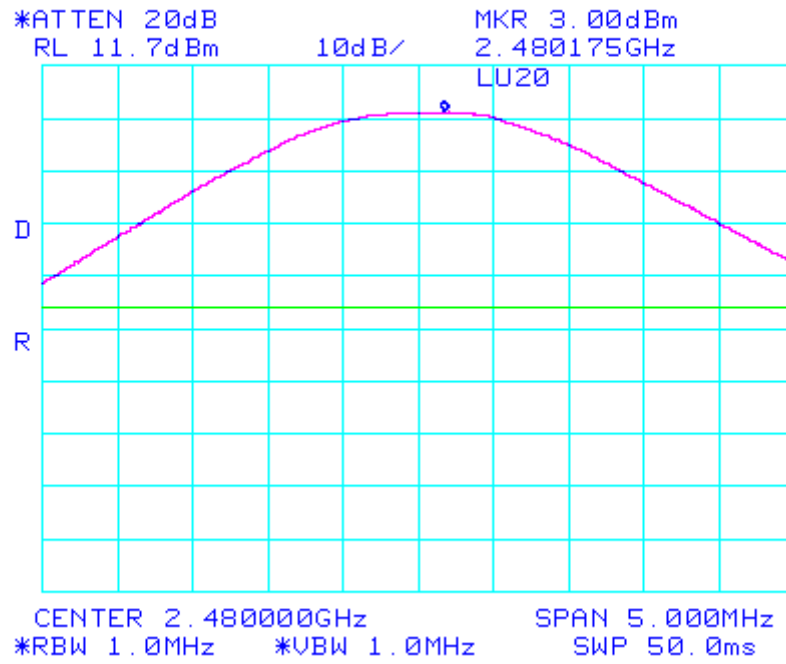
Same as the Chapter 3.2.1 (Figure 1)

TEST EQUIPMENT USED: 01, 19, 50

Peak Output Power



Peak Output Power



3.2.6 Peak Output Power (DSSS)

- Continues -

Procedure:

The peak output power was measured with a spectrum analyzer connected to the antenna terminal at the highest, middle and the lowest available channels..

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

Span = 100 MHz (approximately 5 times of the 20 dB bandwidth)

RBW = 10 MHz (greater than the 20dB bandwidth of the emission being measured)

VBW = 10 MHz (VBW $\geq$ RBW)

Detector function = peak

Trace = max hold

Sweep = auto

Measurement Data:

Frequency (MHz)	Ch.	Test Results				
		Read (dBm)	Cable Loss (dB)	dBm	W	Result
2412	1	14.93	1.67	16.60	0.0457	Complies
2437	6	15.06	1.67	16.73	0.0471	Complies
2462	11	14.93	1.65	16.58	0.0455	Complies

- See next pages for actual measured spectrum plots.

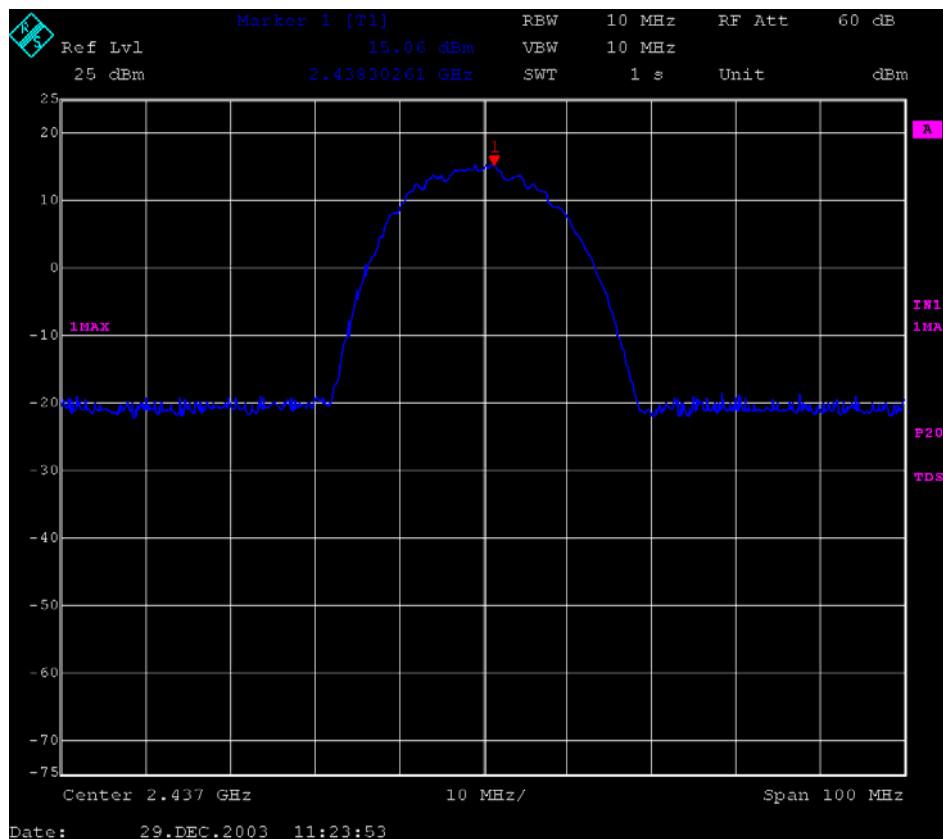
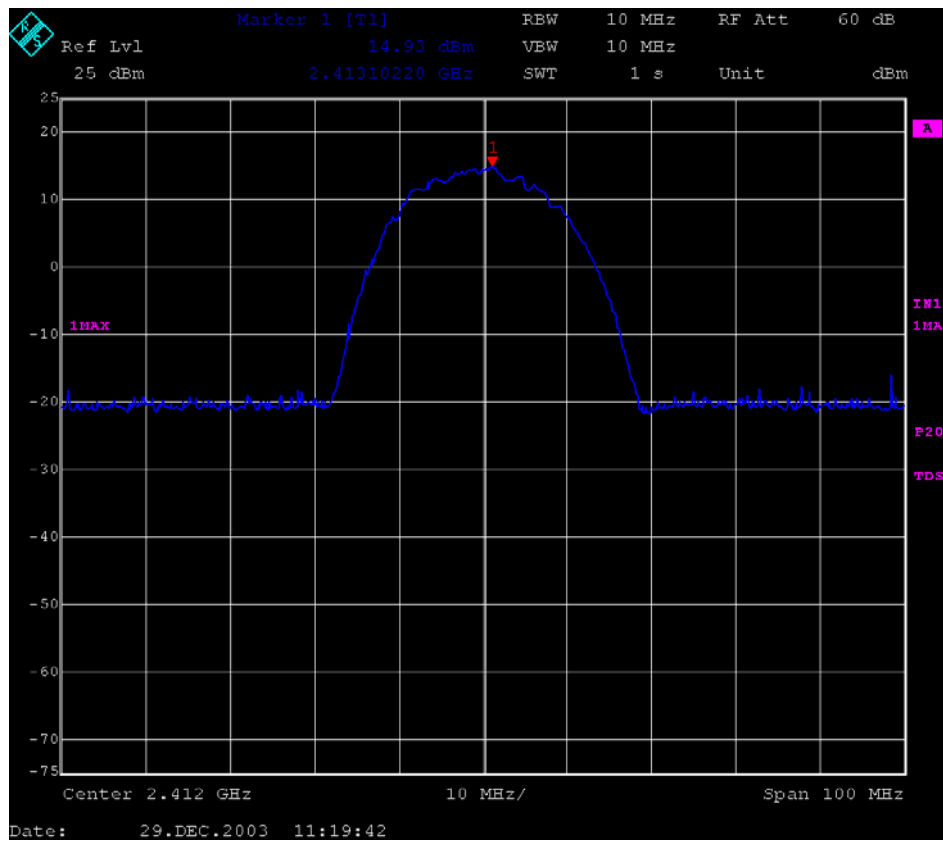
Minimum Standard:	< 1W
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Measurement Setup

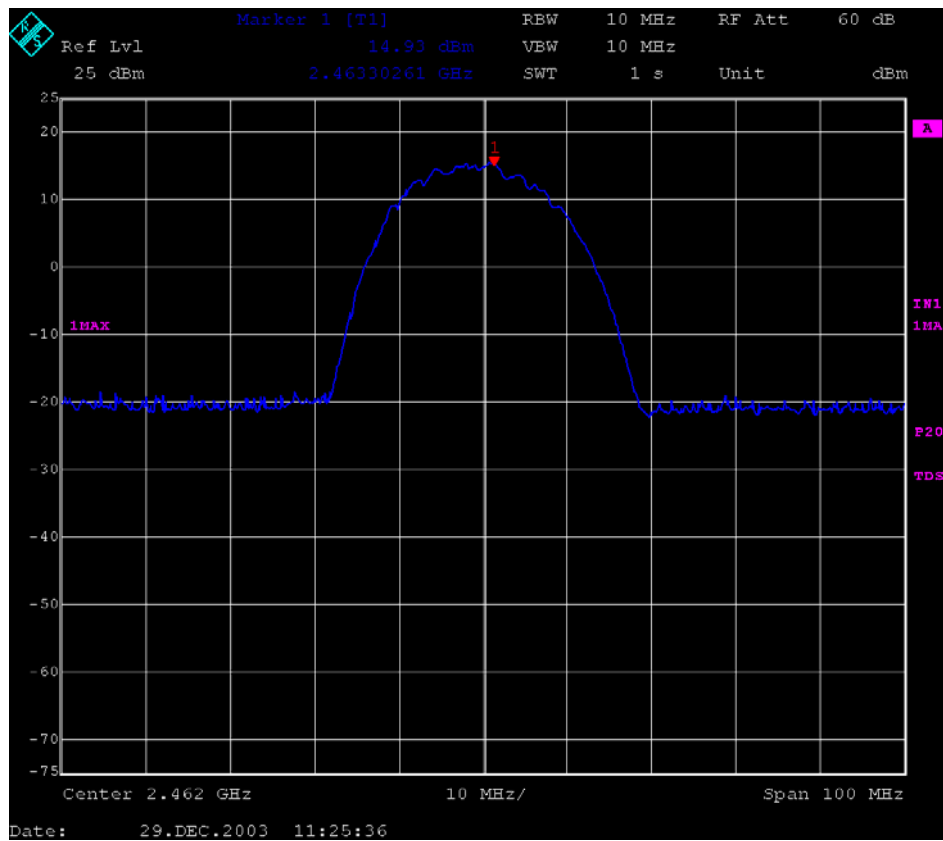
Same as the Chapter 3.2.1 (Figure 1)

TEST EQUIPMENT USED: 19, 50, 51

Peak Output Power



Peak Output Power



3.2.7 Band - edge at 20 dB blow (FHSS)

Procedure:

The bandwidth at 20dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.

After the trace being stable, Use the marker-to-peak function to measure 20 dB down both sides of the intentional emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz

VBW = 100 kHz

Span = 100 MHz

Detector function = peak

Trace = max hold

Sweep = auto

Measurement Data: Complies

- All conducted emission in any 100kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
- See next pages for actual measured spectrum plots.

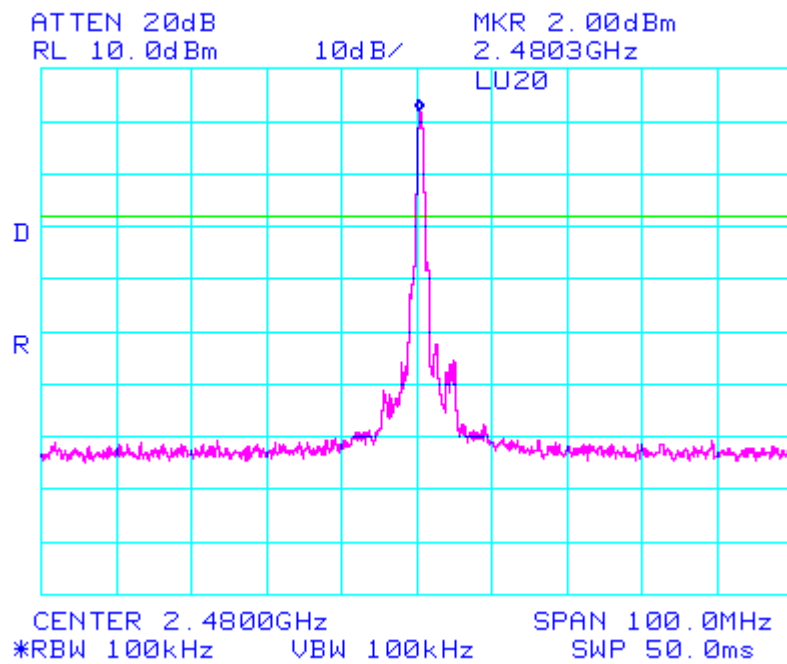
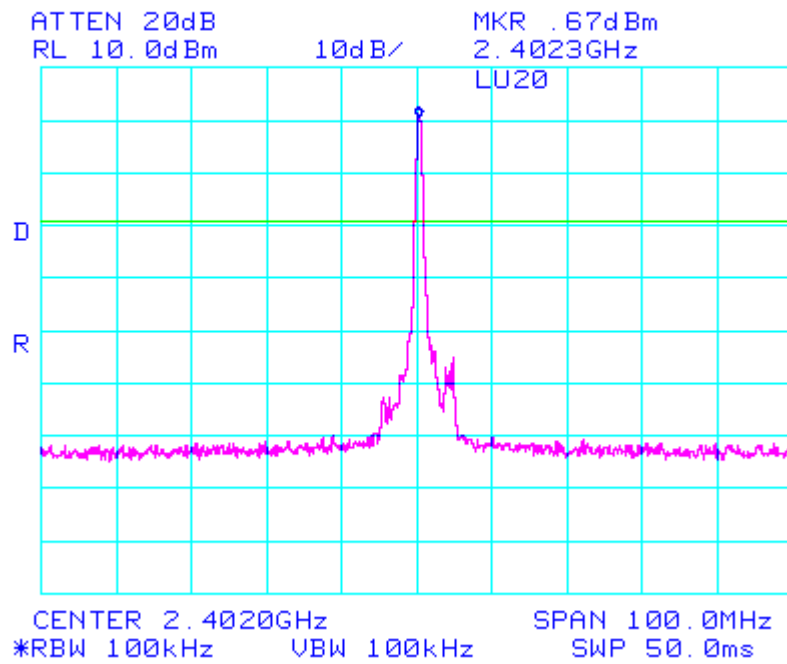
Minimum Standard:	> 20 dBc
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Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

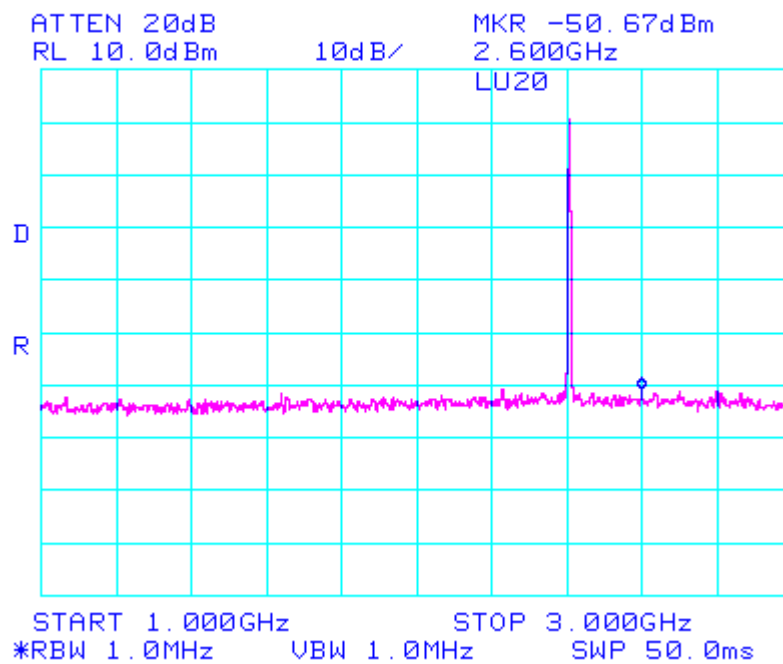
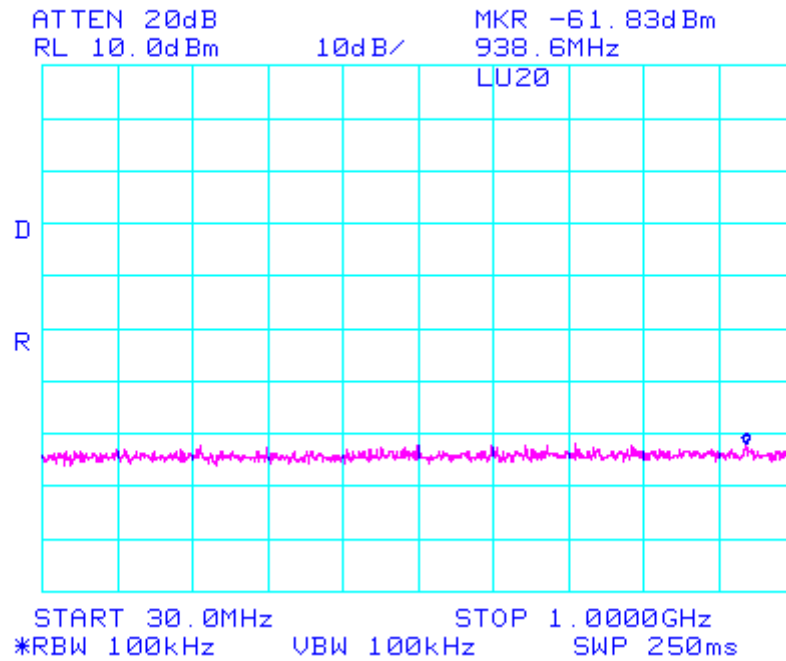
TEST EQUIPMENT USED: 01, 02, 19, 50.....

Band - edge (at 20 dB blow)



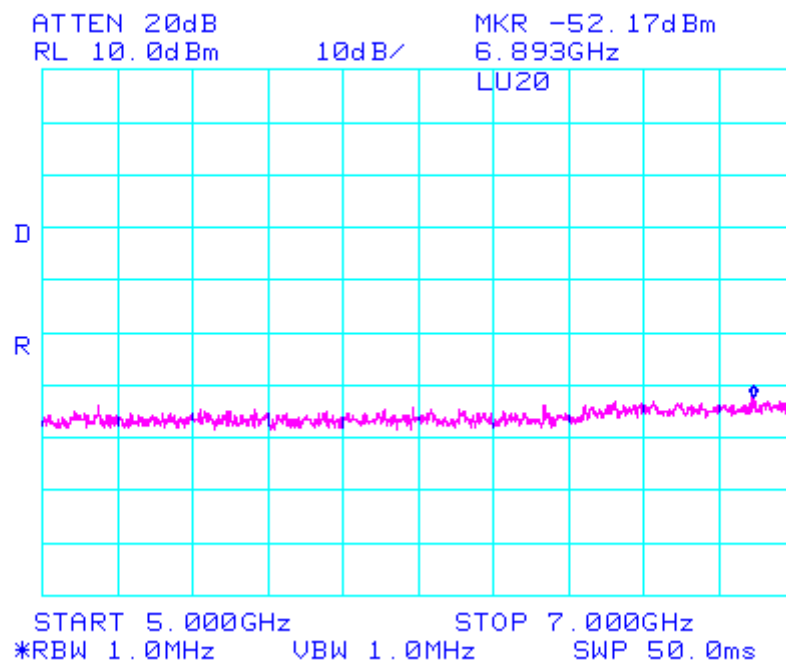
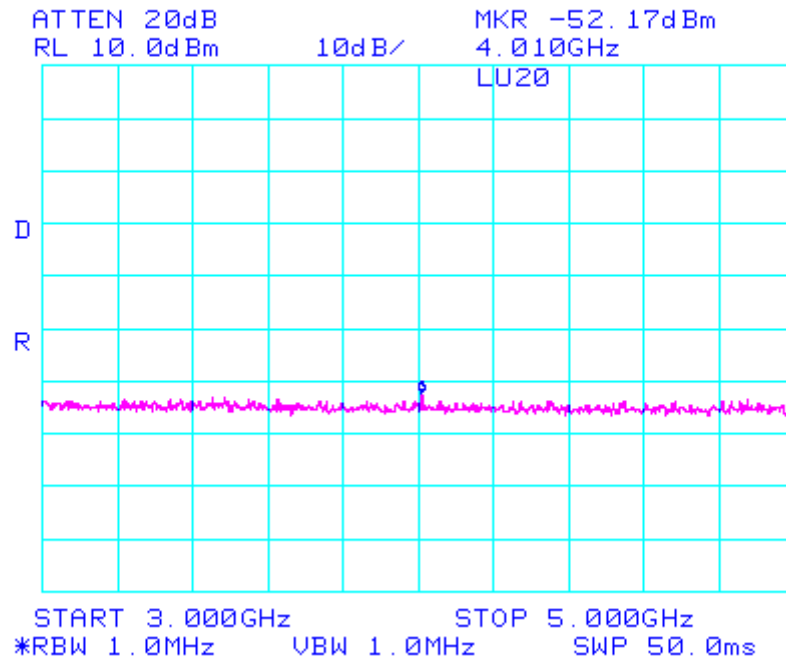
Band - edge (at 20 dB blow)

Frequency Range = 30 MHz ~ 10th harmonic.



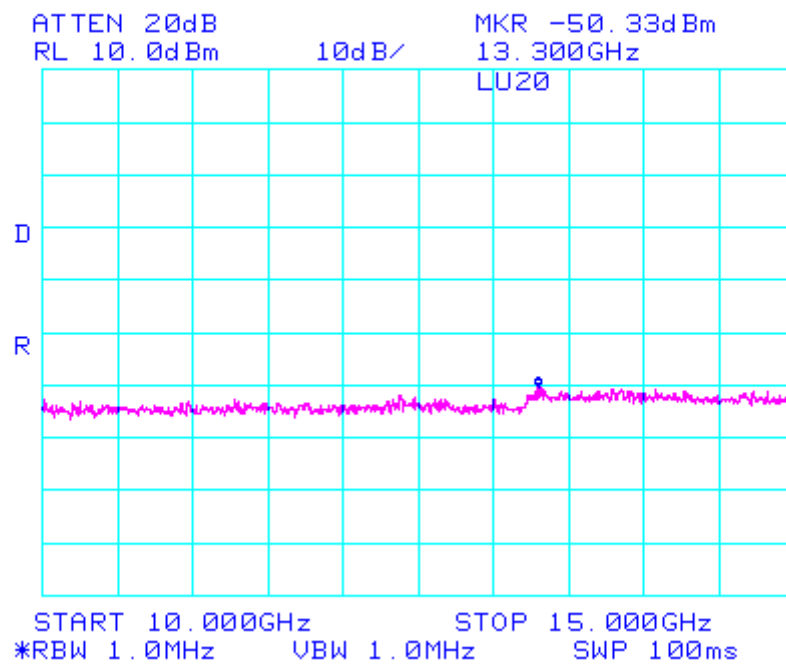
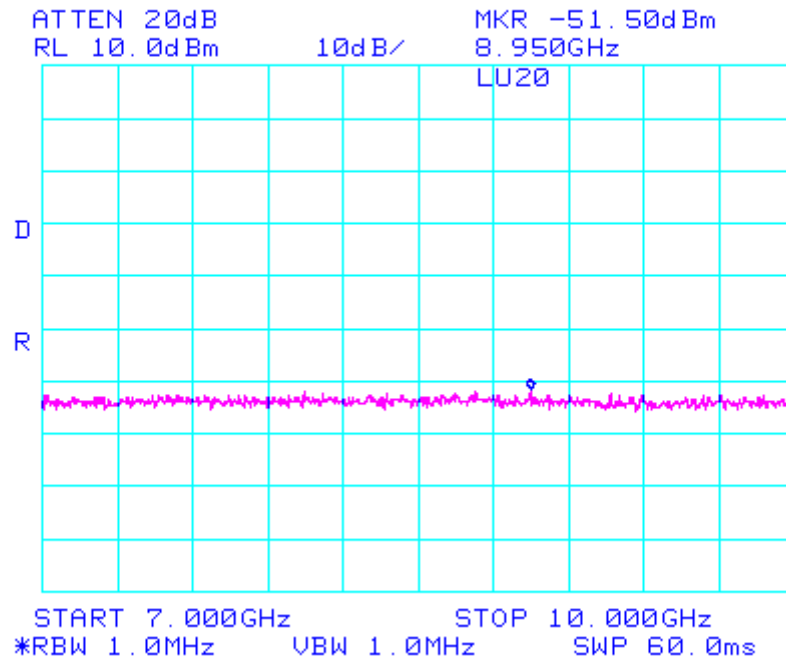
Band - edge (at 20 dB blow)

Frequency Range = 30 MHz ~ 10th harmonic.



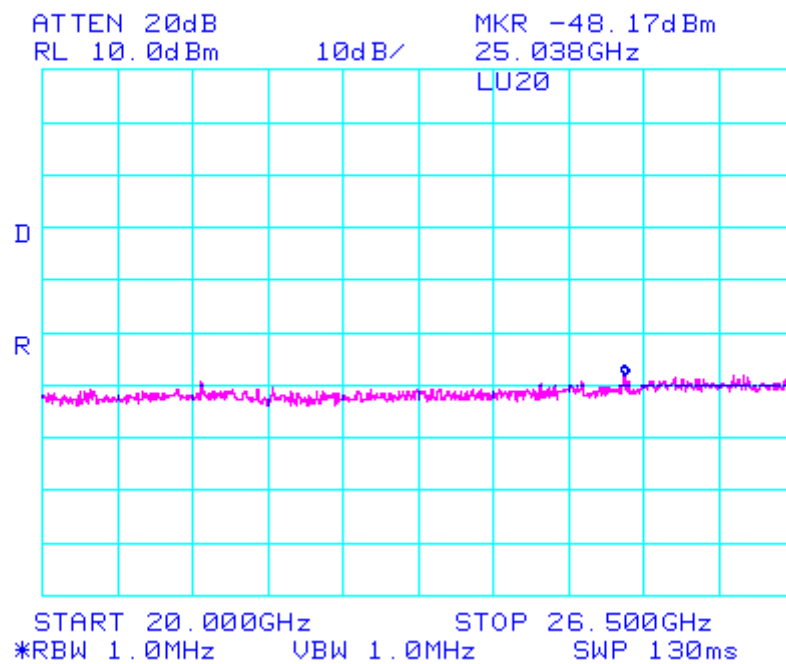
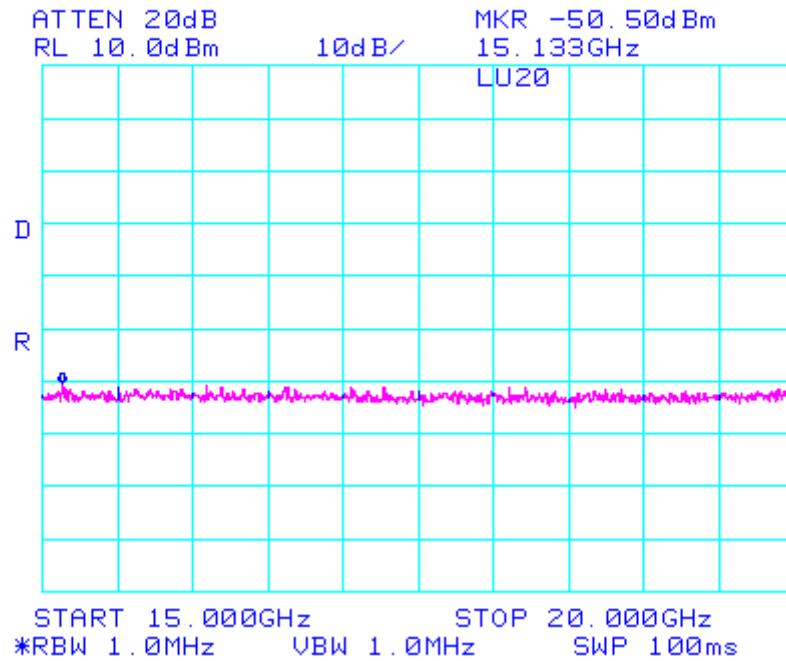
Band - edge (at 20 dB blow)

Frequency Range = 30 MHz ~ 10th harmonic.



Band - edge (at 20 dB blow)

Frequency Range = 30 MHz ~ 10th harmonic.



3.2.7 Band - edge at 20 dB blow / Occupied BandWidth for IC (DSSS) - Continues -

Procedure:

The bandwidth at 20dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal at the highest, middle and the lowest available channels.

After the trace being stable, Use the marker-to-peak function to measure 20 dB down both sides of the intentional emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz

VBW = 100 kHz

Span = 100 MHz

Detector function = peak

Trace = max hold

Sweep = auto

Measurement Data: Complies

- All conducted emission in any 100kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
- See next pages for actual measured spectrum plots.

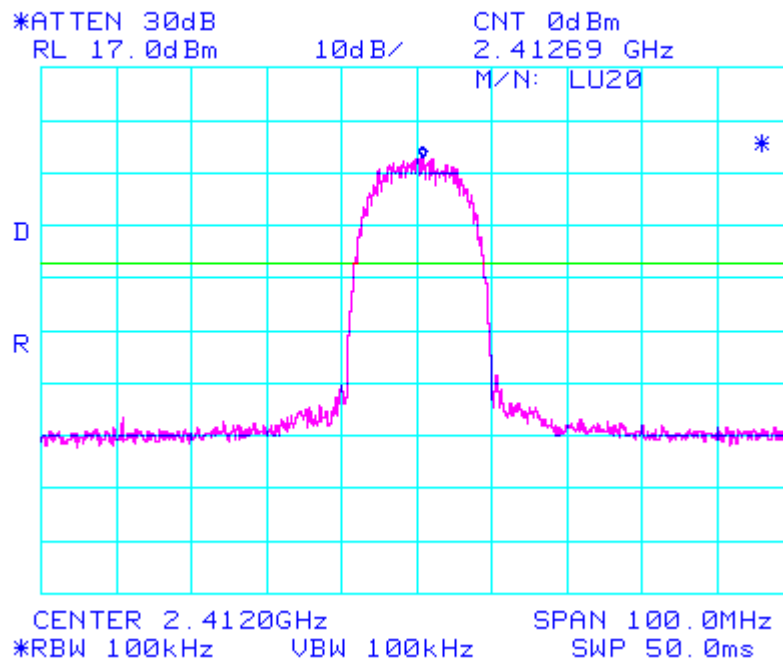
Minimum Standard:	> 20 dBc
--------------------------	----------

Measurement Setup

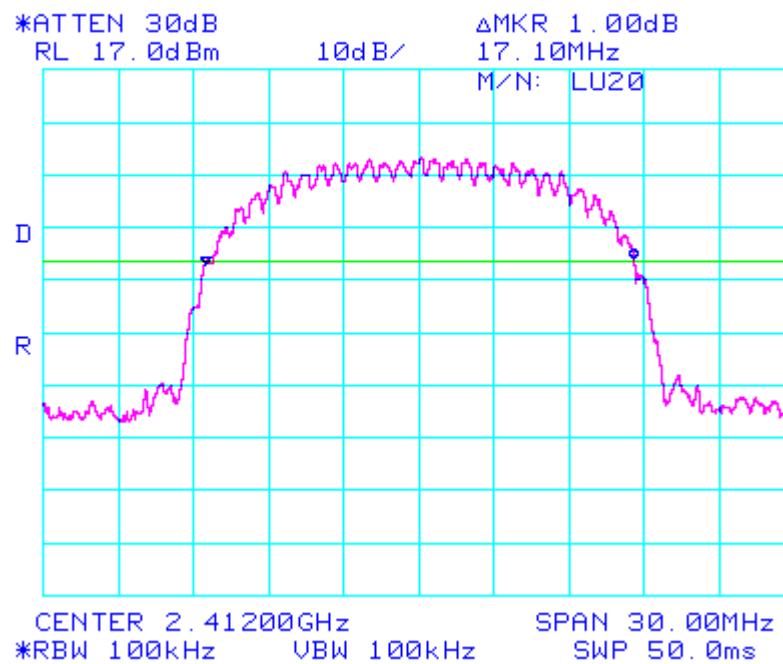
Same as the Chapter 3.2.1 (Figure 1)

TEST EQUIPMENT USED: 01, 02, 19, 50.....

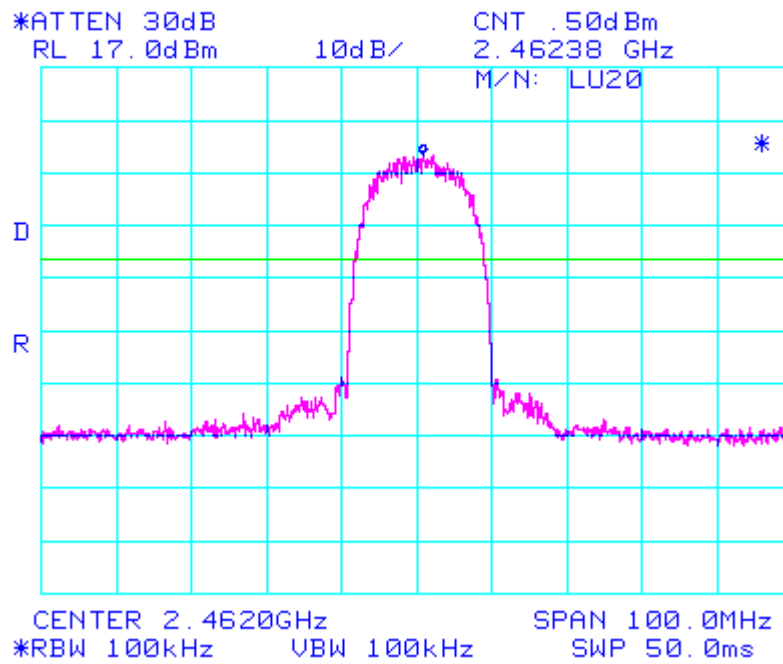
Band - edge (at 20 dB blow)



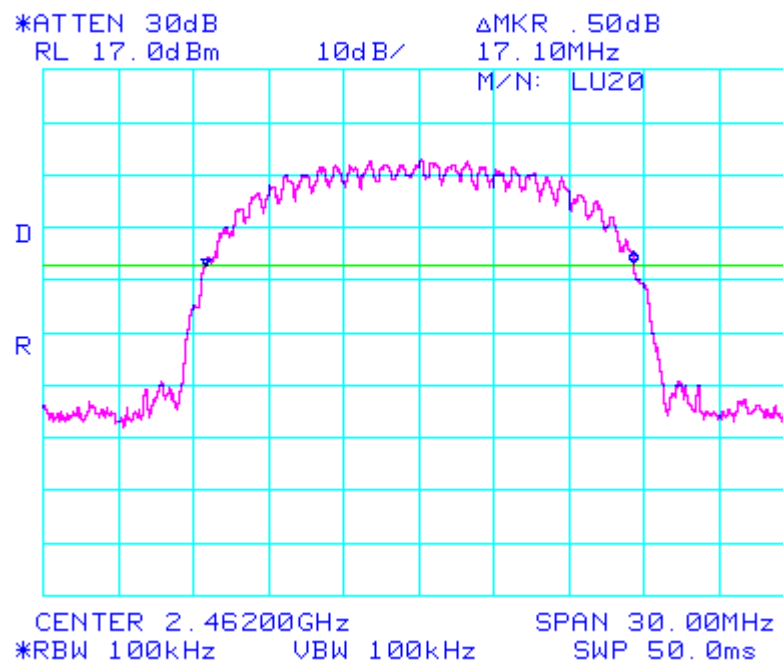
Occupied BandWidth for IC



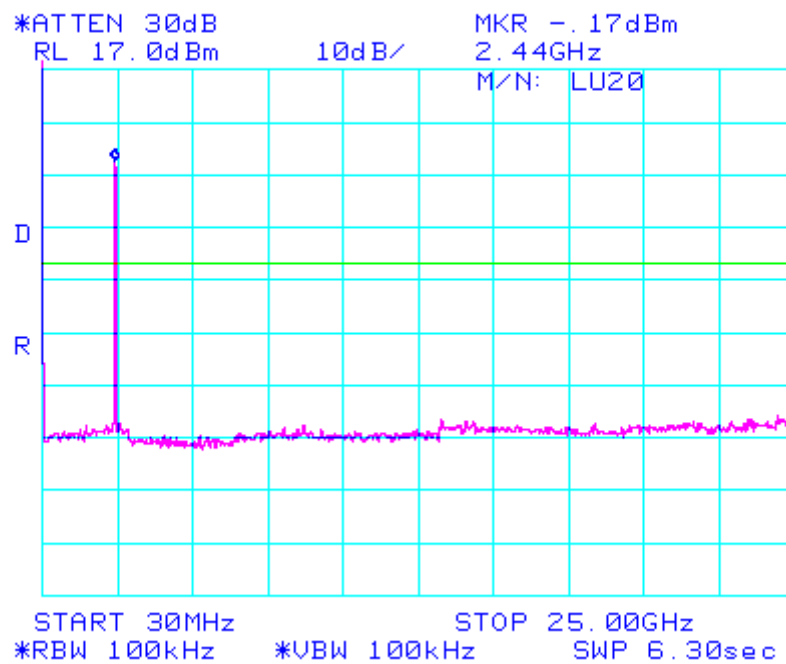
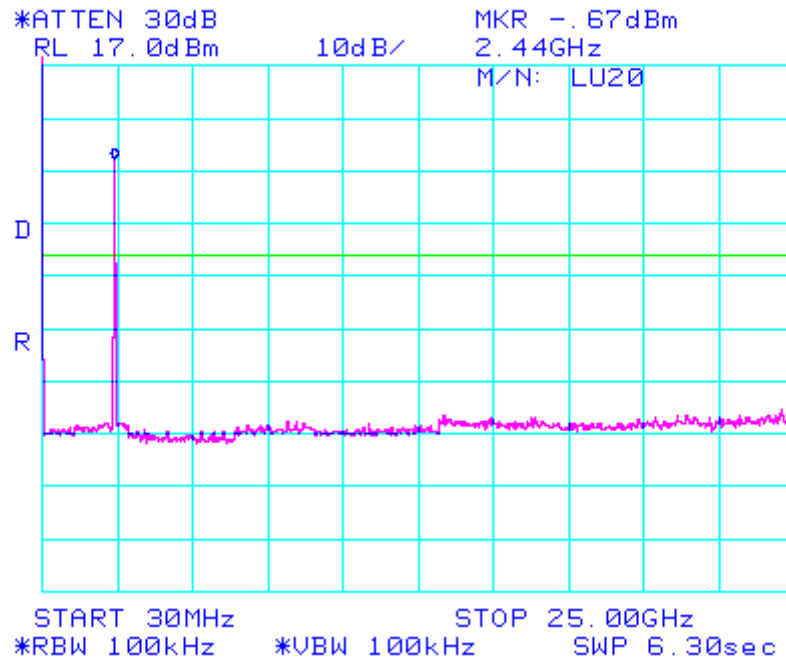
Band - edge (at 20 dB blow)



Occupied BandWidth for IC

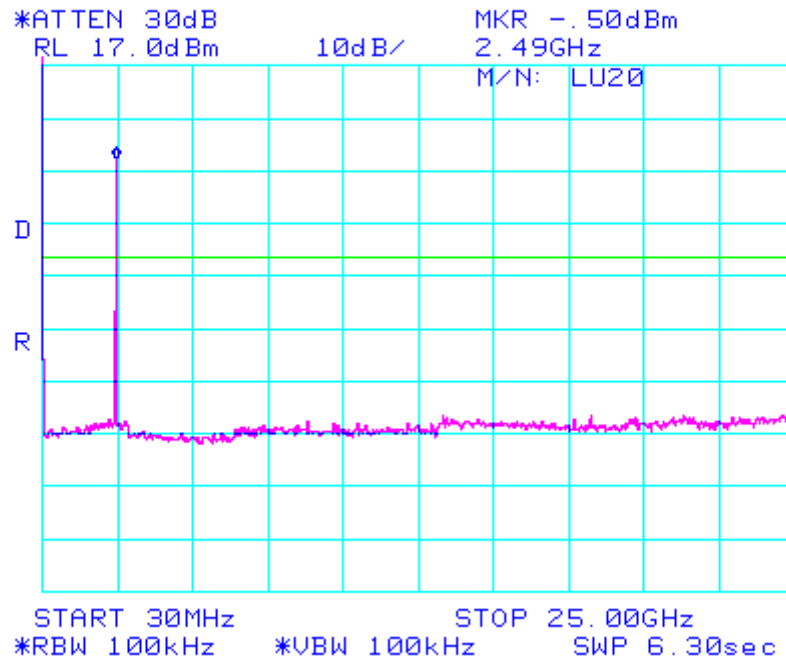


Band - edge (at 20 dB blow)
Frequency Range = 30 MHz ~ 10th harmonic.



Band - edge (at 20 dB blow)

Frequency Range = 30 MHz ~ 10th harmonic.



3.2.8 Out of band Emission - Radiated

Procedure:

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 30 MHz ~ 10th harmonic.

Span = 100 MHz

RBW = 120 kHz (30MHz ~ 1 GHz)

VBW ≥ RBW

= 1 MHz (1 GHz ~ 10th harmonic)

Trace = max hold

Sweep = auto

Detector function = peak

Measurement Data: Complies

frequency (DSSS)			frequency (FHSS)		
Frequency (MHz)	Band-width (kHz)	Level (dBuV)	Frequency (MHz)	Band-width (kHz)	Level (dBuV)
66.37	120	32.2	95.48	120	37.5
95.48	120	36.0	117.30	120	34.5
119.73	120	34.8	214.30	120	34.0
214.30	120	34.0	905.45	120	36.0
907.85	120	37.0	907.85	120	37.5
Measurement uncertainty		+3.5 / -4.3			

Remark: No other emissions were detected at a level greater than 10dB below limit.

Minimum Standard: FCC Part 15.209(a)

Frequency (MHz)	Limit (uV/m) @ 3m
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

TEST EQUIPMENT USED: 02, 22, 30, 31, 33, 34, 39, 40, 41, 47, 49

3.2.9 Transmitter Power Spectral Density (DSSS)

Procedure:

The peak power density is measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.

After the trace being stable, Use the marker-to-peak function to measure 20 dB down both sides of the intentional emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 3 kHz

VBW = 100 kHz

Span = 2 MHz

Detector function = peak

Sweep = auto

Measurement Data:

Frequency (MHz)	Channel No.	Test Results	
		Power Density (dBm)	Result
2412	1	-6.33	Complies
2437	6	-5.83	Complies
2462	11	-6.83	Complies

- See next pages for actual measured spectrum plots.

Minimum Standard:

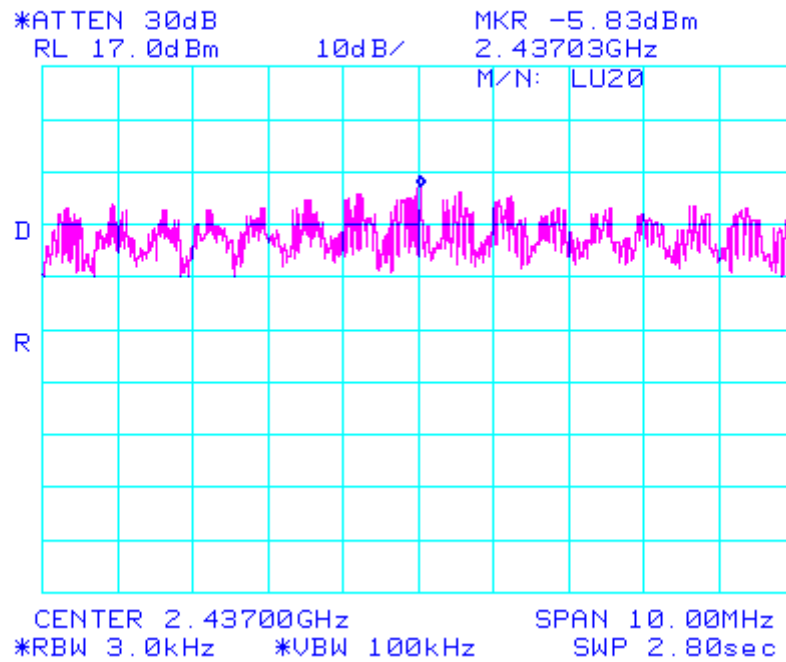
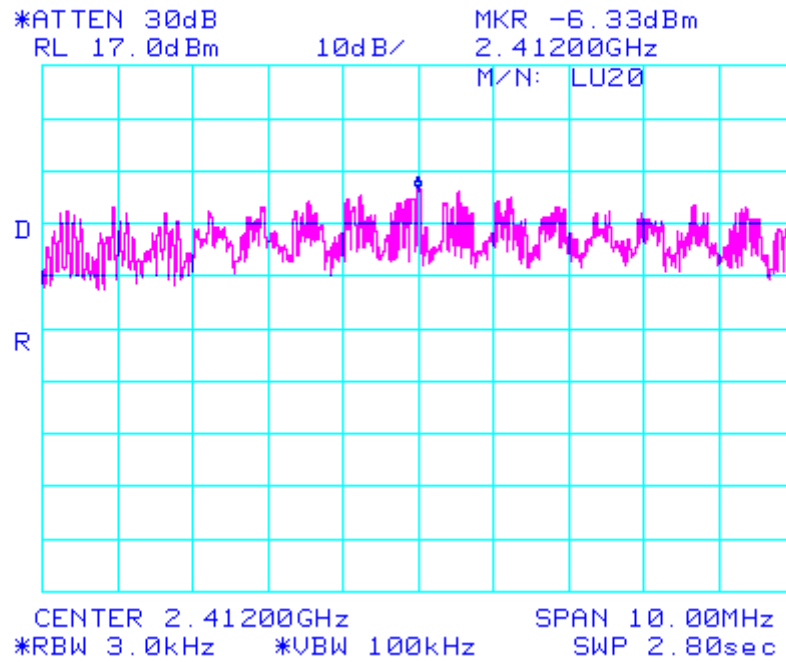
The transmitter power density average over 1-second interval shall not be greater than 8 dBm in any 3kHz BW.
--

Measurement Setup

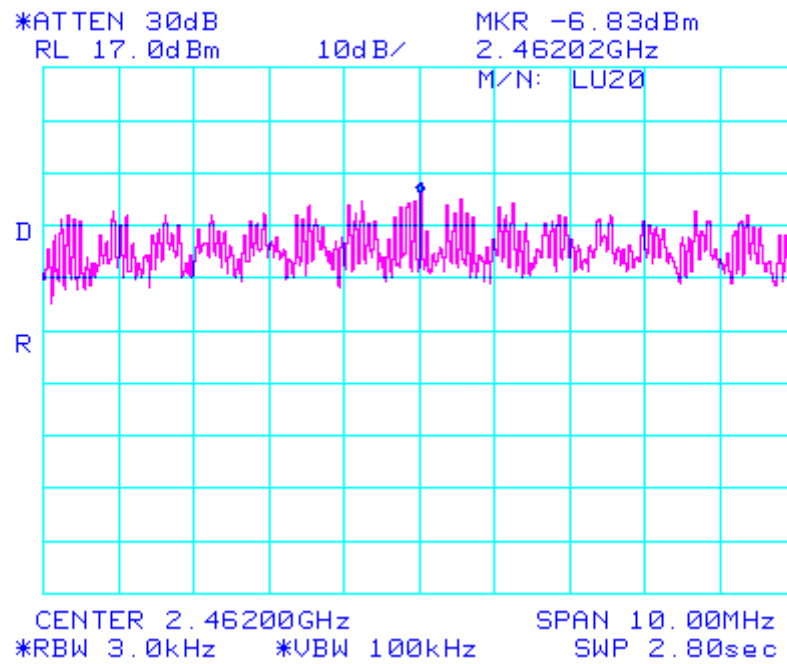
Same as the Chapter 3.2.1 (Figure 1)

TEST EQUIPMENT USED: 01, 19, 50

Transmitter Power Spectral Density



Transmitter Power Spectral Density



3.2.10 AC Conducted Emissions

Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

Measurement uncertainty: ± 2.2 dB

Measurement Data: Complies

- See next pages for actual measured spectrum plots.
- No emissions were detected at a level greater than 10dB below limit.

Minimum Standard: FCC Part 15.207(a)/EN 55022

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

Measurement Setup

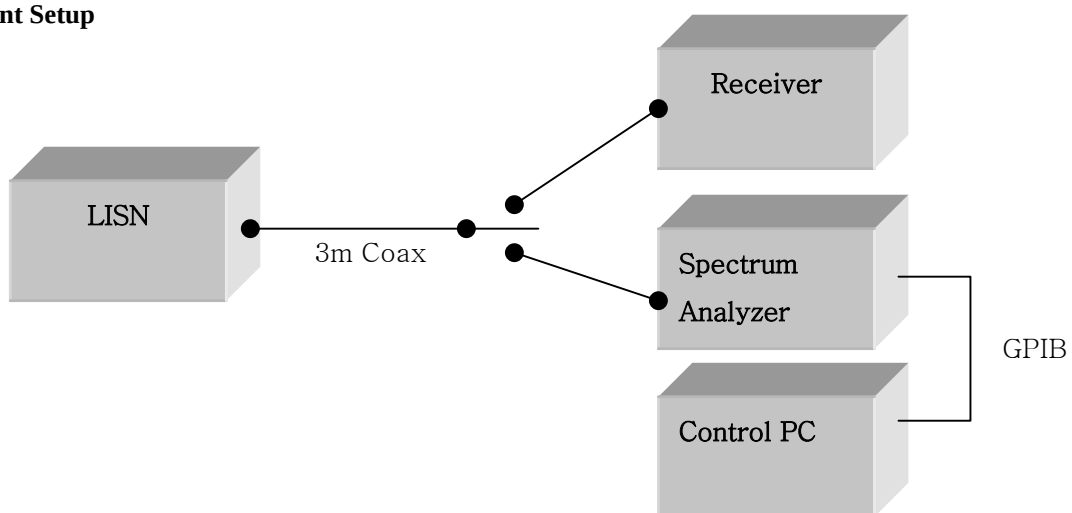
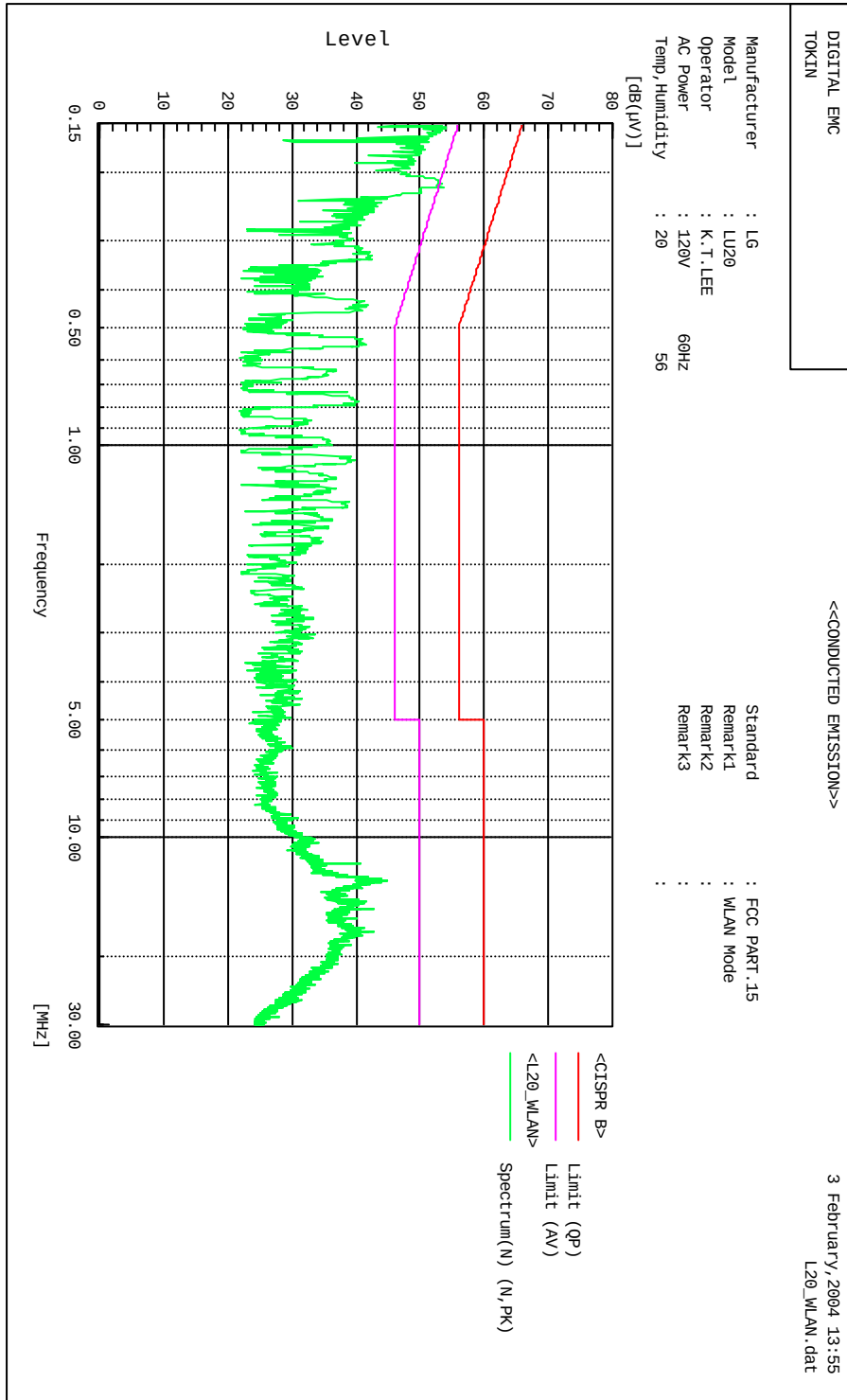


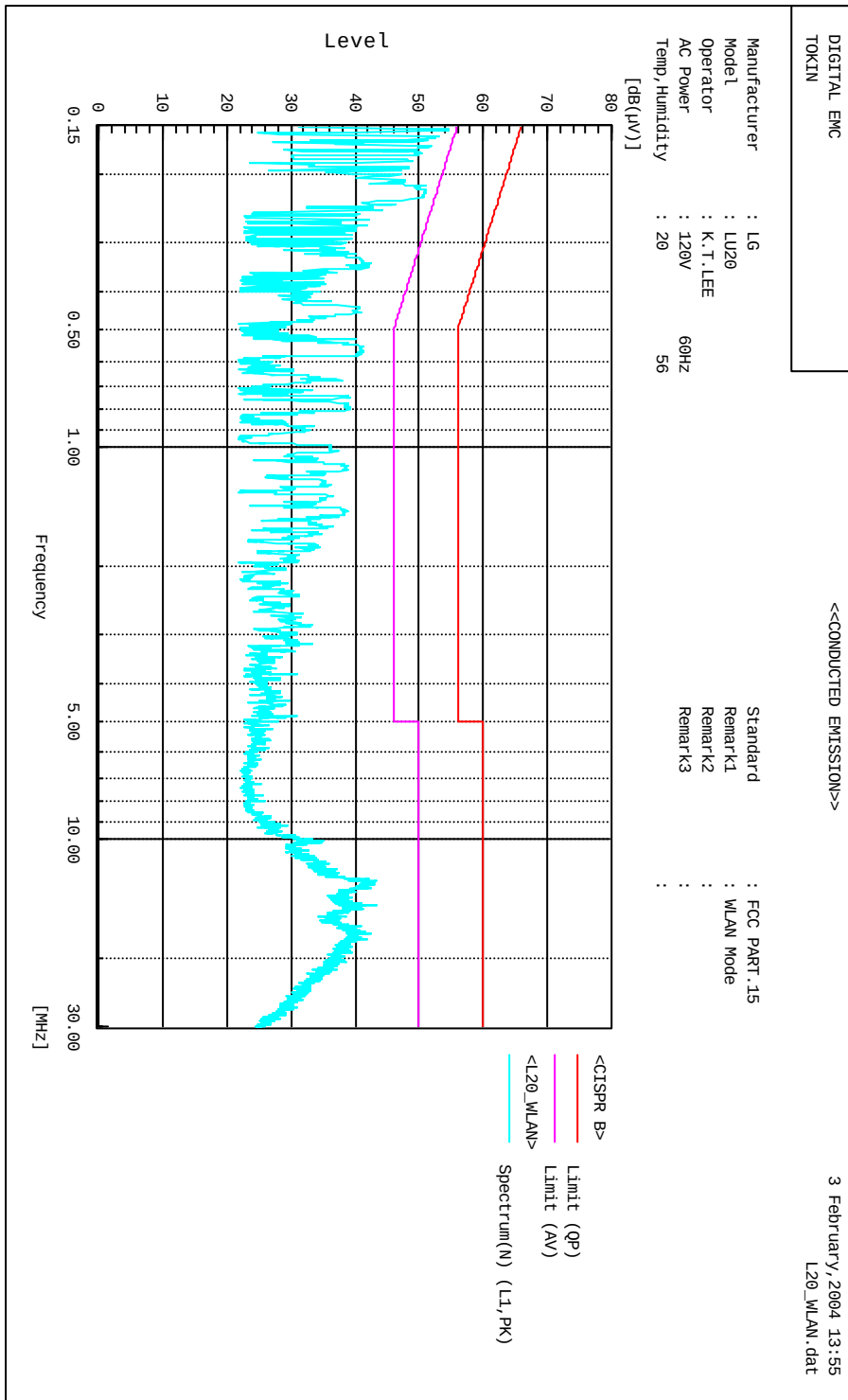
Figure 2: Measurement setup for AC Conducted Emission

TEST EQUIPMENT USED: 42, 43, 44, 45, 46, 48

AC Conducted Emissions - Neutral Graph (Tx: DSSS)



AC Conducted Emissions - Line Graph (Tx: DSSS)



AC Conducted Emissions -DATA (Tx: DSSS)

 DIGITAL EMC *****
 <<CONDUCTED EMISSION>>

3 February, 2004 13:55
 L20_WLAN.dat

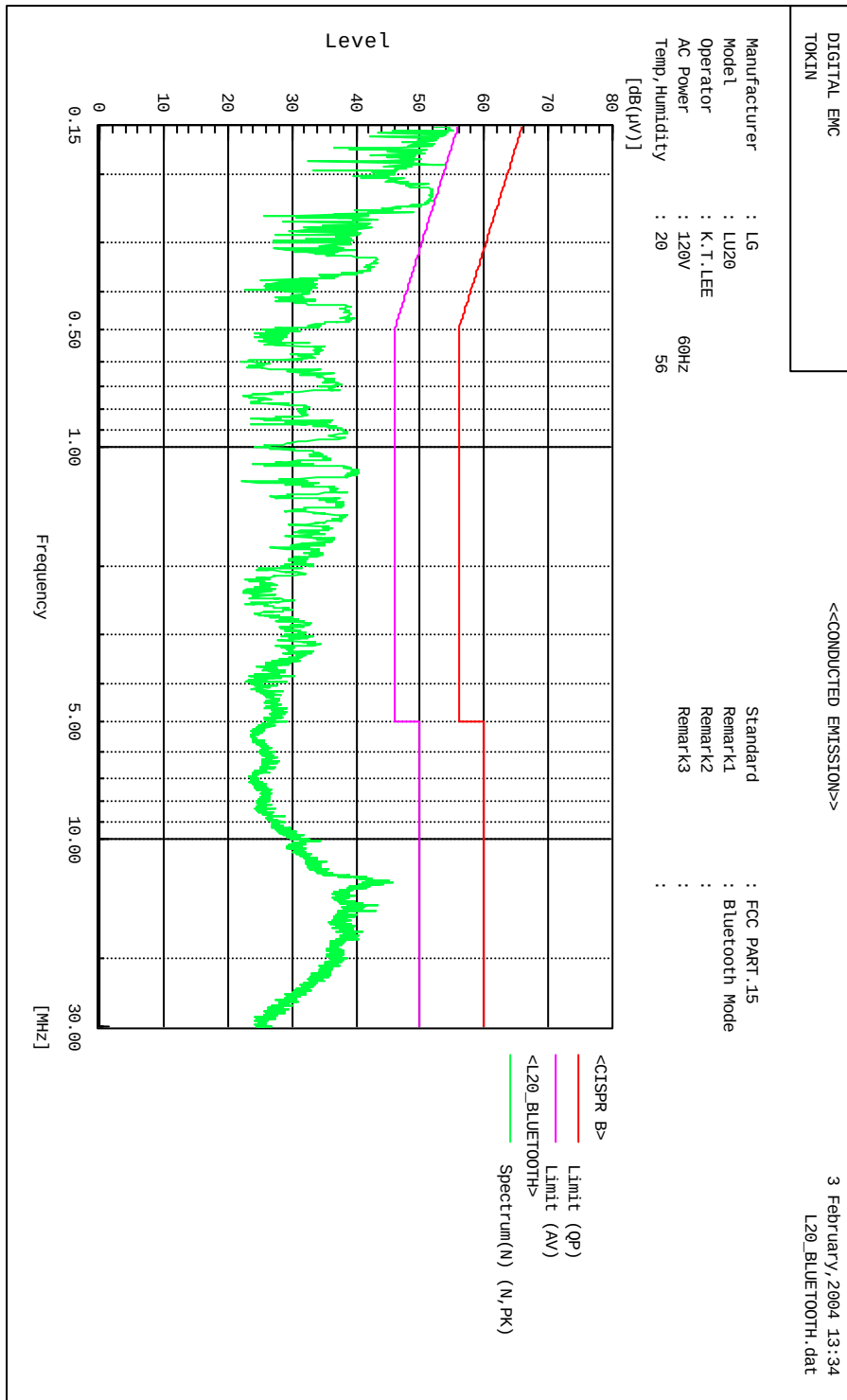
Standard : FCC PART.15
 Manufacturer : LG
 Model : LU20
 Operator : K.T.LEE
 AC Power : 120V 60Hz
 Temp, Humidity : 20 56
 Remark1 : WLAN Mode
 Remark2 :
 Remark3 :

 Final Result *****

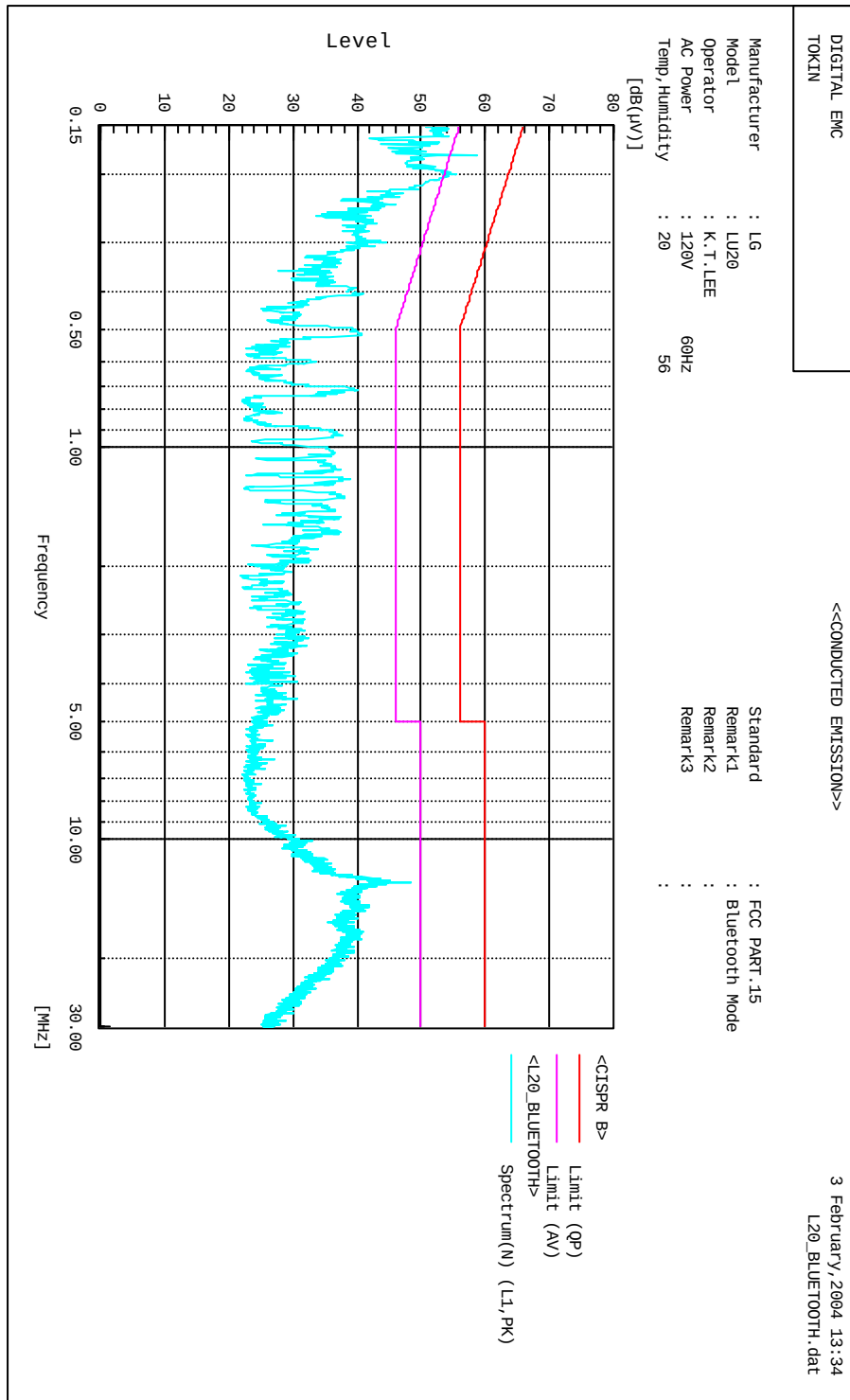
--- N Phase ---											
No.	Frequency	Reading	Qp	Reading	AV	c.f	Result	Qp	Result	AV	Remark
	[MHz]	[dB(μV)]		[dB(μV)]		[dB]	[dB(μV)]		[dB(μV)]		
1	12.828	34.8	34.8	27.4	0.5	35.3	27.9	60.0	50.0	24.7	22.1
2	0.230	48.2	48.2	37.4	1.0	49.2	38.4	62.4	52.4	13.2	14.0
3	0.150	44.1	44.1	0.0	1.8	45.9	0.0	66.0	56.0	20.1	0.0
4	0.470	39.2	39.2	29.8	0.3	39.5	30.1	56.5	46.5	17.0	16.4
5	0.589	39.1	39.1	33.4	0.3	39.4	33.7	56.0	46.0	16.6	12.3
6	0.819	36.1	36.1	30.6	0.3	36.4	30.9	56.0	46.0	19.6	15.1

--- L1 Phase ---											
No.	Frequency	Reading	Qp	Reading	AV	c.f	Result	Qp	Result	AV	Remark
	[MHz]	[dB(μV)]		[dB(μV)]		[dB]	[dB(μV)]		[dB(μV)]		
1	0.150	43.4	43.4	0.0	1.8	45.2	0.0	66.0	56.0	20.8	0.0
2	0.230	48.7	48.7	36.8	1.0	49.7	37.8	62.5	52.5	12.8	14.7
3	0.568	39.8	39.8	25.4	0.3	40.1	25.7	56.0	46.0	15.9	20.3
4	0.813	37.1	37.1	26.7	0.3	37.4	27.0	56.0	46.0	18.6	19.0
5	1.177	37.0	37.0	28.9	0.3	37.3	29.2	56.0	46.0	18.7	16.8
6	12.849	36.1	36.1	28.5	0.6	36.7	29.1	60.0	50.0	23.3	20.9

AC Conducted Emissions - Neutral Graph (Tx: FHSS)



AC Conducted Emissions - Line Graph (Tx: FHSS)



AC Conducted Emissions - DATA (Tx: FHSS)

```

*****
DIGITAL EMC
<<CONDUCTED EMISSION>>
*****
Standard : FCC PART.15
Manufacturer : LG
Model : LU20
Operator : K.T.LEE
AC Power : 120V 60Hz
Temp, Humidity : 20 56
Remark1 : Bluetooth Mode
Remark2 :
Remark3 :
*****
3 February, 2004 13:34
L20_BLUETOOTH.dat

```

Final Result

--- N Phase ---											
No.	Frequency	Reading	Qp	AV	Reading	Qp	AV	c.f	Result	Qp	AV
	[MHz]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]
1	0.150	43.7	0.0	0.0	1.8	45.5	0.0	1.8	51.4	39.3	63.0
2	0.215	50.3	38.2	1.1	51.4	39.3	63.0	1.1	51.4	39.3	63.0
3	0.327	40.5	31.5	0.7	41.2	32.2	59.5	0.7	41.2	32.2	59.5
4	0.435	39.0	30.2	0.4	39.4	30.6	57.2	0.4	39.4	30.6	57.2
5	1.113	37.3	22.5	0.2	37.5	22.7	56.0	0.2	37.5	22.7	56.0
6	12.830	36.4	28.7	0.5	36.9	29.2	60.0	0.5	36.9	29.2	60.0

--- L1 Phase ---											
No.	Frequency	Reading	Qp	AV	Reading	Qp	AV	c.f	Result	Qp	AV
	[MHz]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]
1	0.150	44.2	0.0	0.0	1.8	46.0	0.0	1.8	51.4	37.0	66.0
2	0.207	50.4	36.0	1.0	51.4	37.0	66.0	1.0	51.4	37.0	66.0
3	0.517	39.5	21.5	0.3	39.8	21.8	56.0	0.3	39.8	21.8	56.0
4	0.727	37.8	0.0	0.3	38.1	0.0	56.0	0.3	38.1	0.0	56.0
5	1.361	35.7	0.0	0.3	36.0	0.0	56.0	0.3	36.0	0.0	56.0
6	12.867	37.3	29.5	0.6	37.9	30.1	60.0	0.6	37.9	30.1	60.0

3.3 Receiver requirements

3.3.1 AC Conducted Emissions

Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its receiving function. Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

Measurement uncertainty: ± 2.2 dB

Measurement Data: Complies

- See next pages for actual measured spectrum plots.
- No emissions were detected at a level greater than 10dB below limit.

Minimum Standard: FCC Part 15.207(a)/EN 55022

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

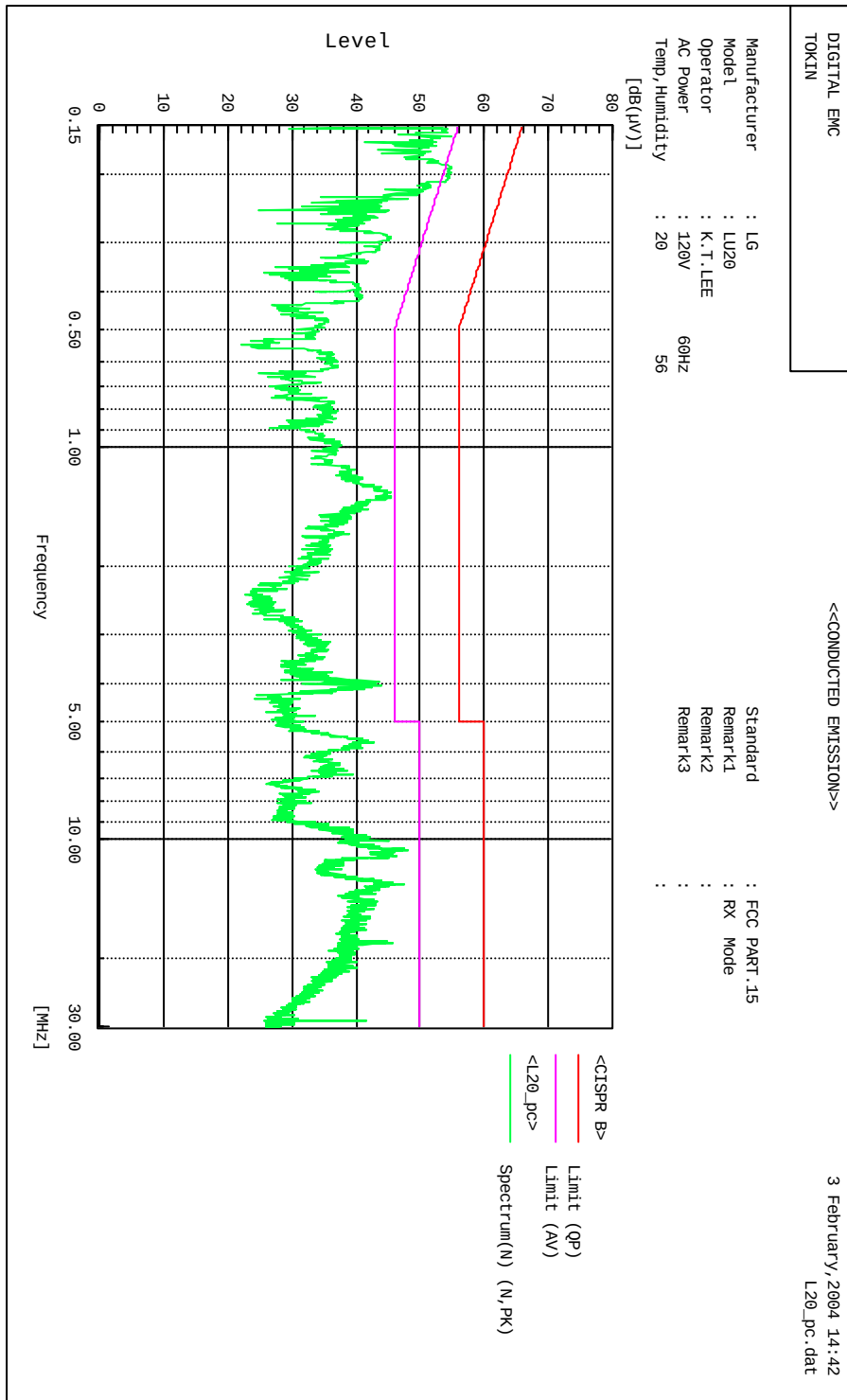
Measurement Setup

Same as the Chapter 3.2.9 (Figure 2)

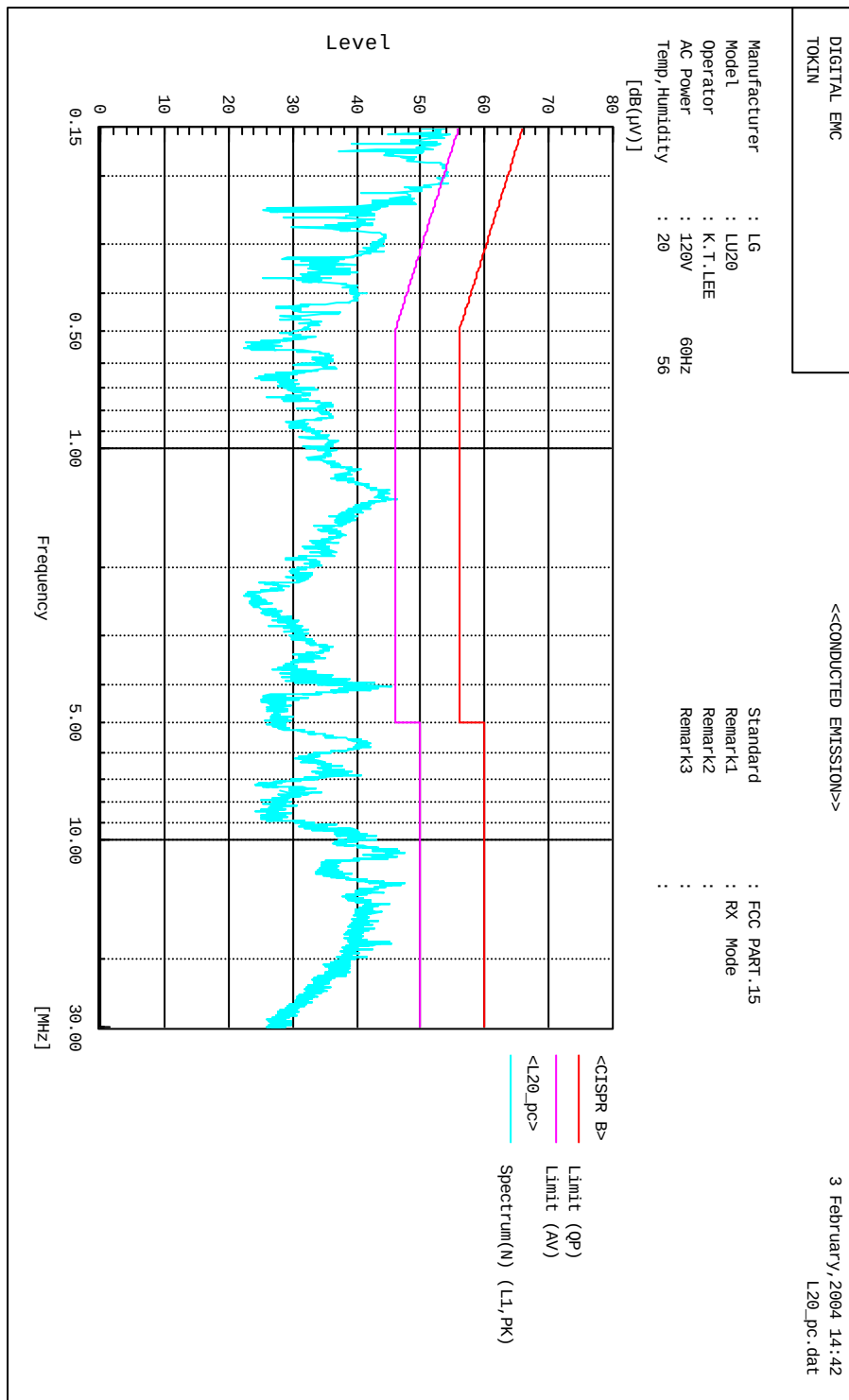
Measurement uncertainty

TEST EQUIPMENT USED: 42, 43, 44, 45, 46, 48

AC Conducted Emissions -Neutral Graph



AC Conducted Emissions - Line Graph



AC Conducted Emissions -DATA

```

*****
<<CONDUCTED EMISSION>>
*****
Standard      : FCC PART.15
Manufacturer   : LG
Model          : LU20
Operator       : K.T.LEE
AC Power       : 120V      60Hz
Temp, Humidity : 20
Remark1        : RX Mode
Remark2        :
Remark3        :
*****
3 February, 2004 14:42
L20_pc.dat

```

Final Result

--- N Phase ---

No.	Frequency	Reading QP	Reading AV	c.f	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV	Remark
1	[MHz] 0.150	[dB(μV)] 44.3	[dB(μV)] 0.0	[dB] 1.8	[dB(μV)] 46.1	[dB(μV)] 0.0	[dB(μV)] 66.0	[dB(μV)] 56.0	[dB] 19.9	[dB] 0.0	
2	0.190	50.0	30.2	1.2	51.2	31.4	64.1	54.1	12.9	22.7	
3	13.027	38.3	30.3	0.5	38.8	30.8	60.0	50.0	21.2	19.2	
4	1.321	40.5	30.6	0.2	40.7	30.8	56.0	46.0	15.3	15.2	
5	3.953	36.4	0.0	0.6	37.0	0.0	56.0	46.0	19.0	0.0	
6	10.769	39.0	29.3	0.6	39.6	29.9	60.0	50.0	20.4	20.1	

--- L1 Phase ---

No.	Frequency	Reading QP	Reading AV	c.f	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV	Remark
1	[MHz] 0.150	[dB(μV)] 44.5	[dB(μV)] 0.0	[dB] 1.8	[dB(μV)] 46.3	[dB(μV)] 0.0	[dB(μV)] 66.0	[dB(μV)] 56.0	[dB] 19.7	[dB] 0.0	
2	0.203	49.6	30.9	1.0	50.6	31.9	63.5	53.5	12.9	21.6	
3	1.329	40.4	30.3	0.3	40.7	30.6	56.0	46.0	15.3	15.4	
4	3.971	35.4	16.6	0.6	36.0	17.2	56.0	46.0	20.0	28.8	
5	10.777	40.0	29.6	0.7	40.7	30.3	60.0	50.0	19.3	19.7	
6	12.869	38.5	30.8	0.6	39.1	31.4	60.0	50.0	20.9	18.6	

3.3.2 Out of Band Emissions

Procedure:

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in a OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

The spectrum analyzer is set to:

Frequency Range = 30 MHz ~ 10th harmonic.

RBW = 120 kHz (30MHz ~ 1 GHz)

= 1 MHz (1 GHz ~ 10th harmonic)

Trace = max hold

Sweep = auto

VBW ≥ RBW

Detector function = peak

Measurement Data: Complies

- Refer to the Next page

Minimum Standard: FCC Part 15.209(a)

Frequency (MHz)	Limit (uV/m) @ 3m
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

TEST EQUIPMENT USED: 02, 22, 30, 31, 33, 34, 39, 40, 41, 47, 49

Measurement Data:

Frequency	P	Reading	C.F	Result	Limit	Margin
95.481	V	25.3	10.0	35.3	43.5	8.2
95.481	H	24.4	10.0	34.4	43.5	9.1
119.752	H	23.4	11.8	35.2	43.5	8.3
156.100	H	21.2	11.5	32.7	43.5	10.8
165.800	V	22.9	10.6	33.5	43.5	10.0
214.300	H	24.8	9.6	34.4	43.5	9.1
468.925	V	16.1	19.9	36.0	46.0	10.0
468.925	H	15.2	19.9	35.1	46.0	10.9
500.450	H	16.9	20.7	37.6	46.0	8.4
548.950	V	11.7	23.6	35.3	46.0	10.7
776.900	H	14.8	25.5	40.3	46.0	5.7
801.150	H	13.1	27.4	40.5	46.0	5.5
832.675	V	13.4	28.8	42.2	46.0	3.8
Measurement uncertainty			+3.5 / -4.3			

Remark: No other emissions were detected at a level greater than 10dB below limit.

APPENDIX

TEST EQUIPMENT USED FOR TESTS

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment.

	Type	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	S/N
01	Spectrum Analyzer	Agilent	E4404B	22/11/04	30601-01-6025569
02	Spectrum Analyzer	H.P	8563E	10/02/04	3551A04634
03	Power Meter	H.P	EPM-442A	15/03/04	GB37170413
04	Power Sensor	H.P	8481A	19/04/04	3318A96332
05	Frequency Counter	H.P	5342A	26/09/04	2119A04450
06	Multifunction Synthesizer	H.P	8904A	15/10/04	3633A08404
07	Signal Generator	H.P	8673D	26/09/04	2844A00753
08	Signal Generator	H.P	E4421A	29/04/04	US37230529
09	Signal Generator	H.P	8657A	05/06/04	3430U02049
10	Audio Analyzer	H.P	8903B	18/04/04	3011A0944B
11	Modulation Analyzer	H.P	8901B	21/04/04	3028A03029
12	Sensor Module	H.P	11722A	21/04/04	3111A04665
13	Oscilloscope	LeCroy	9314A	27/08/04	93144390
14	CDMA Mobile Station Test Set	H.P	8924C	09/09/04	US35360688
15	Power Splitter	WEINSCHEL	1593	23/04/04	332
16	BAND Reject Filter	Wainwright	WRCG824	08/19/04	SN1
17	BAND Reject Filter	Wainwright	WRCG1750	08/19/04	SN2
18	AC Power supply	DAEKWANG	5KVA	03/04/04	N/A
19	DC Power Supply	H.P	6622A	24/03/04	465487
20	Attenuator (30dB)	H.P	8498A	23/05/04	50101
21	Attenuator (10dB)	WEINSCHEL	23-10-34	15/10/04	BP4387
22	HORN ANT	EMCO	3115	22/02/04	6419
23	HORN ANT	EMCO	3115	01/10/04	21097
24	HORN ANT	A.H.Systems	SAS-574	27/11/04	154
25	HORN ANT	A.H.Systems	SAS-574	14/11/04	155
26	Dipole Antenna	Schwarzbeck	VHA9103	04/10/04	2116

	Type	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	S/N
27	Dipole Antenna	Schwarzbeck	VHA9103	04/10/04	2117
28	Dipole Antenna	Schwarzbeck	UHA9105	04/10/04	2261
29	Dipole Antenna	Schwarzbeck	UHA9105	04/10/04	2262
30	RFI/FIELD Intensity Meter	Kyorits	KNM-504D	25/07/04	SN-161-4
31	Frequency Converter	Kyorits	KCV-604C	05/07/04	4-230-3
32	TEMP & HUMIDITY Chamber	JISCO	J-RHC2	14/09/04	021031
33	Log Periodic Antenna	Schwarzbeck	UHALP9108A1	23/10/04	1098
34	Biconical Antenna	Schwarzbeck	VHA9103	23/10/04	VHA91031946
35	Digital Multimeter	H.P	34401A	15/10/04	3146A13475
36	Attenuator (10dB)	WEINSCHEL	23-10-34	15/10/04	BP4386
37	High-Pass Filter	ANRITSU	MP526	12/05/04	M27756
38	Attenuator (3dB)	Agilent	8491B	15/10/04	58177
39	Amplifier (25dB)	Agilent	8447D	24/06/04	2944A10144
40	Position Controller	TOKIN	5901T	N/A	14173
41	Driver	TOKIN	5902T2	N/A	14174
42	Spectrum Analyzer	H.P	8591E	23/05/04	3649A05889
43	RFI/FIELD Intensity Meter	Kyorits	KNW-2402	25/07/04	4N-170-3
44	LISN	Kyorits	KNW-407	29/08/04	8-317-8
45	LISN	Kyorits	KNW-242	22/08/04	8-654-15
46	CVCF	NF Electronic	4400	N/A	344536 4420064
47	Software	ToYo EMI	EP5/RE	N/A	Ver 2.0.800
48	Software	ToYo EMI	EP5/CE	N/A	Ver 2.0.801
49	Software	AUDIX	e3	N/A	Ver 3.0
50	Software	Agilent	Benchlink	N/A	A.01.09 021211
51	Receiver	ROHDE&SCHWARZ	ESIB26	18/11/04	100191