

## ANNEX 1

## “MEASUREMENT DIAGRAMS“

TO

TEST REPORT  
No.: 6-0111-11-1-3A

for

ROBERT BOSCH CAR MULTIMEDIA GMBH

BLUETOOTH CAR NAVIGATION UNIT NISSAN LCN2

FCC-ID: YBN-LCN20  
IC: 9595A-LCN20

Laboratory Accreditation and Listings						
 Deutsche Akkreditierungsstelle D-PL-12047-01-01	 Reg. No.: 736496 MRA US-EU 0003	 Reg. No.: 3462D-1 Reg. No.: 3462D-2 Reg. No.: 3462D-3	 Voluntary Controls for Electromagnetic Emissions Reg. No.: R-2665, R-2666 C-2914, T-1967, G-301			
	 LAB CODE 20011130-00					
accredited according to DIN EN ISO/IEC 17025						
<b>CETECOM GmbH</b> Laboratory Radio Communications & Electromagnetic Compatibility Im Teelbruch 116 • 45219 Essen • Germany Registered in Essen, Germany, Reg. No.: HRB Essen 8984 Tel.: + 49 (0) 20 54 / 95 19-954 • Fax: + 49 (0) 20 54 / 95 19-964 E-mail: info@cetecom.com • Internet: www.cetecom.com						

Version of template: 11.08

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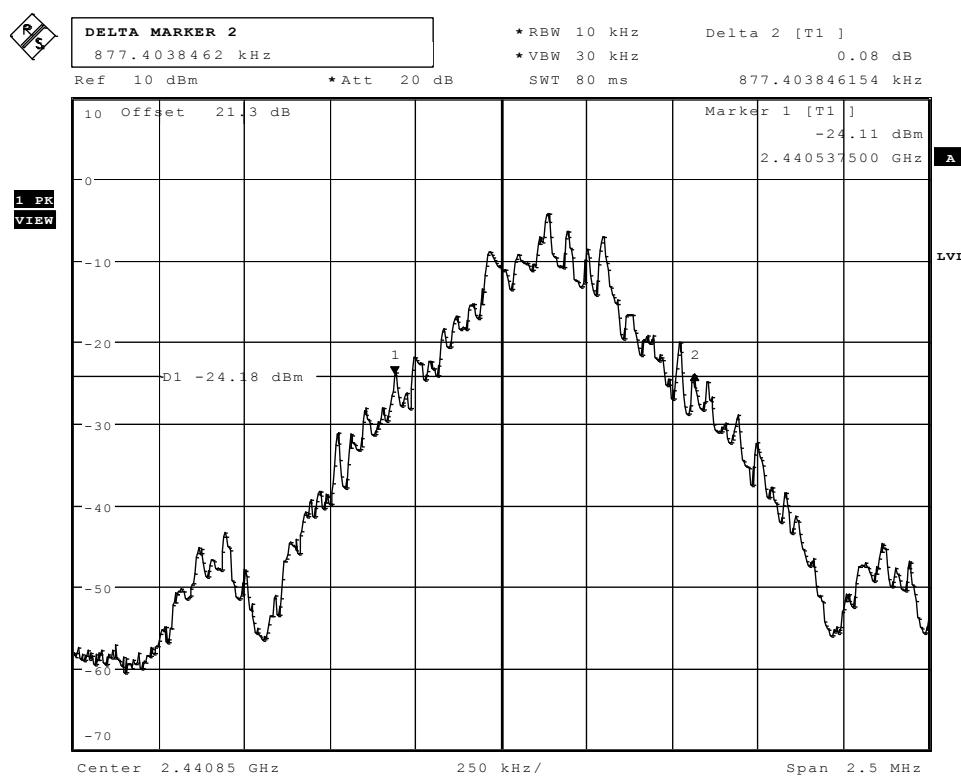
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## 1. Measurement diagrams

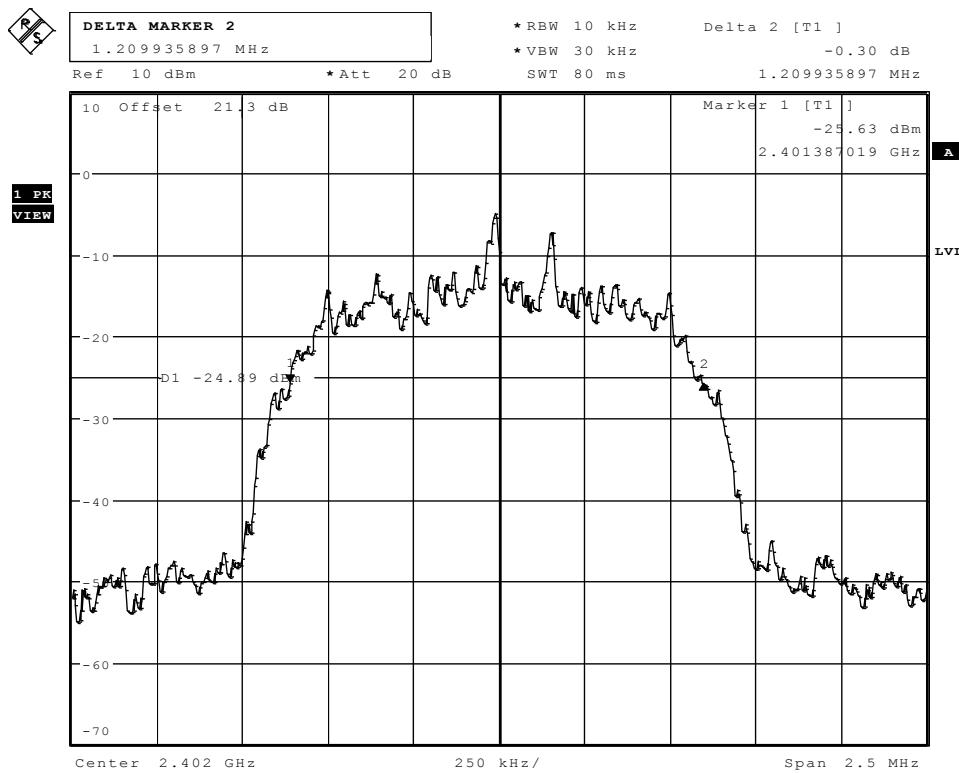
### 1.1. 20dB bandwidth

Following table show measured values for the 20dB bandwidth for different modulation types and channels. Minimum and Maximum data rates were tested for each mode.

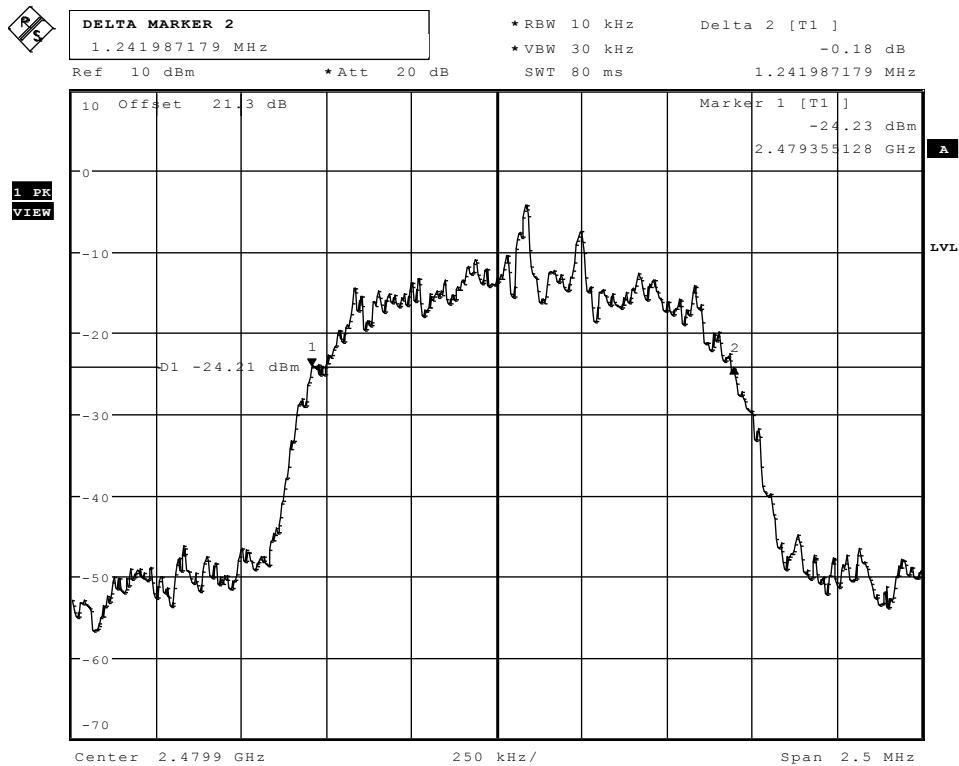
Modulation/ Packet type	20 dB Bandwidth [kHz]			Max Value
	Nominal Ch 0 =2402 MHz	Nominal Ch 39 = 2441MHz	Nominal Ch 78 = 2480MHz	
DH1	825,3205	825,3205	825,3205	
DH3	873,3974	873,3974	<b>877,4038</b>	877,4038
DH5	873,3974	<b>877,4038</b>	<b>877,4038</b>	
2DH1	1161,8589	1165,8653	1161,8589	
2DH3	<b>1209,9358</b>	1205,9294	1201,9230	1209,9358
2DH5	1201,9230	1201,9230	1197,9166	
3DH1	1197,9166	1201,9230	1197,9166	
3DH3	1237,9807	1237,9807	1229,9679	1241,9871
3DH5	1229,9679	1233,9743	<b>1241,9871</b>	



Date: 9.DEC.2011 13:42:13  
**DH5 Packet type, Channel 39/78**



Date: 9.DEC.2011 13:09:25

**2DH3 Packet type, Channel 0**

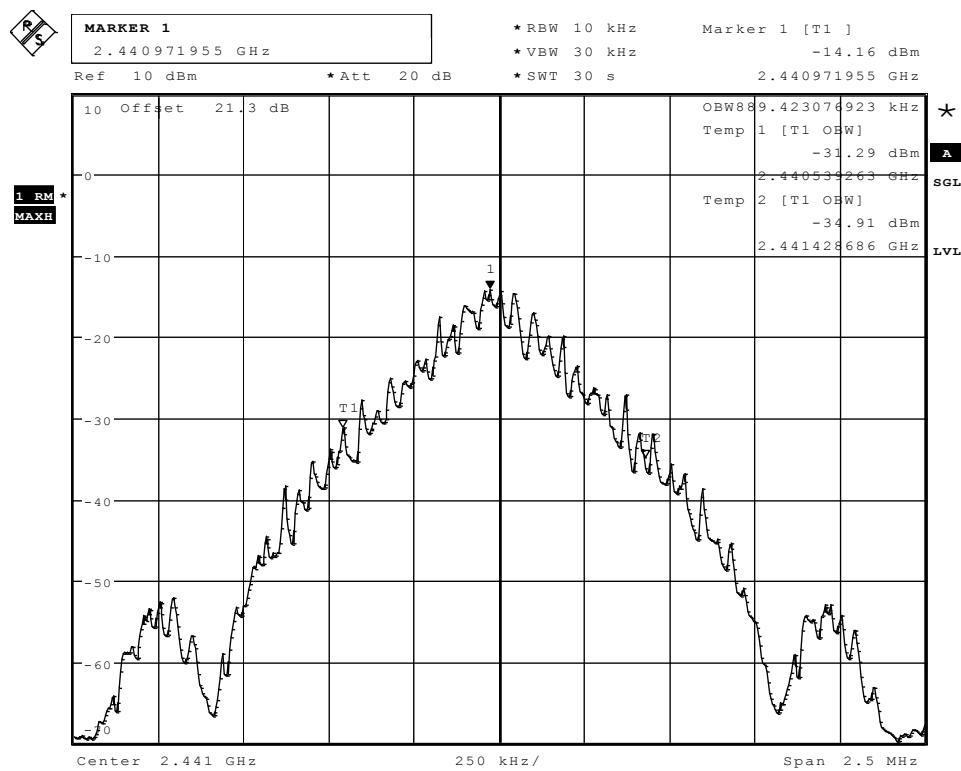
Date: 9.DEC.2011 14:04:08

**3DH5 Packet type, Channel 78**

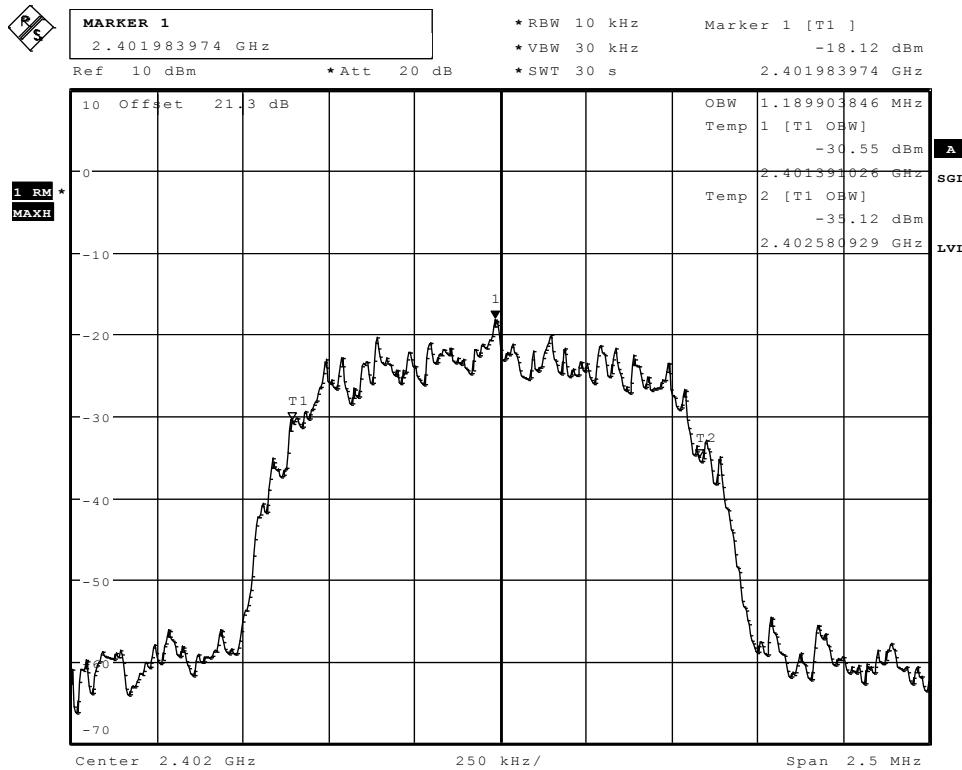
## 1.2. 99% Occupied bandwidth

Value was measured for each modulation were also worst-case 6dB bandwidth.

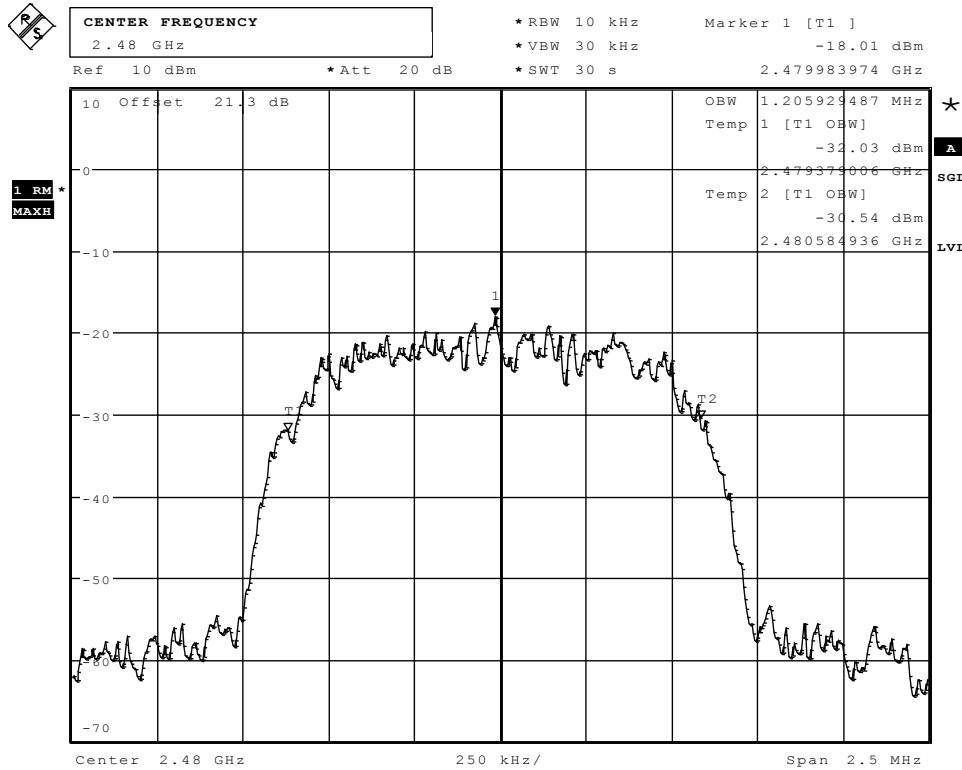
Modulation/ packet type	99% bandwidth [kHz]			Maximum value
	Nominal Ch 0 =2402 MHz	Nominal Ch 39 =2441MHz	Nominal Ch 78 =2480MHz	
DH				
DH3				
DH5		889,4230	889,4230	
2DH				
2DH3	1189,9038			
2DH5				1205,93
3DH				
3DH2				
3DH5			1205,9294	



Date: 9.DEC.2011 14:13:19  
**DH5 Packet type, Channel 39**



Date: 9.DEC.2011 14:10:22

**2DH3 Packet type, Channel 0**

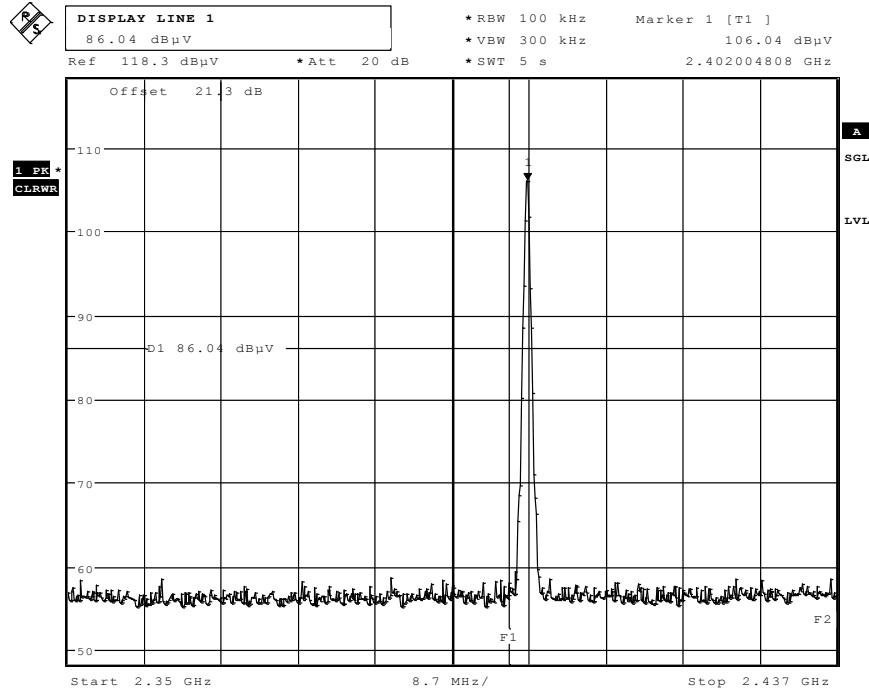
Date: 9.DEC.2011 14:07:25

**3DH5 Packet type, channel 78**

### 1.3. 20dBc conducted emissions

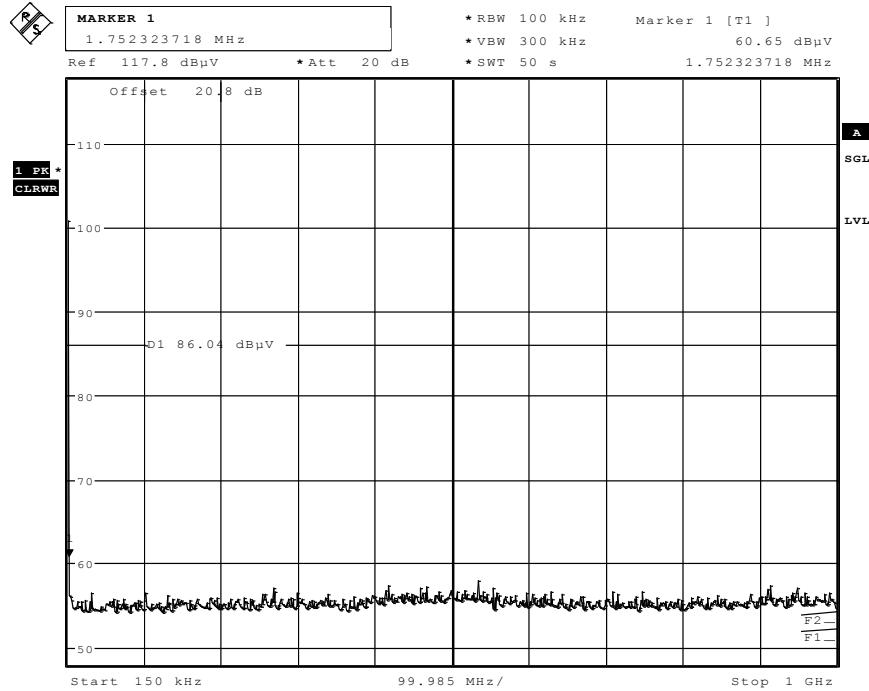
Tests have been performed at maximum measured power level of each modulation type. Pls. compare chapter conducted power for each worst-case. In addition the lowest and highest channel was checked against 20dBc compliance at the relevant band-edge.

#### 1.3.1. DH1 modulation



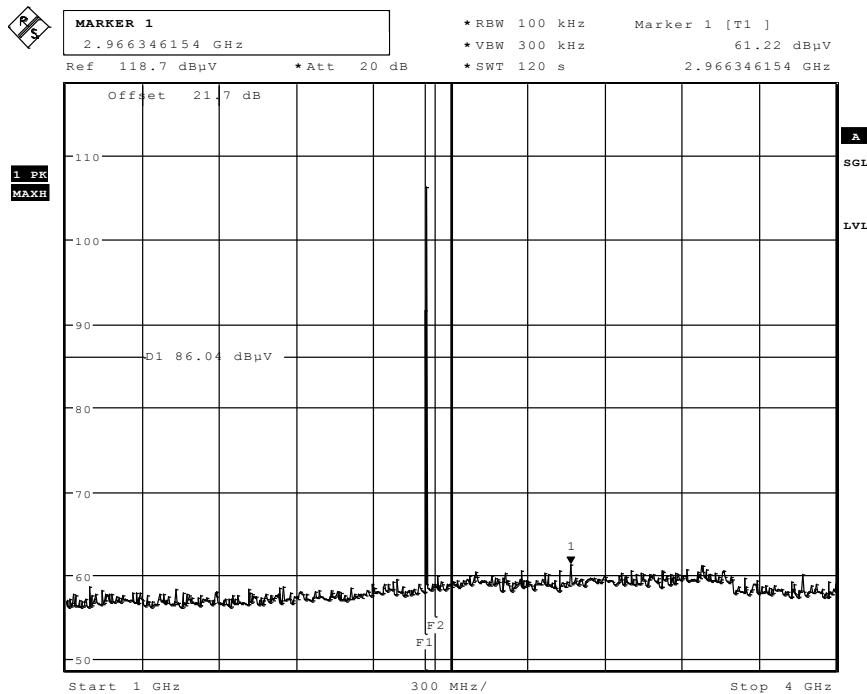
Date: 12.DEC.2011 13:24:32

#### In-BAND reference value for channel 0



Date: 12.DEC.2011 13:28:23

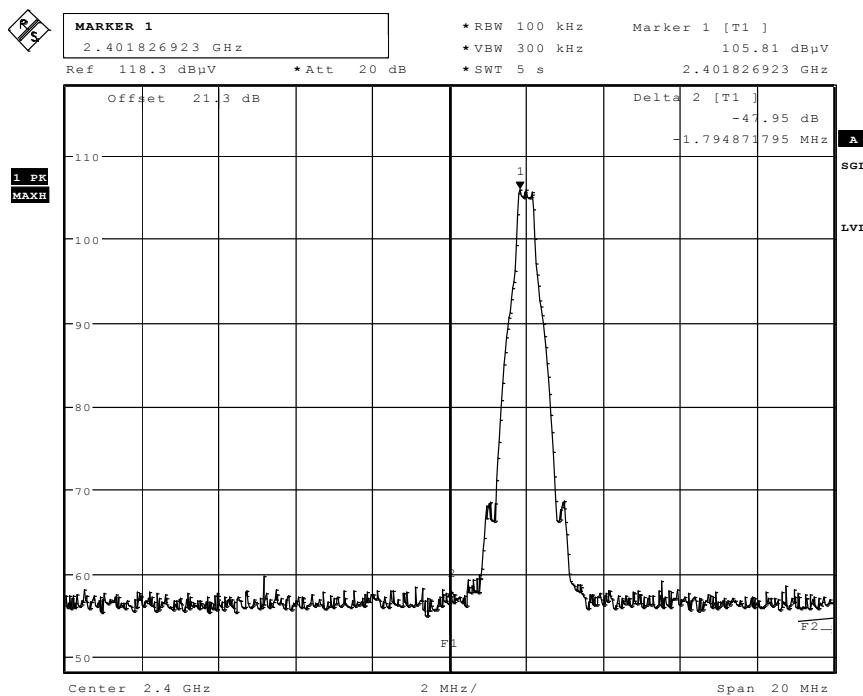
#### Sweep 1: Channel 0 (150kHz to 1GHz)



Date: 12.DEC.2011 13:32:52

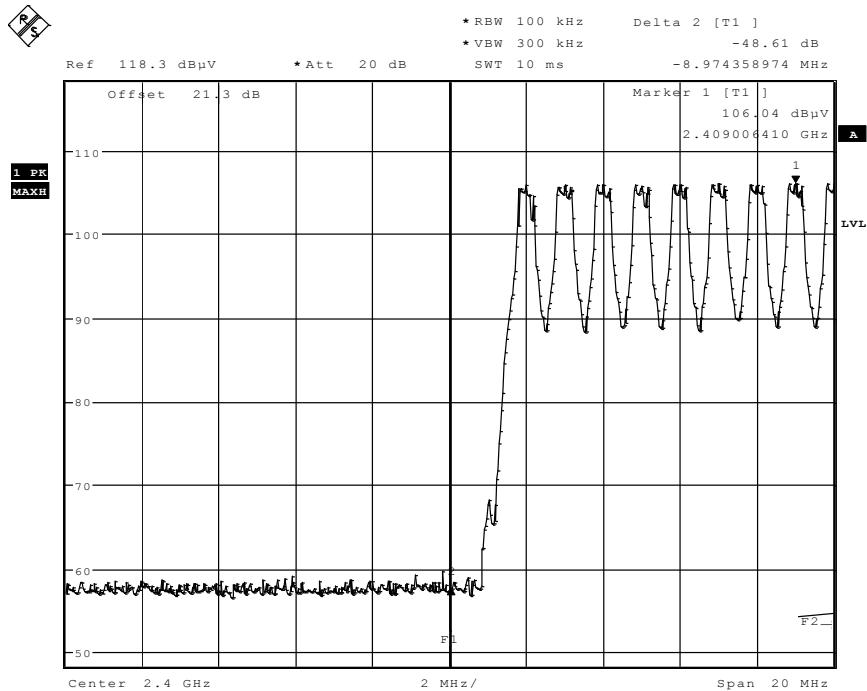
**Sweep 2: Channel 0 (1GHz to 4GHz)**

The Frequency range 4 to 18GHz: radiated measurement

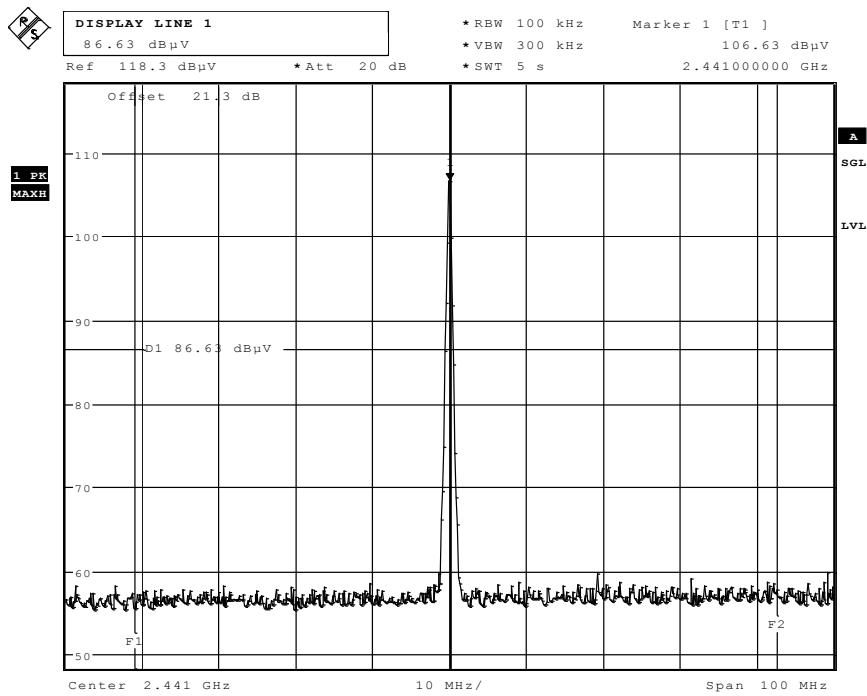
**Sweep 3: Channel 0 (4GHz to 18GHz) – not performed, 3DH1 modulation performed instead**

Date: 12.DEC.2011 14:10:49

**Band-Edge left (no hopping)**

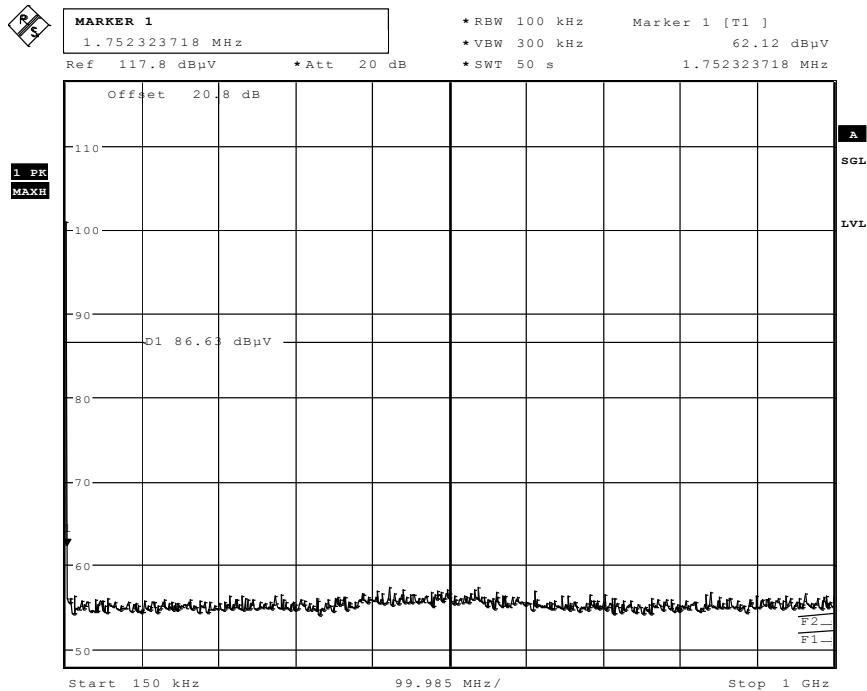


Date: 12.DEC.2011 14:08:48

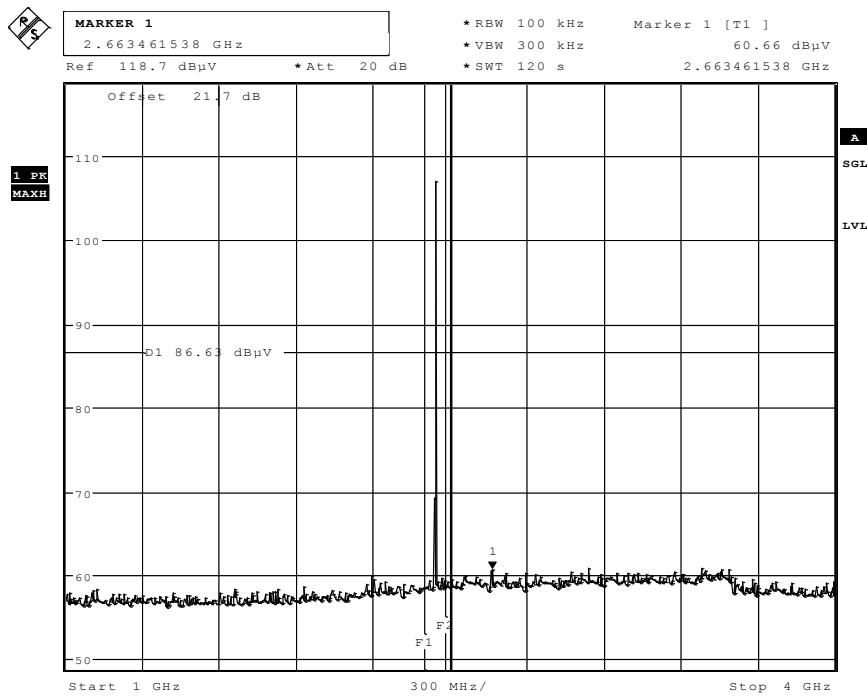
**Band-Edge left (hopping mode)**

Date: 12.DEC.2011 13:35:44

**In-BAND reference value for channel 39**



Date: 12.DEC.2011 13:38:04

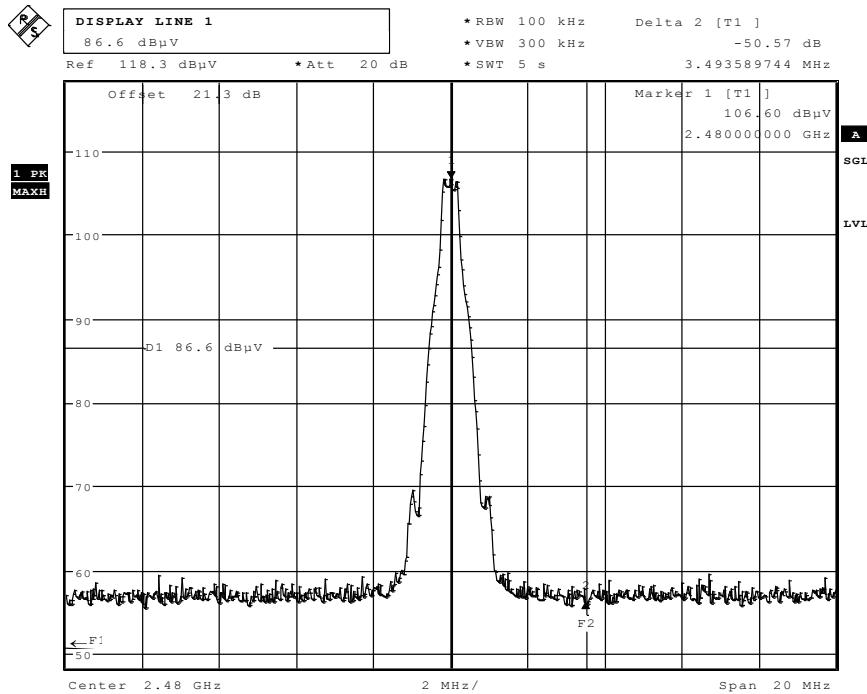
**Sweep 1: Channel 39 (150kHz to 1GHz)**

Date: 12.DEC.2011 13:41:28

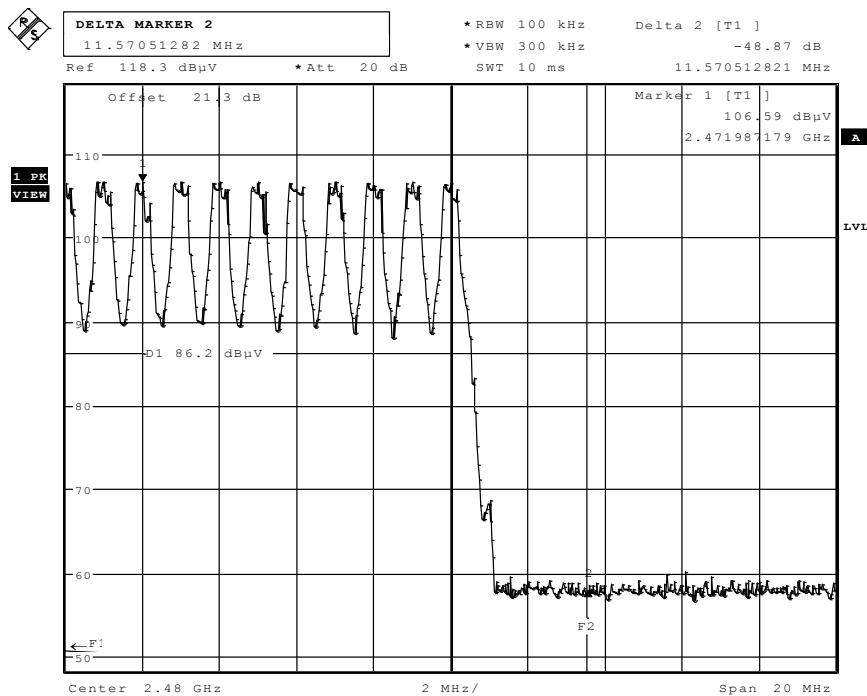
**Sweep 2: Channel 39 (1GHz to 4GHz)**

The Frequency range 4 to 18GHz: radiated measurement

**Sweep 3: Channel 39 (4GHz to 18GHz) – not performed, 3DH1 modulation performed instead**

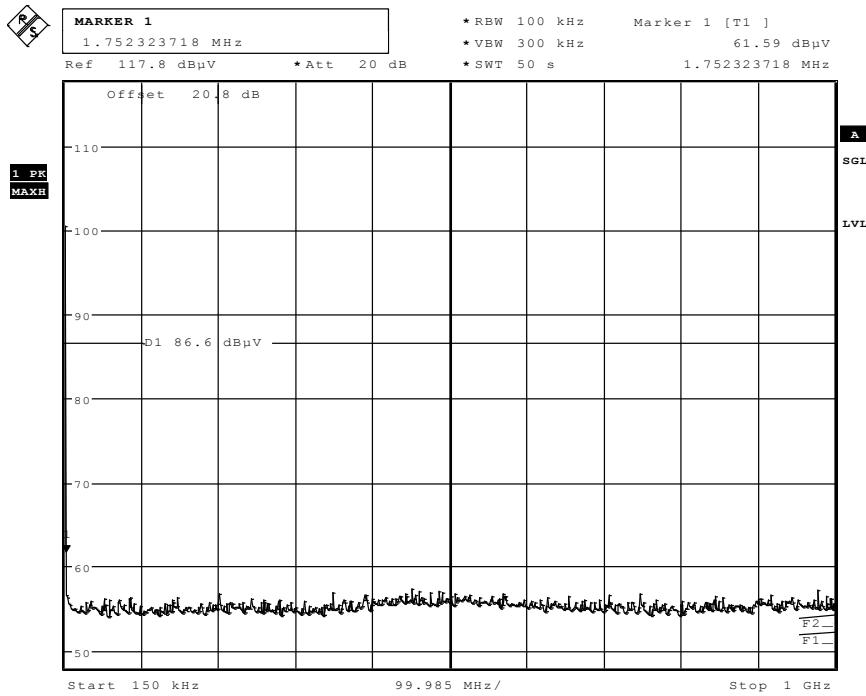


Date: 12.DEC.2011 13:44:46

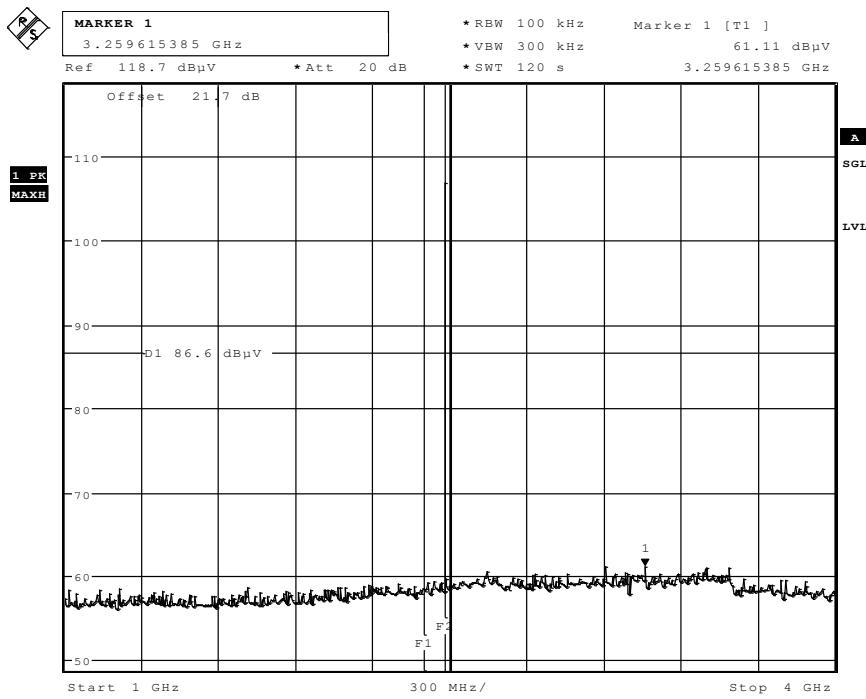
**In-BAND reference value for channel 78/Band-Edge (no hopping mode)**

Date: 12.DEC.2011 13:57:49

**Band-Edge right (hopping mode)**



Date: 12.DEC.2011 13:47:41

**Sweep 1: Channel 78 (150kHz to 1GHz)**

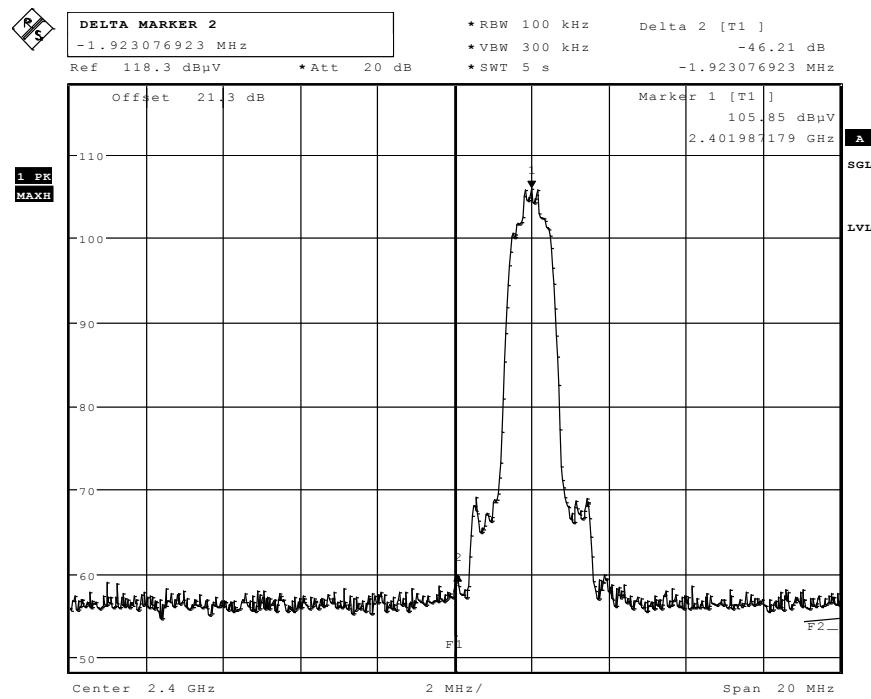
Date: 12.DEC.2011 13:51:43

**Sweep 2: Channel 78 (1GHz to 4GHz)**

The Frequency range 4 to 18GHz: radiated measurement

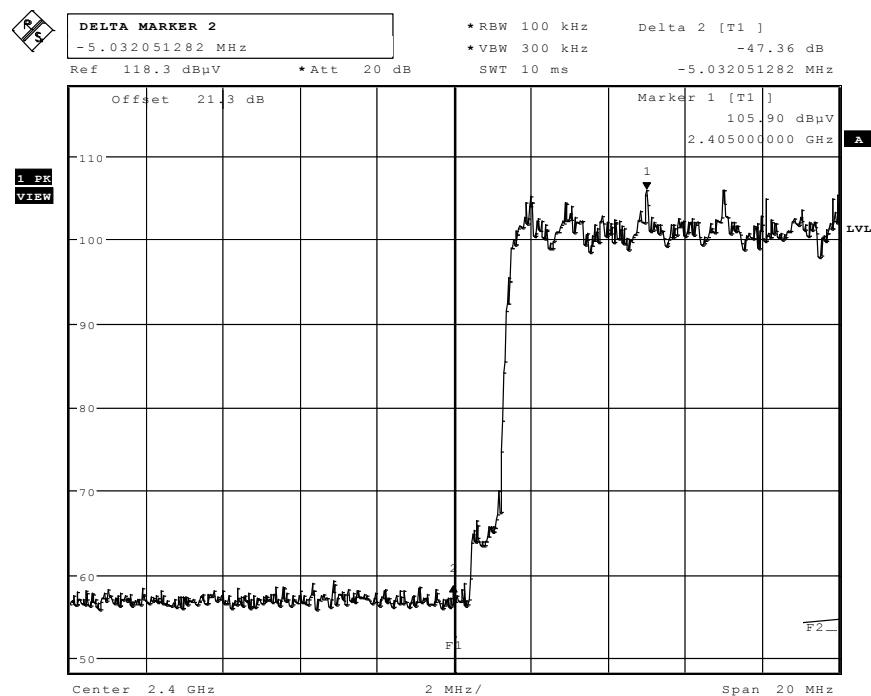
**Sweep 3: Channel 78 (4GHz to 18GHz) – not performed, 3DH1 modulation performed instead**

### 1.3.2. 2DH5 modulation



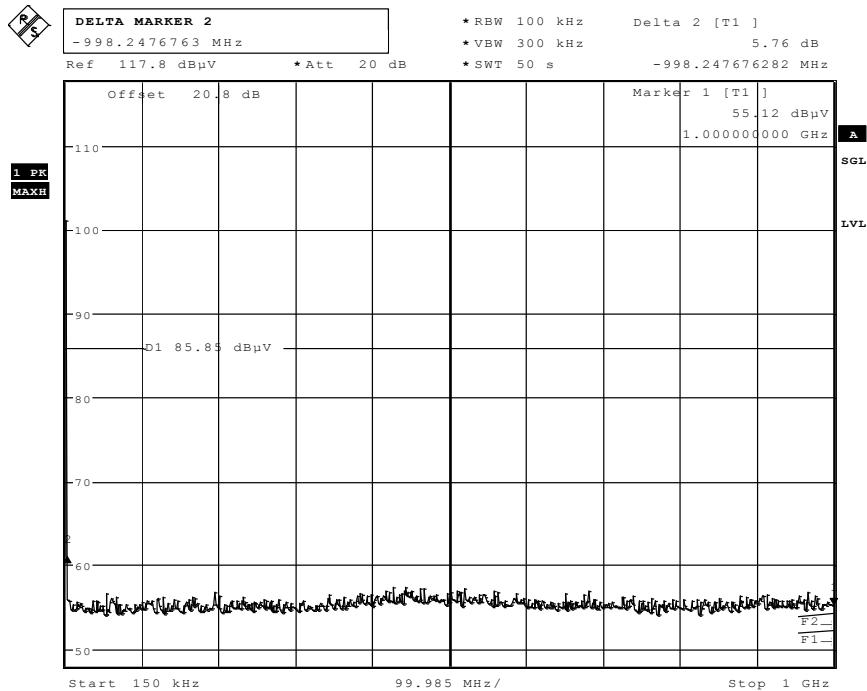
Date: 12.DEC.2011 14:14:00

### In-BAND reference value for channel 0/ Band-Edge (no hopping mode)

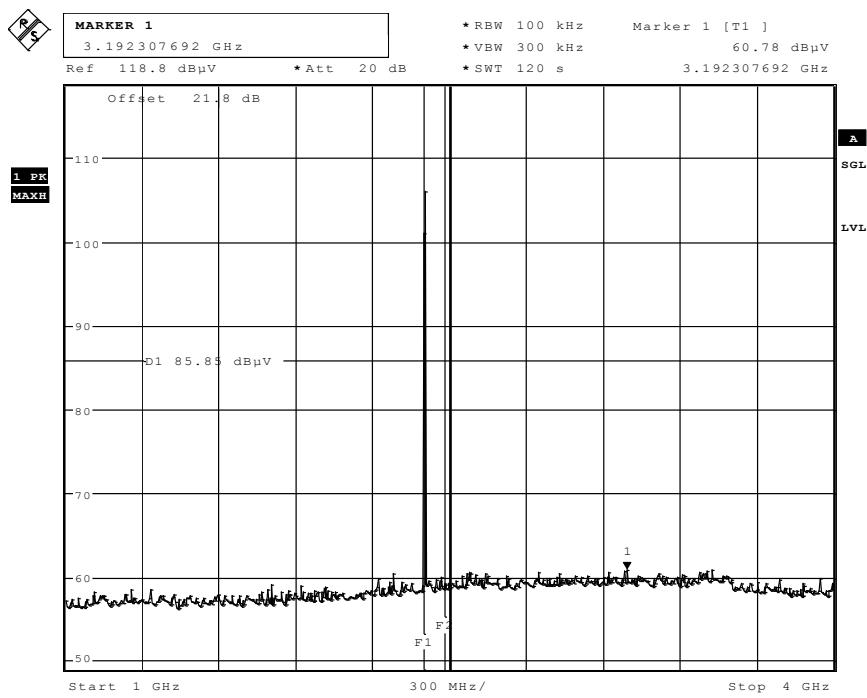


Date: 12.DEC.2011 14:26:02

### Band-Edge left (hopping mode)



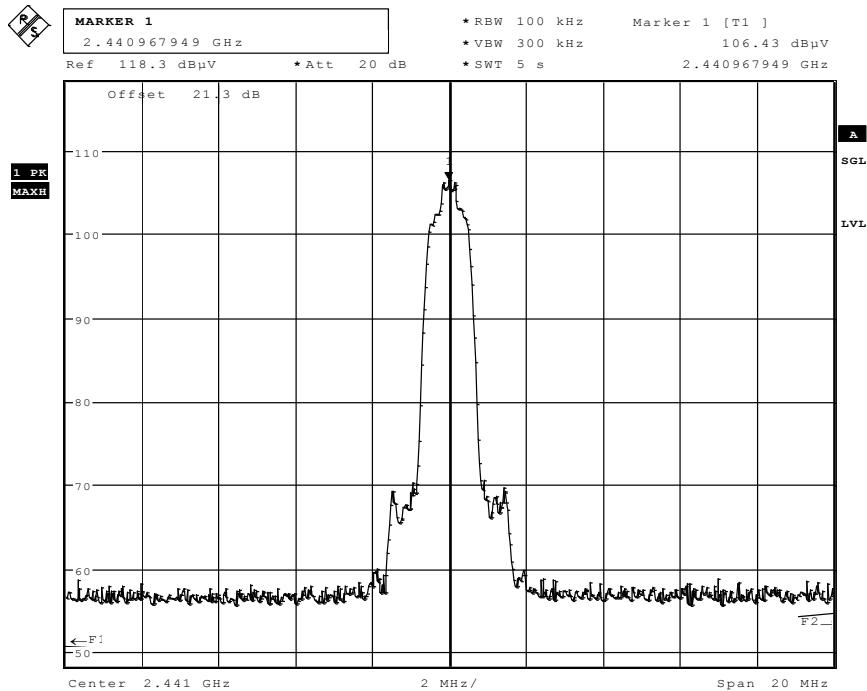
Date: 12.DEC.2011 14:19:07  
**Sweep 1: Channel 0 (150kHz to 1GHz)**



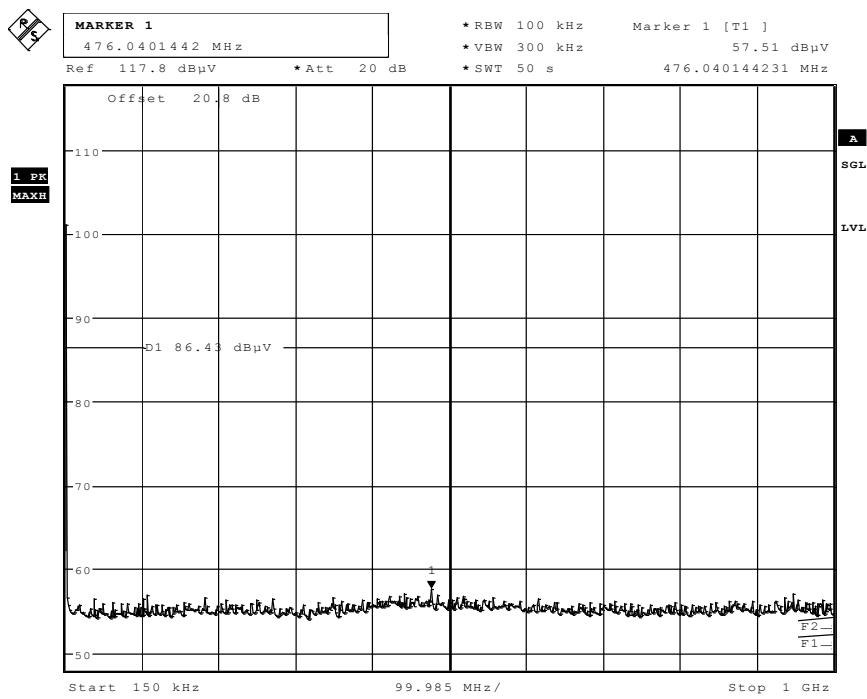
Date: 12.DEC.2011 14:22:29  
**Sweep 2: Channel 0 (1GHz to 4GHz)**

The Frequency range 4 to 18GHz: radiated measurement

**Sweep 3: Channel 0 (4GHz to 18GHz) – not performed, 3DH1 modulation performed instead**

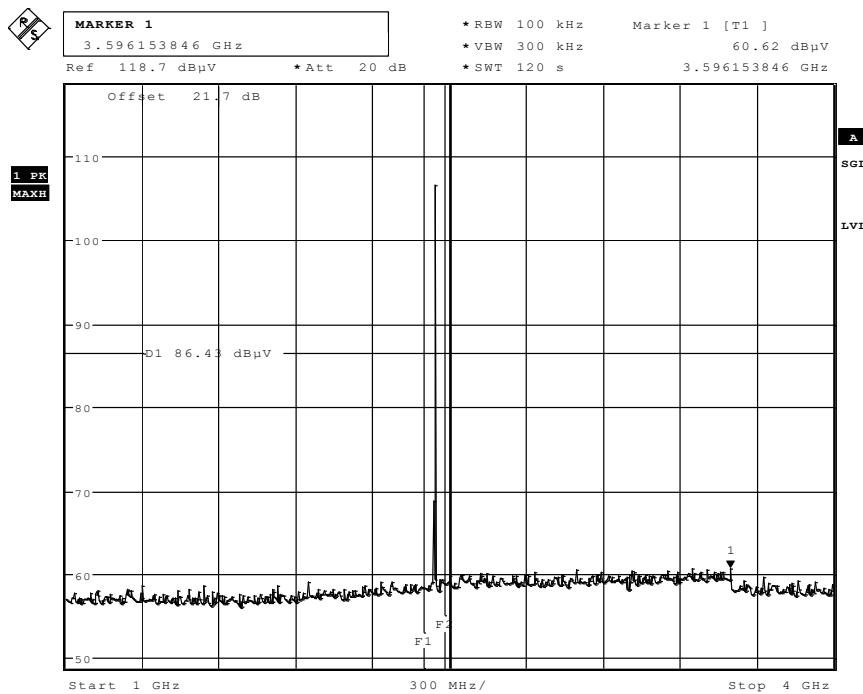


Date: 12.DEC.2011 14:45:27

**In-Band reference value for channel 39**

Date: 12.DEC.2011 14:47:48

**Sweep 1: Channel 39 (150kHz to 1GHz)**

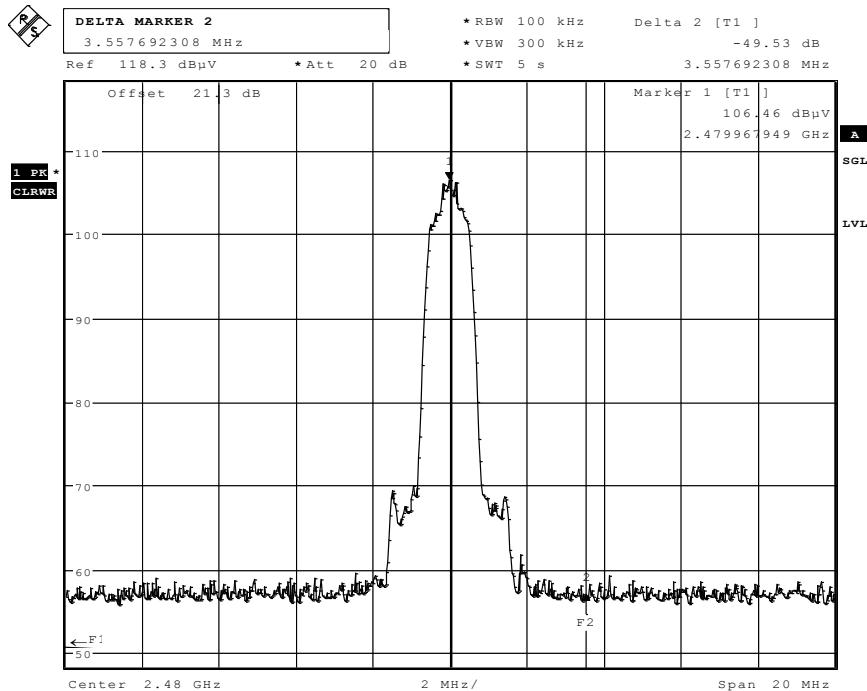


Date: 12.DEC.2011 14:51:10

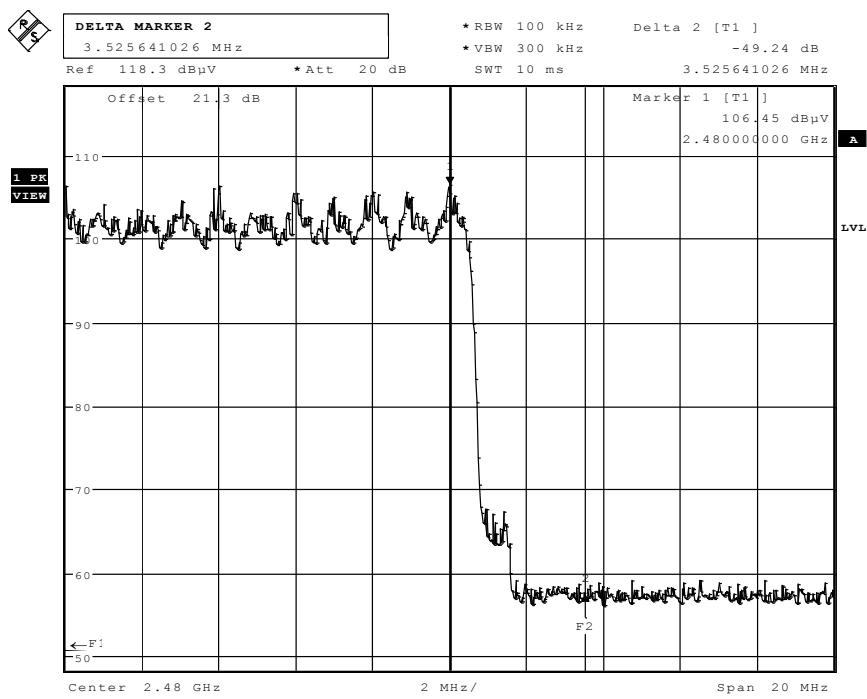
**Sweep 2: Channel 39 (1GHz to 4GHz)**

The Frequency range 4 to 18GHz: radiated measurement

**Sweep 3: Channel 39 (4GHz to 18GHz) – not performed, 3DH1 modulation performed instead**

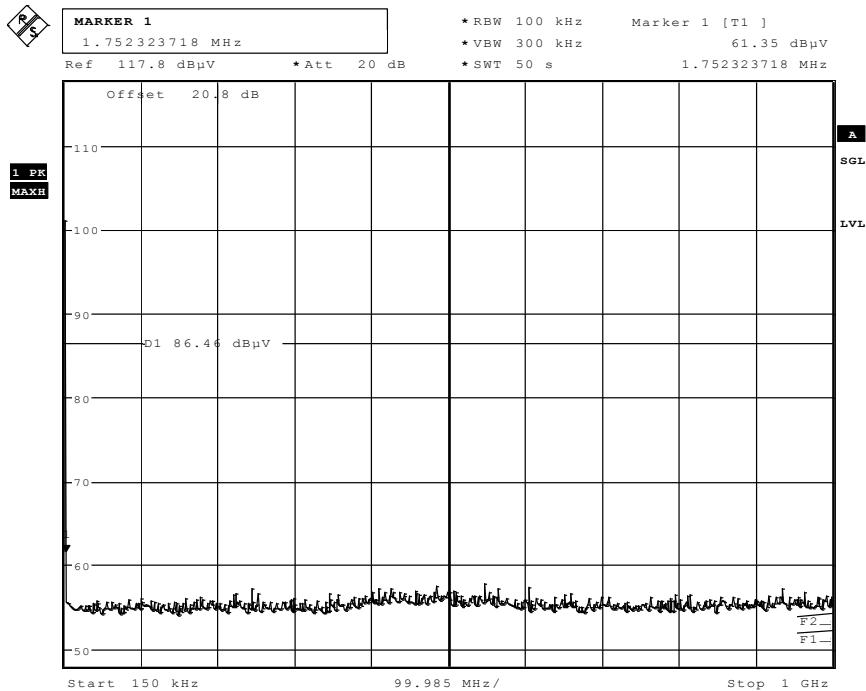


Date: 12.DEC.2011 14:35:05

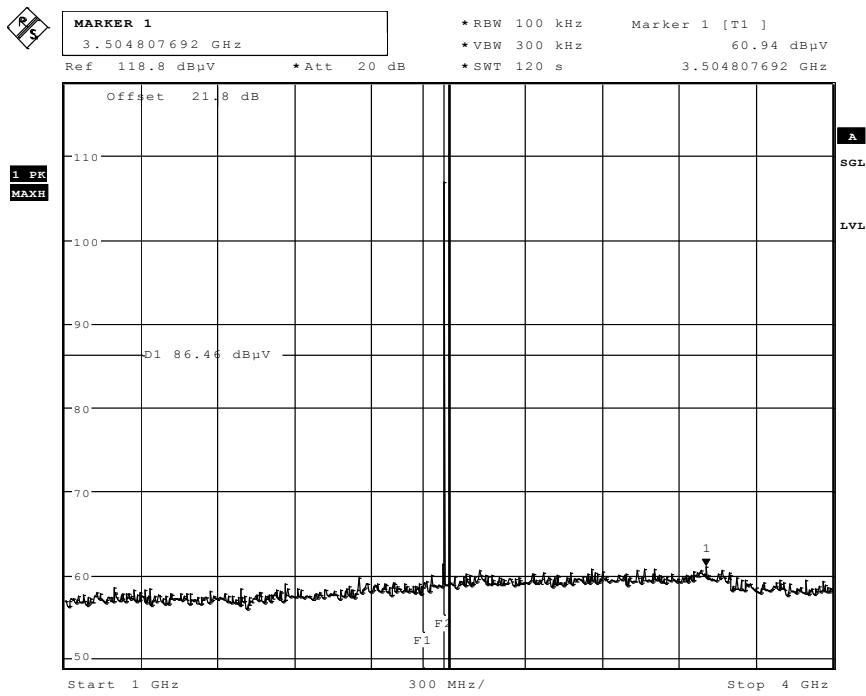
**In-BAND reference value for channel 78/ Band-Edge (no hopping mode)**

Date: 12.DEC.2011 14:37:22

**Band-Edge right (hopping mode)**



Date: 12.DEC.2011 14:40:50

**Sweep 1: Channel 78 (150kHz to 1GHz)**

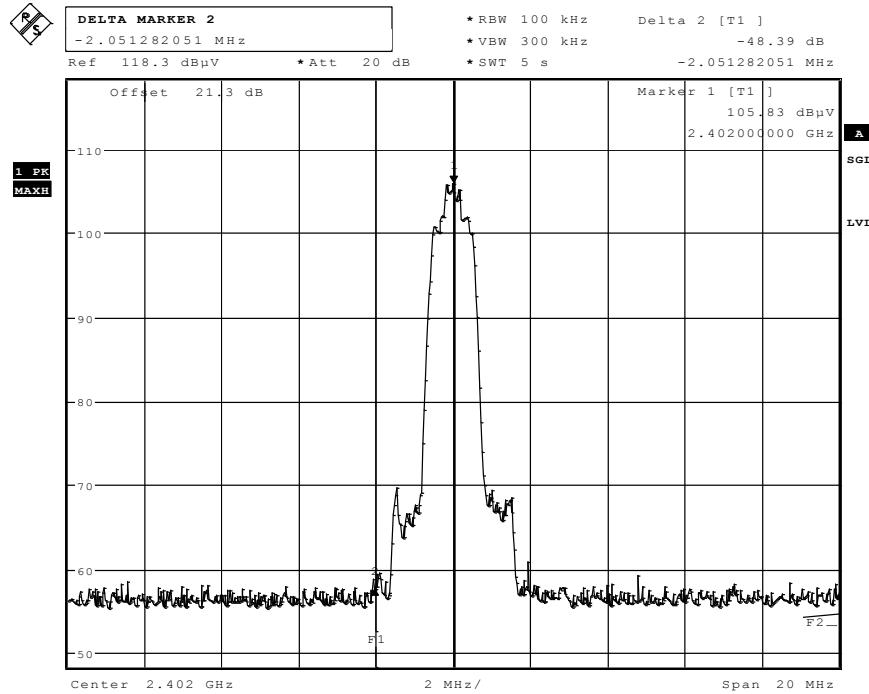
Date: 12.DEC.2011 14:44:15

**Sweep 2: Channel 78 (1GHz to 4GHz)**

The Frequency range 4 to 18GHz: radiated measurement

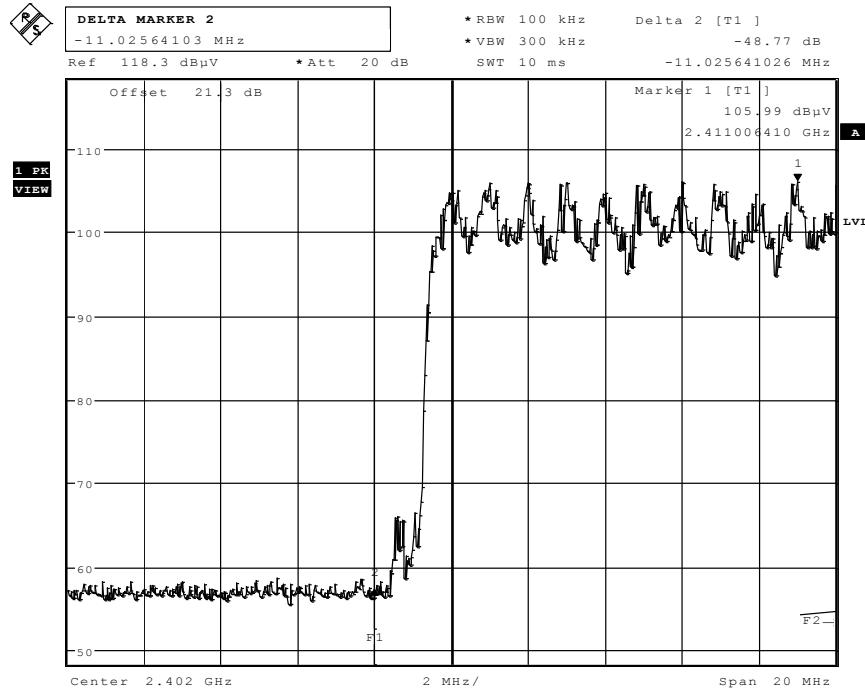
**Sweep 3: Channel 78 (4GHz to 18GHz) – not performed, 3DH1 modulation performed instead**

### 1.3.3. 3DH1 modulation



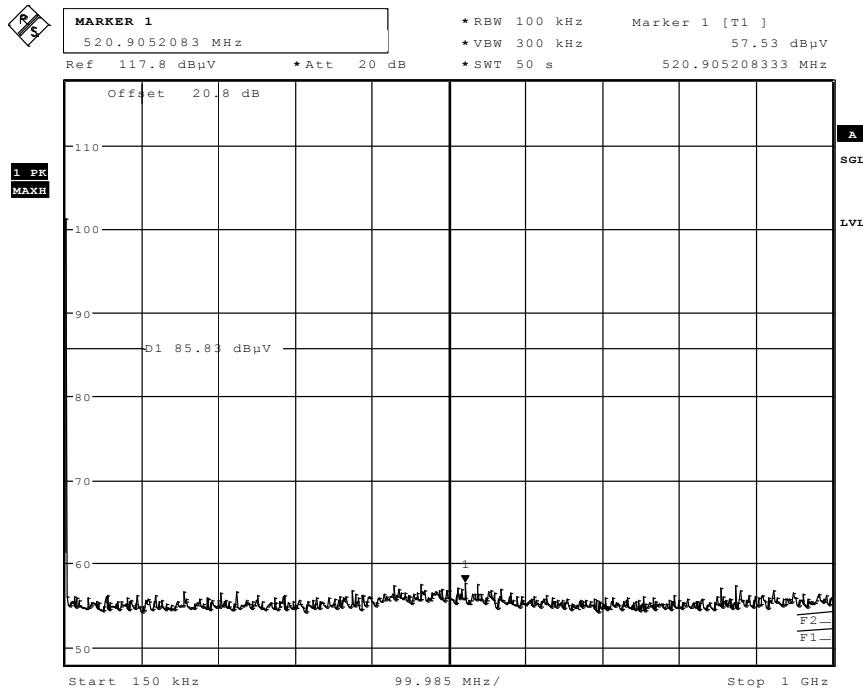
Date: 12.DEC.2011 15:26:08

### In-BAND reference value for channel 0/ Band-Edge (no hopping mode)

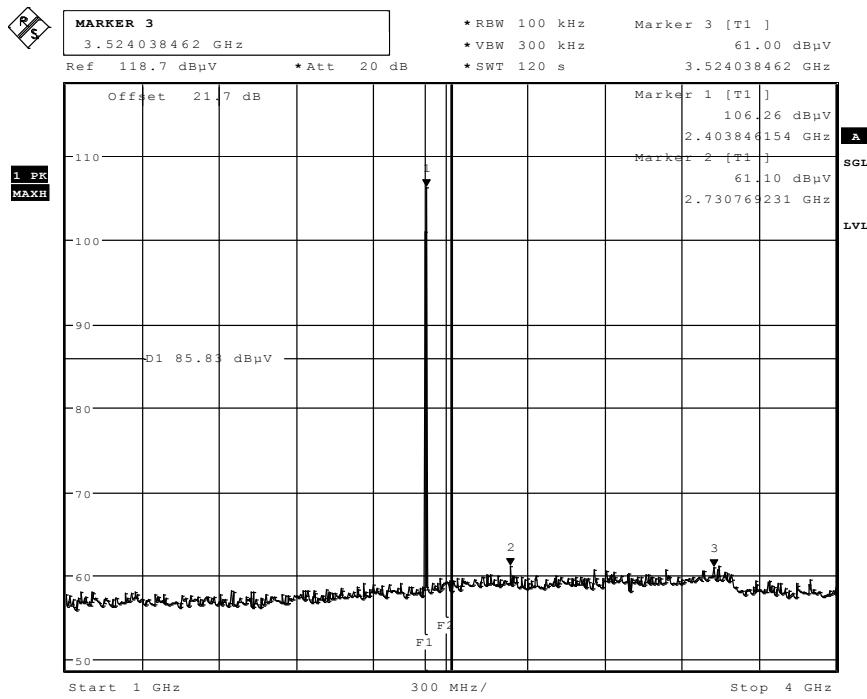


Date: 12.DEC.2011 15:29:43

### Band-Edge left (hopping mode)

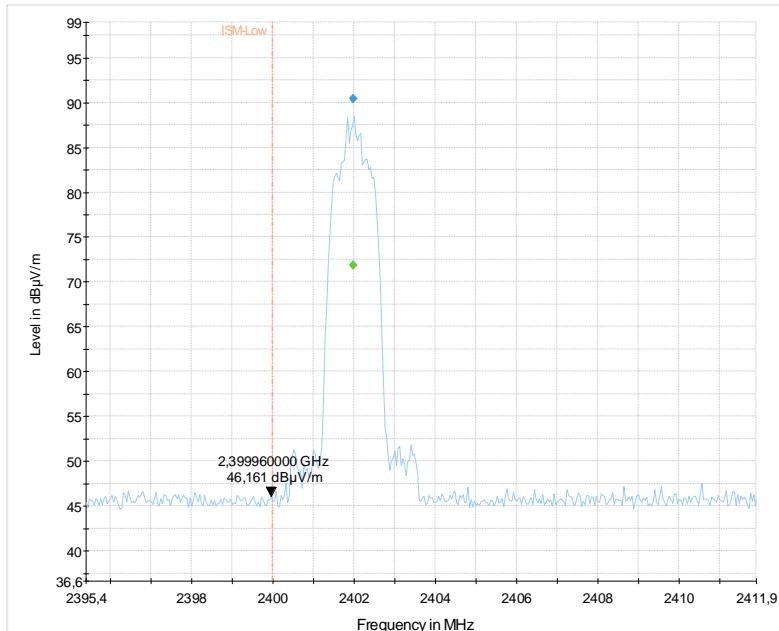


Date: 12.DEC.2011 15:52:07  
**Sweep 1: Channel 0 (150kHz to 1GHz)**

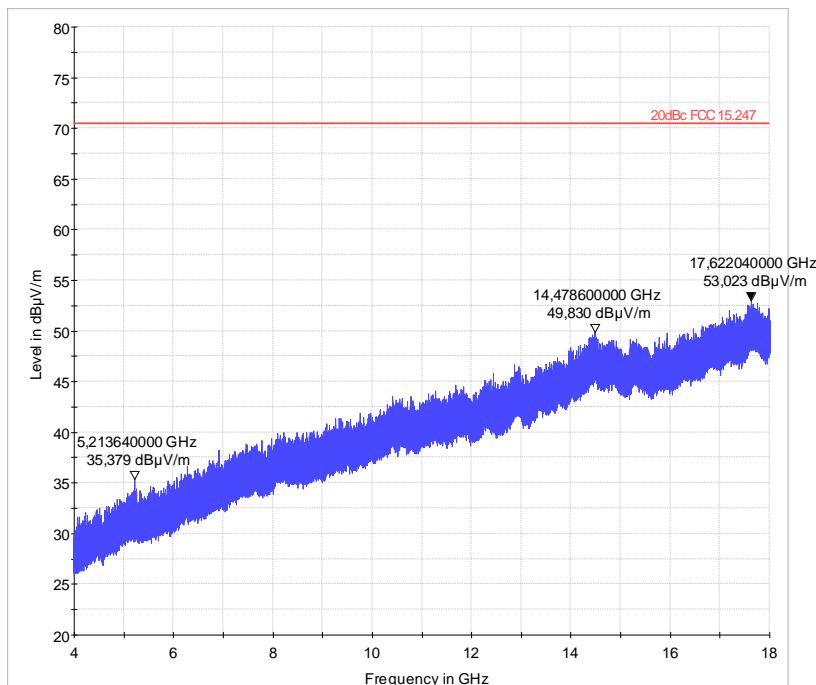


Date: 12.DEC.2011 15:49:53  
**Sweep 2: Channel 0 (1GHz to 4GHz)**

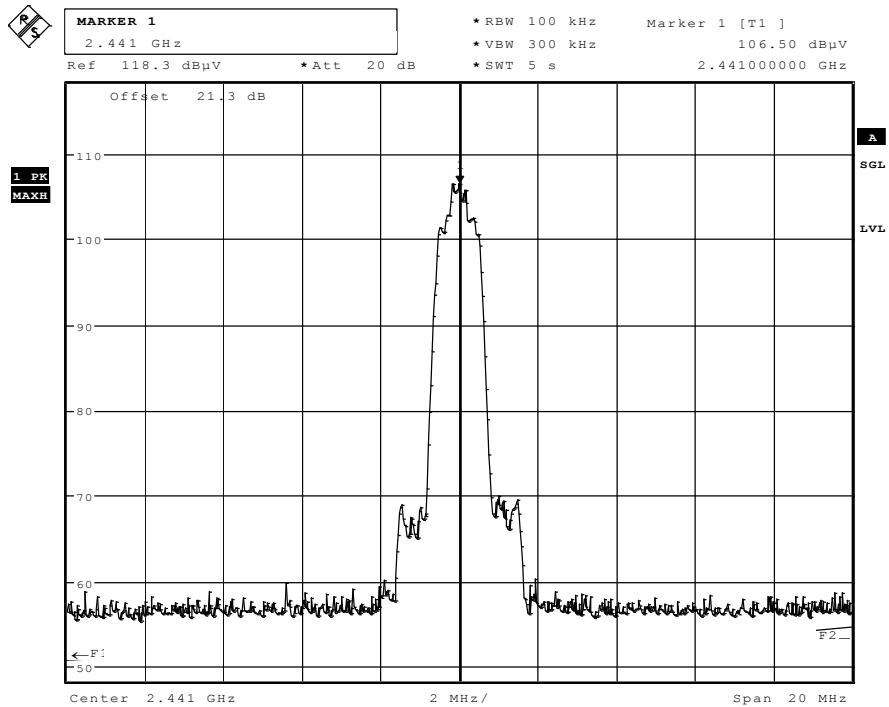
The Frequency range 4 to 18GHz: **radiated** measurement



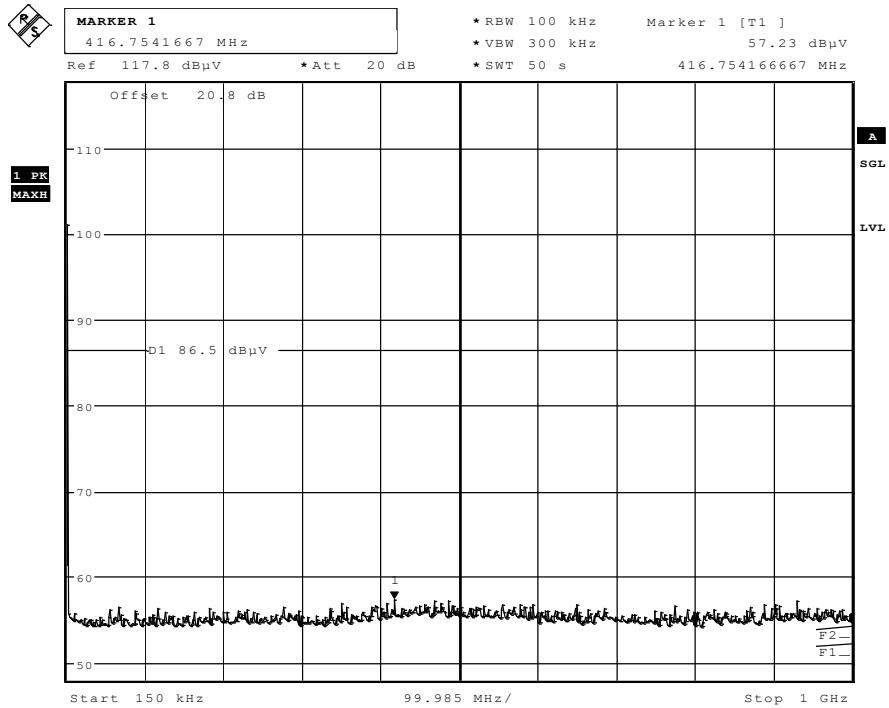
#### In-Band radiated measurement – channel 0



#### Sweep 3: Channel 0 (4GHz to 18GHz)

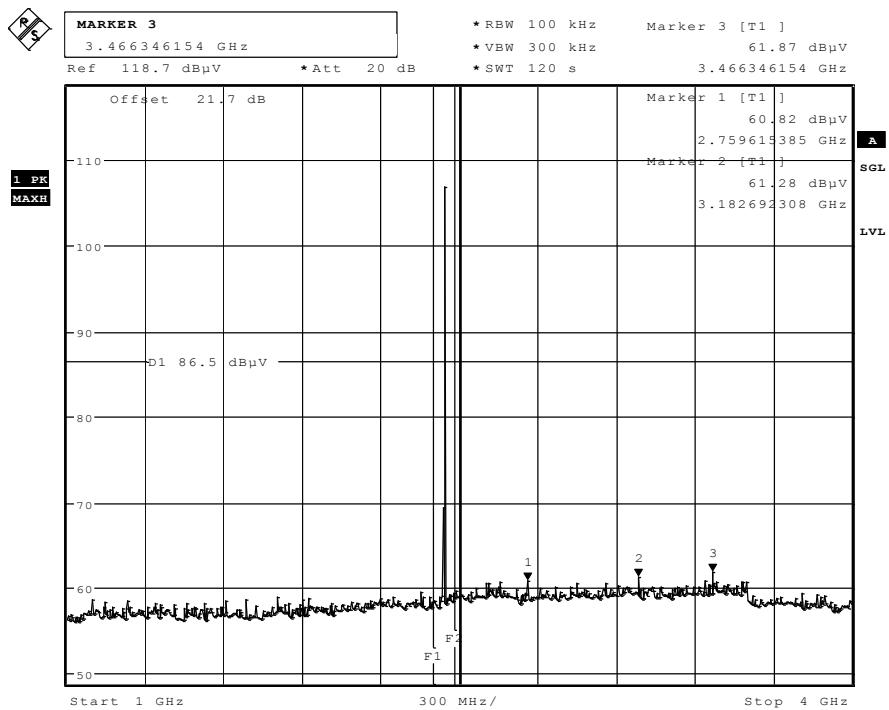


Date: 12.DEC.2011 15:55:45

**In-BAND reference value for channel 39**

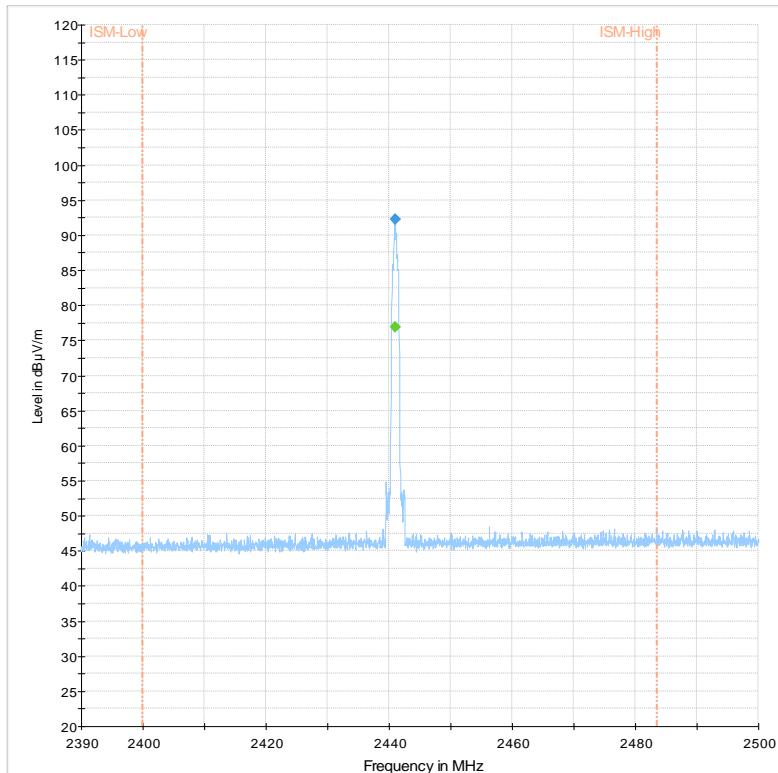
Date: 12.DEC.2011 15:57:41

**Sweep 1: Channel 39 (150kHz to 1GHz)**

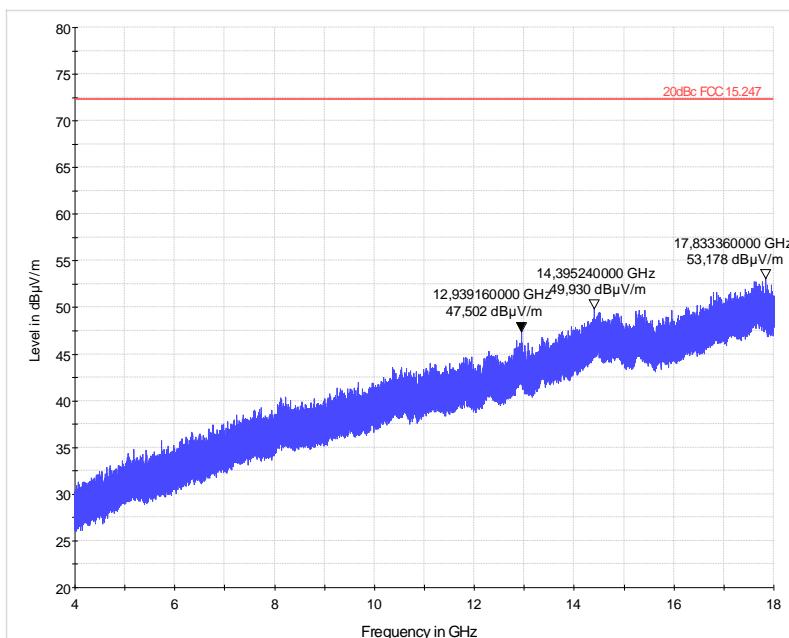


Date: 12.DEC.2011 16:00:55  
**Sweep 2: Channel 39 (1GHz to 4GHz)**

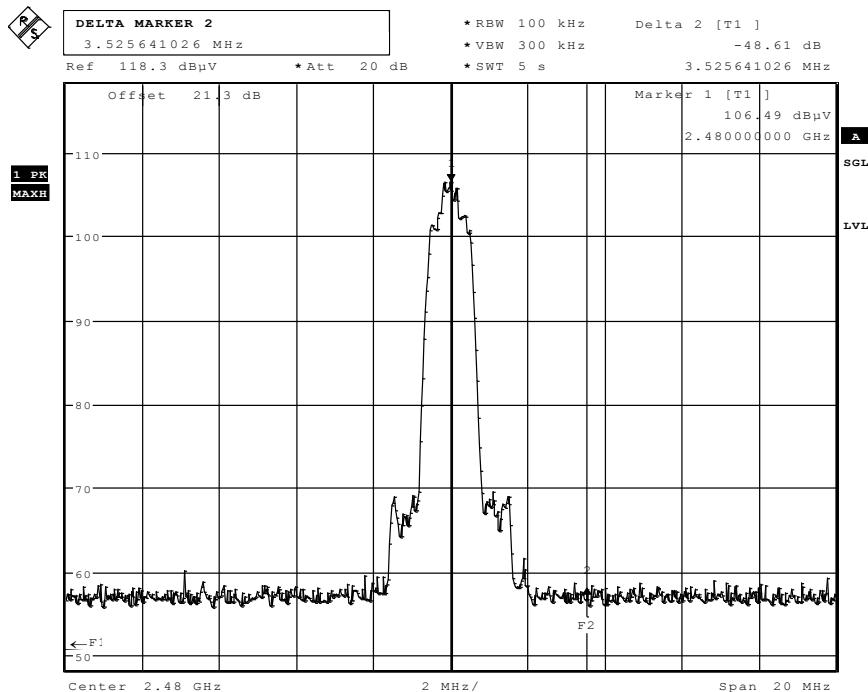
The Frequency range 4 to 18GHz: **radiated** measurement



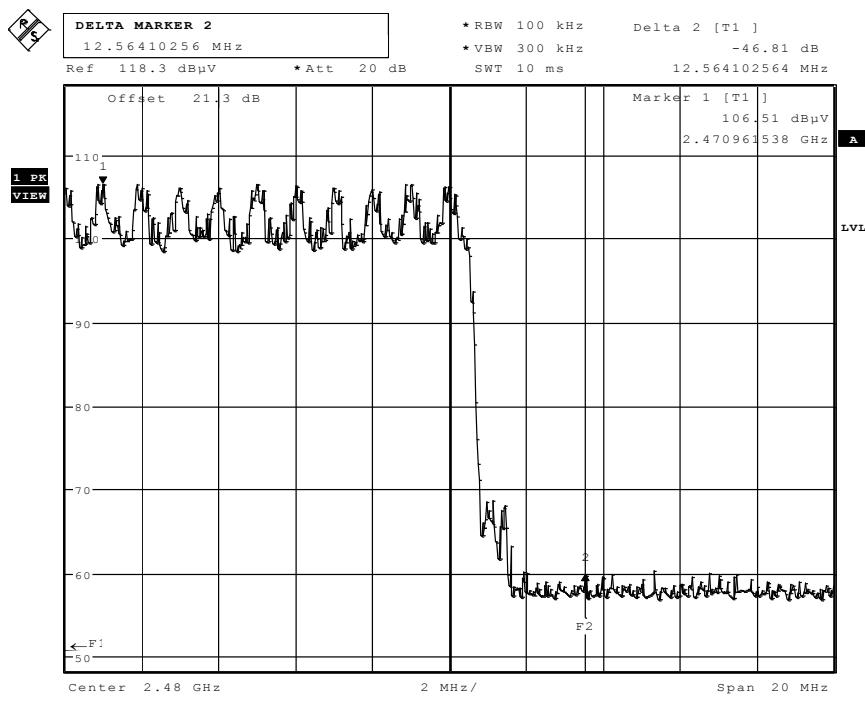
#### In-Band radiated measurement – channel 39



#### Sweep 3: Channel 39 (4GHz to 18GHz)

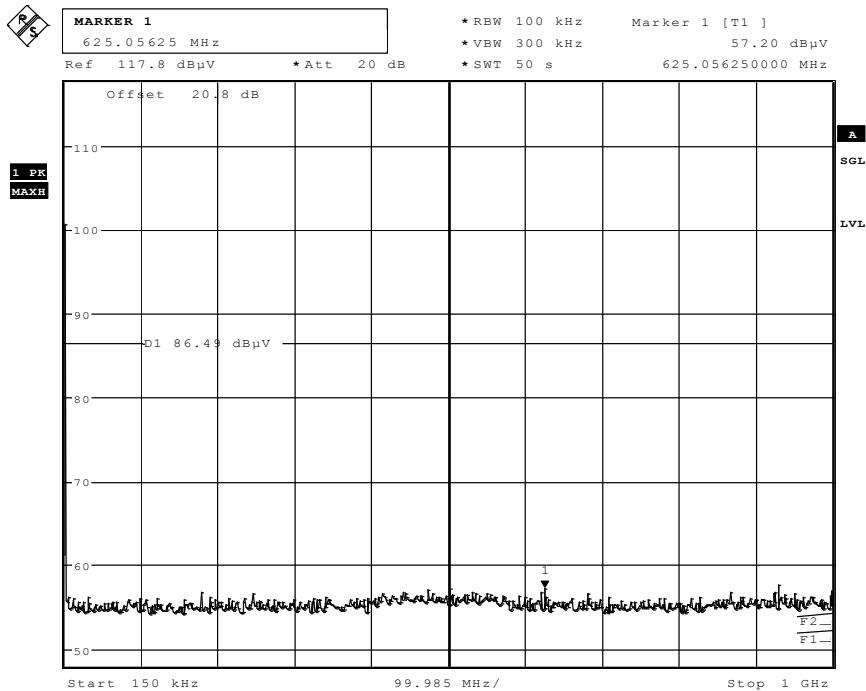


Date: 12.DEC.2011 15:31:51

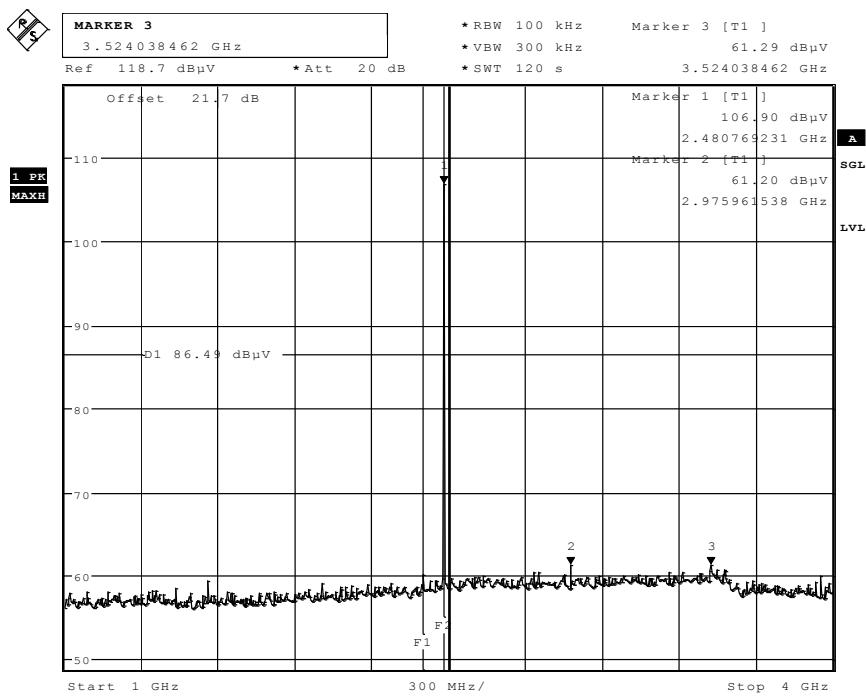
**In-BAND reference value for channel 78/ Band- Edge (no hopping mode)**

Date: 12.DEC.2011 15:35:50

**Band-Edge right (hopping mode)**



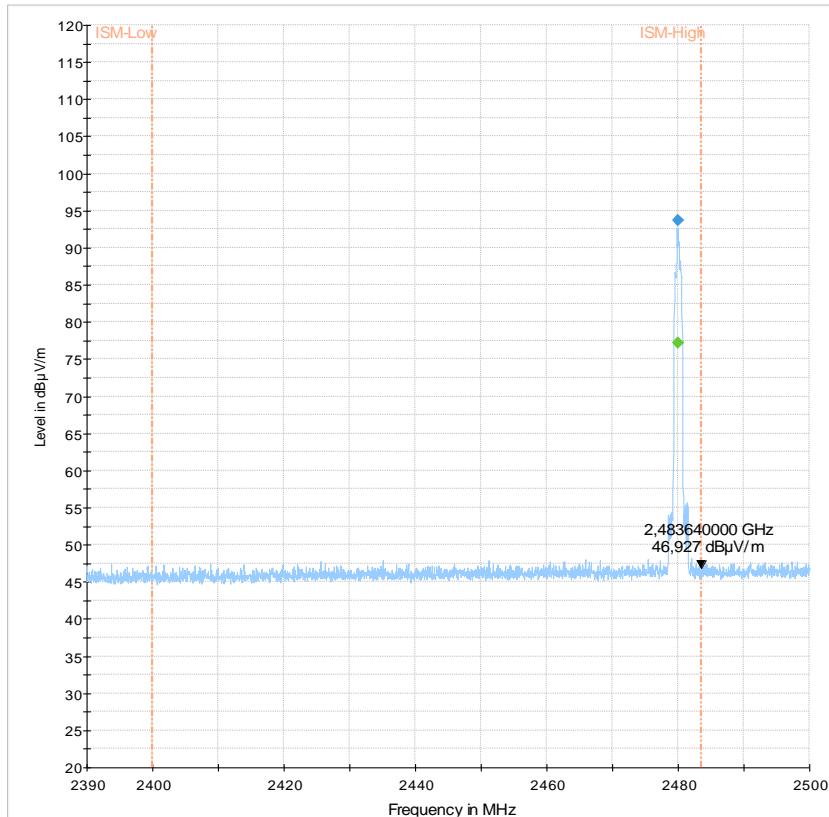
Date: 12.DEC.2011 15:53:34

**Sweep 1: Channel 78 (150kHz to 1GHz)**

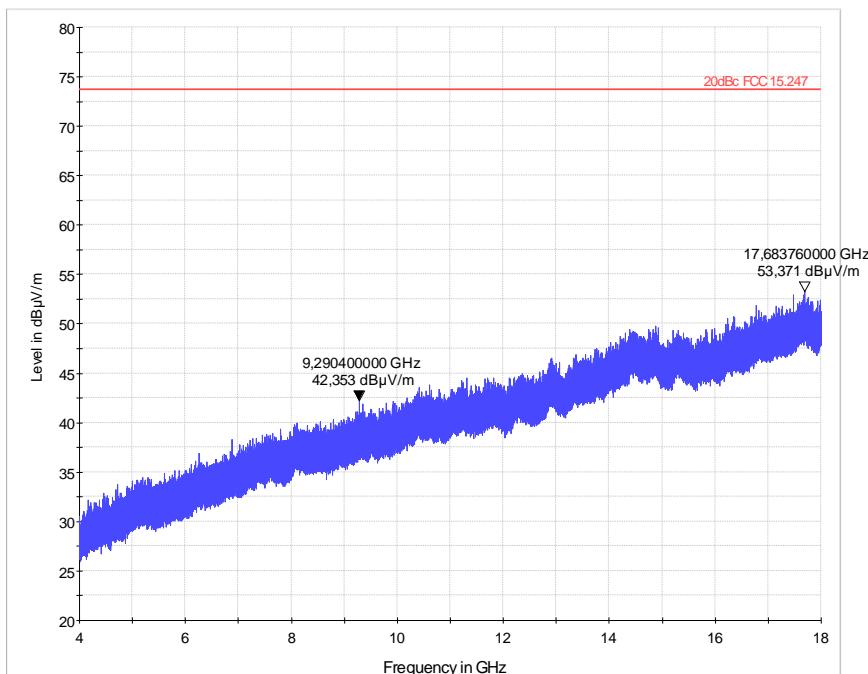
Date: 12.DEC.2011 15:47:20

**Sweep 2: Channel 78 (1GHz to 4GHz)**

The Frequency range 4 to 18GHz: **radiated** measurement



#### In-Band radiated measurement – channel 78



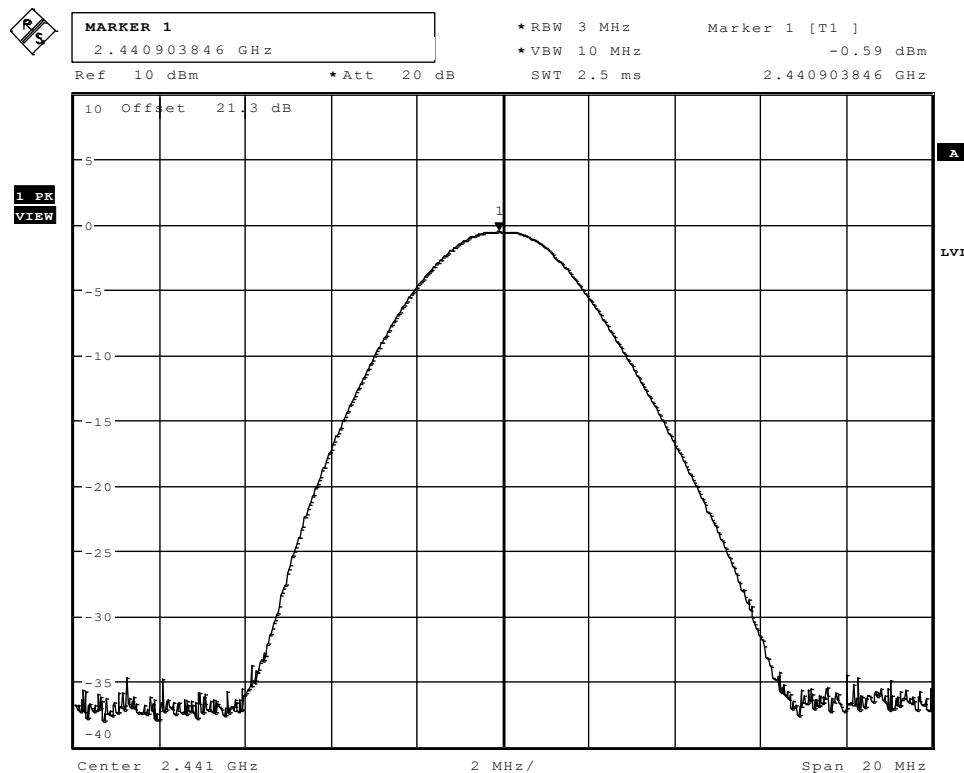
#### Sweep 3: Channel 78 (4GHz to 18GHz)

## 1.4. Maximum peak conducted power

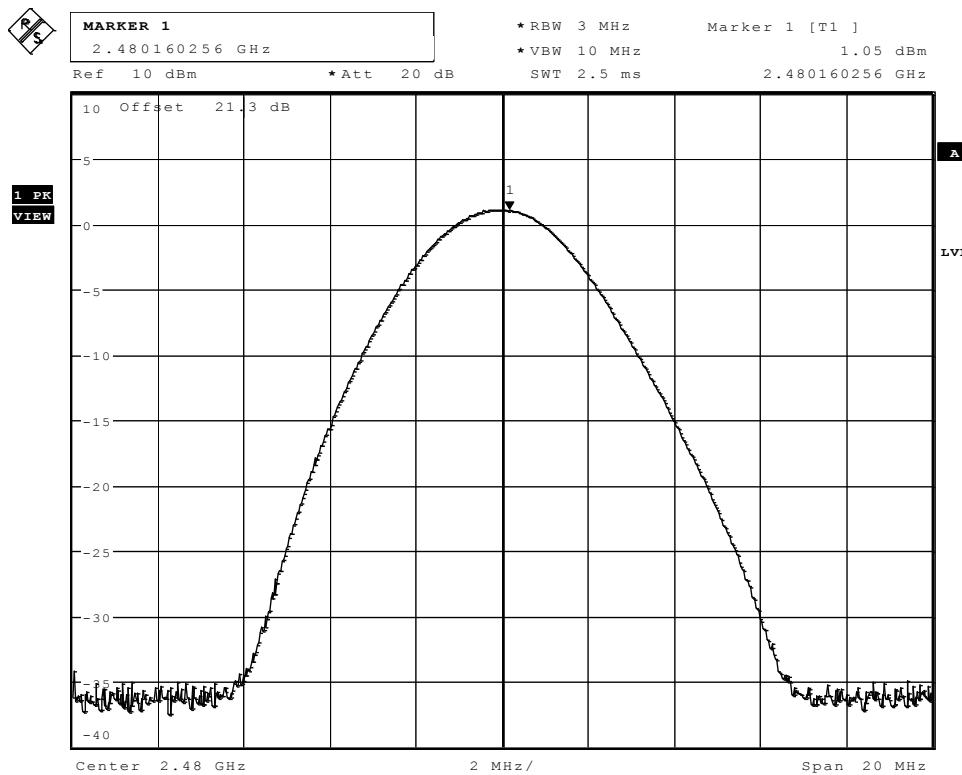
Following table show measured values for the maximum peak conducted power for different modulation types and channels.

Modulation/Packet type	Maximum Peak conducted power [dBm]			Maximum value	Max Value
	Nominal Ch 0 =2402 MHz	Nominal Ch 39 =2441MHz	Nominal Ch 79 =2480MHz		
DH1	-1,24	<b>-0,59</b>	-0,60		
DH3	-1,29	-0,61	-0,62	-0,59	
DH5	-1,27	-0,61	-0,63		
2DH1	0,34	1,01	1,03		
2DH3	0,33	1,01	1,02	1,05	<b>1,53</b>
2DH5	0,33	1,02	<b>1,05</b>		
<b>3DH1</b>	0,80	<b>1,53</b>	<b>1,53</b>		
3DH3	0,82	1,50	1,52	1,53	
3DH5	0,81	1,51	1,50		

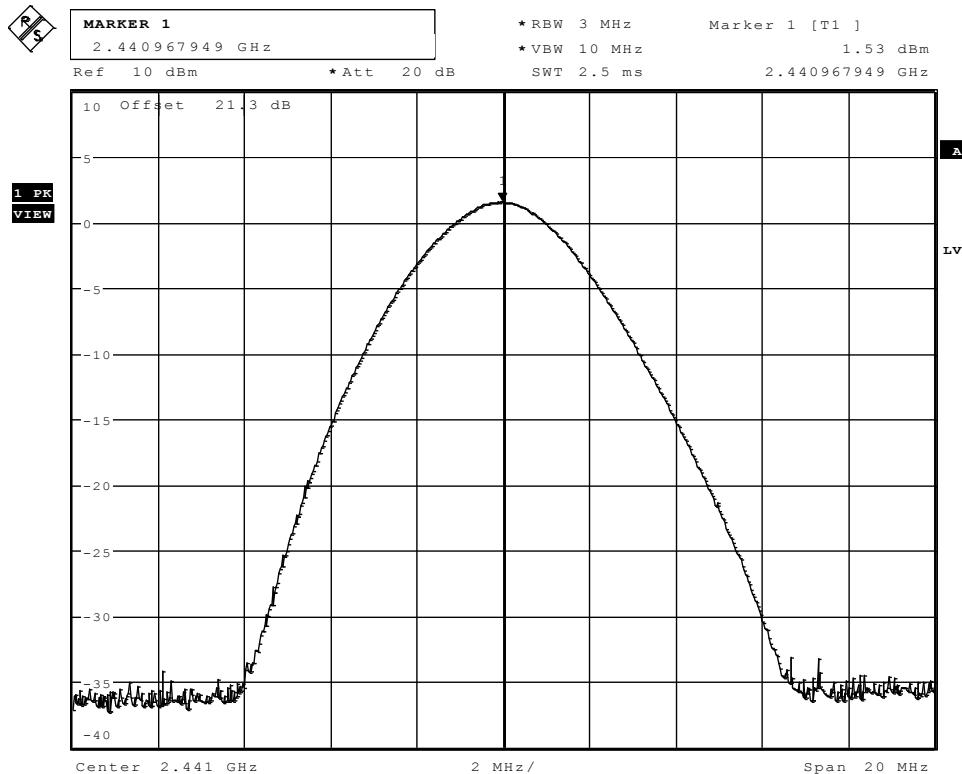
Below also some diagrams showing the maximum value for different modulation/packet types:



Date: 9.DEC.2011 14:35:50  
**DH1 Packet type, Channel 39**



Date: 9.DEC.2011 14:24:14

**2DH5 Packet type, Channel 78**

Date: 9.DEC.2011 14:30:18

**3DH1 Packet type, Channel 39/78 -> absolute maximum value between modulation/data rates**

## 1.5. Radiated field strength (15.209/RSS-Gen.)

### 1.5.1. Radiated magnetic field strength measurements (f<30MHz)

#### 1.5.1.1. Channel 0

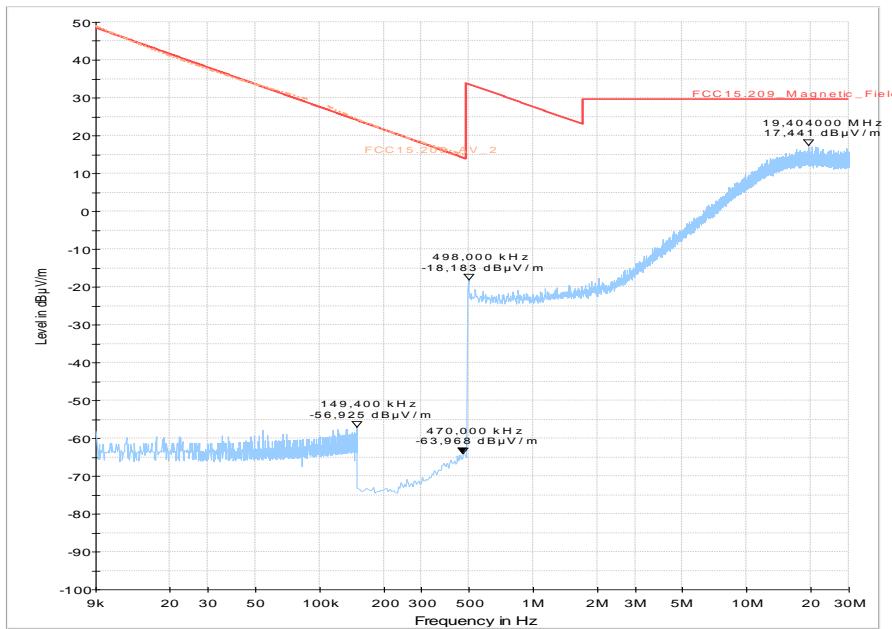


Diagram 3.01 – EUT horizontal/laying

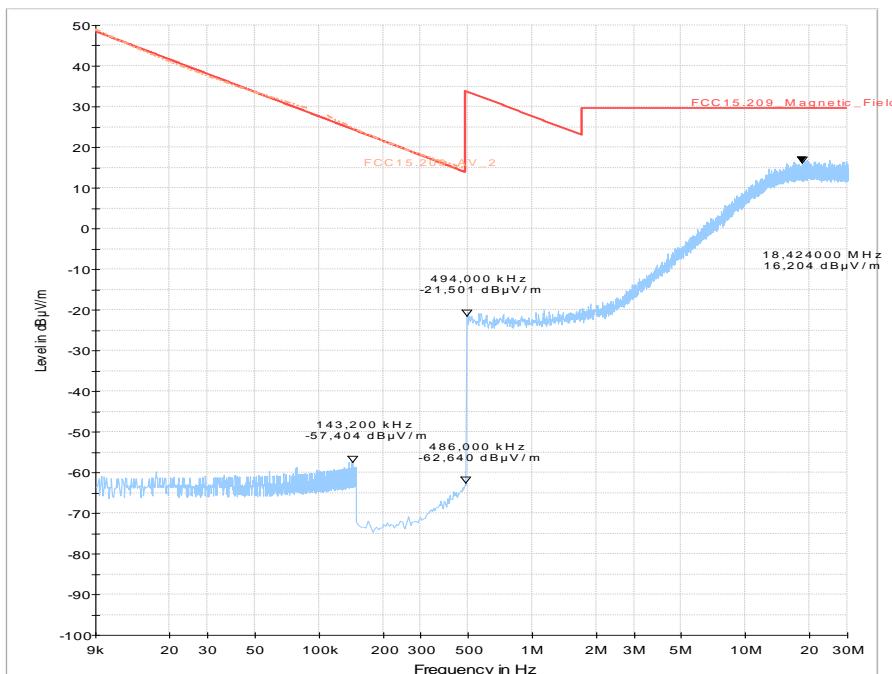


Diagram 3.02 – EUT vertical/standing

## 1.5.1.2. Channel 39

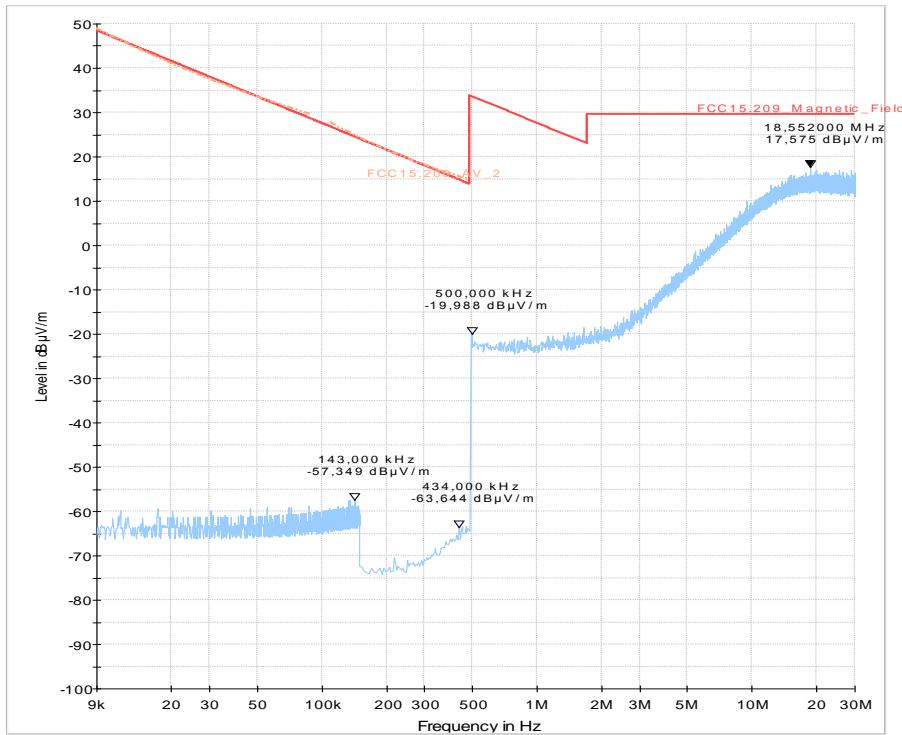


Diagram 3.03 – EUT horizontal/laying

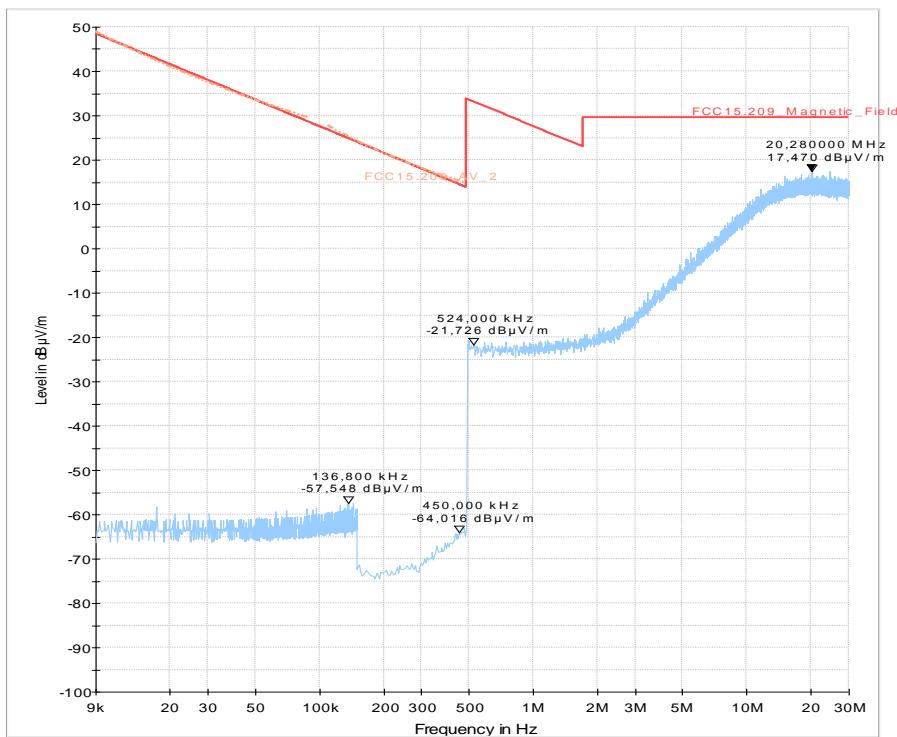


Diagram 3.04 – EUT vertical/standing

### 1.5.1.3. Channel 78

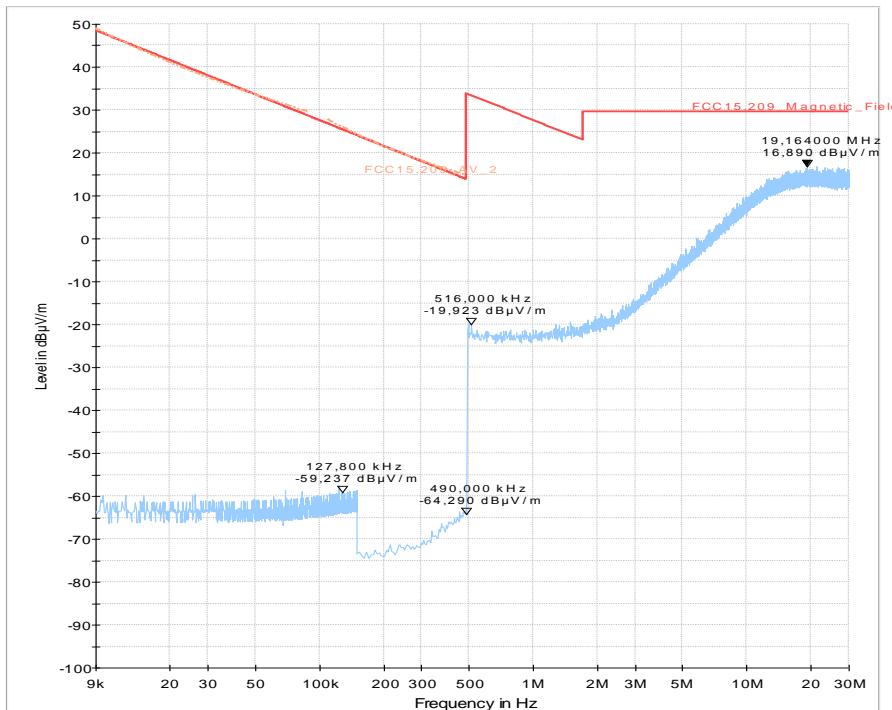


Diagram 3.05 – EUT horizontal/laying

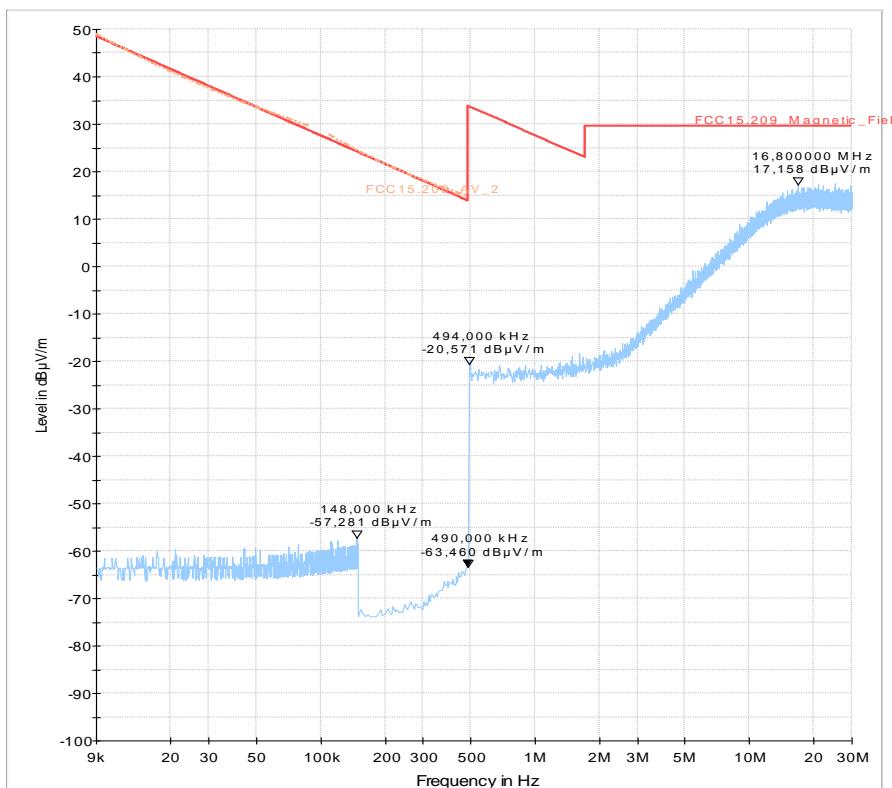


Diagram 3.06 – EUT vertical/standing

### 1.5.2. Radiated field strength (30MHz < f < 1GHz)

#### 1.5.2.1. TX-Mode, Channel 0, 3DH5 packet types

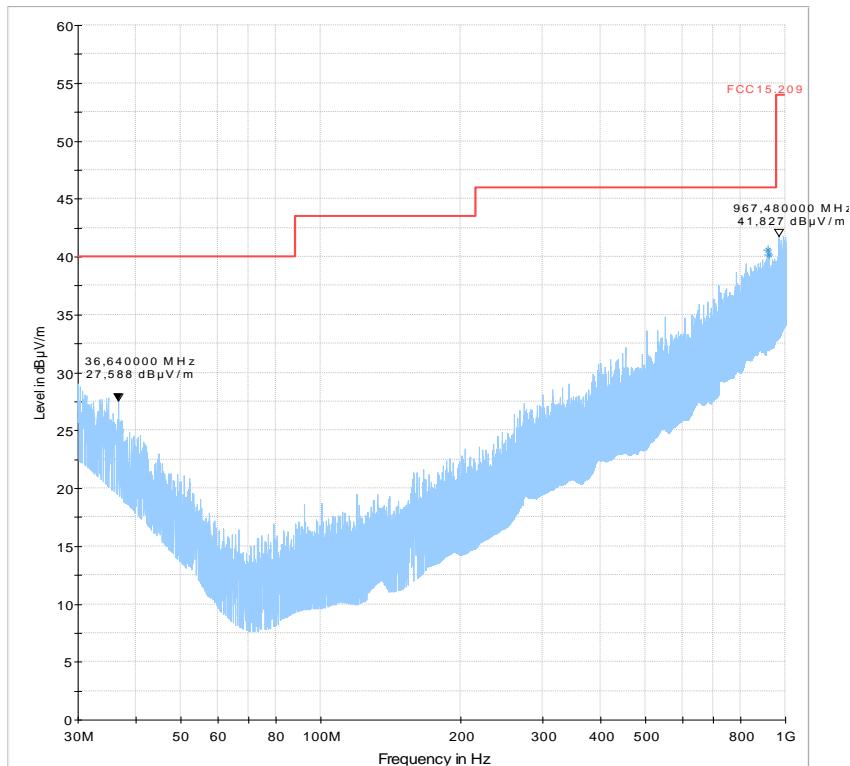


Diagram 2.01, EUT horizontal (laying)

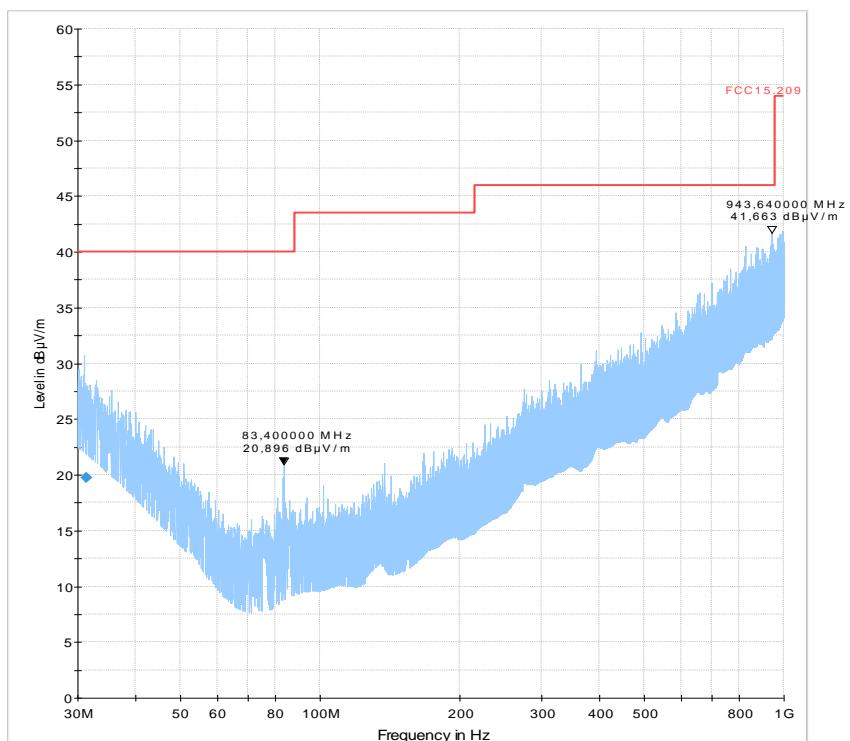


Diagram 2.02, EUT vertical (standing)

### 1.5.2.2. TX-Mode, Channel 39, 3DH5 packet types

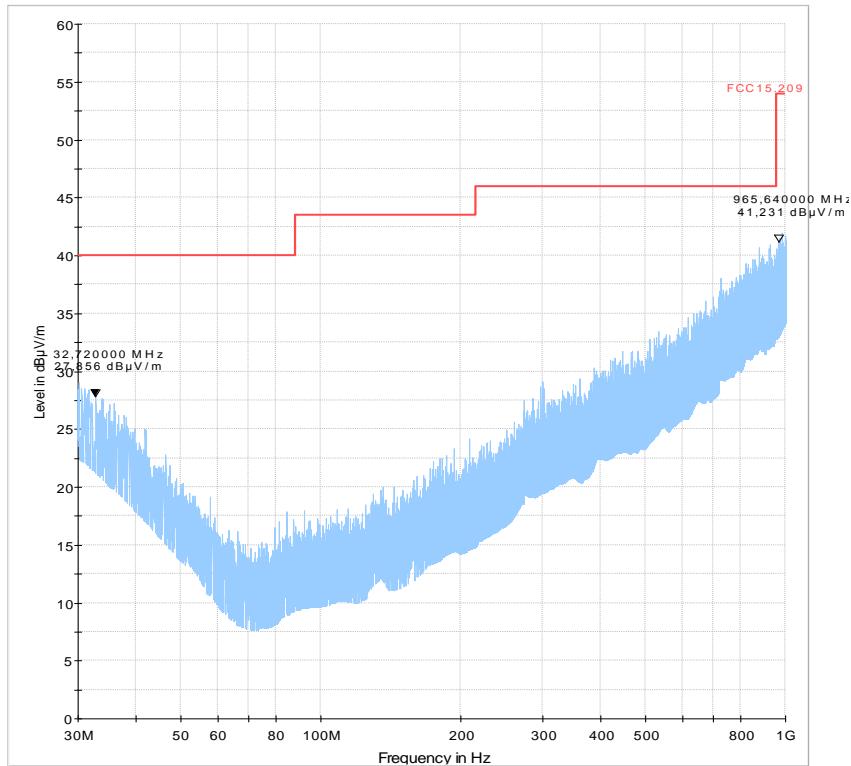


Diagram 2.03, EUT horizontal (laying)

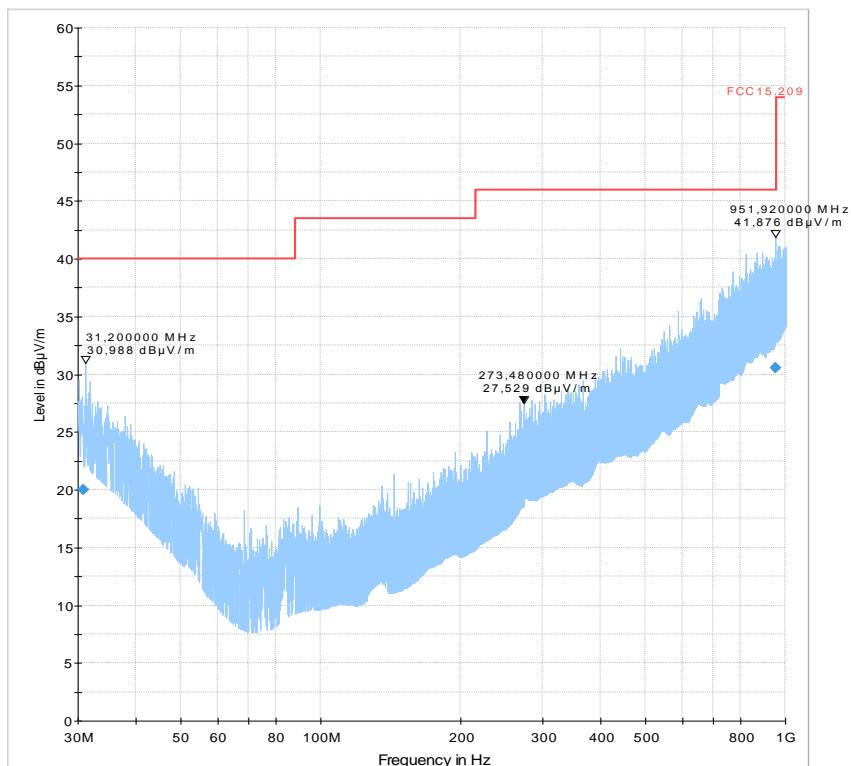


Diagram 2.04, EUT vertical (standing)

### 1.5.2.3. TX-Mode, Channel 78, 3DH5 packet types

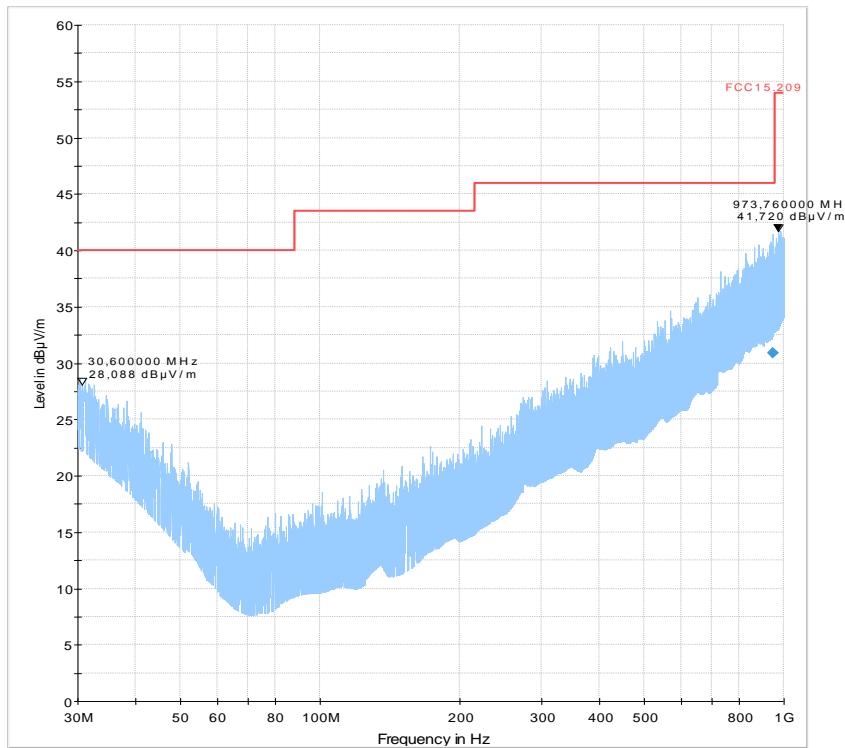


Diagram 2.05, EUT horizontal (laying)

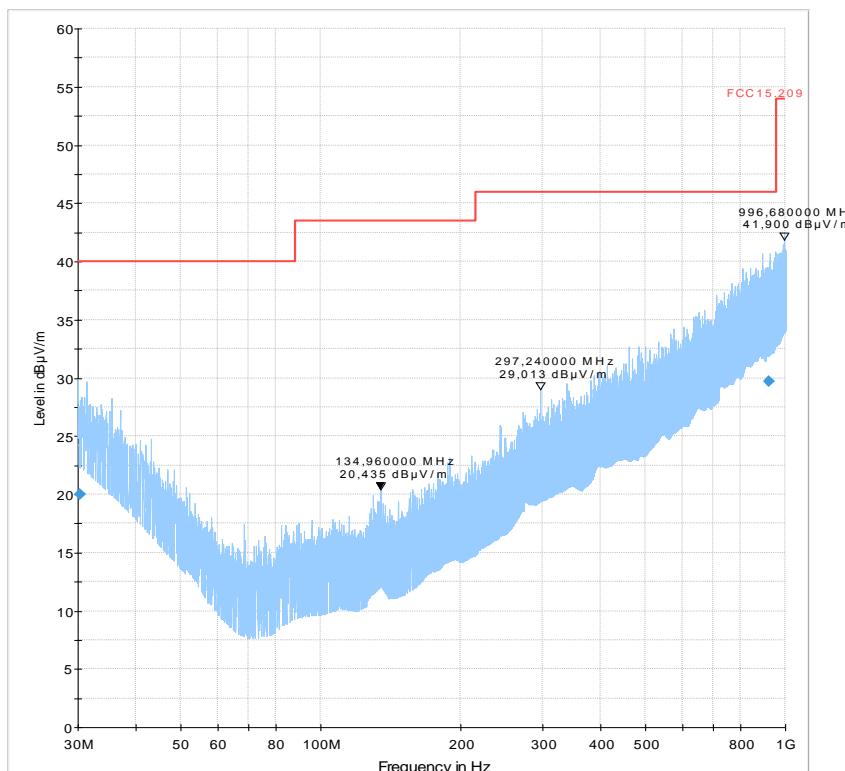


Diagram 2.06, EUT vertical (standing)

## 1.5.2.4. RX-Mode, Channel 39

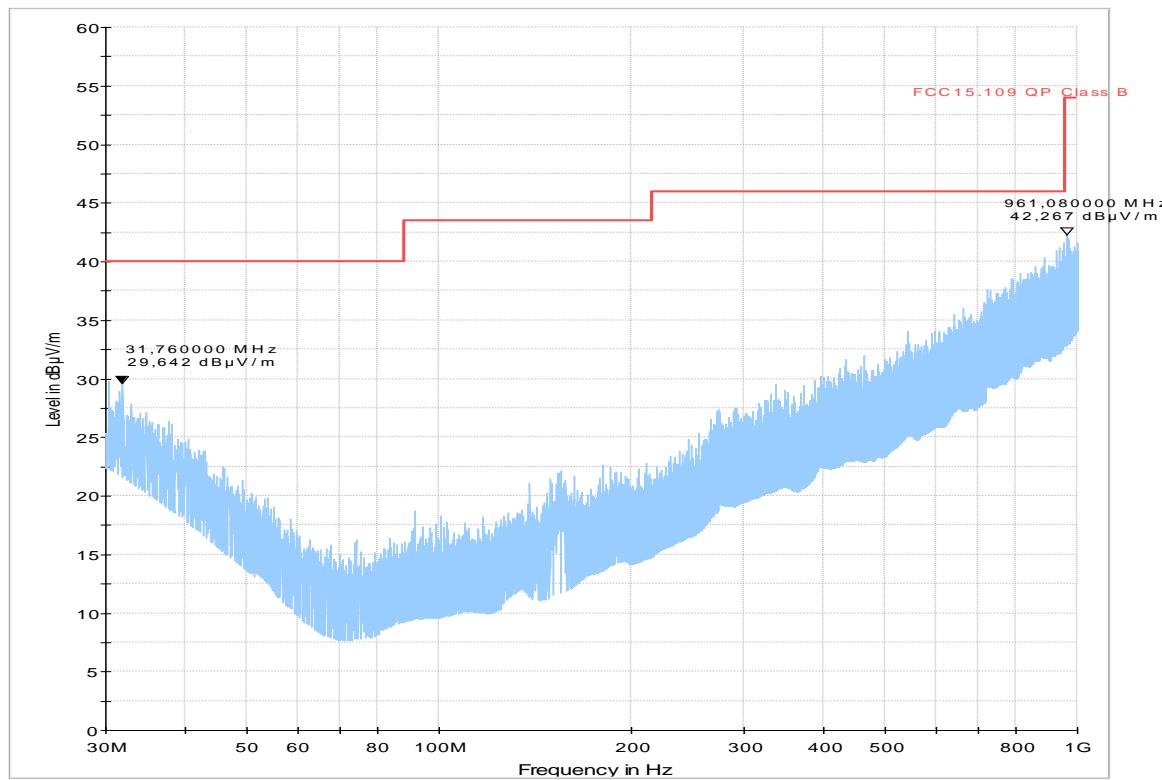


Diagram 2.07, EUT horizontal (laying)

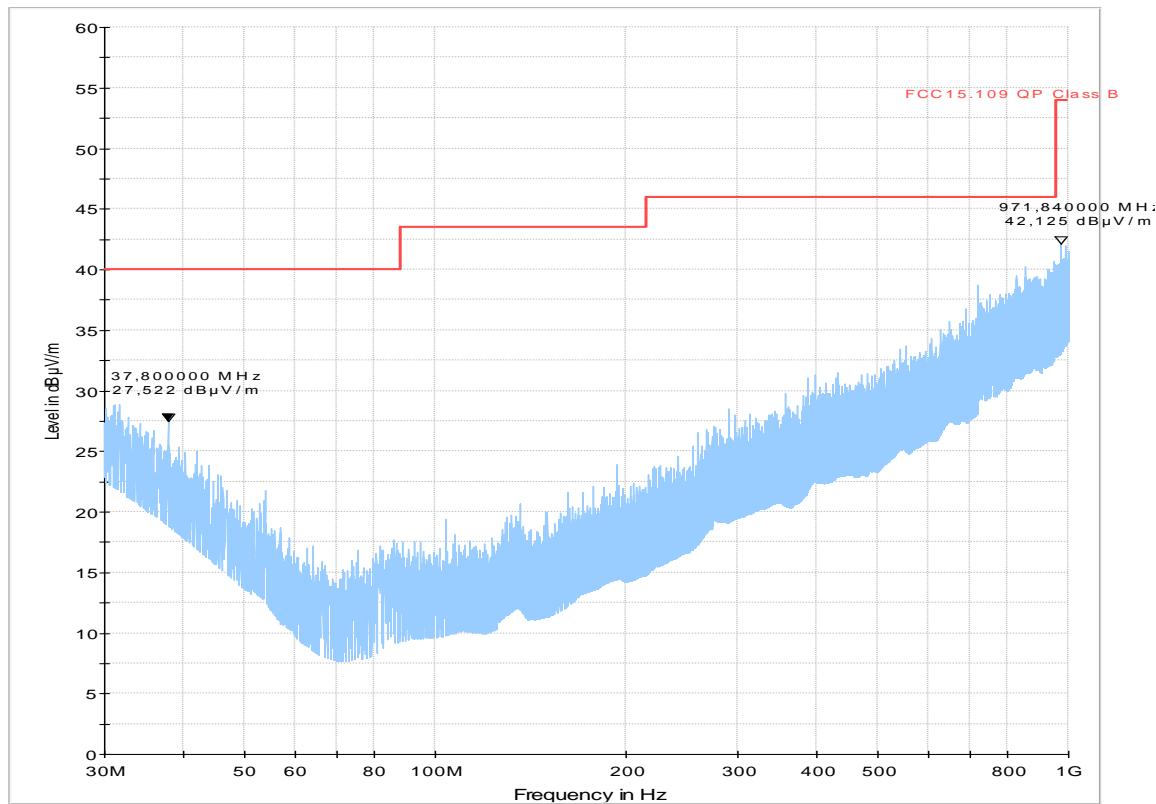


Diagram 2.08, EUT vertical (standing)

### 1.5.3. Radiated field strength (1GHz < f < 18GHz)

#### 1.5.3.1. Channel 0, 3DH5 packet types

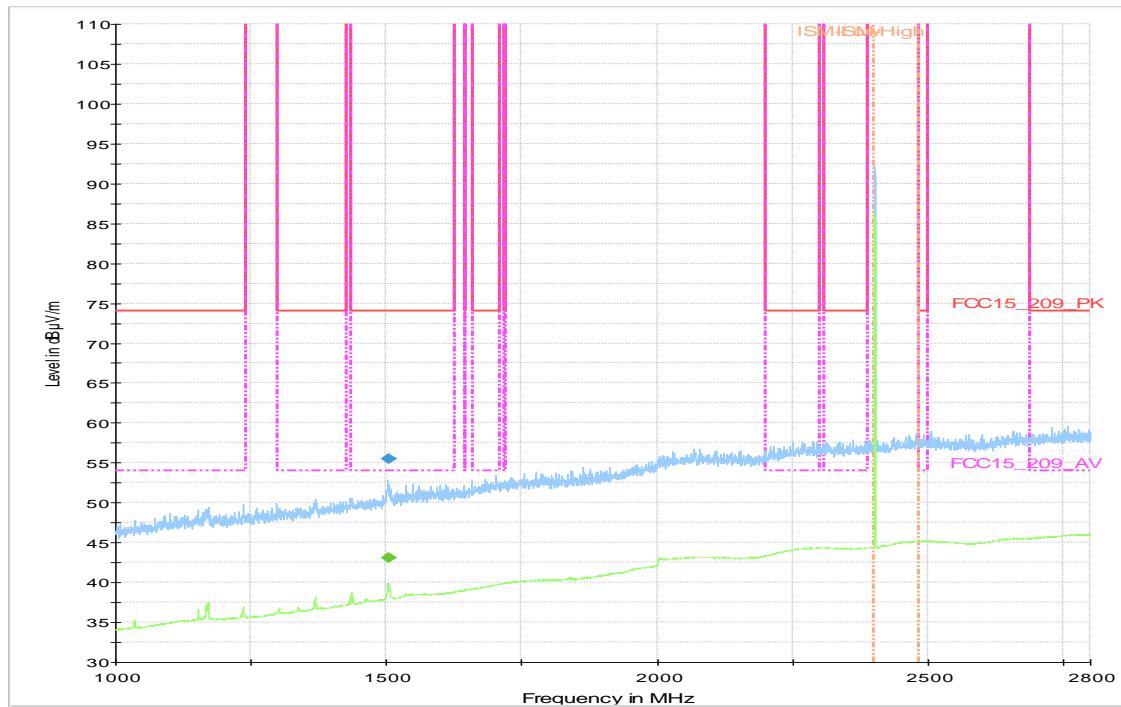


Diagram 2.10 (1GHz to 2.8GHz)

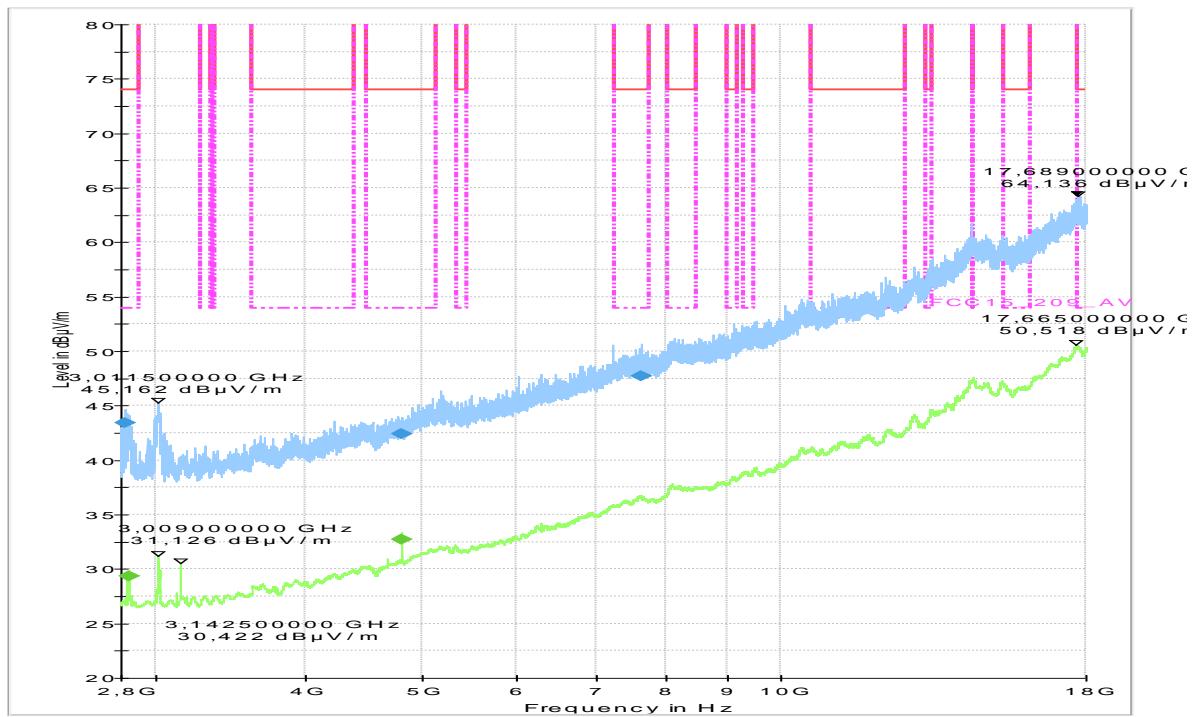


Diagram 2.11 (2.8 to 18GHz)

### 1.5.3.2. Channel 39, 3DH5 packet types

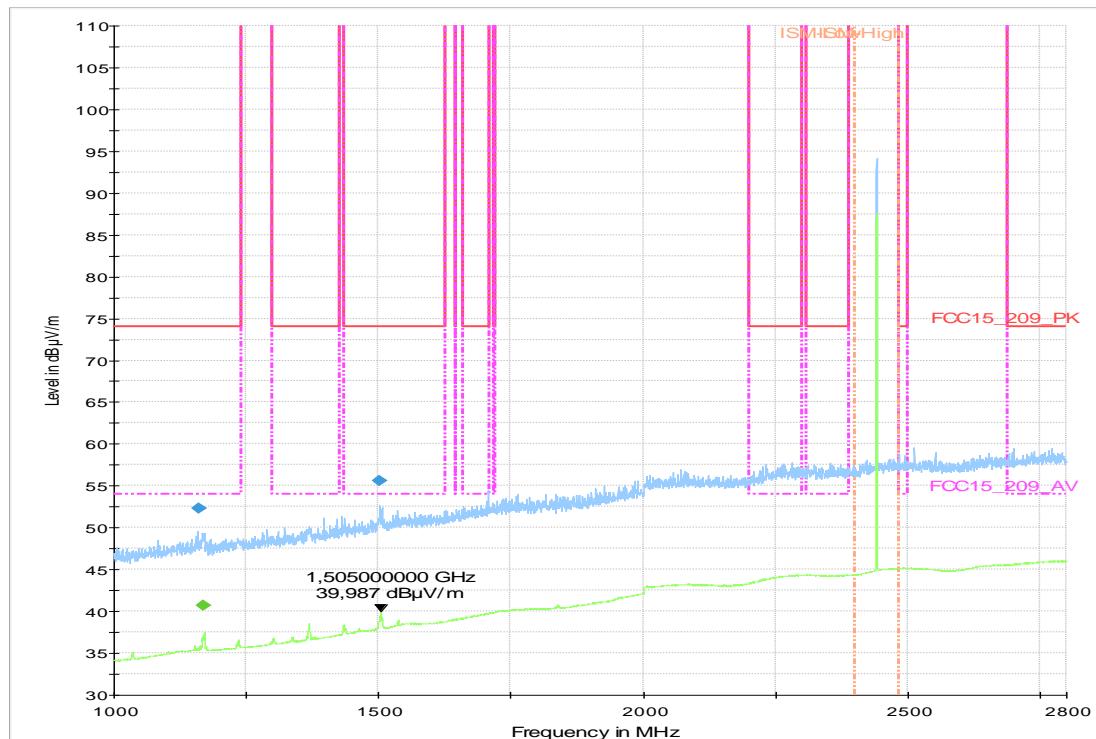


Diagram 2.12 (1GHz to 2.8GHz)

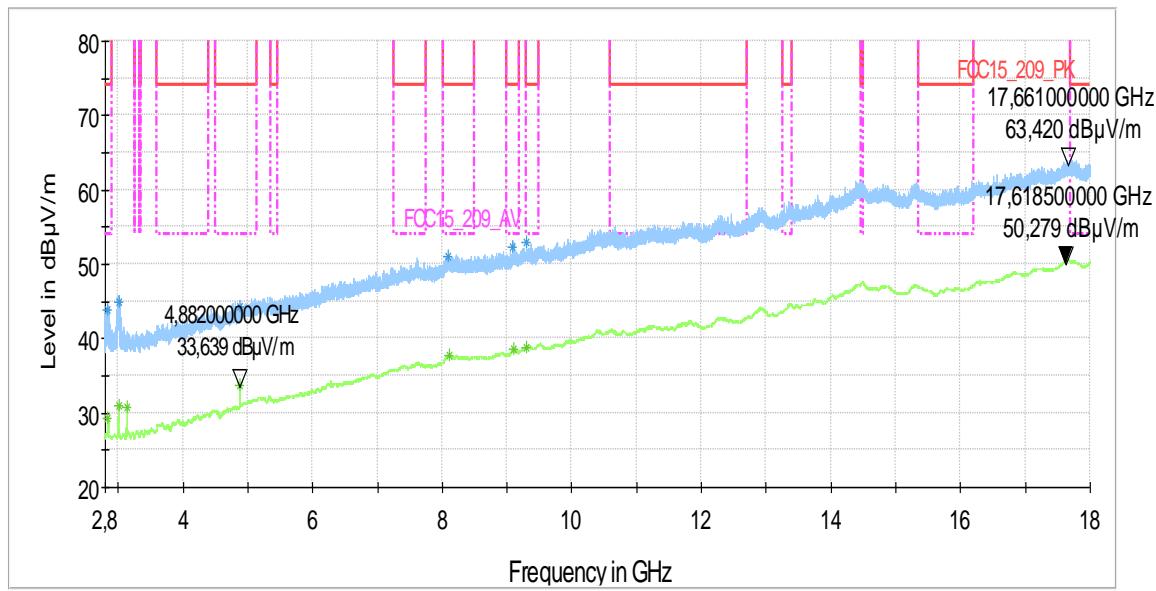
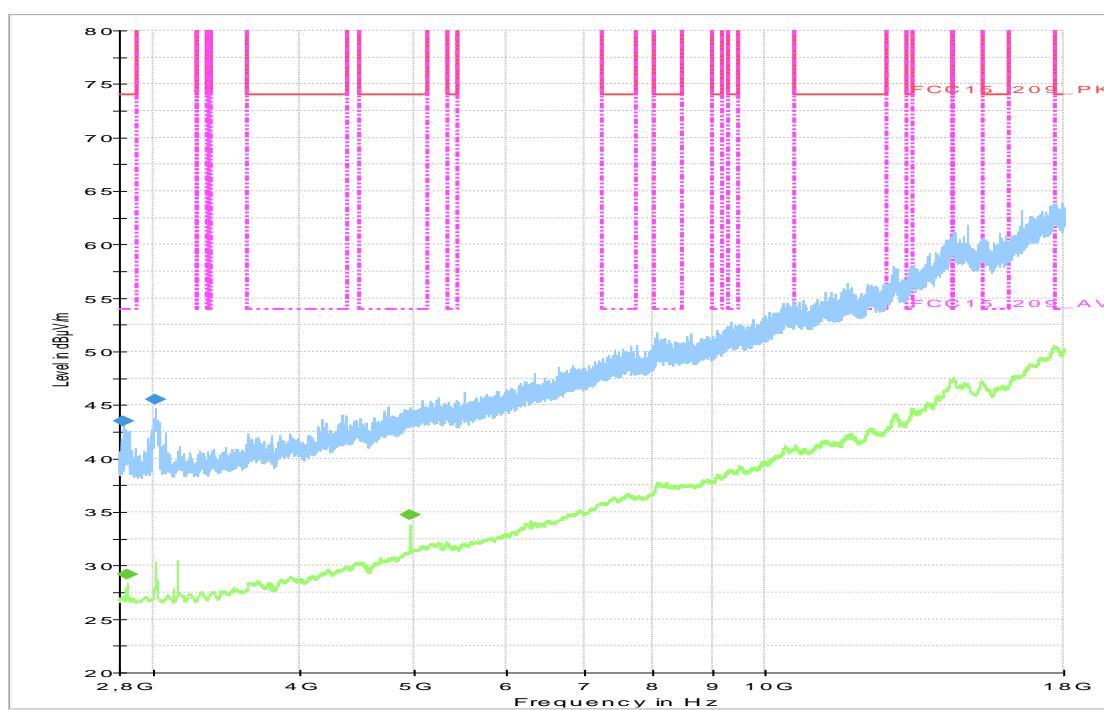
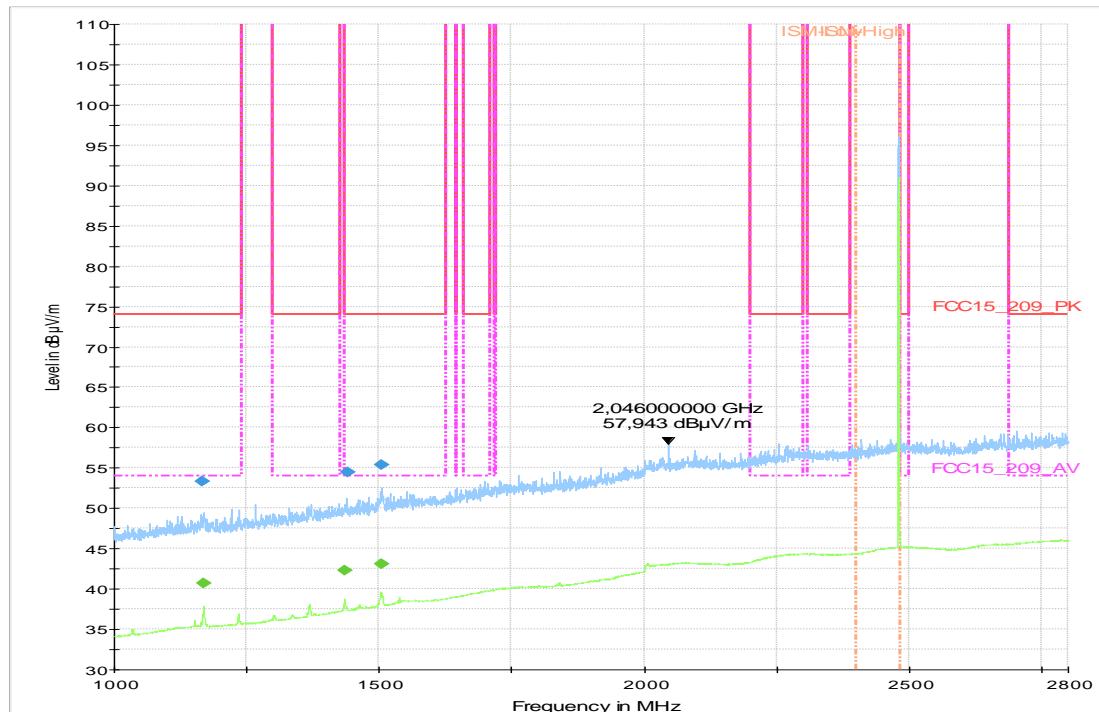
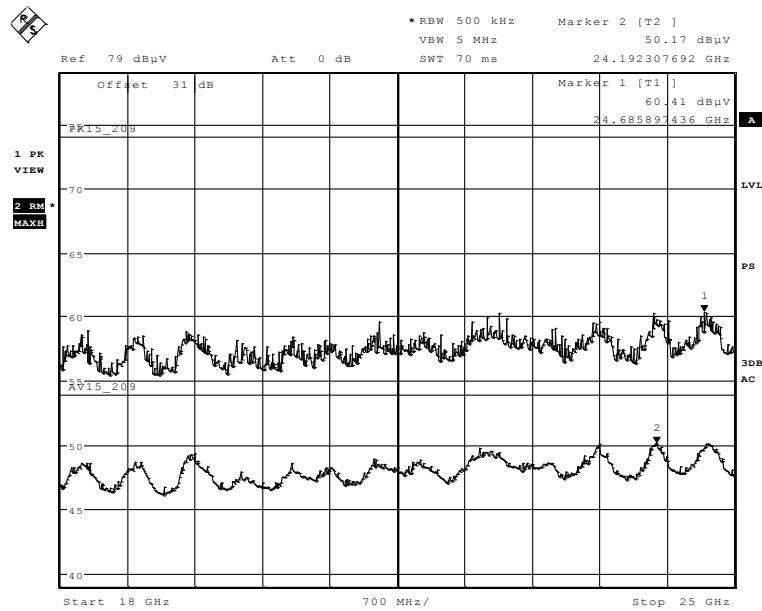


Diagram 2.13 (2.8 to 18GHz)

### 1.5.3.3. Channel 78, 3DH5 packet types

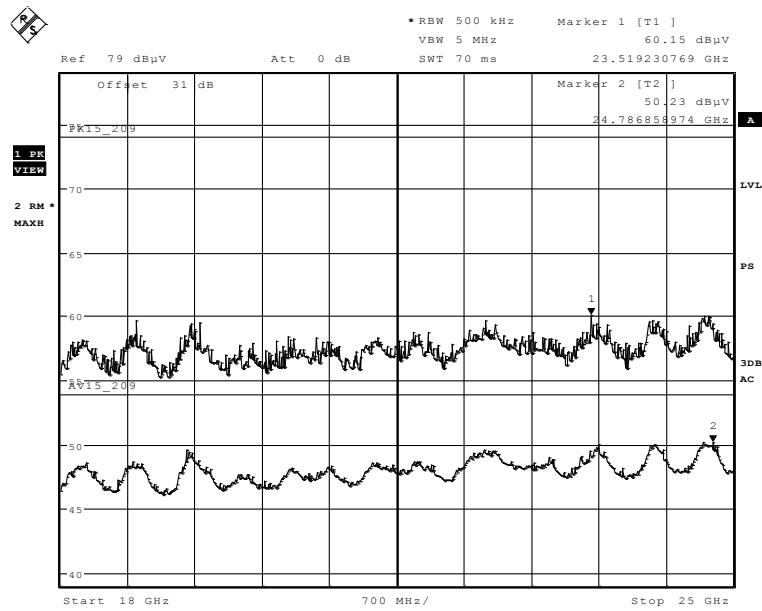


### 1.5.4. Radiated emissions in the frequency range above 18GHz



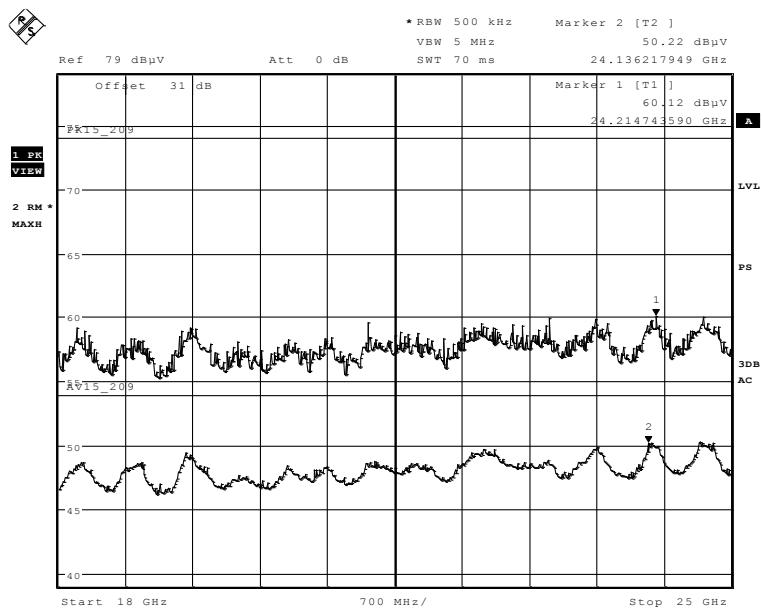
Date: 6.JAN.2012 08:23:28

Channel 0 (overview measurement only) – no critical emissions detected



Date: 6.JAN.2012 08:27:33

Channel 39 (overview measurement only)

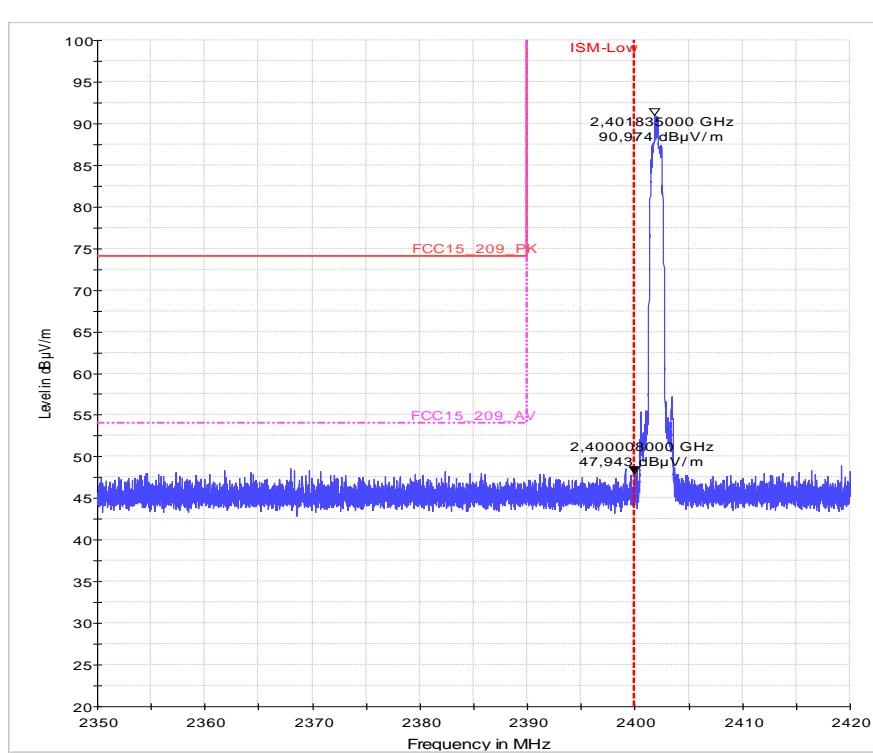
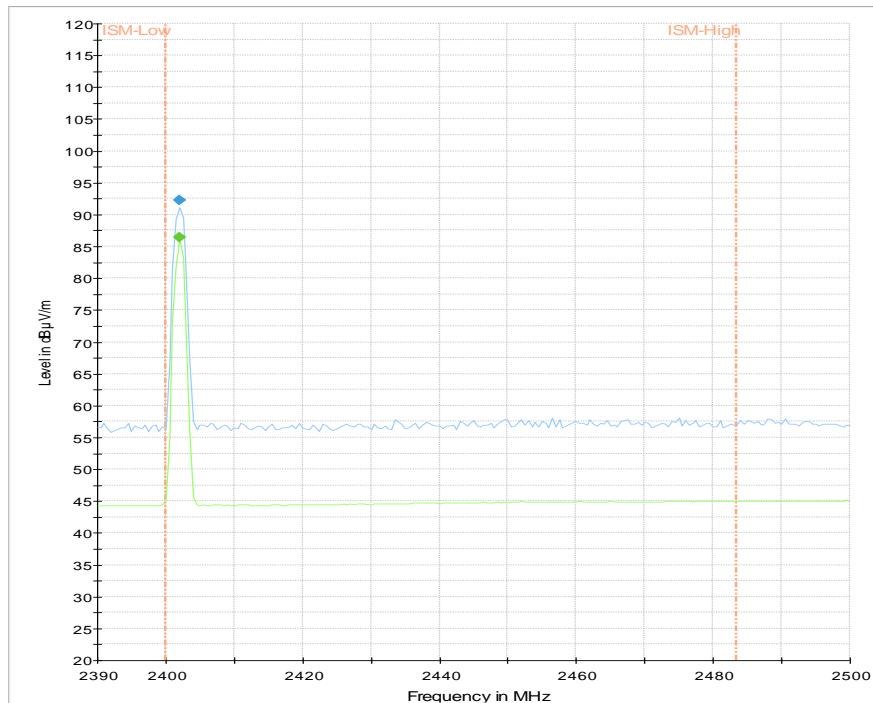


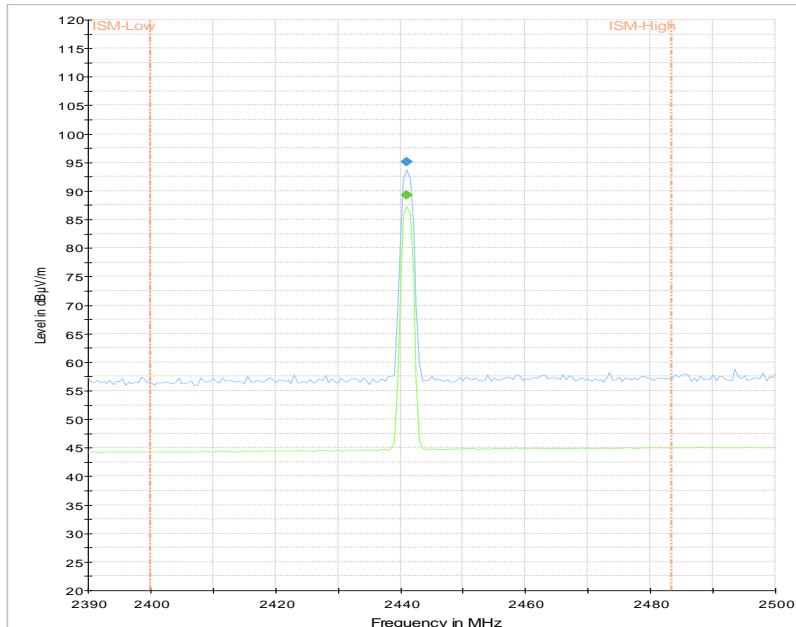
Date: 6.JAN.2012 08:32:56

Channel 78 (overview measurement only)

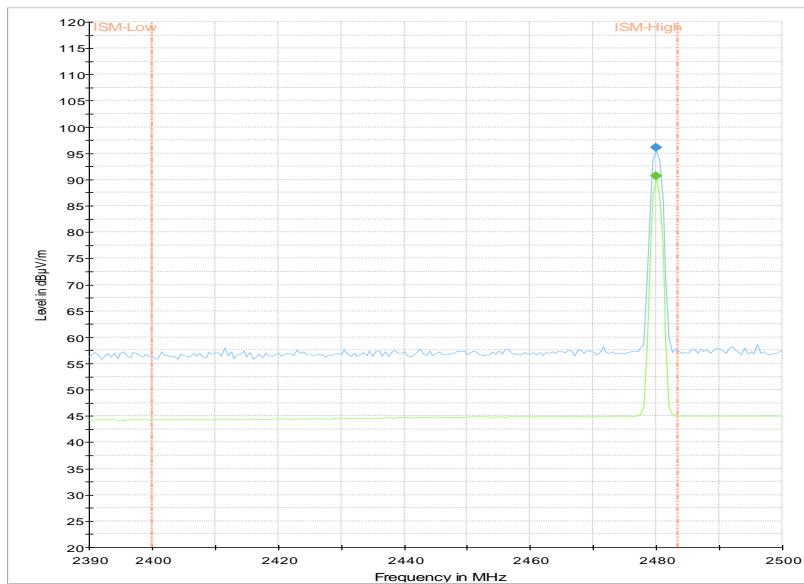
### 1.5.5. Carrier radiated field strength in 3m distance and band-edge compliance radiated according FCC §15.205 & §15.209

#### 1.5.5.1. Used for radiated compliance demonstration: Packet types 3DH5

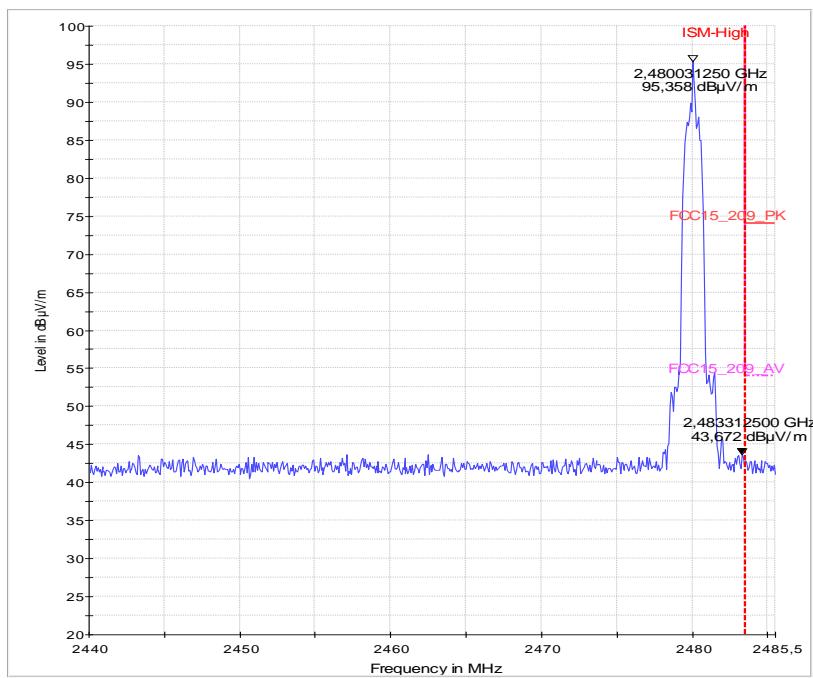




Carrier field strength, channel 39



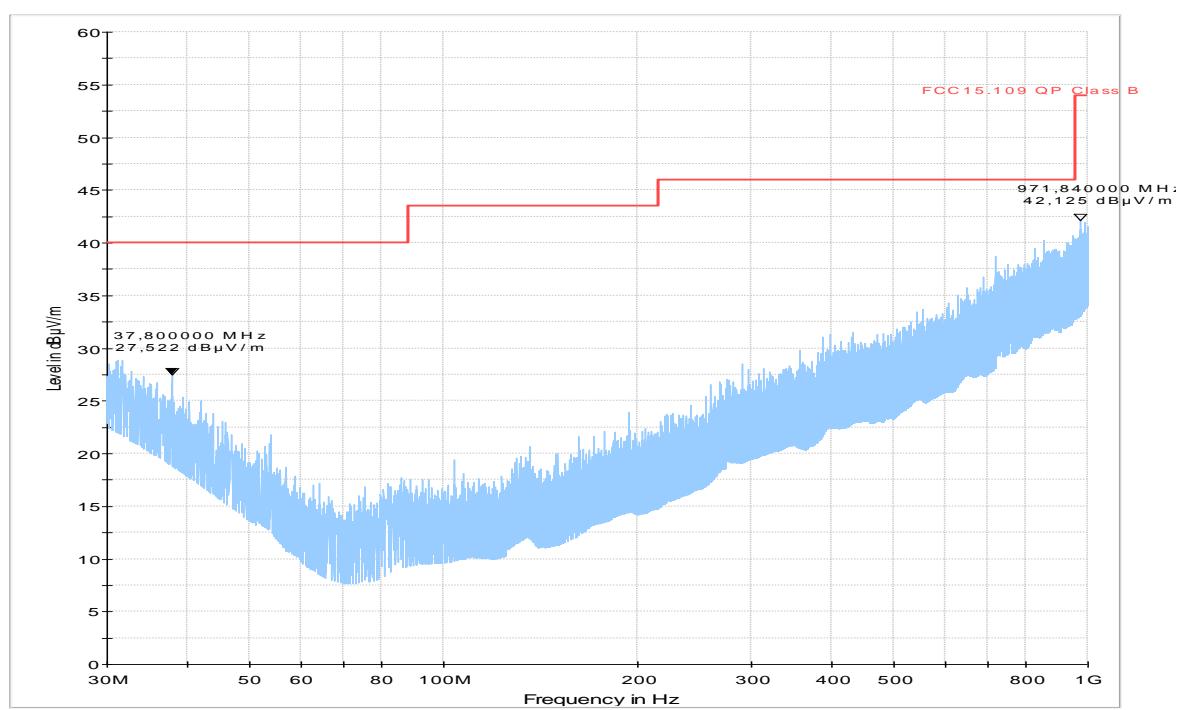
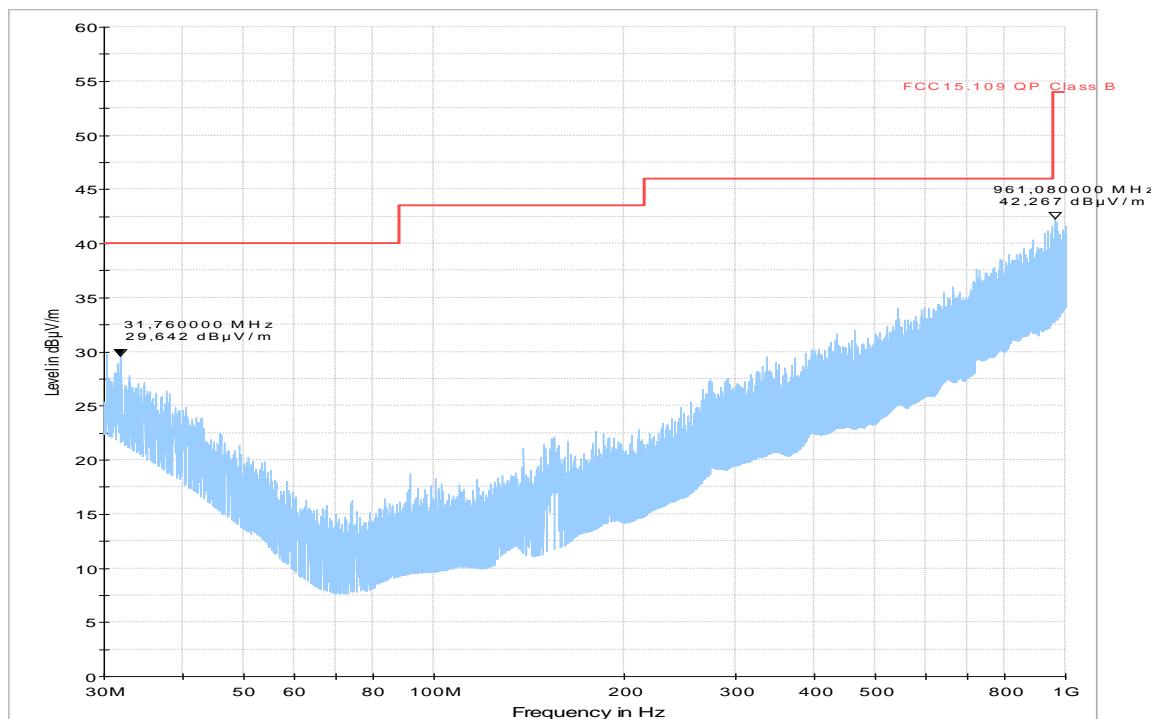
Band-Edge right, Step 1 & carrier field strength, channel 78



Band-Edge right, Step 2, channel 78

## 1.6. Radiated field strength (§15.109, Class B)

### 1.6.1. Radiated field strength ( $30\text{MHz} < f < 1\text{GHz}$ )



### 1.6.2. Radiated field strength (1GHz < f < 20GHz)

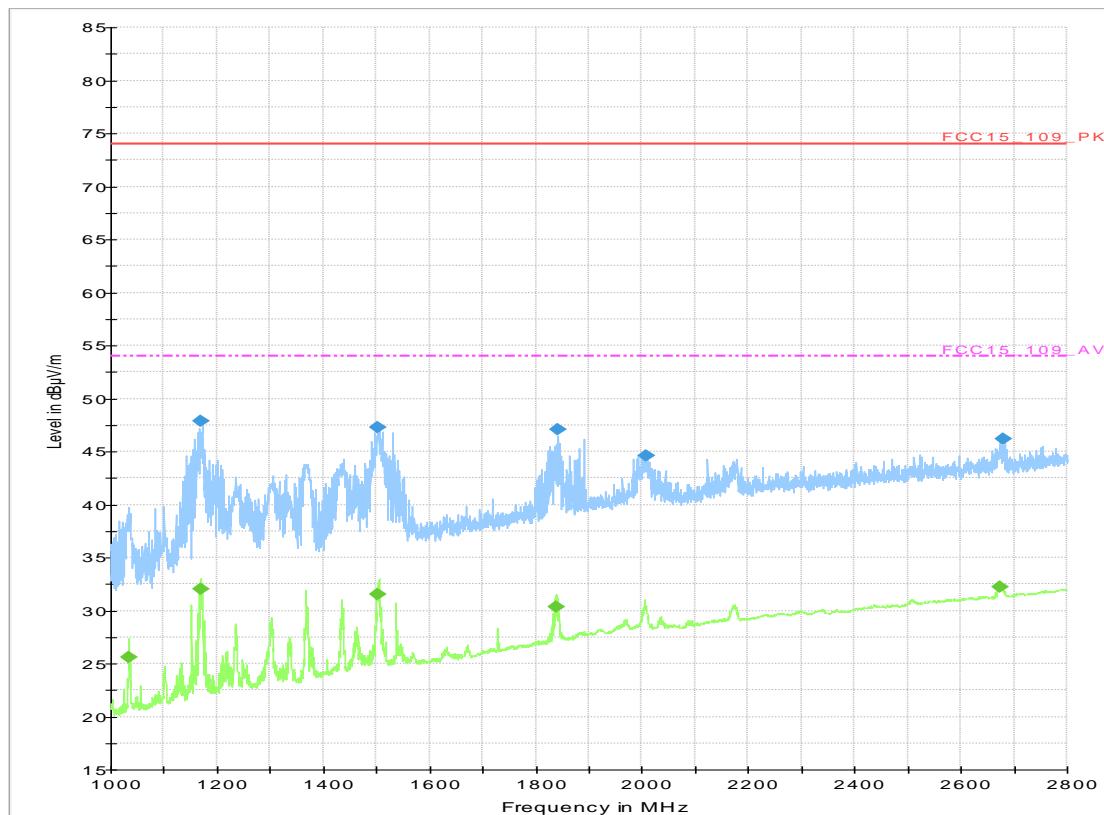


Diagram 2.22a – RX Mode channel 39

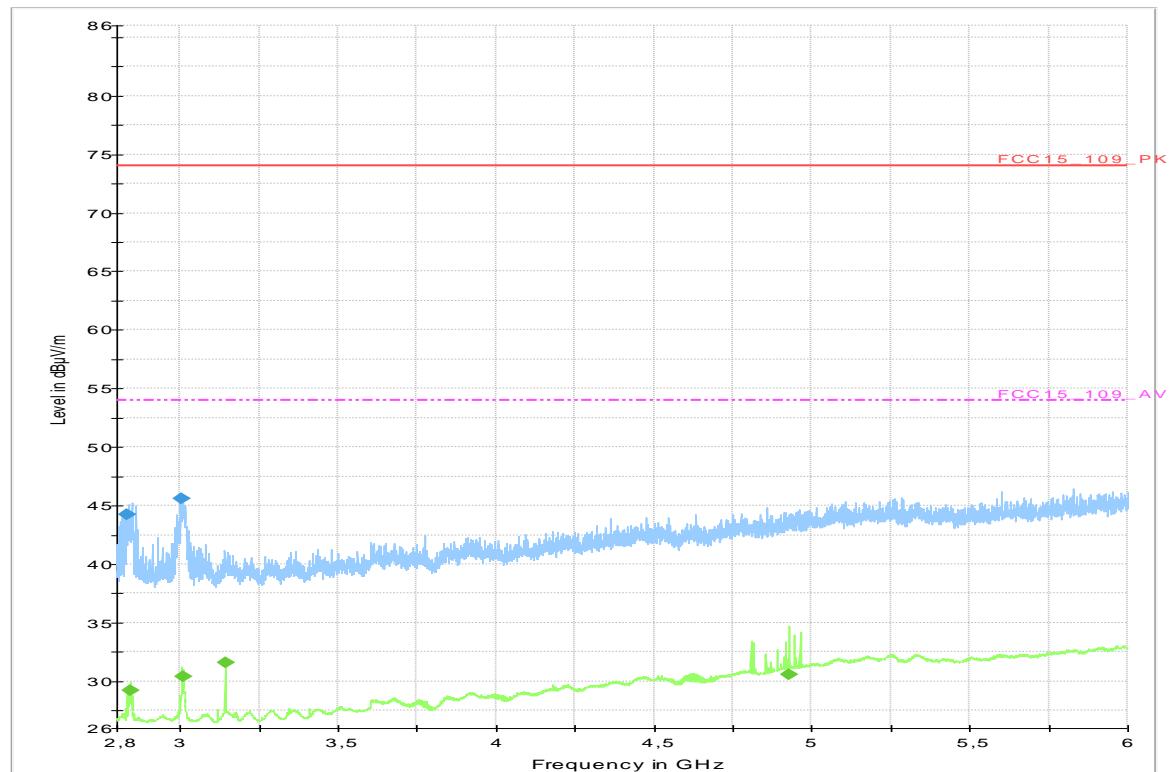


Diagram 2.22b – RX Mode channel 39 (1 to 6GHz)

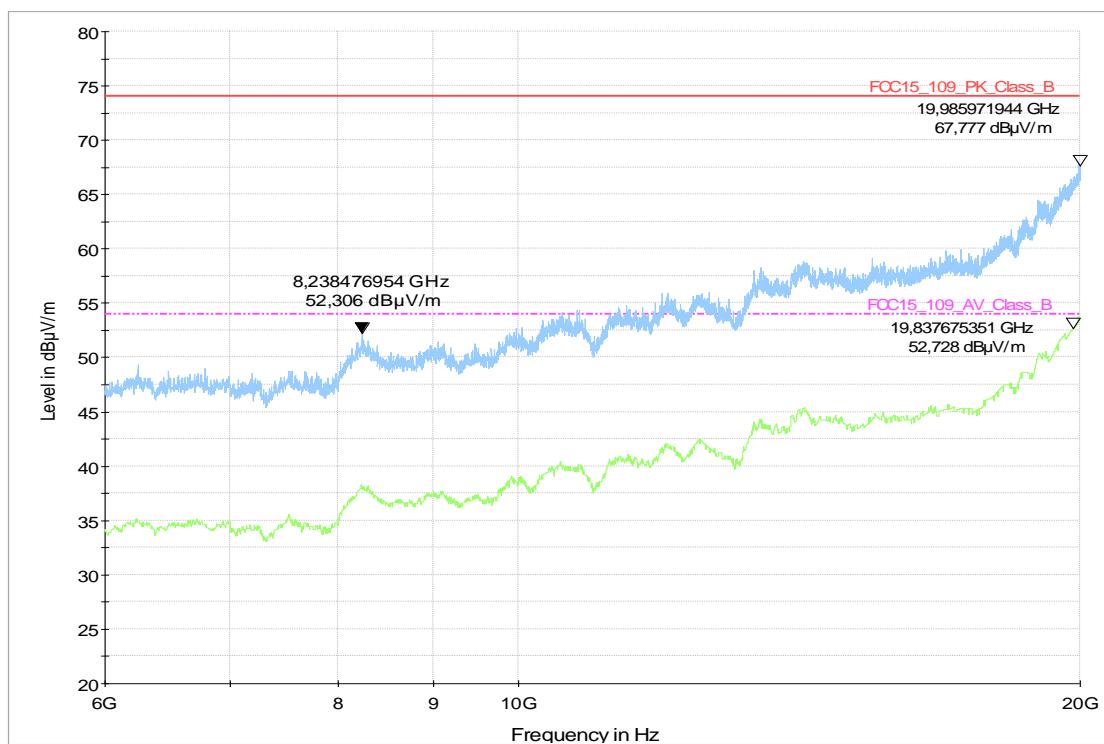
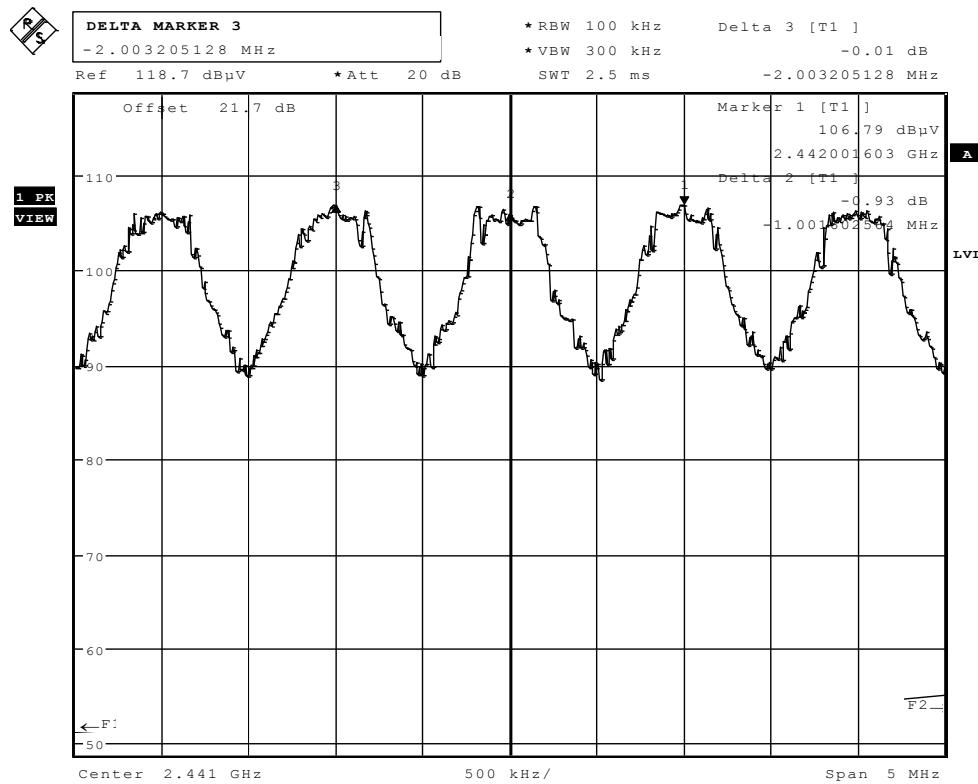


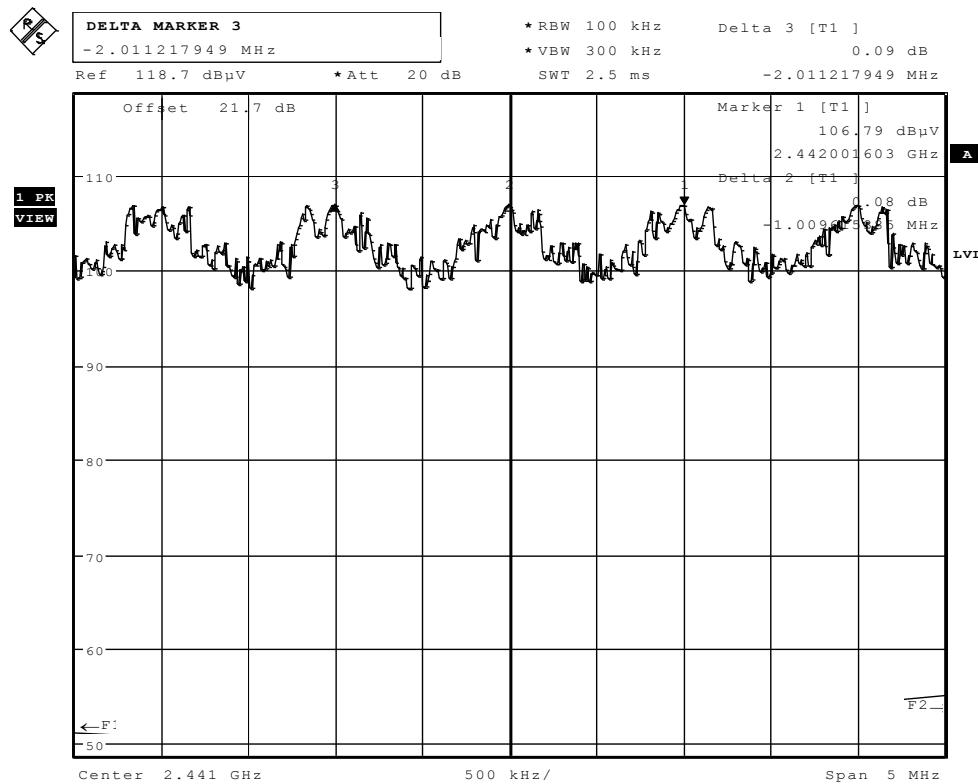
Diagram 2.22c – RX Mode channel 39 (6GHz to 20GHz)

## 1.7. Channel spacing



Date: 12.DEC.2011 15:02:48

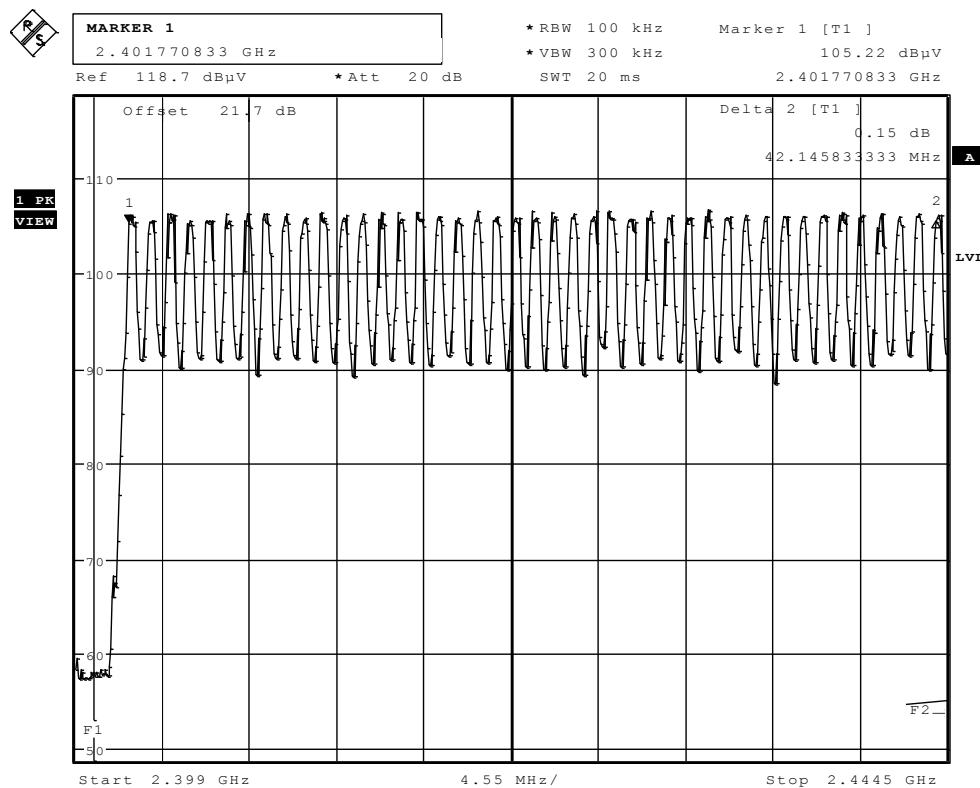
Diagram: Channel spacing with DH5 Packet type (view around middle channel)



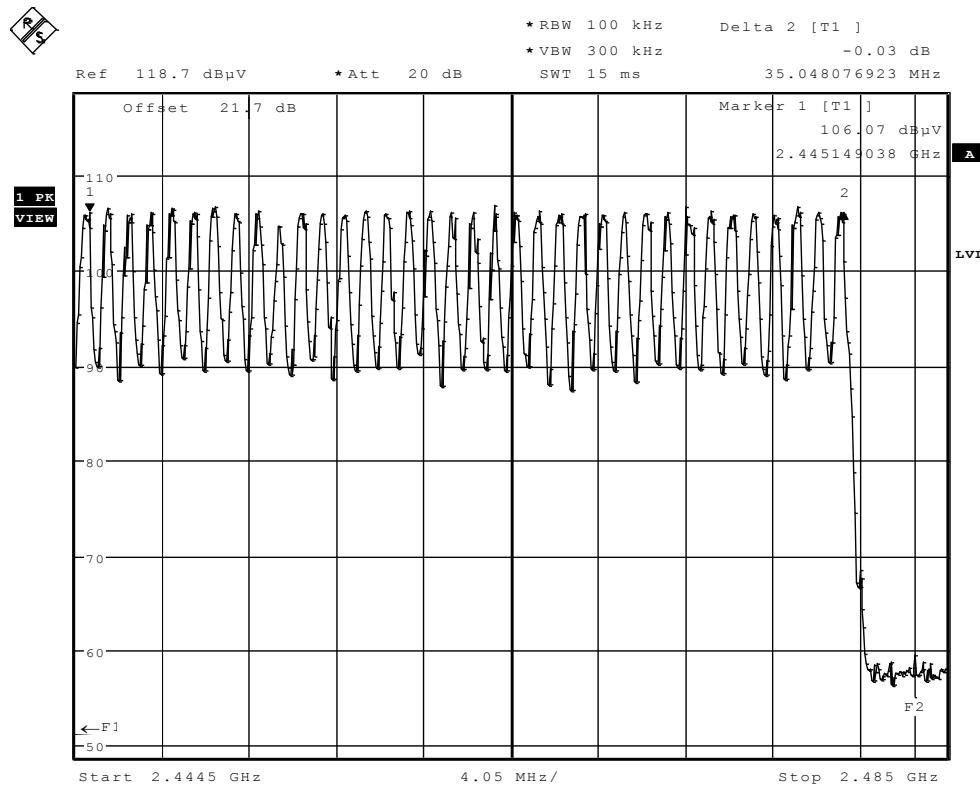
Date: 12.DEC.2011 14:59:21

Diagram: Channel spacing with 3DH1 Packet type (view around middle channel)

## 1.8. Number of hopping channels



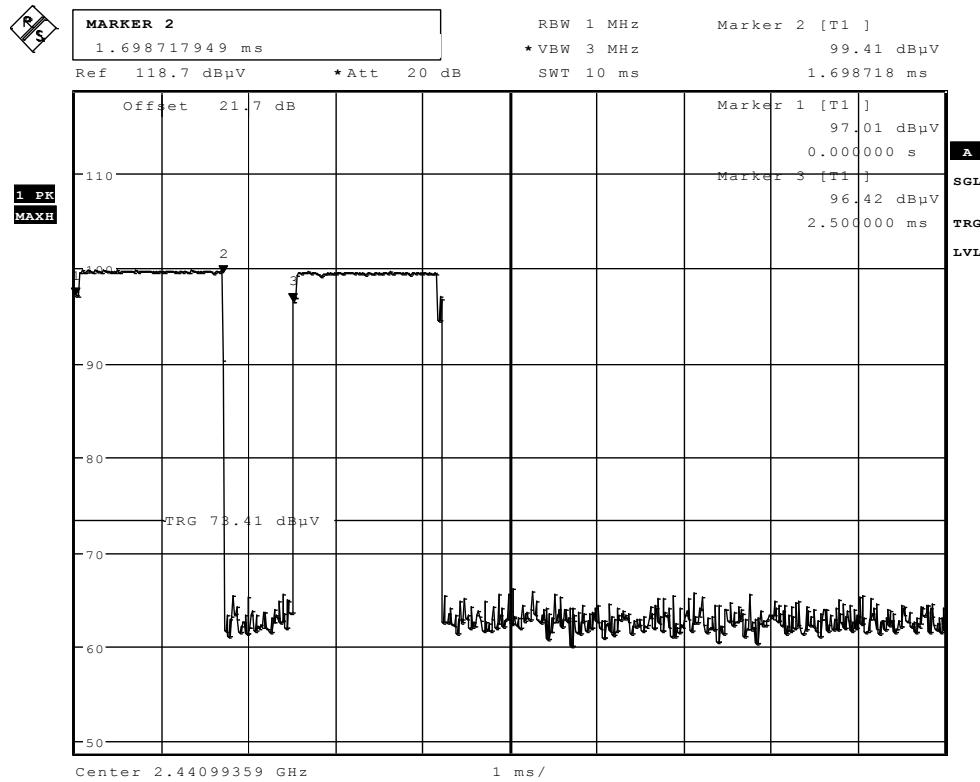
Date: 12.DEC.2011 15:10:30

**Diagram: Split screen 1**

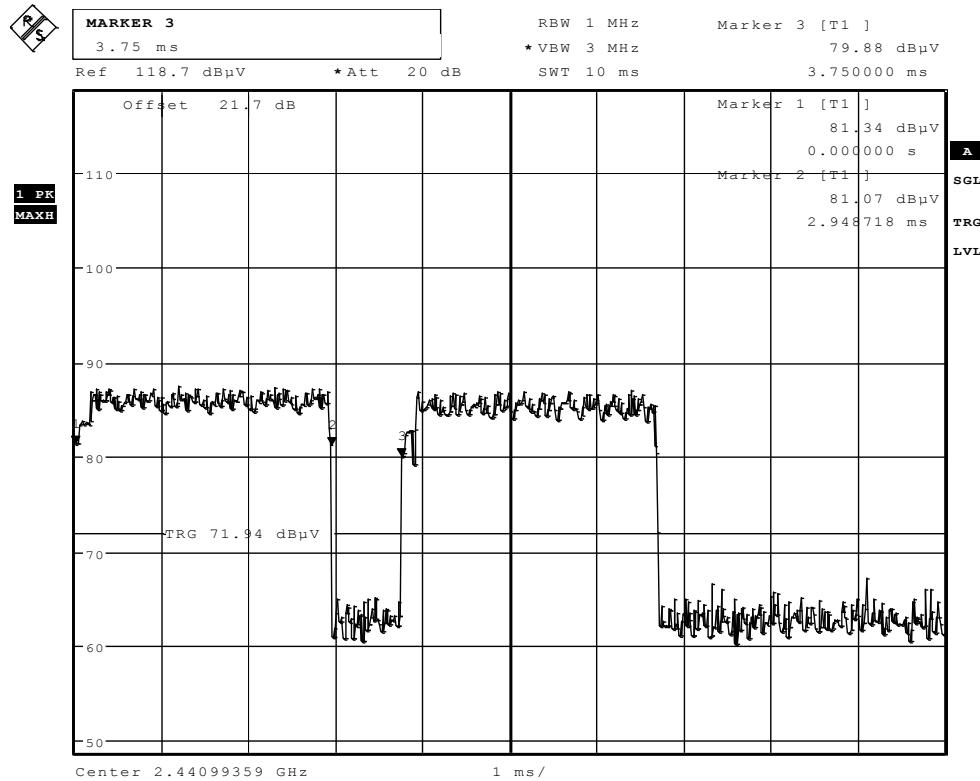
Date: 12.DEC.2011 15:17:35

**Diagram: Split screen 2**

### 1.9. Timing of hopping channels (Dwell-Time per channel)

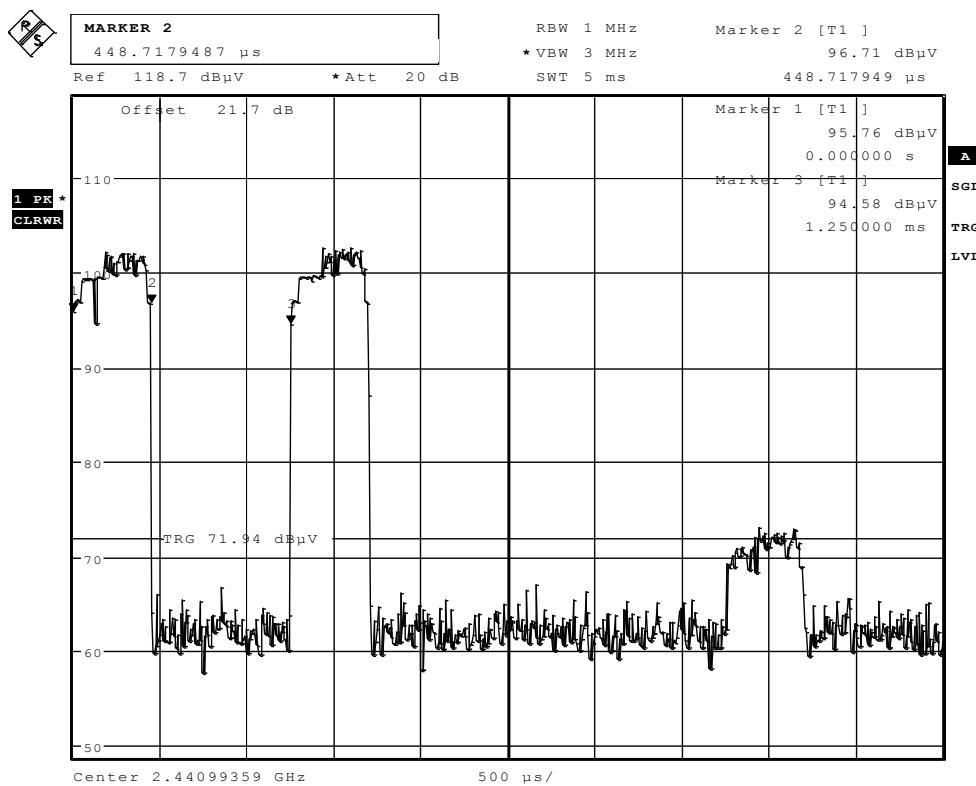


Date: 12.DEC.2011 16:09:50

**Diagram: DH3 packet type (channel 39)**

Date: 12.DEC.2011 16:07:27

**Diagram: 2DH5 packet type (channel 39)**



Date: 12.DEC.2011 16:04:59

**Diagram: 3DH1 packet type (channel 39)**