

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	 FEDERAL COMMUNICATIONS COMMISSION USA Reg. No.: 736496 MRA US-EU 0003	 Industry Canada 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
 AUTHORIZED RF LABORATORY	 LAB CODE 20011130-00		
accredited according to DIN EN ISO/IEC 17025			
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11.08

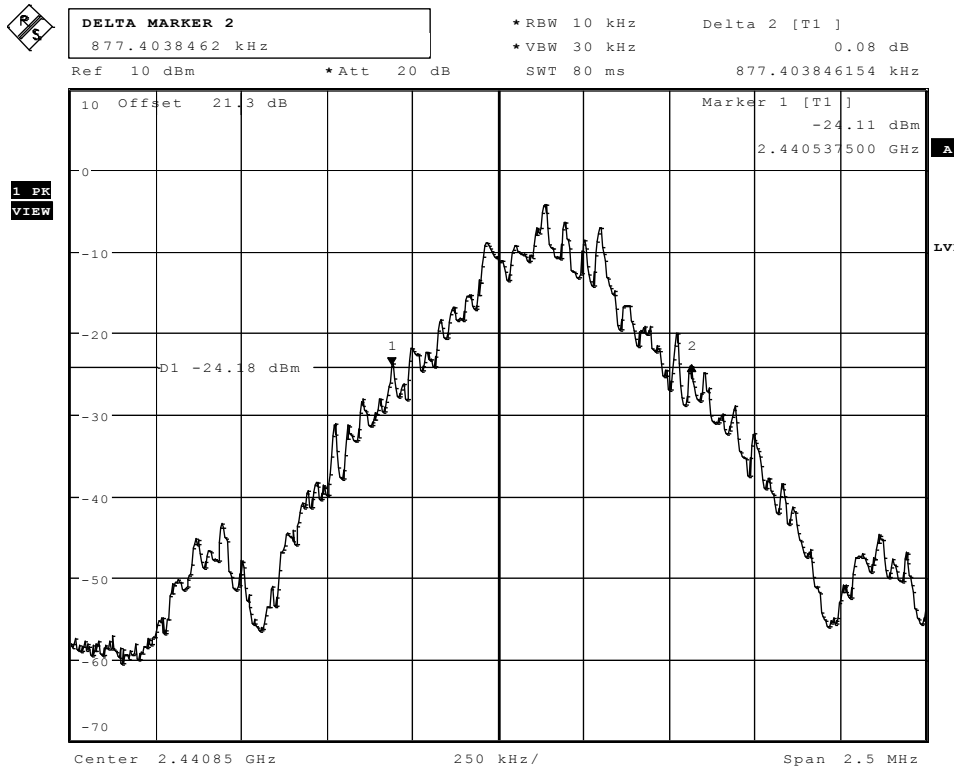
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1. Measurement diagrams

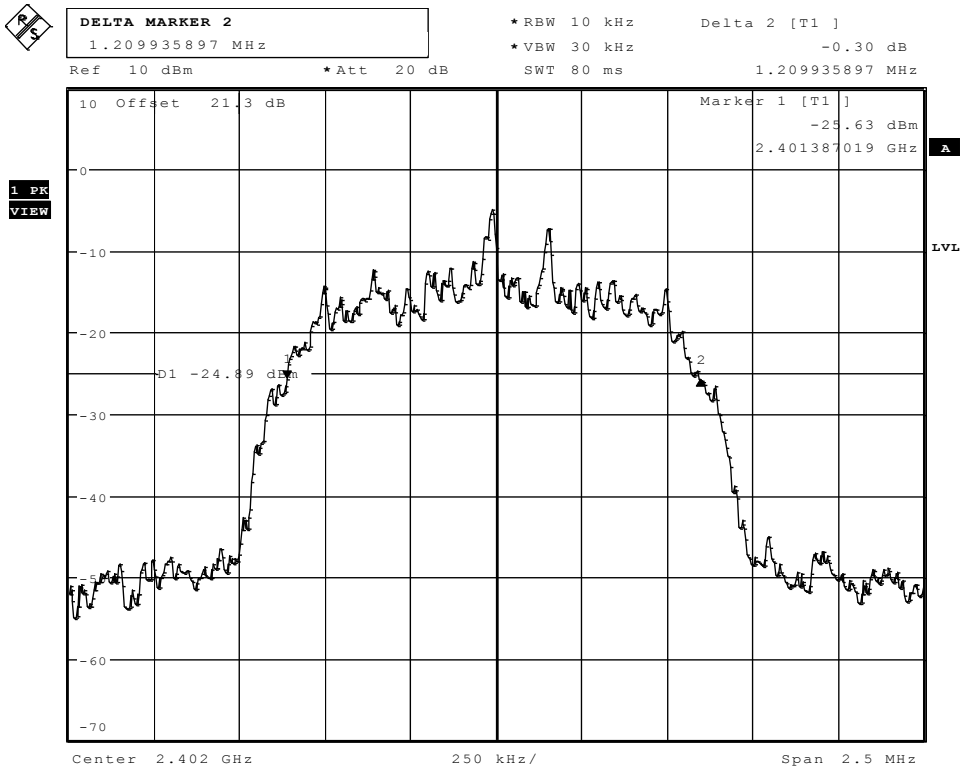
1.1. 20dB bandwidth

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.

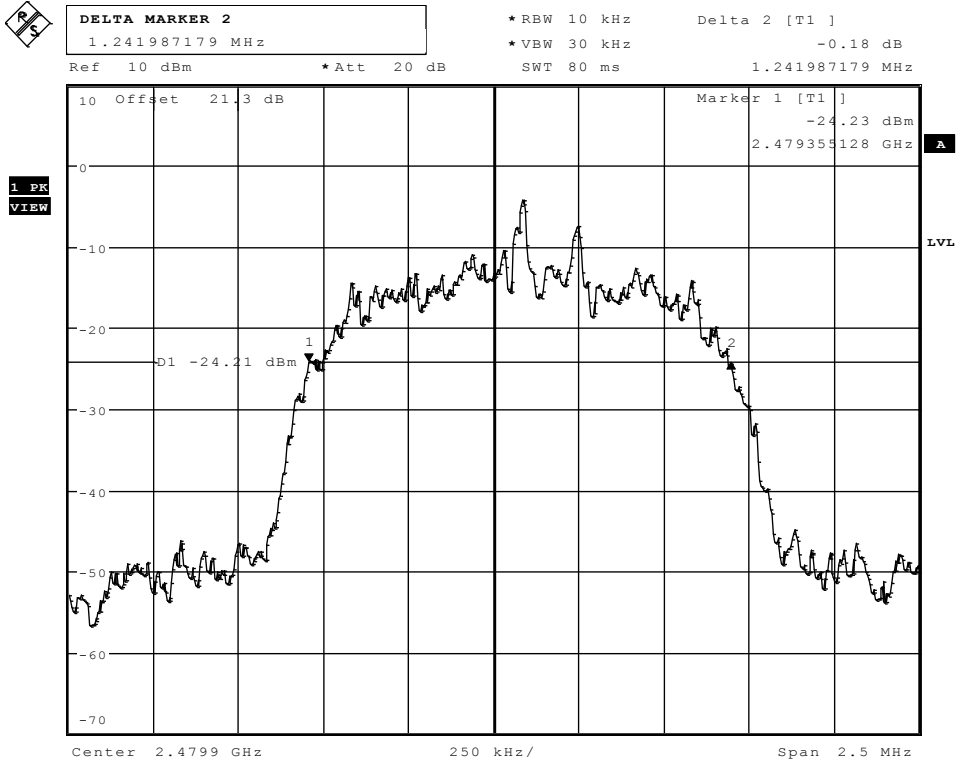
Modulation/ Packet type	20 dB Bandwidth [kHz]			Max Value
	Nominal Ch 0 =2402 MHz	Nominal Ch 39 = 2441MHz	Nominal Ch 78 = 2480MHz	
DH1	825,3205	825,3205	825,3205	877,4038
DH3	873,3974	873,3974	877,4038	
DH5	873,3974	877,4038	877,4038	
2DH1	1161,8589	1165,8653	1161,8589	1209,9358
2DH3	1209,9358	1205,9294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



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

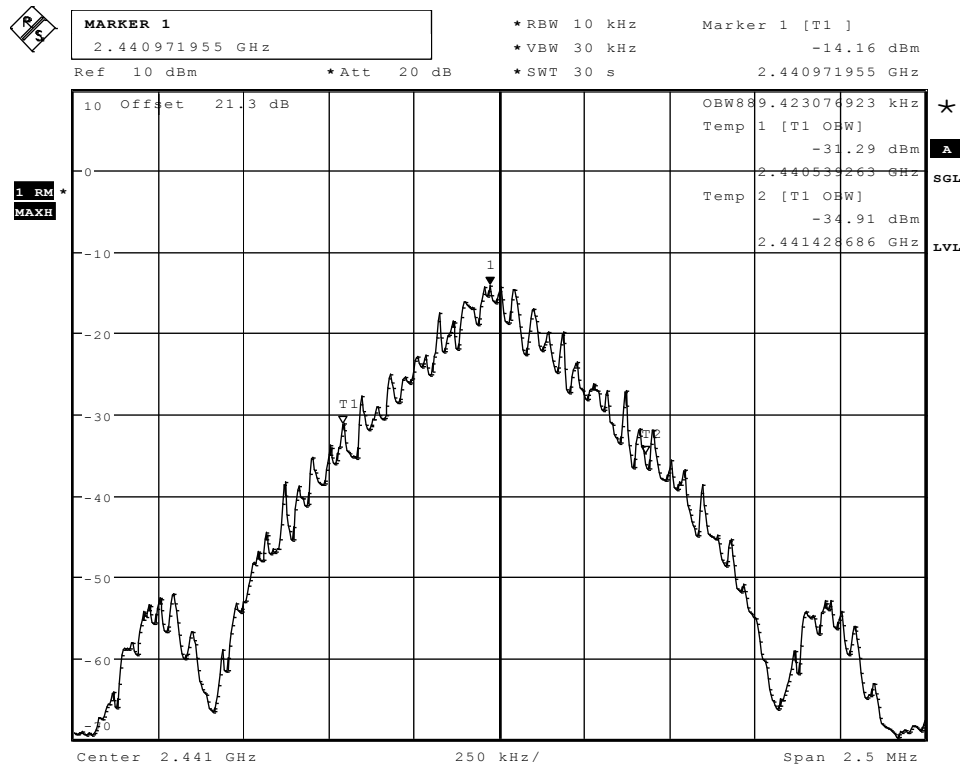


Date: 9.DEC.2011 14:04:08
3DH5 Packet type, Channel 78

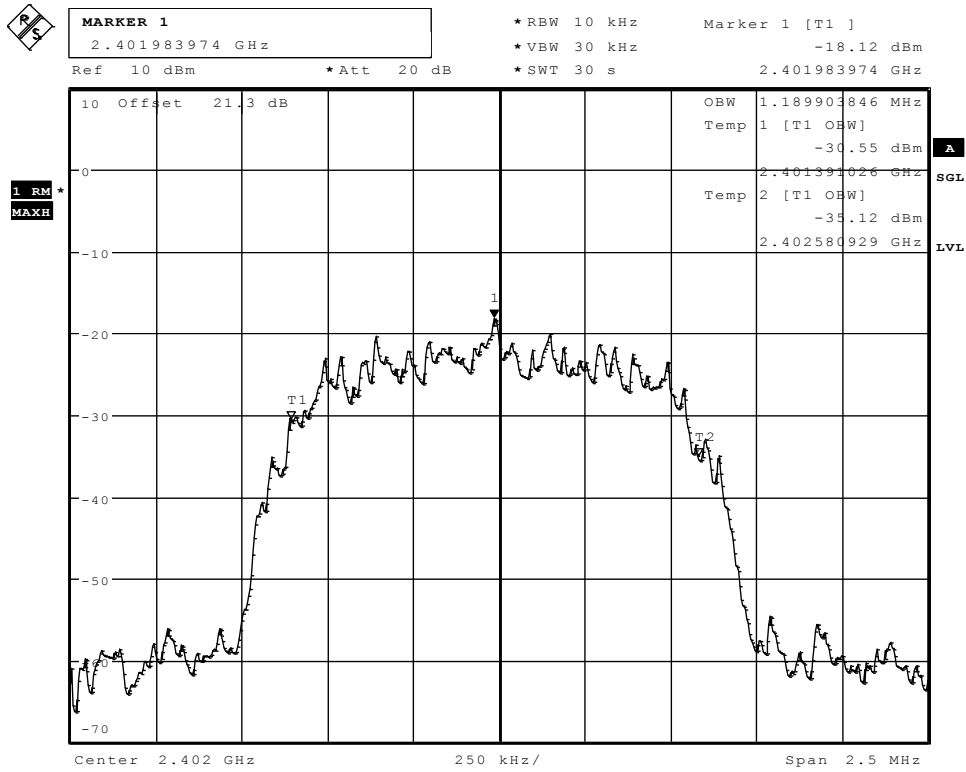
1.2. 99% Occupied bandwidth

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

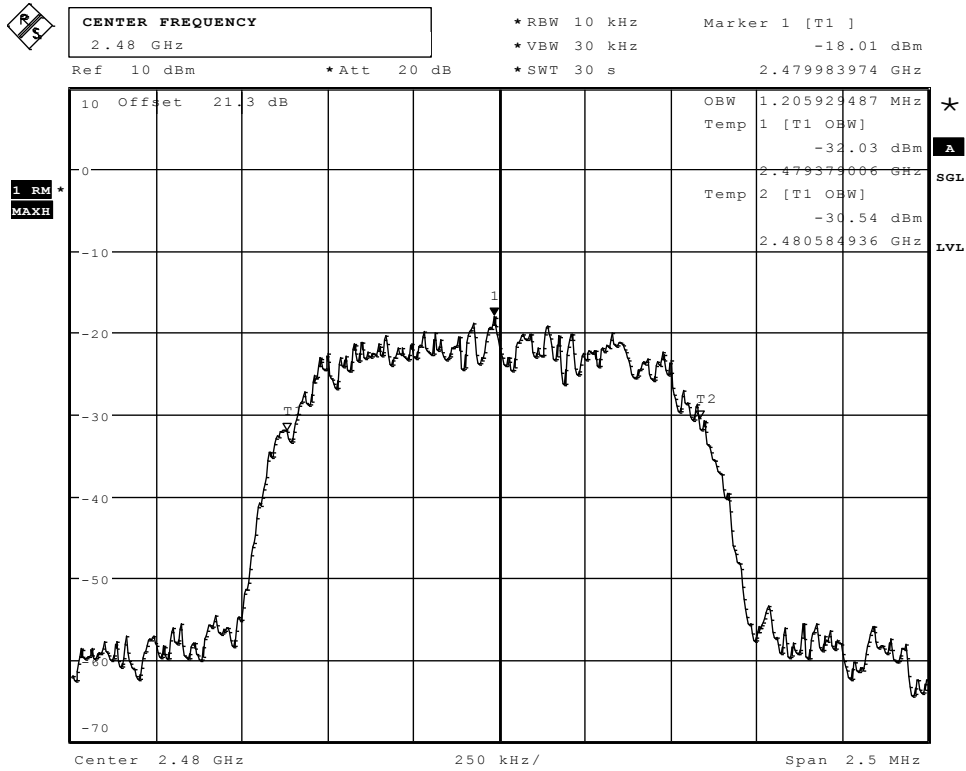
Modulation/ packet type	99% bandwidth [kHz]			Maximum value
	Nominal Ch 0 =2402 MHz	Nominal Ch 39 =2441MHz	Nominal Ch 78 =2480MHz	
DH				
DH3				
DH5		889,4230	889,4230	
2DH				
2DH3	1189,9038			
2DH5				1205,93
3DH				
3DH2				
3DH5			1205,9294	



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



Date: 9.DEC.2011 14:10:22
2DH3 Packet type, Channel 0

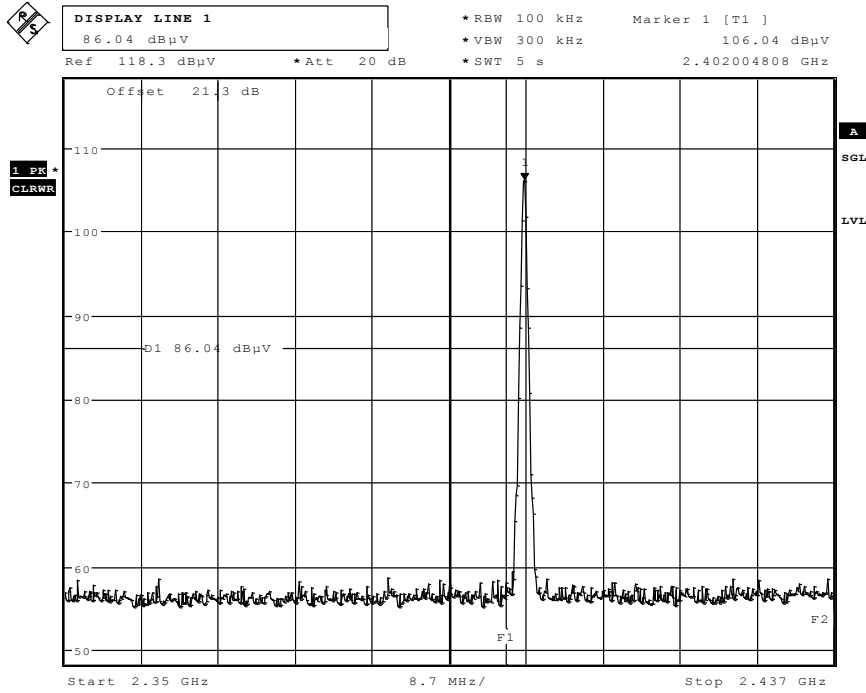


Date: 9.DEC.2011 14:07:25
3DH5 Packet type, channel 78

1.3. 20dBc conducted emissions

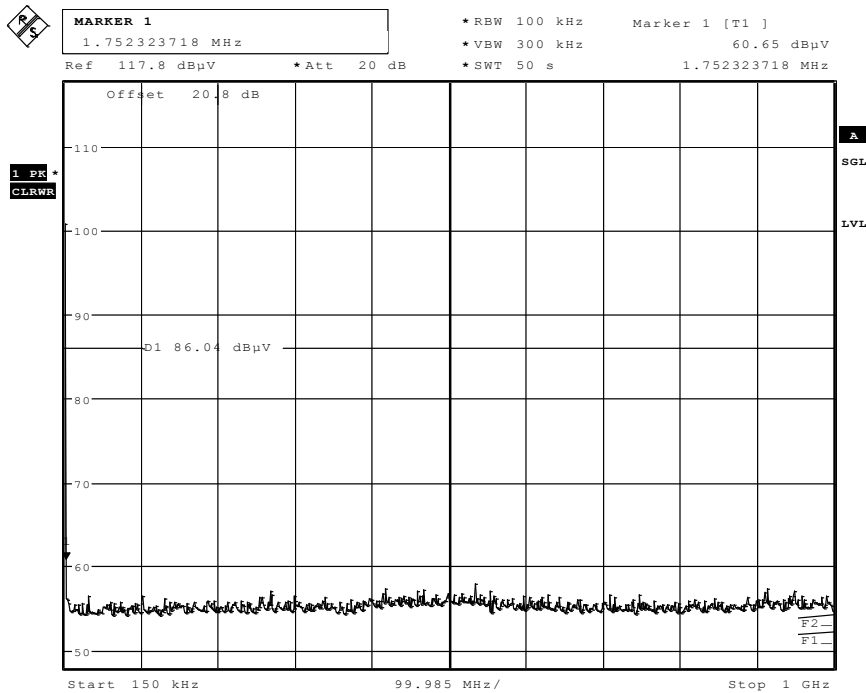
Tests have been performed at maximum measured power level of each modulation type. Pls. compare chapter conducted power for each worst-case. In addition the lowest and highest channel was checked against 20dBc compliance at the relevant band-edge.

1.3.1. DH1 modulation



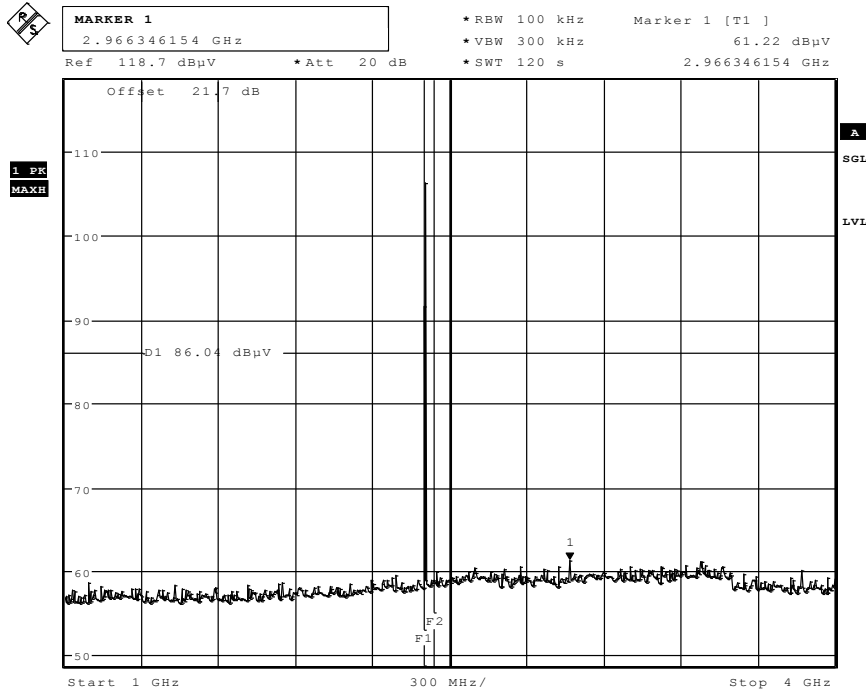
Date: 12.DEC.2011 13:24:32

In-BAND reference value for channel 0



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

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

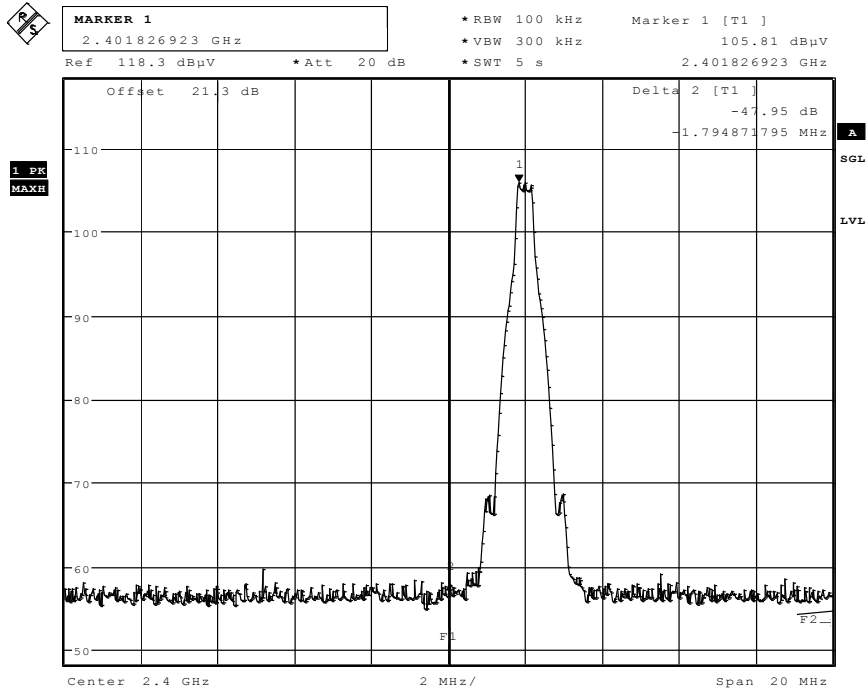


Date: 12.DEC.2011 13:32:52

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

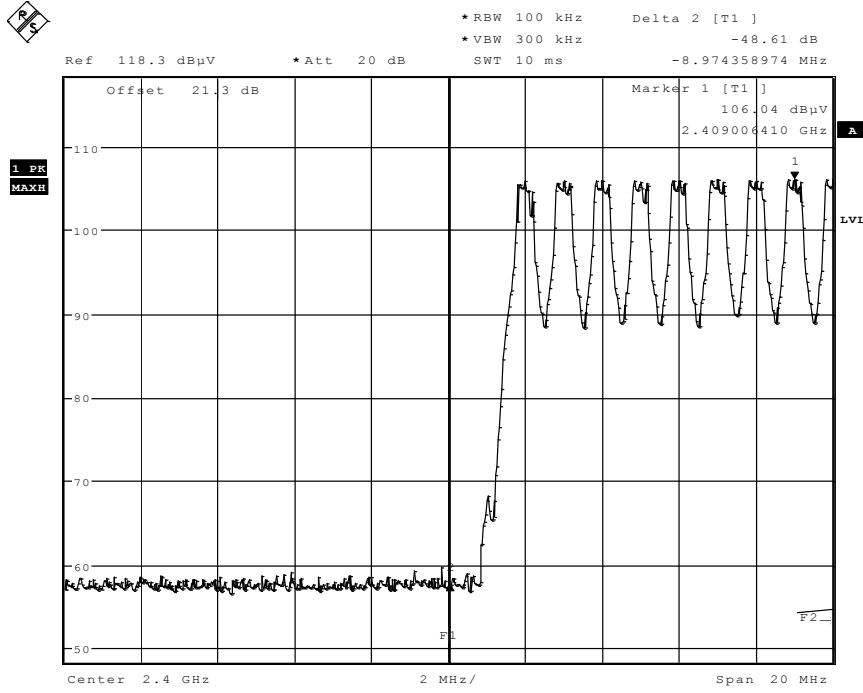
The Frequency range 4 to 18GHz: radiated measurement

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



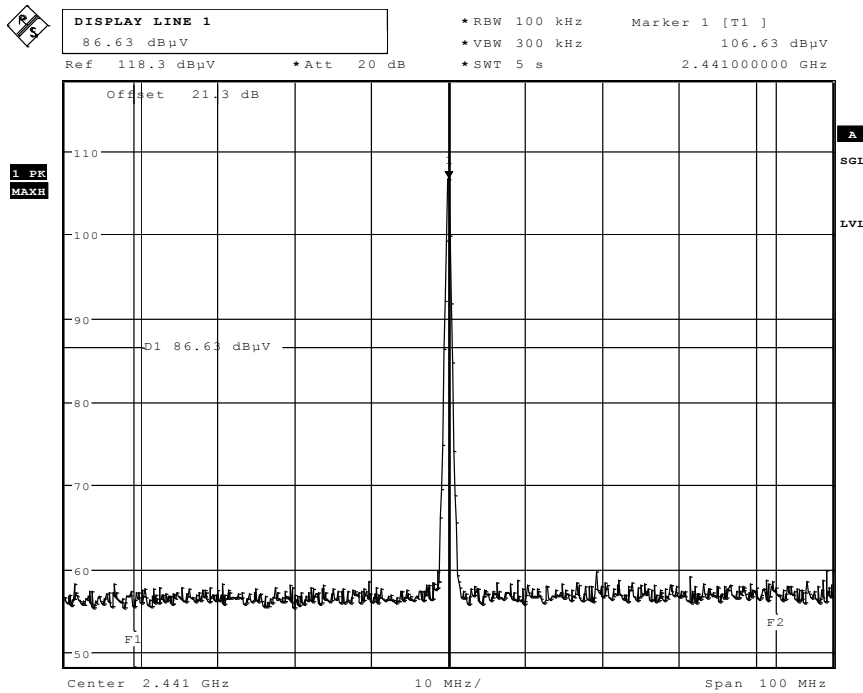
Date: 12.DEC.2011 14:10:49

Band-Edge left (no hopping)



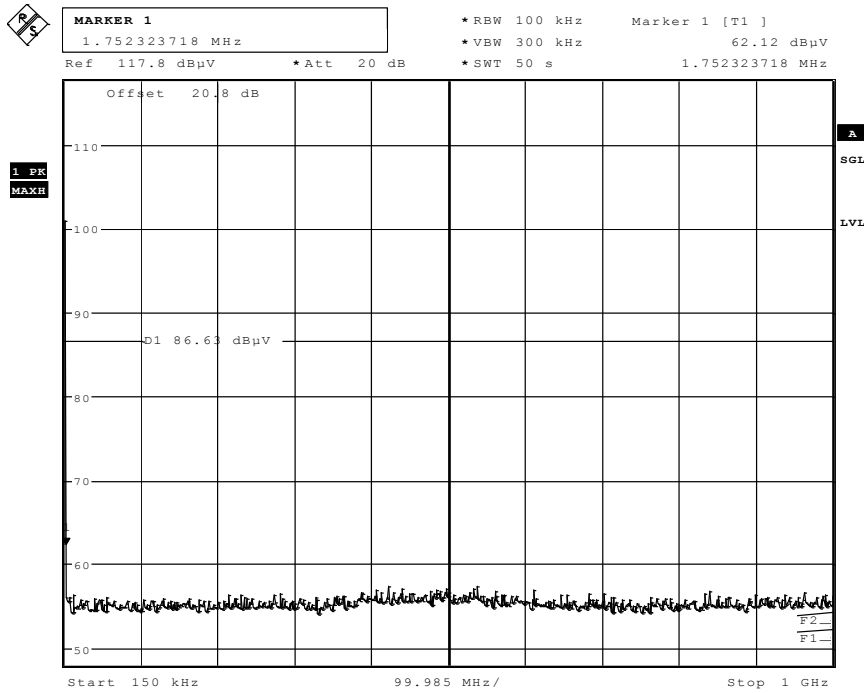
Date: 12.DEC.2011 14:08:48

Band-Edge left (hopping mode)



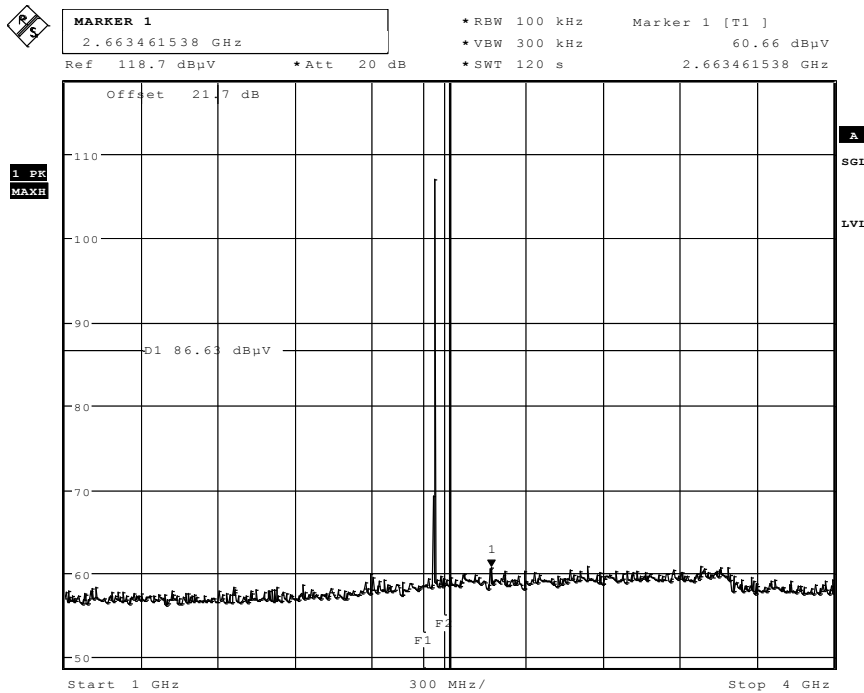
Date: 12.DEC.2011 13:35:44

In-BAND reference value for channel 39



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

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

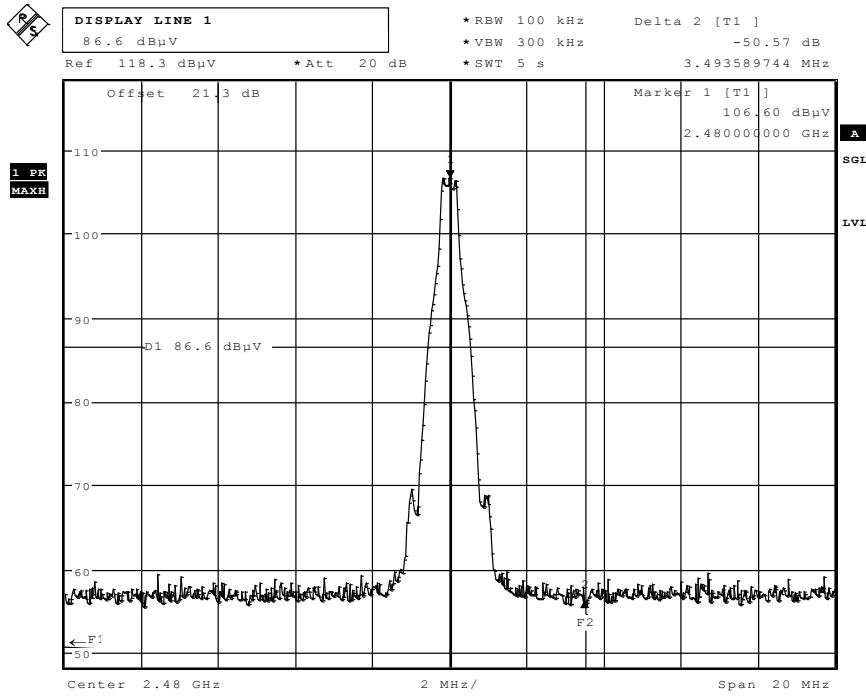


Date: 12.DEC.2011 13:41:28

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

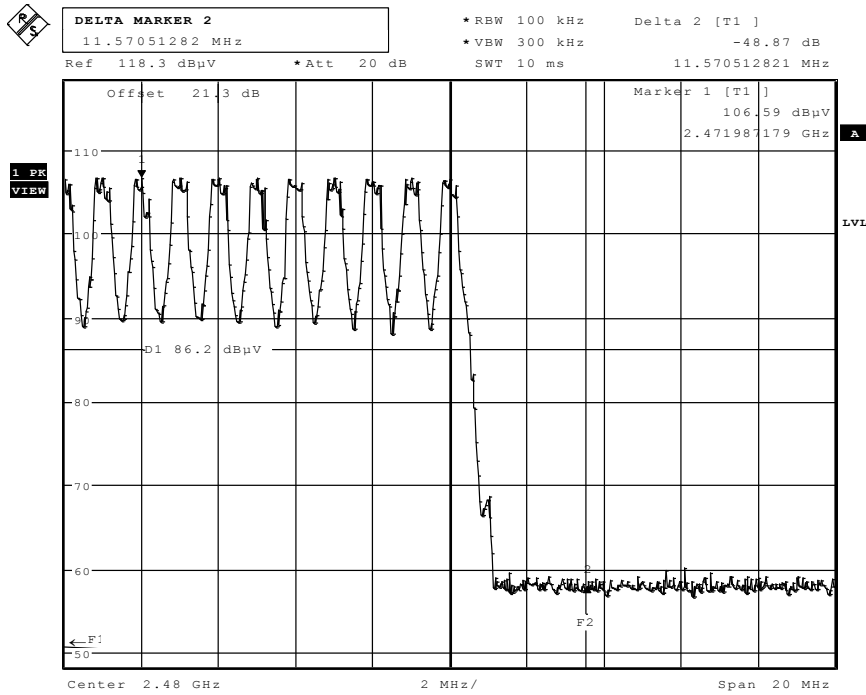
The Frequency range 4 to 18GHz: radiated measurement

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



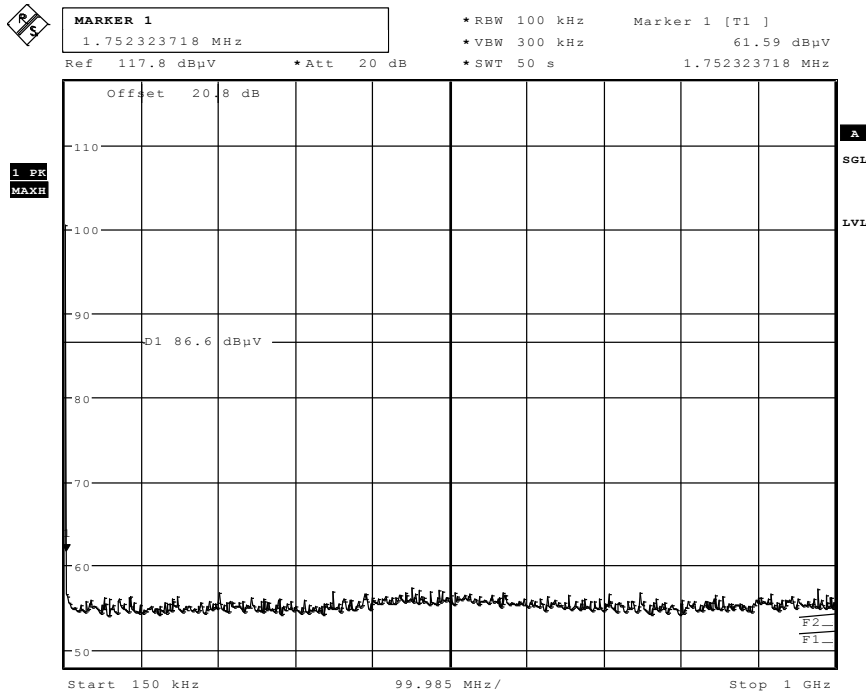
Date: 12.DEC.2011 13:44:46

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



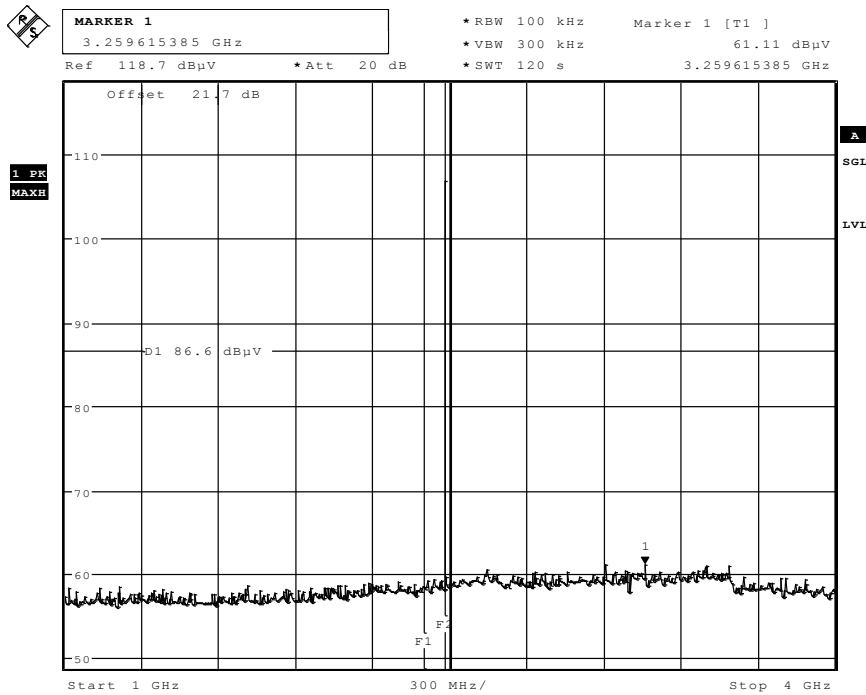
Date: 12.DEC.2011 13:57:49

Band-Edge right (hopping mode)



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

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



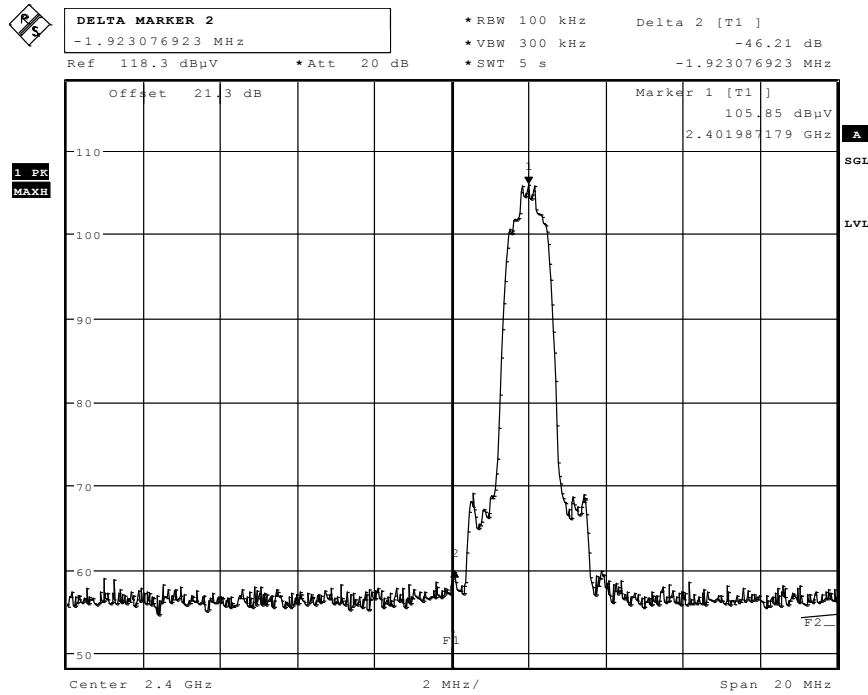
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Sweep 2: Channel 78 (1GHz to 4GHz)

The Frequency range 4 to 18GHz: radiated measurement

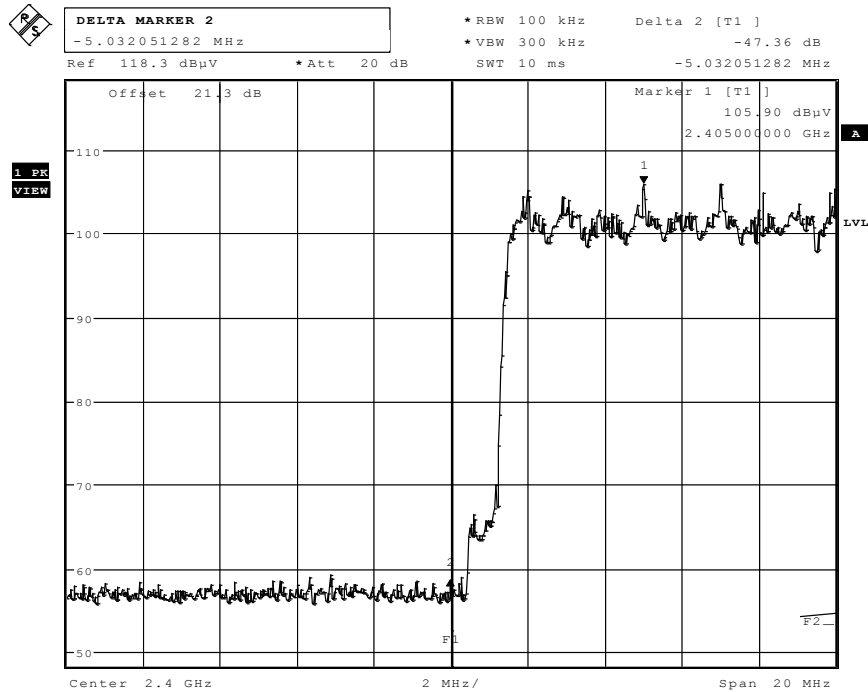
Sweep 3: Channel 78 (4GHz to 18GHz) – not performed, 3DH1 modulation performed instead

1.3.2. 2DHS modulation



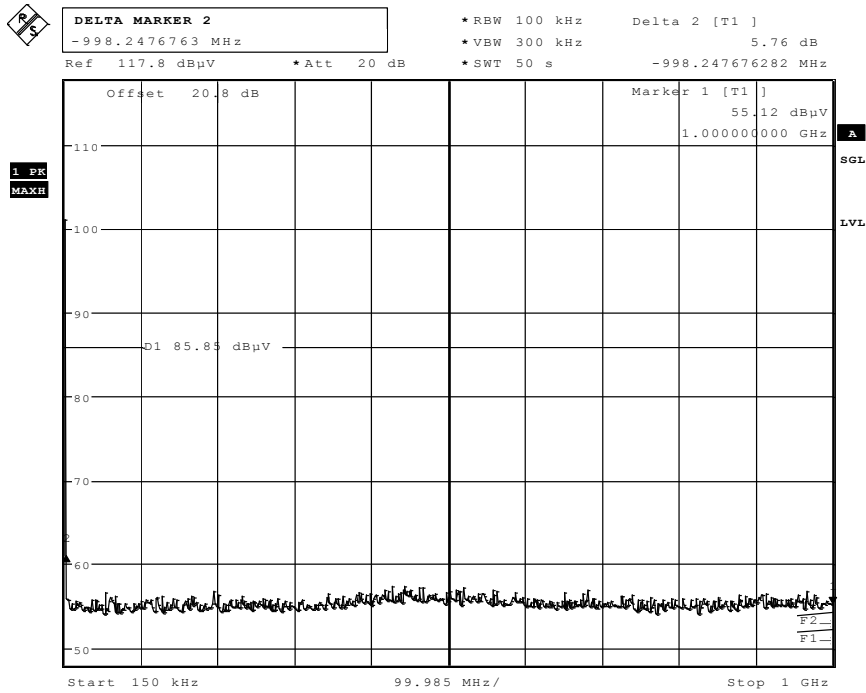
Date: 12.DEC.2011 14:14:00

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

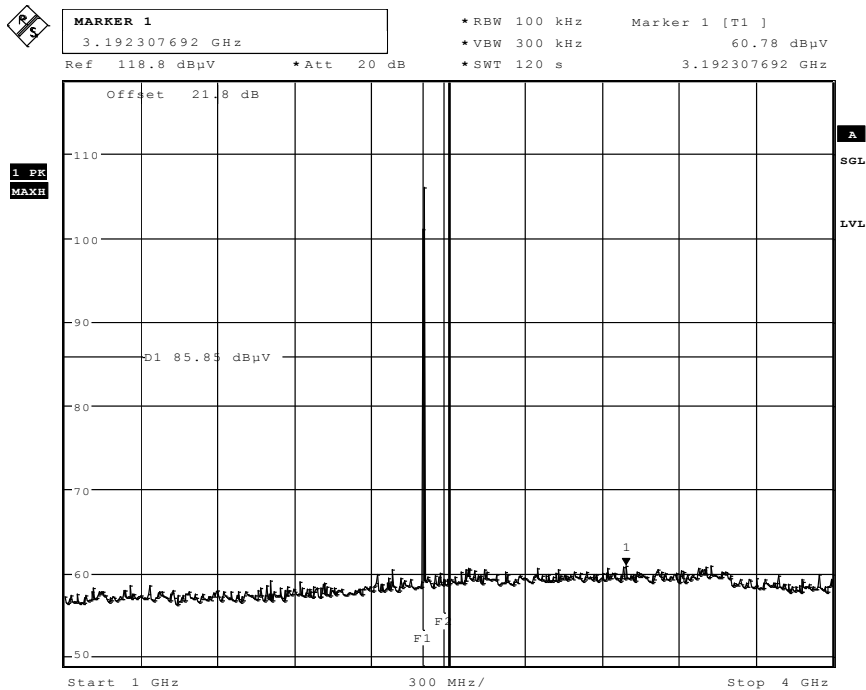


Date: 12.DEC.2011 14:26:02

Band-Edge left (hopping mode)



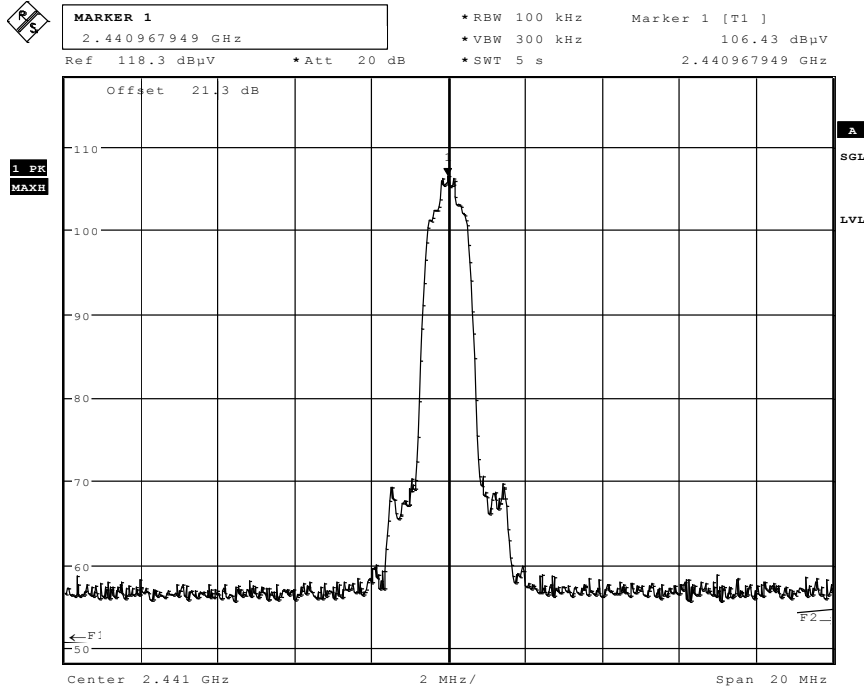
Date: 12.DEC.2011 14:19:07
Sweep 1: Channel 0 (150kHz to 1GHz)



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

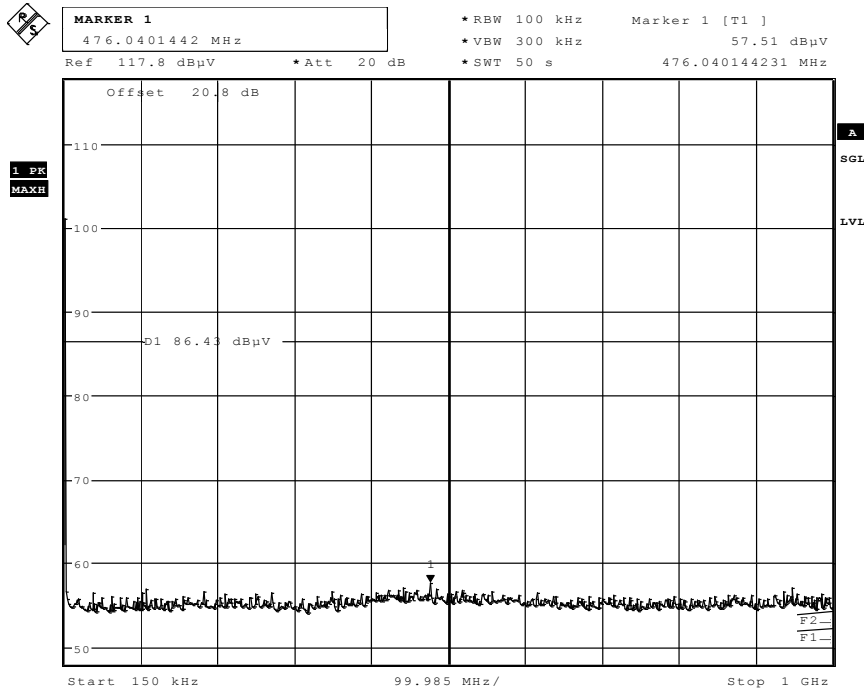
The Frequency range 4 to 18GHz: radiated measurement

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



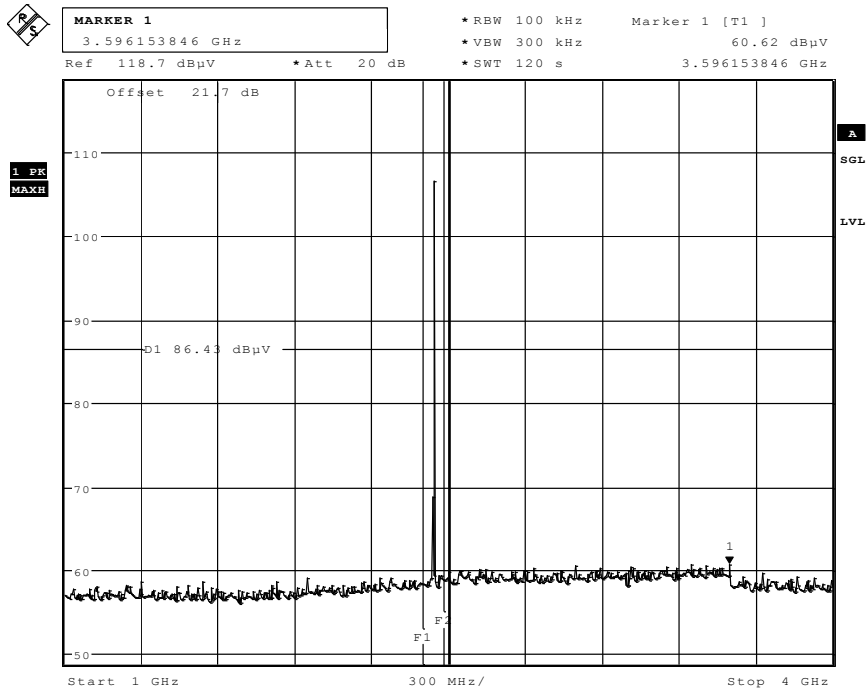
Date: 12.DEC.2011 14:45:27

In-Band reference value for channel 39



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

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

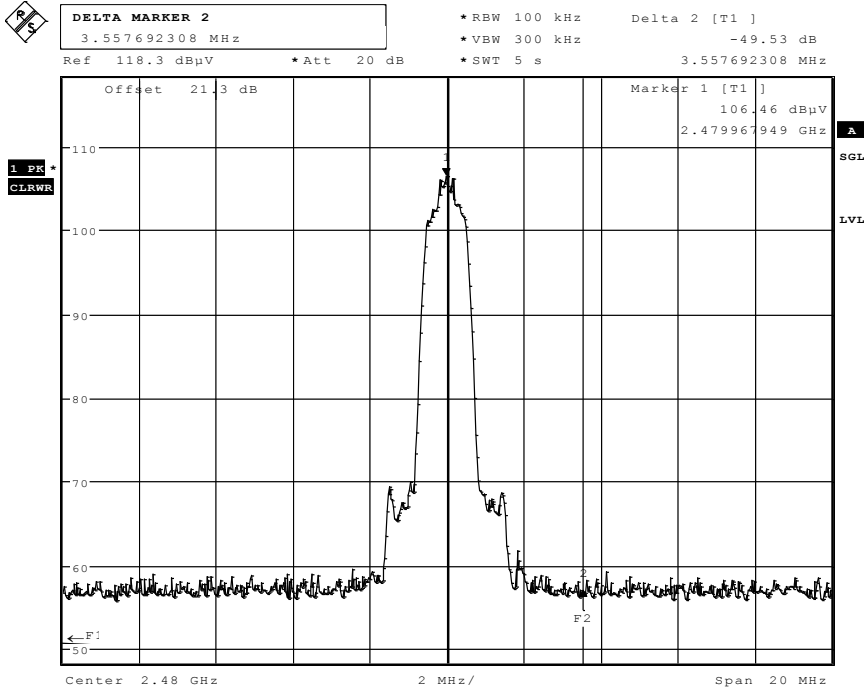


Date: 12.DEC.2011 14:51:10

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

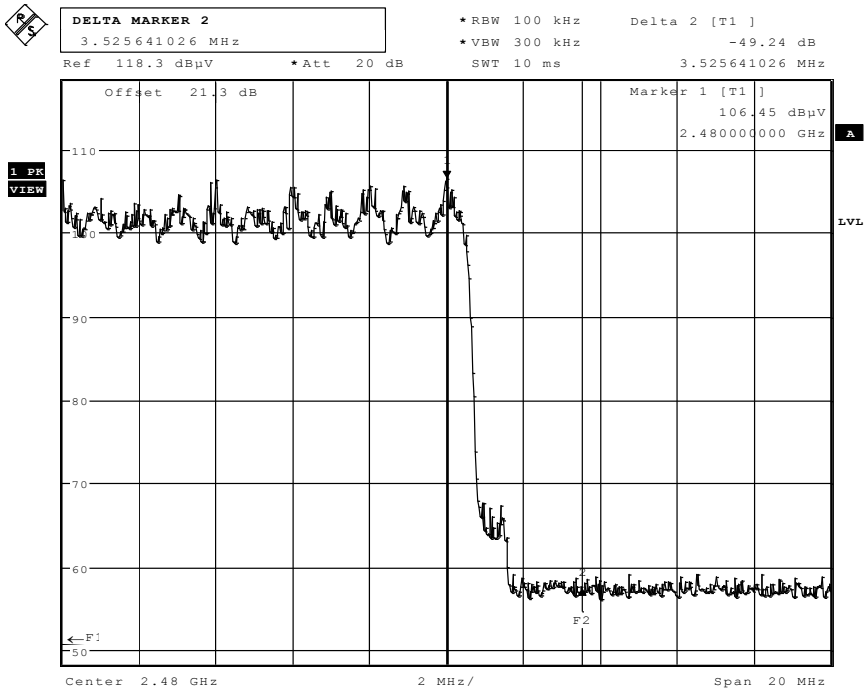
The Frequency range 4 to 18GHz: radiated measurement

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



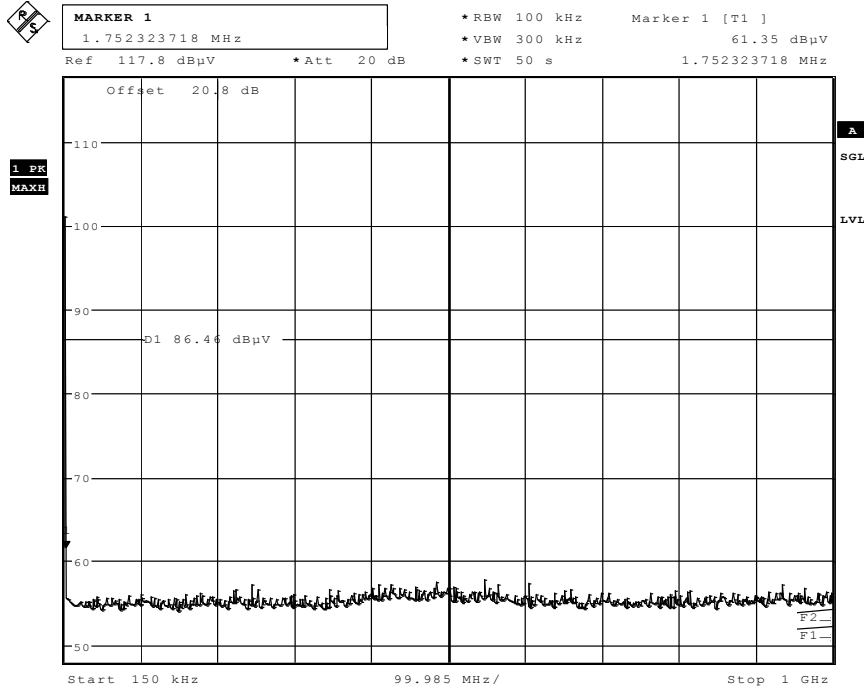
Date: 12.DEC.2011 14:35:05

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



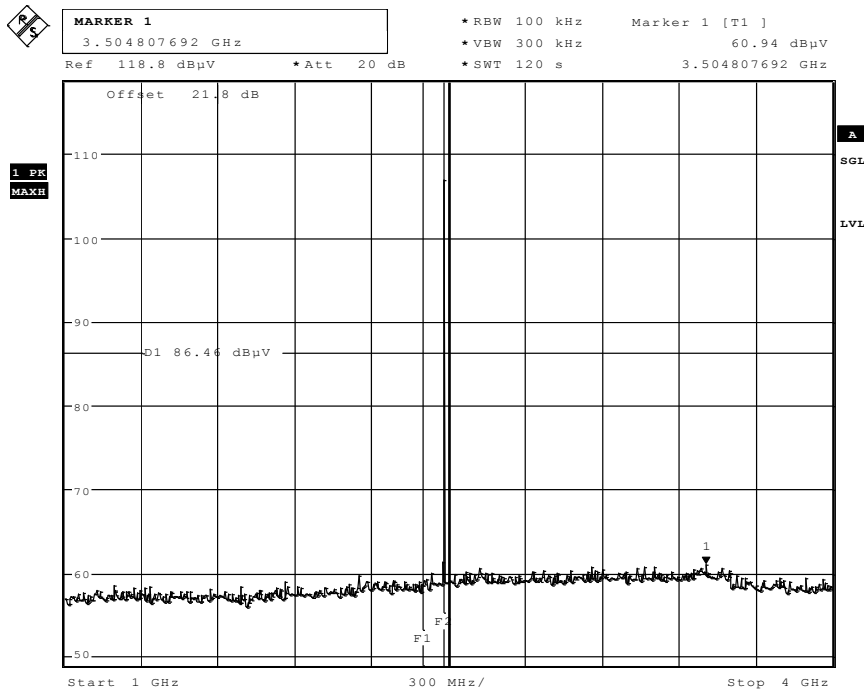
Date: 12.DEC.2011 14:37:22

Band-Edge right (hopping mode)



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

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



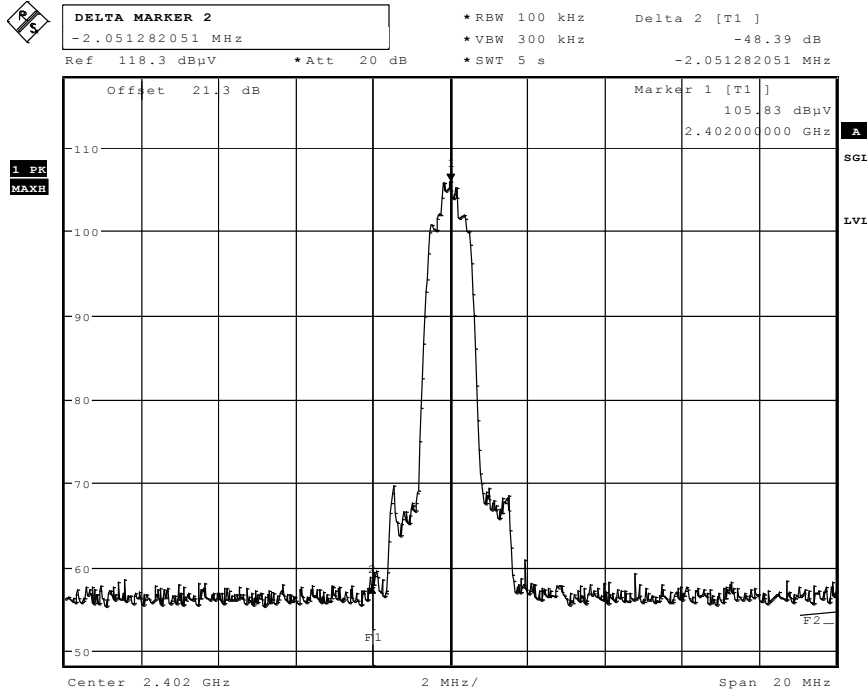
Date: 12.DEC.2011 14:44:15

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

The Frequency range 4 to 18GHz: radiated measurement

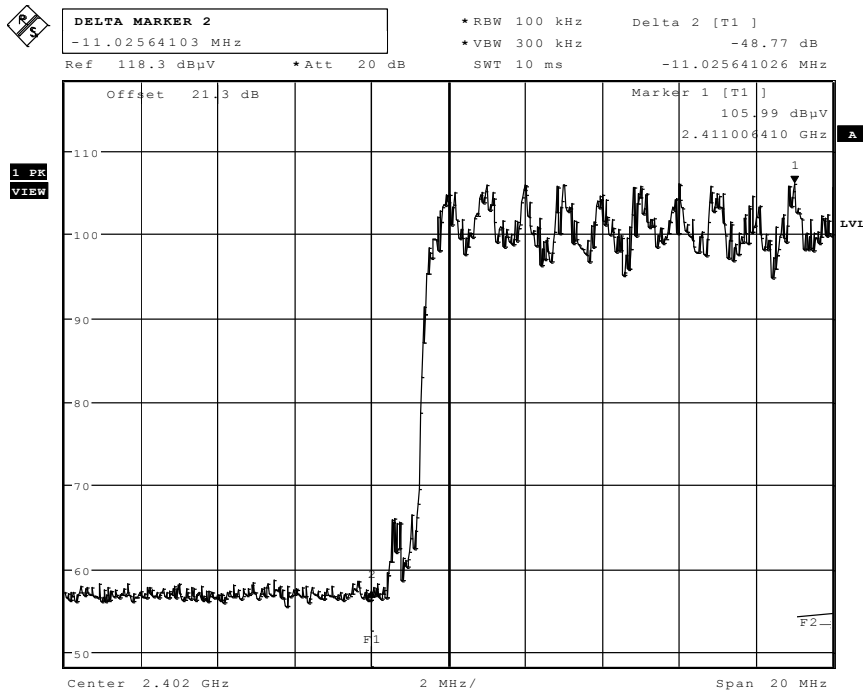
Sweep 3: Channel 78 (4GHz to 18GHz) – not performed, 3DH1 modulation performed instead

1.3.3. 3DH1 modulation



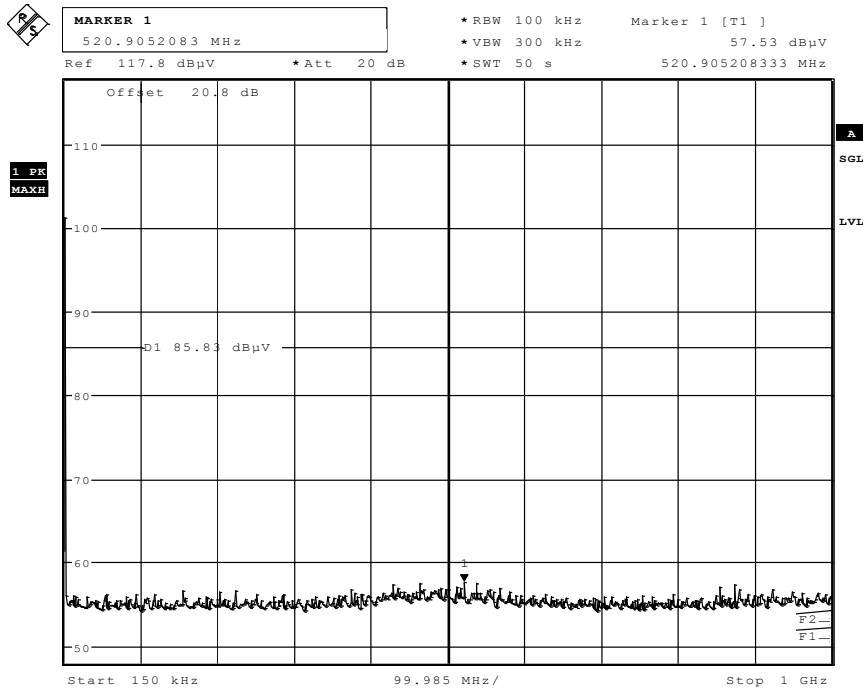
Date: 12.DEC.2011 15:26:08

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



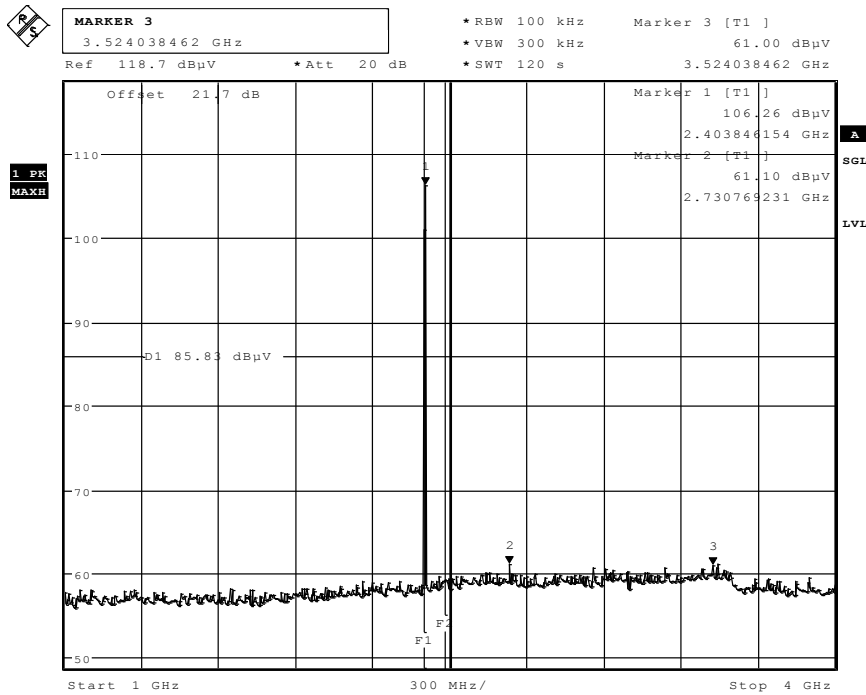
Date: 12.DEC.2011 15:29:43

Band-Edge left (hopping mode)



Date: 12.DEC.2011 15:52:07

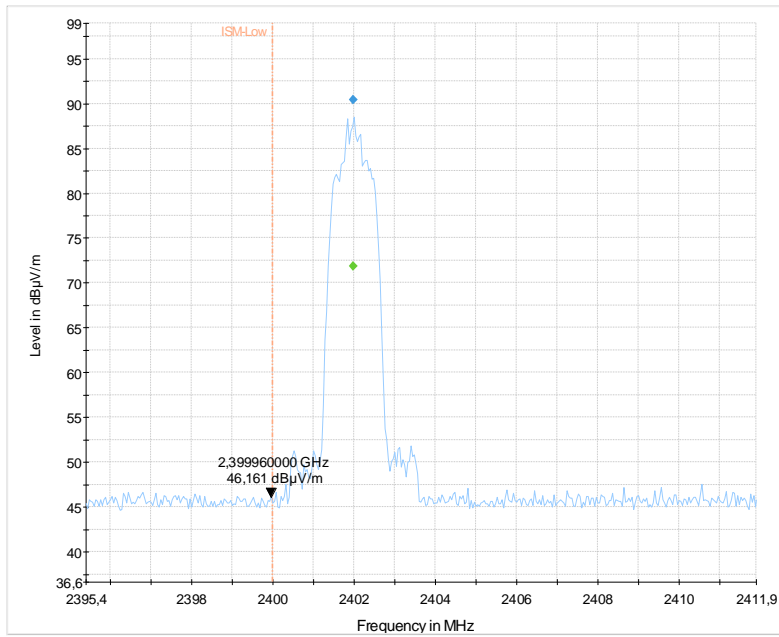
Sweep 1: Channel 0 (150kHz to 1GHz)



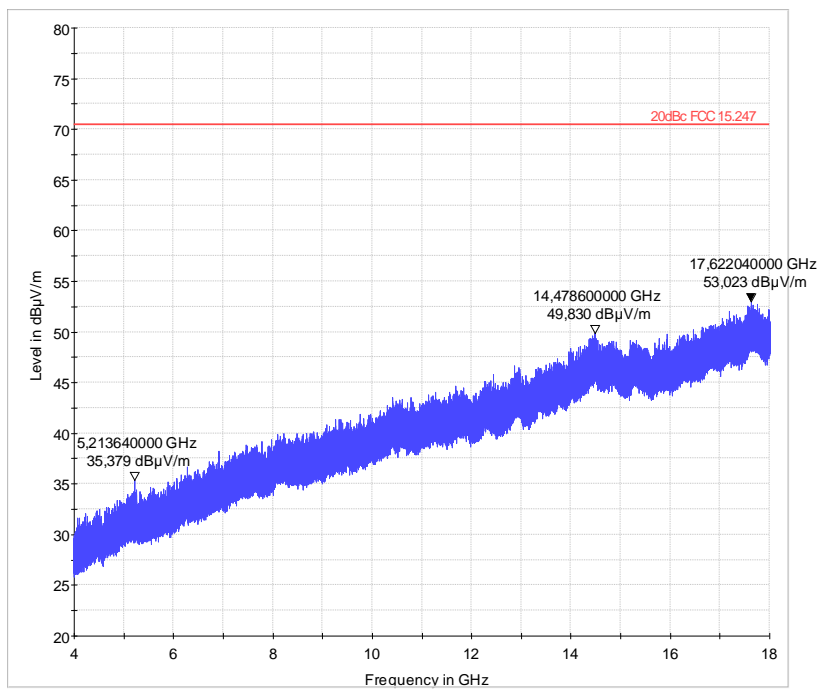
Date: 12.DEC.2011 15:49:53

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

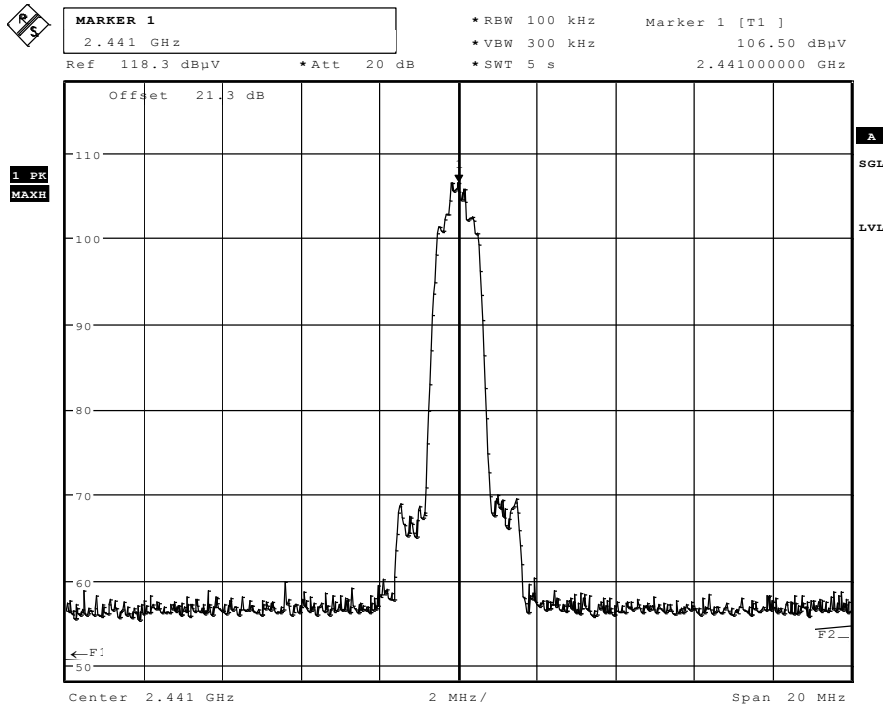
The Frequency range 4 to 18GHz: **radiated** measurement



In-Band radiated measurement – channel 0

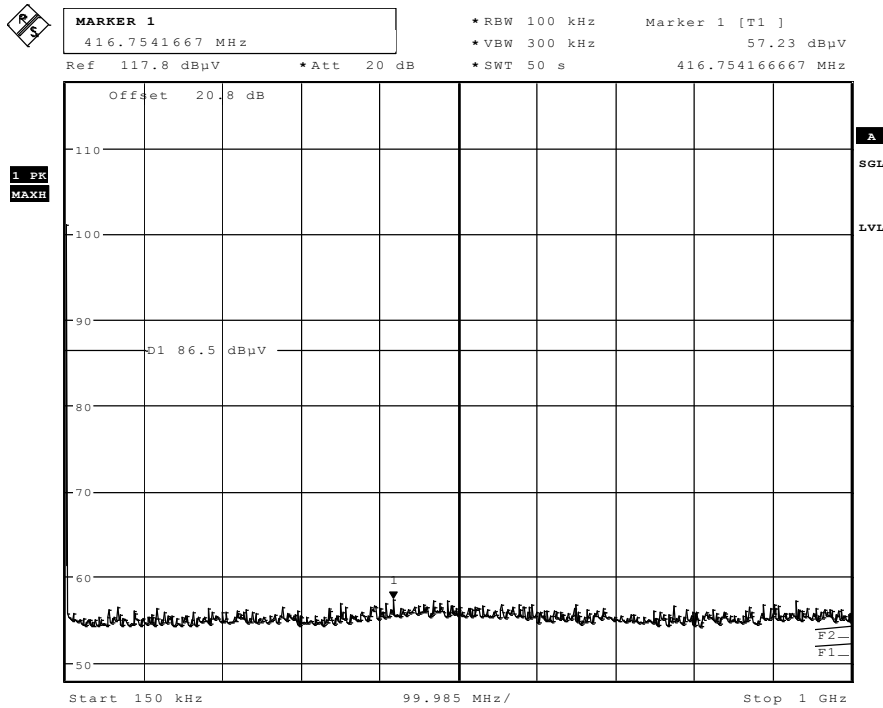


Sweep 3: Channel 0 (4GHz to 18GHz)



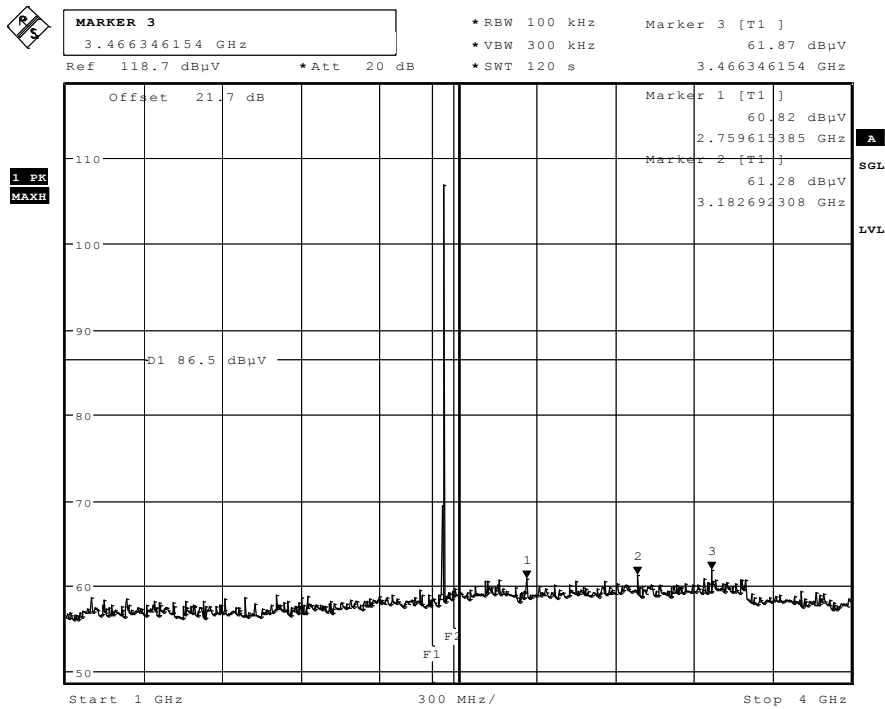
Date: 12.DEC.2011 15:55:45

In-BAND reference value for channel 39



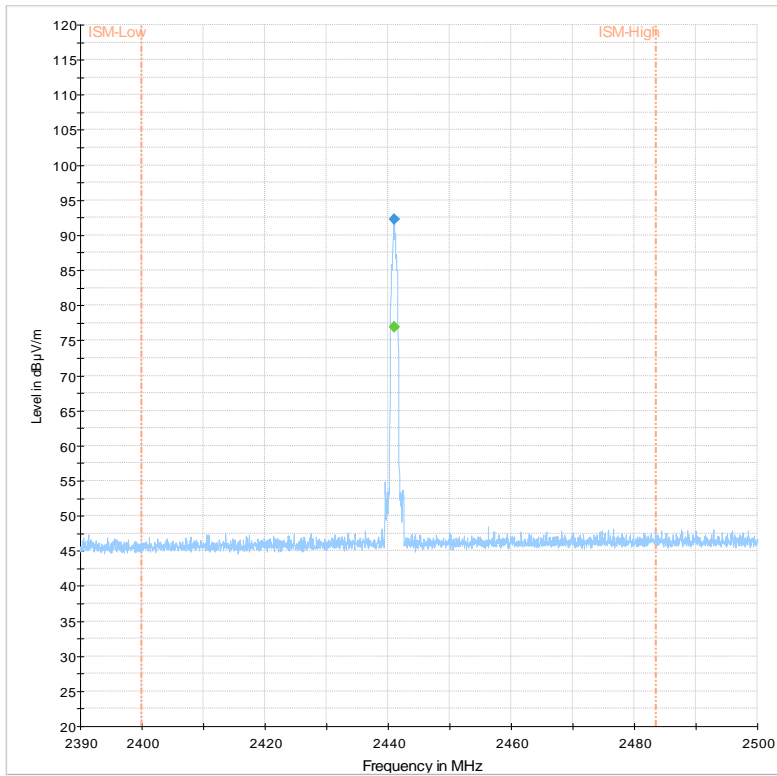
Date: 12.DEC.2011 15:57:41

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

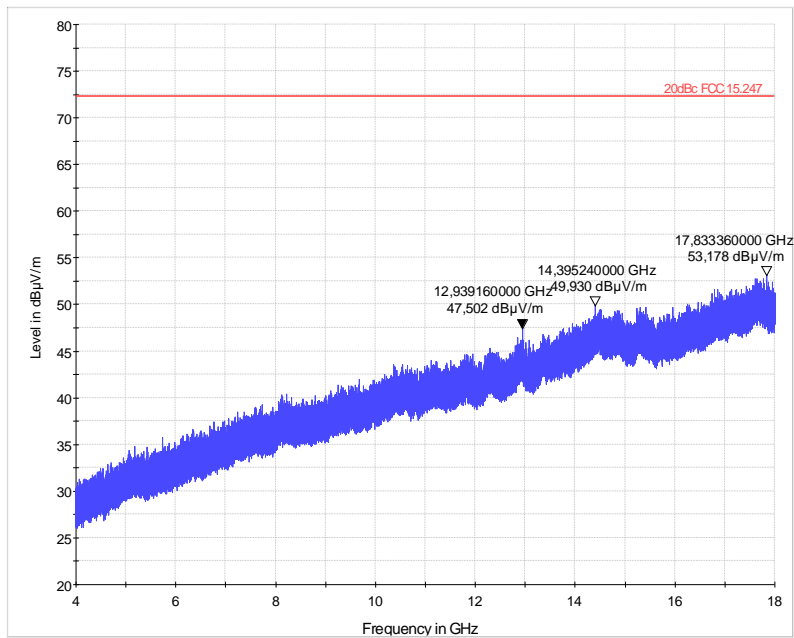


Date: 12.DEC.2011 16:00:55
Sweep 2: Channel 39 (1GHz to 4GHz)

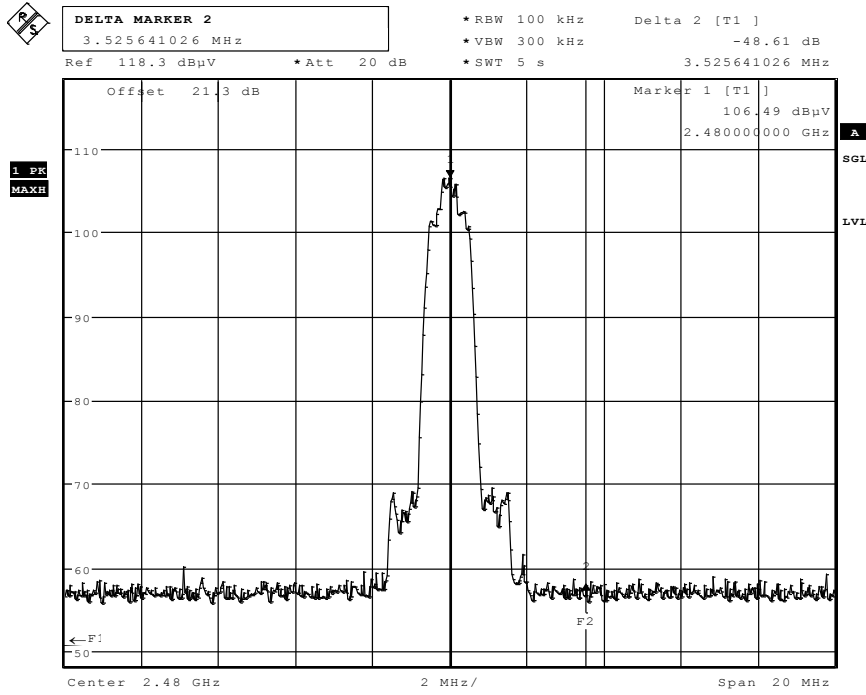
The Frequency range 4 to 18GHz: **radiated** measurement



In-Band radiated measurement – channel 39

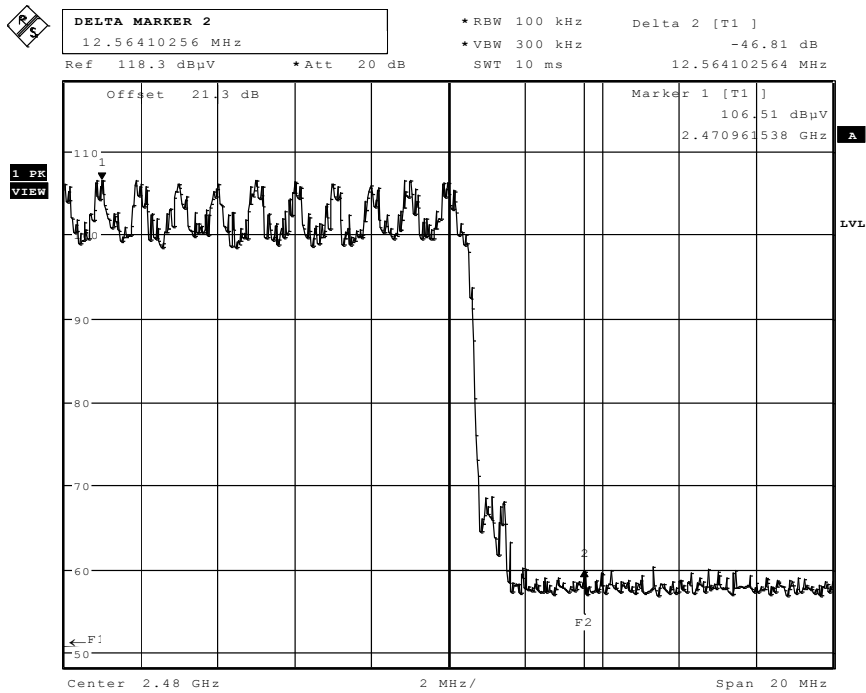


Sweep 3: Channel 39 (4GHz to 18GHz)



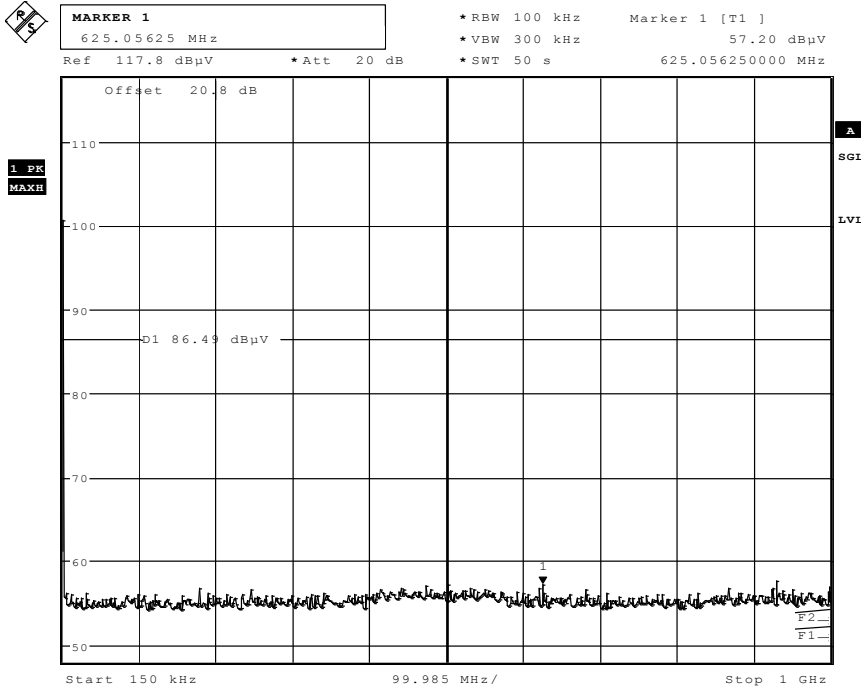
Date: 12.DEC.2011 15:31:51

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



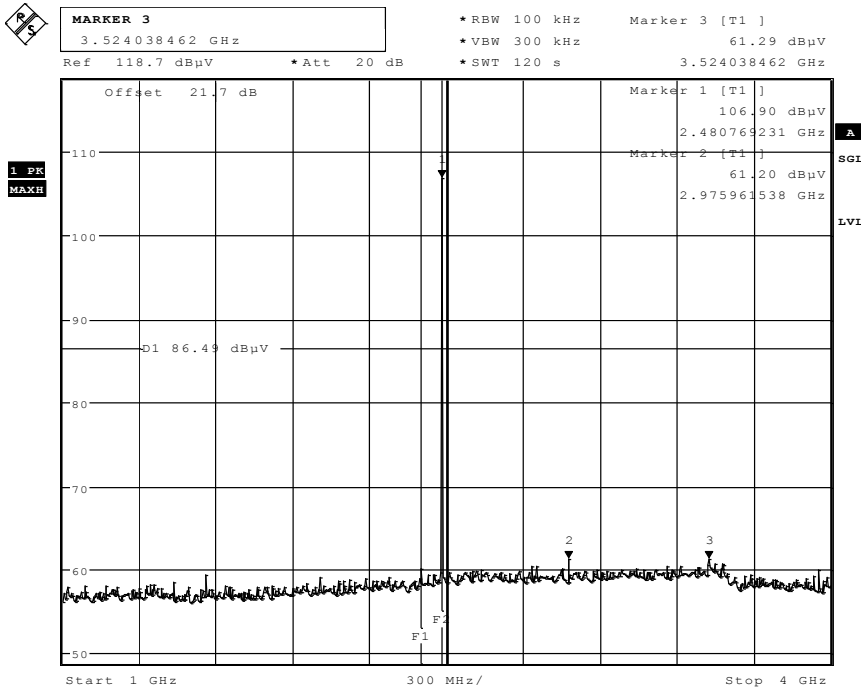
Date: 12.DEC.2011 15:35:50

Band-Edge right (hopping mode)



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

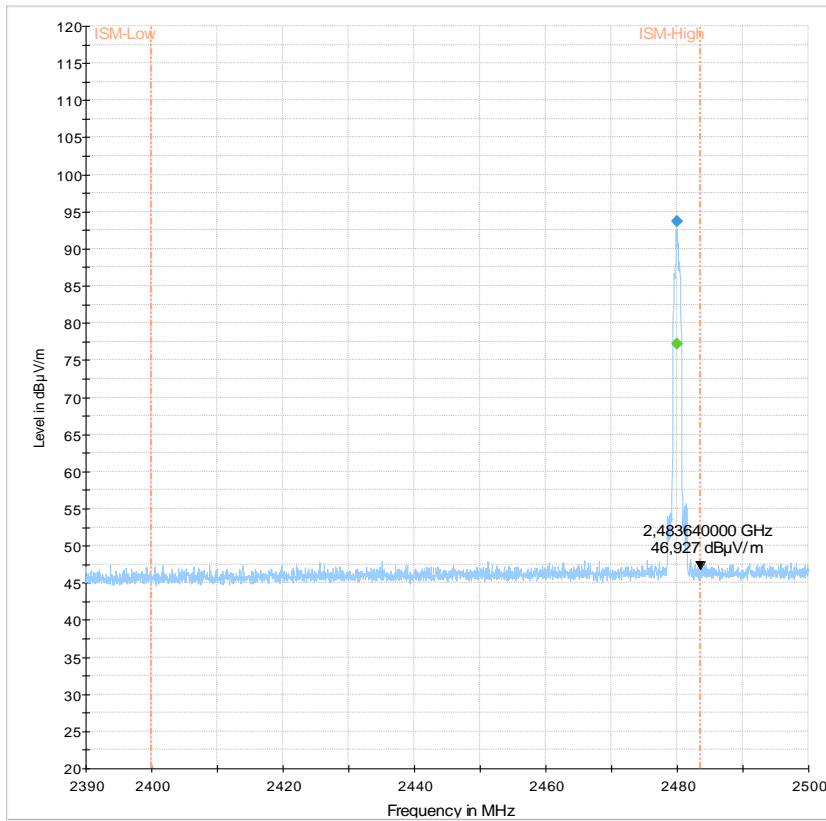
Sweep 1: Channel 78 (150kHz to 1GHz)



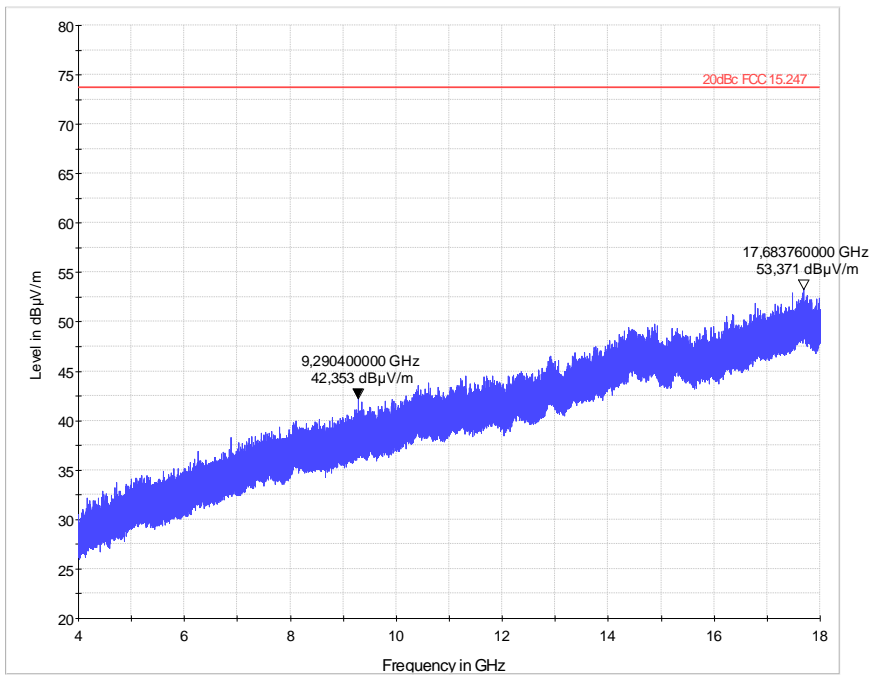
Date: 12.DEC.2011 15:47:20

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

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



In-Band radiated measurement – channel 78



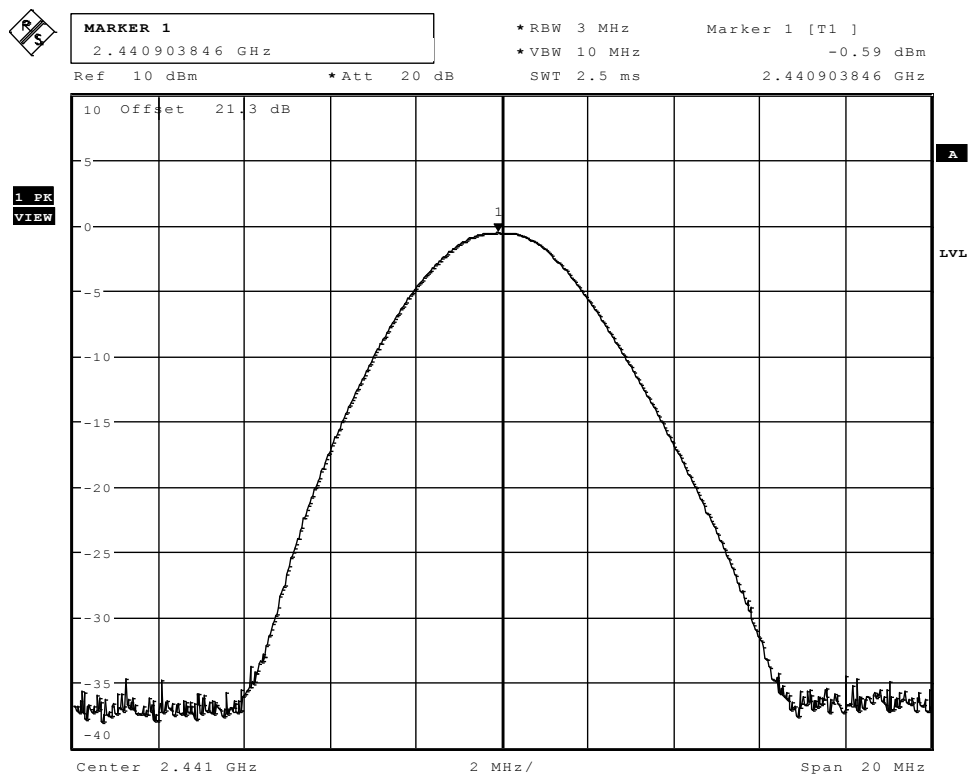
Sweep 3: Channel 78 (4GHz to 18GHz)

1.4. Maximum peak conducted power

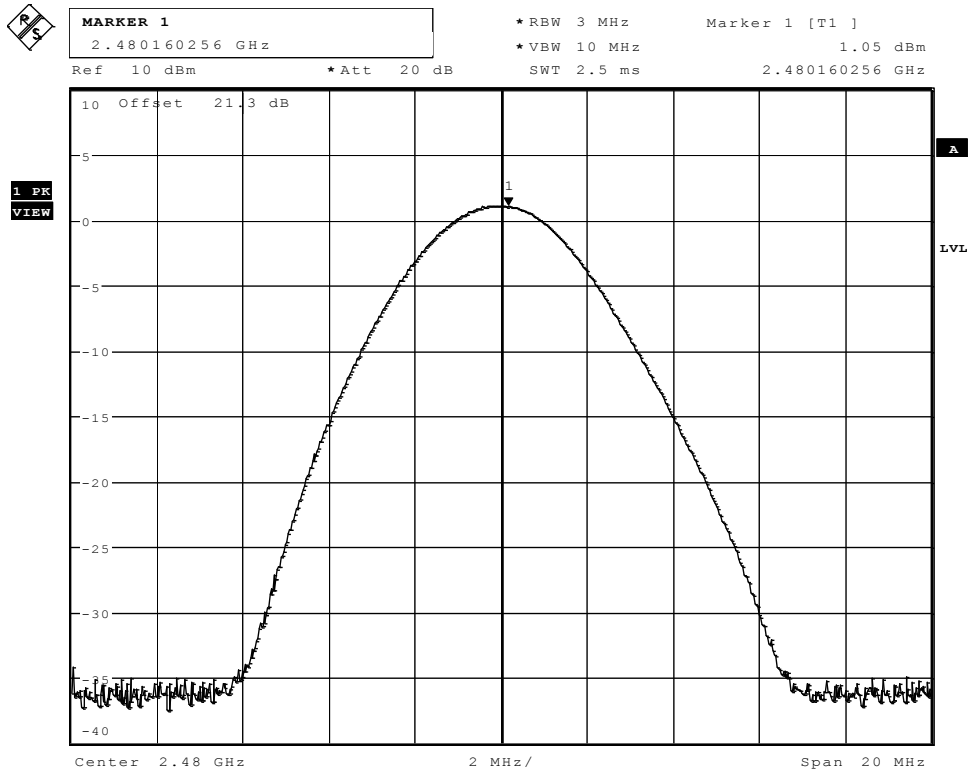
Following table show measured values for the maximum peak conducted power for different modulation types and channels.

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	-0,59	-0,60	-0,59	
DH3	-1,29	-0,61	-0,62		
DH5	-1,27	-0,61	-0,63		
2DH1	0,34	1,01	1,03	1,05	1,53
2DH3	0,33	1,01	1,02		
2DH5	0,33	1,02	1,05		
3DH1	0,80	1,53	1,53	1,53	
3DH3	0,82	1,50	1,52		
3DH5	0,81	1,51	1,50		

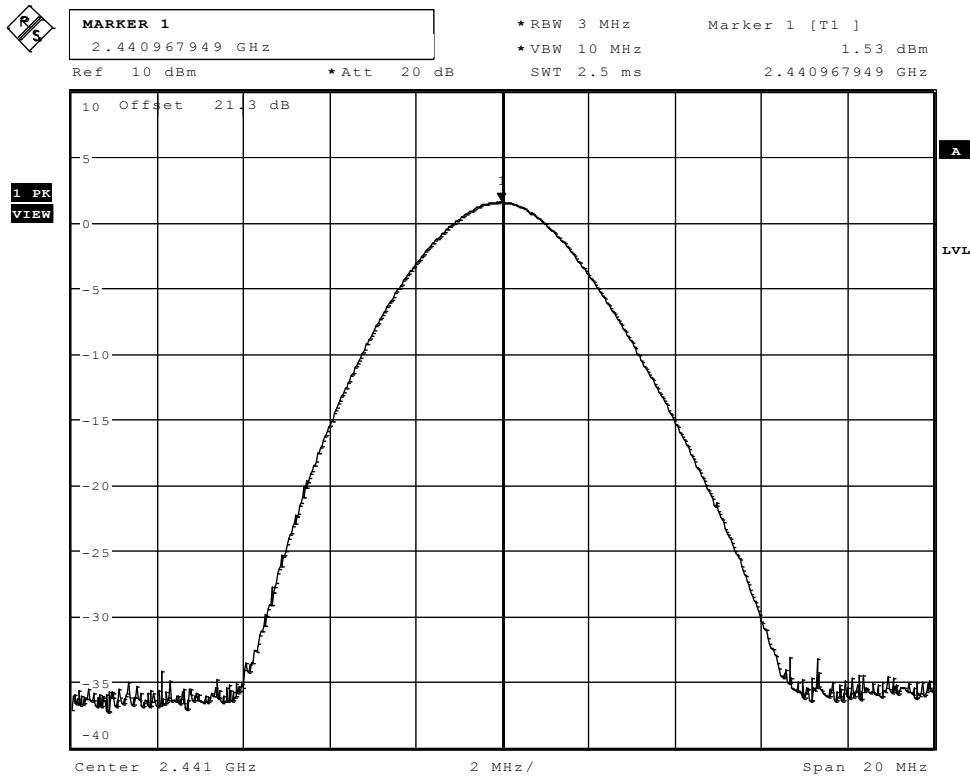
Below also some diagrams showing the maximum value for different modulation/packet types:



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

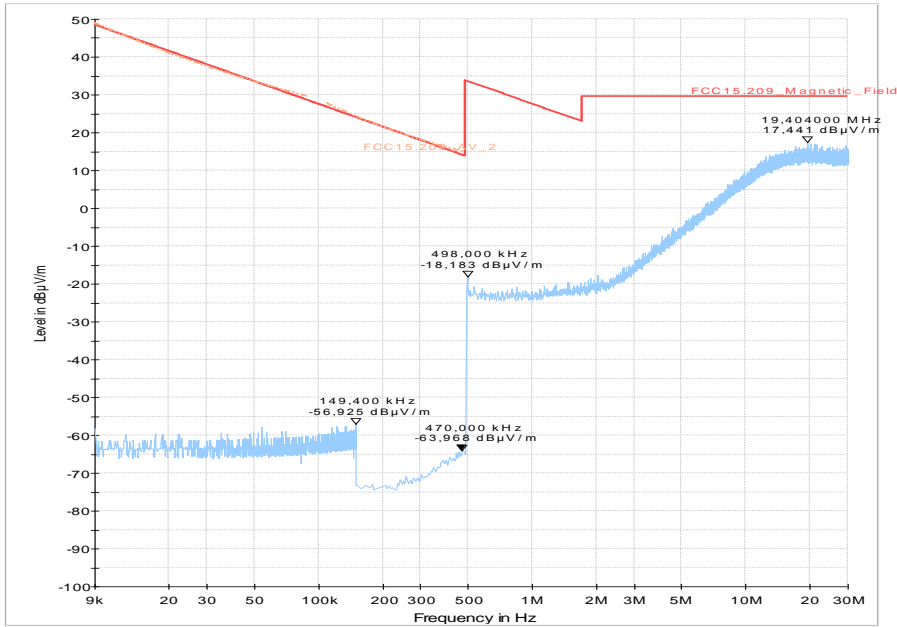


Diagram 3.01 – EUT horizontal/laying

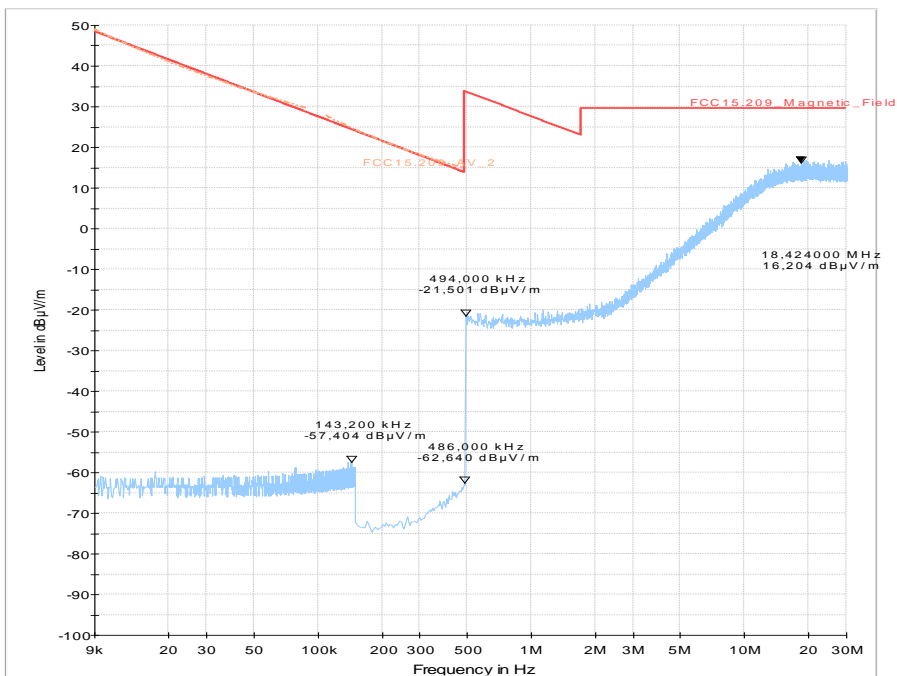


Diagram 3.02 – EUT vertical/standing

1.5.1.2. Channel 39

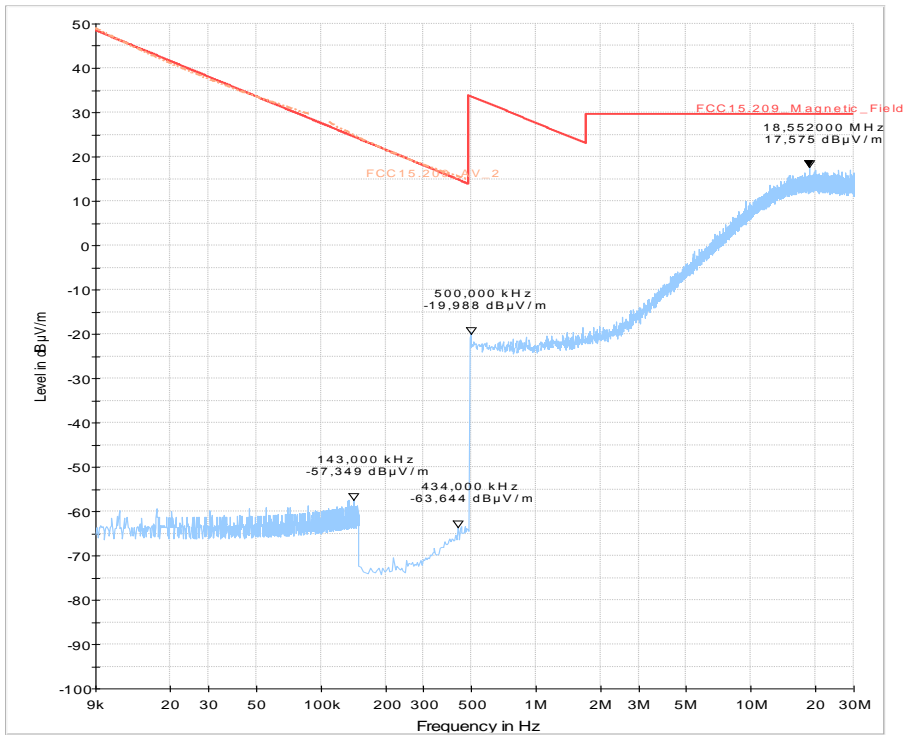


Diagram 3.03 – EUT horizontal/laying

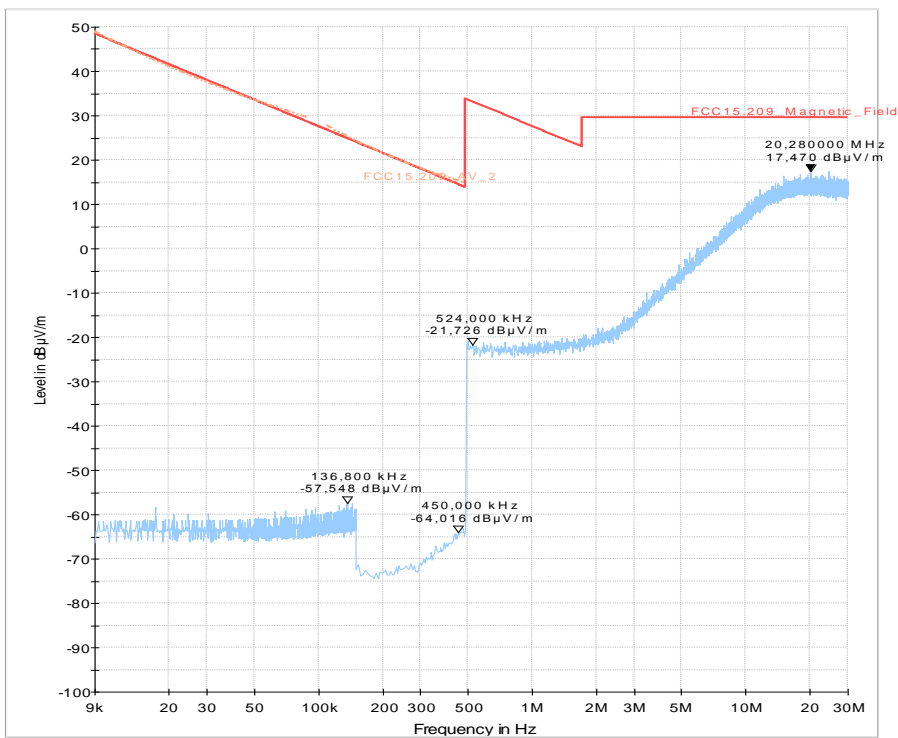


Diagram 3.04 – EUT vertical/standing

1.5.1.3. Channel 78

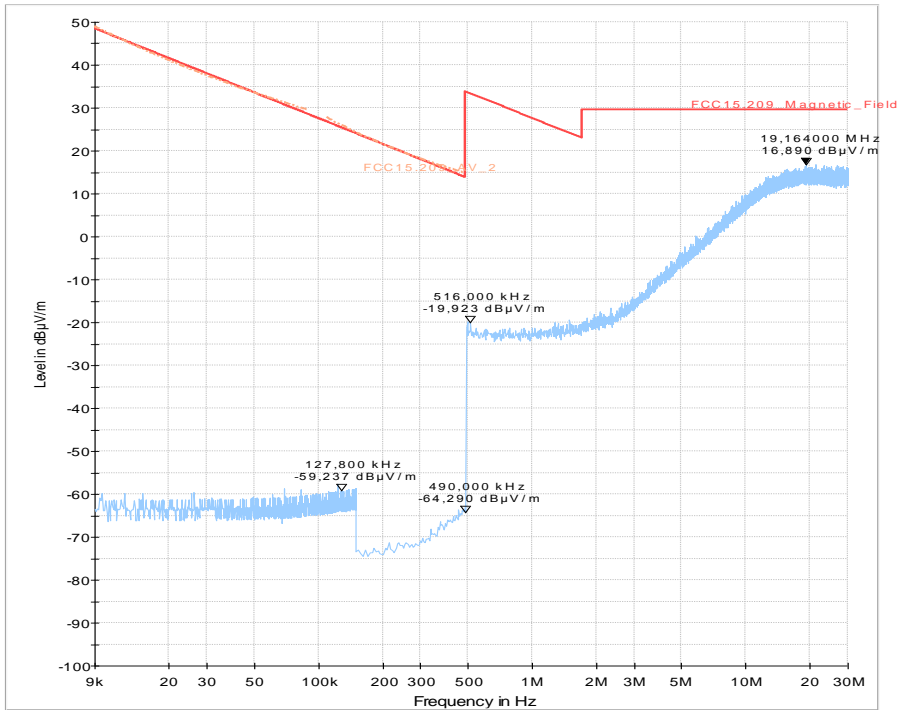


Diagram 3.05 – EUT horizontal/laying

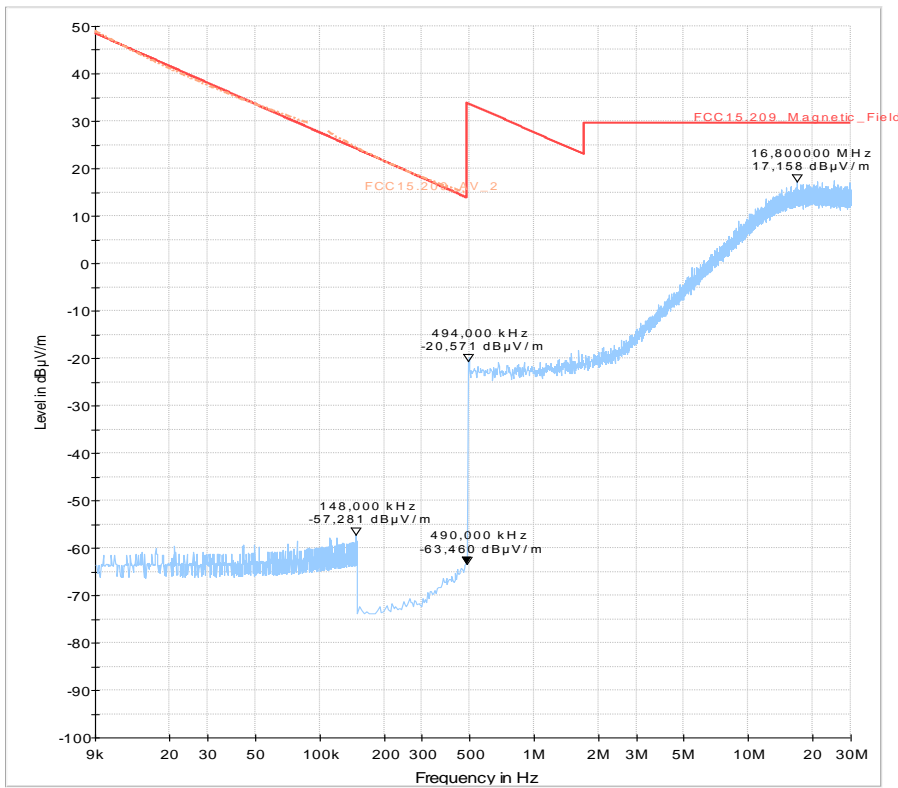


Diagram 3.06 – EUT vertical/standing

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

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

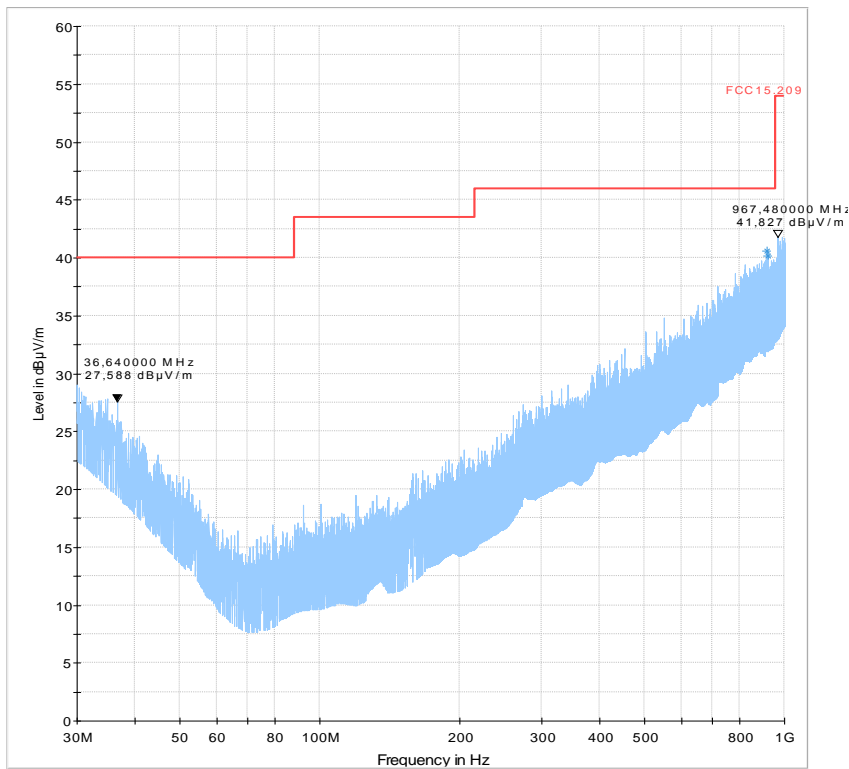


Diagram 2.01, EUT horizontal (laying)

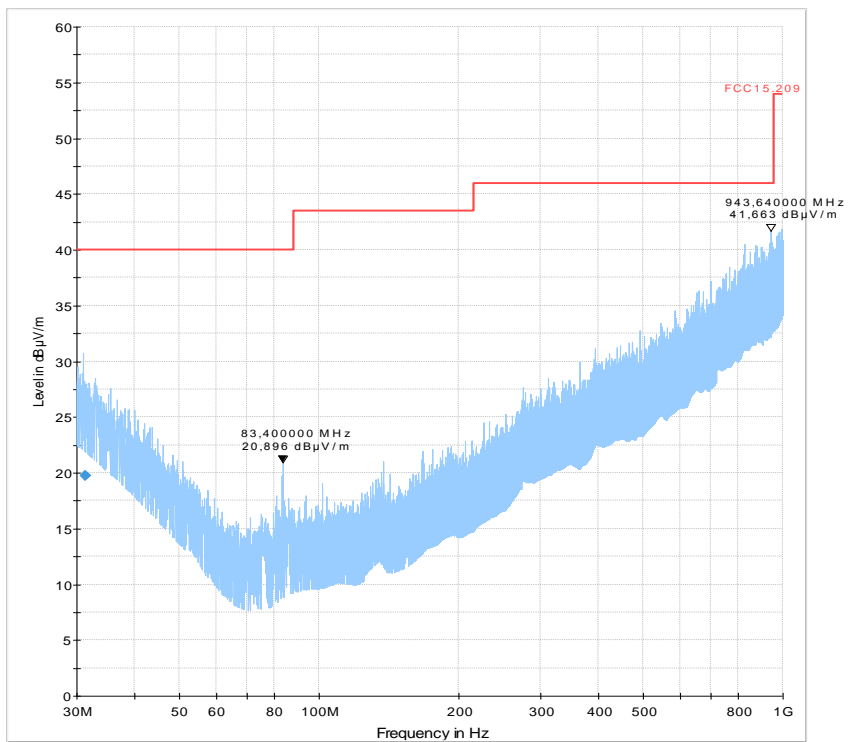


Diagram 2.02, EUT vertical (standing)

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

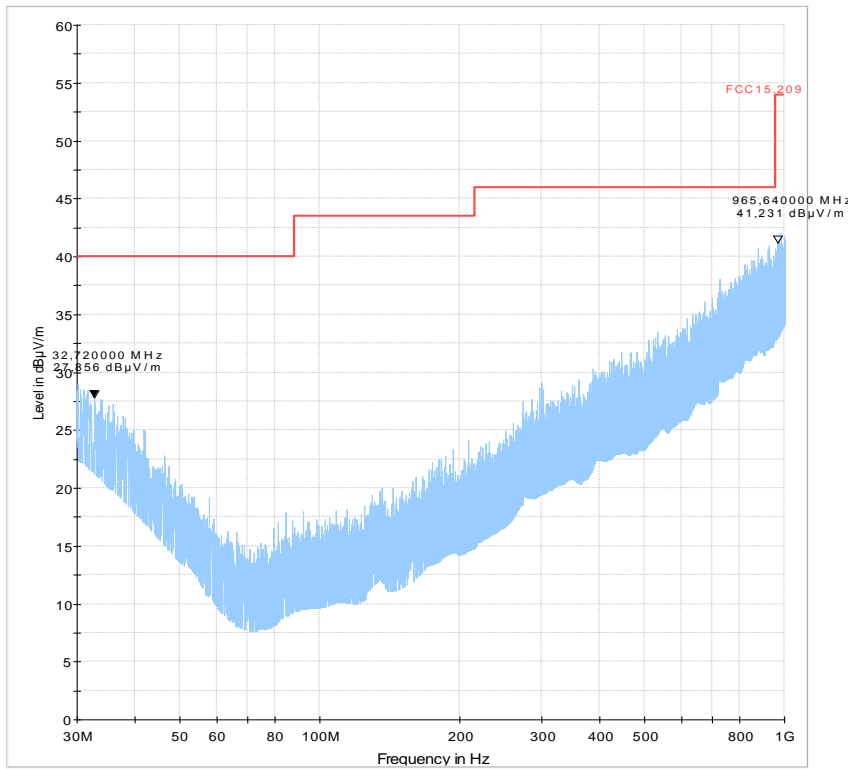


Diagram 2.03, EUT horizontal (laying)

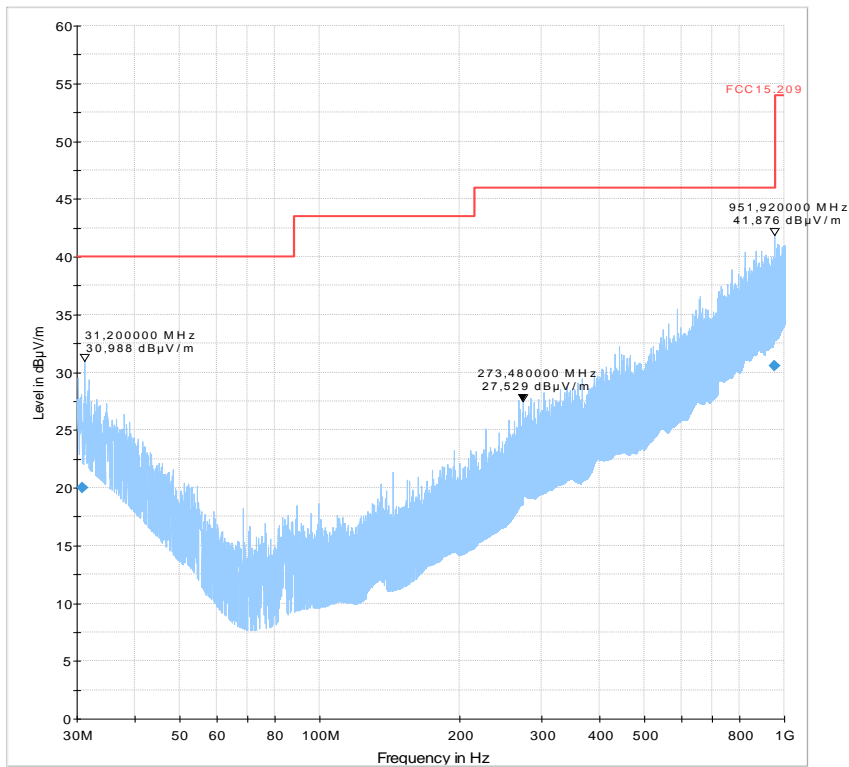


Diagram 2.04, EUT vertical (standing)

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

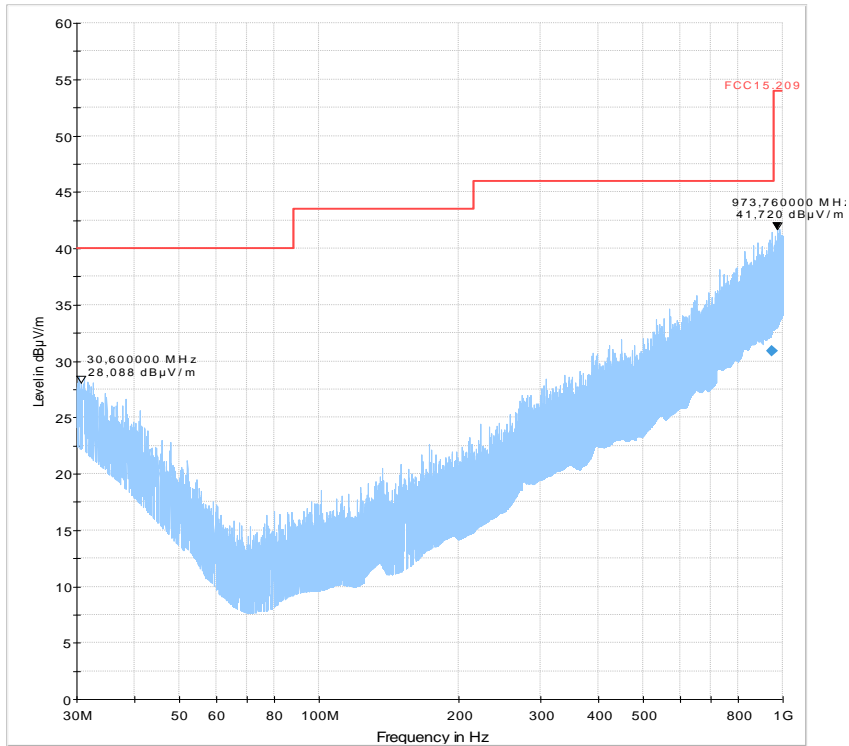


Diagram 2.05, EUT horizontal (laying)

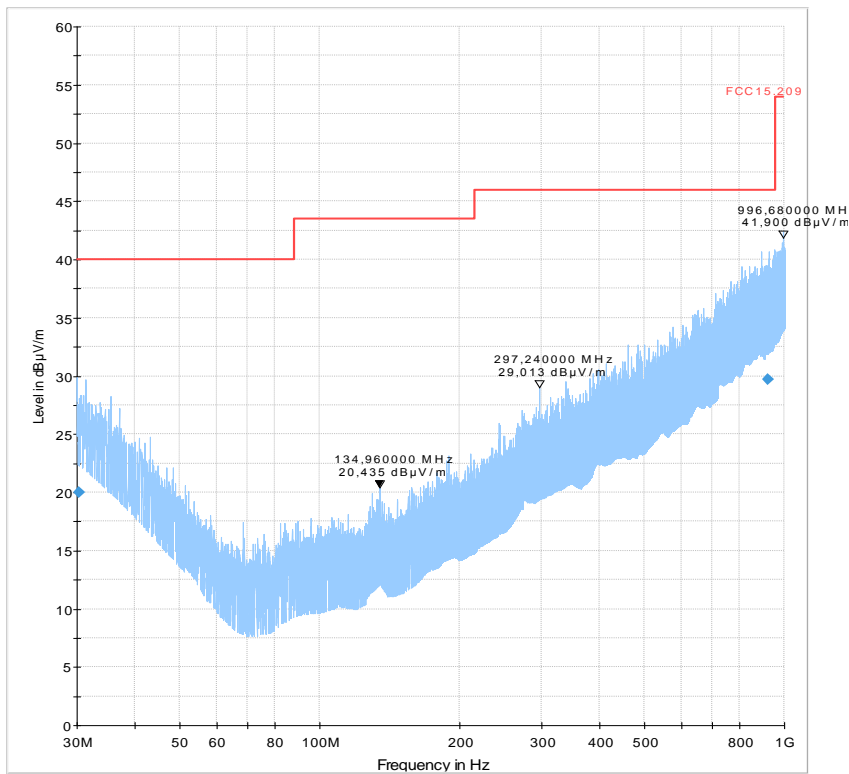


Diagram 2.06, EUT vertical (standing)

1.5.2.4. RX-Mode, Channel 39

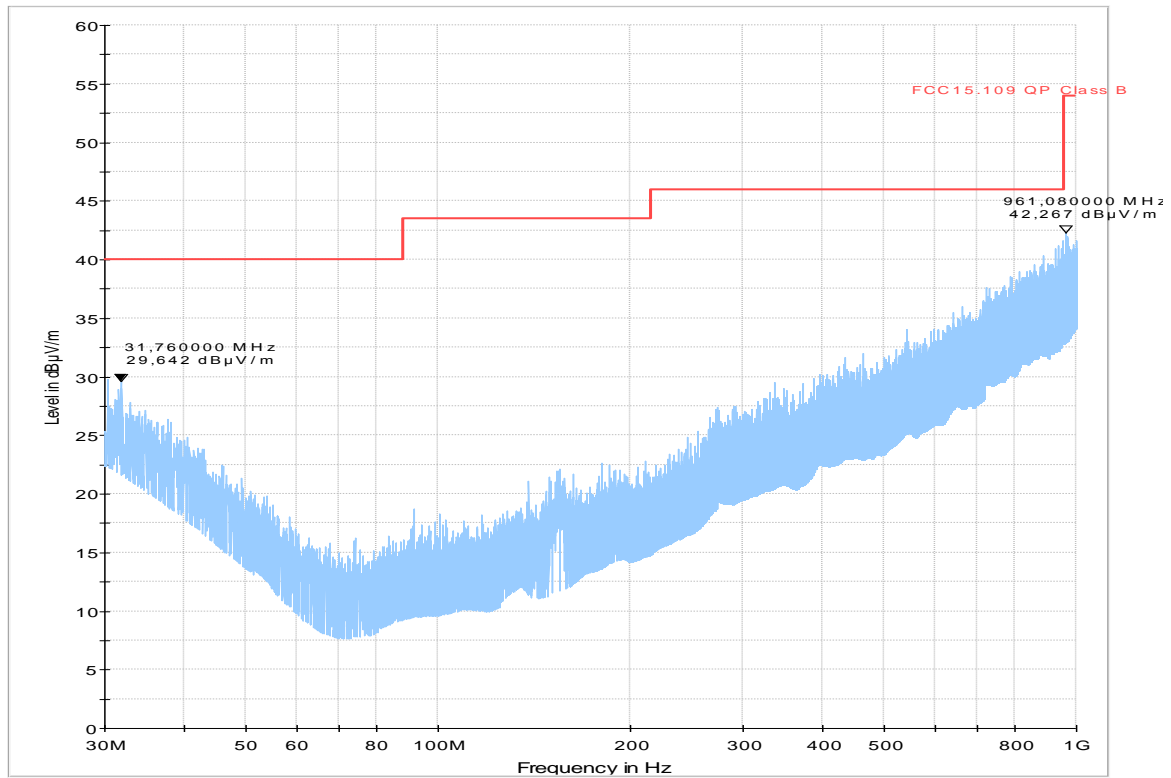


Diagram 2.07, EUT horizontal (laying)

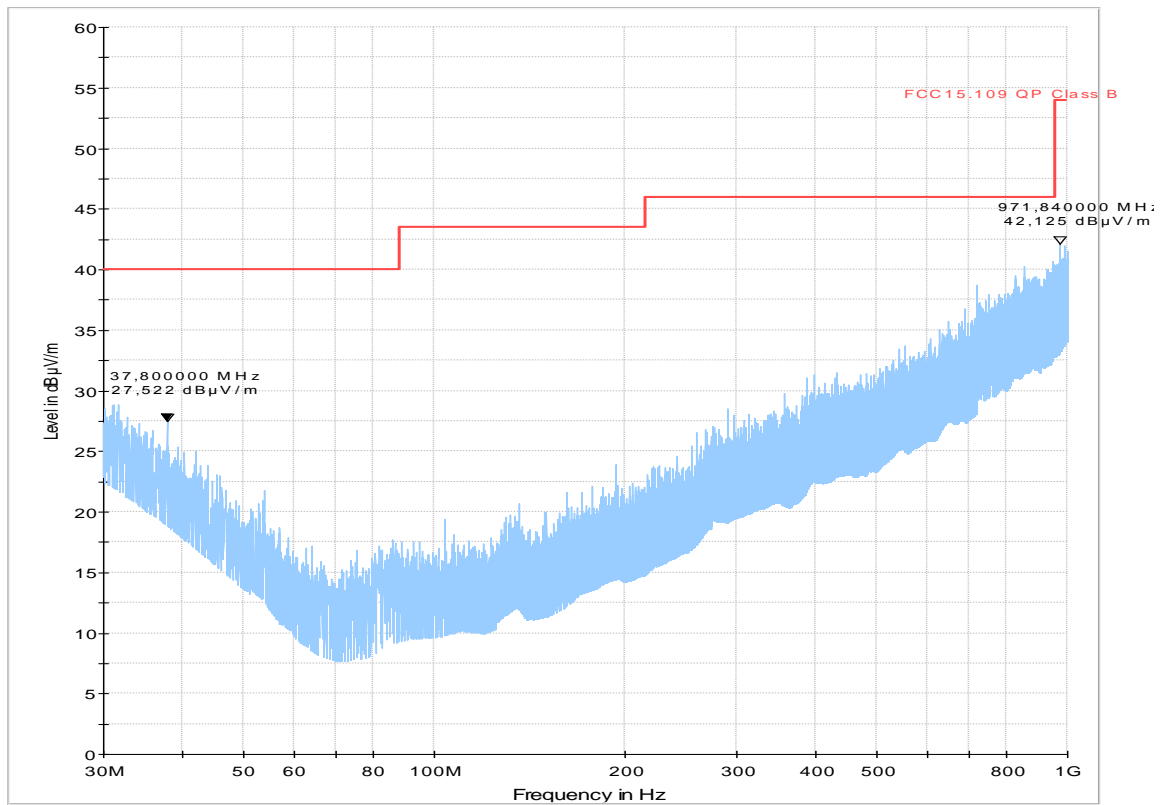


Diagram 2.08, EUT vertical (standing)

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

1.5.3.1. Channel 0, 3DH5 packet types

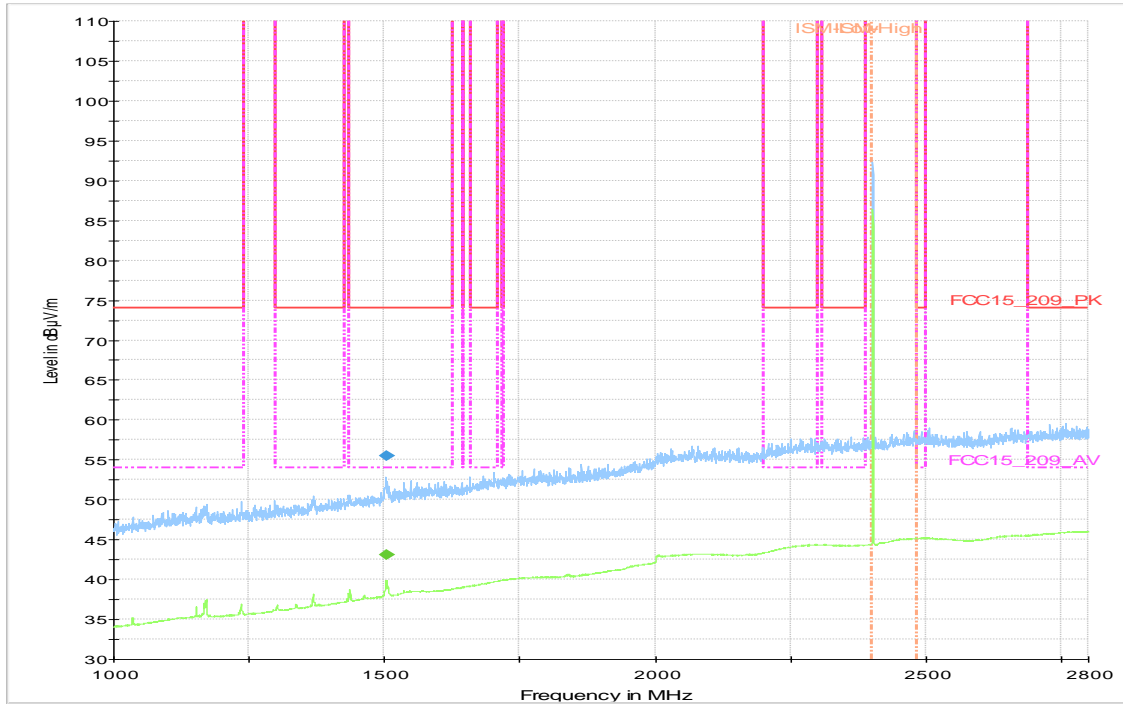


Diagram 2.10 (1GHz to 2.8GHz)

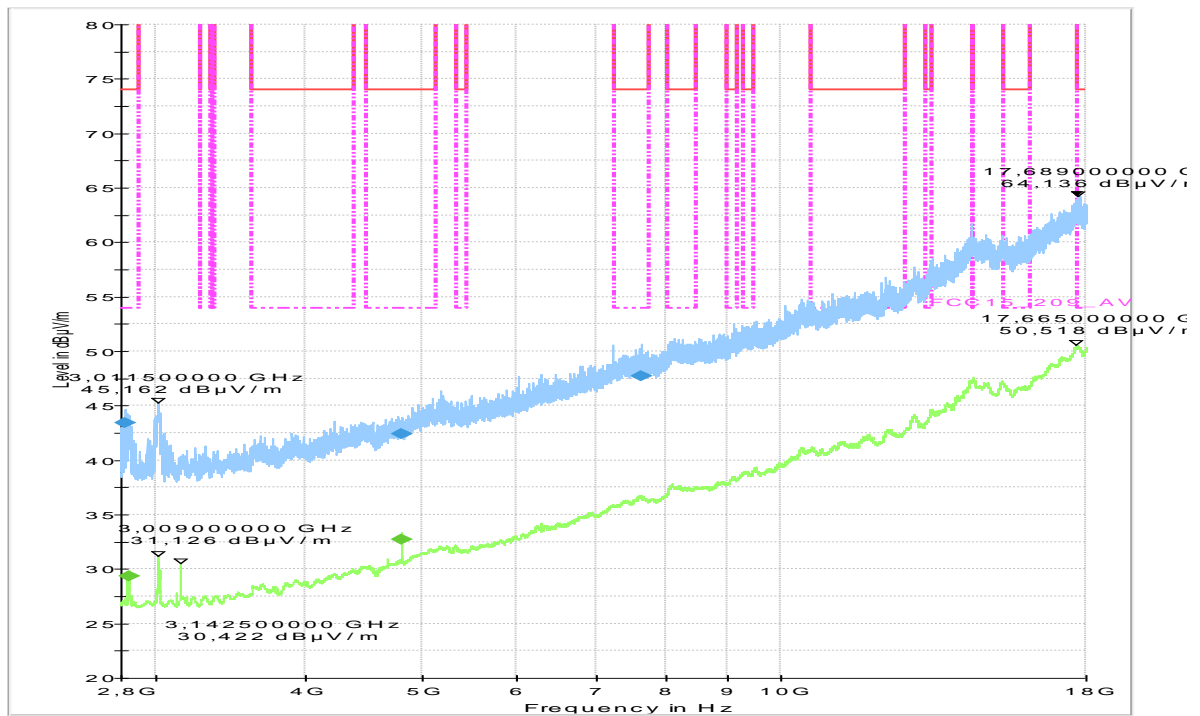


Diagram 2.11 (2.8 to 18GHz)

1.5.3.2. Channel 39, 3DH5 packet types

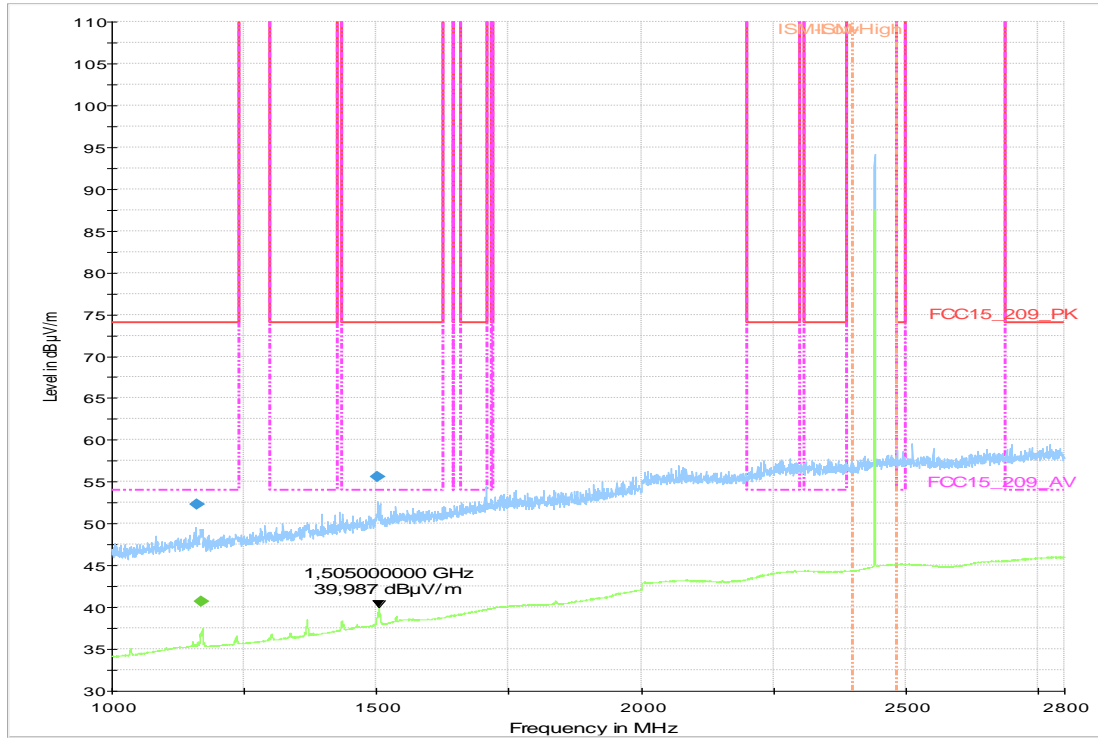


Diagram 2.12 (1GHz to 2.8GHz)

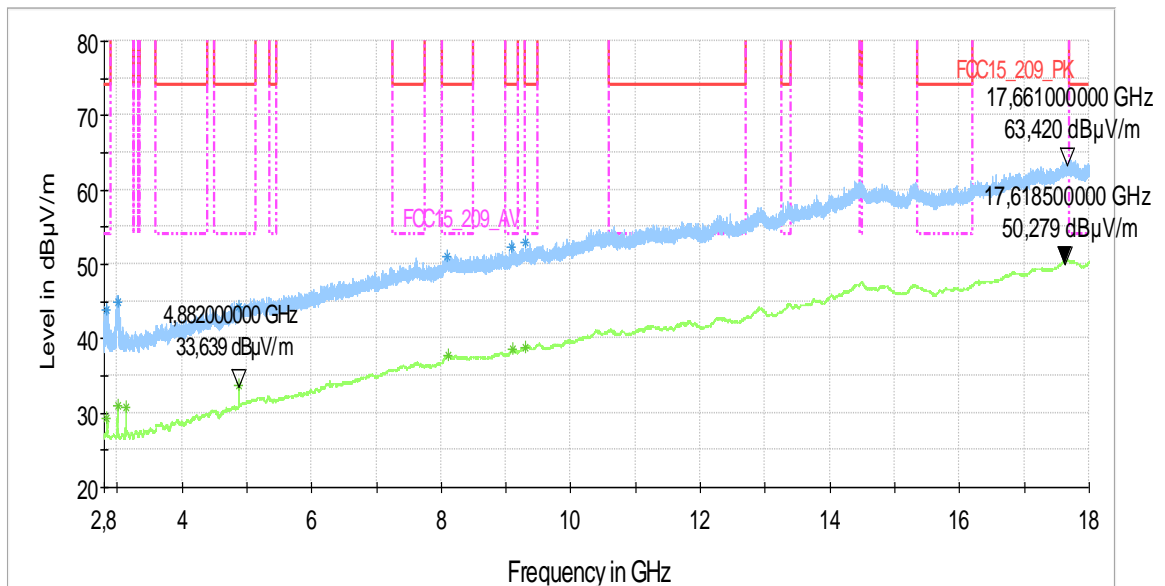


Diagram 2.13 (2.8 to 18GHz)

1.5.3.3. Channel 78, 3DH5 packet types

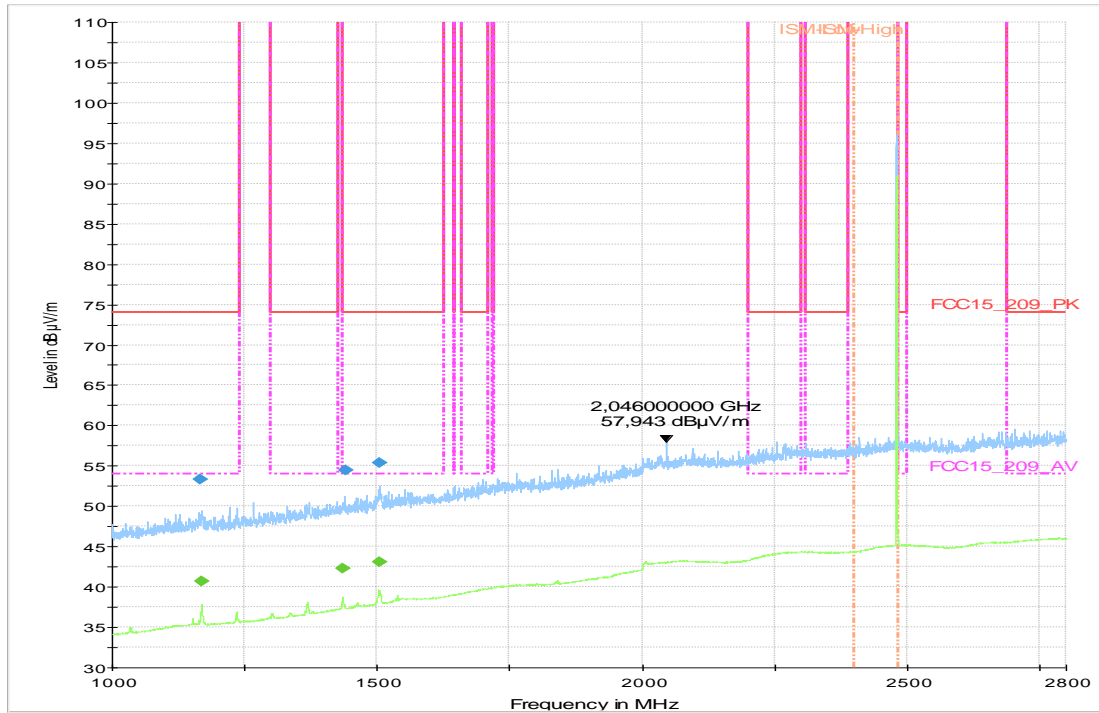


Diagram 2.14 (1GHz to 2.8GHz)

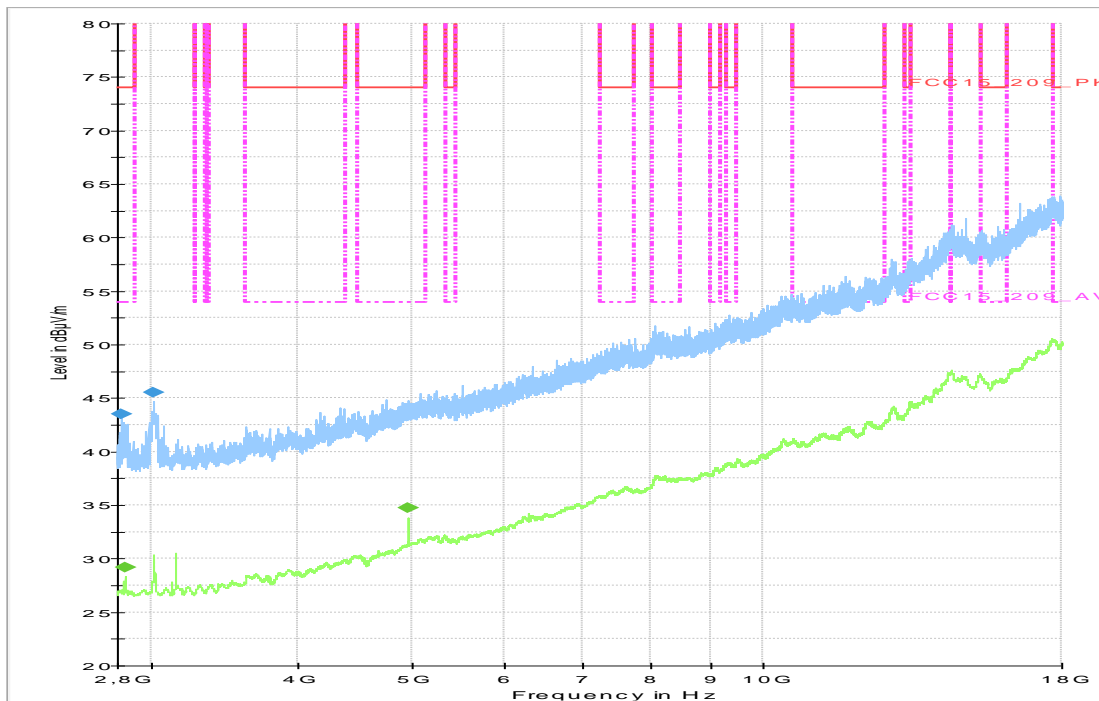
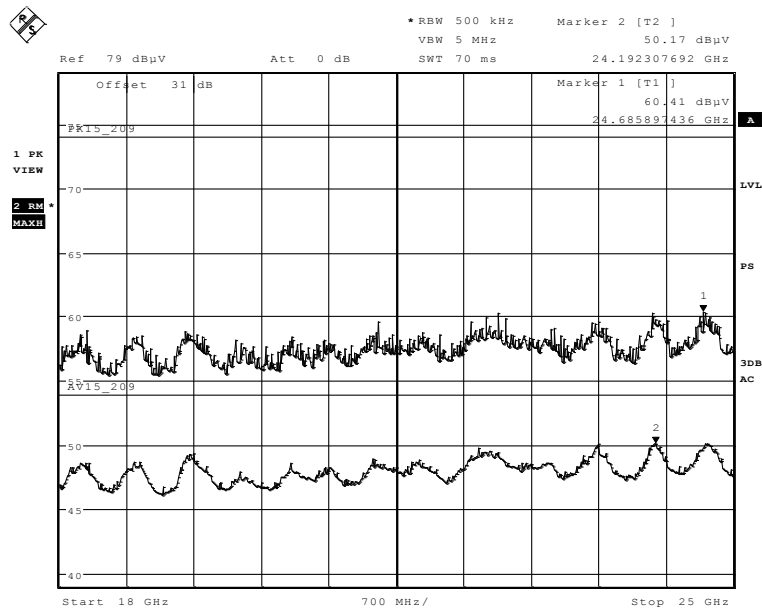


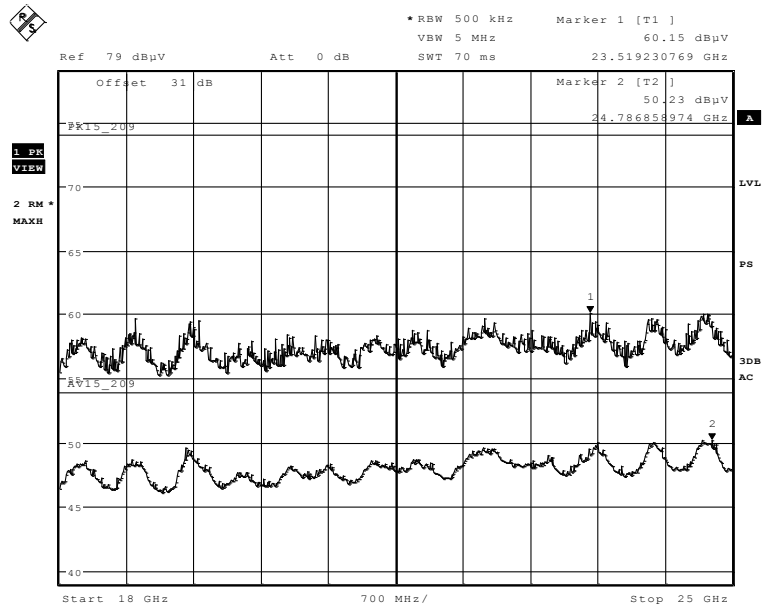
Diagram 2.15 (2.8 to 18GHz)

1.5.4. Radiated emissions in the frequency range above 18GHz



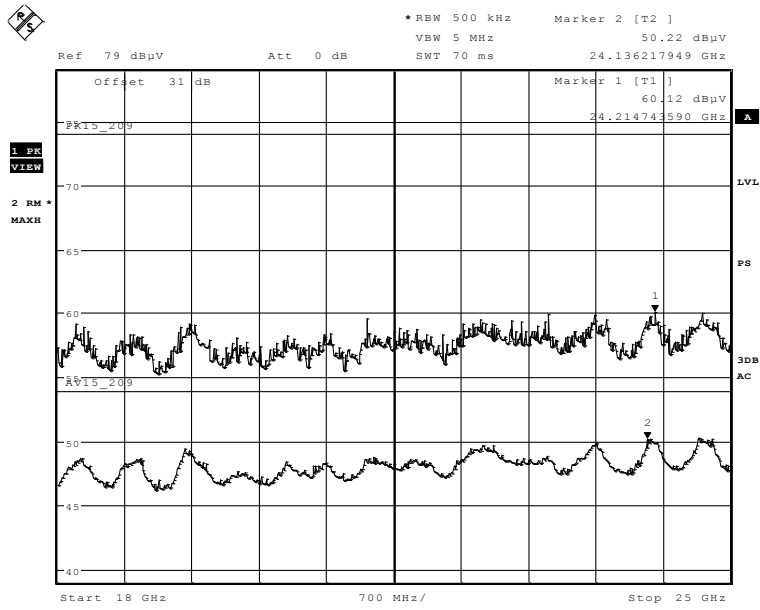
Date: 6.JAN.2012 08:23:28

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



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

Channel 39 (overview measurement only)

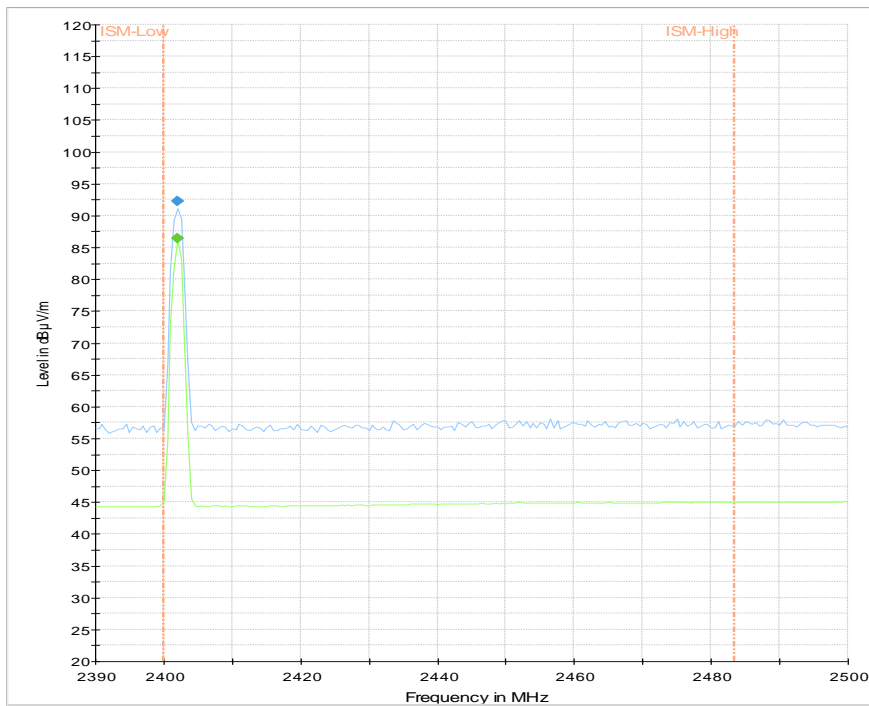


Date: 6.JAN.2012 08:32:56

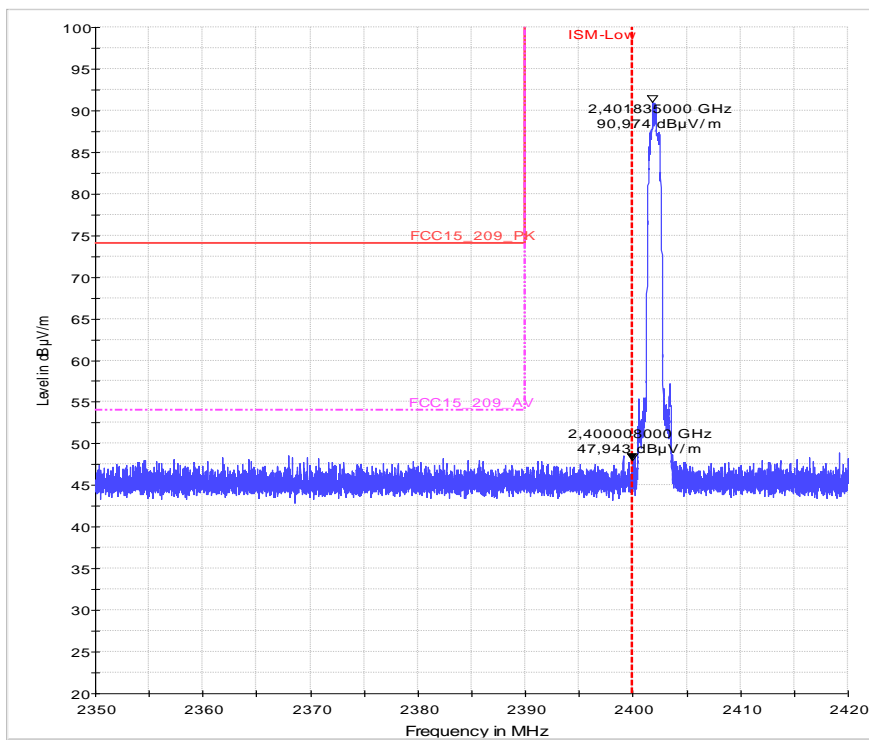
Channel 78 (overview measurement only)

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

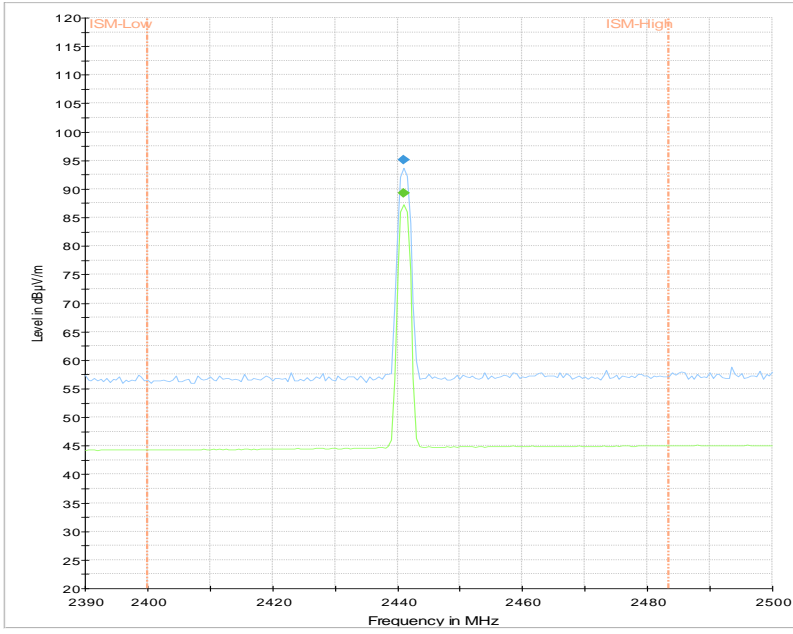
1.5.5.1. Used for radiated compliance demonstration: Packet types 3DH5



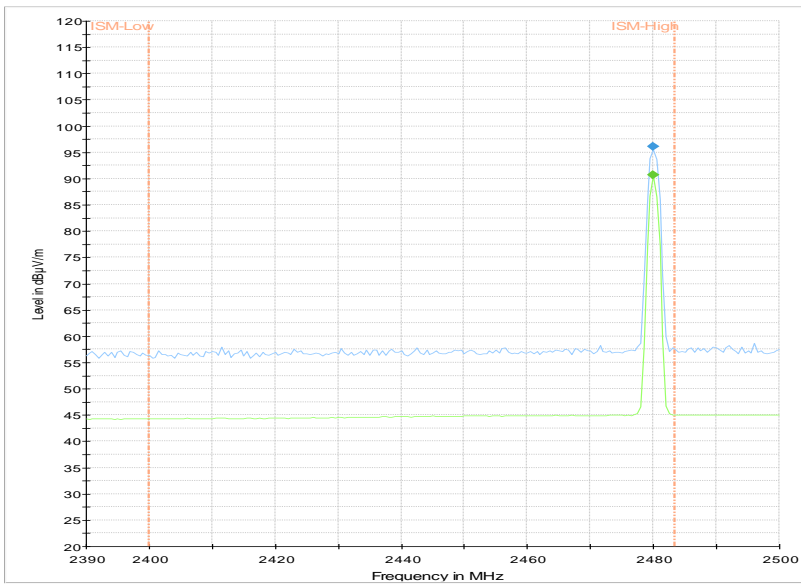
Carrier field strength, channel 0



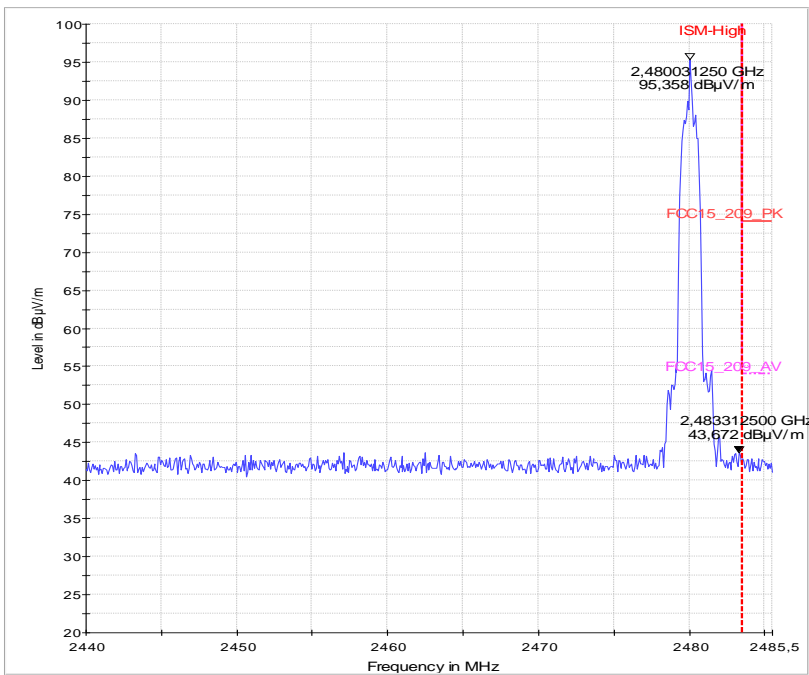
Band-Edge left, Channel 0



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 (30MHz < f < 1GHz)

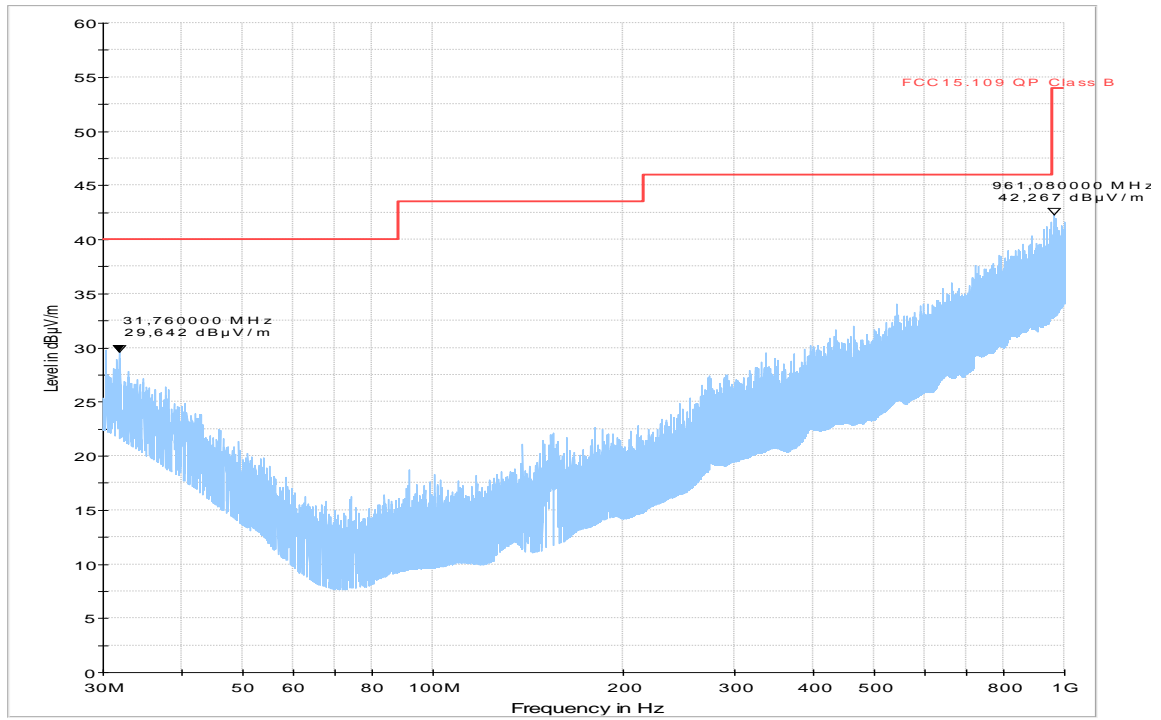


Diagram no. 2.07 – EUT place horizontal (laying)

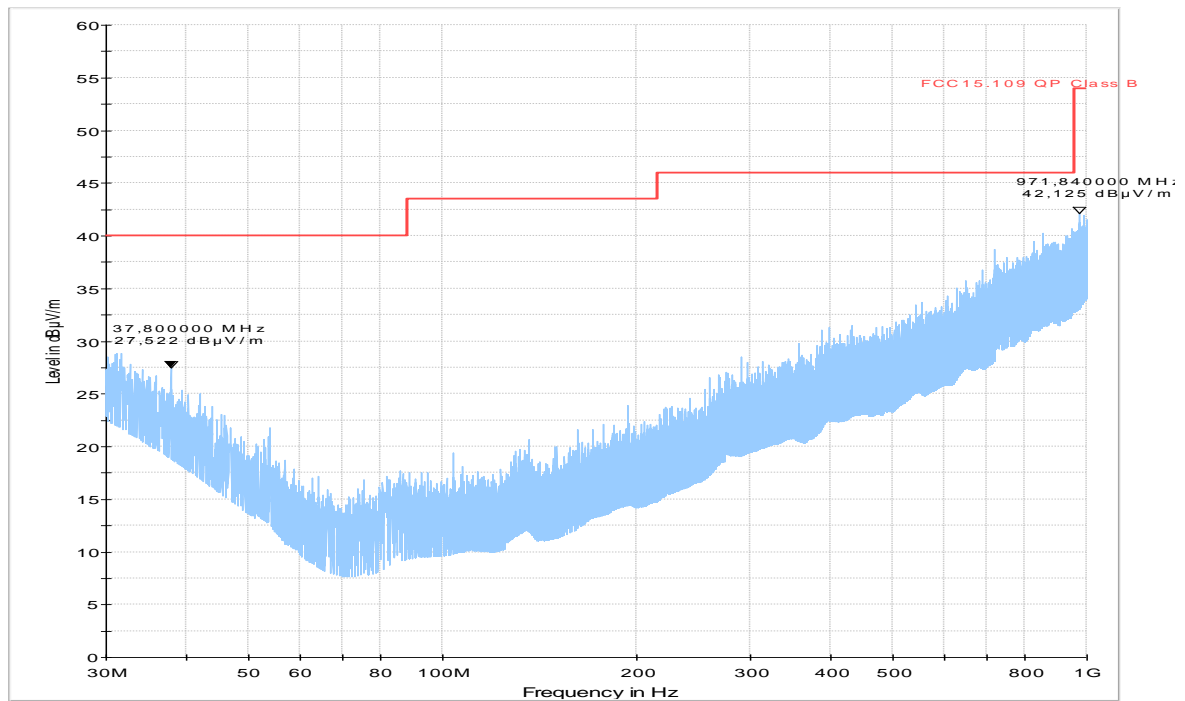


Diagram no. 2.08 – EUT placed vertical

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

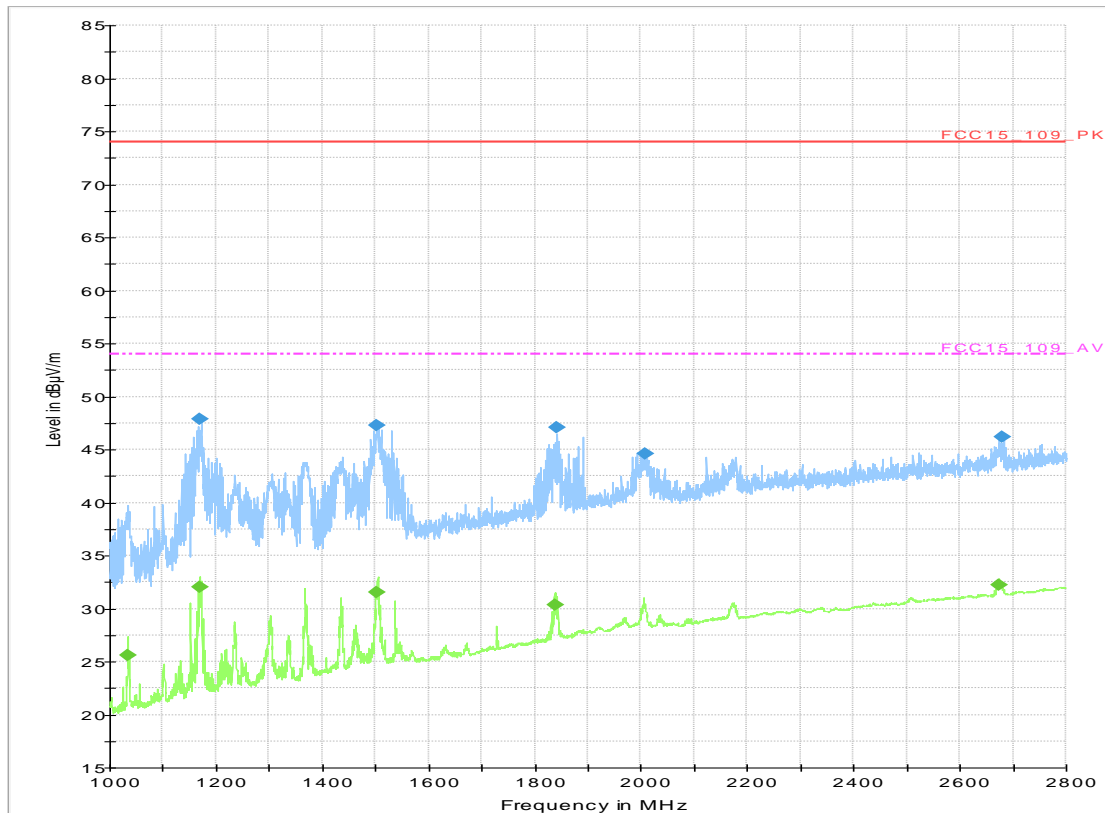


Diagram 2.22a – RX Mode channel 39

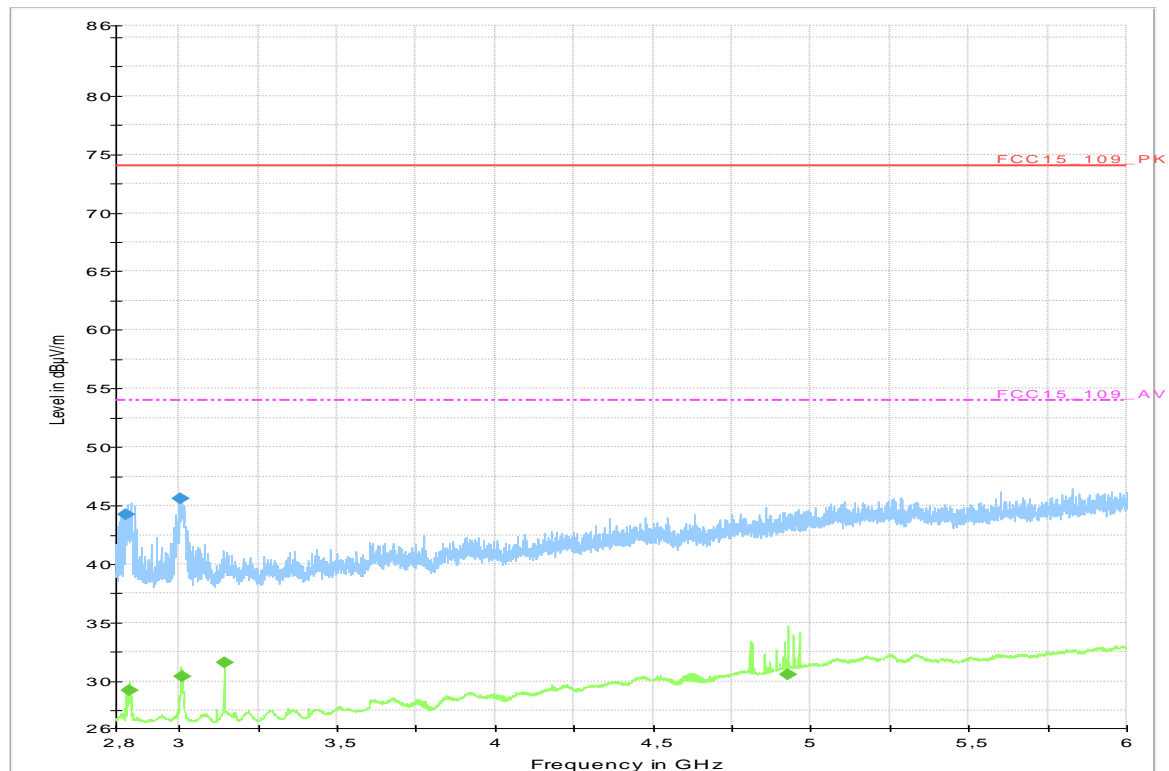


Diagram 2.22b – RX Mode channel 39 (1 to 6GHz)

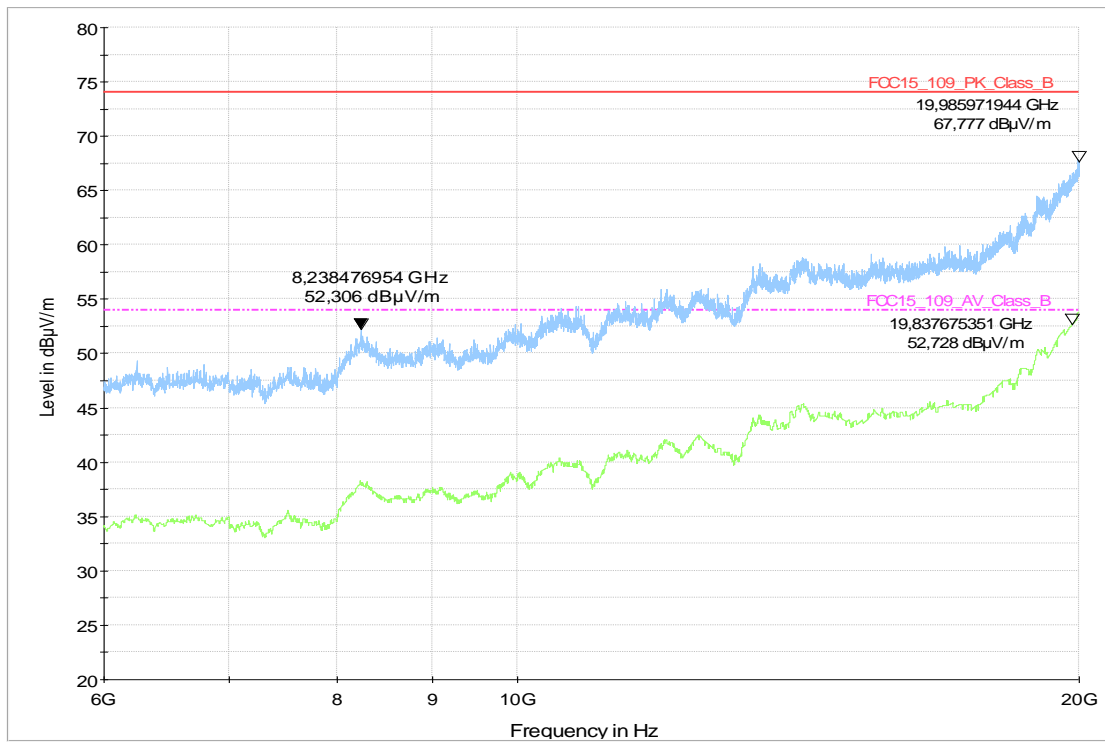
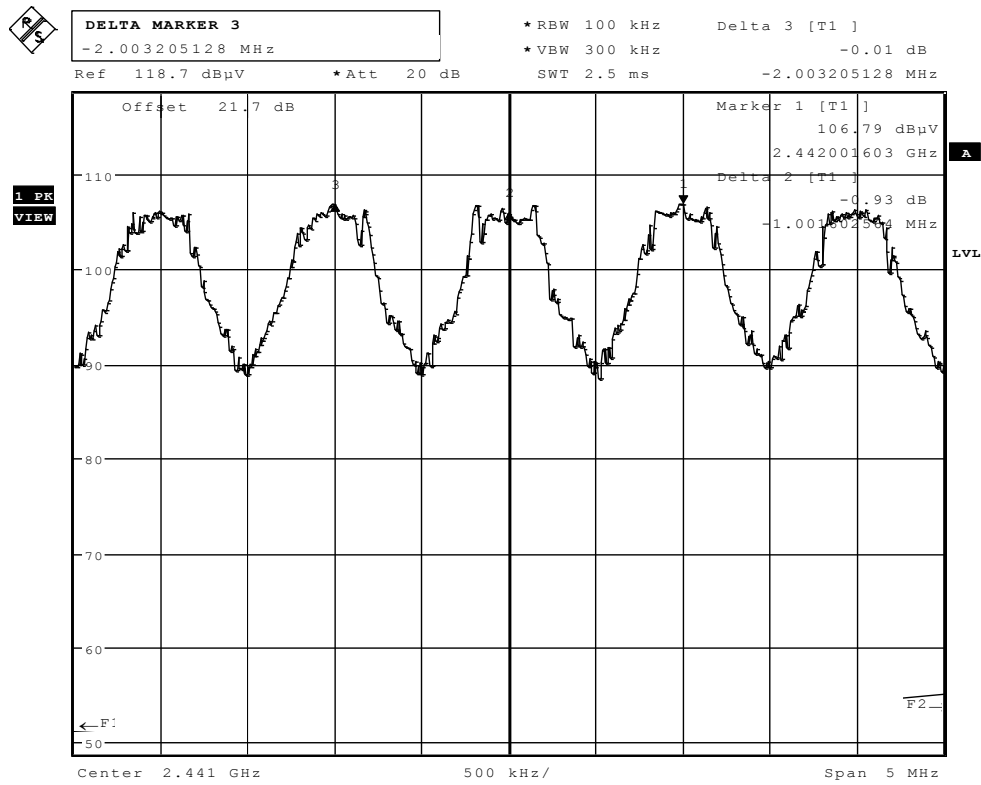


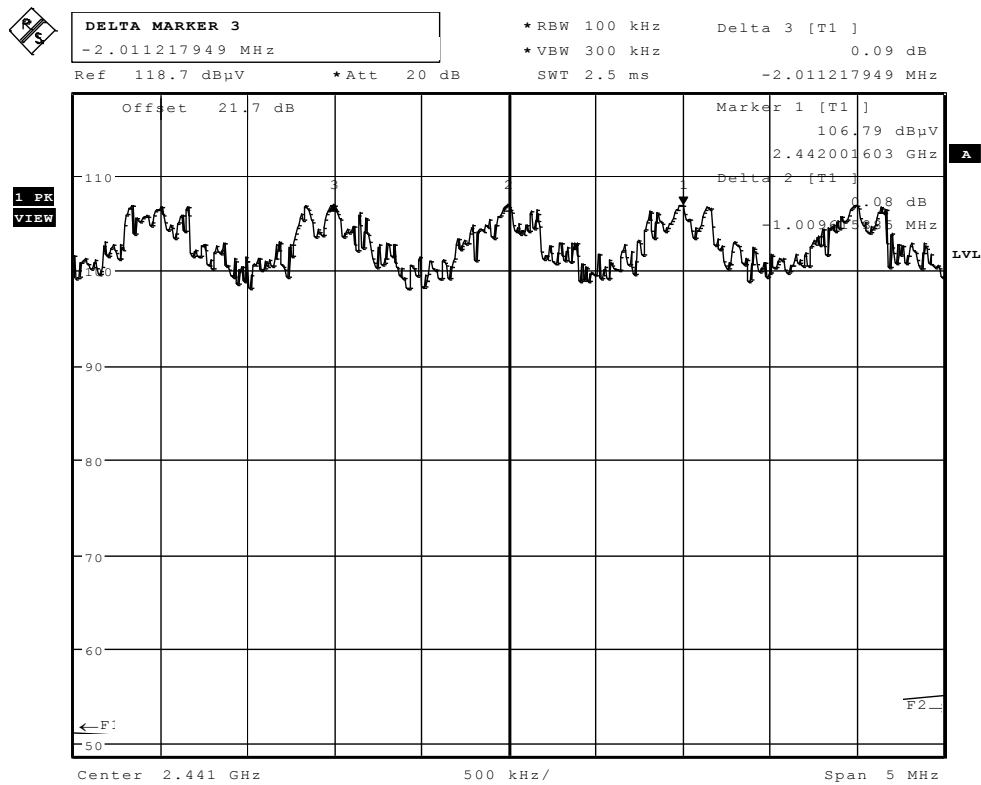
Diagram 2.22c – RX Mode channel 39 (6GHz to 20GHz)

1.7. Channel spacing



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

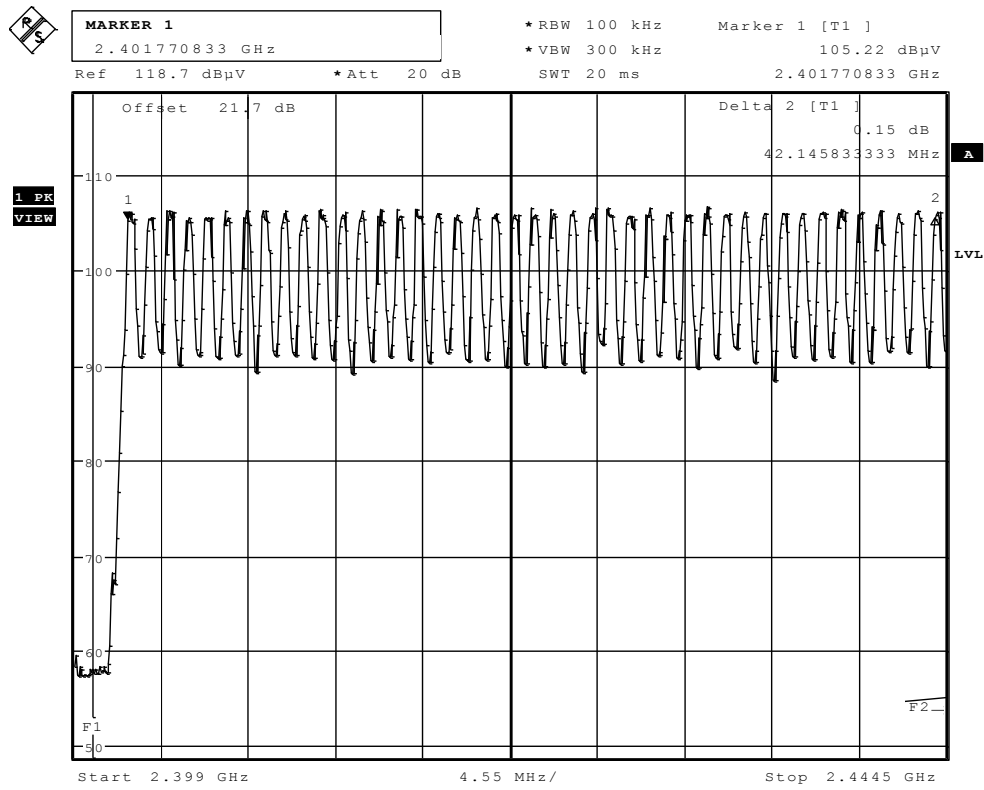
Diagram: Channel spacing with DH5 Packet type (view around middle channel)



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

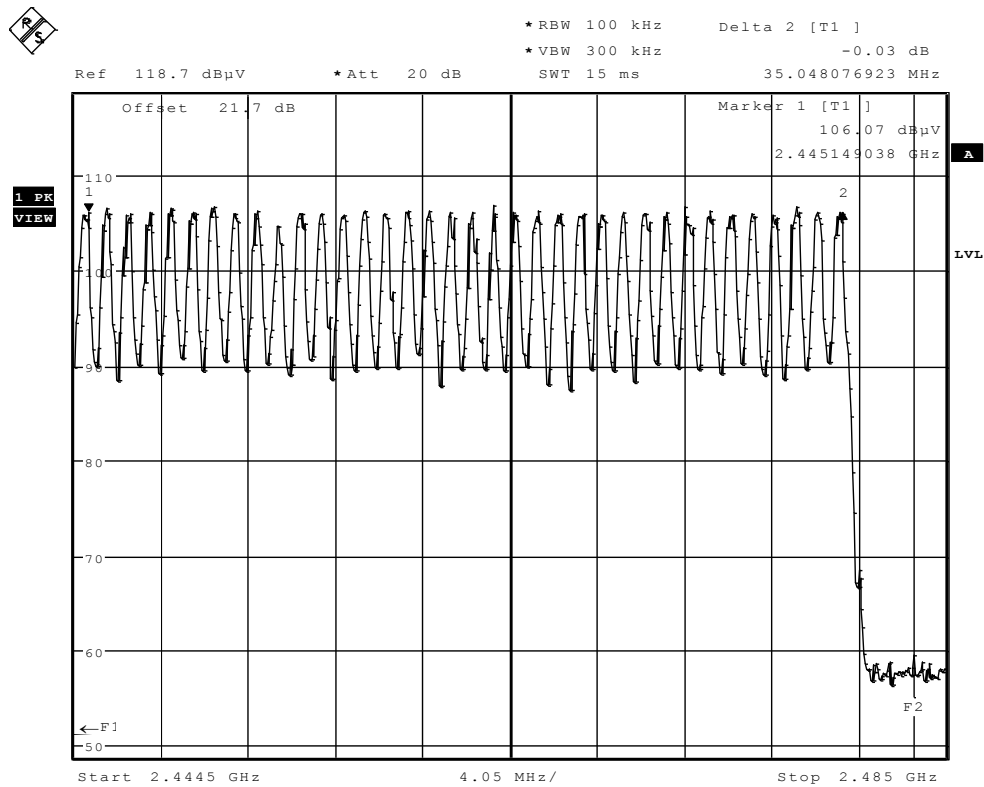
Diagram: Channel spacing with 3DH1 Packet type (view around middle channel)

1.8. Number of hopping channels



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

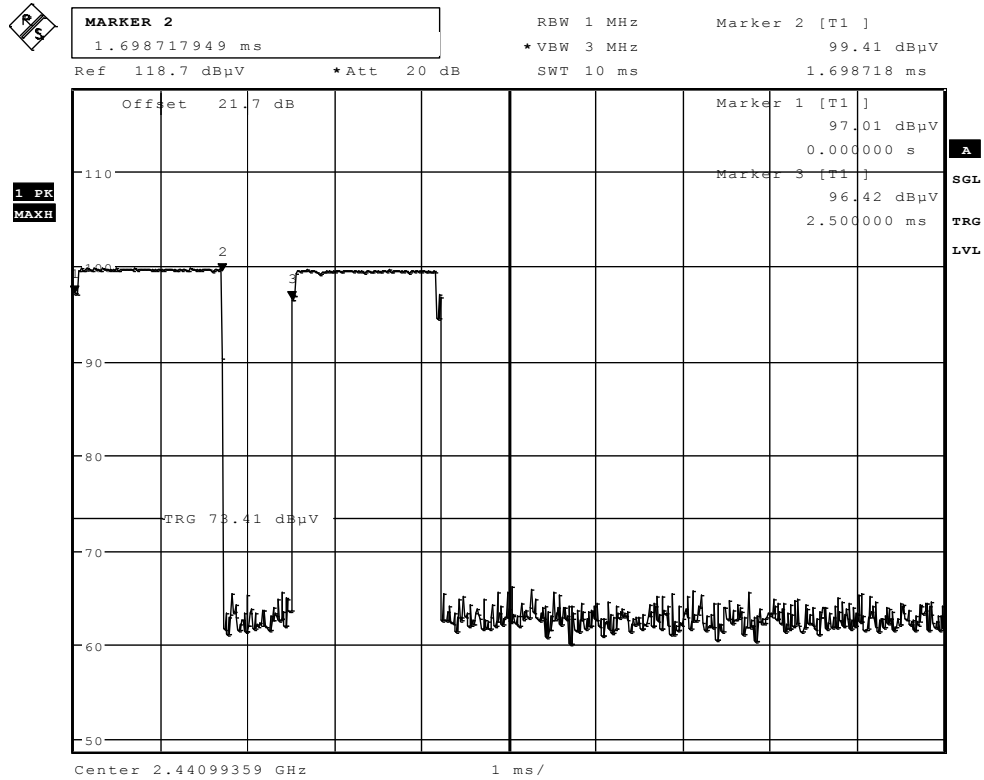
Diagram: Split screen 1



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

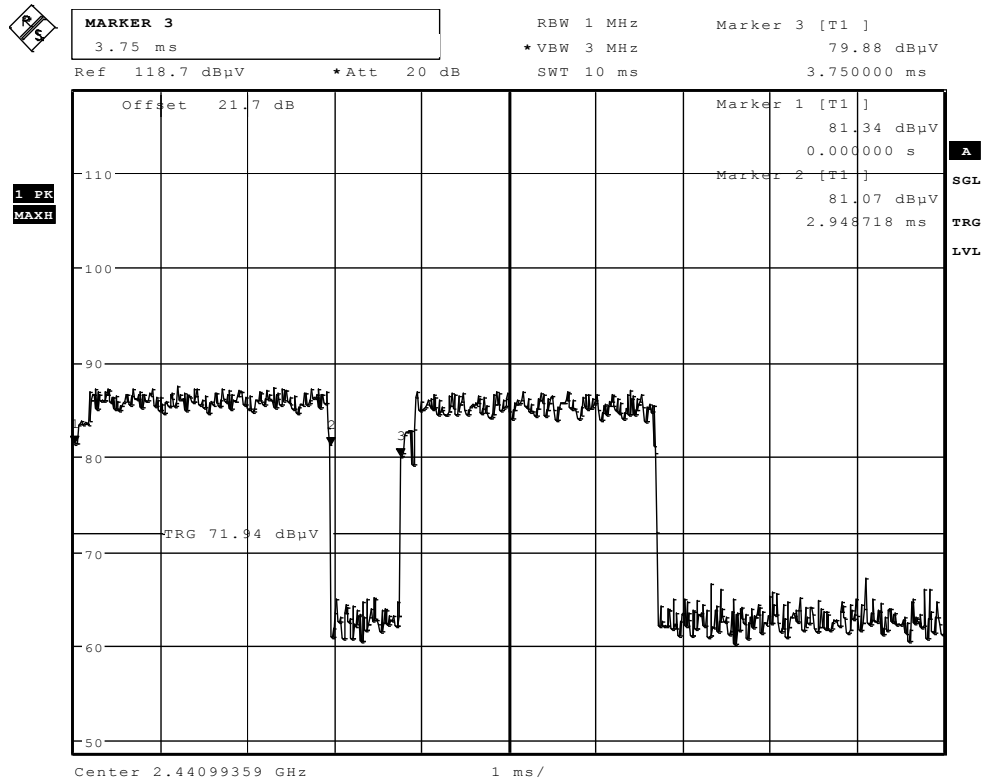
Diagram: Split screen 2

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



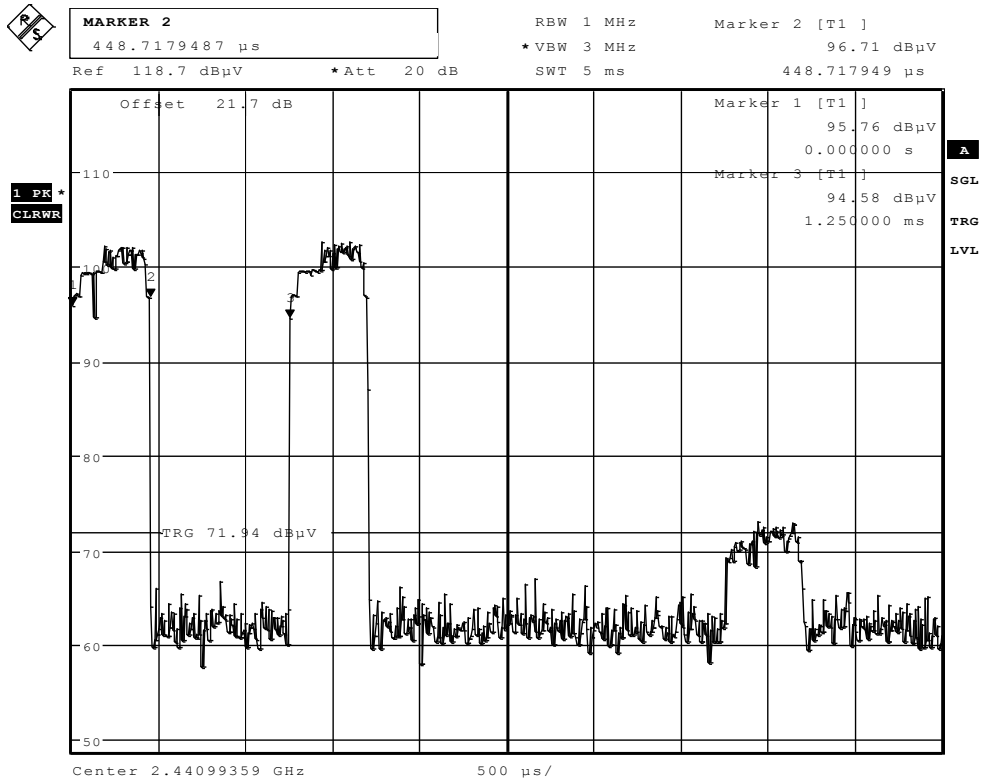
Date: 12.DEC.2011 16:09:50

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)