

ANNEX 4: Measurement Diagrams
to
TEST REPORT
No.: 3-0071-13-5-2b

FCC ID: QNG-BE2807
IC: 6434C-BE2807

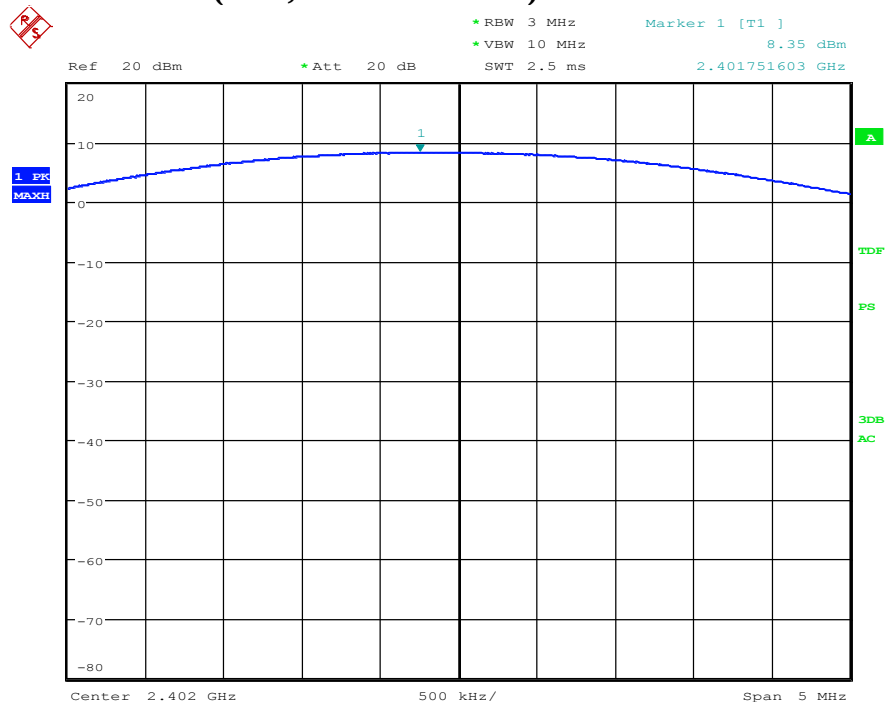
Laboratory Accreditation and Listings			
 Deutsche Akkreditierungsstelle D-PL-12047-01-01	 Reg. No.: 736496 MRA US-EU 0003	 Industry Canada Reg. No.: 3462D-1 Reg. No.: 3462D-2 Reg. No.: 3462D-3	 Voluntary Controls for Electromagnetic Emissions Reg. No.: R-2665, R-2666 C-2914, T-1967, G-301
 AUTHORIZED RF LABORATORY	 LAB CODE 20011130-00		
accredited according to DIN EN ISO/IEC 17025			
CETECOM GmbH 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			

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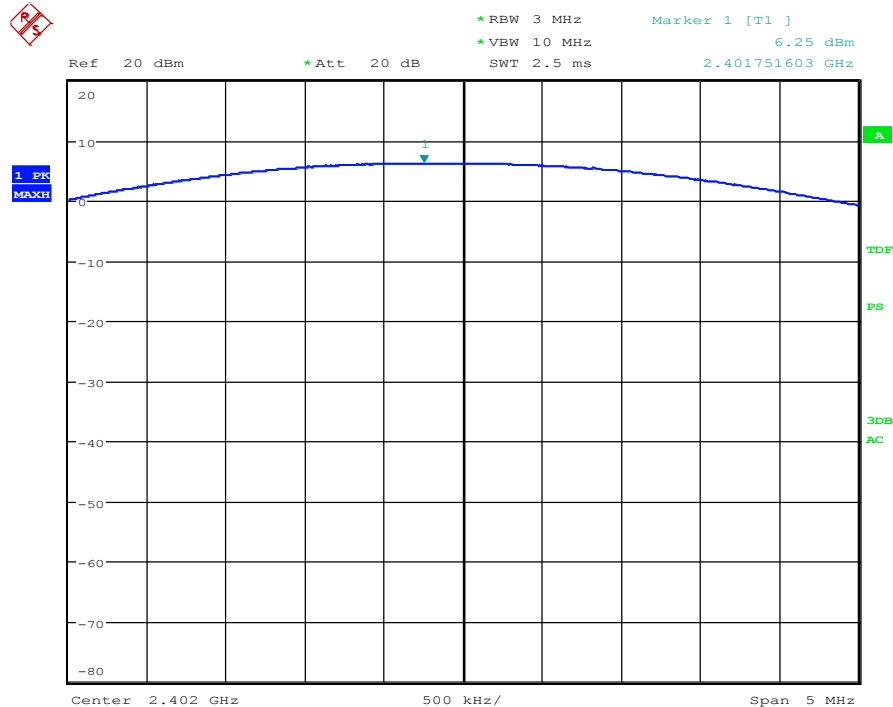
1. Transmitter Peak Output Power (conducted)

1.1. Channel 0 (DH1, 2-DH1 & 3-DH1)



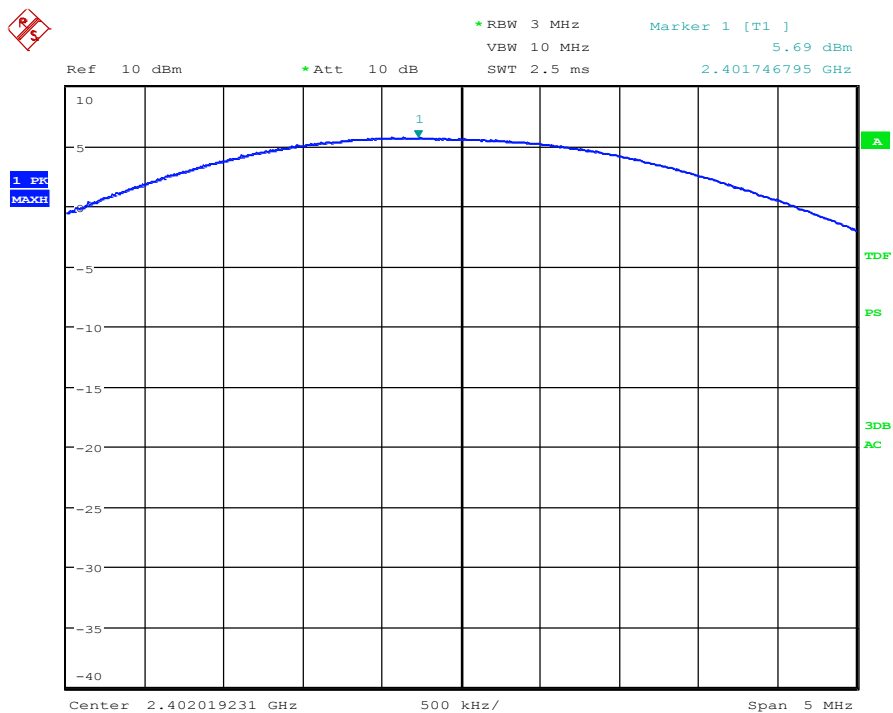
Date: 17.MAY.2013 09:11:55

DH1



Date: 17.MAY.2013 09:20:35

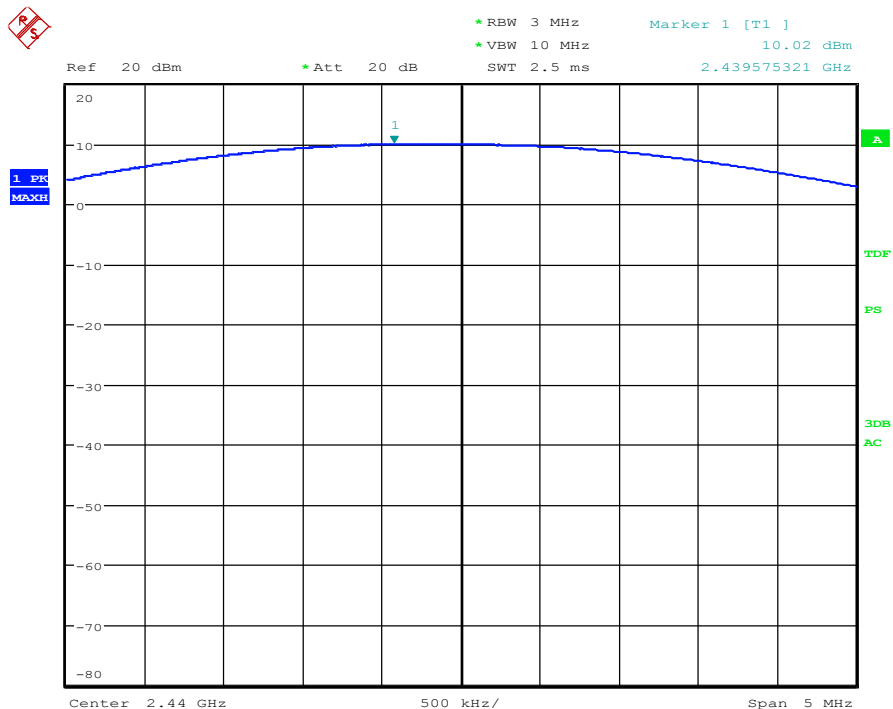
2-DH1



Date: 18.JUN.2013 09:21:25

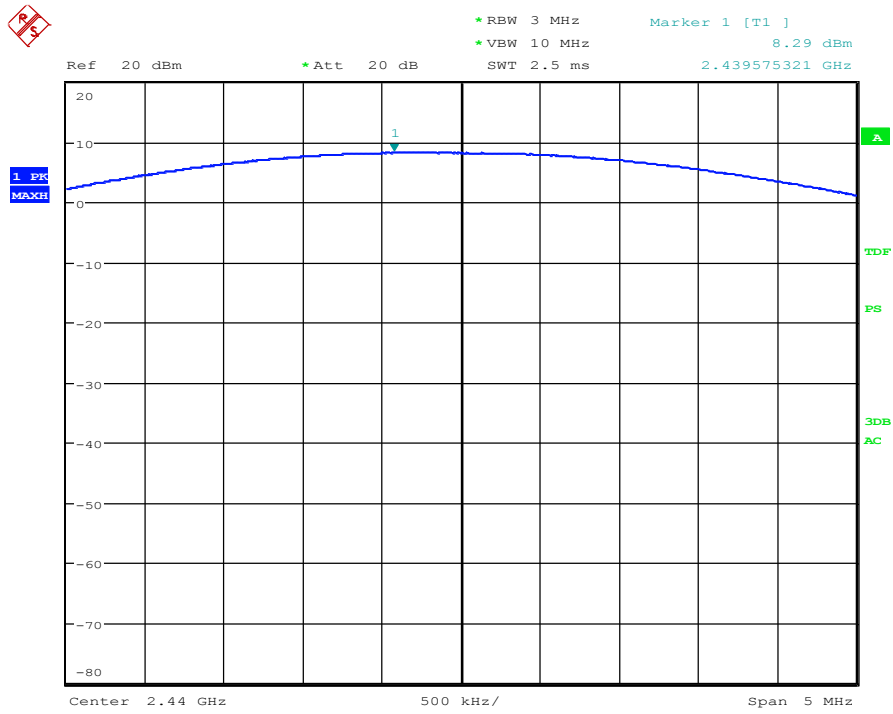
3-DH1

1.2. Channel 38 (DH1, 2-DH1 & 3-DH1)

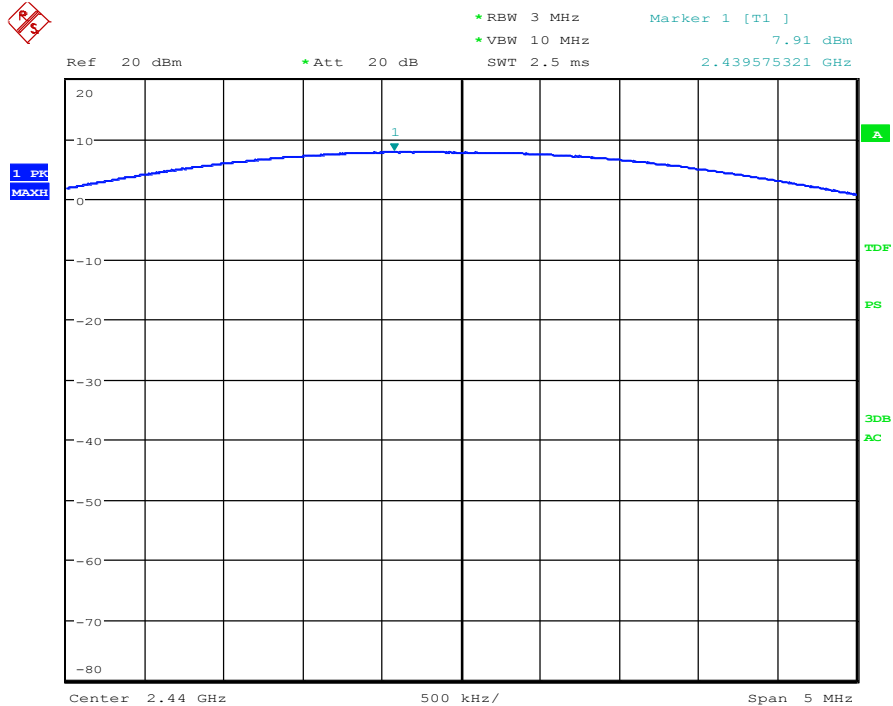


Date: 17.MAY.2013 09:28:18

DH1



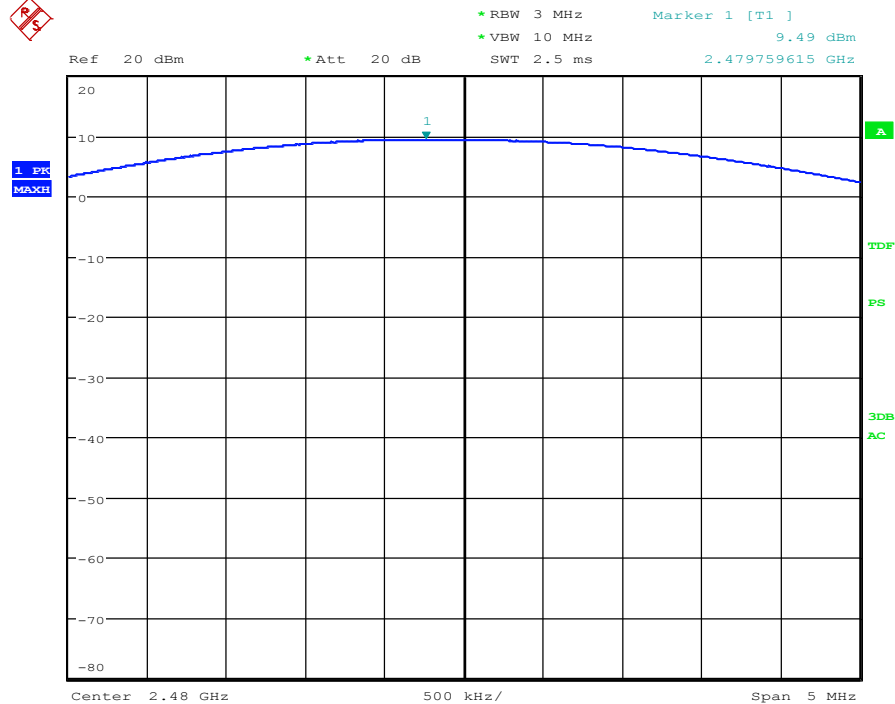
Date: 17.MAY.2013 09:25:37

2DH-1

Date: 17.MAY.2013 09:23:40

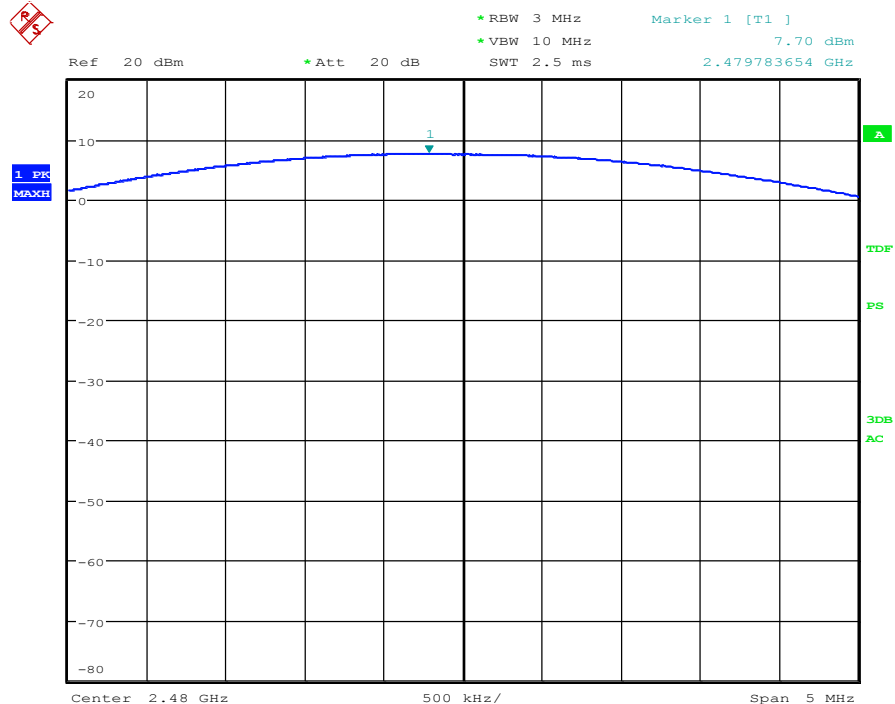
3DH-1

1.3. Channel 78 (DH1, 2-DH1 & 3-DH1)



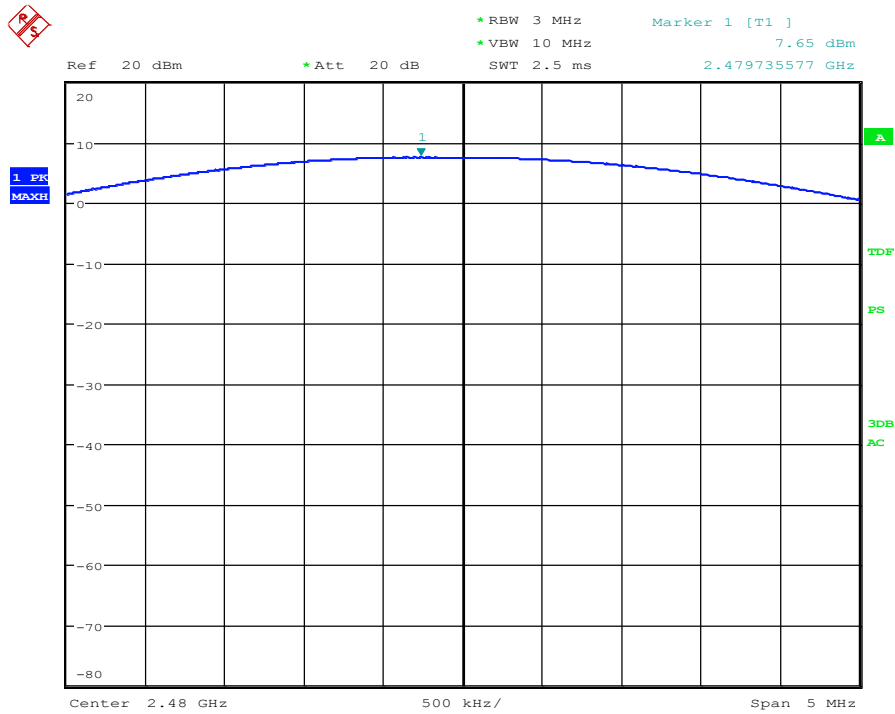
Date: 17.MAY.2013 09:30:49

DH-1



Date: 17.MAY.2013 09:32:59

2-DH1

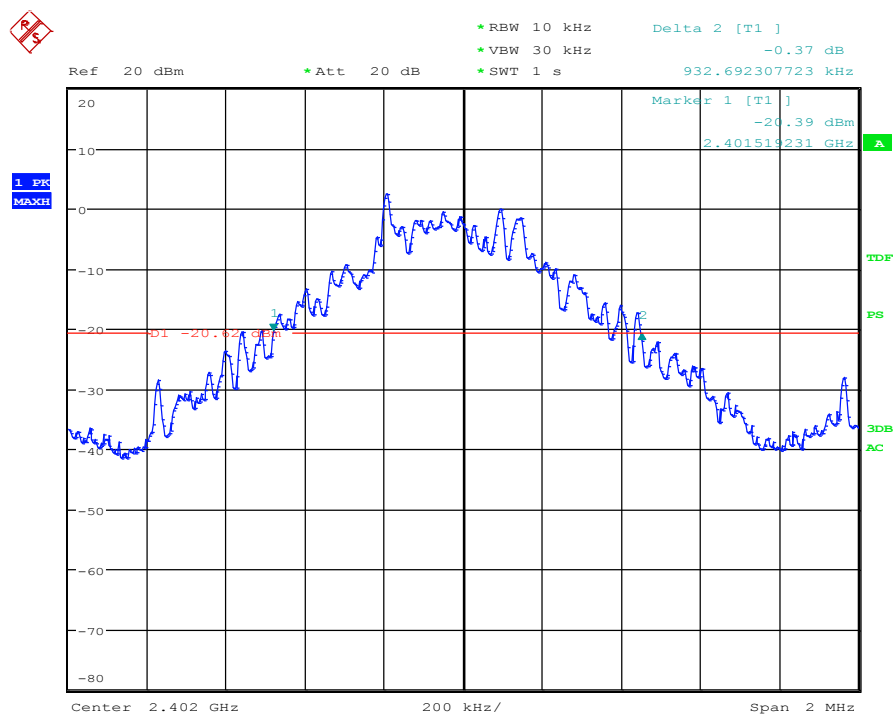


Date: 17.MAY.2013 09:36:50

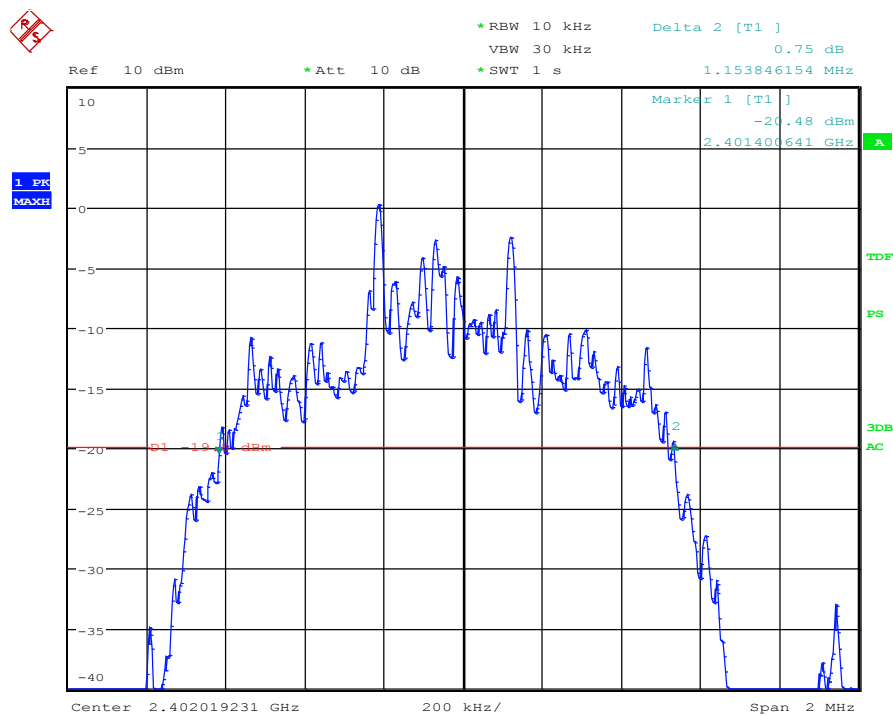
3-DH1

2. 20 dB bandwidth (conducted)

2.1. Channel 0 (DH1, 2-DH1 & 3-DH1)



Date: 17.MAY.2013 10:21:03

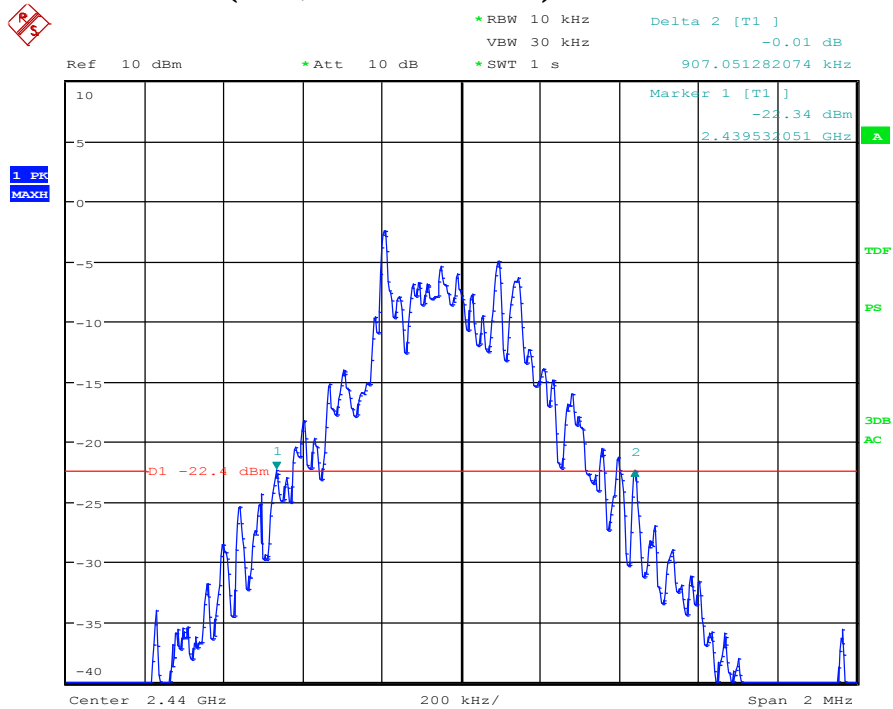


Date: 18.JUN.2013 09:25:43

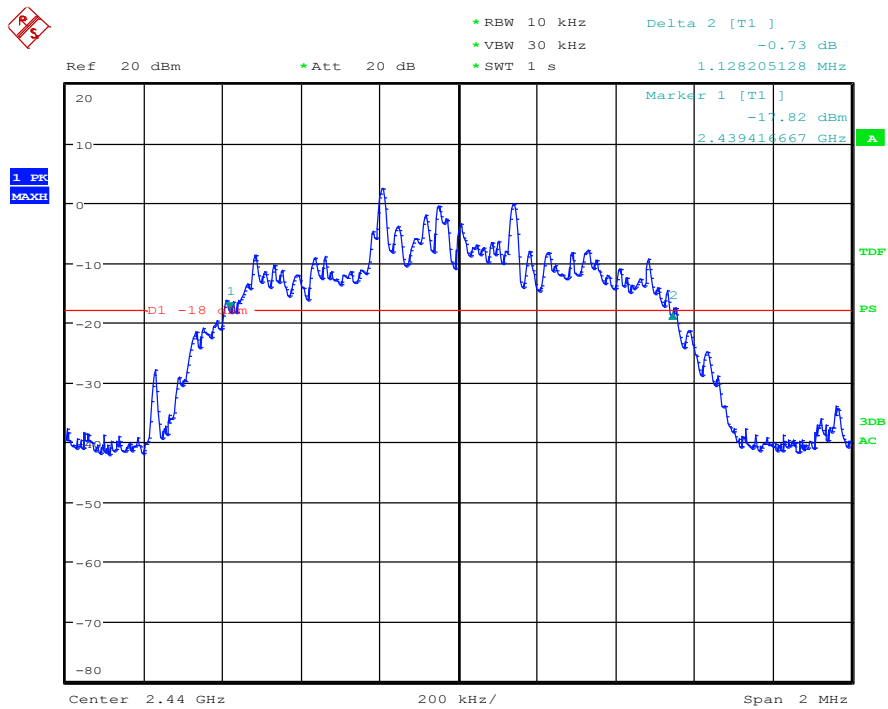


Date: 18.JUN.2013 09:28:19

2.2. Channel 38 (DH1, 2-DH1 & 3-DH1)



Date: 18.JUN.2013 09:30:00

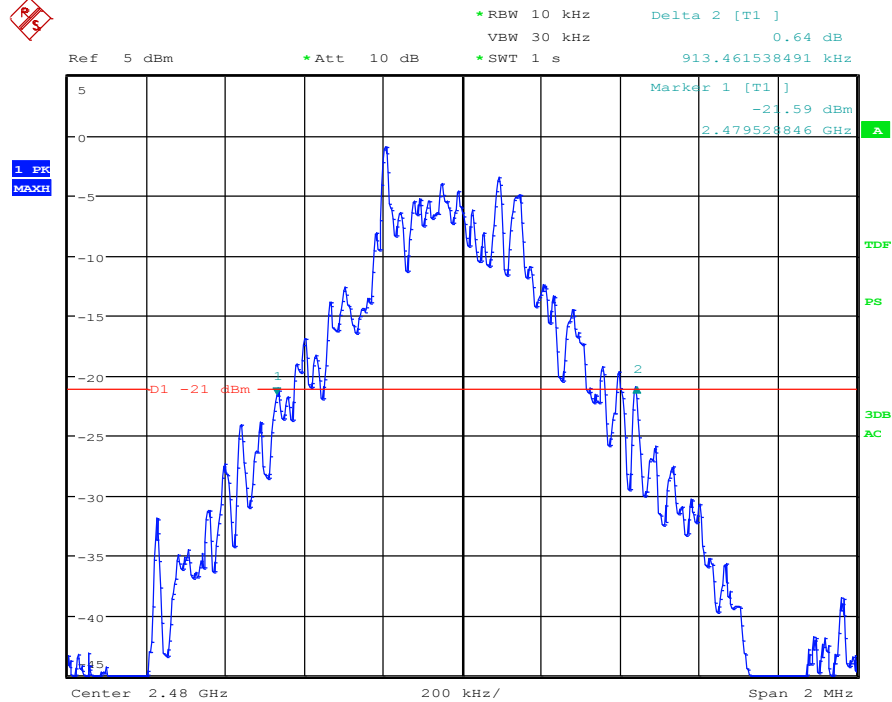


Date: 17.MAY.2013 10:42:44

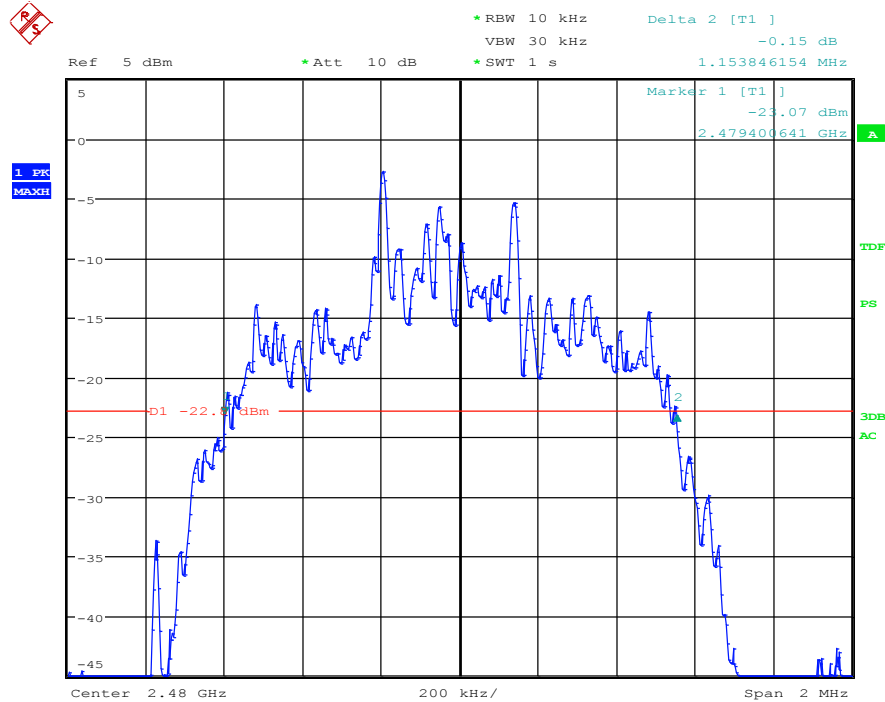


Date: 18.JUN.2013 09:31:51

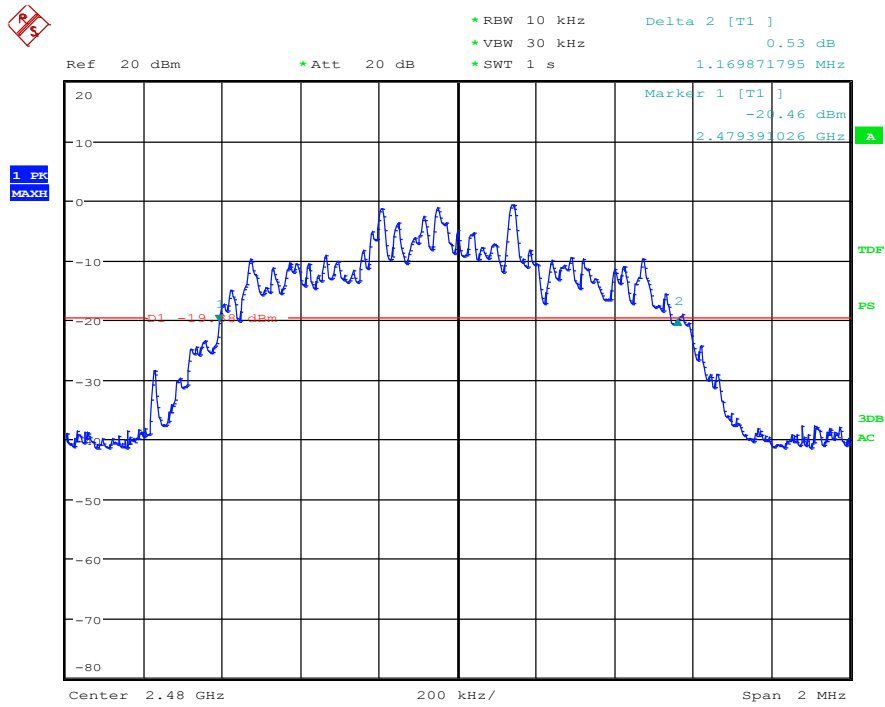
2.3. Channel 78 (DH1, 2-DH1 & 3-DH1)



Date: 18.JUN.2013 09:34:16



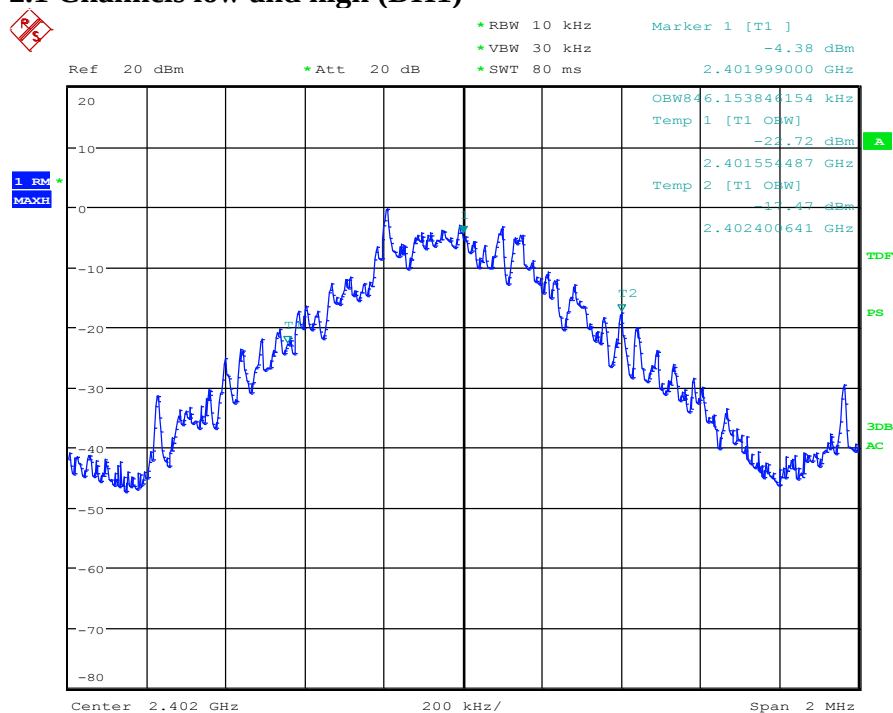
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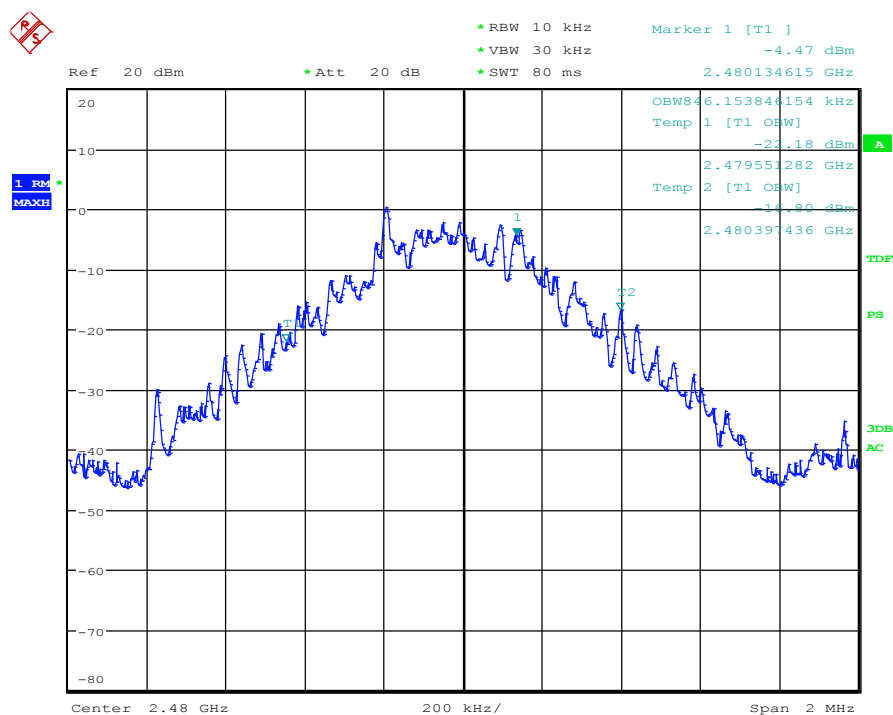
Date: 17.MAY.2013 10:39:00

3. 99% occupied bandwidth (conducted)

2.1 Channels low and high (DH1)

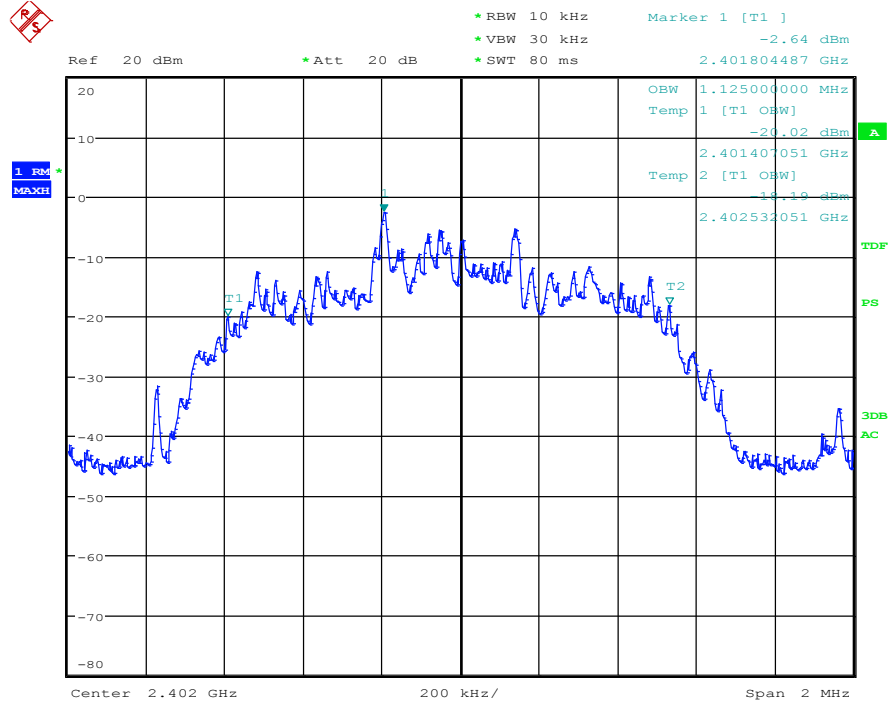


Date: 17.MAY.2013 09:50:31

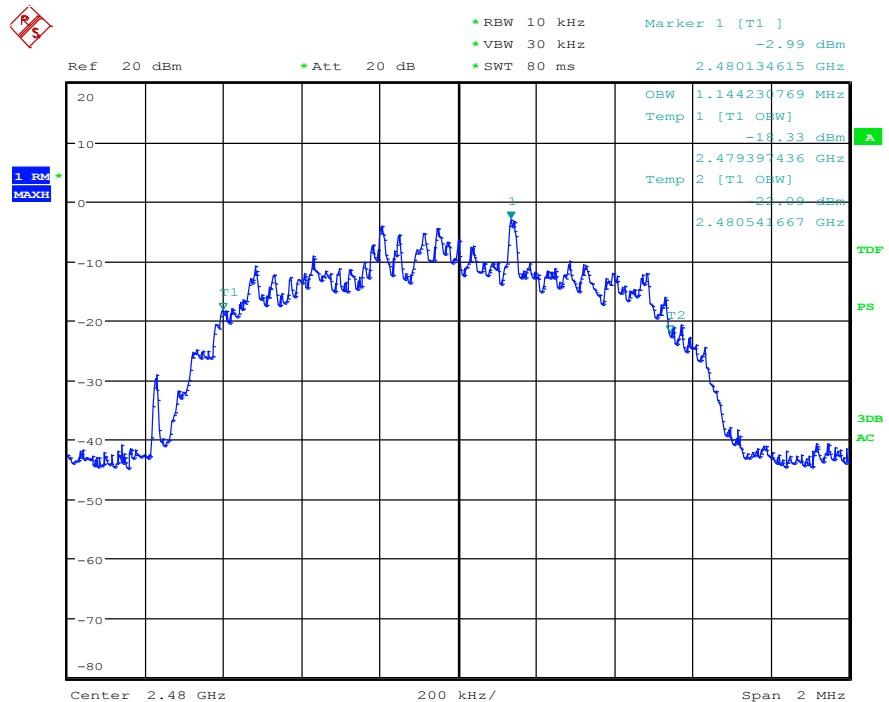


Date: 17.MAY.2013 09:58:33

2.2 Channels low and high (2-DH1)

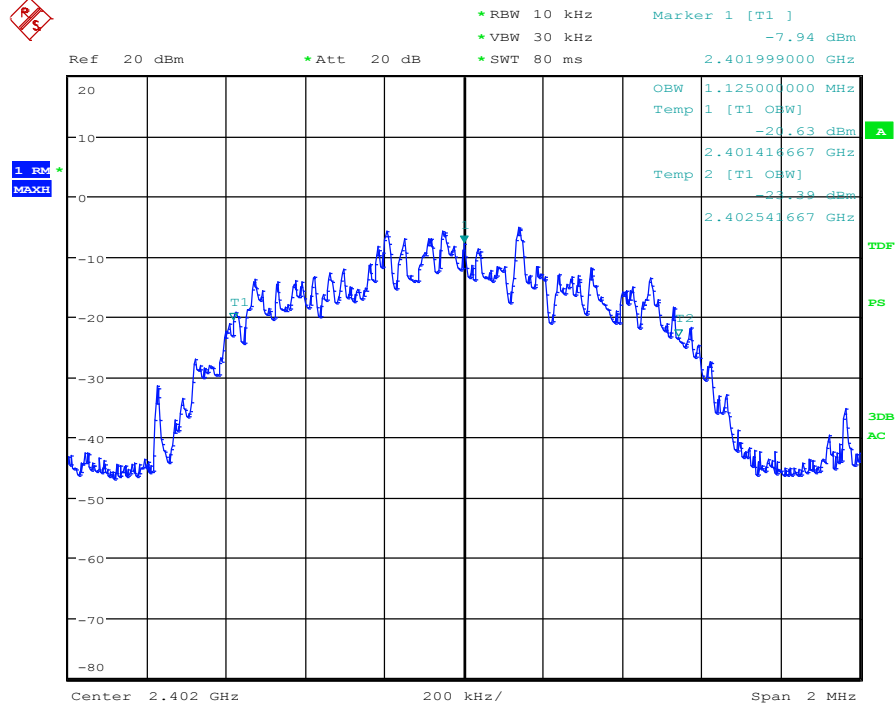


Date: 17.MAY.2013 10:01:22

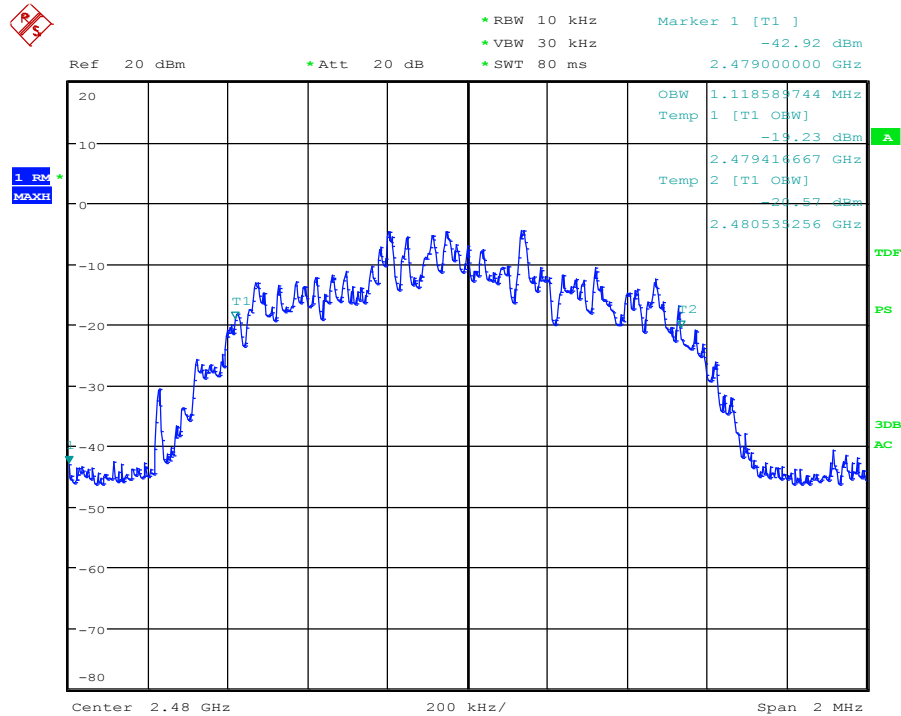


Date: 17.MAY.2013 09:56:51

2.3 Channels low and high (3-DH1)



Date: 17.MAY.2013 09:51:33

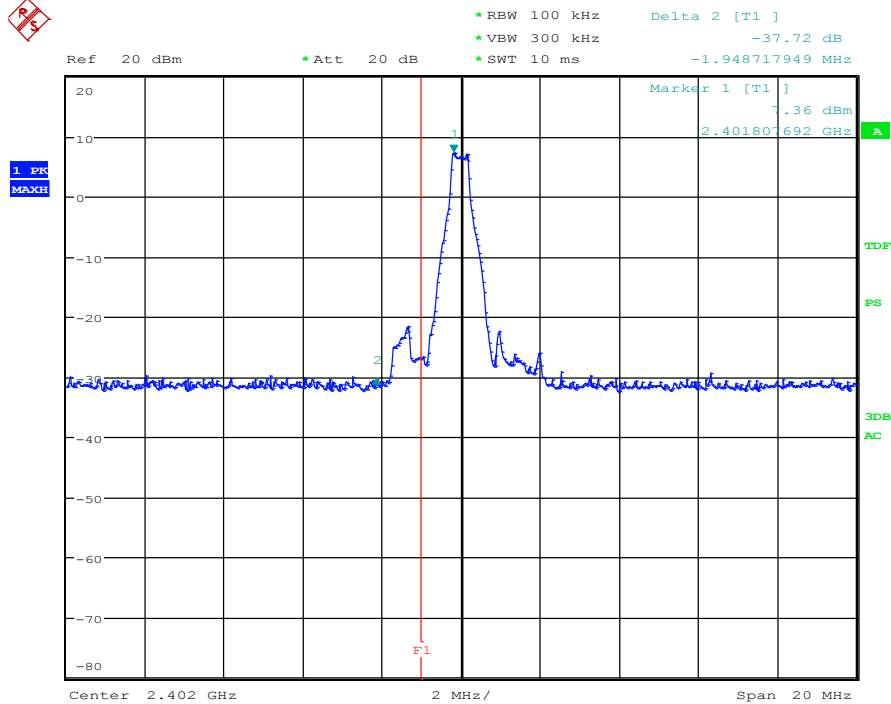


Date: 17.MAY.2013 09:53:14

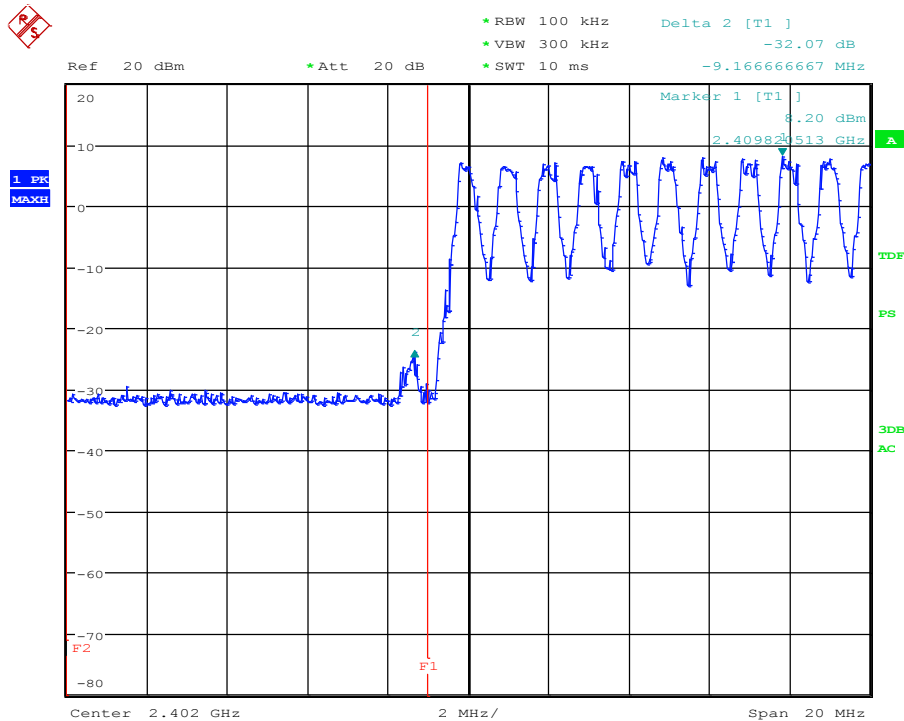
4. Out-Of-Band RF- and Band-Edge emissions (20dBc)

4.1 Inband Emissions, Channels 0/38/78 (DH-1, hopping off/on)

Low channel

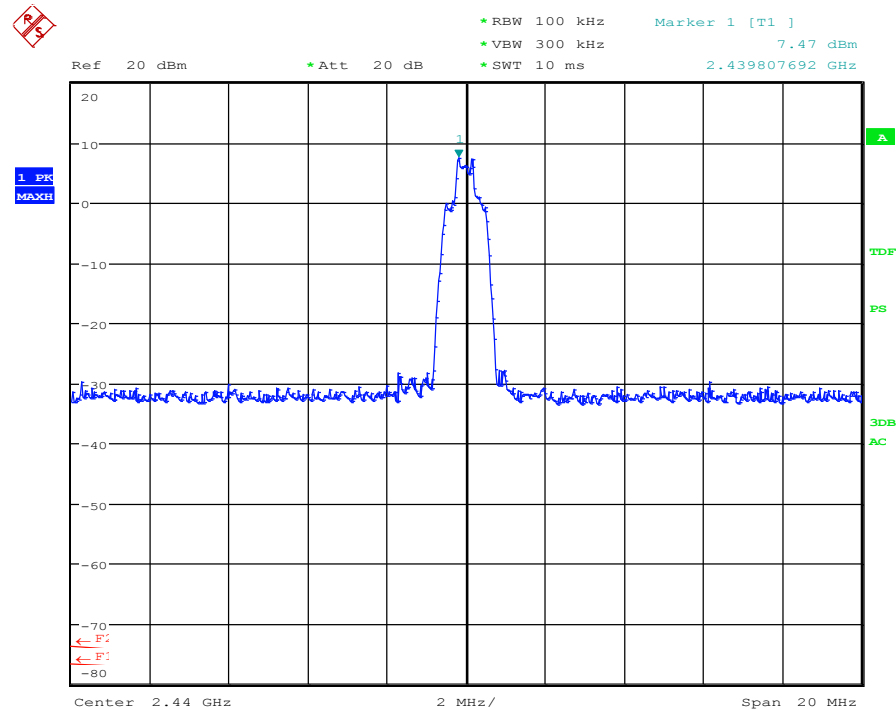


Date: 17.MAY.2013 14:37:59



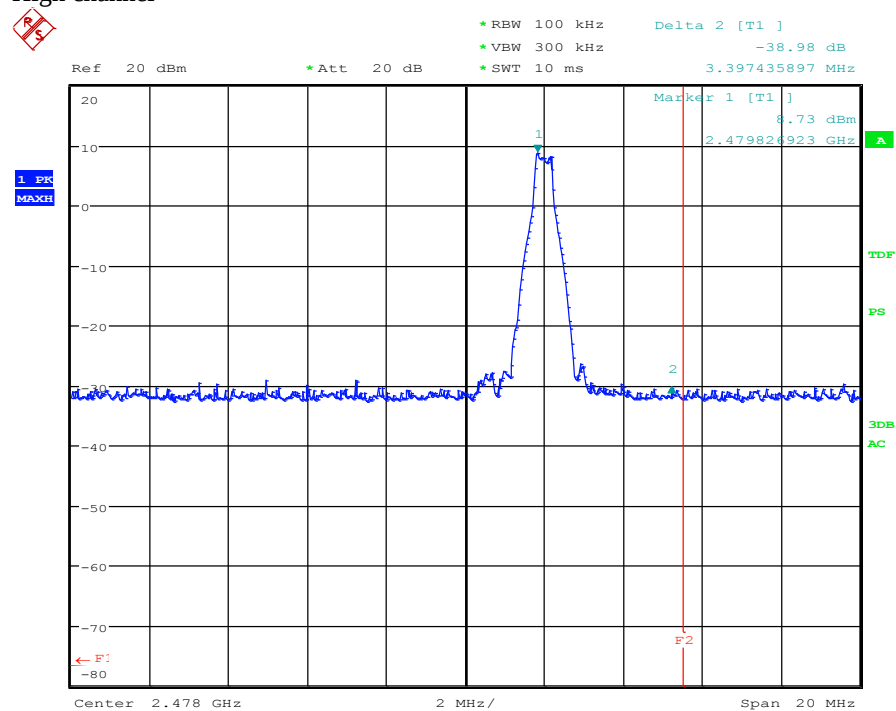
Date: 17.MAY.2013 11:12:50

Middle channel

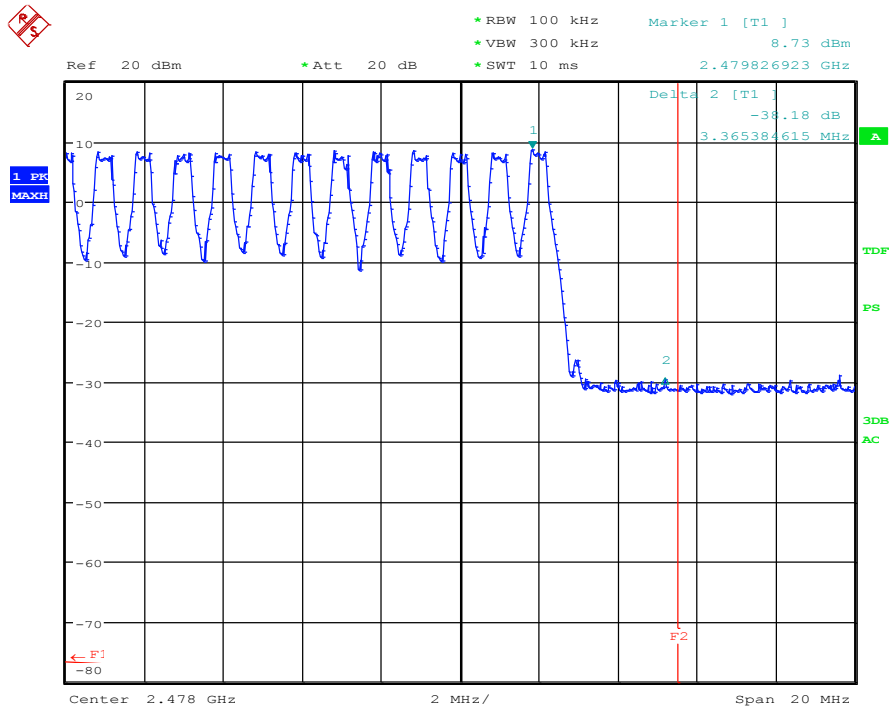


Date: 17.MAY.2013 11:17:46

High channel

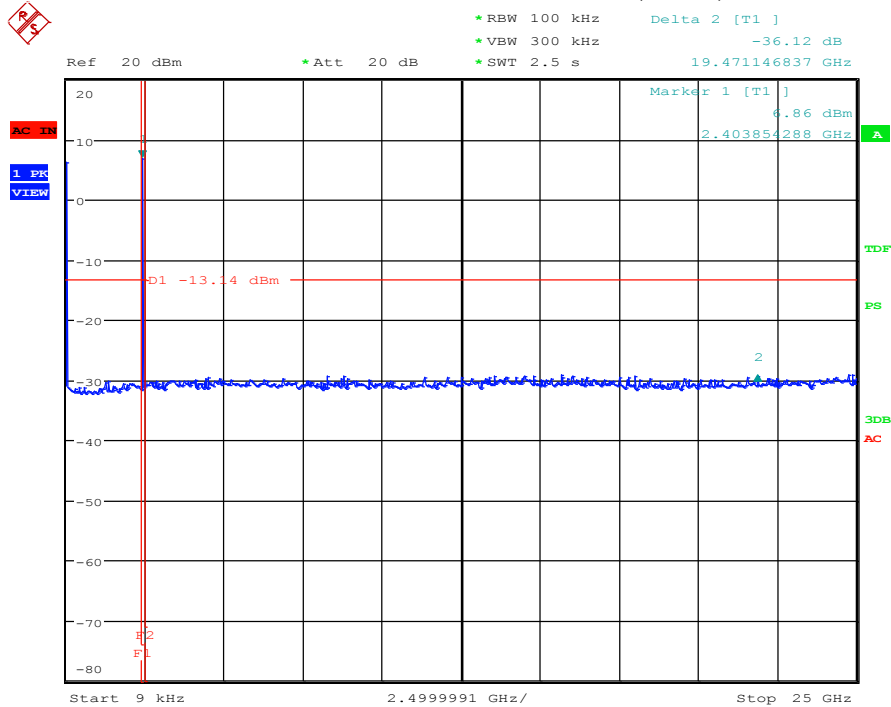


Date: 17.MAY.2013 11:21:08



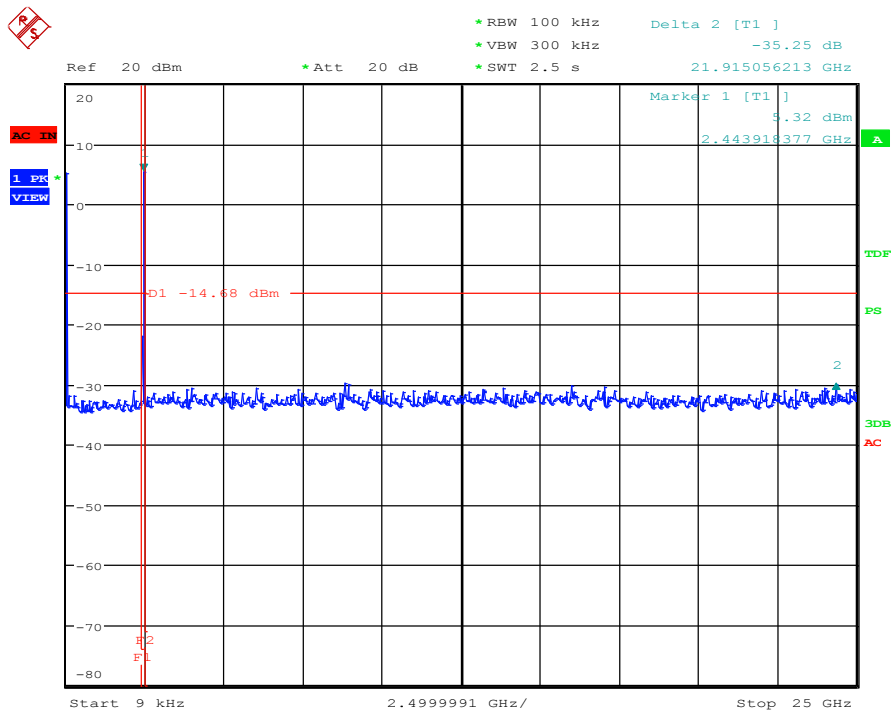
Date: 17.MAY.2013 11:24:58

4.2 Out-of-Band Emissions, Channels 0/38/78 (DH-1)



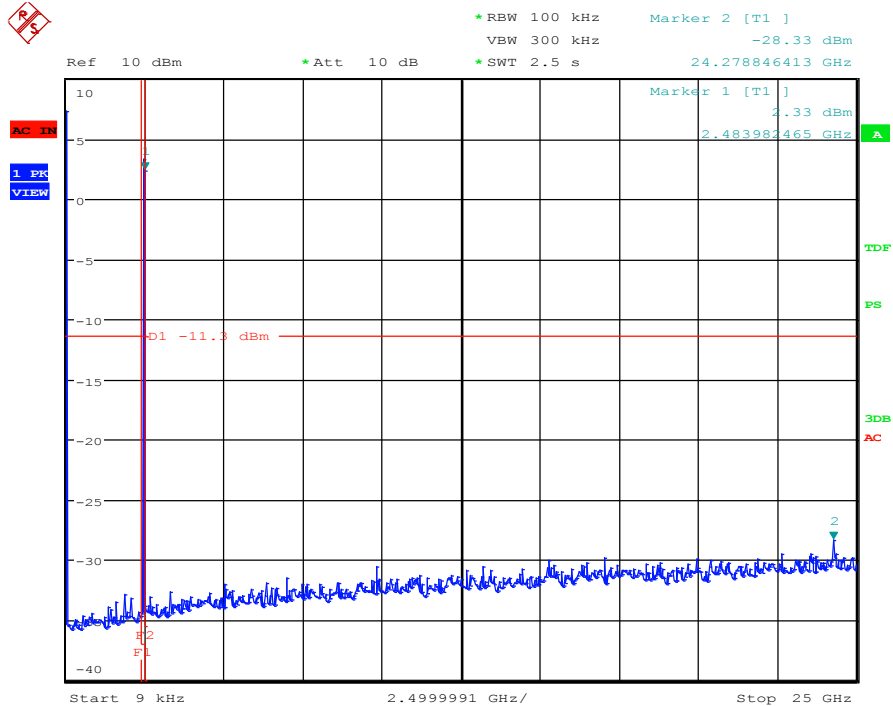
Date: 17.MAY.2013 11:32:03

Channel low



Date: 17.MAY.2013 11:37:45

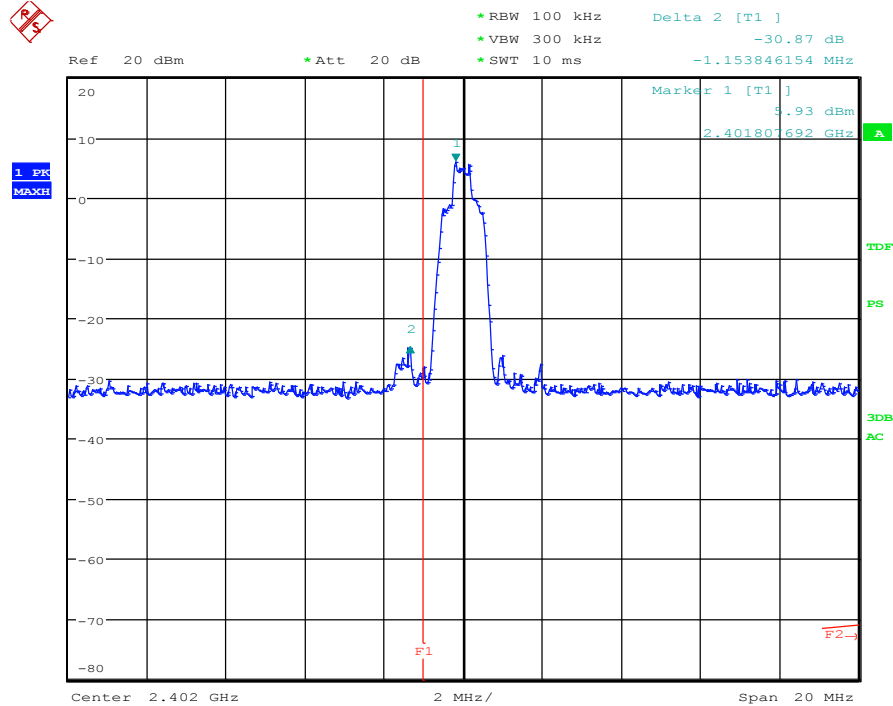
Channel middle



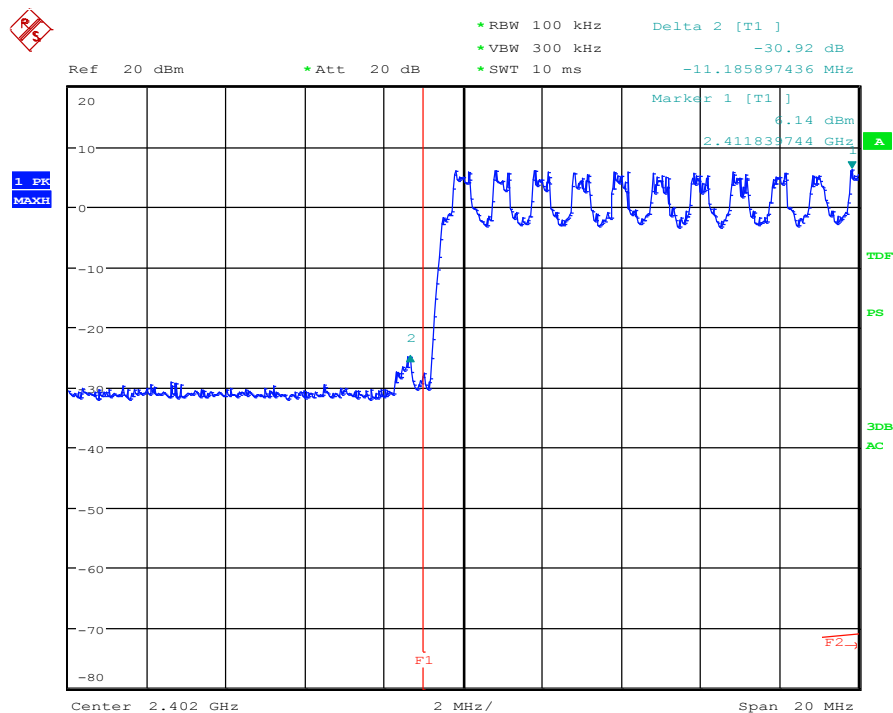
Date: 18.JUN.2013 09:45:39

Channel high

4.3 Inband Emissions, Channels 0/38/78 (2-DH1, hopping off/on)

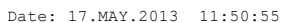


Date: 17.MAY.2013 11:44:02



Date: 17.MAY.2013 11:49:31

Channel low



1 PK
MAX

Ref 20 dBm * Att 20 dB

* RBW 100 kHz Delta 2 [T1]
 * VBW 300 kHz -37.23 dB
 * SWT 10 ms 3.397435897 MHz

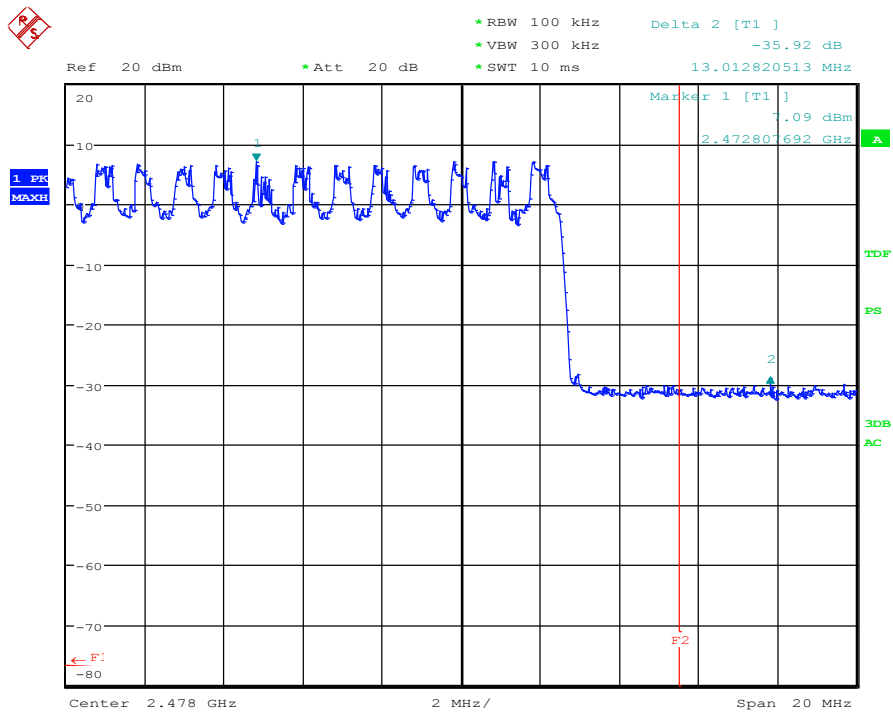
Marker 1 [T1]
 6.98 dBm
 2.479826923 GHz

2

F2

Center 2.478 GHz 2 MHz/
 Span 20 MHz

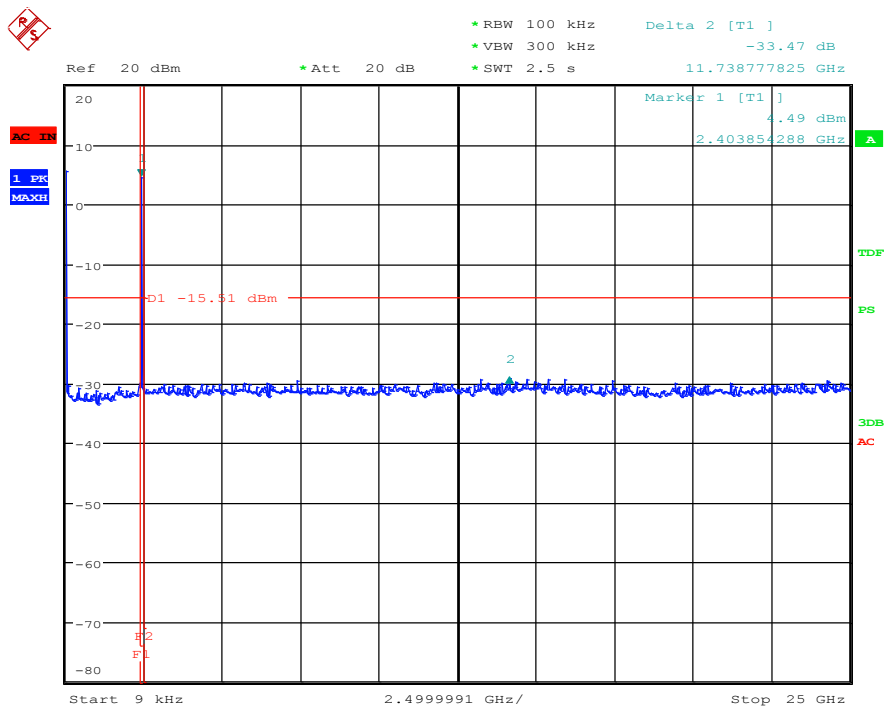
TR3-0071-13-5-2b_A4.docx



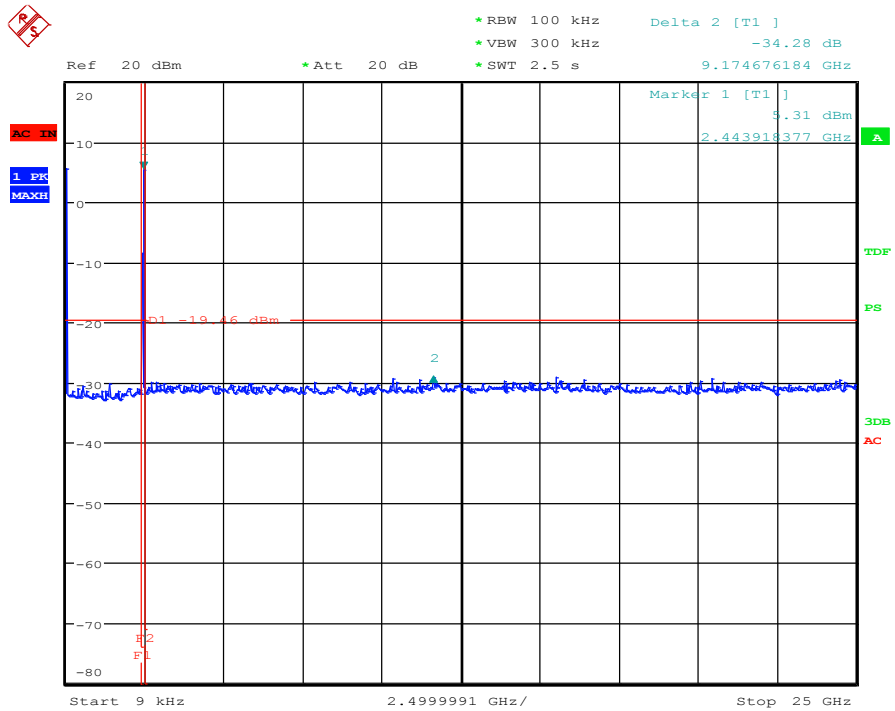
Date: 17.MAY.2013 11:55:17

Channel high

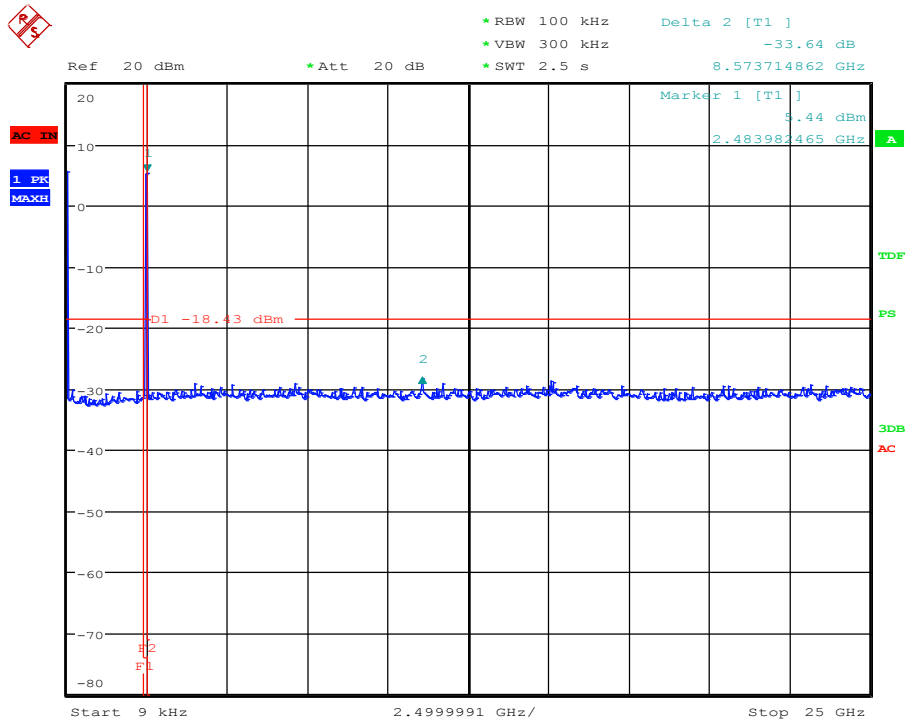
4.4 Out-of-Band Emissions, Channels 0/38/78 (2DH-1)



Date: 17.MAY.2013 12:41:03



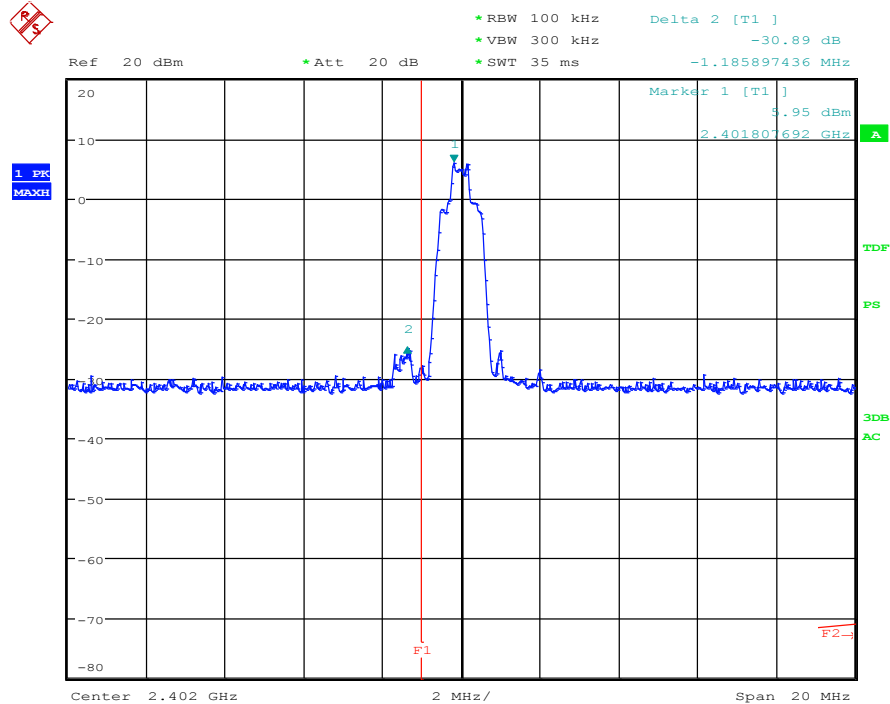
Date: 17.MAY.2013 12:43:24



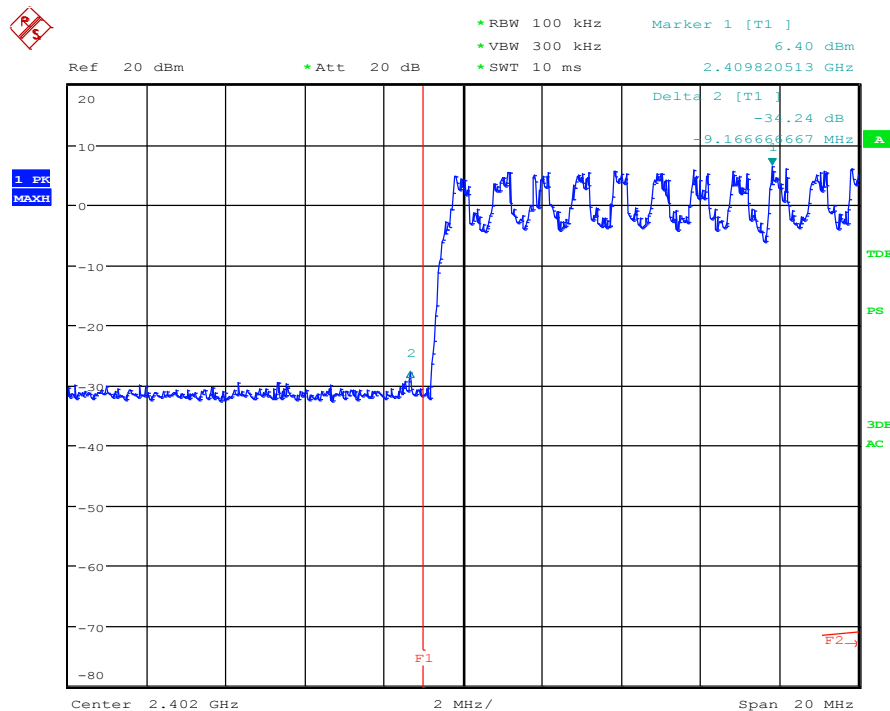
Date: 17.MAY.2013 12:45:52

4.5 Inband Emissions, Channels 0/38/78 (3DH-1, hopping off/on)

Channel low

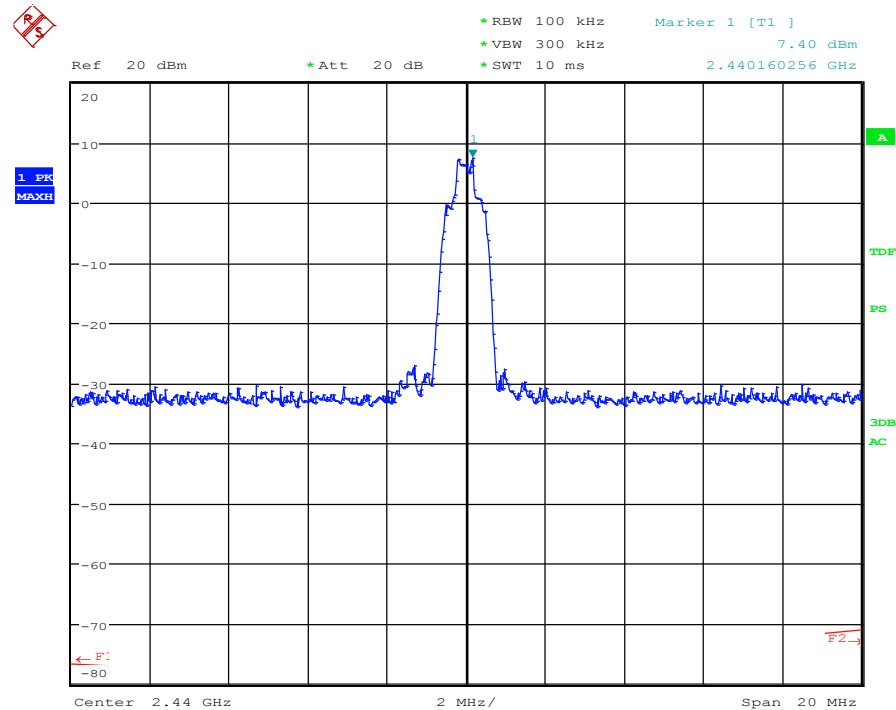


Date: 17.MAY.2013 12:06:23



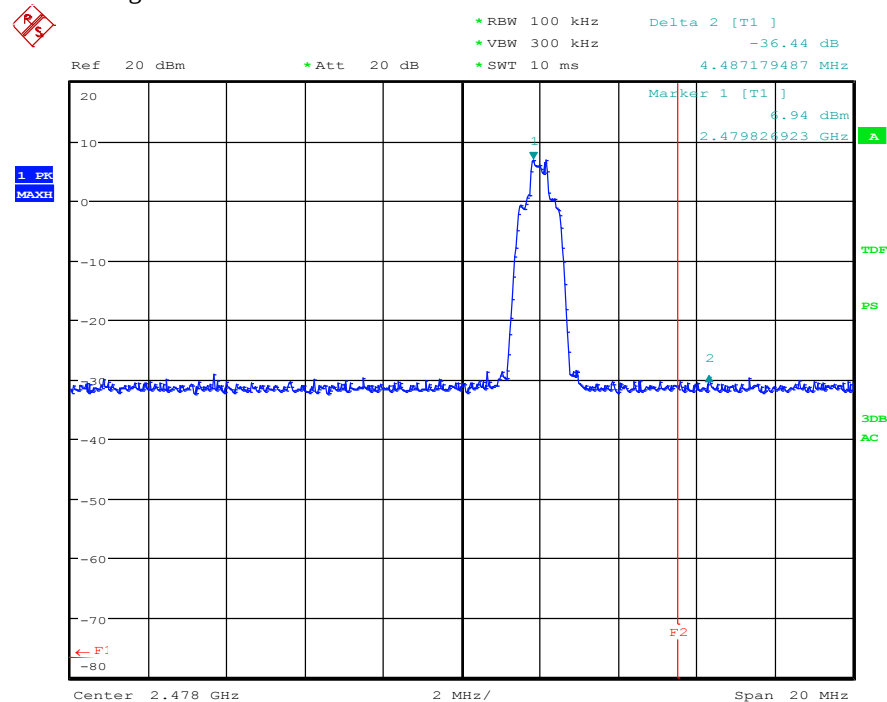
Date: 17.MAY.2013 12:10:24

Channel middle

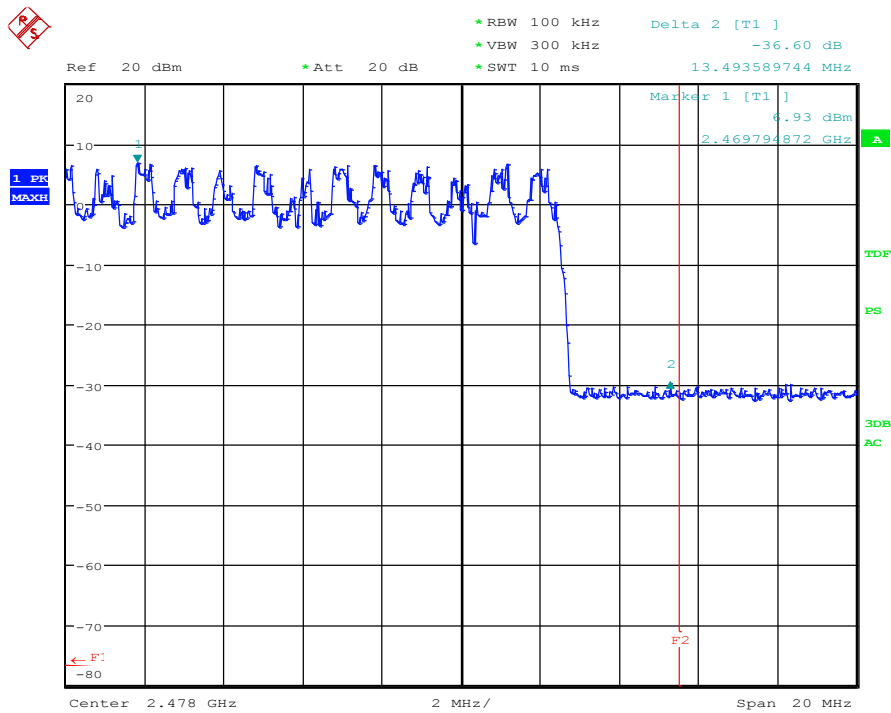


Date: 17.MAY.2013 12:18:23

Channel high



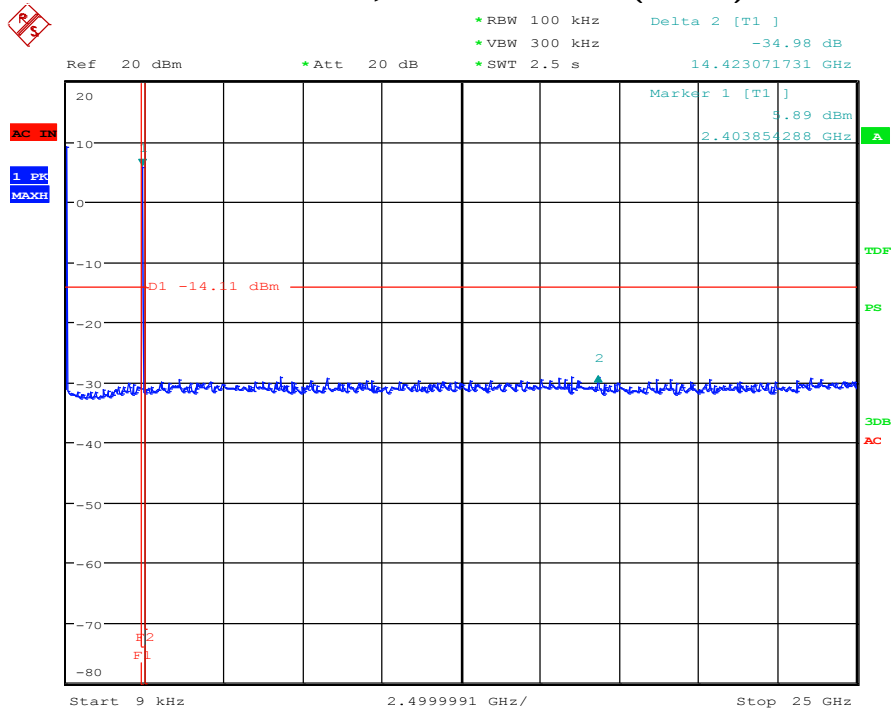
Date: 17.MAY.2013 12:17:10



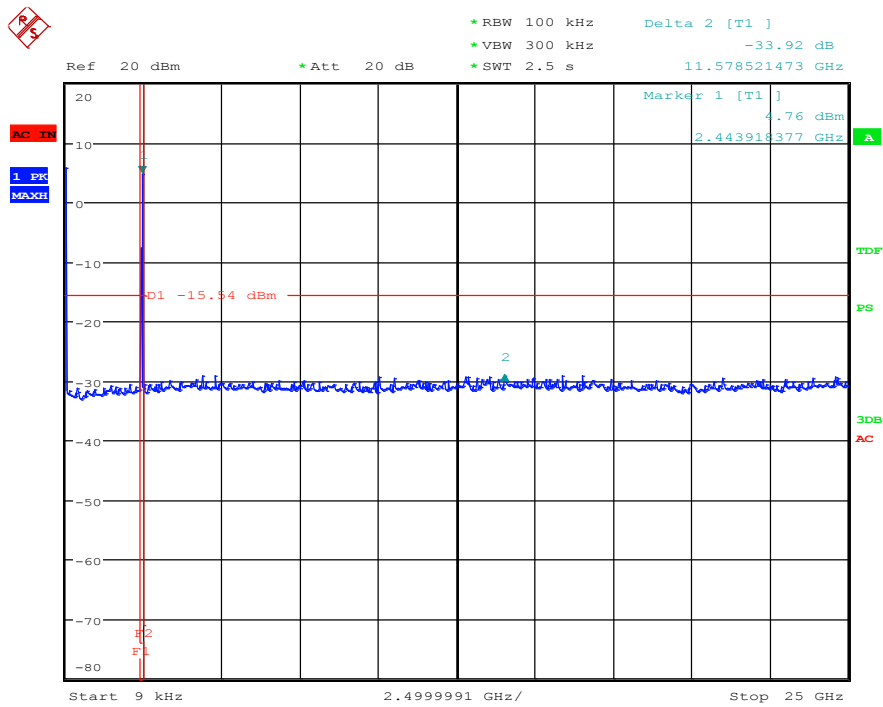
Date: 17.MAY.2013 12:13:38

Channel high

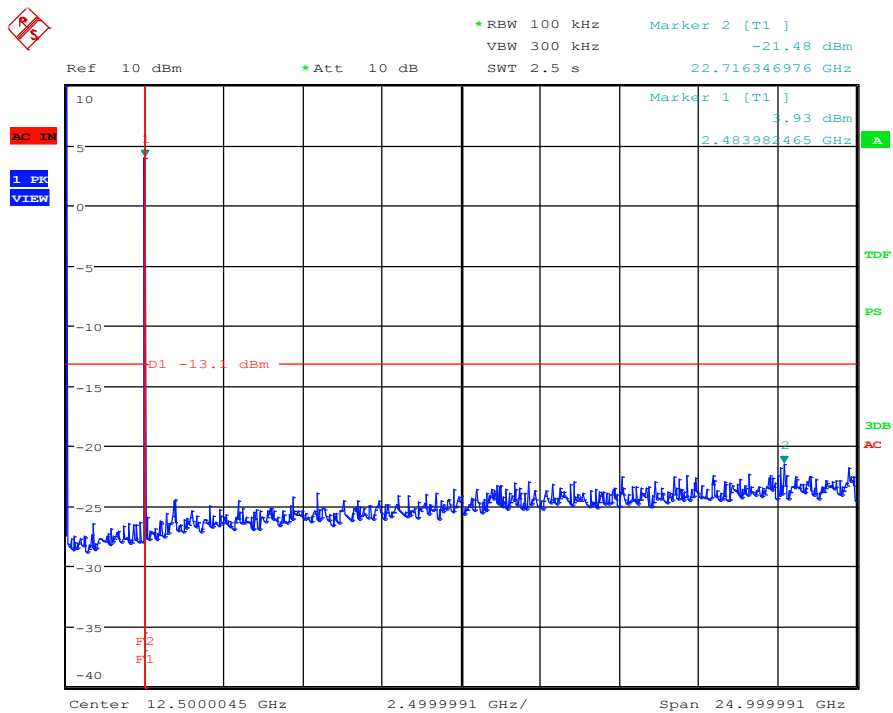
4.6 Out-of-Band Emissions, Channels 0/38/78 (3DH-1)



Date: 17.MAY.2013 12:39:16



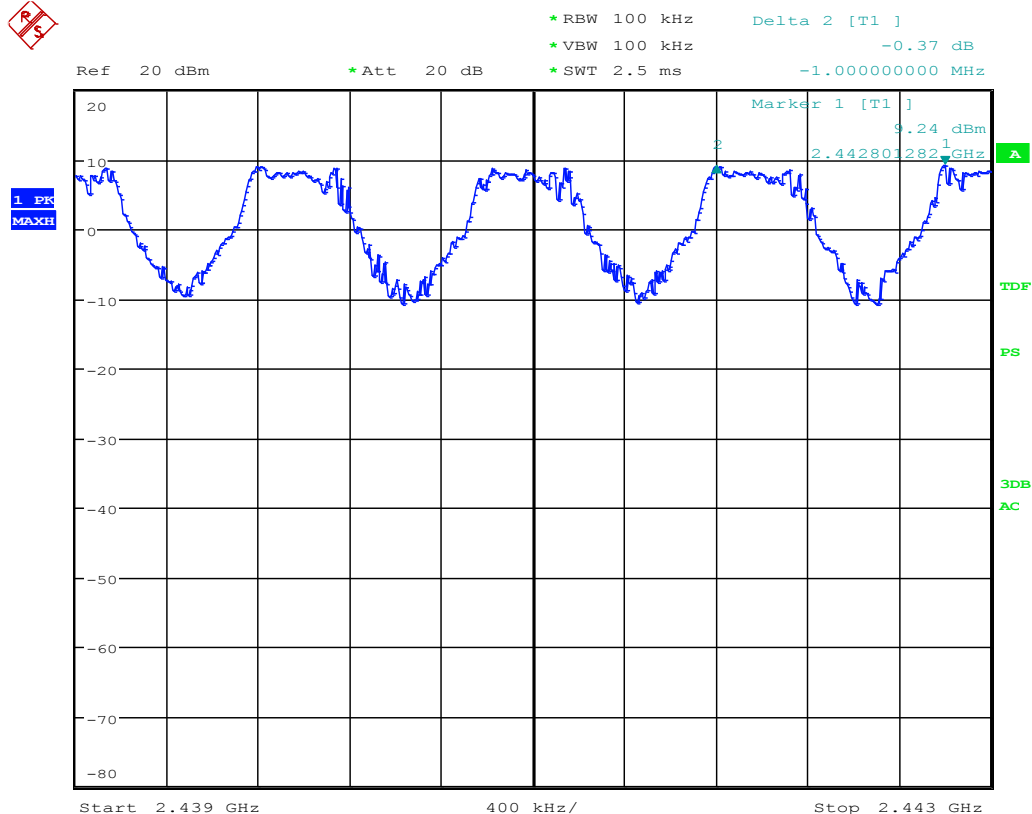
Date: 17.MAY.2013 12:36:56



Date: 18.JUN.2013 10:12:51

5. Channel carrier frequency separation (conducted)

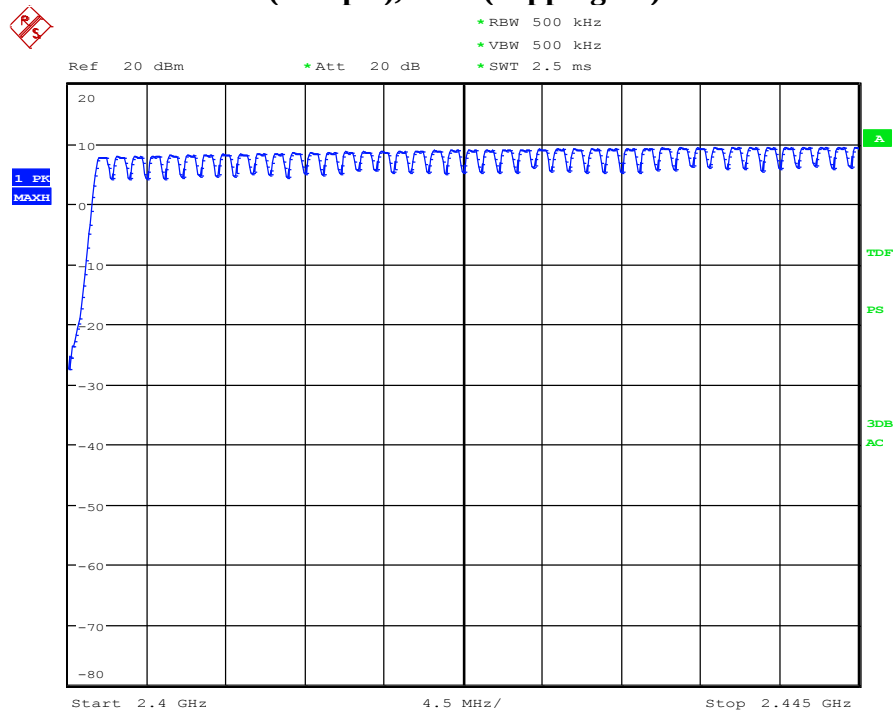
5.1 Channels 38-39 (DH5, hopping-on)



Date: 17.MAY.2013 13:59:24

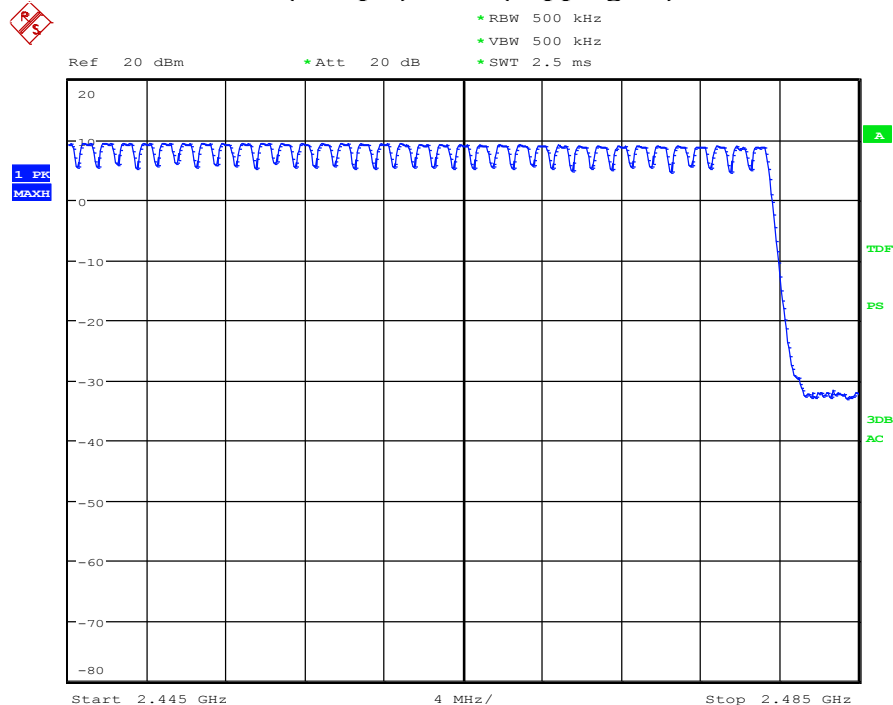
6. Number of channels (conducted)

6.1 Channels 0 -38 (sweep 1), DH5 (hopping-on)



Date: 17.MAY.2013 13:51:51

6.2 Channels 39 -78 (sweep 2), DH5 (hopping-on)



Date: 17.MAY.2013 13:54:07

7.. Radiated field strength measurements accord. §15.209&15.205

7.1 Below 30 MHz

Diagram No. 2.01

Common Information

Test description:	Date: 15.05.2013 Page 1 of 1
Test site and distance:	Magnetic Fieldstrength Measurement related to 30/300 m distance
Version of Testsoftware:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
Distance correction:	EMC32 v8.51.0
Rec. antenna (pre-scan):	Pls. refer detailed in the test report
Used filter:	height 1.00 m, parallel and 90° to EUT polarisation
Test specification:	bypass
	FCC 15.205 § 15.209; RSS-Gen: Issue 3
Operator:	YZH
Operating conditions:	BT v3.0+EPC, Ch 0+ DH1
Comment 1:	3-0017-13-5-2b

EUT Information

EUT Name:	Automotive Infotainment System
Manufacturer:	Harman International Industries (Automotive Division)
Serial Number:	sample #1
Hardware Rev:	T00BE093371102
Software Rev:	13.19.0
Comment:	Power supply during the test is nominal 13,2 V DC

FCC15.209_magn hor+vert

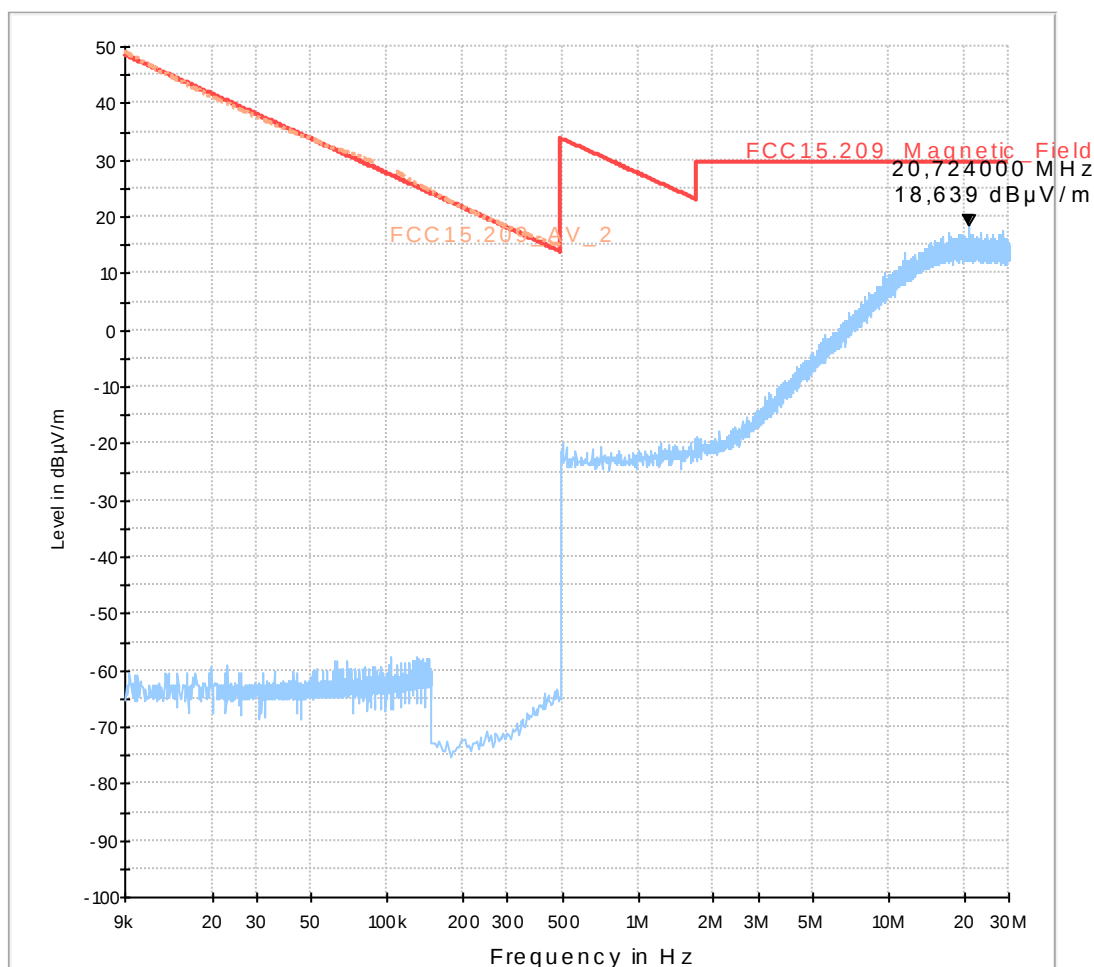


Diagram No. 2.02

Common Information

Date:	15.05.2013	Page 1 of 1
Test description:	Magnetic Fieldstrength Measurement related to 30/300 m distance	
Test site and distance:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance	
Version of Testsoftware:	EMC32 v8.51.0	
Distance correction:	Pls. refer detailed in the test report	
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation	
Used filter:	bypass	
Test specification:	FCC 15.205 § 15.209; RSS-Gen: Issue 3	
Operator:	YZH	
Operating conditions:	BT v3.0+EPC, Ch 38+2-DH1	
Comment 1:	3-0017-13-5-2b	

EUT Information

EUT Name:	Automotive Infotainment System
Manufacturer:	Harman International Industries (Automotive Division)
Serial Number:	sample #1
Hardware Rev:	T00BE093371102
Software Rev:	13.19.0
Comment:	Power supply during the test is nominal 13,2 V DC

FCC15.209_magn hor+vert

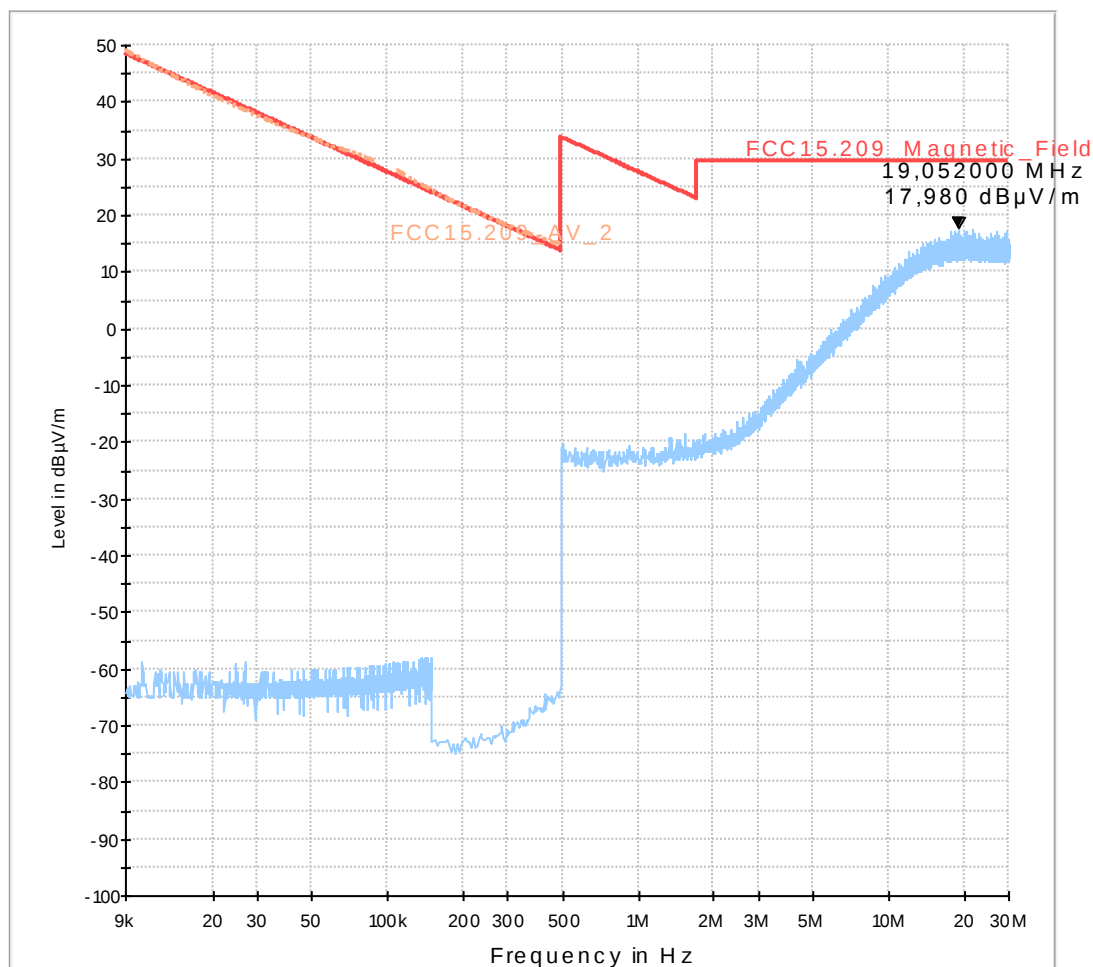


Diagram No. 2.03

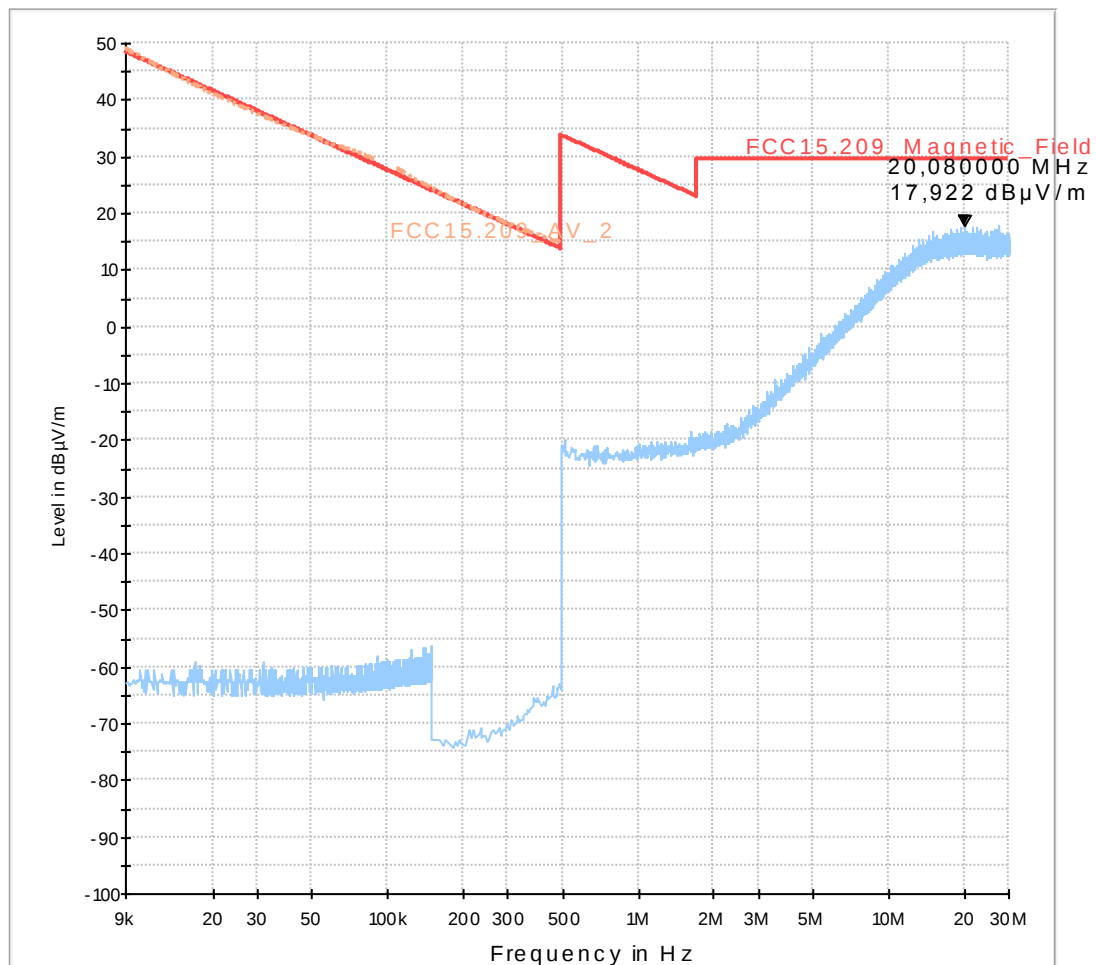
Common Information

Date:	15.05.2013	Page 1 of 1
Test description:	Magnetic Fieldstrength Measurement related to 30/300 m distance	
Test site and distance:	Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance	
Version of Testsoftware:	EMC32 v8.51.0	
Distance correction:	Pls. refer detailed in the test report	
Rec. antenna (pre-scan):	height 1.00 m, parallel and 90° to EUT polarisation	
Used filter:	bypass	
Test specification:	FCC 15.205 § 15.209; RSS-Gen: Issue 3	
Operator:	YZH	
Operating conditions:	BT v3.0+EPC, Ch 78+3-DH1	
Comment 1:	3-0017-13-5-2b	

EUT Information

EUT Name:	Automotive Infotainment System
Manufacturer:	Harman International Industries (Automotive Division)
Serial Number:	sample #1
Hardware Rev:	T00BE093371102
Software Rev:	13.19.0
Comment:	Power supply during the test is nominal 13,2 V DC

FCC15.209_magn hor+vert



7.2 Frequency range 30 MHz - 1 GHz

Diagram No. 3.01

Common Information

Date: 15.05.2013 Page 1 of 1
 Test description: Electric Fieldstrength Measurement
 Test site and distance: Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
 Version of Testsoftware: EMC32 v8.51.0
 Distance correction: used accord. table, pls. see test report
 Used filter: lowpass 1200 MHz
 Test specification.: FCC 15.209; RSS-Gen: Issue 3

Operator: YZH
 Operating conditions: BT v3.0+EPC, Ch0+ DH1
 Comment 1: 3-0071-13-5-2b

EUT Information

EUT Name: Automotive Infotainment System
 Manufacturer: Harman International Industries (Automotive Division)
 Serial Number: sample #1
 Hardware Rev: T00BE093371102
 Software Rev: 13.19.0
 Comment: Power supply during the test is nominal 13,2 V DC

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
64.000000	26.1	1000.0	120.000	100.0	V	36.0	8.8	13.90	40.00
90.030000	30.0	1000.0	120.000	113.0	V	16.0	8.7	13.50	43.50
91.920000	31.2	1000.0	120.000	152.0	V	211.0	8.7	12.30	43.50
127.980000	37.8	1000.0	120.000	100.0	V	301.0	9.0	5.70	43.50
138.080000	28.6	1000.0	120.000	100.0	V	330.0	9.7	14.90	43.50
159.980000	31.1	1000.0	120.000	100.0	V	350.0	9.3	12.40	43.50
191.980000	29.7	1000.0	120.000	100.0	V	341.0	12.1	13.80	43.50

01_FCC15.209_hor+vert_KP0

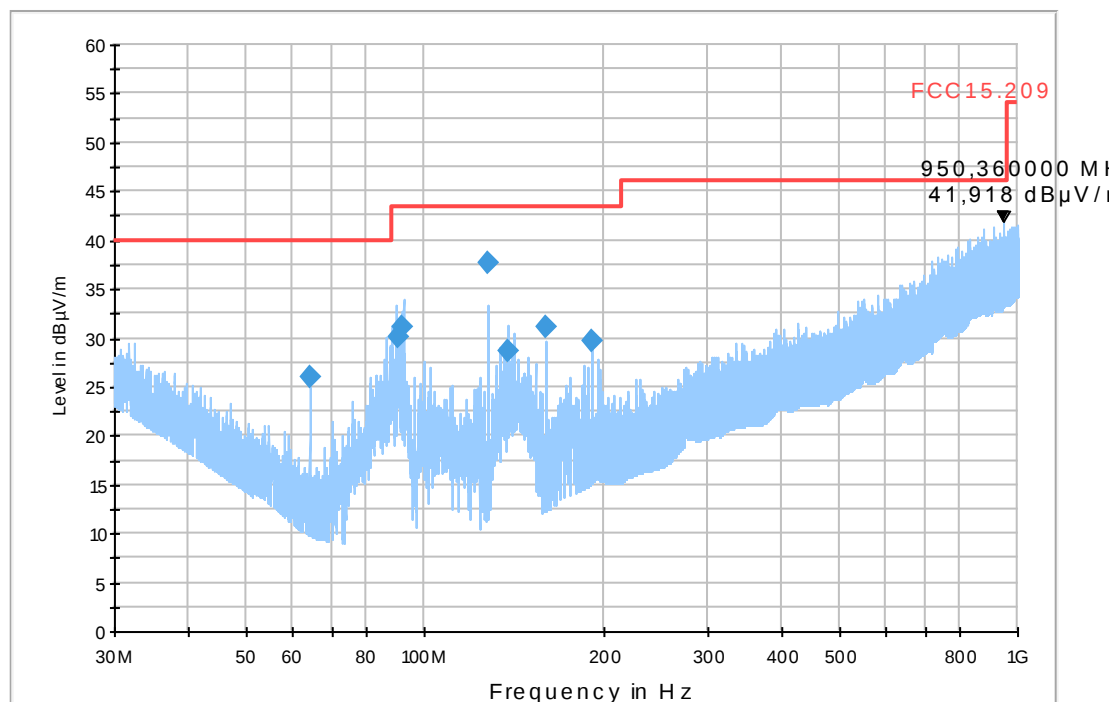


Diagram No. 3.02

Common Information

Date: 15.05.2013 Page 1 of 1
 Test description: Electric Fieldstrength Measurement
 Test site and distance: Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
 Version of Testsoftware: EMC32 v8.51.0
 Distance correction: used accord. table, pls. see test report
 Used filter: lowpass 1200 MHz
 Test specification.: FCC 15.209; RSS-Gen: Issue 3

 Operator: YZH
 Operating conditions: BT v3.0+EPC, Ch0 38 + 2-DH1
 Comment 1: 3-0071-13-5-2b

EUT Information

EUT Name: Navigation and Connectivity Box (Automotive Infotainment System)
 Manufacturer: Harman International Industries (Automotive Division)
 Serial Number: sample #1
 Hardware Rev: T00BE093371102
 Software Rev: 13.19.0
 Comment: Power supply during the test is nominal 13,2 V DC

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
63.980000	25.9	1000.0	120.000	113.0	V	28.0	8.8	14.10	40.00
91.910000	32.1	1000.0	120.000	100.0	V	13.0	8.7	11.40	43.50
96.000000	26.9	1000.0	120.000	100.0	V	304.0	8.8	16.60	43.50
127.990000	37.9	1000.0	120.000	100.0	V	296.0	9.0	5.60	43.50
132.090000	27.5	1000.0	120.000	100.0	V	313.0	9.8	16.00	43.50
159.990000	31.1	1000.0	120.000	100.0	V	336.0	9.3	12.40	43.50
191.950000	28.3	1000.0	120.000	100.0	V	346.0	12.1	15.20	43.50
219.920000	21.1	1000.0	120.000	100.0	V	31.0	12.5	24.90	46.00
927.160000	30.0	1000.0	120.000	282.0	V	180.0	27.0	16.00	46.00

01_FCC15.209_hor+vert_KP0

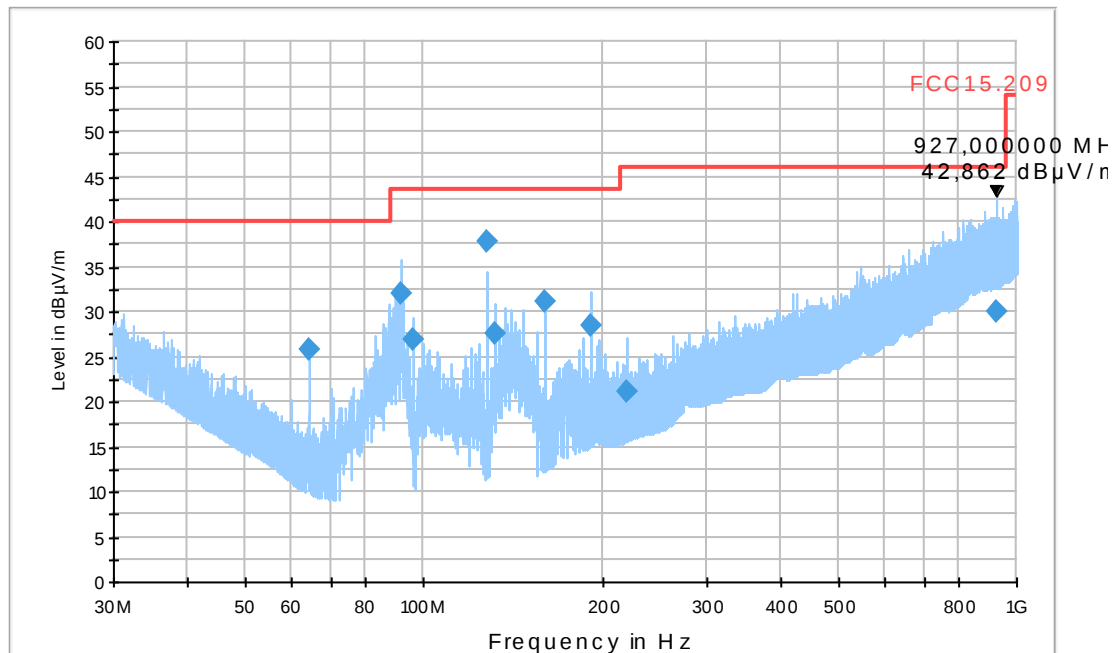


Diagram No. 3.03

Common Information

Date: 15.05.2013 Page 1 of 1
 Test description: Electric Fieldstrength Measurement
 Test site and distance: Ref.-Nr. 441 Semi Anechoic Room (SAR) with 3 m measurement distance
 Version of Testsoftware: EMC32 v8.51.0
 Distance correction: used accord. table, pls. see test report
 Used filter: lowpass 1200 MHz
 Test specification.: FCC 15.209; RSS-Gen: Issue 3

 Operator: YZH
 Operating conditions: BT v3.0+EPC, Ch78+3-DH1
 Comment 1: 3-0071-13-5-2b

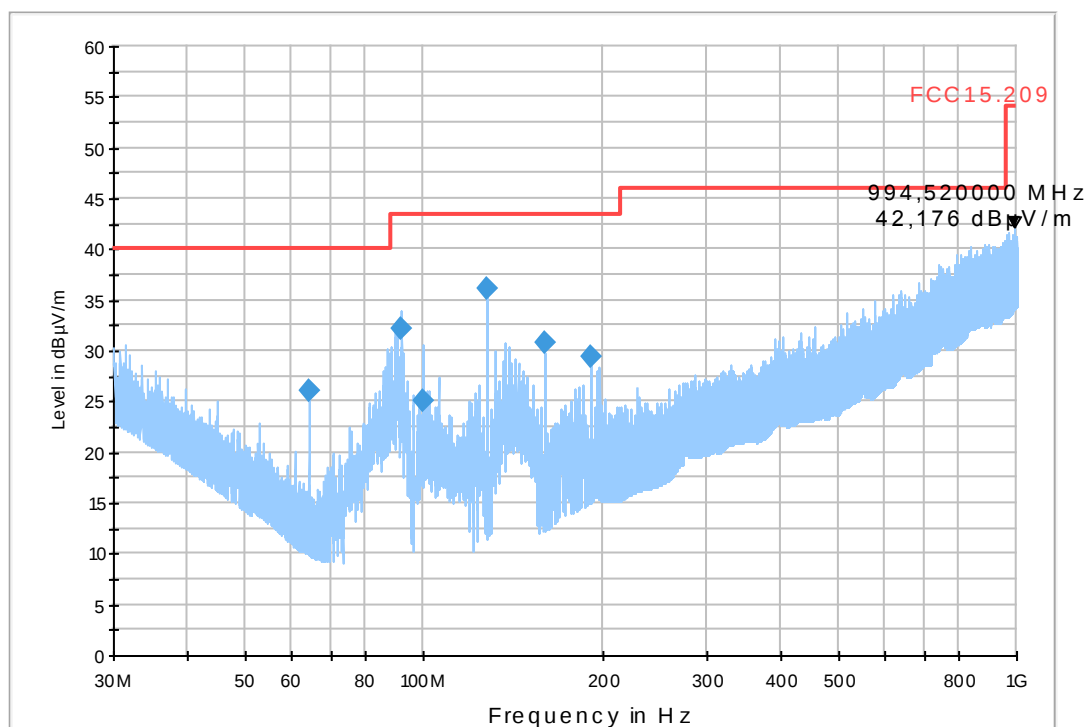
EUT Information

EUT Name: Automotive Infotainment System
 Manufacturer: Harman International Industries (Automotive Division)
 Serial Number: sample #1
 Hardware Rev: T00BE093371102
 Software Rev: 13.19.0
 Comment: Power supply during the test is nominal 13,2 V DC

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
64.000000	26.0	1000.0	120.000	100.0	V	52.0	8.8	14.00	40.00
91.910000	32.1	1000.0	120.000	100.0	V	8.0	8.7	11.40	43.50
100.060000	25.0	1000.0	120.000	144.0	V	276.0	8.6	18.50	43.50
127.980000	36.2	1000.0	120.000	269.0	H	244.0	9.0	7.30	43.50
159.970000	30.8	1000.0	120.000	100.0	V	331.0	9.3	12.70	43.50
191.970000	29.4	1000.0	120.000	100.0	V	349.0	12.1	14.10	43.50

01_FCC15.209_hor+vert_KP0



7.3 Frequency range 1 GHz - 18 GHz

Diagram No.: 4.01

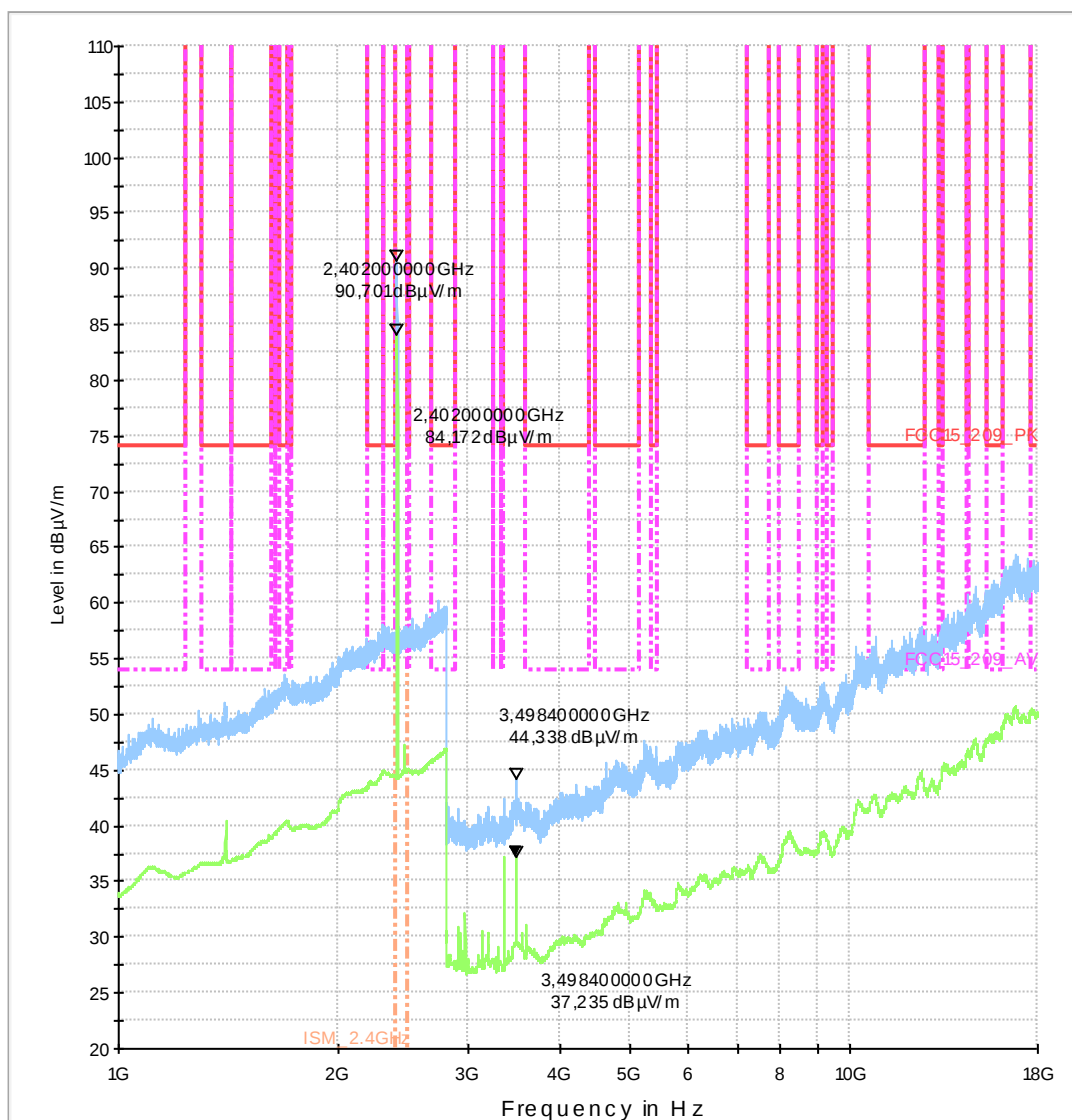
Common Information

Test Description:	Radiated field strength emission accord. §15.247 in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	§15.205 & §15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
	3-0071-13-5-2b
Operator Name:	HLA
Comment:	Channel no. low (DH1)
Op. Mode:	Bluetooth EPC(BT_3.0)

EUT Information

EUT Name:	Automotive Infotainment System
Manufacturer:	Harman International Industries (Automotive Division)
Serial Number:	sample #5
Hardware Rev:	T00BE093371102
Software Rev:	13.19.0
Comment:	Power supply during the test is nominal 13,2 V DC

00431_SM1_KP1_BT_5ms



EMI Auto Test Template: 00431_SM1_KP1_BT_5ms

Diagram No.: 4.02

Common Information

Test Description:	Radiated field strength emission accord. §15.247 in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	§15.205 & 15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
	3-0071-13-5-2b
Operator Name:	HLA
Comment:	Channel no. mid (3-DH5)
Op. Mode:	Bluetooth EPC(BT_3.0)

EUT Information

EUT Name:	Automotive Infotainment System
Manufacturer:	Harman International Industries (Automotive Division)
Serial Number:	sample #5
Hardware Rev:	T00BE093371102
Software Rev:	13.19.0
Comment:	Power supply during the test is nominal 13,2 V DC

00431_SM1_KP1_BT_5ms

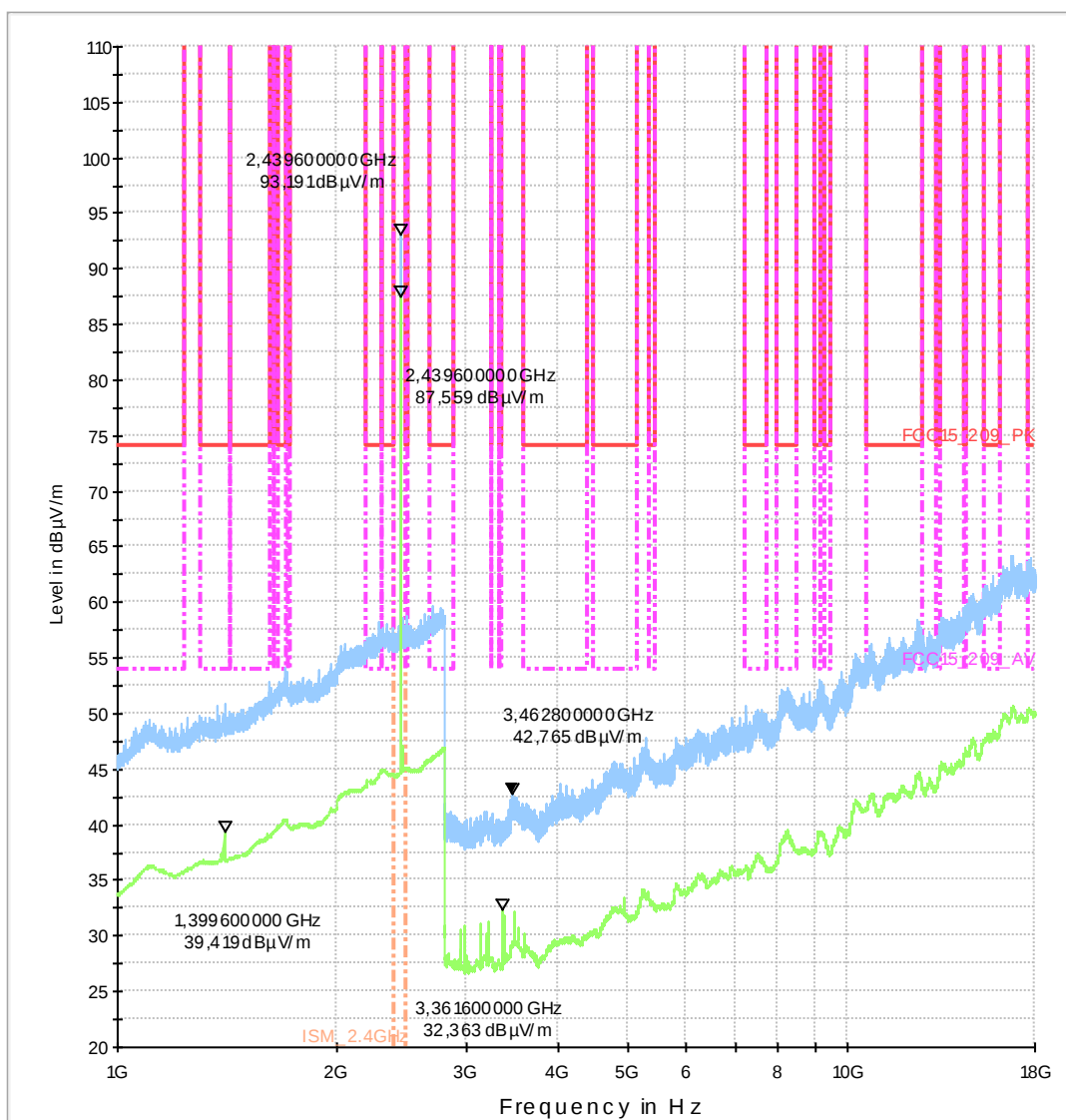


Diagram No.: 4.03

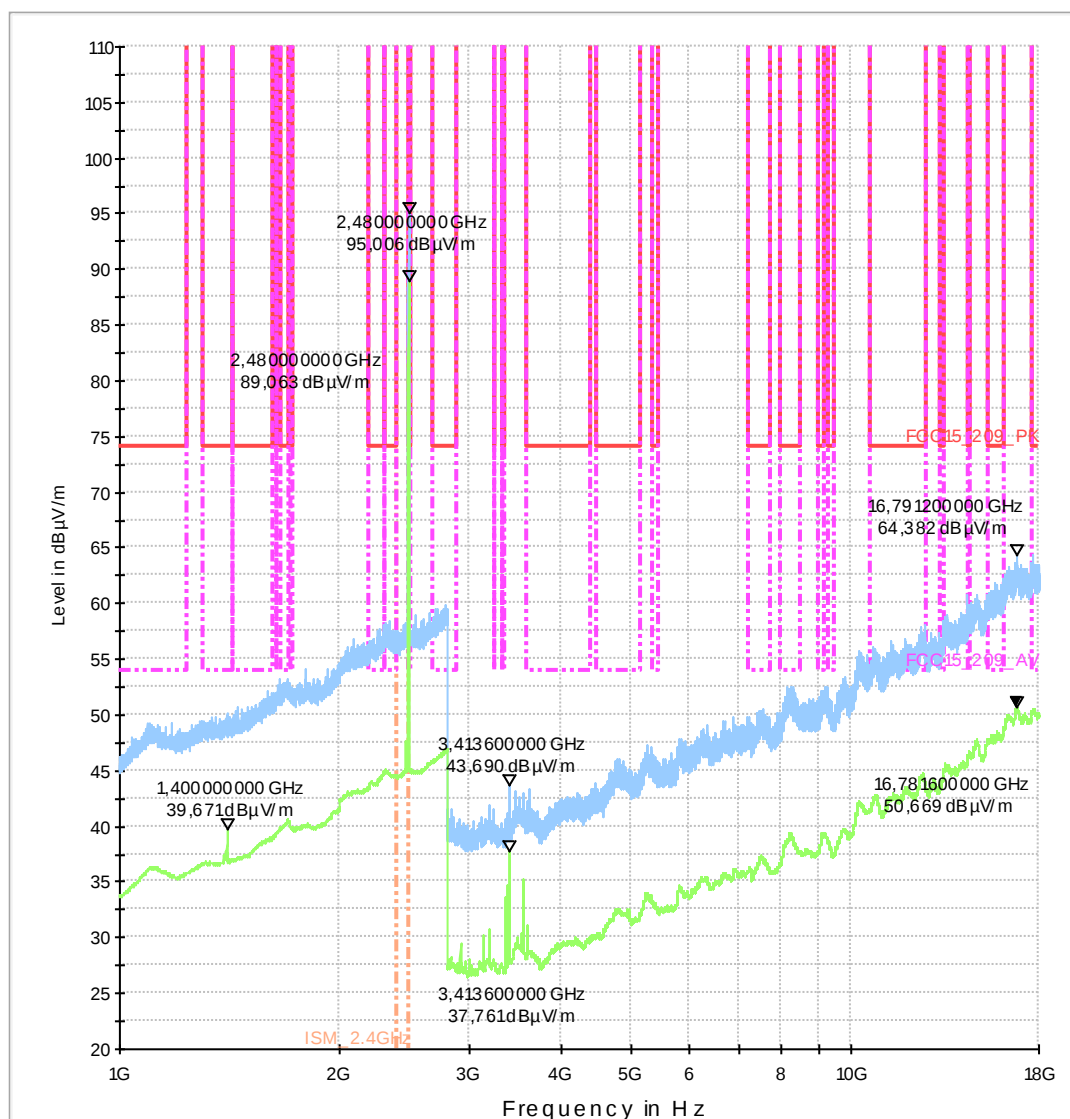
Common Information

Test Description:	Radiated field strength emission accord. §15.247 in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	§15.205 & 15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
	3-0071-13-5-2b
Operator Name:	HLA
Comment:	Channel no. high (3-DH1)
Op. Mode:	Bluetooth EPC(BT_3.0)

EUT Information

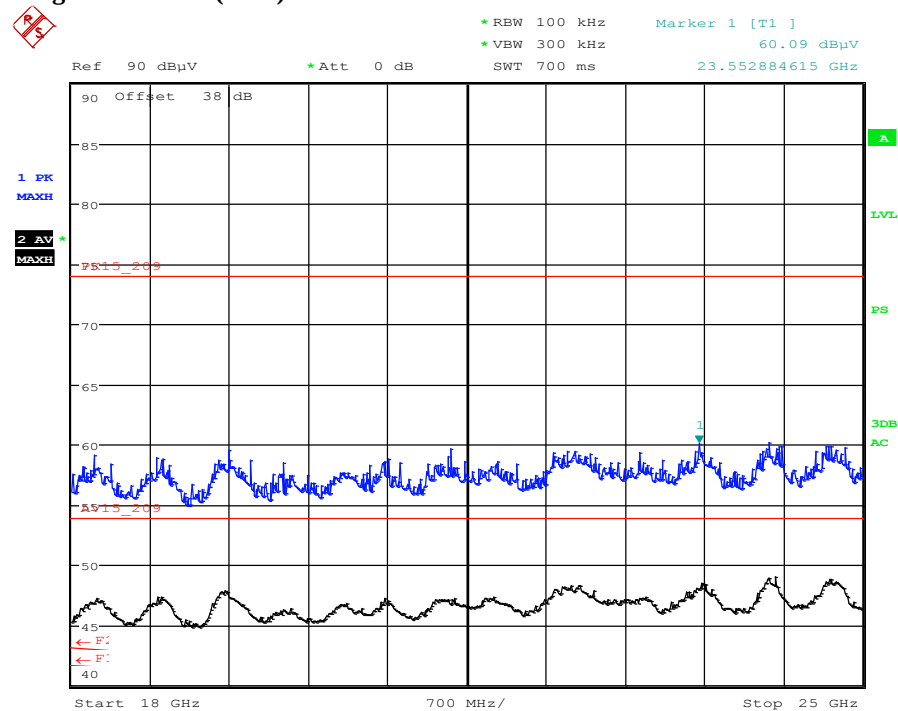
EUT Name:	Automotive Infotainment System
Manufacturer:	Harman International Industries (Automotive Division)
Serial Number:	sample #5
Hardware Rev:	T00BE093371102
Software Rev:	13.19.0
Comment:	Power supply during the test is nominal 13,2 V DC

00431_SM1_KP1_BT_5 ms



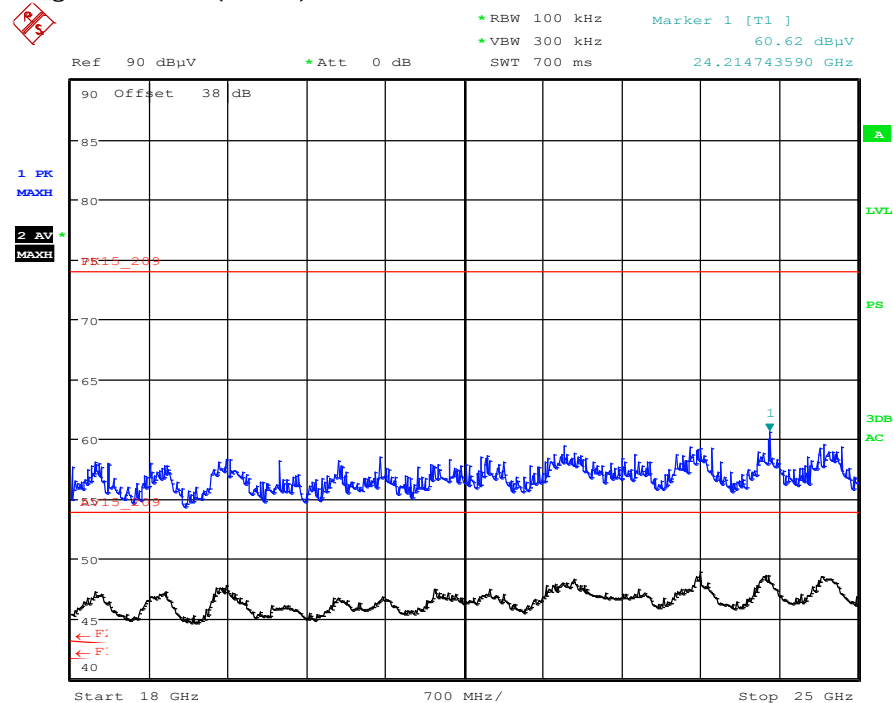
7.4 Frequency range 18 GHz - 25 GHz

Diagram no. 4.04 (DH1)

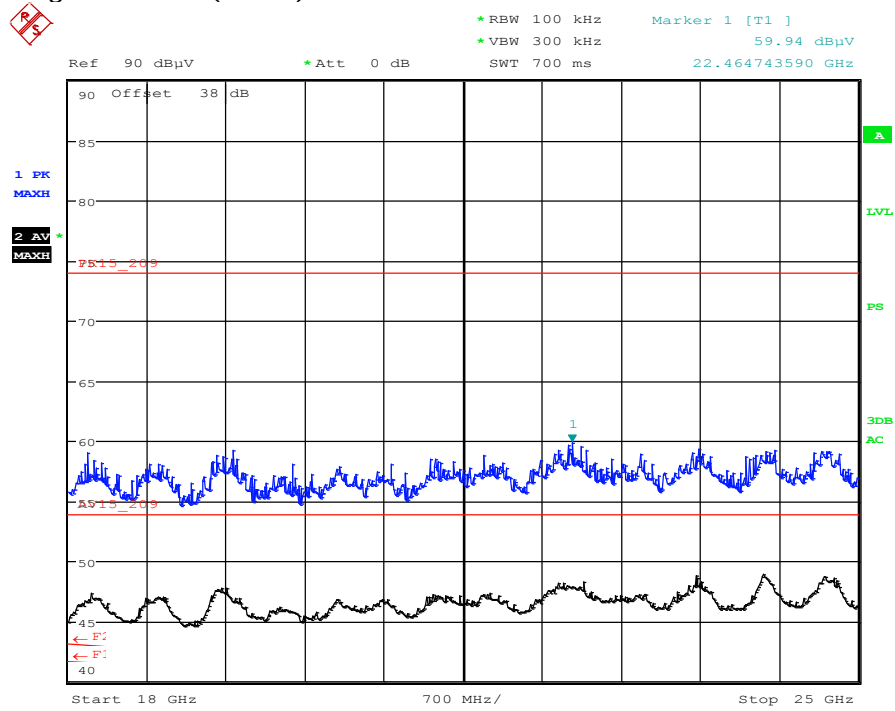


Date: 18.JUN.2013 10:43:35

Diagram no. 4.05 (2-DH1)



Date: 18.JUN.2013 10:45:21

Diagram no. 4.06 (3-DH1)

Date: 18.JUN.2013 10:46:49

8. Radiated band-edge measurements accord. §15.209 & §15.205

Diagram No.: 9.01

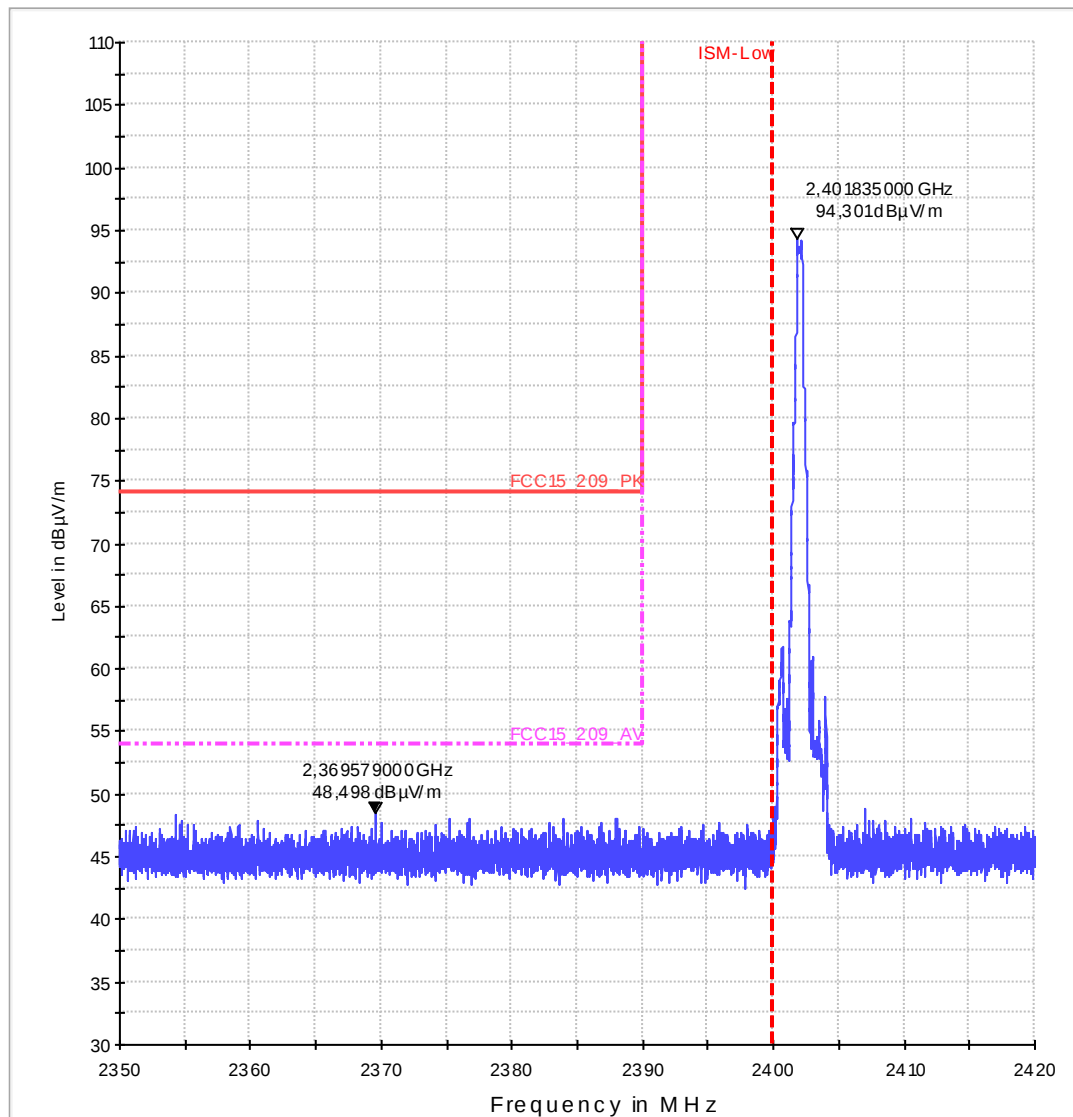
Common Information

Test Description:	Radiated field strength emission accord. §15.247 in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	§15.205 & §15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
	3-0071-13-5-2b
Operator Name:	HLA
Comment:	Channel no. low (DH5)
Op. Mode:	Bluetooth EPC(BT_3.0)

EUT Information

EUT Name:	Navigation and Connectivity Box (Automotive Infotainment System)
Manufacturer:	Harman International Industries (Automotive Division)
Serial Number:	sample #5
Hardware Rev:	T00BE093371102
Software Rev:	13.19.0
Comment:	Power supply during the test is nominal 13,2 V DC

08_ESU_2.4GHz_Low_Band_Edge_PA0



Sweep Setup: 08_ESU_2.4GHz_Low_Band_Edge_PA0 [EMI radiated]

Diagram No.: 9.02

Common Information

Test Description:	Radiated field strength emission accord. §15.247 in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	§15.205 & 15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
	3-0071-13-5-2b
Operator Name:	HLA
Comment:	Channel no. high (DH5)
Op. Mode:	Bluetooth EPC(BT_3.0)

EUT Information

EUT Name:	Navigation and Connectivity Box (Automotive Infotainment System)
Manufacturer:	Harman International Industries (Automotive Division)
Serial Number:	sample #5
Hardware Rev:	T00BE093371102
Software Rev:	13.19.0
Comment:	Power supply during the test is nominal 13,2 V DC

09_ESU_2.4GHz_High_Band_Edge_PA0

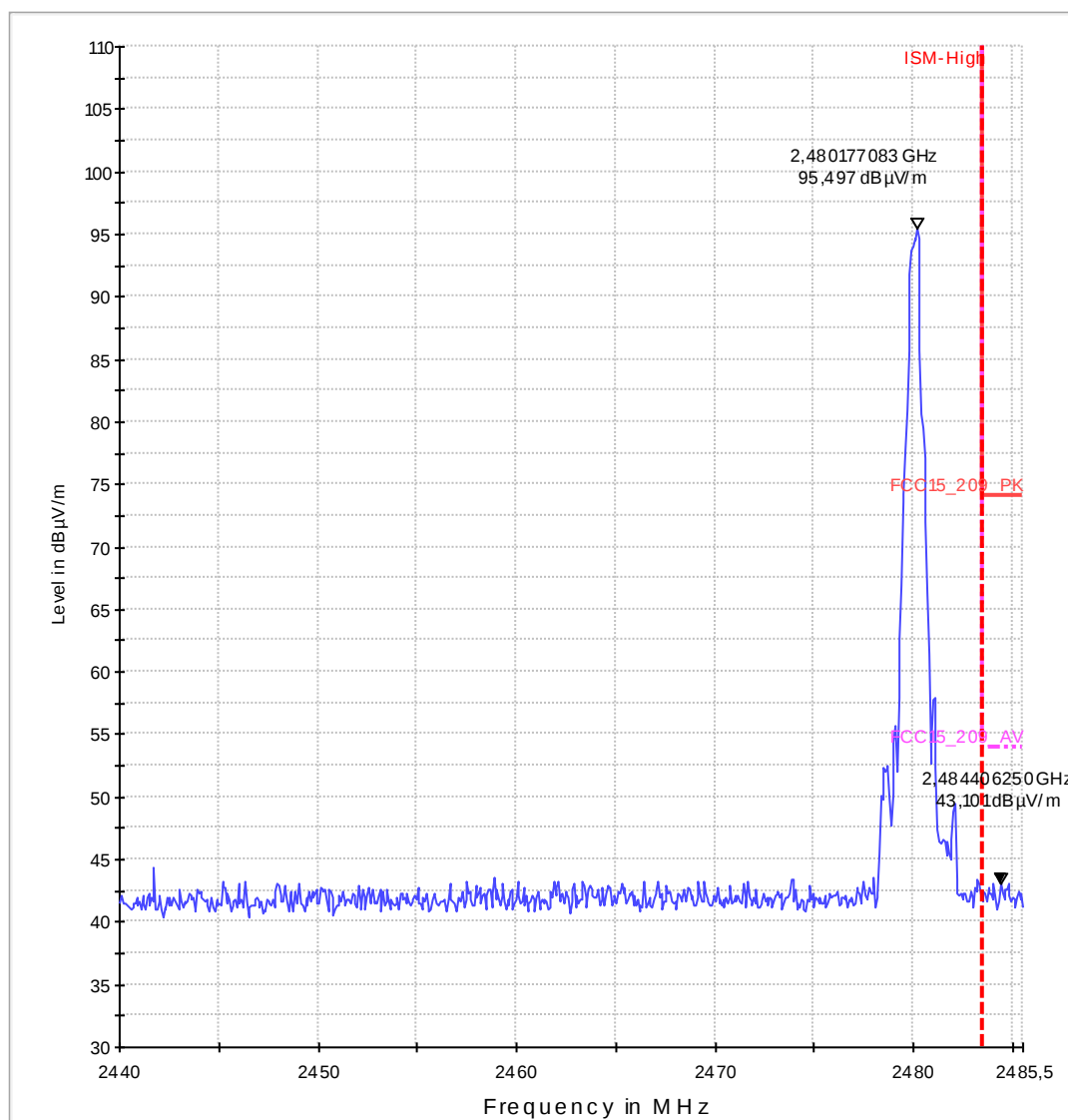


Diagram No.: 9.03

Common Information

Test Description:	Radiated field strength emission accord. §15.247 in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	§15.205 & 15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
	3-0071-13-5-2b
Operator Name:	HLA
Comment:	Channel no. low (DH5)
Op. Mode:	Bluetooth EPC(BT_3.0)

EUT Information

EUT Name:	Navigation and Connectivity Box (Automotive Infotainment System)
Manufacturer:	Harman International Industries (Automotive Division)
Serial Number:	sample #5
Hardware Rev:	T00BE093371102
Software Rev:	13.19.0
Comment:	Power supply during the test is nominal 13,2 V DC

08_ESU_2.4GHz_Low_Band_Edge_PA0

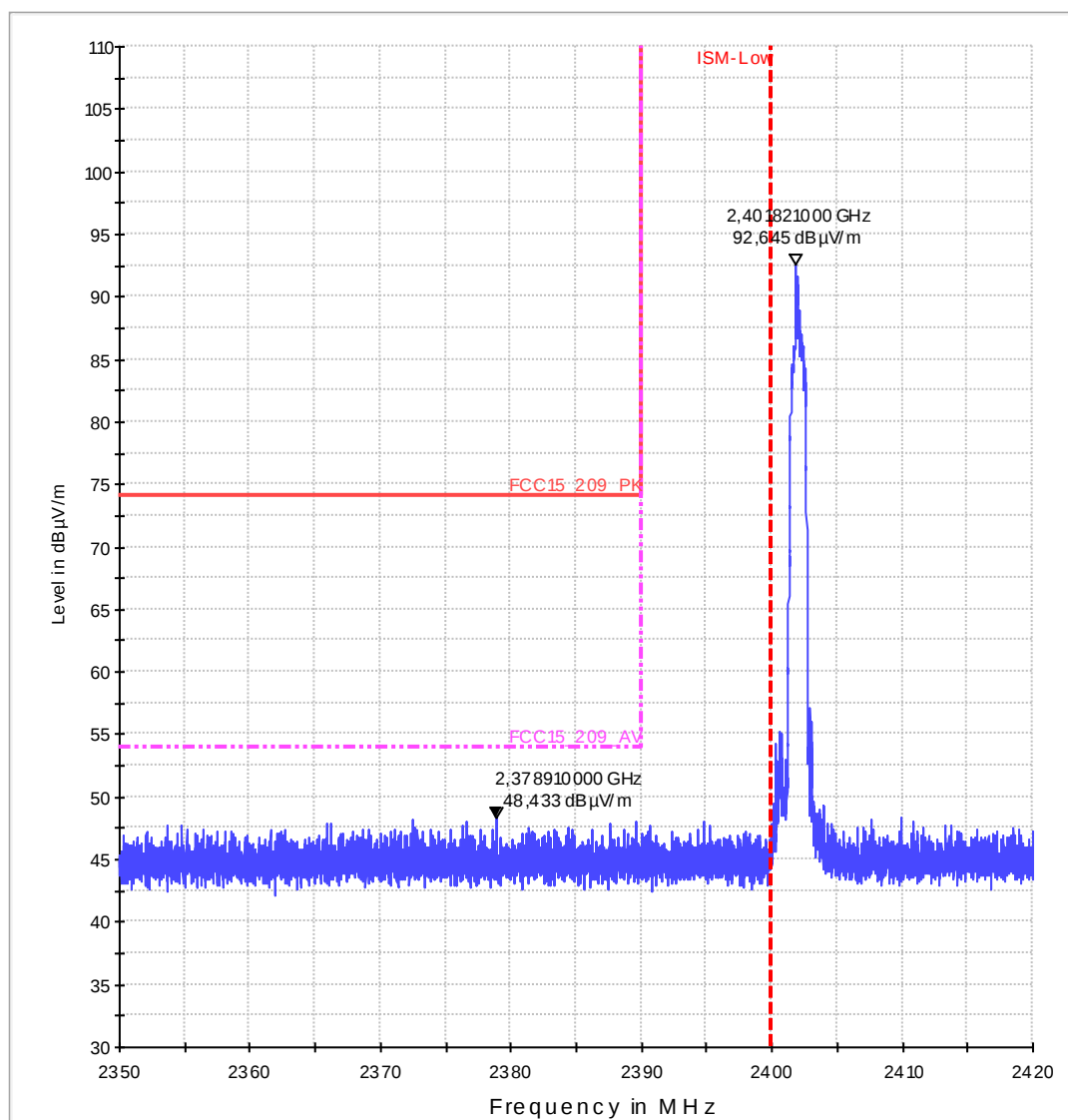


Diagram No.: 9.04

Common Information

Test Description:	Radiated field strength emission accord. §15.247 in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	§15.205 & 15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
	3-0071-13-5-2b
Operator Name:	HLA
Comment:	Channel no. high (2-DH5)
Op. Mode:	Bluetooth EPC(BT_3.0)

EUT Information

EUT Name:	Navigation and Connectivity Box (Automotive Infotainment System)
Manufacturer:	Harman International Industries (Automotive Division)
Serial Number:	sample #5
Hardware Rev:	T00BE093371102
Software Rev:	13.19.0
Comment:	Power supply during the test is nominal 13,2 V DC

09_ESU_2.4GHz_High_Band_Edge_PA0

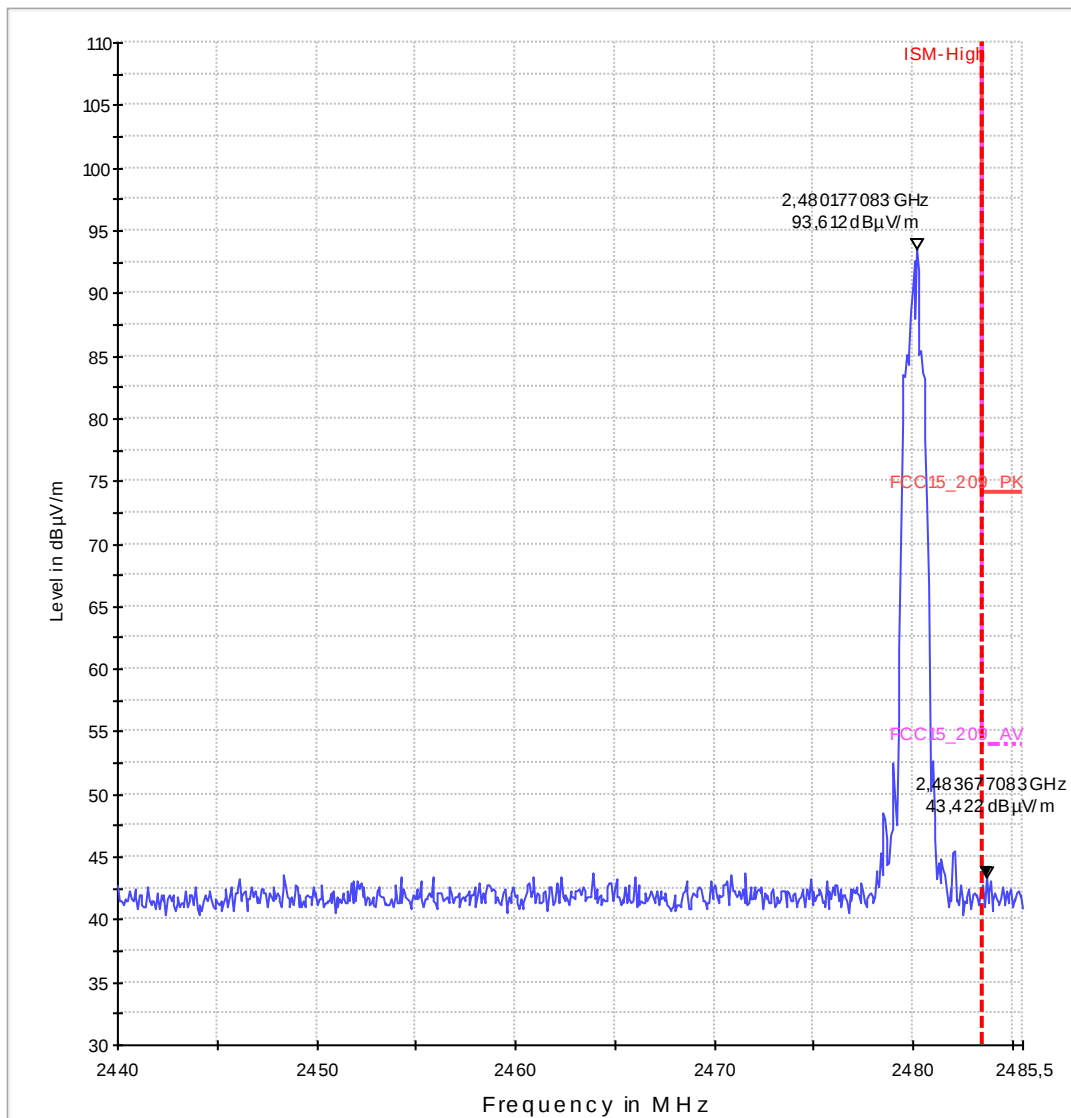


Diagram No.: 9.05

Common Information

Test Description:	Radiated field strength emission accord. §15.247 in 3m distance
Test Site:	CETECOM GmbH Essen
Test Standard:	§15.205 & 15.209 Intentional Radiator
Antenna polarisation:	horizontal/vertical
	3-0071-13-5-2b
Operator Name:	HLA
Comment:	Channel no. low
Op. Mode:	Channel no. high (3-DH5)

EUT Information

EUT Name:	Navigation and Connectivity Box (Automotive Infotainment System)
Manufacturer:	Harman International Industries (Automotive Division)
Serial Number:	sample #5
Hardware Rev:	T00BE093371102
Software Rev:	13.19.0
Comment:	Power supply during the test is nominal 13,2 V DC

08_ESU_2.4GHz_Low_Band_Edge_PA0

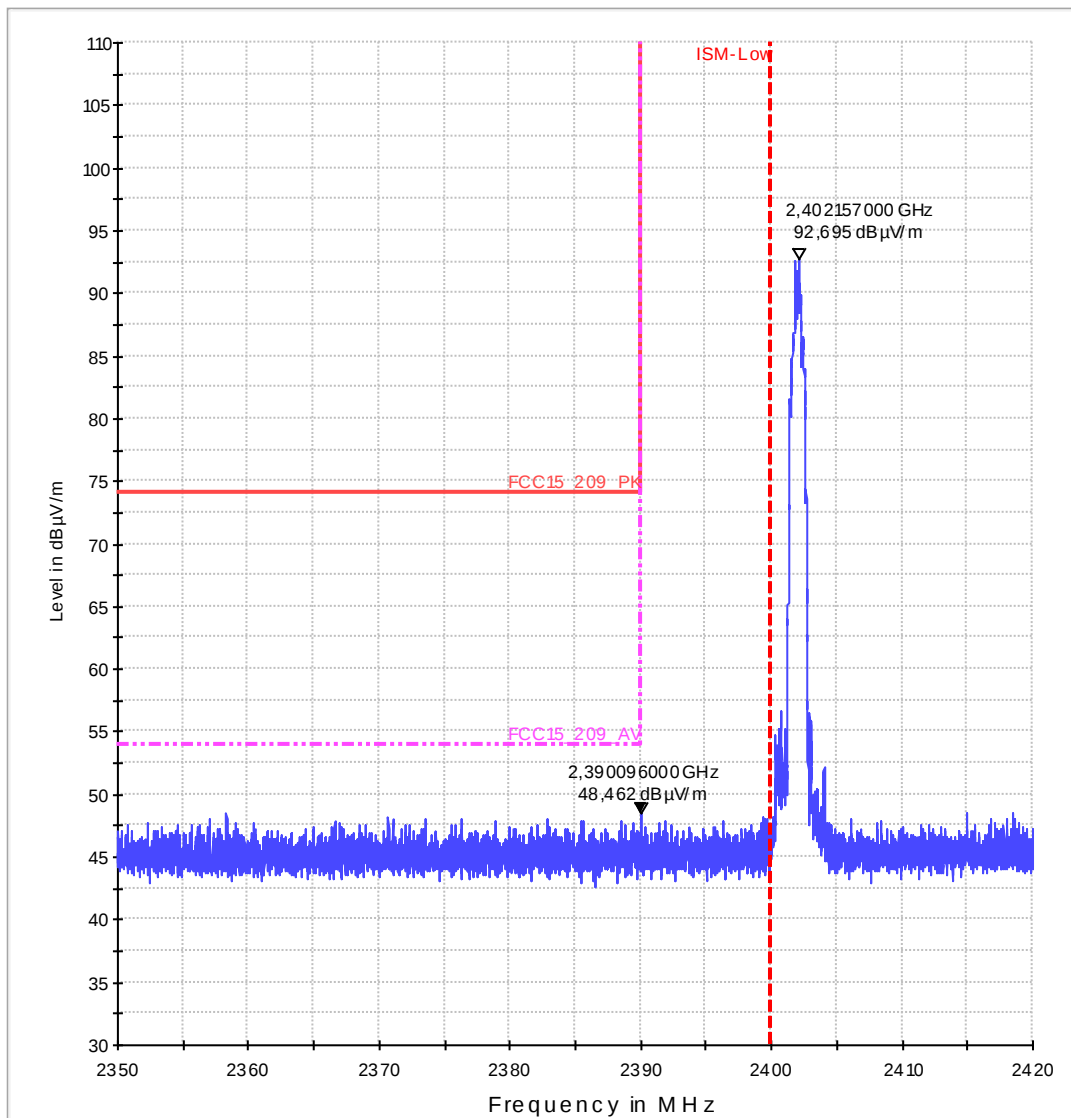


Diagram No.: 9.06

Common Information

Test Description: Radiated field strength emission accord. §15.247 in 3m distance
 Test Site: CETECOM GmbH Essen
 Test Standard: §15.205 & 15.209 Intentional Radiator
 Antenna polarisation: horizontal/vertical
 3-0071-13-5-2b

Operator Name: HLa
 Comment: Channel no. high (3-DH5)
 Op. Mode: Bluetooth EPC(BT_3.0)

EUT Information

EUT Name: Navigation and Connectivity Box (Automotive Infotainment System)
 Manufacturer: Harman International Industries (Automotive Division)
 Serial Number: sample #5
 Hardware Rev: T00BE093371102
 Software Rev: 13.19.0
 Comment: Power supply during the test is nominal 13,2 V DC

09_ESU_2.4GHz_High_Band_Edge_PA0

