REPORT

issued by an FCC listed Laboratory Reg. no. 93866.
The test sites comply with RSS-Gen, IC file no: 3482A

Date	Reference	Page
2012-06-18	FX211814-F27L	1 (2)

1002
ISO/IEC 17025

Handled by, department
Jörgen Wassholm
Electronics
+46 10 516 5706, jorgen.wassholm@sp.se

Ericsson AB
Mia Jernhake
PDU HW
164 80 Stockholm

Radio measurements on AIR 21 B4A/B2P 1700/ 2100 MHz radio equipment withFCC ID: TA8AKRC118046-1 and IC: 287AB-AS1180461

(8 appendices)

Test object

AIR 21 B4A/B2P, KRC 118 046/1 Rev R1B

Summary

Appendix 1 describes the test object and set-ups during test.
Appendix 8 presents photos of the test object.

Standard		Compliant	Appendix
FCC CFR 47 / IC RSS-139			
2.1046 / RSS-139 6.4	RF power output	Yes	2
2.1049 / RSS-Gen 4.6.1	Occupied bandwidth	Yes	3
2.1051 / RSS-139 6.5	Band edge	Yes	4
2.1051 / RSS-139 6.5	Spurious emission at antenna terminals	Yes	5
2.1053 / RSS-139 6.5	Field strength of spurious radiation	Yes	6
2.1055 / RSS-139 6.3	Frequency stability	Yes	7

Note: Above RSS-139 items are given as cross-reference only. Measurements were performed according to ANSI procedures referenced by FCC and covered by SP's accreditation.

SP Sveriges Tekniska Forskningsinstitut
Electronics - EMC

Jörgen Wassholm
Technical Officer

Christer Karlsson
Technical Manager

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Table of contents

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 1

Description of test object

Equipment:	Radio equipment AIR 21 B4A/B2P running in LTE mode
Frequency bands:	TX: 2110 – 2155 MHz RX: 1710 – 1755 MHz The highest and lowest EARFCNs and the corresponding frequencies for each supported channel BW configuration are listed below and are pursuant to 3GPP TS 36.141 section 5.7 Channel arrangement
Supported channel bandwidth configurations	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz and 20 MHz
Modulation and access scheme	OFDMA in FDD
OFDM subcarrier modulation	System information and pilots use BPSK and QPSK. For payload data QPSK, 16QAM and 64QAM can be used.
Nominal output power per antenna port:	Single carrier: 1x 44.8 dBm (1x30 W)
Number of antenna ports:	2 TX ports configured for TX diversity
Nominal supply voltage:	-48 VDC

Tested frequencies and EARFCNs for TX measurements

EARFCN Downlink	Frequency [MHz]	Comment
1957	2110.7	TX bottom (B) frequency in 1.4 MHz BW configuration
1965	2111.5	TX bottom (B) frequency in 3 MHz BW configuration
1975	2112.5	TX bottom (B) frequency in 5 MHz BW configuration
2000	2115.0	TX bottom (B) frequency in 10 MHz BW configuration
2025	2117.5	TX bottom (B) frequency in 15 MHz BW configuration
2050	2120.0	TX bottom (B) frequency in 20 MHz BW configuration
2175	2132.5	TX band mid (M) frequency in all BW configurations
2300	2145.0	TX top (T) frequency in 20 MHz BW configuration
2325	2147.5	TX top (T) frequency in 15 MHz BW configuration
2350	2150.0	TX top (T) frequency in 10 MHz BW configuration
2375	2152.5	TX top (T) frequency in 5 MHz BW configuration
2385	2153.5	TX top (T) frequency in 3 MHz BW configuration
2393	2154.3	TX top (T) frequency in 1.4 MHz BW configuration

Note: EARFCN are derived according to 3GPP TS 36.141, table 5.7.3-1.

Operation modes during measurements

Measurements were performed with the test object transmitting test models as defined in 3GPP TS 36.141. Test model E-TM1.1 was used to represent QPSK, test model E-TM3.2 to represent 16QAM and test model E-TM3.1 to represent 64QAM payload modulation.

The setting TX single carrier with test model E-TM1.1 in channel bandwidth configuration 1.4 MHz was found to be representative for all traffic scenarios when several settings with different modulations and channel bandwidth configurations were compared to find a worst case setting. This setting was used for all measurements unless noted otherwise.

The test object was powered with -48 VDC unless noted otherwise. All measurements were performed with the test object configured for maximum transmit power.

Conducted measurements

The EUT was a pole mounted unit supplied with -48 VDC by an external power supply. All TX parameters were measured at port RF A with port RF B terminated into 50 ohm. Complete measurements were made on RF A with additional measurements on RF B to verify that the ports are identical.

Radiated measurements

The test object was powered with -48 VDC. All measurements were performed with the test object configured for maximum transmit power. The configuration of E-TM1.1, with 1.4 MHz BW at Mid channel represents worst case for radiated spurious emission measurements.

Purpose of test

The purpose of the tests is to verify compliance to the performance characteristics specified in applicable parts of FCC CFR 47, IC RSS-133 and IC RSS-Gen.

References

Measurements were done according to relevant parts of the following standards:
ANSI C63.4-2003
ANSI/TIA/EIA-603-C-2004
3GPP TS 36.141, version 8.5.0
CFR 47 part 2, October 1st , 2010
CFR 47 part 24 Subpart E, October 1st, 2010
RSS-139 Issue 2
RSS-Gen Issue 3

Measurement equipment

Measurement equipment	Calibration Due	SP number
Test site Tesla	2014-01	503 881
R&S FSIQ 40	2012-07	503 738
R&S FSQ 40	2012-07	504 143
R&S ESI 26	2012-07	503 292
Control computer with R&S software EMC32 version 8.52.0	-	503 479
High pass filter	2012-07	504 199
High pass filter	2013-01	901 373
High pass filter	2012-07	503 739
High pass filter	2012-07	503 740
RF attenuator	2012-07	504 159
RF attenuator	2012-07	900 233
Boonton RF Peak power meter/analyzer	2012-11	503 144
Boonton Power sensor 56518-S/4	2012-11	503 145
Chase Bilog Antenna CBL 6111A	2013-10	503 182
EMCO Horn Antenna 3115	2014-01	502 175
Std.gain horn FLANN model 20240-20	-	503 674
µComp Nordic, Low Noise Amplifier	2013-03	901 545
MITEQ Low Noise Amplifier	2012-07	503 285
Temperature cabinet	-	503 360
Testo 635 Temperature and humidity meter	2013-05	504 203

Uncertainties

Measurement and test instrument uncertainties are described in the quality assurance documentation ”SP-QD 10885”. The uncertainties are calculated with a coverage factor k=2 (95% level of confidence).
Compliance evaluation is based on a shared risk principle with respect to the measurement uncertainty.

Reservation

The test results in this report apply only to the particular test object as declared in the report.

Delivery of test object

The test object was delivered: 2012-05-28.

Manufacturer’s representative

Christer Gustavsson, Ericsson AB

Test engineers

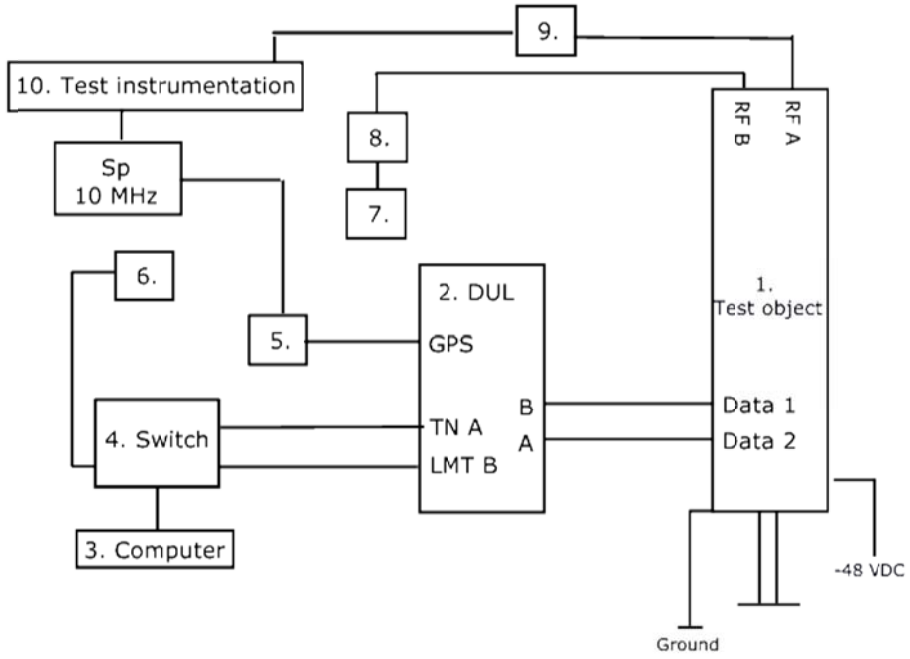
Andreas Johnson Tomas Isbring, Hyder Khalaf, Kexin Chen, Jörgen Wassholm, and Martin Theorin, SP

Test participant(-s)

Mikael Jansson, Ericsson AB (Partly present)

Test set-up conducted measurements TX

Test object

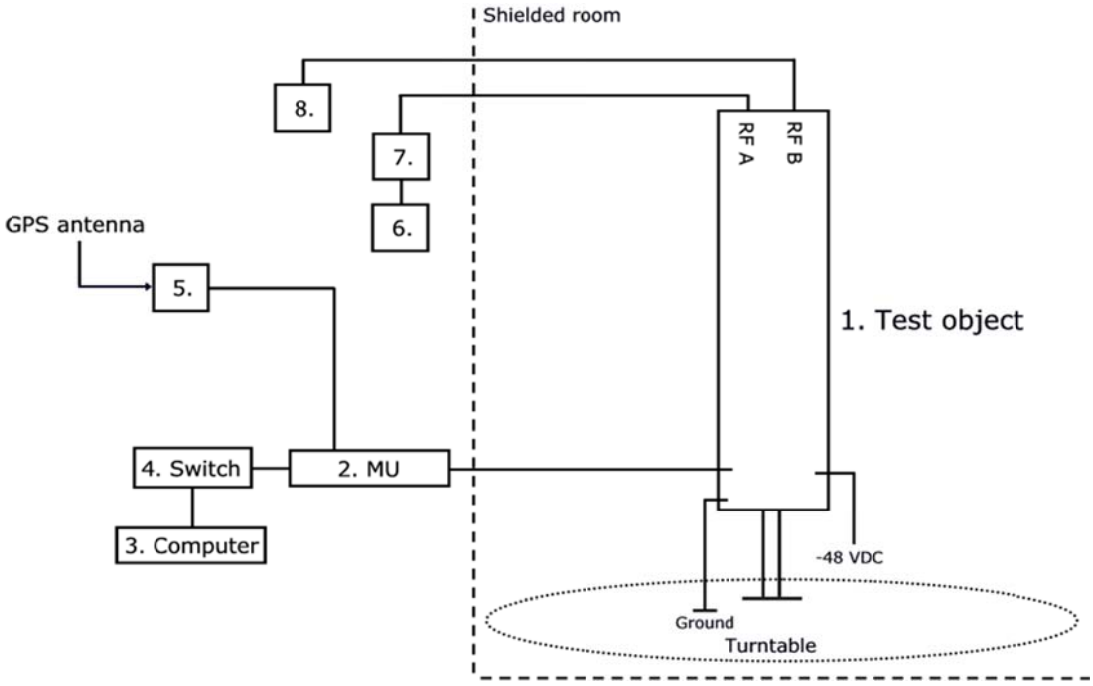


1. AIR 21 B4A/B2P, KRC 118 046/1, rev. R1B, s/n: CQ30001893
   with software (PIS) CXP 901 3268/6 rev. R44GK
   (FCC ID: TA8AKRC118046-1 / IC: 287AB-AS1180461

Functional test equipment

2. DUL 20 01, KDU 137 533/4, revision R1A, S/N: C823562991
3. Computer HP Elitebook 8540w, BAMS – 1001052043
4. Fast Ethernet switch, Netgear FS276T
5. Jointing Box, NCD 901 40/1, R1A, S/N A401222750
6. Rubidium Frequency Standard Symmetricom 8040, BAMS – 100071418
7. Attenuator
8. Terminator
9. SP test instrument according measurement equipment list
10. SP test instrument according measurement equipment list

Test set-up, radiated measurements



Test object

1 AIR 21 B4A/B2P, KRC 118 046/1, rev. R1B, s/n: CQ30001893
with software (PIS) CXP 901 3268/6 rev. R44GK
(FCC ID: TA8AKRC118046-1 / IC: 287AB-AS1180461)

Functional test equipment

2. DUL 20 01, KDU 137 533/4, revision R1A, S/N: C823562991
SUP 6601 1/BFL 901 009/1 Rev R3B, S/N. BR81526559
3. Computer HP Elitebook 8540w, BAMS – 1001052043
4. Fast Ethernet switch, Netgear GS108E
5. GPS 02 01, NCD 901 41/1 R1D A401724403
6. R&S ESI 26, for monitoring the RF signal
7. Attenuator
8. Terminator

Test object ports

Interface:	**Type of port:**
Supply power -48 VDC	DC Power
Antenna port (A), 7/16 connector, N/A in this configuration	Antenna
Antenna port (B), 7/16 connector, N/A in this configuration	Antenna
Opto 1, Optical Interface Link, single mode opto fibre	Telecom
Opto 2, Optical Interface Link, single mode opto fibre	Telecom
Ground wire	Ground

RBS software

Software	**Revision**
CXP 102 051/16	R16AZ

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 2

RF power output measurements according to CFR 47 §27.50 / IC RSS-139 6.4

Date	Temperature	Humidity
2012-06-11	22 °C ± 3 °C	46 % ± 5 %
2012-06-12	22 °C ± 3 °C	39 % ± 5 %

Test set-up and procedure

The test object was connected to a signal analyzer measuring peak and RMS output power in CDF mode. A resolution bandwidth of 50 MHz was used.

Measurement equipment	SP number
RF attenuator	504 159
Testo 635, temperature and humidity meter	504 203
Rhode & Schwarz FSQ26	504 143

Measurement uncertainty: 1.1 dB

Results

Single carrier: Rated output power level at RF A connector 1x 44.8 dBm

EARFCN	Carrier BW (MHz)	Result RMS (dBm)	10log(N) [1)] (dBm)	Result RMS (dBm/ MHz)[2)]
B	1.4	44.4	47.4	47.0
B	20.0	44.6	47.6	35.1
M	1.4	44.5	47.5	47.1
M	3.0	44.6	47.6	43.3
M	5.0	44.6	47.6	41.1
M	10.0	44.5	47.5	38.0
M	15.0	44.6	47.6	36.3
M	20.0	44.6	47.6	35.1
T	1.4	44.6	47.6	47.2
T	20.0	44.6	47.6	35.1

Single carrier: Rated output power level at RF B connector 1x44.8 dBm

EARFCN	Carrier BW (MHz)	Result RMS (dBm)	10log(N) [1)] (dBm)	Result RMS (dBm/ MHz)[2)]
B	1.4	44.5	47.5	47.1
B	20	44.6	47.6	35.1

[1)]: 2 outputs summed power according to FCC KDB662911 Multiple transmitter output v01r01
[2)]: Power density (dBm/MHz) for a 5 MHz BW= Output power -10log(OBW/1MHz)

Diagram	BW configuration	Tested frequency
1	1.4 MHz	B
2	20 MHz	B
3	1.4 MHz	M
4	3 MHz	M
5	5 MHz	M
6	10 MHz	M
7	15 MHz	M
8	20 MHz	M
9	1.4 MHz	T
10	20 MHz	T
11 RF B	1.4MHz	M
12 RF B	20MHz	M

Limits

§27.50: The maximum output power may not exceed 1640 W (EIRP) / MHz. The Peak to Average Ratio (PAR) may not exceed 13 dB.

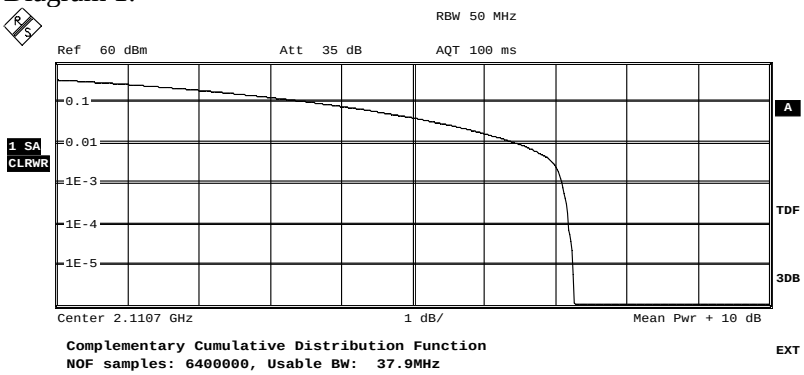
RSS-139 6.4: The average equivalent isotropically radiated power (e.i.r.p.) limits in SRSP-513 apply, resulting in a maximum EIRP of 1640 W / MHz for the scope of this report. The peak-to-average ratio of the power shall not exceed 13 dB.

Complies?	Yes

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 2

Diagram 1:

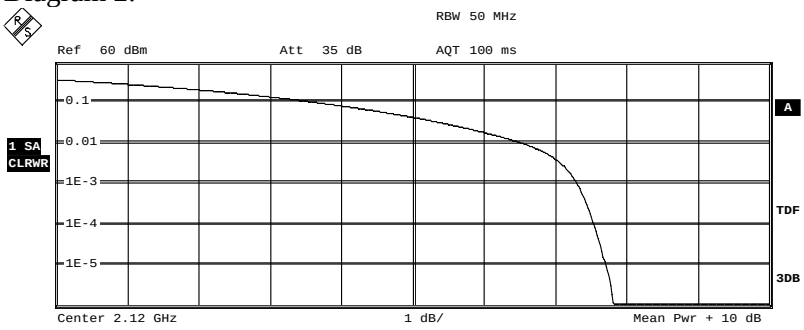


Complementary Cumulative Distribution Function
NOF samples: 6400000, Usable BW: 37.9MHz

	Trace 1
Mean	44.44 dBm
Peak	51.77 dBm
Crest	7.32 dB
10 %	3.67 dB
1 %	6.47 dB
.1 %	7.10 dB
.01 %	7.20 dB

Date: 11.JUN.2012 18:47:17

Diagram 2:

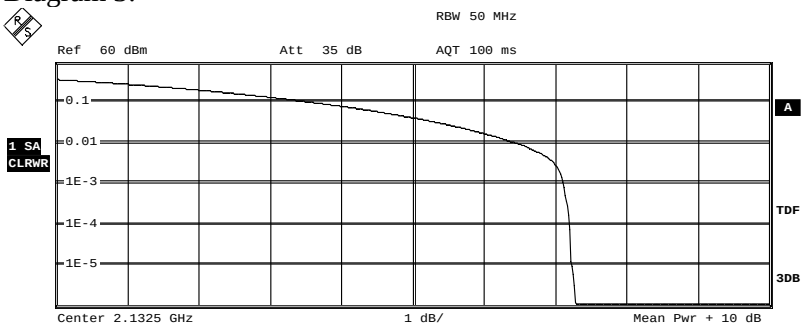


Complementary Cumulative Distribution Function
NOF samples: 6400000, Usable BW: 37.9MHz

	Trace 1
Mean	44.55 dBm
Peak	52.42 dBm
Crest	7.87 dB
10 %	3.70 dB
1 %	6.54 dB
.1 %	7.31 dB
.01 %	7.55 dB

Date: 11.JUN.2012 14:12:16

Diagram 3:

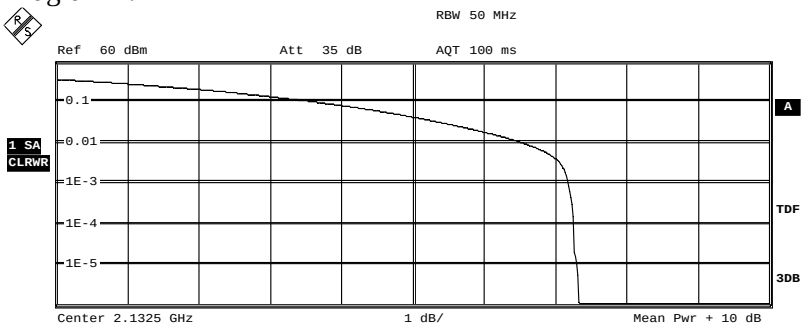


Complementary Cumulative Distribution Function
NOF samples: 6400000, Usable BW: 37.9MHz

	Trace 1
Mean	44.52 dBm
Peak	51.80 dBm
Crest	7.28 dB
10 %	3.67 dB
1 %	6.47 dB
.1 %	7.12 dB
.01 %	7.21 dB

Date: 11.JUN.2012 11:55:11

Diagram 4:



Complementary Cumulative Distribution Function
NOF samples: 6400000, Usable BW: 37.9MHz

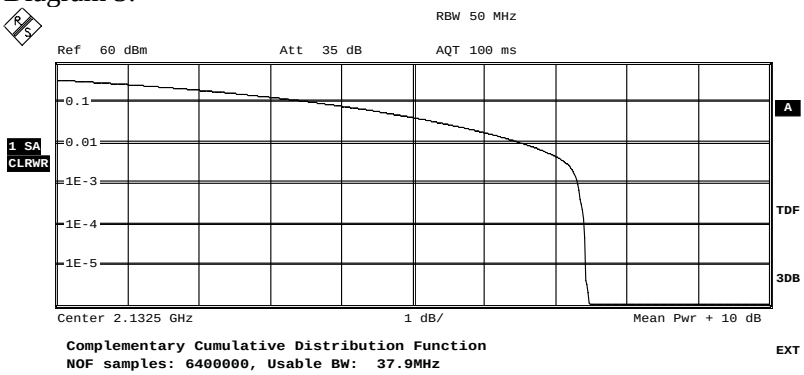
	Trace 1
Mean	44.61 dBm
Peak	51.94 dBm
Crest	7.33 dB
10 %	3.70 dB
1 %	6.55 dB
.1 %	7.18 dB
.01 %	7.26 dB

Date: 11.JUN.2012 10:54:38

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 2

Diagram 5:

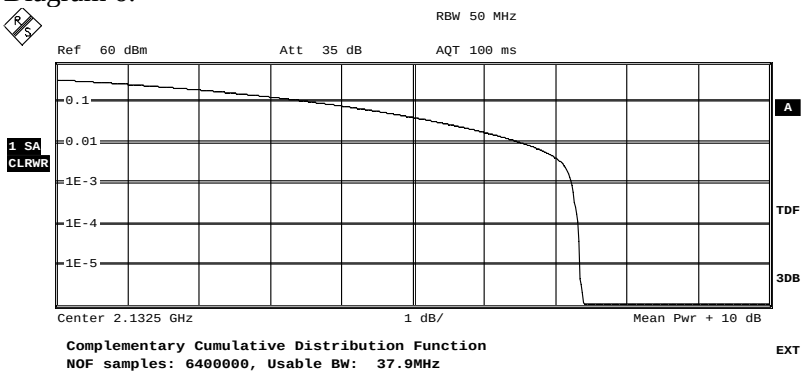


Complementary Cumulative Distribution Function
NOF samples: 6400000, Usable BW: 37.9MHz

	Trace 1
Mean	44.60 dBm
Peak	52.08 dBm
Crest	7.49 dB
10 %	3.70 dB
1 %	6.55 dB
.1 %	7.32 dB
.01 %	7.40 dB

Date: 11.JUN.2012 10:18:31

Diagram 6:

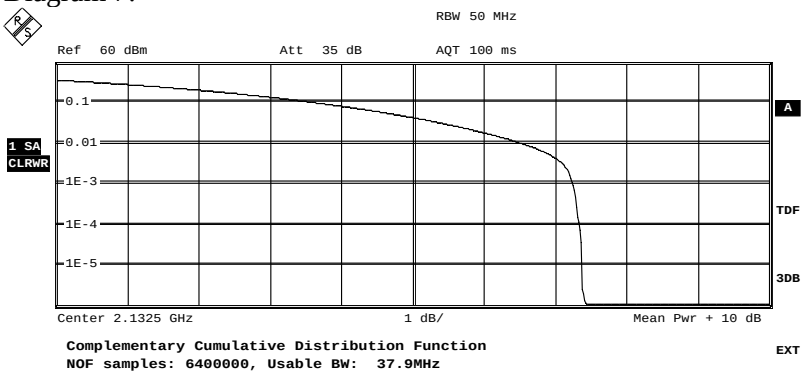


Complementary Cumulative Distribution Function
NOF samples: 6400000, Usable BW: 37.9MHz

	Trace 1
Mean	44.54 dBm
Peak	51.94 dBm
Crest	7.41 dB
10 %	3.70 dB
1 %	6.55 dB
.1 %	7.23 dB
.01 %	7.32 dB

Date: 11.JUN.2012 12:12:30

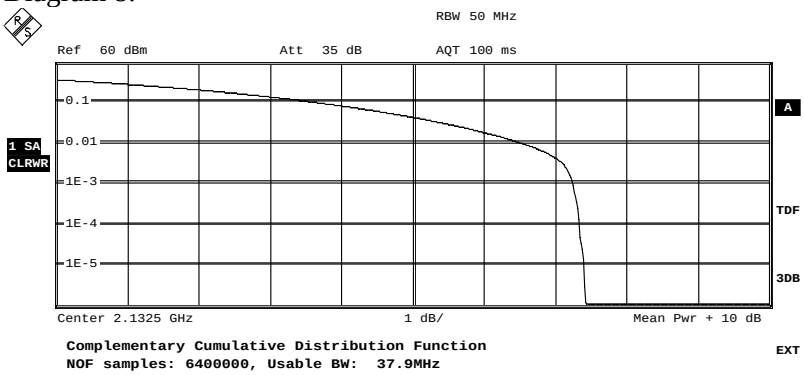
Diagram 7:



	Trace 1
Mean	44.57 dBm
Peak	52.01 dBm
Crest	7.44 dB
10 %	3.69 dB
1 %	6.54 dB
.1 %	7.24 dB
.01 %	7.34 dB

Date: 11.JUN.2012 12:27:33

Diagram 8:



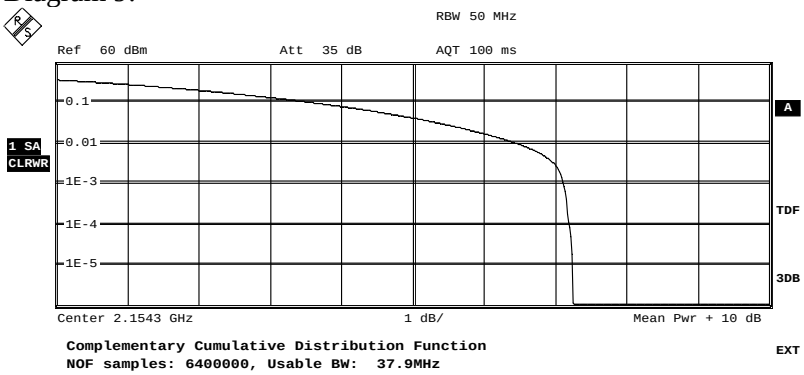
	Trace 1
Mean	44.60 dBm
Peak	52.08 dBm
Crest	7.48 dB
10 %	3.70 dB
1 %	6.54 dB
.1 %	7.24 dB
.01 %	7.34 dB

Date: 11.JUN.2012 12:43:18

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 2

Diagram 9:

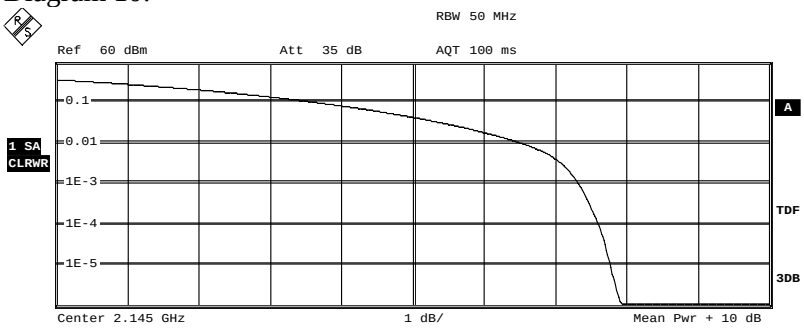


Complementary Cumulative Distribution Function
NOF samples: 6400000, Usable BW: 37.9MHz

	Trace 1
Mean	44.46 dBm
Peak	51.77 dBm
Crest	7.31 dB
10 %	3.67 dB
1 %	6.46 dB
.1 %	7.12 dB
.01 %	7.20 dB

Date: 15.JUN.2012 12:42:40

Diagram 10:



Complementary Cumulative Distribution Function
NOF samples: 6400000, Usable BW: 37.9MHz

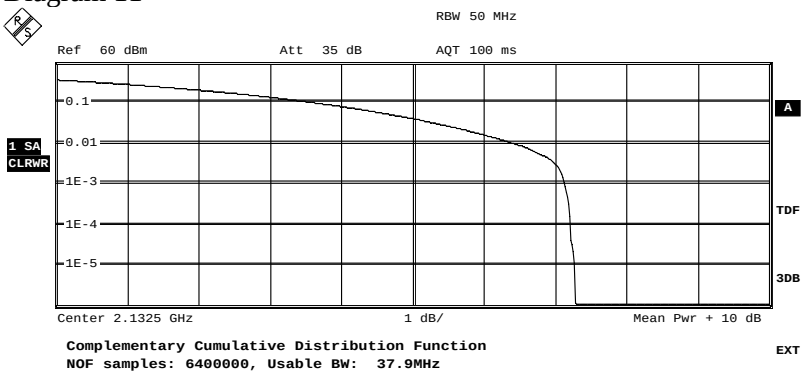
	Trace 1
Mean	44.59 dBm
Peak	52.60 dBm
Crest	8.00 dB
10 %	3.70 dB
1 %	6.52 dB
.1 %	7.32 dB
.01 %	7.61 dB

Date: 11.JUN.2012 13:00:01

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 2

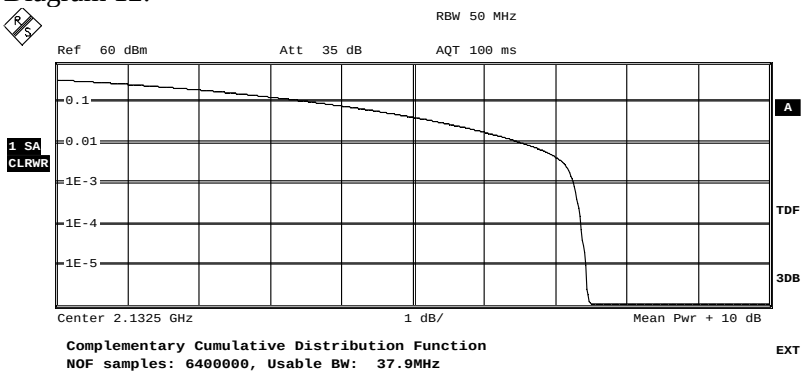
Diagram 11



	Trace 1
Mean	44.45 dBm
Peak	51.73 dBm
Crest	7.28 dB
10 %	3.67 dB
1 %	6.43 dB
.1 %	7.13 dB
.01 %	7.21 dB

Date: 12.JUN.2012 10:48:38

Diagram 12:



	Trace 1
Mean	44.58 dBm
Peak	52.08 dBm
Crest	7.51 dB
10 %	3.70 dB
1 %	6.55 dB
.1 %	7.26 dB
.01 %	7.37 dB

Date: 12.JUN.2012 11:06:42

Occupied bandwidth measurements according to 47 CFR 2.1049 / IC RSS-Gen 4.6.1

Date	Temperature	Humidity
2012-06-11	22 °C ± 3 °C	46 % ± 5 %
2012-06-12	22 °C ± 3 °C	39 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §2.1049. The output was connected to a signal analyzer with the RMS detector activated. The signal analyzer was connected to an external 10 MHz reference standard during the measurements.

Measurement equipment	SP number
Rohde & Schwarz signal analyzer FSQ40	504 143
RF attenuator	504 159
Testo 615 temperature and humidity meter	503 498

Measurement uncertainty: 3.7 dB

Results

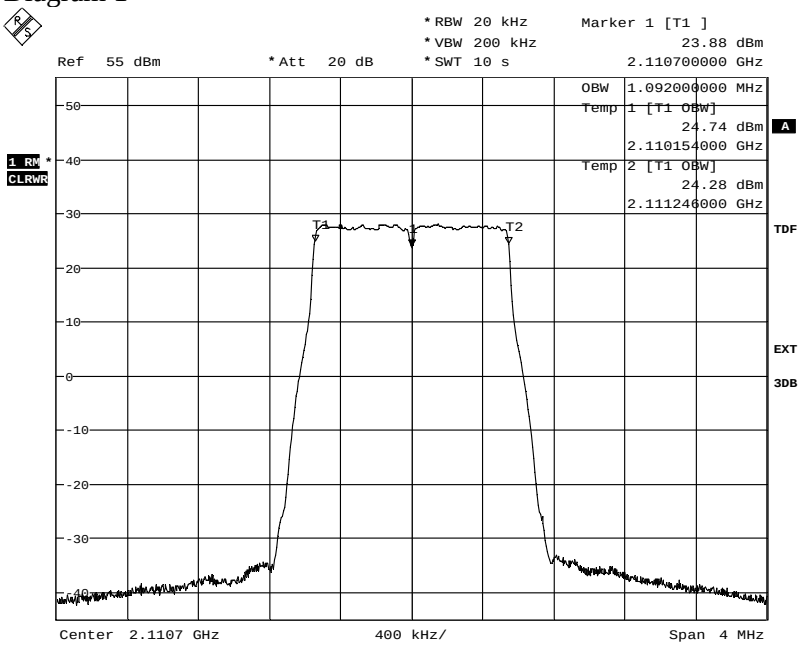
The results are shown in appendix 3.1

Diagram	BW configuration	Tested frequency	OBW / [MHz]
1	1.4 MHz	B	1.09
2	20 MHz	B	17.86
3	1.4 MHz	M	1.09
4	3 MHz	M	2.69
5	5 MHz	M	4.48
6	10 MHz	M	8.93
7	15 MHz	M	13.42
8	20 MHz	M	17.86
9	1.4 MHz	T	1.09
10	20 MHz	T	17.84
11	1.4MHz	M, RF B	1092
12	20MHz	M, RF B	17.88

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

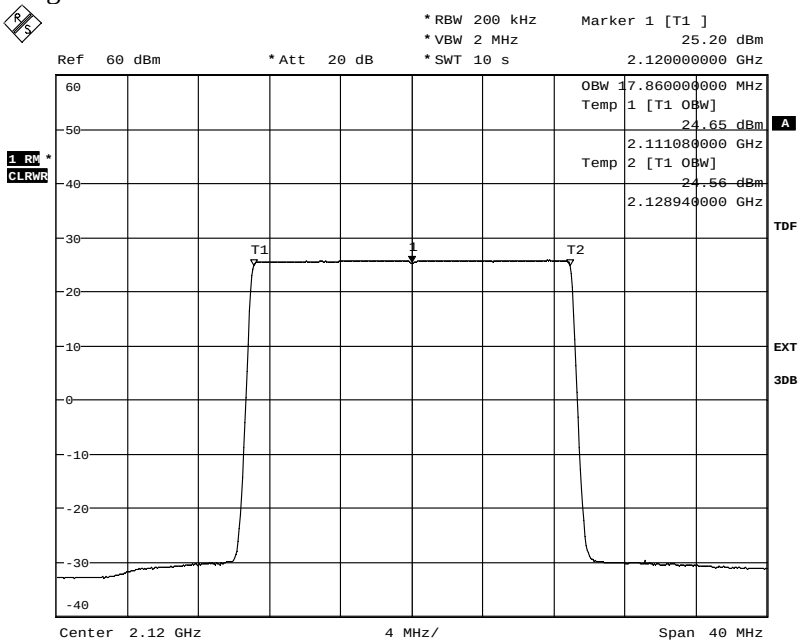
Appendix 3

Diagram 1



Date: 11.JUN.2012 18:50:24

Diagram 2

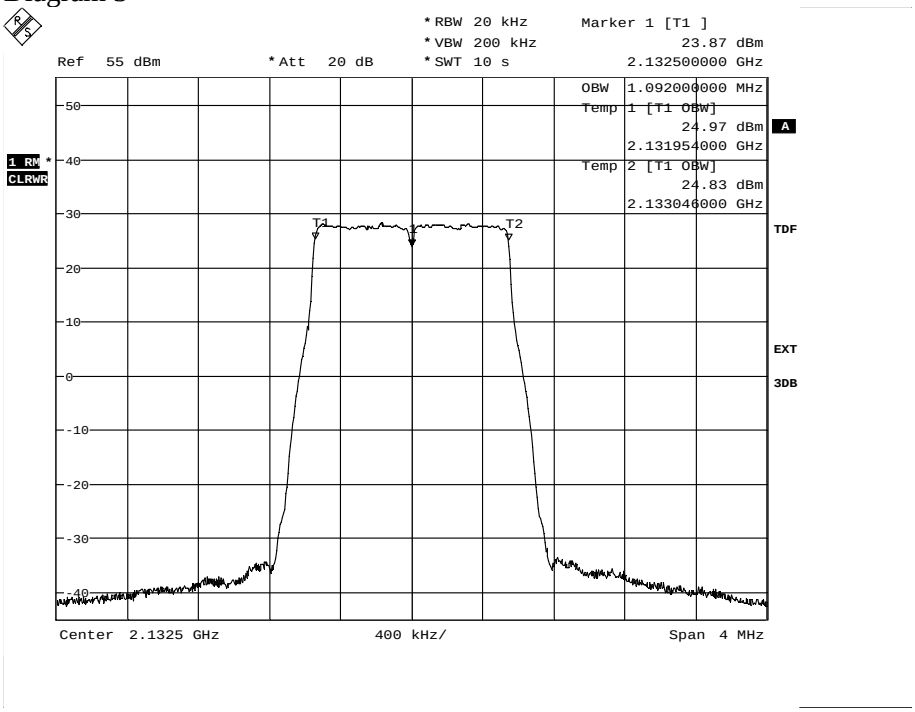


Date: 11.JUN.2012 19:48:24

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

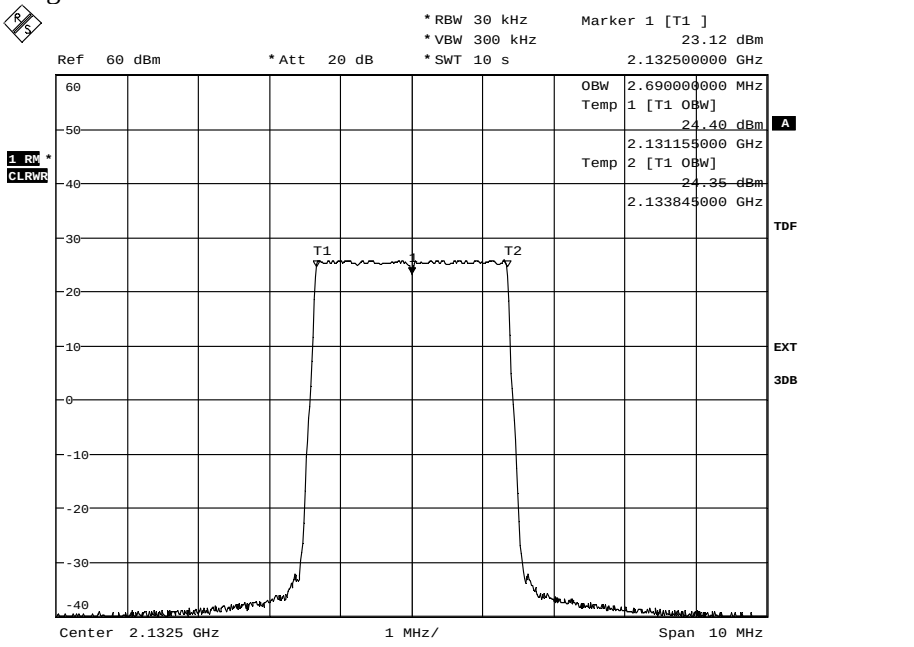
Appendix 3

Diagram 3



Date: 11.JUN.2012 11:58:59

Diagram 4

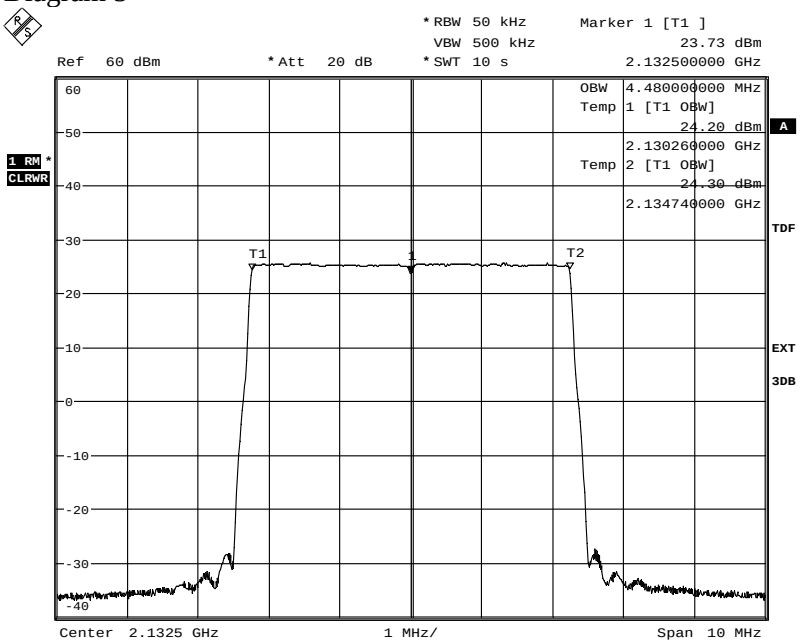


Date: 12.JUN.2012 09:28:44

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

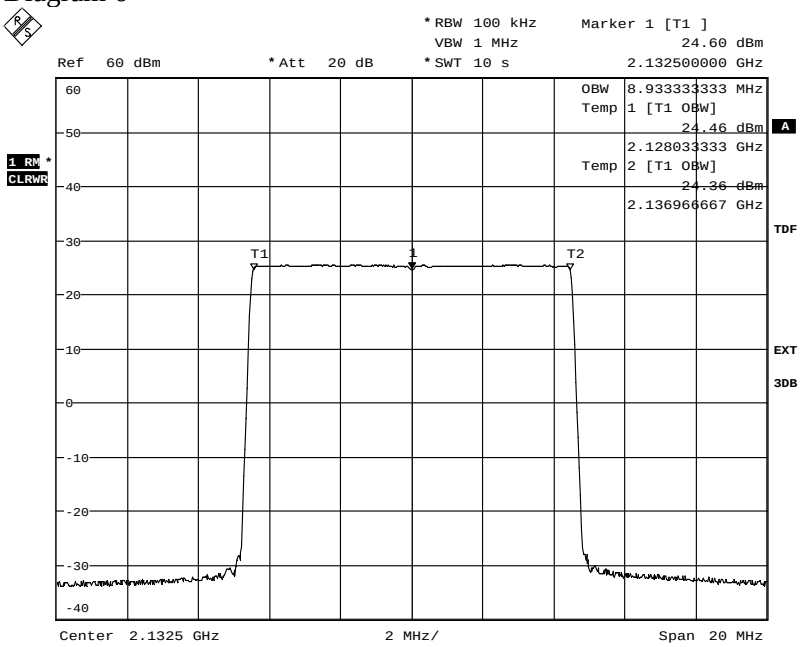
Appendix 3

Diagram 5



Date: 11.JUN.2012 10:29:08

Diagram 6

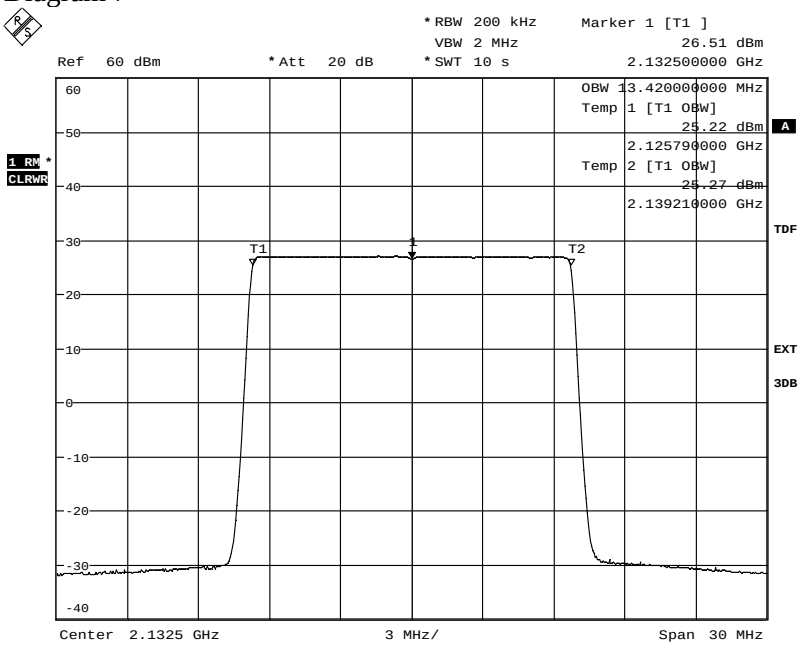


Date: 11.JUN.2012 12:15:13

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

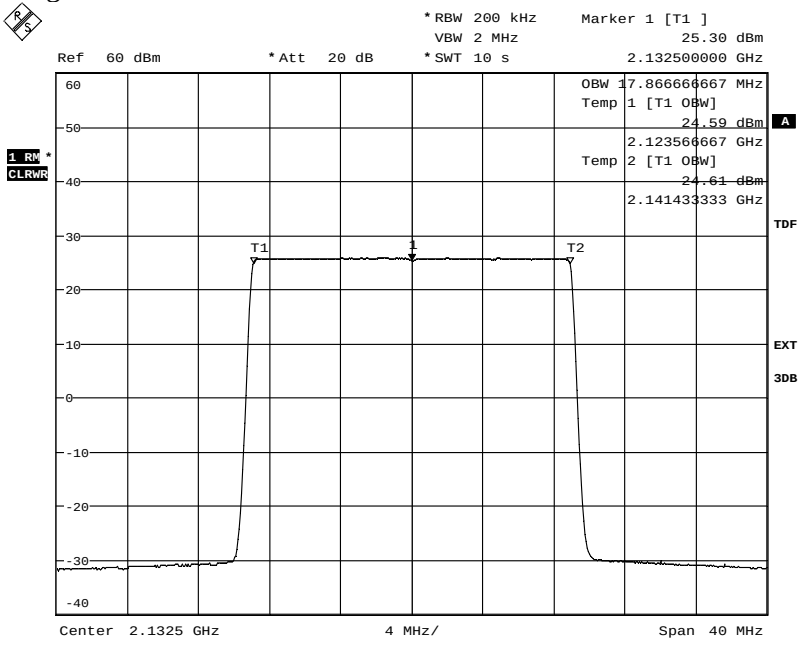
Appendix 3

Diagram 7



Date: 11.JUN.2012 12:29:44

Diagram 8

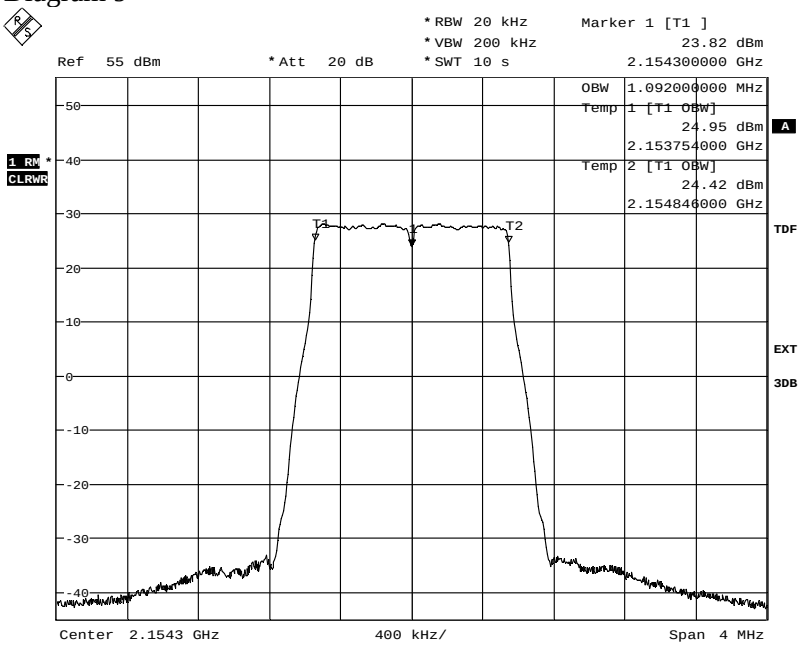


Date: 11.JUN.2012 12:45:40

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

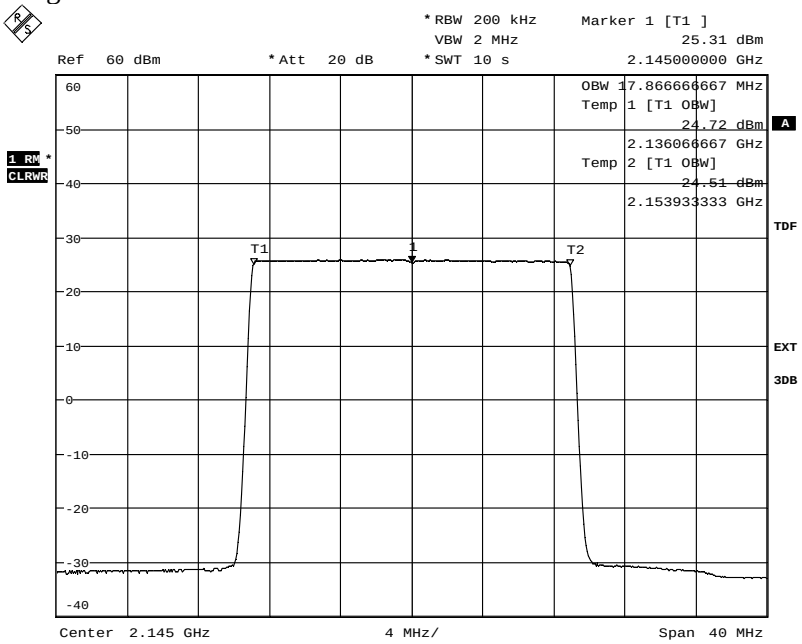
Appendix 3

Diagram 9



Date: 12.JUN.2012 09:32:25

Diagram 10

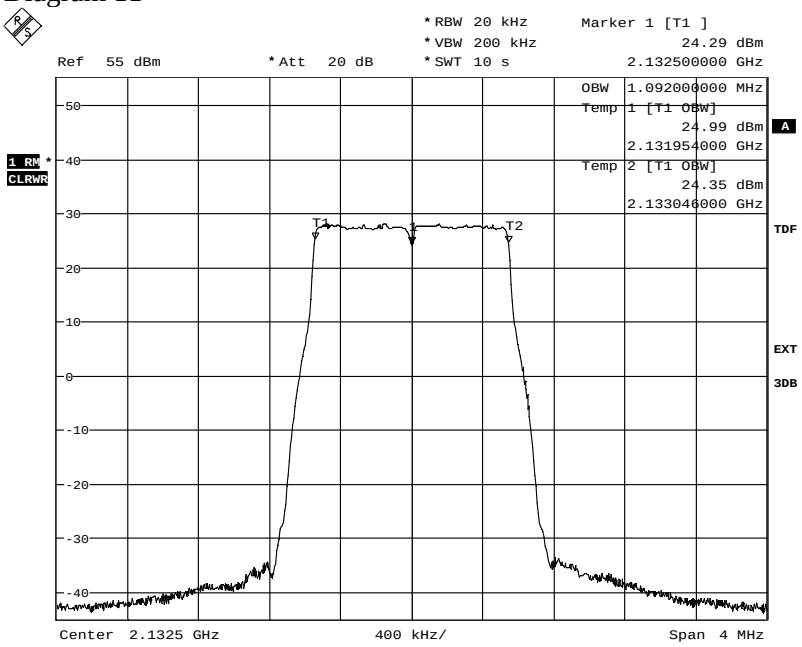


Date: 11.JUN.2012 13:03:34

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

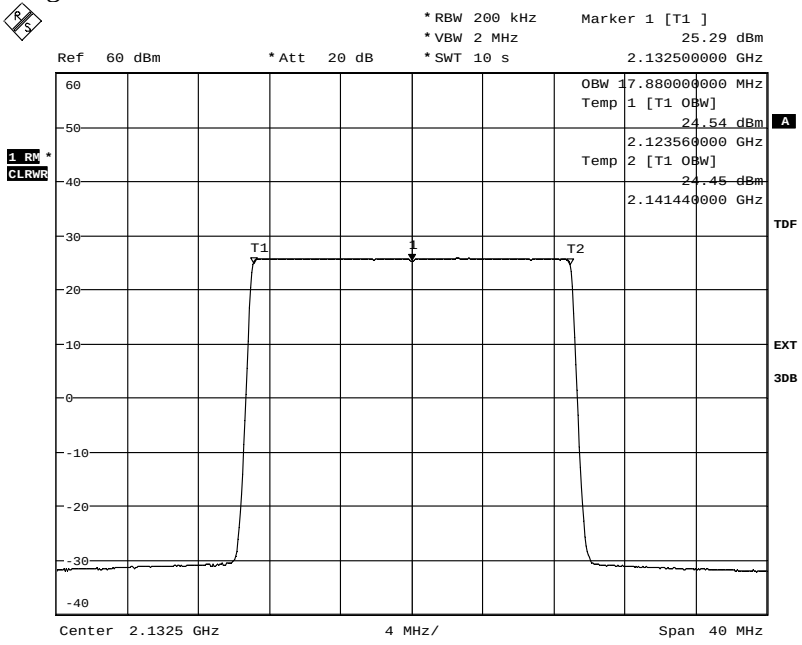
Appendix 3

Diagram 11



Date: 12.JUN.2012 10:50:34

Diagram 12



Date: 12.JUN.2012 11:09:04

Band edge measurements according to CFR 47 §27.53(h) / IC RSS-139 6.5

Date	Temperature	Humidity
2012-06-11	22 °C ± 3 °C	46 % ± 5 %
2012-06-12	22 °C ± 3 °C	39 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §27.53(h) The test object was connected to a spectrum analyzer with the RMS detector activated. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements.

Beyond the 1st MHz off the band edges the limit was adjusted to compensate for reduced measurement bandwidths pursuant to the FCC rules, specifying a RBW of at least 1% of the fundamental emission bandwidth up to 1 MHz away from the band edges and a RBW of 1 MHz for measurements of emissions more than 1 MHz away from the band edges.
A resolution bandwidth of 200 kHz was used 1 MHz to 6 MHz away from the band edges, to compensate for the reduced resolution bandwidth and 10 log (N) according to FCC KDB662911, the limit was adjusted by 7 dB to -23 dBm.

Measurement equipment	SP number
R&S FSQ	504 143
RF attenuator	504 159
Testo 615 temperature and humidity meter	503 498

Measurement uncertainty: 3.7 dB

Results

The results are shown in appendix 4.1

Diagram	BW configuration	Tested frequency
1 a+b+c	1.4 MHz	B
2 a+b+c	3 MHz	B
3 a+b+c	5 MHz	B
4 a+b+c	10 MHz	B
5 a+b+c	15 MHz	B
6 a+b+c	20 MHz	B
7 a+b+c	1.4 MHz	T
8 a+b+c	3 MHz	T
9 a+b+c	5 MHz	T
10a+b+c	10 MHz	T
11 a+b+c	15 MHz	T
12a+b+c	20 MHz	T
13a+b+c	1.4MHz RF B	B
14a+b+c	1.4MHz RF B	T

Limits

CFR 47 §27.53(h) and RSS-139 6.5

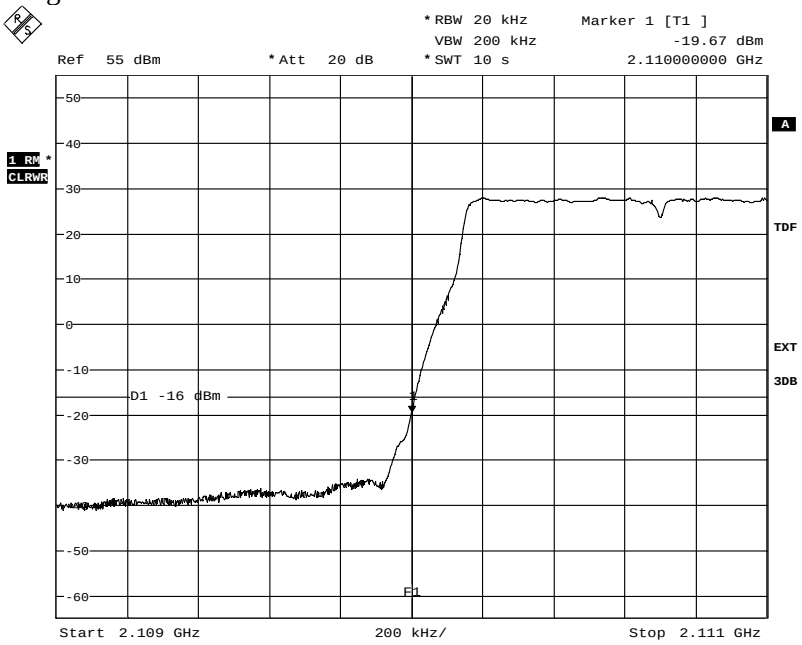
Outside a licensee's frequency band(s) of operation the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, resulting in a limit of -13 dBm.

Complies?	Yes

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

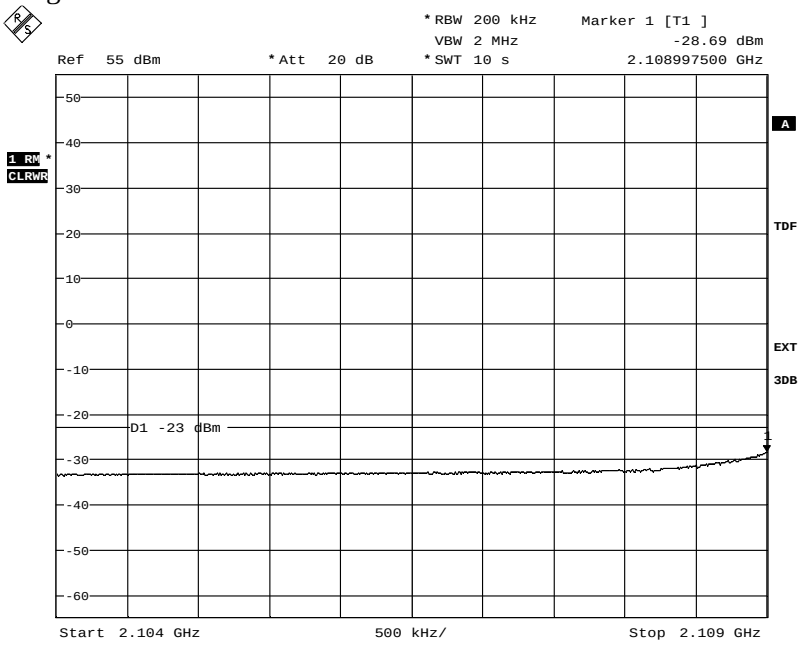
Appendix 4

Diagram 1 a



Date: 11.JUN.2012 18:54:05

Diagram 1 b

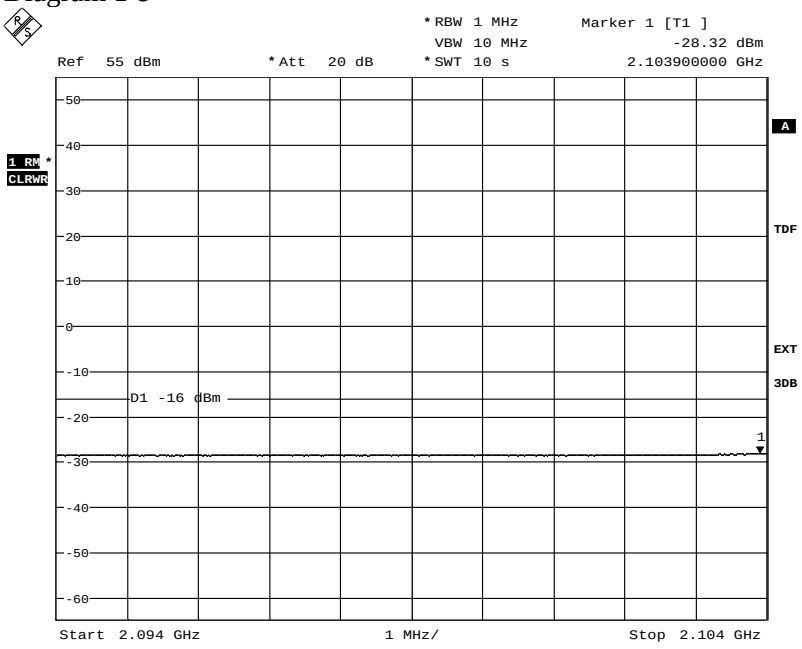


Date: 11.JUN.2012 18:55:39

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 4

Diagram 1 c

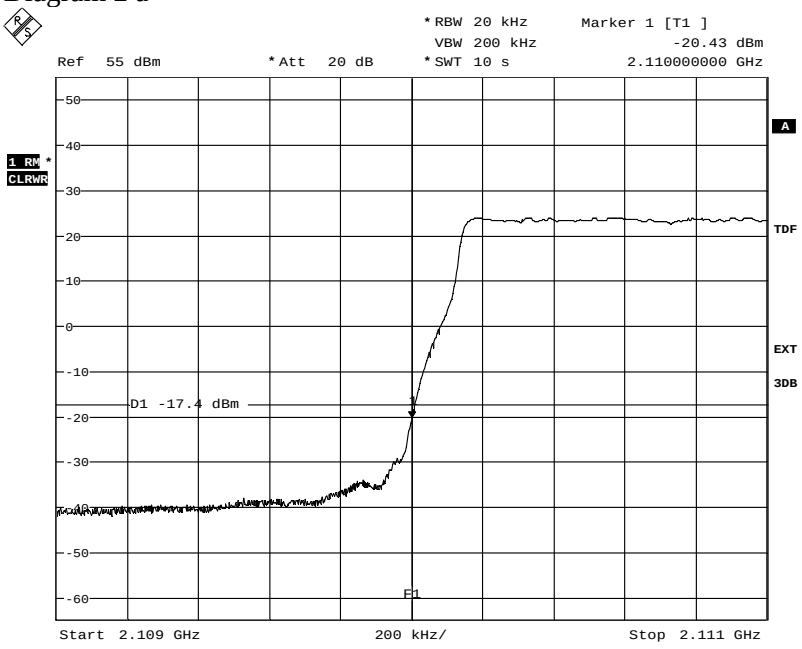


Date: 11.JUN.2012 18:57:11

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

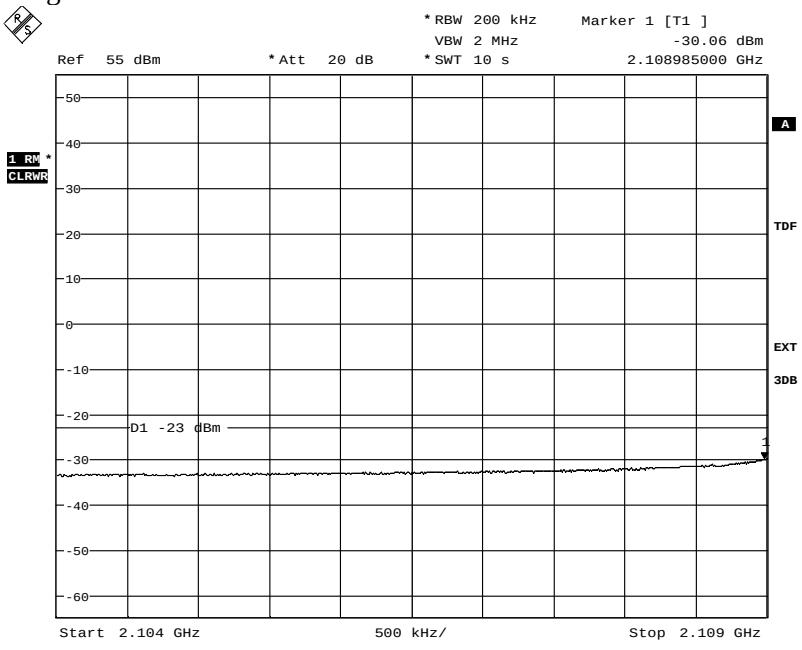
Appendix 4

Diagram 2 a



Date: 11.JUN.2012 19:56:30

Diagram 2 b

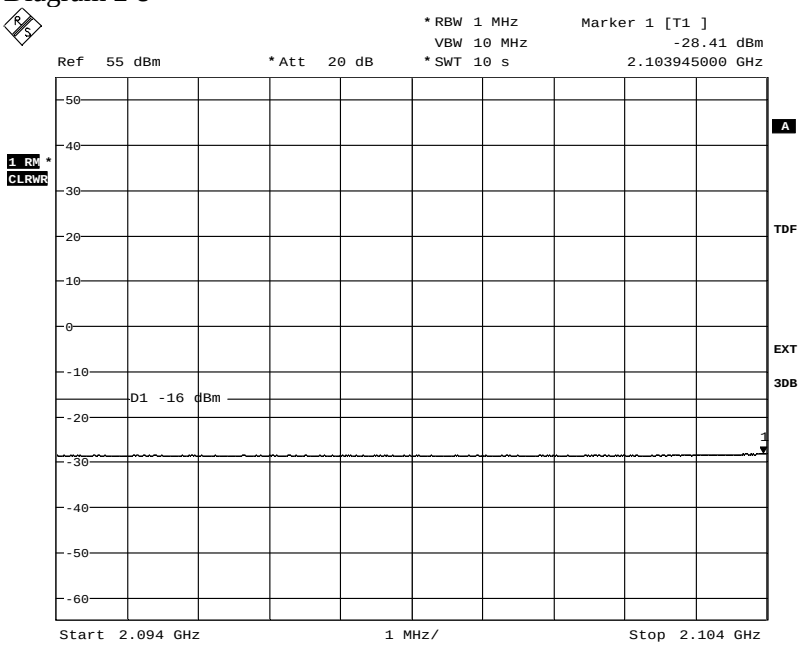


Date: 11.JUN.2012 19:57:17

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 4

Diagram 2 c

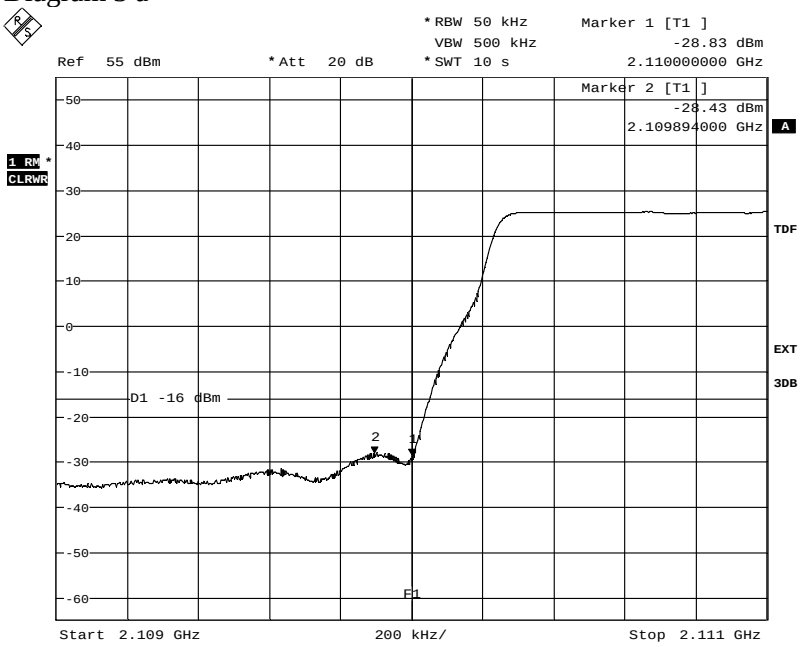


Date: 11.JUN.2012 19:57:59

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

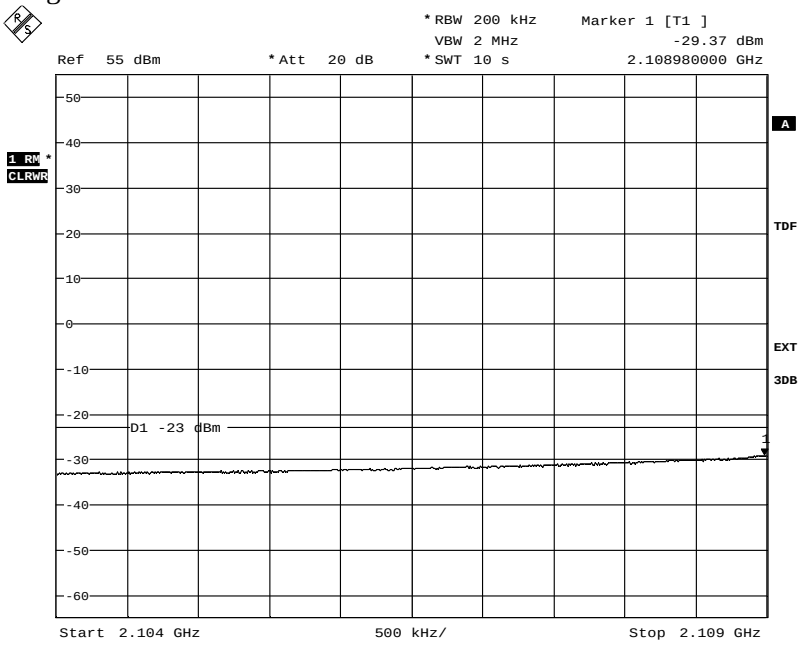
Appendix 4

Diagram 3 a



Date: 11.JUN.2012 20:14:57

Diagram 3 b

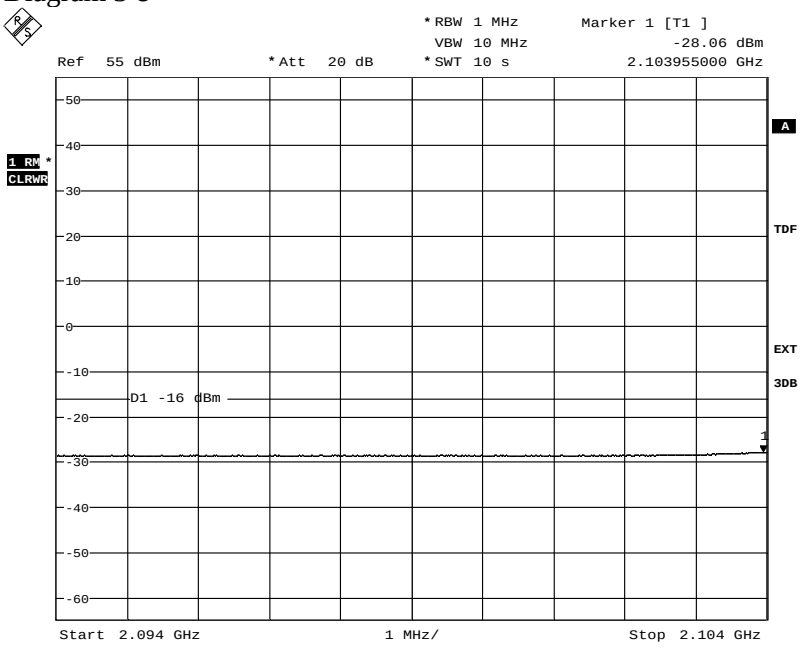


Date: 11.JUN.2012 20:15:34

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 4

Diagram 3 c

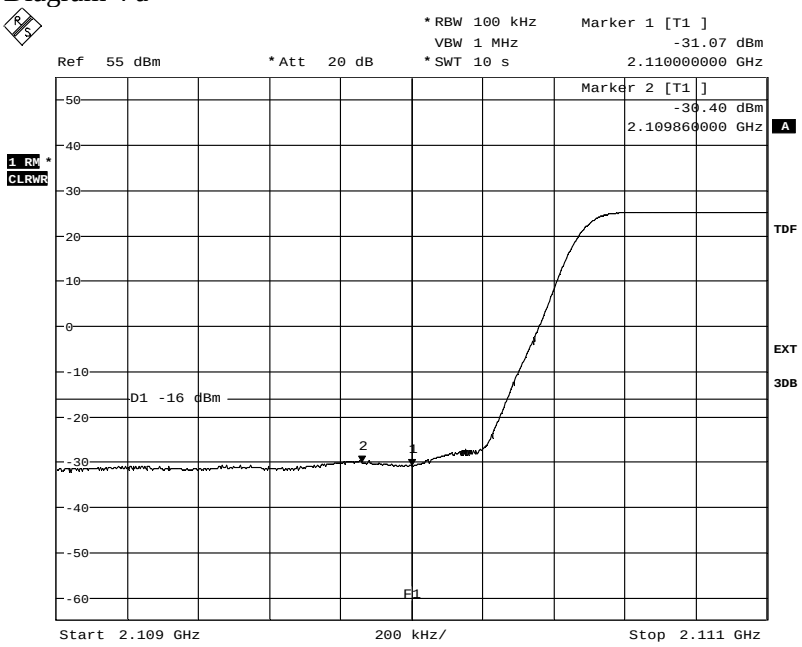


Date: 11.JUN.2012 20:16:14

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

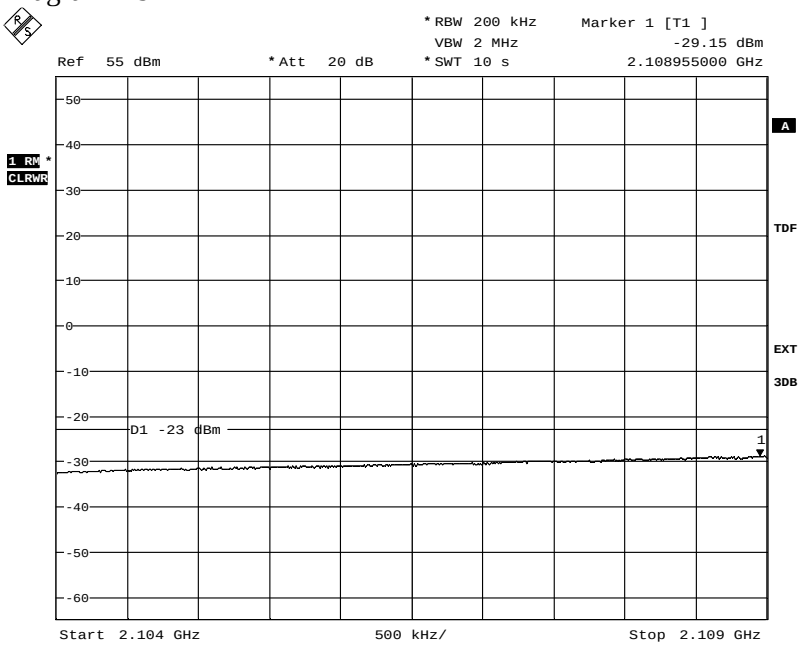
Appendix 4

Diagram 4 a



Date: 12.JUN.2012 08:21:15

Diagram 4 b

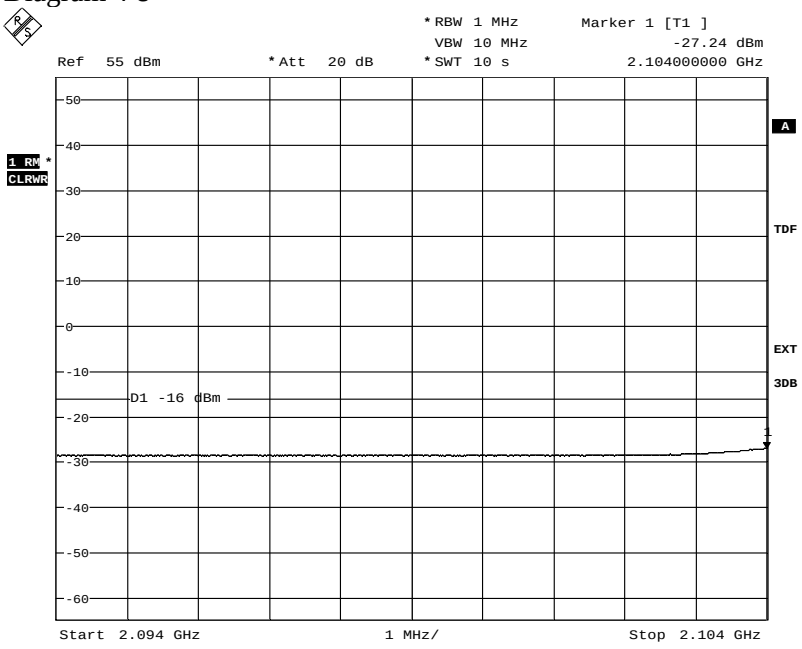


Date: 12.JUN.2012 08:21:56

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 4

Diagram 4 c

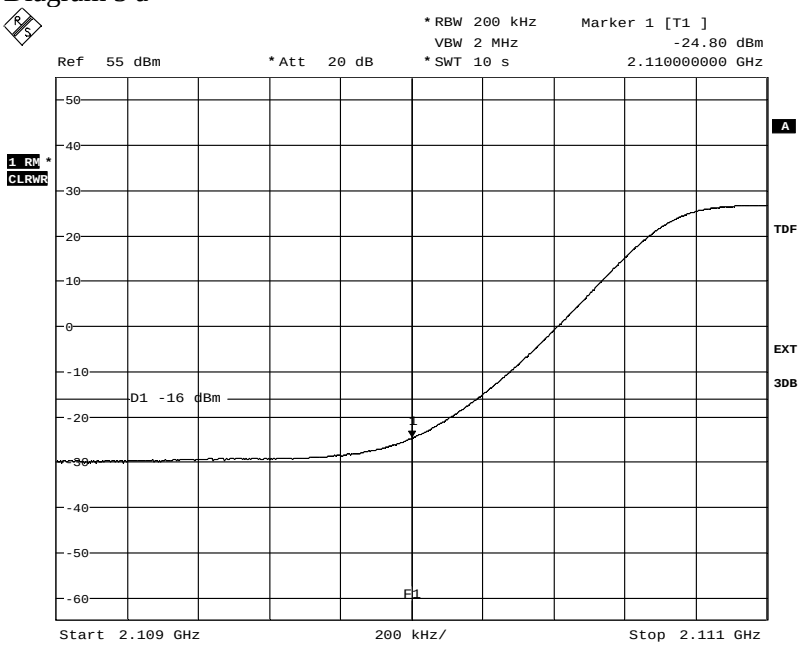


Date: 12.JUN.2012 08:22:37

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

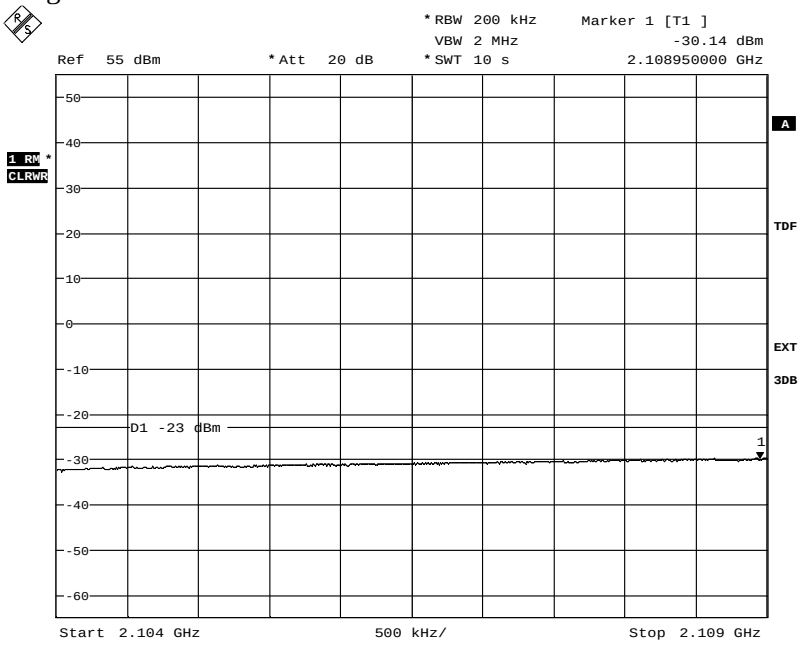
Appendix 4

Diagram 5 a



Date: 12.JUN.2012 08:36:59

Diagram 5 b

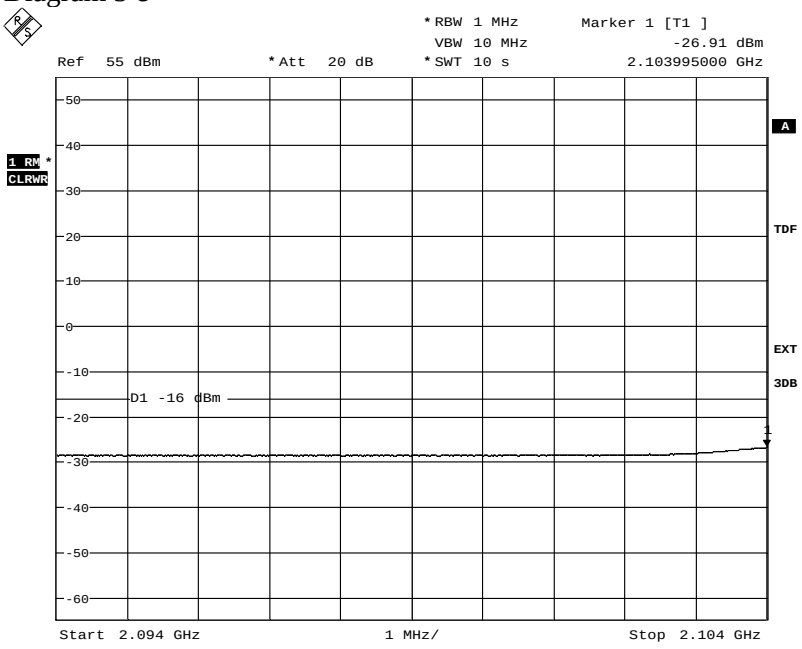


Date: 12.JUN.2012 08:37:38

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

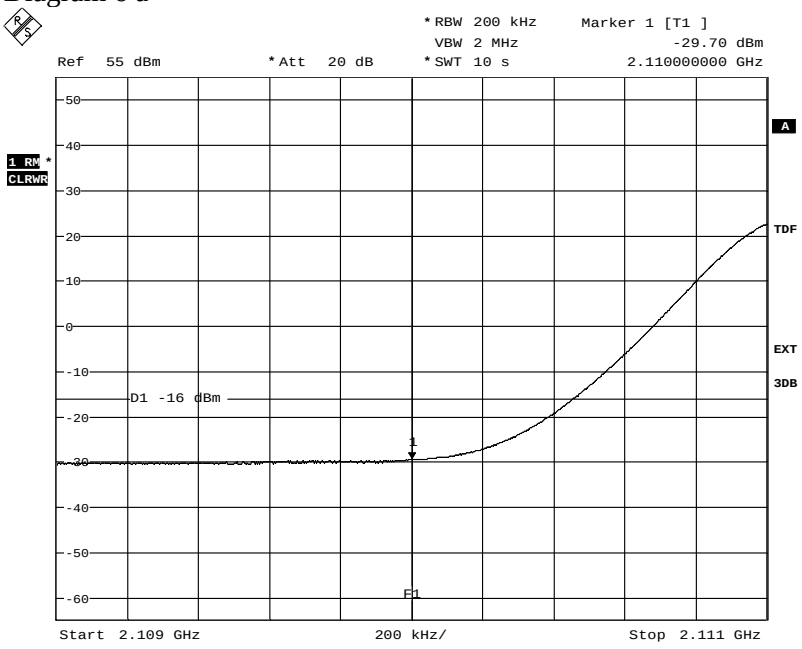
Appendix 4

Diagram 5 c



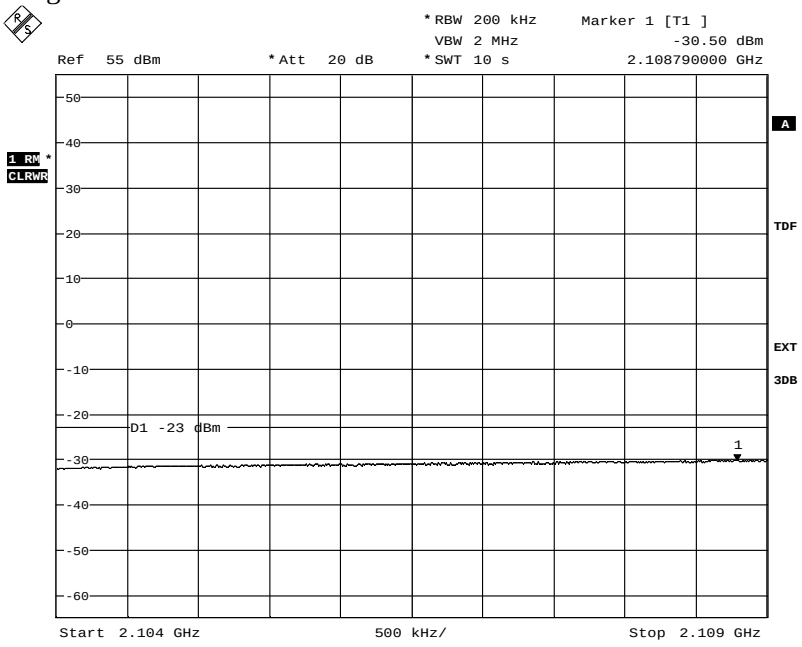
Date: 12.JUN.2012 08:38:16

Diagram 6 a



Date: 11.JUN.2012 16:12:30

Diagram 6 b

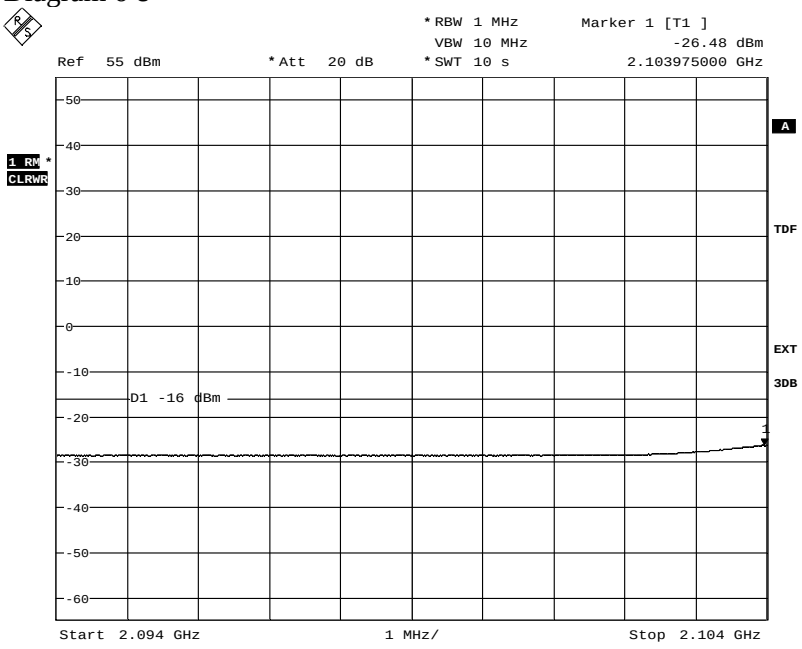


Date: 11.JUN.2012 16:14:17

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 4

Diagram 6 c

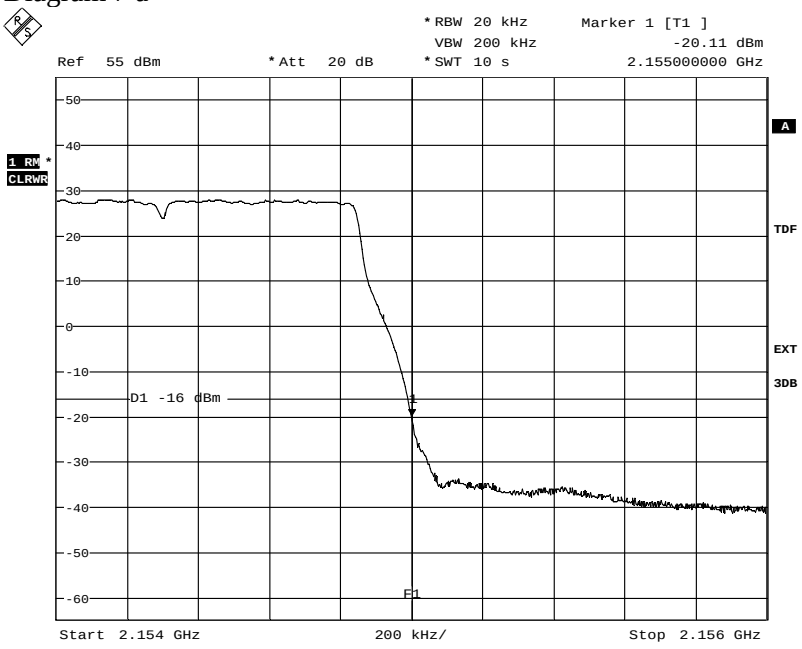


Date: 11.JUN.2012 16:43:38

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

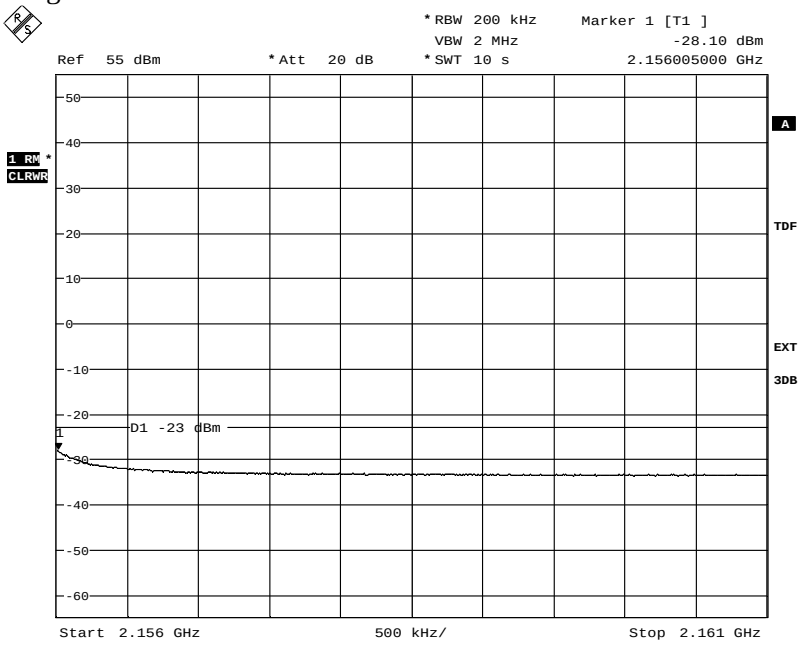
Appendix 4

Diagram 7 a



Date: 11.JUN.2012 19:24:08

Diagram 7 b

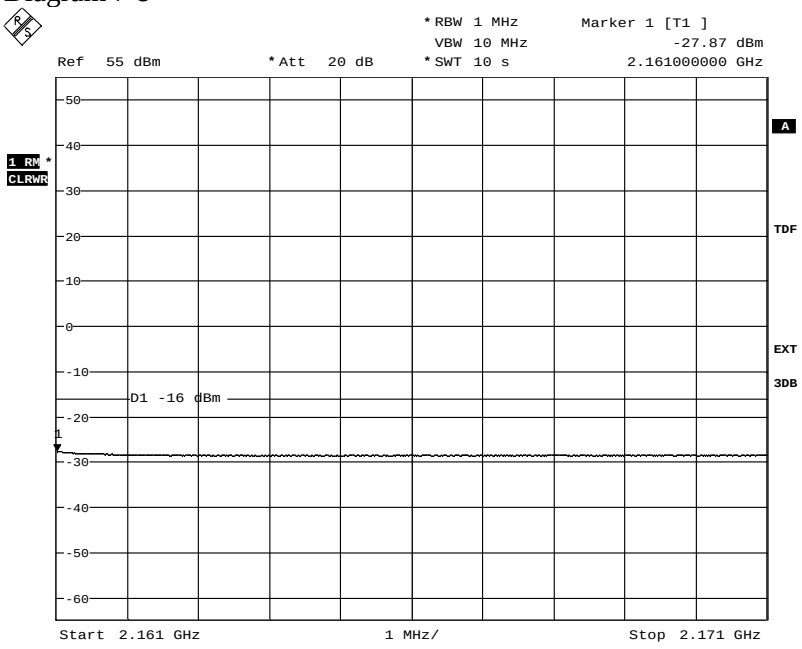


Date: 11.JUN.2012 19:25:45

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 4

Diagram 7 c

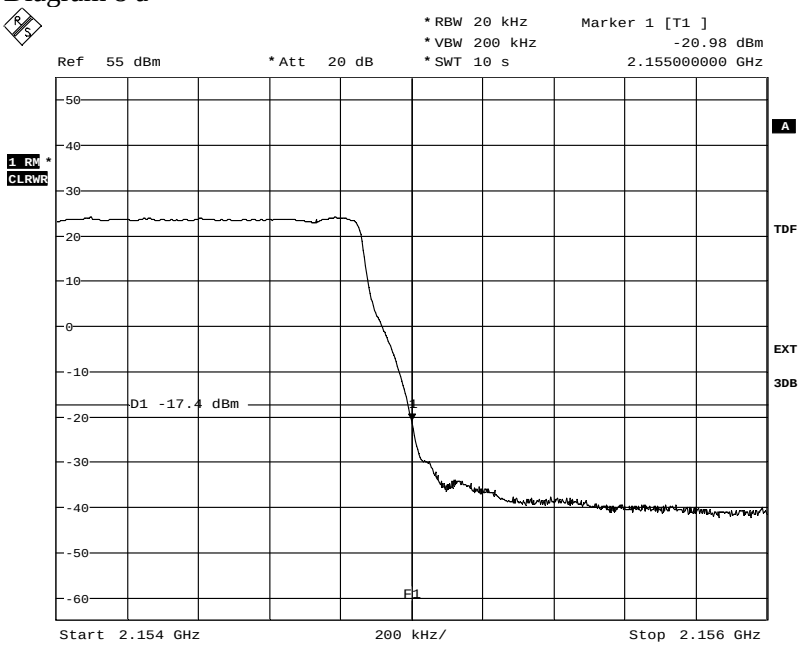


Date: 11.JUN.2012 19:30:08

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

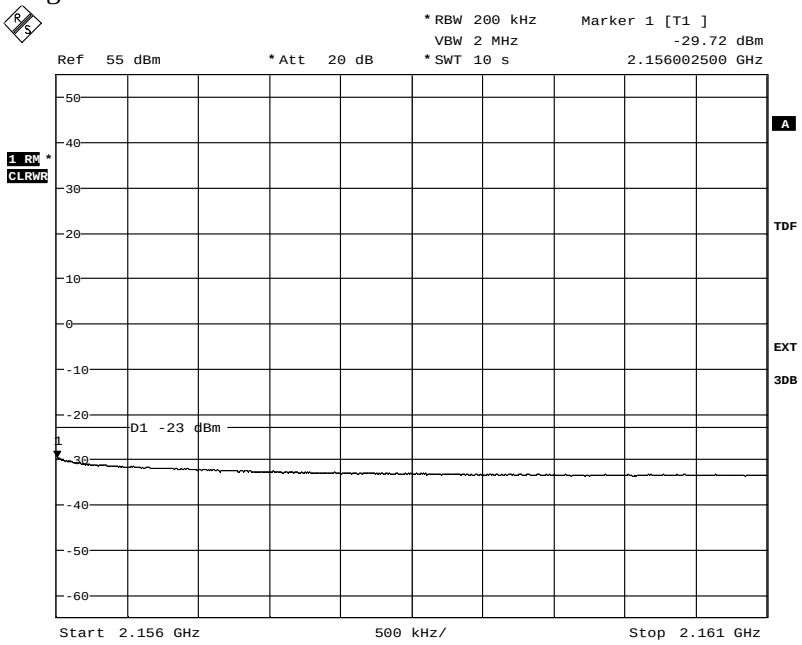
Appendix 4

Diagram 8 a



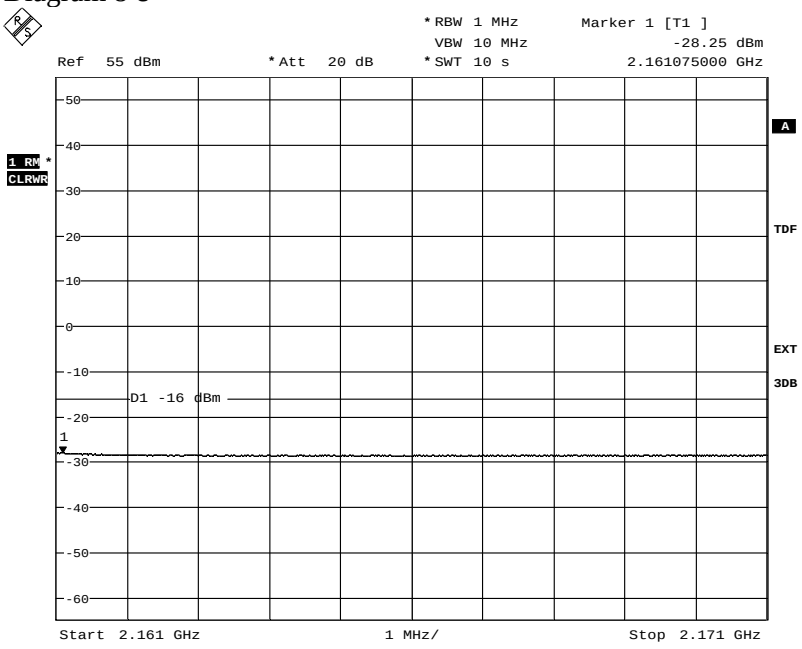
Date: 11.JUN.2012 20:02:22

Diagram 8 b



Date: 11.JUN.2012 20:02:54

Diagram 8 c

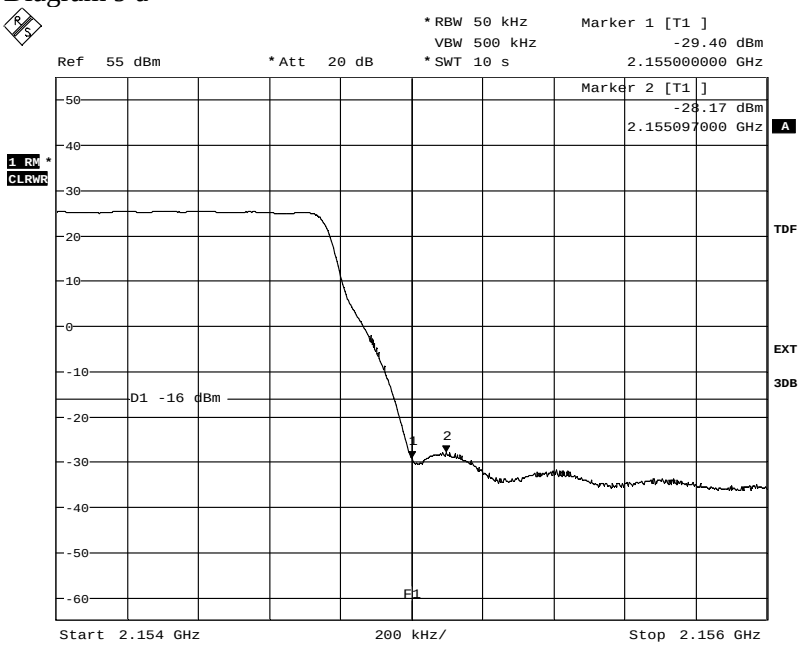


Date: 11.JUN.2012 20:03:35

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

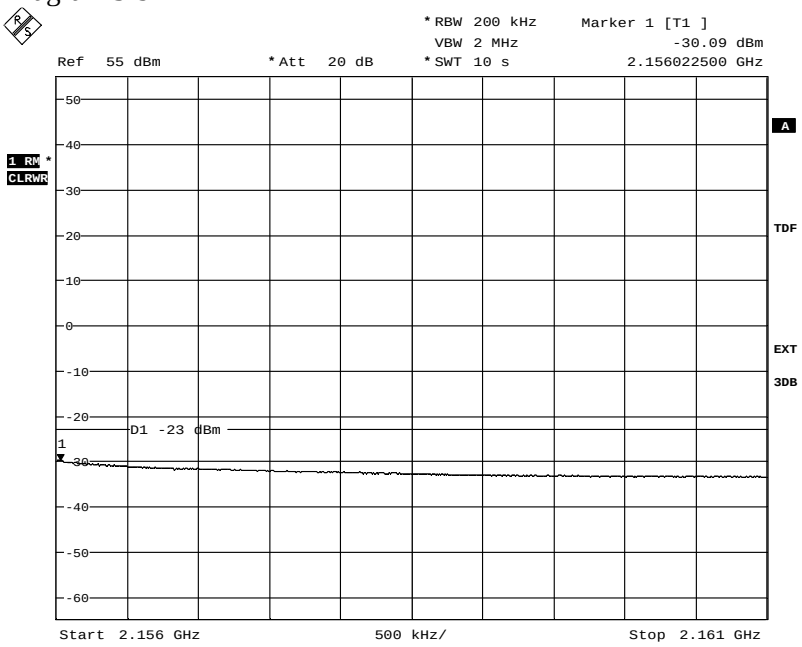
Appendix 4

Diagram 9 a



Date: 11.JUN.2012 20:09:16

Diagram 9 b

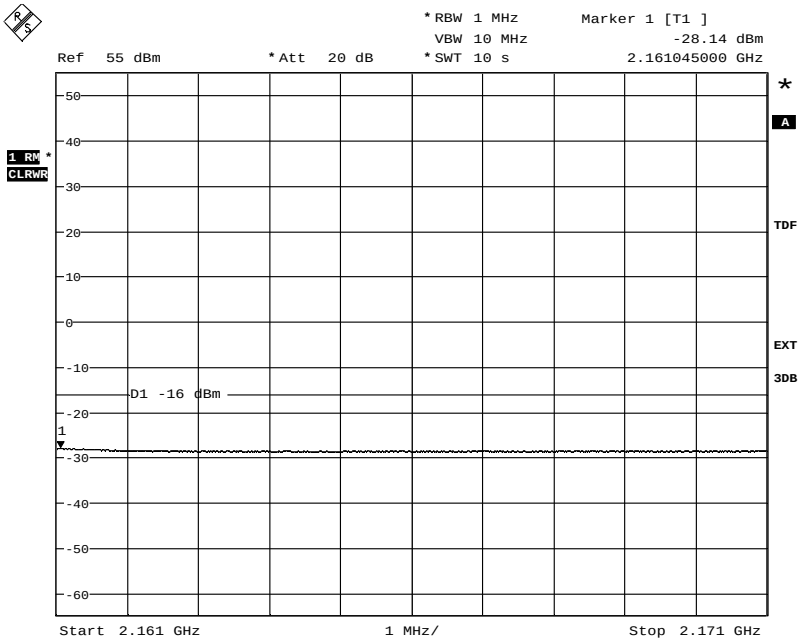


Date: 11.JUN.2012 20:09:58

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 4

Diagram 9 c

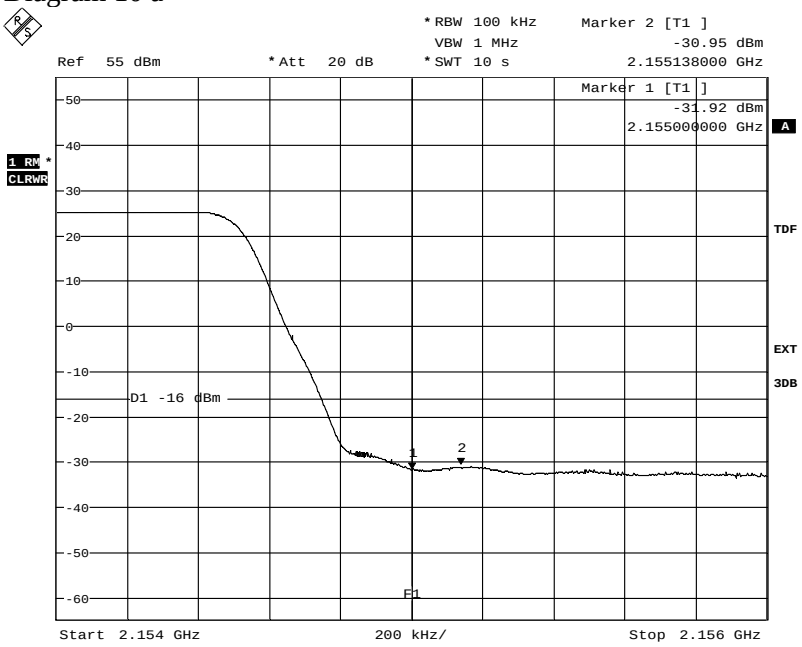


Date: 11.JUN.2012 20:10:35

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

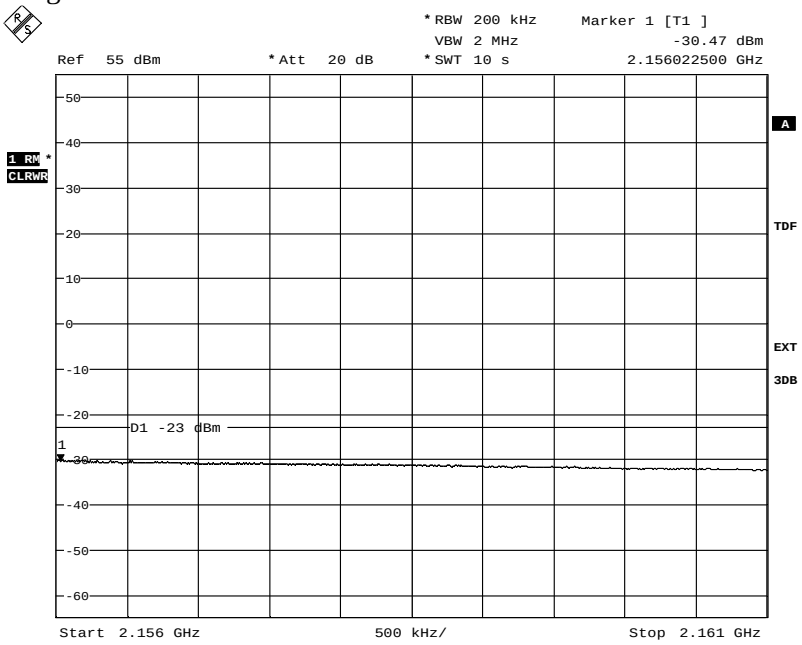
Appendix 4

Diagram 10 a



Date: 12.JUN.2012 08:27:12

Diagram 10 b

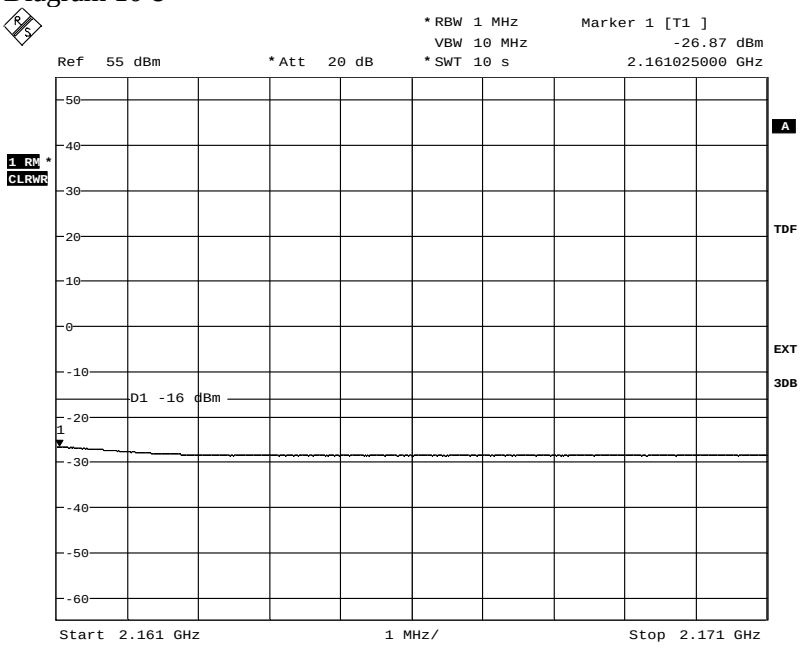


Date: 12.JUN.2012 08:27:49

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 4

Diagram 10 c

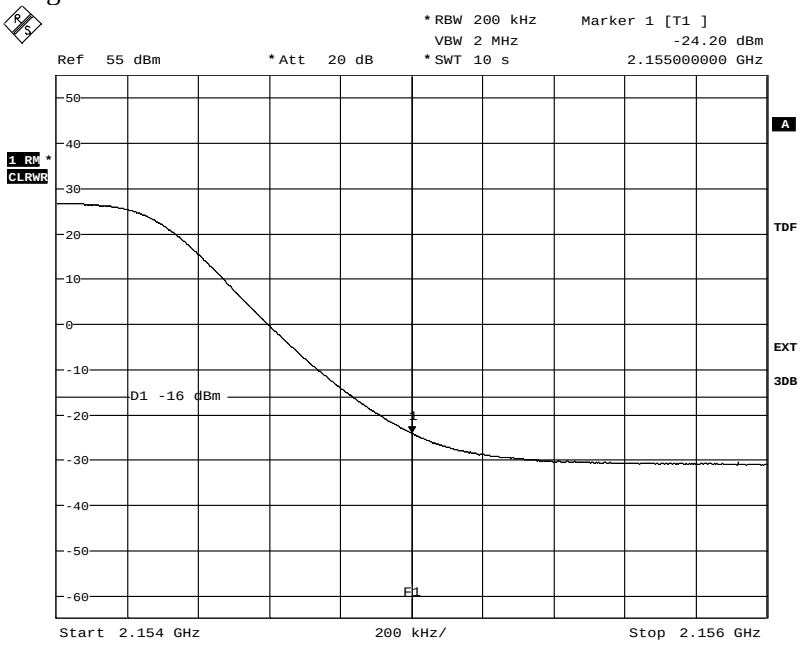


Date: 12.JUN.2012 08:28:31

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

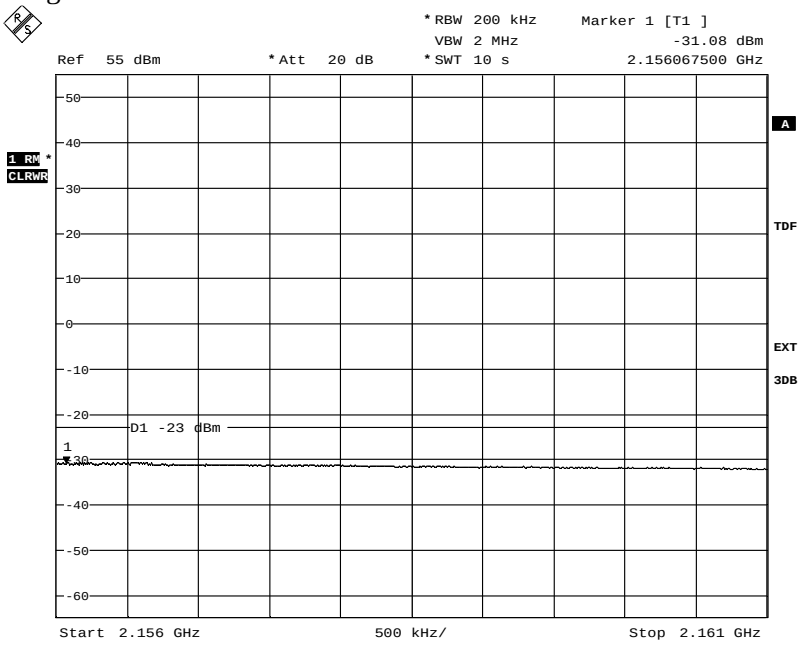
Appendix 4

Diagram 11 a



Date: 12.JUN.2012 08:49:52

Diagram 11 b

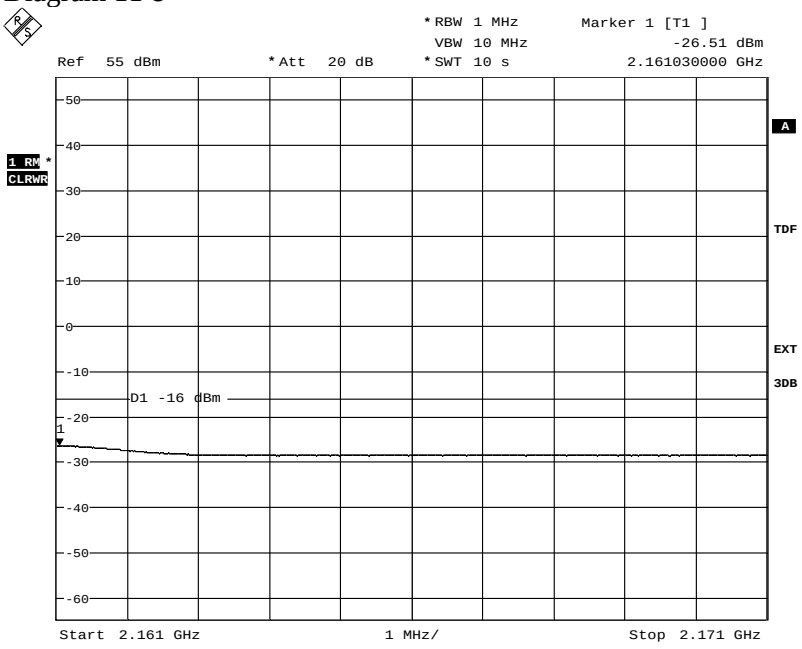


Date: 12.JUN.2012 08:50:31

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 4

Diagram 11 c

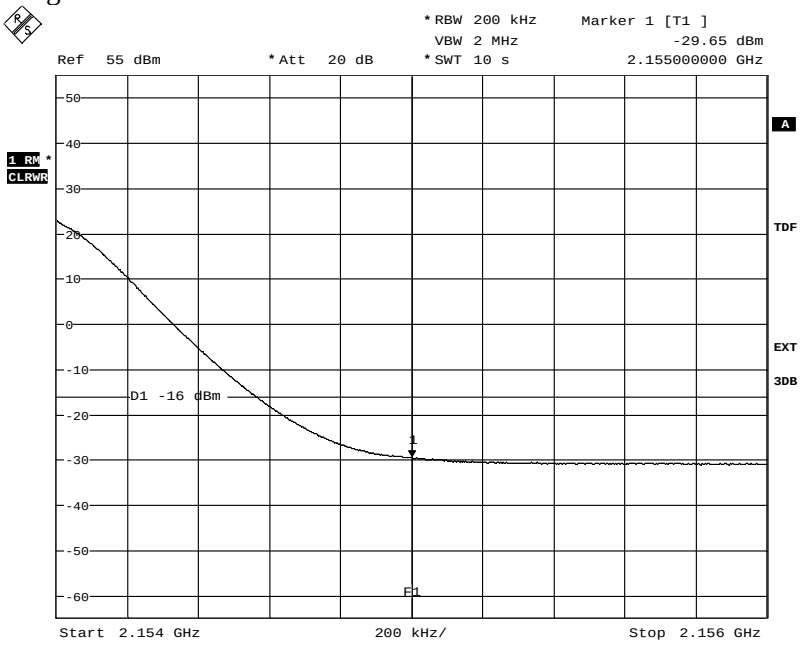


Date: 12.JUN.2012 08:51:09

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

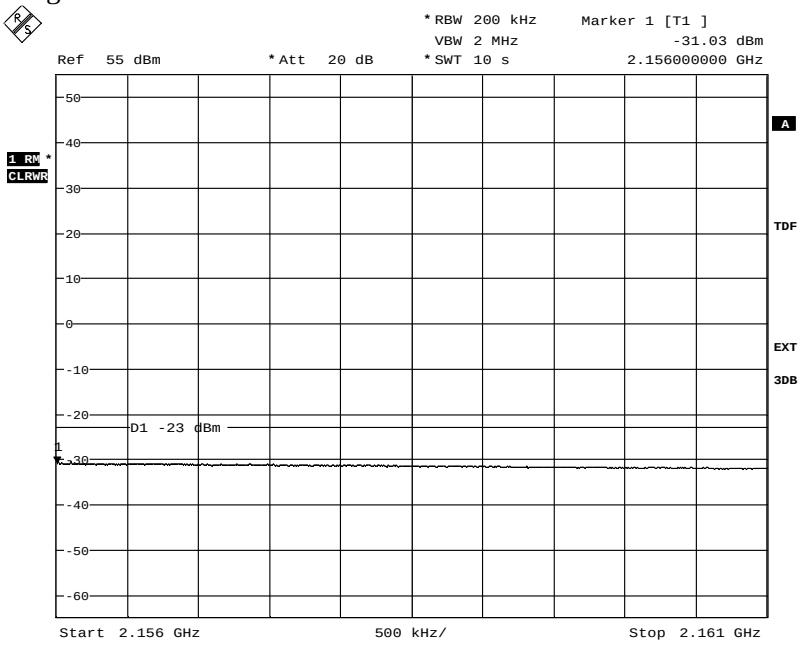
Appendix 4

Diagram 12 a



Date: 11.JUN.2012 13:46:42

Diagram 12 b

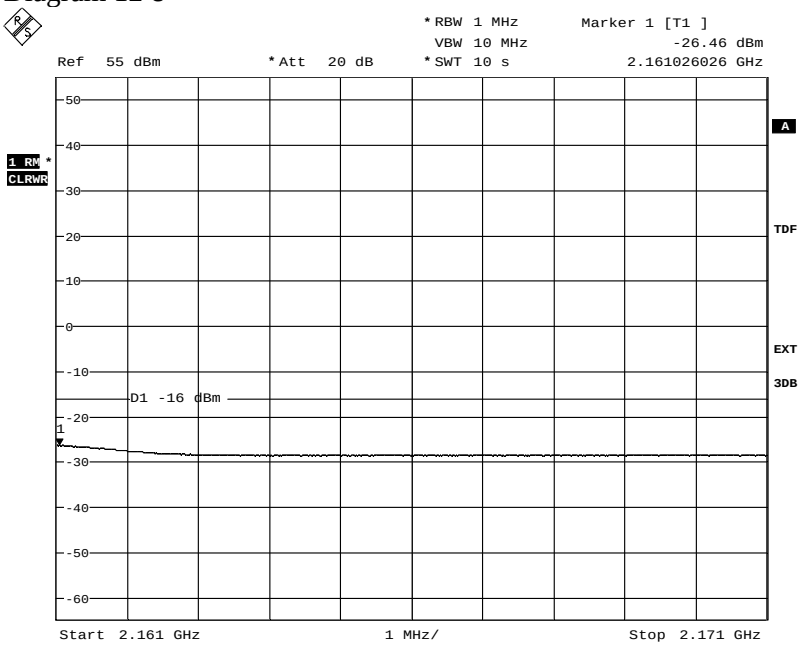


Date: 11.JUN.2012 13:49:31

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

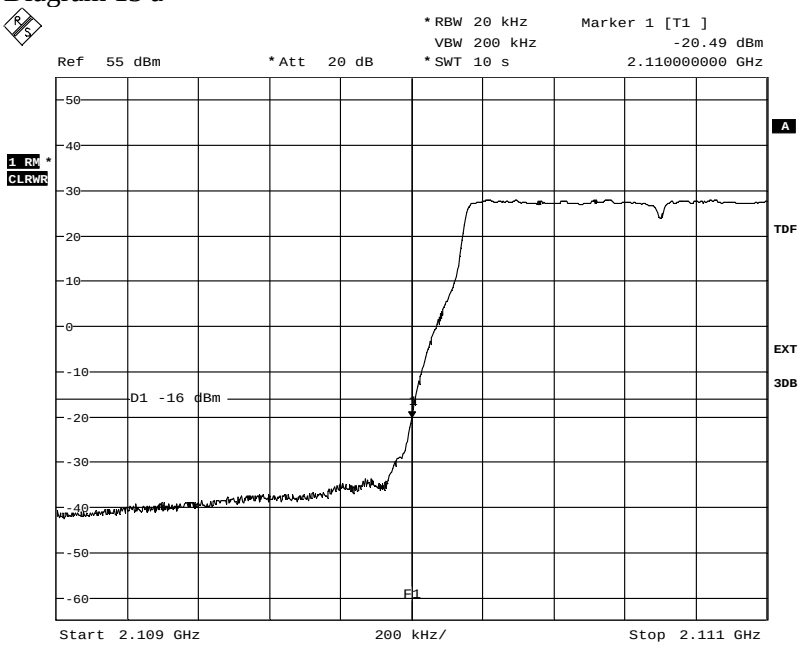
Appendix 4

Diagram 12 c



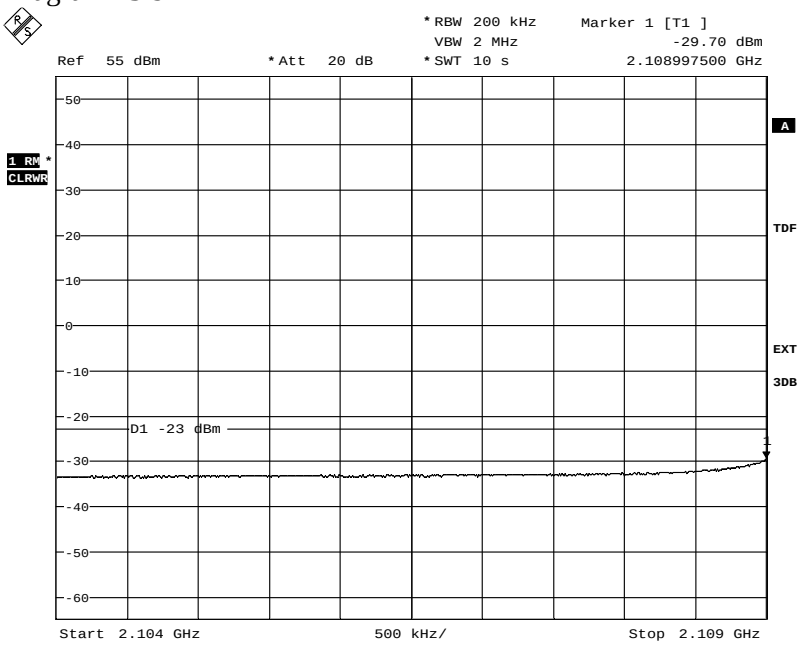
Date: 11.JUN.2012 13:53:23

Diagram 13 a



Date: 12.JUN.2012 11:40:33

Diagram 13 b

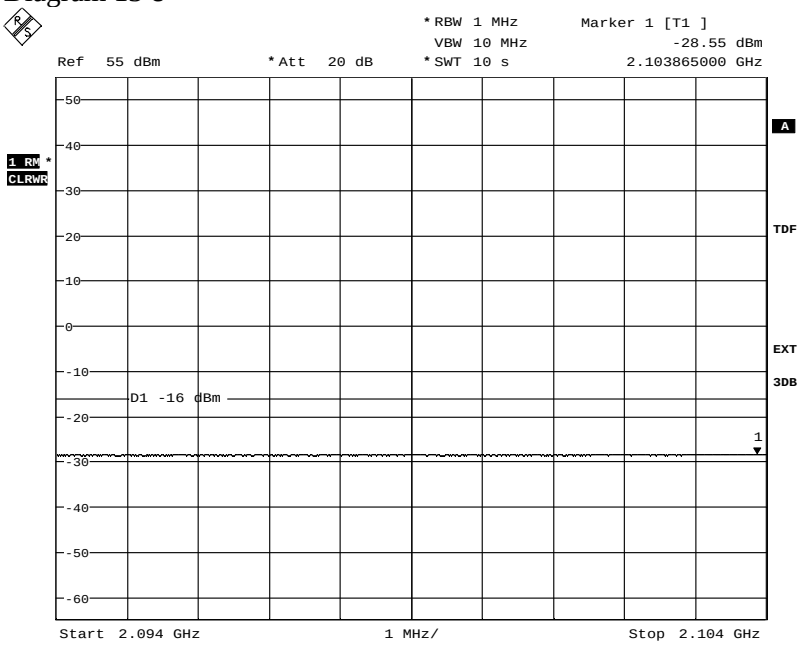


Date: 12.JUN.2012 11:42:21

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 4

Diagram 13 c

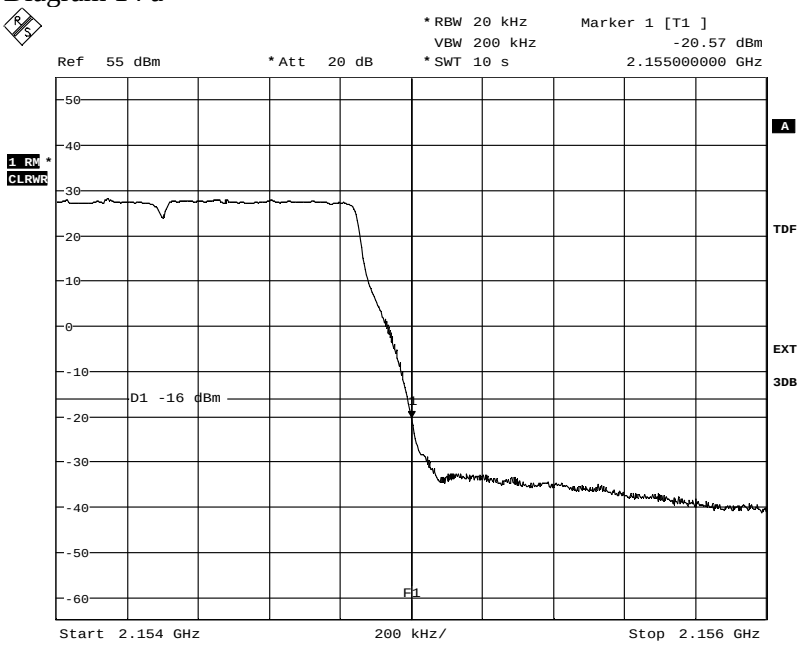


Date: 12.JUN.2012 11:44:05

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

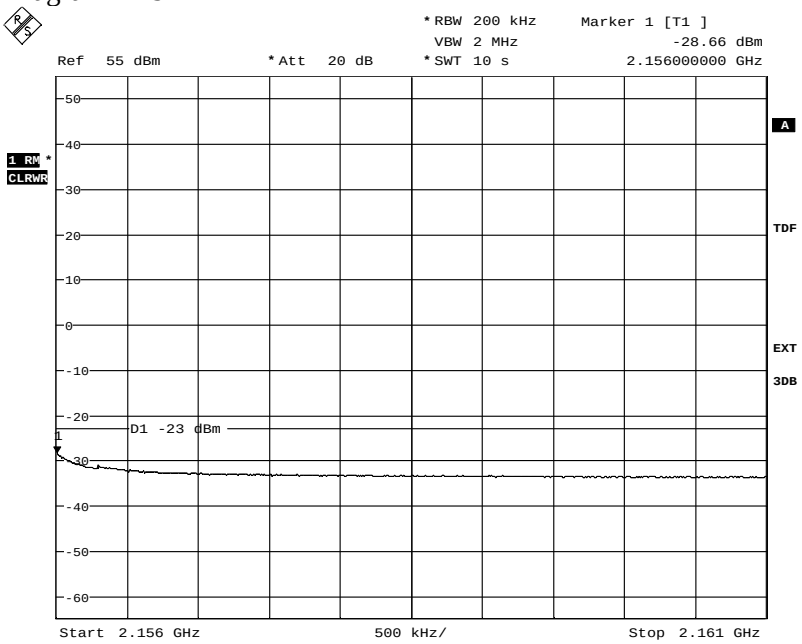
Appendix 4

Diagram 14 a



Date: 12.JUN.2012 11:49:30

Diagram 14 b

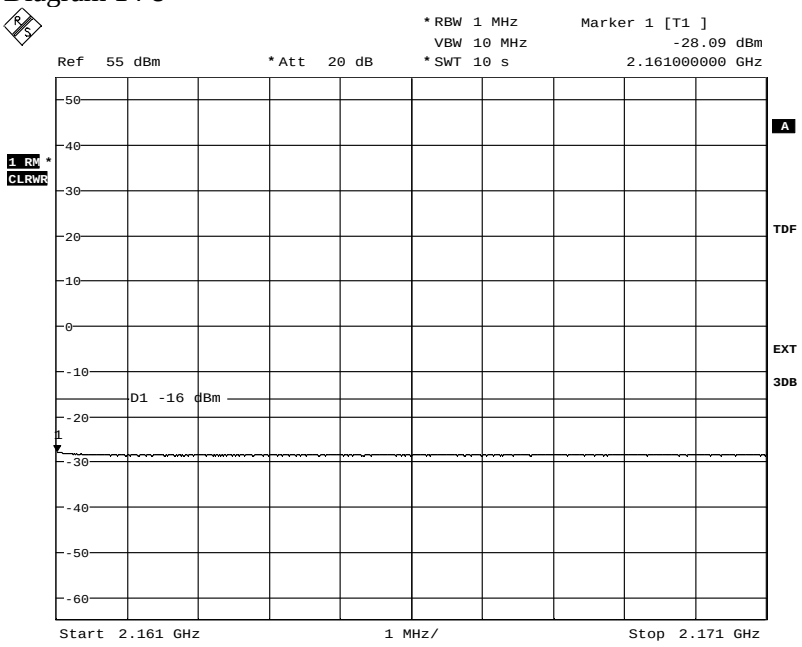


Date: 12.JUN.2012 11:50:06

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 4

Diagram 14 c



Date: 12.JUN.2012 11:50:44

Conducted spurious emission measurements according to CFR 47 §27.53(h) / IC RSS-139 6.5

Date	Temperature	Humidity
2012-06-11	22 °C ± 3 °C	46 % ± 5 %
2012-06-12	22 °C ± 3 °C	39 % ± 5 %

Test set-up and procedure
The measurements were made per definition in §27.53(h). The output was connected to a spectrum analyzer with a RBW setting of 1 MHz and RMS detector activated. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements. The limit was adjusted with 3 dB to -16 dBm to compensate for TX diversity according to FCC KDB662911 [10 log (N)].

Measurement equipment	SP number
R&S FSQ	504 143
RF attenuator	504 159
High pass filter	504 200
RF attenuator	900 229
High pass filter	503 740
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

Diagram	BW configuration / [MHz]	Tested frequency
1 a-d	1.4	B
2 a-d	20	B
3 a-d	1.4	M
4 a-d	3	M
5 a-d	5	M
6 a-d	10	M
7 a-d	15	M
8 a-d	20	M
9 a-d	1.4	T
10 a-d	20	T
11 a-d	1.4	M, RF B
12 a-d	20	M, RF B

The diagrams are shown in appendix 5.1

Remark

The emission at 9 kHz on some plots was not generated by the test object. A complementary measurement with a smaller RBW showed that it was related to the LO feed-through.

The highest internal frequency as declared by the client was 2.4576 GHz, thus the choice of the upper frequency boundary was set to 10x2.5 GHz = 25 GHz for emission measurements.

Limits

§27.53(h) and RSS-139 6.5

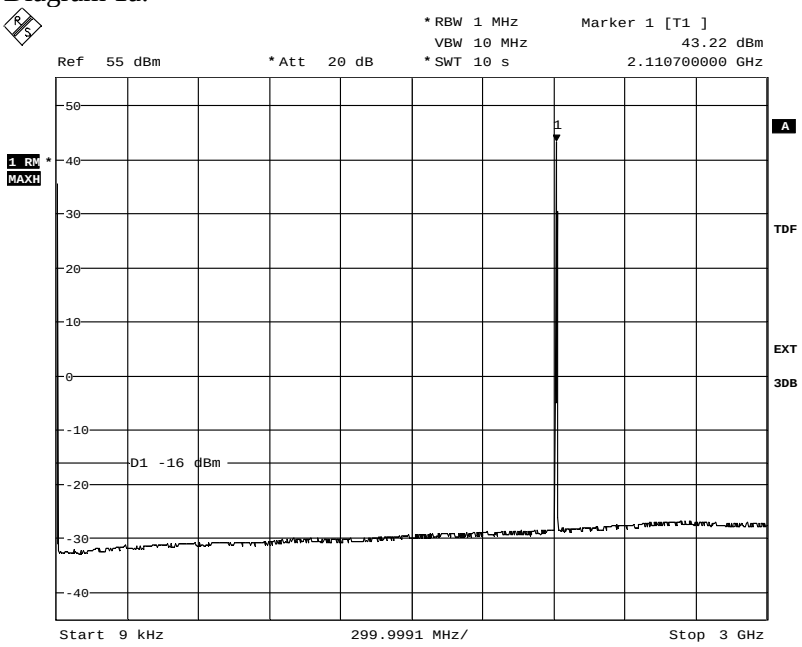
Outside a licensee's frequency band(s) of operation the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, resulting in a limit of -13 dBm per 1 MHz RBW.

Complies?	Yes

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

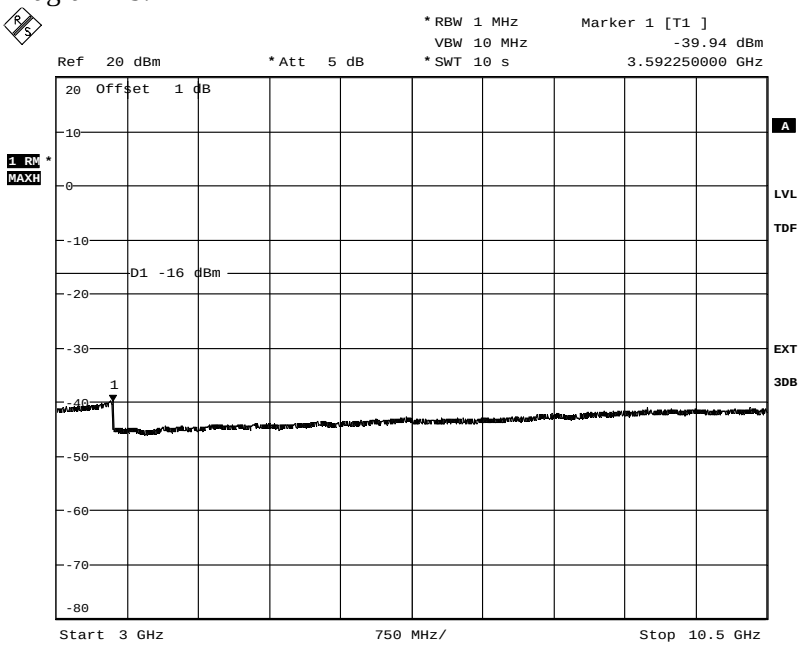
Appendix 5

Diagram 1a:



Date: 11.JUN.2012 18:58:57

Diagram 1b:

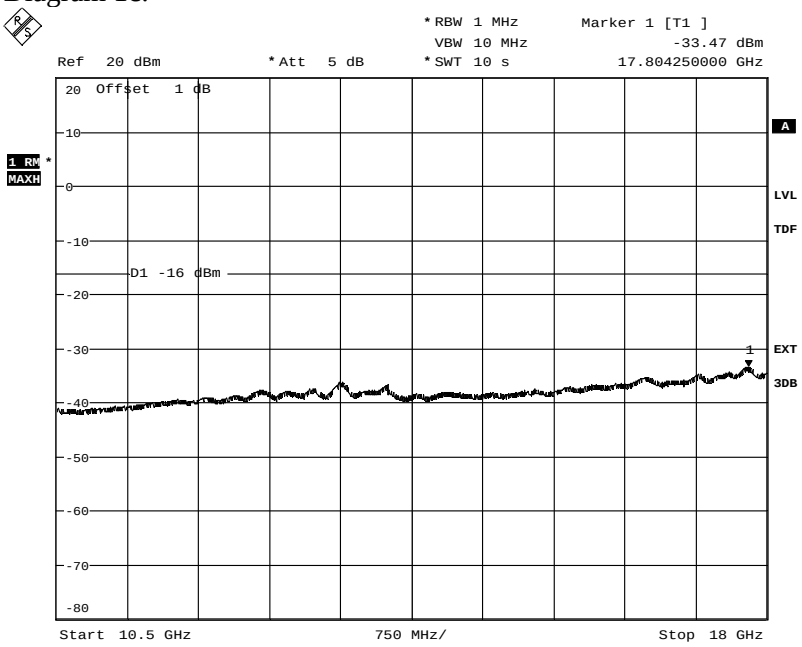


Date: 11.JUN.2012 19:00:54

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

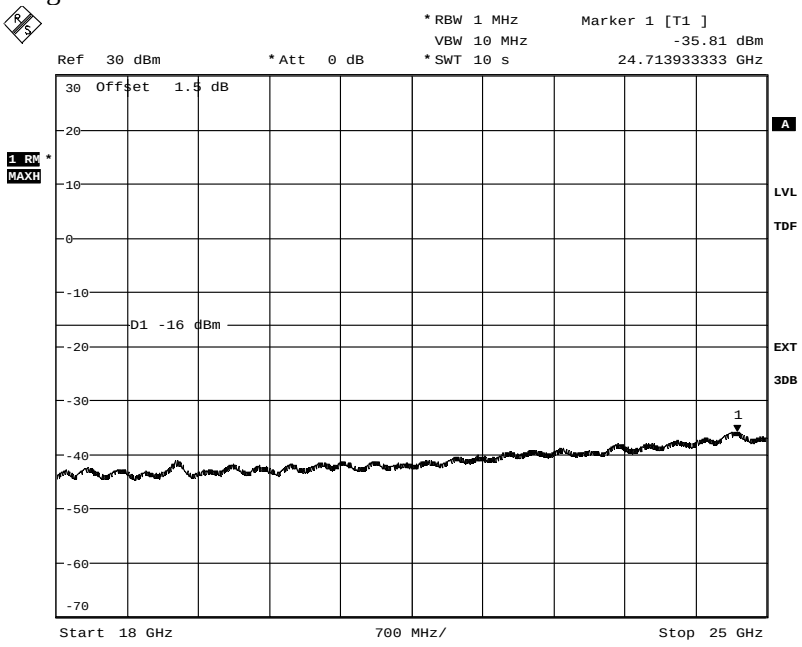
Appendix 5

Diagram 1c:



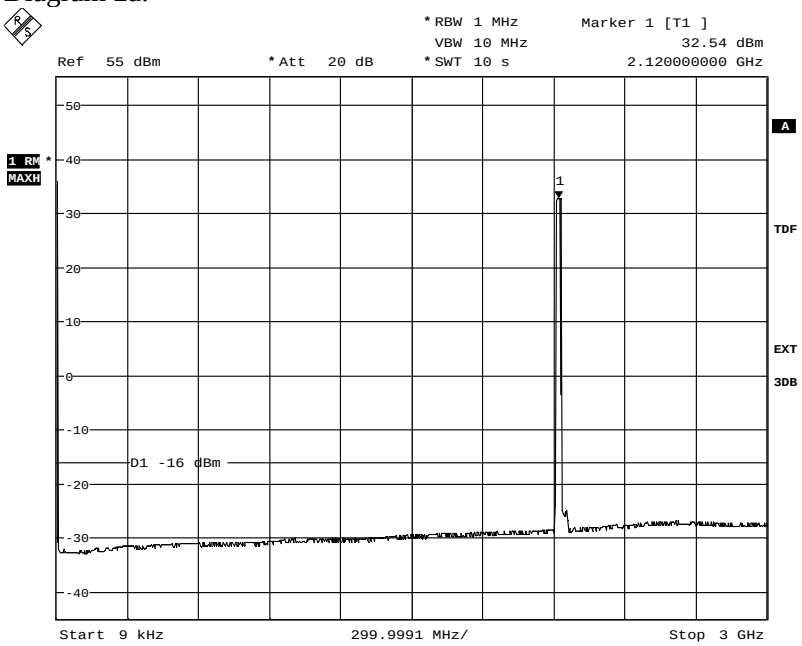
Date: 11.JUN.2012 19:02:07

Diagram 1d:



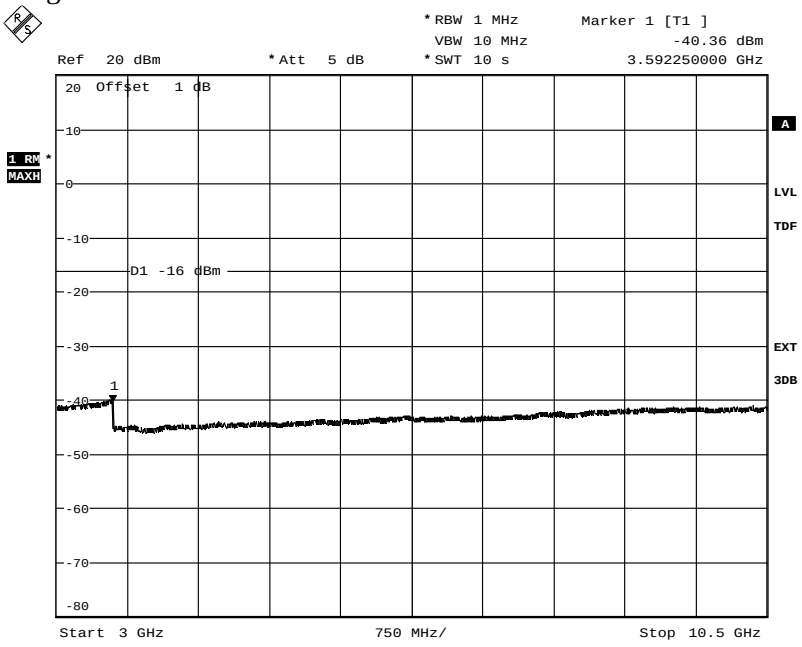
Date: 11.JUN.2012 19:36:40

Diagram 2a:



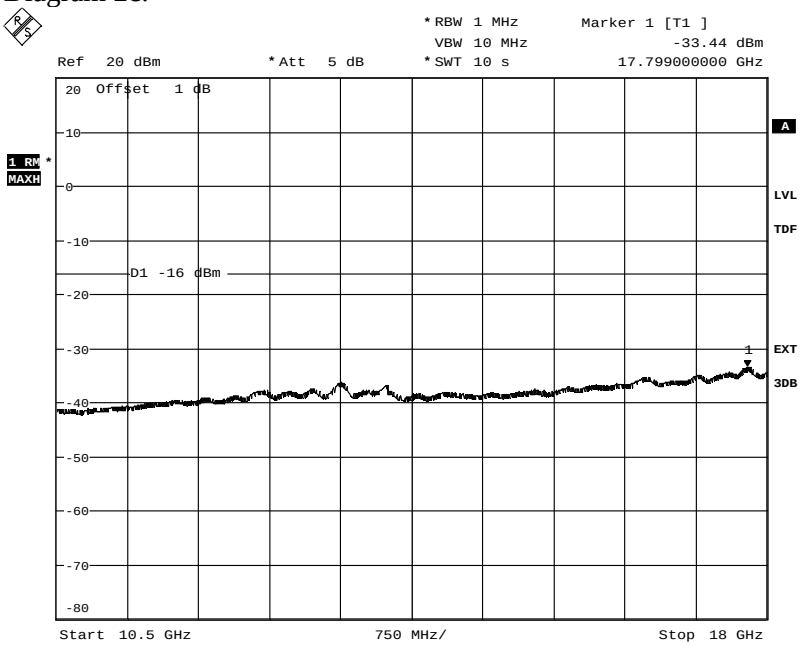
Date: 11.JUN.2012 14:17:12

Diagram 2b:



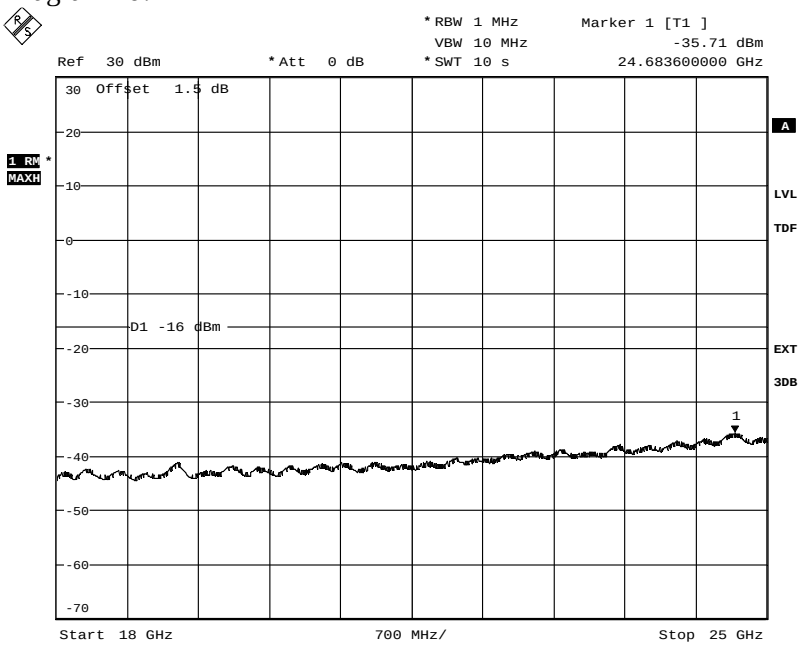
Date: 11.JUN.2012 14:20:45

Diagram 2c:



Date: 11.JUN.2012 14:23:33

Diagram 2d:

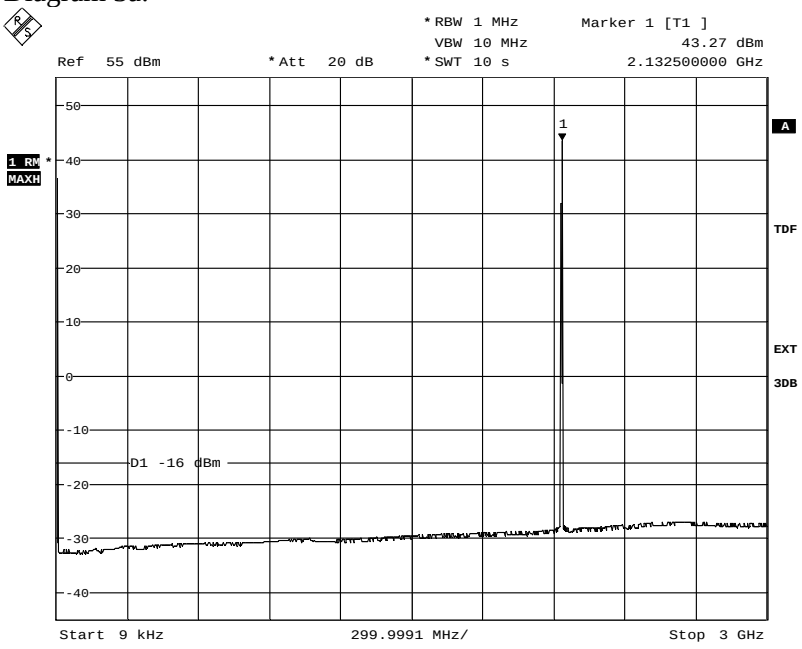


Date: 11.JUN.2012 16:21:45

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

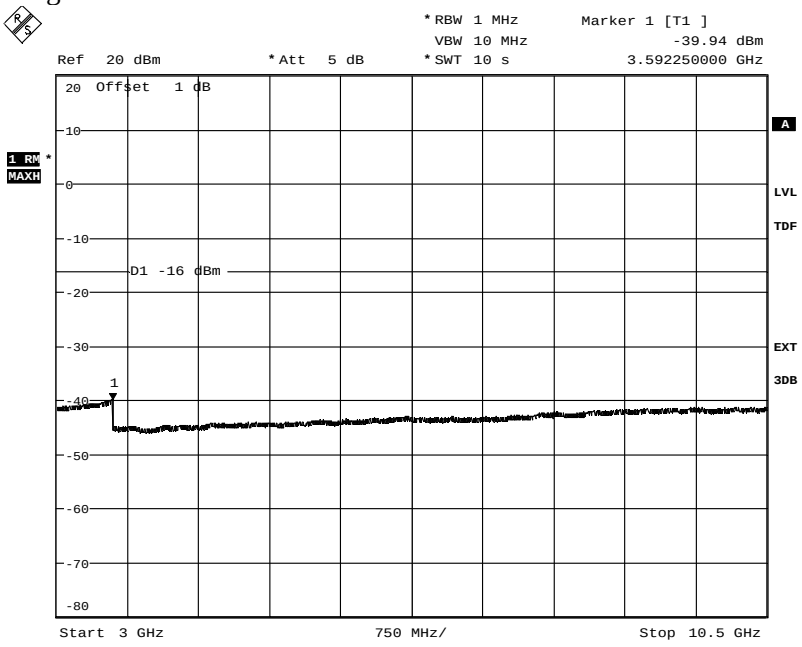
Appendix 5

Diagram 3a:



Date: 11.JUN.2012 12:01:43

Diagram 3b:

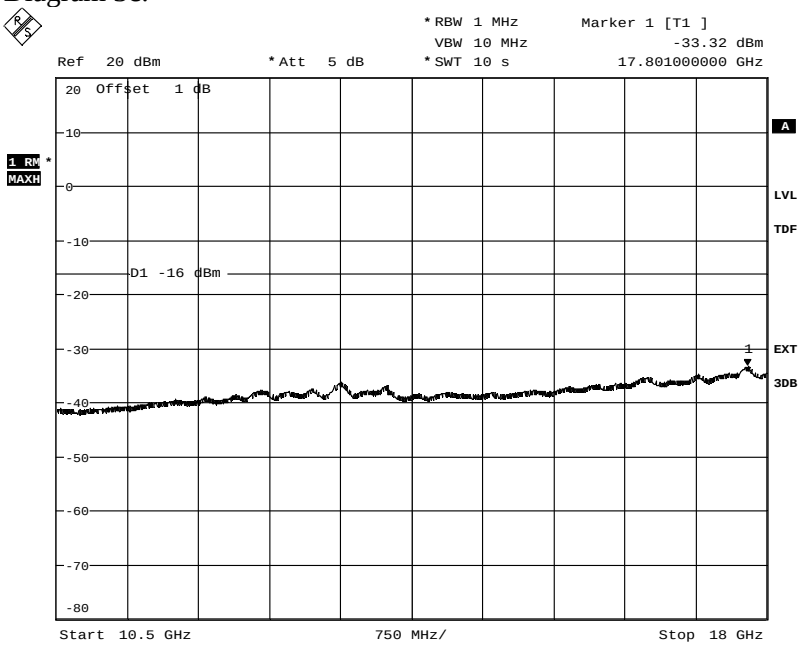


Date: 11.JUN.2012 12:03:40

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

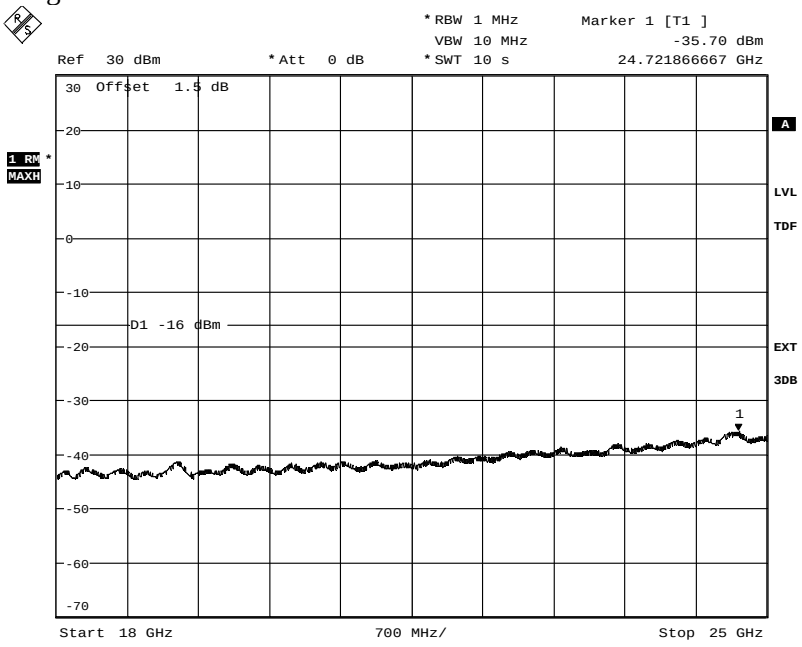
Appendix 5

Diagram 3c:



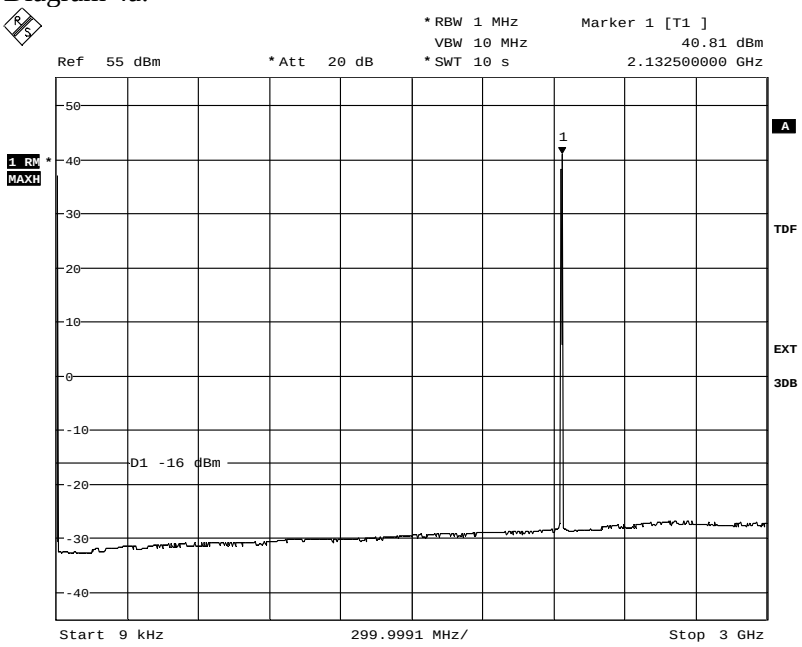
Date: 11.JUN.2012 12:05:08

Diagram 3d:



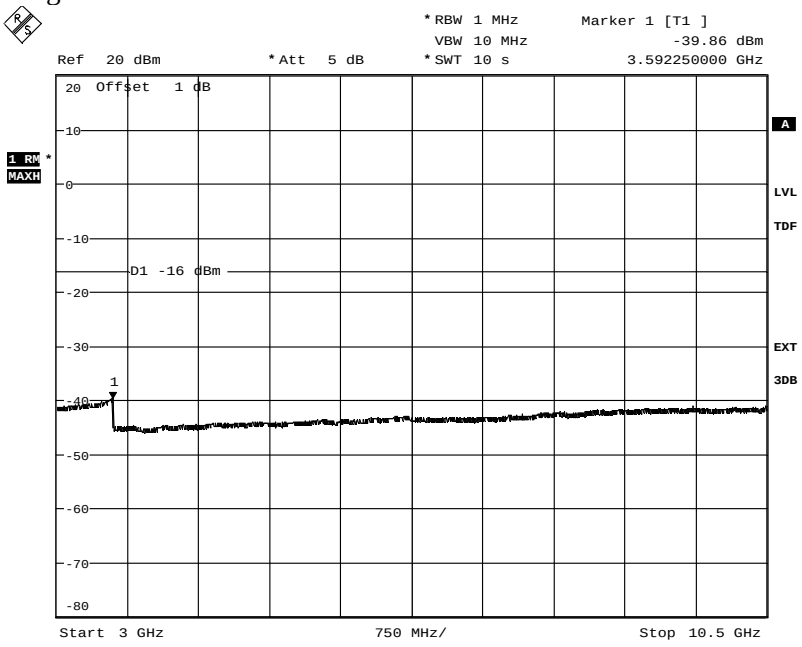
Date: 11.JUN.2012 12:07:38

Diagram 4a:



Date: 11.JUN.2012 11:00:32

Diagram 4b:

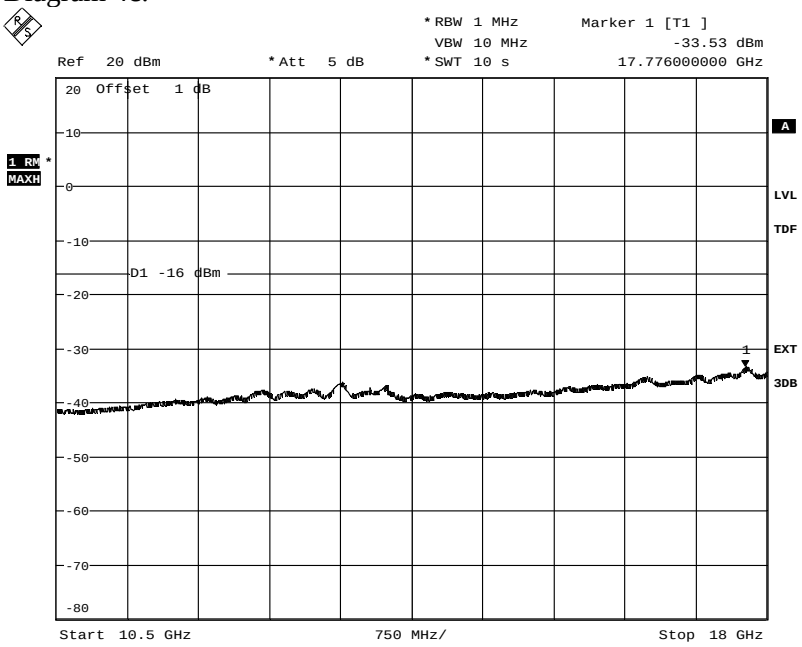


Date: 11.JUN.2012 11:02:14

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

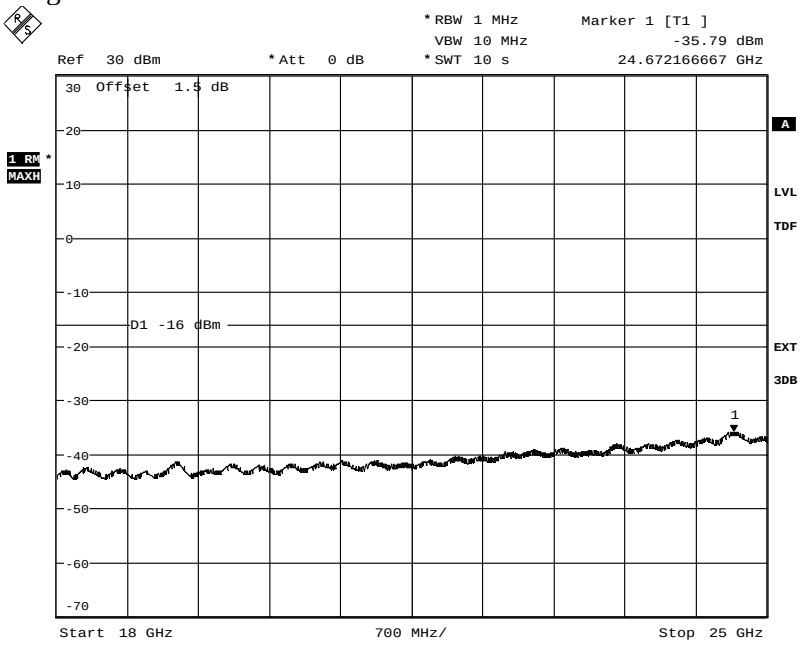
Appendix 5

Diagram 4c:



Date: 11.JUN.2012 11:03:38

Diagram 4d:

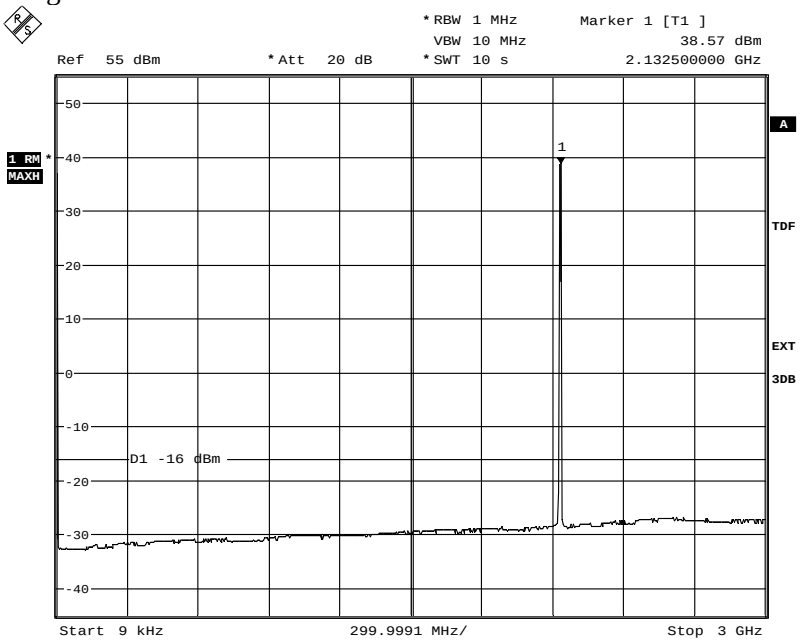


Date: 11.JUN.2012 11:05:53

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

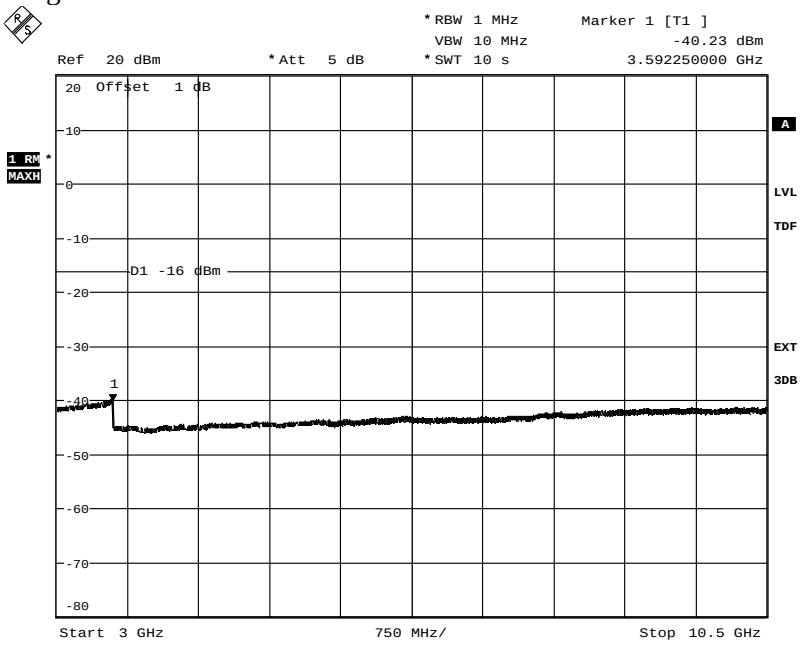
Appendix 5

Diagram 5a:



Date: 11.JUN.2012 10:32:51

Diagram 5b:

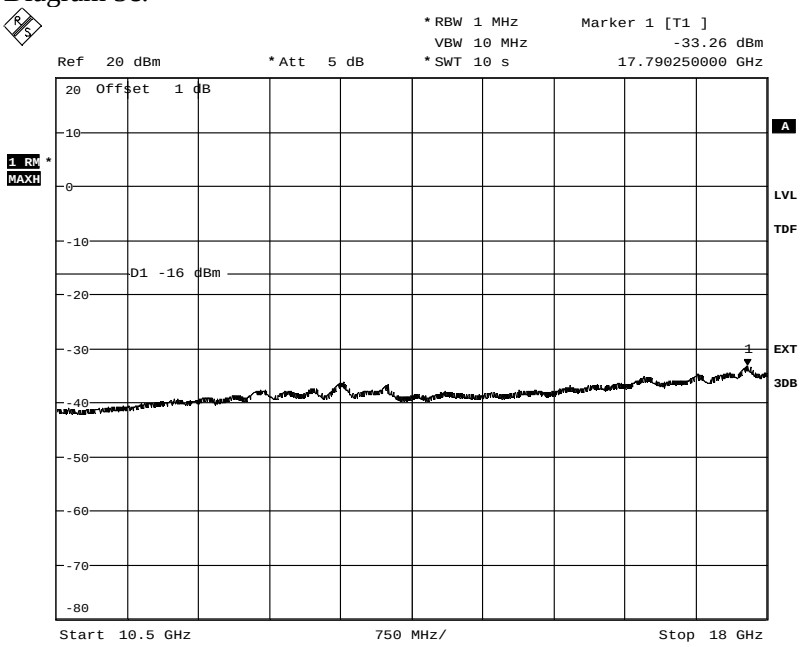


Date: 11.JUN.2012 10:41:20

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

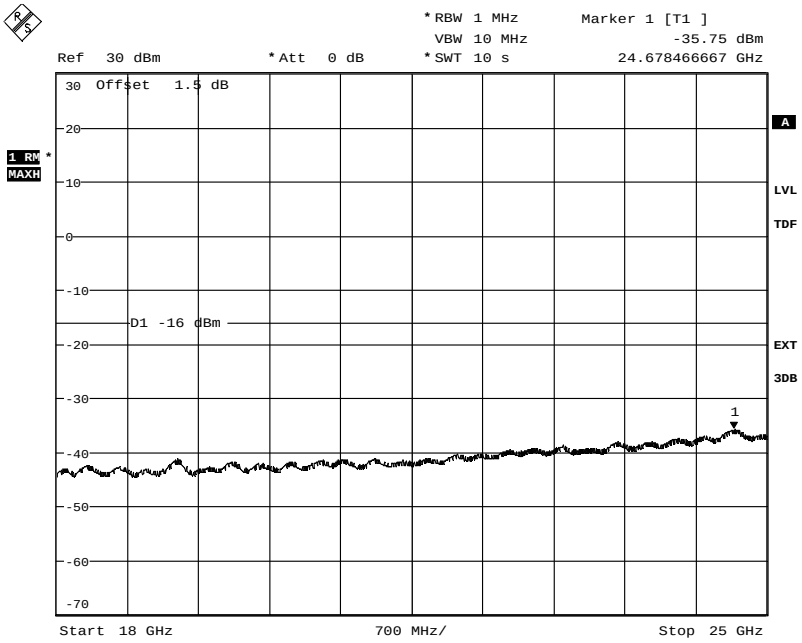
Appendix 5

Diagram 5c:



Date: 11.JUN.2012 10:43:01

Diagram 5d:

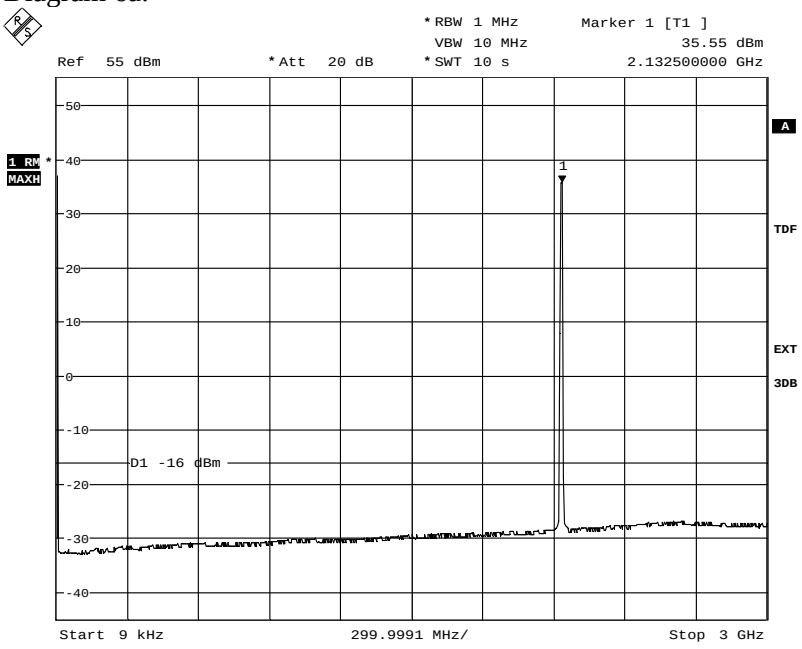


Date: 11.JUN.2012 10:46:16

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

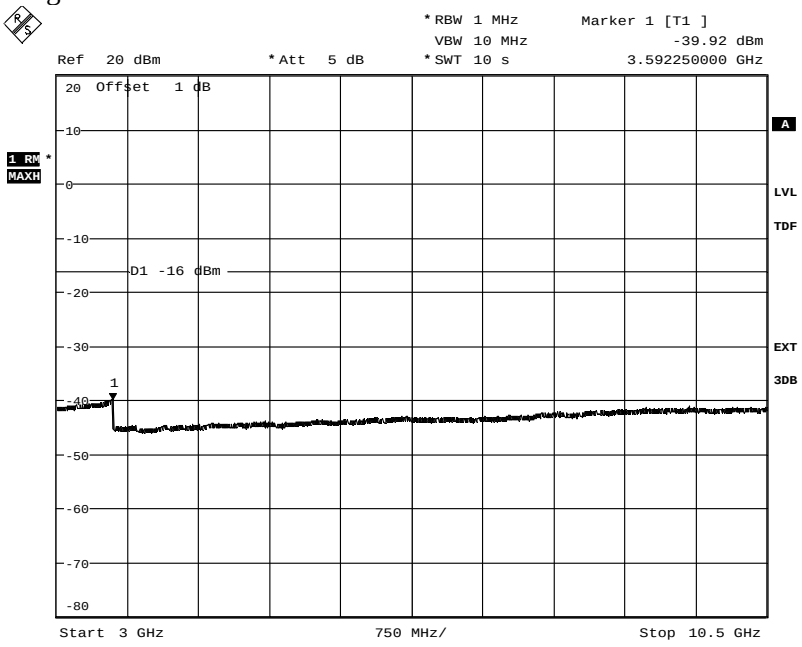
Appendix 5

Diagram 6a:



Date: 11.JUN.2012 12:16:56

Diagram 6b:

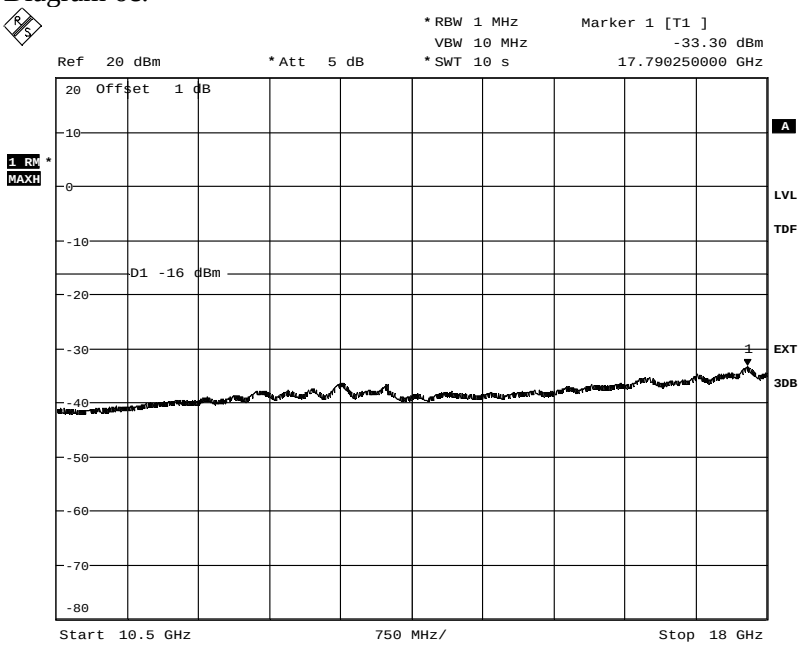


Date: 11.JUN.2012 12:18:38

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

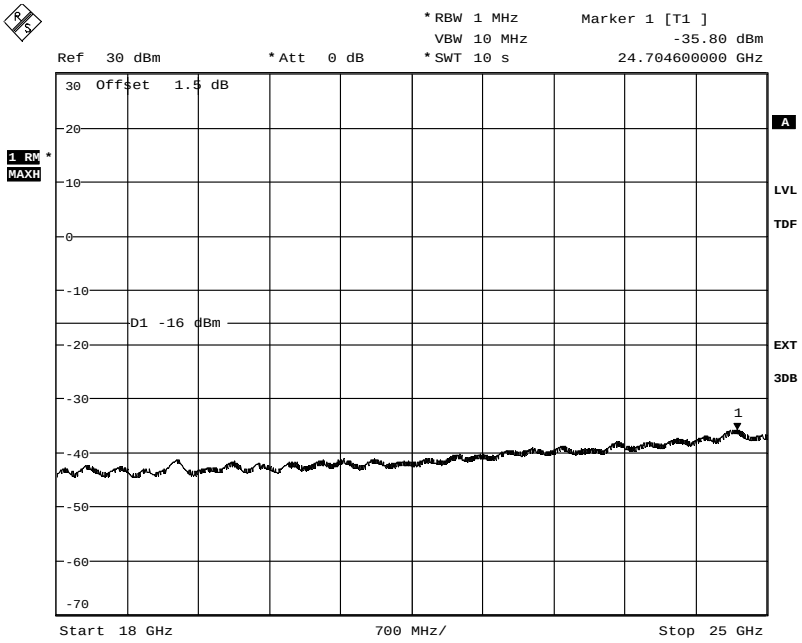
Appendix 5

Diagram 6c:



Date: 11.JUN.2012 12:19:42

Diagram 6d:

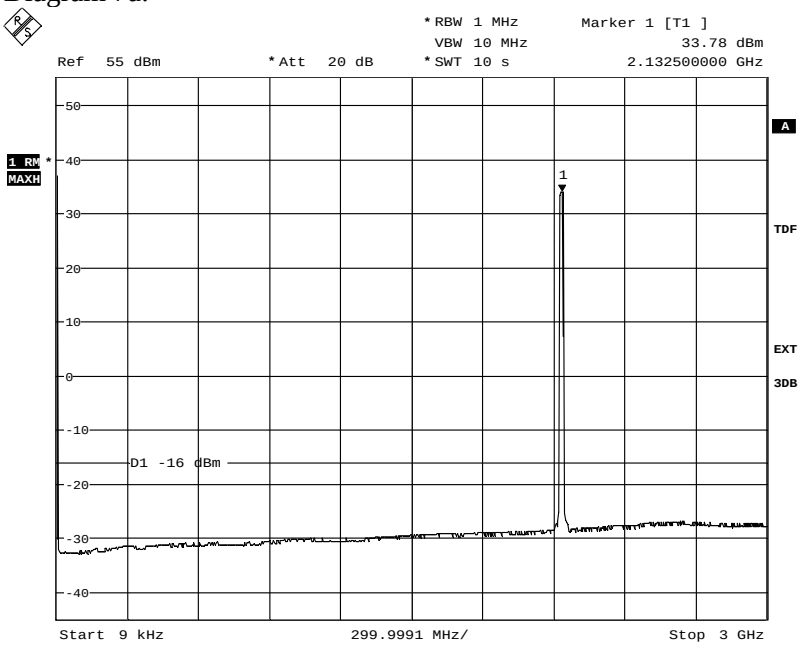


Date: 11.JUN.2012 12:21:50

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

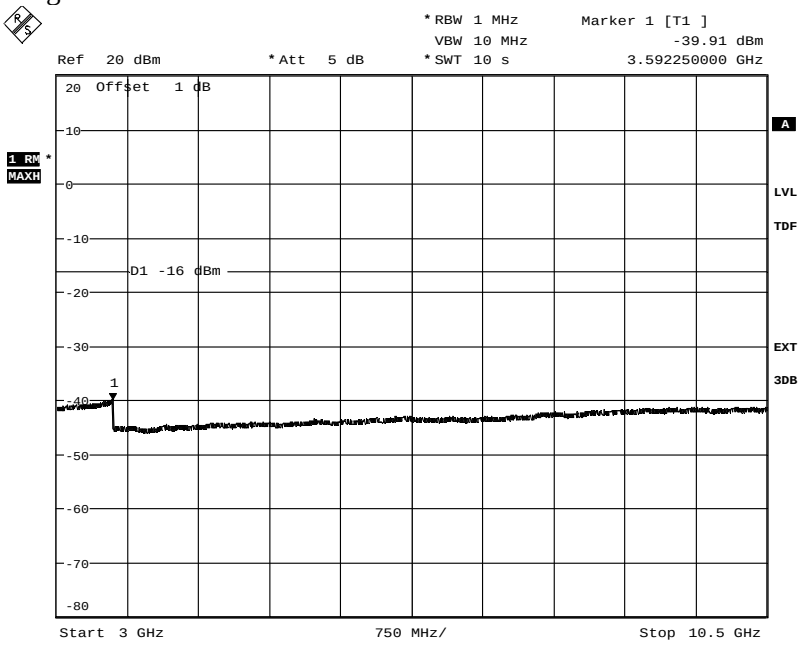
Appendix 5

Diagram 7a:



Date: 11.JUN.2012 12:31:51

Diagram 7b:

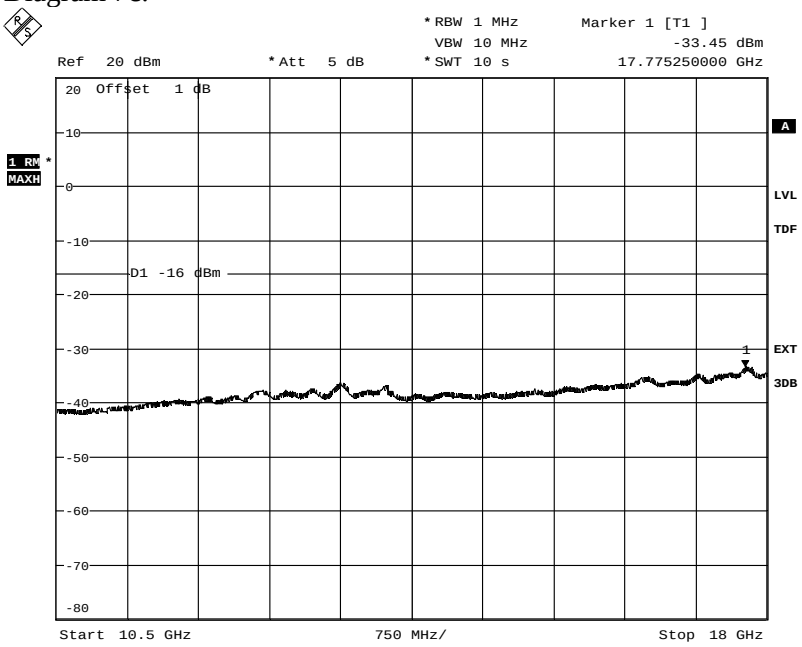


Date: 11.JUN.2012 12:33:37

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

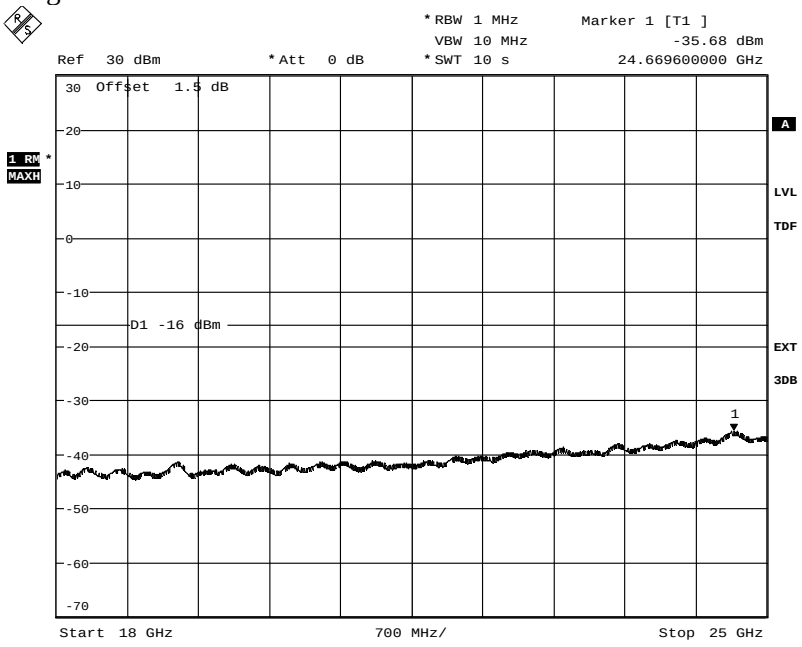
Appendix 5

Diagram 7c:



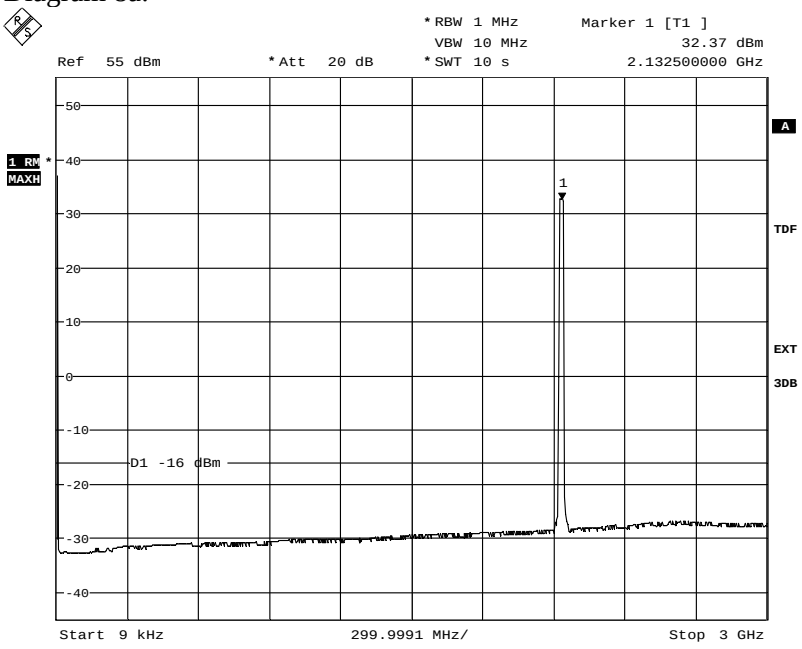
Date: 11.JUN.2012 12:34:36

Diagram 7d:



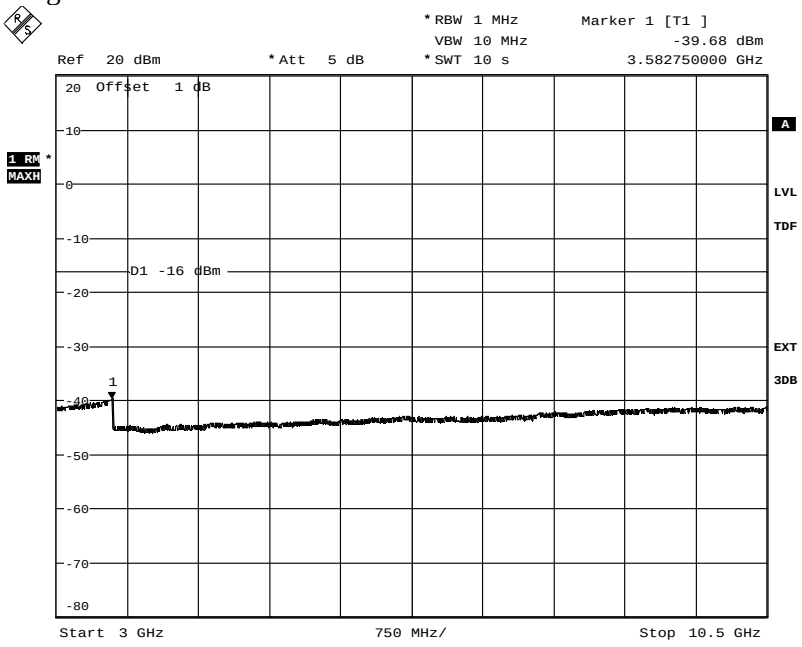
Date: 11.JUN.2012 12:25:16

Diagram 8a:



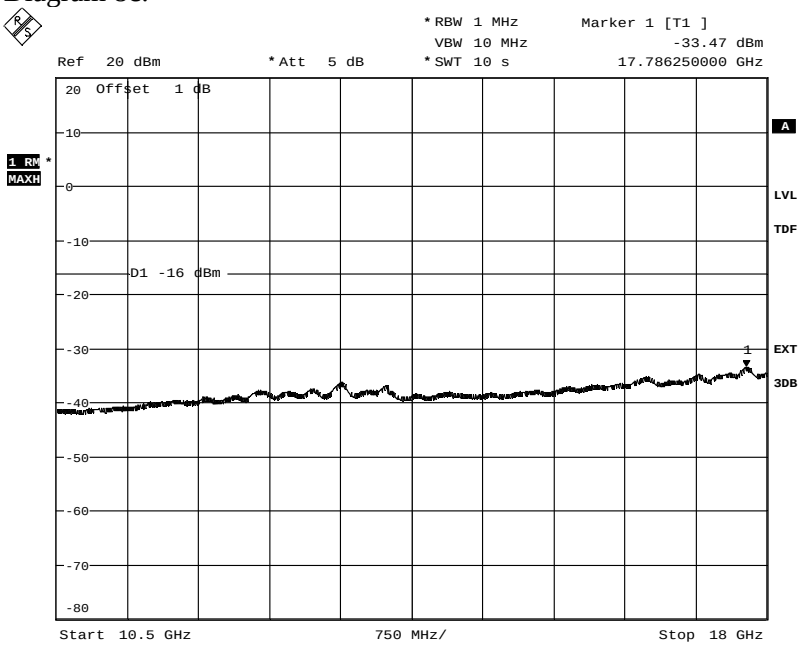
Date: 11.JUN.2012 12:41:48

Diagram 8b:



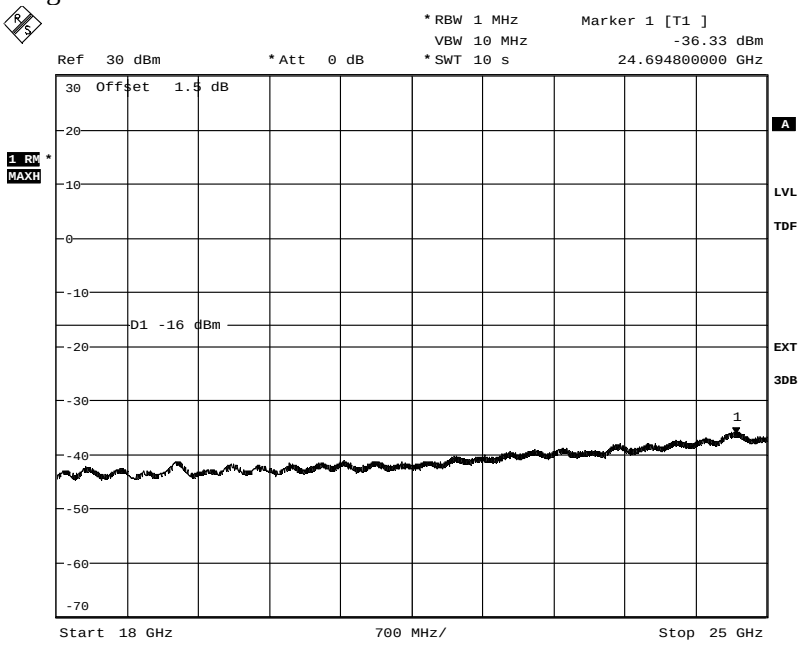
Date: 11.JUN.2012 12:40:25

Diagram 8c:



Date: 11.JUN.2012 12:39:33

Diagram 8d:

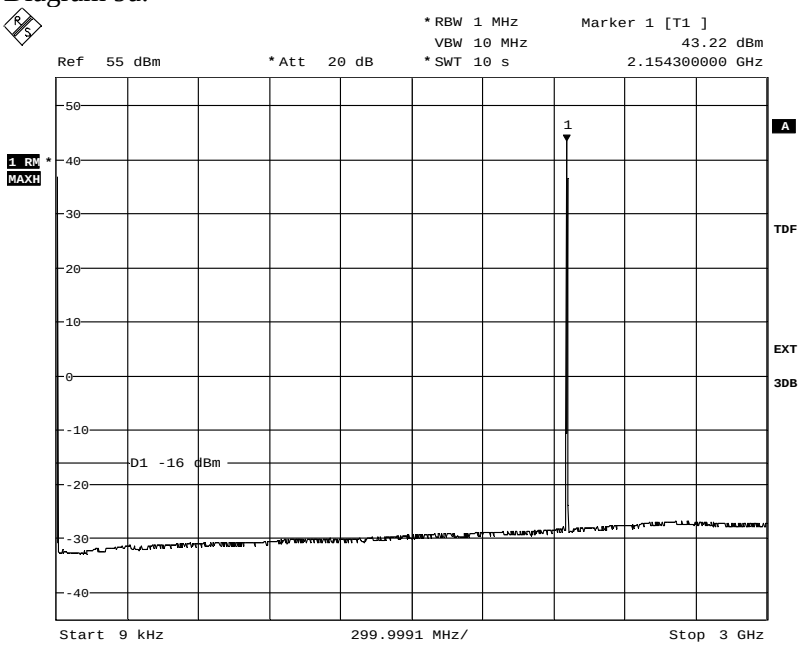


Date: 11.JUN.2012 12:49:25

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

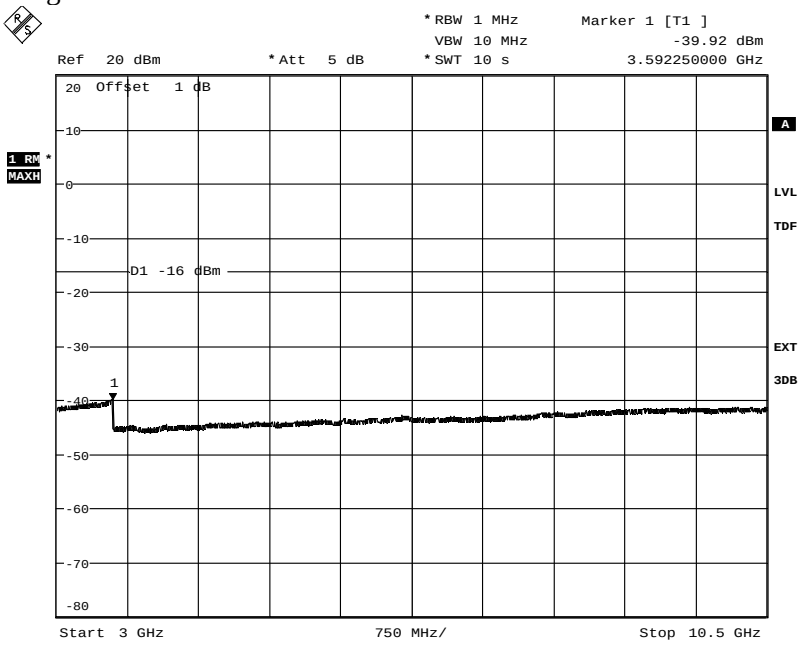
Appendix 5

Diagram 9a:



Date: 11.JUN.2012 19:12:01

Diagram 9b:

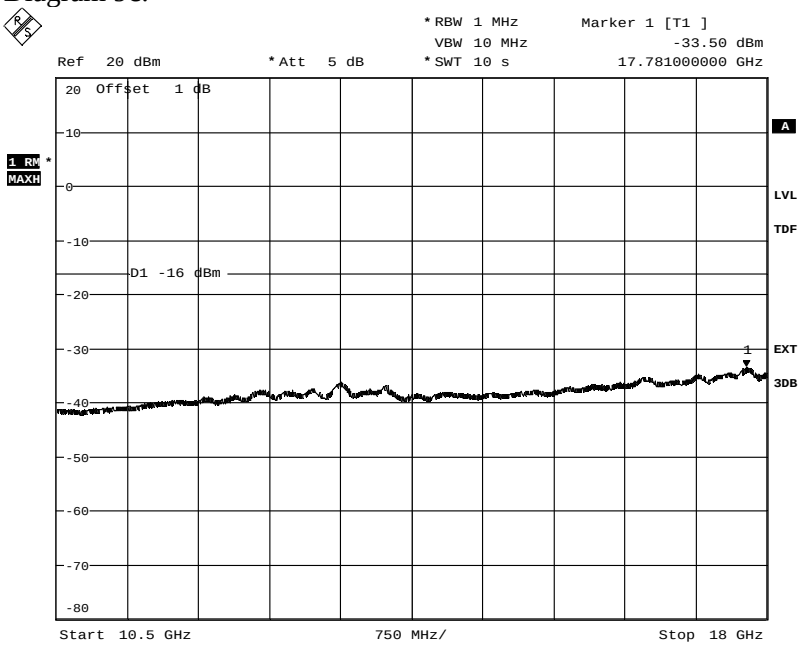


Date: 11.JUN.2012 19:10:08

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

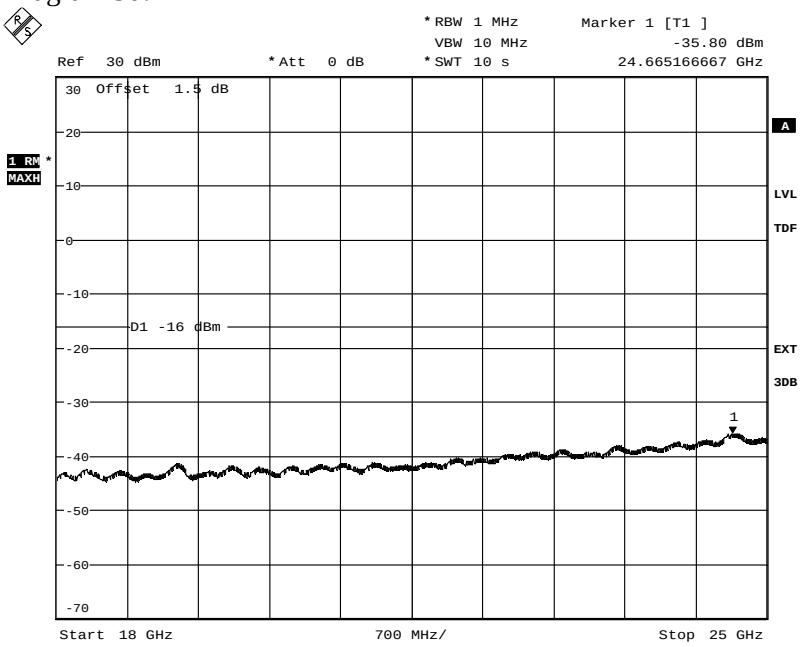
Appendix 5

Diagram 9c:



Date: 11.JUN.2012 19:08:52

Diagram 9d:

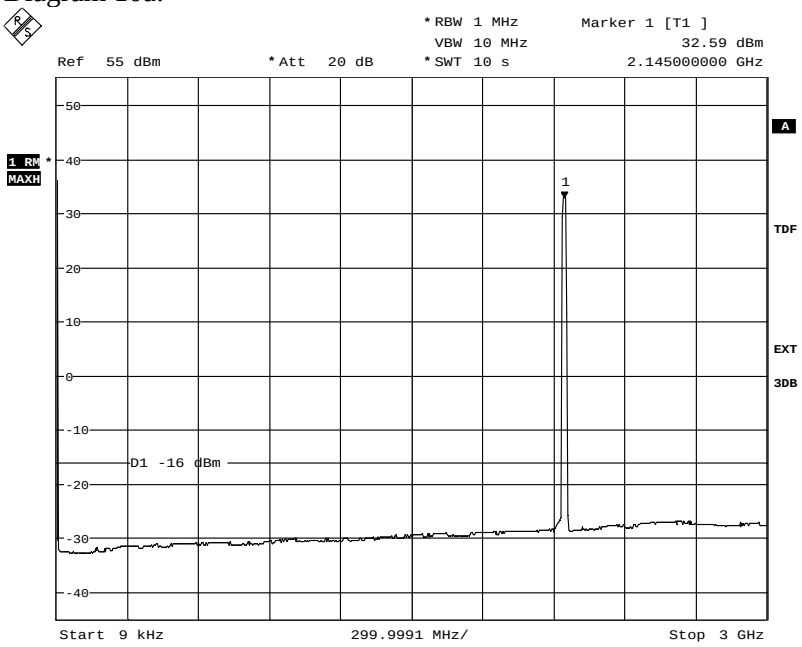


Date: 11.JUN.2012 19:33:06

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

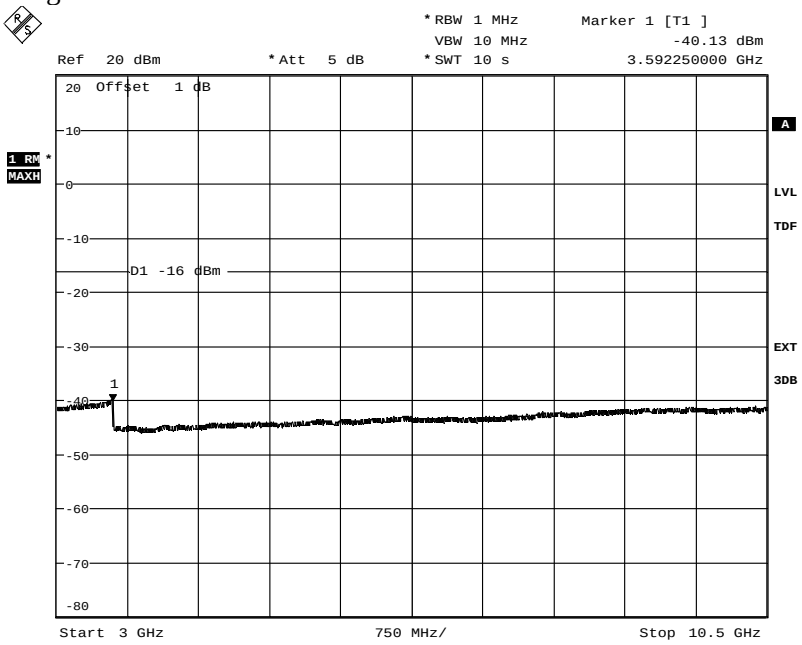
Appendix 5

Diagram 10a:



Date: 11.JUN.2012 13:07:00

Diagram 10b:

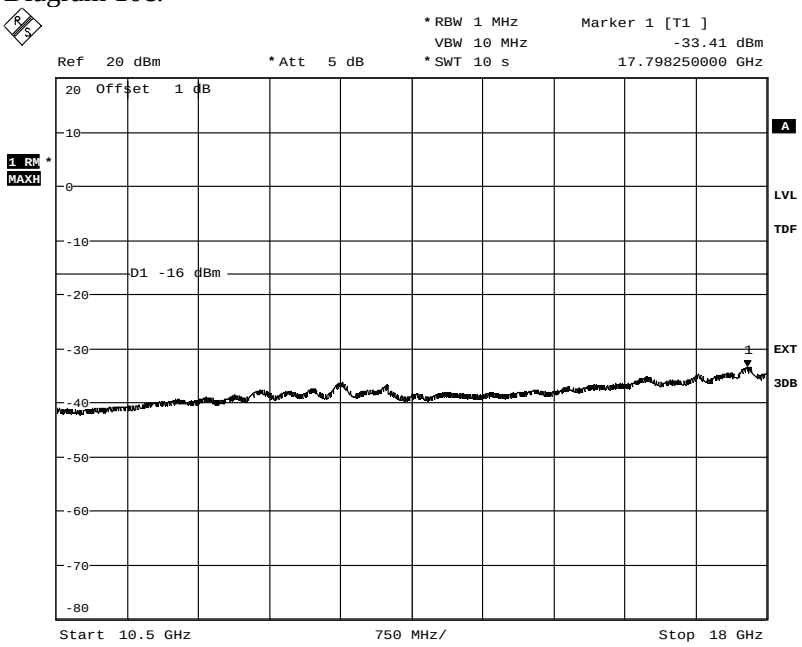


Date: 11.JUN.2012 13:09:38

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

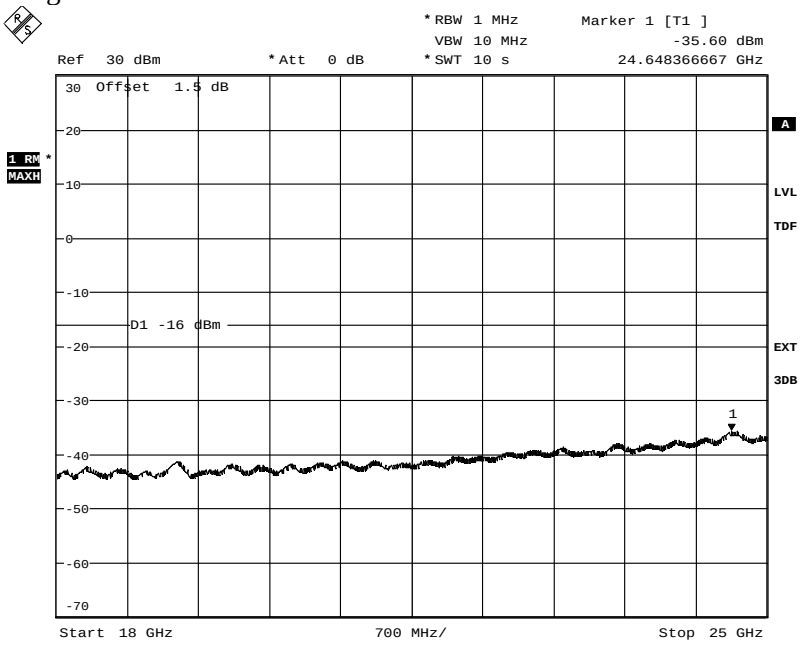
Appendix 5

Diagram 10c:



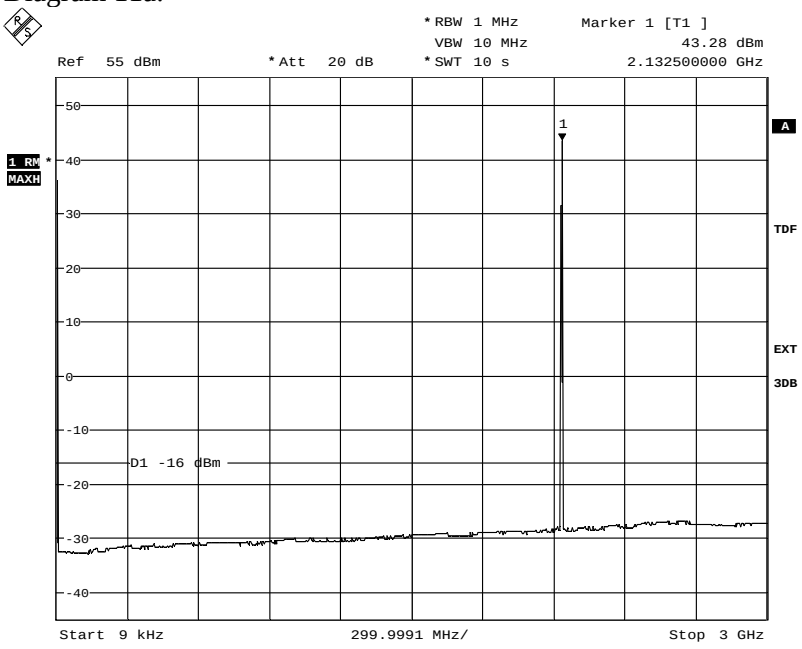
Date: 11.JUN.2012 13:10:45

Diagram 10d:



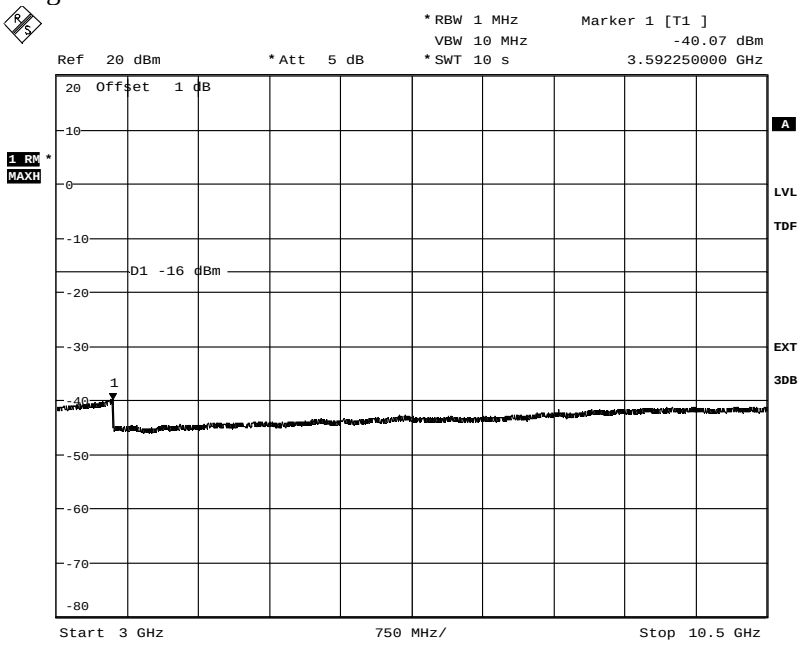
Date: 11.JUN.2012 16:50:02

Diagram 11a:



Date: 12.JUN.2012 10:52:59

Diagram 11b:

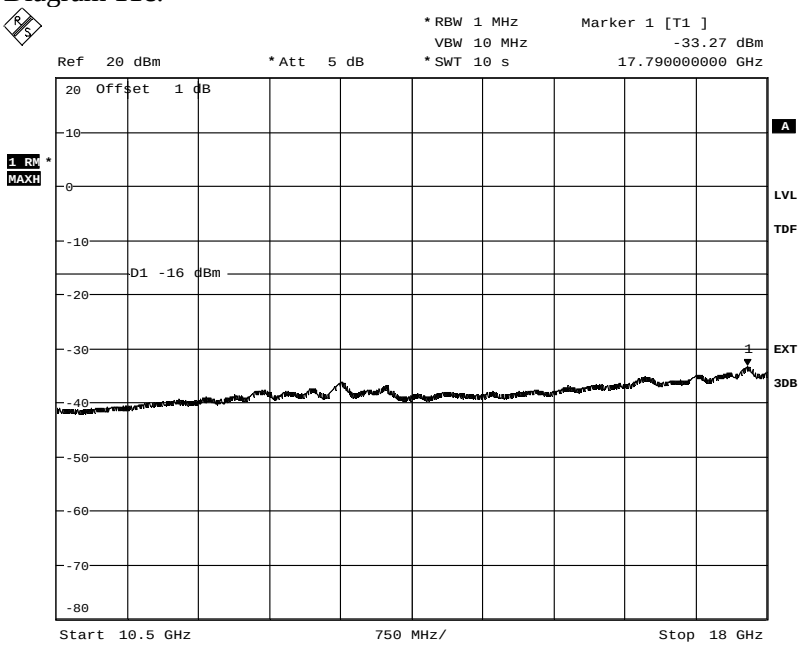


Date: 12.JUN.2012 10:54:44

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

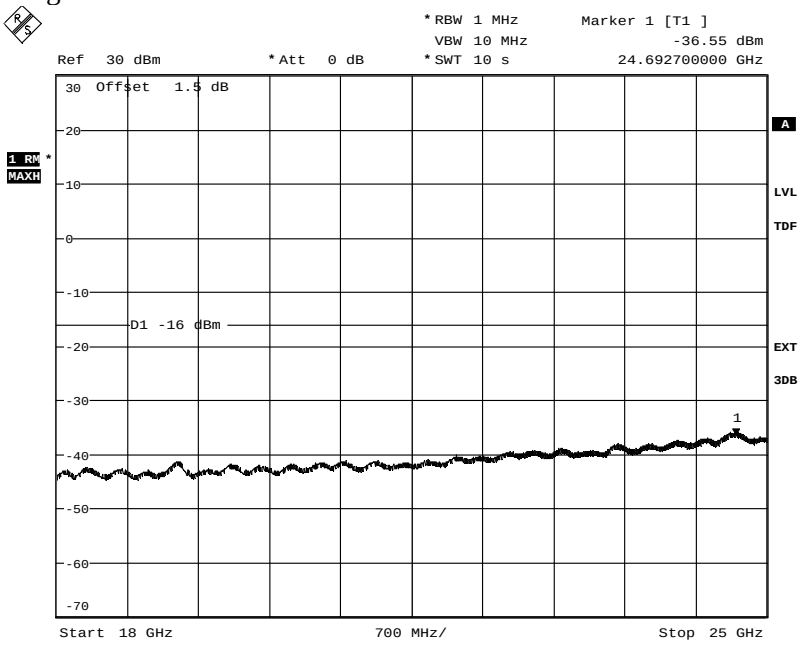
Appendix 5

Diagram 11c:



Date: 12.JUN.2012 10:56:09

Diagram 11d:

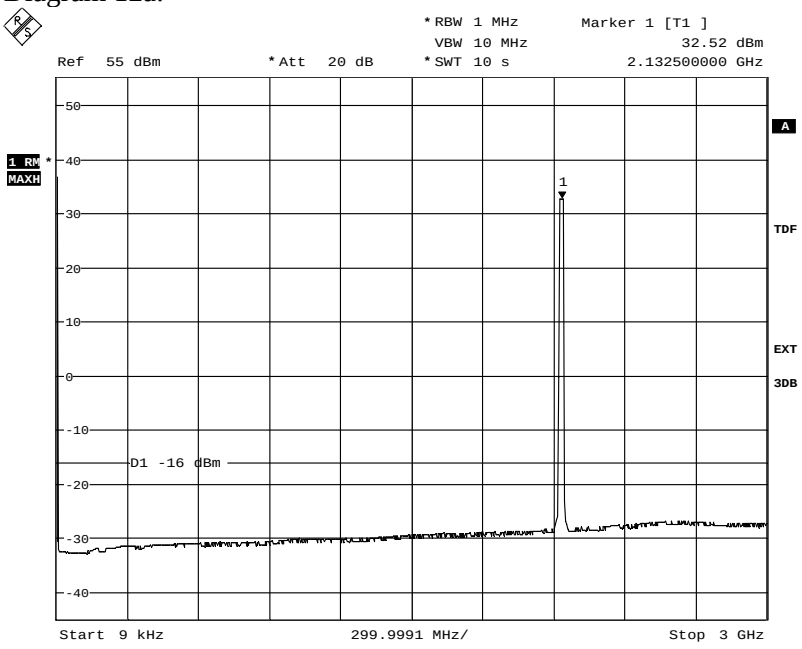


Date: 12.JUN.2012 11:26:28

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

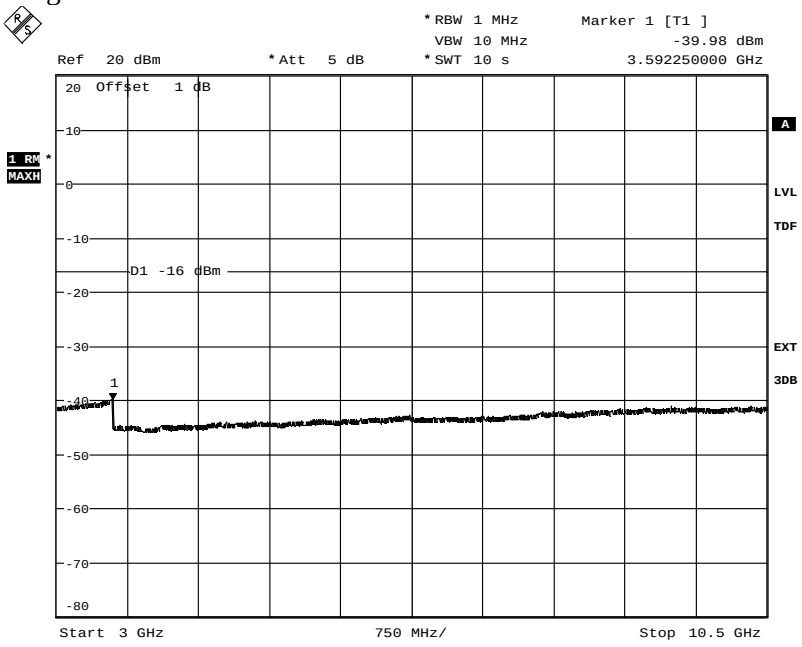
Appendix 5

Diagram 12a:



Date: 12.JUN.2012 11:05:09

Diagram 12b:

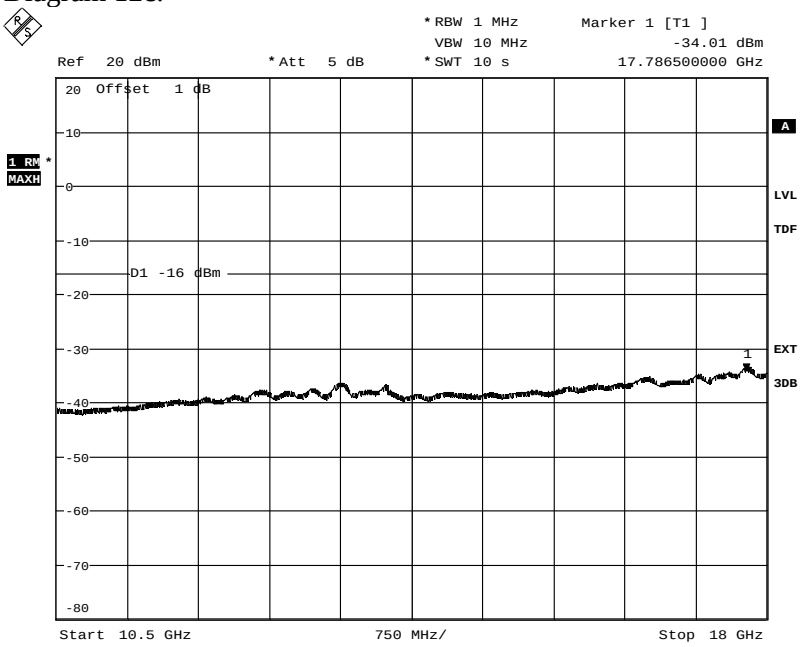


Date: 12.JUN.2012 11:03:22

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

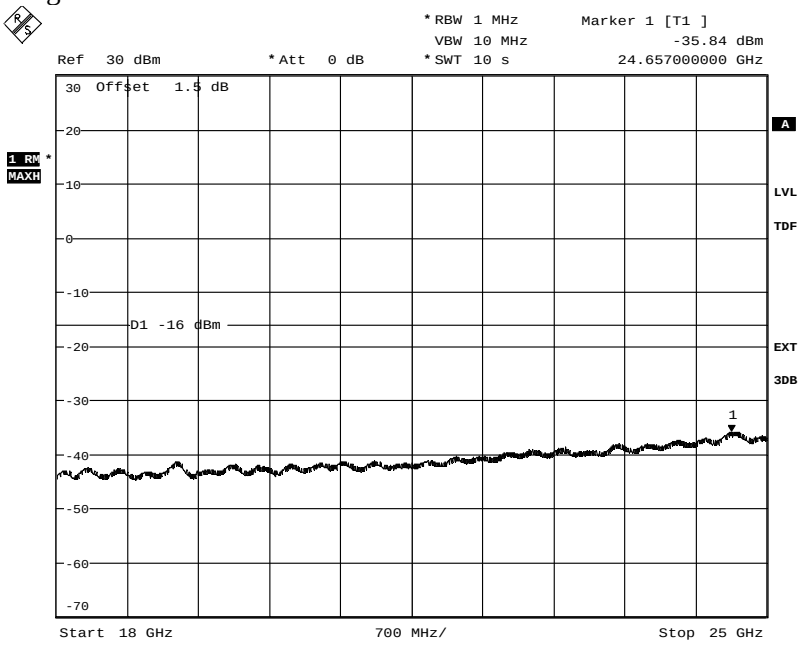
Appendix 5

Diagram 12c:



Date: 12.JUN.2012 11:02:01

Diagram 12d:



Date: 12.JUN.2012 11:21:18

Field strength of spurious radiation measurements according to CFR 47 §27.53(h) / IC RSS-139 6.5

Date	Temperature	Humidity
2012-05-28	23°C ± 3°C	50 % ± 5 %
2012-05-29	22°C ± 3°C	22 % ± 5 %
2012-05-30	22°C ± 3°C	22 % ± 5 %

Test set-up and procedure

The test sites are listed at FCC, Columbia with registration number: 93866. The test site complies with RSS-Gen, Industry Canada file no. 3482A-1.

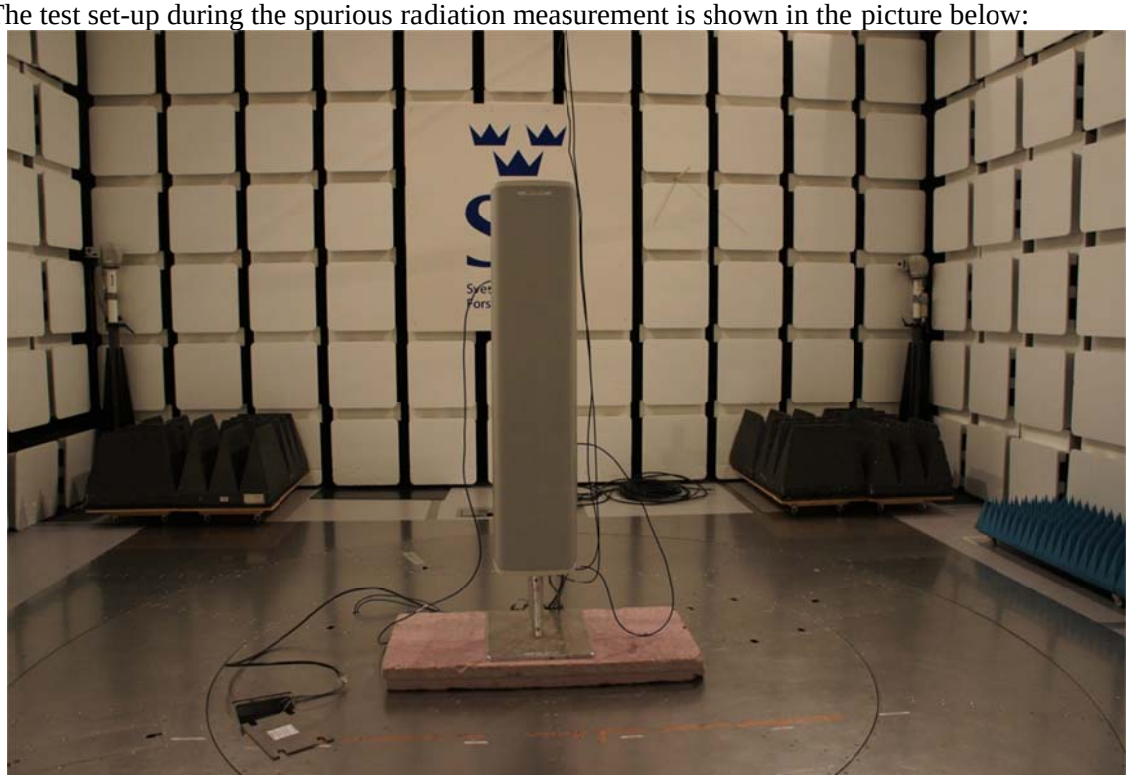
The measurements were performed with both horizontal and vertical polarization of the antenna. The antenna distance was 3 m in the frequency range 30 MHz – 18 GHz and 1m in the frequency range 18 - 25 GHz.

In the frequency range 30 MHz - 25 GHz the measurement was performed in power with a RBW of 1 MHz. A propagation loss in free space was calculated. The used formula was $\gamma = 20\log\left(\frac{4\pi D}{\lambda}\right)$, γ is the propagation loss and D is the antenna distance.

The measurement procedure was as the following:

1. The pre-measurement was first performed with peak detector. The EUT was measured in eight directions and with the antenna at three heights, 1.0 m, 1.5 m and 2.0 m.
2. Spurious radiation on frequencies closer than 20 dB to the limit in the pre-measurement is scanned 0-360 degrees and the antenna is scanned 1- 4 m for maximum response. The emission is then measured with the RMS detector and the RMS value is reported. Frequencies closer than 10 dB to the limit when measured with the RMS detector were measured with the substitution method according to the standard.

The test set-up during the spurious radiation measurement is shown in the picture below:



Measurement equipment

Measurement equipment	SP number
Test site Tesla	503 881
R&S ESI 26	503 292
Control computer	503 479
Software: R&S EMC32, ver. 8.20.1	503 745
Chase Bilog antenna CBL 6111A	503 182
µCorp Nordic, Low Noise Amplifier	504 160
Miteq, Low Noise Amplifier	503 285
EMCO Horn Antenna 3115	502 175
Standard gain antenna 20240-20	503 674
High pass filter, Wainright	504 200
High pass filter, RLC Electronics	503 739
Testo 635 temperature and humidity meter	504 203

Results, representing worst case

Diagram 1 a-d: 0.03-25 GHz, E-TM1.1, BW 1.4 MHz, M

Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
30-25 000	All emission > 20 dB below limit	All emission > 20 dB below limit

Measurement uncertainty:

3.2 dB up to 18 GHz, 3.6 dB above 18 GHz

Limits

§27.53(h) and RSS-139 6.5

Outside a licensee's frequency band(s) of operation the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, resulting in a limit of -13 dBm per 1 MHz RBW.

Complies?	Yes

Diagram 1a:

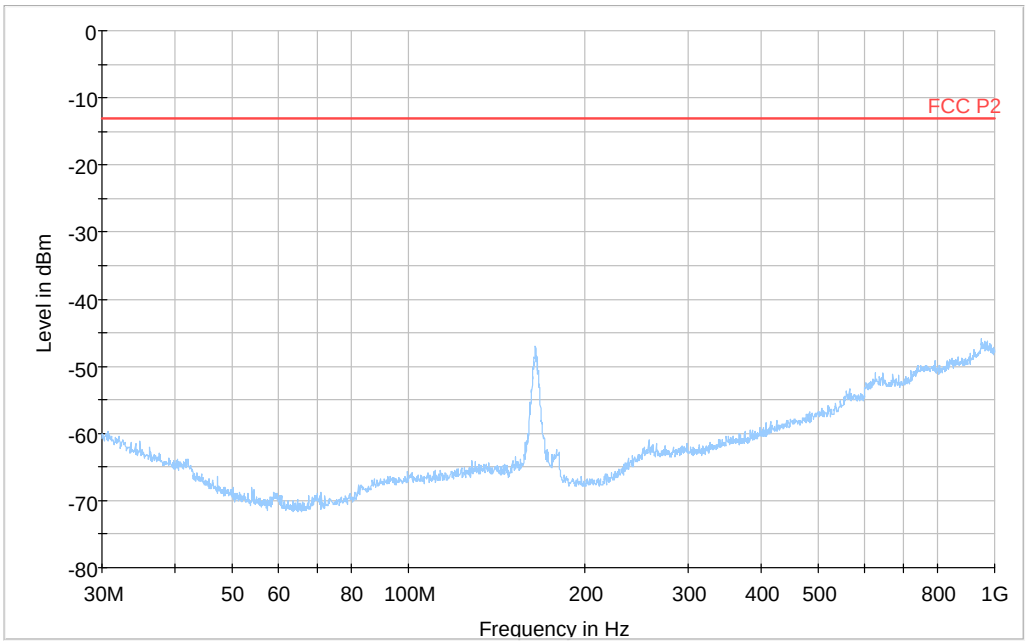


Diagram 1b:

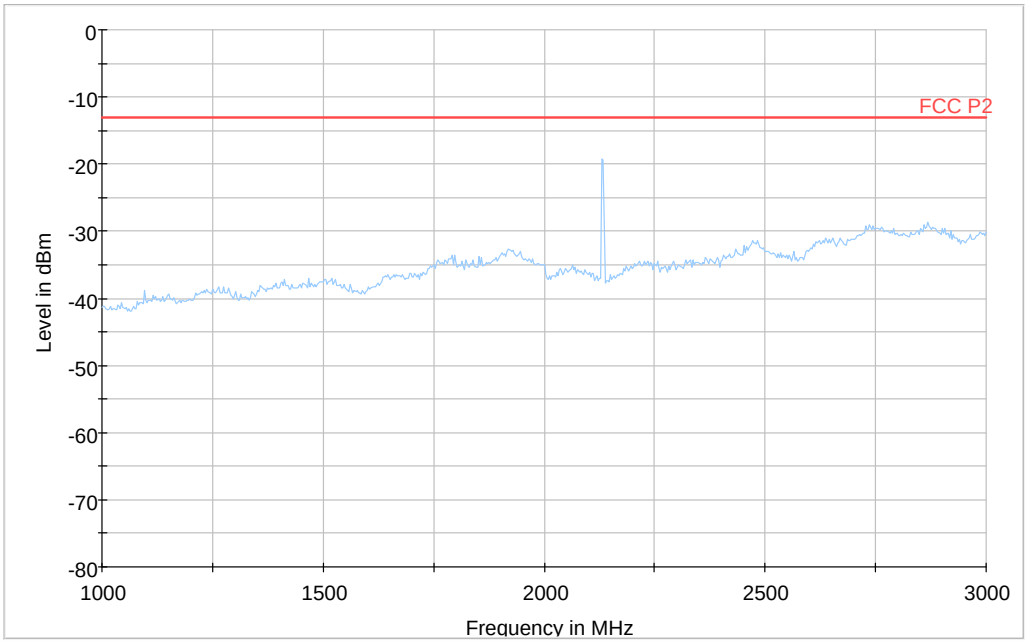


Diagram 1c:

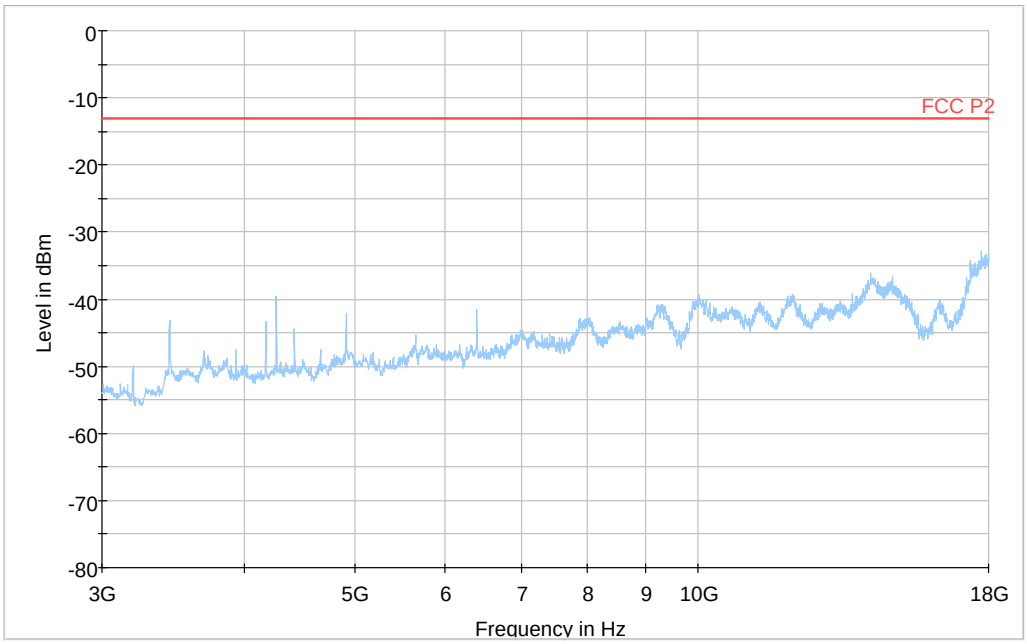
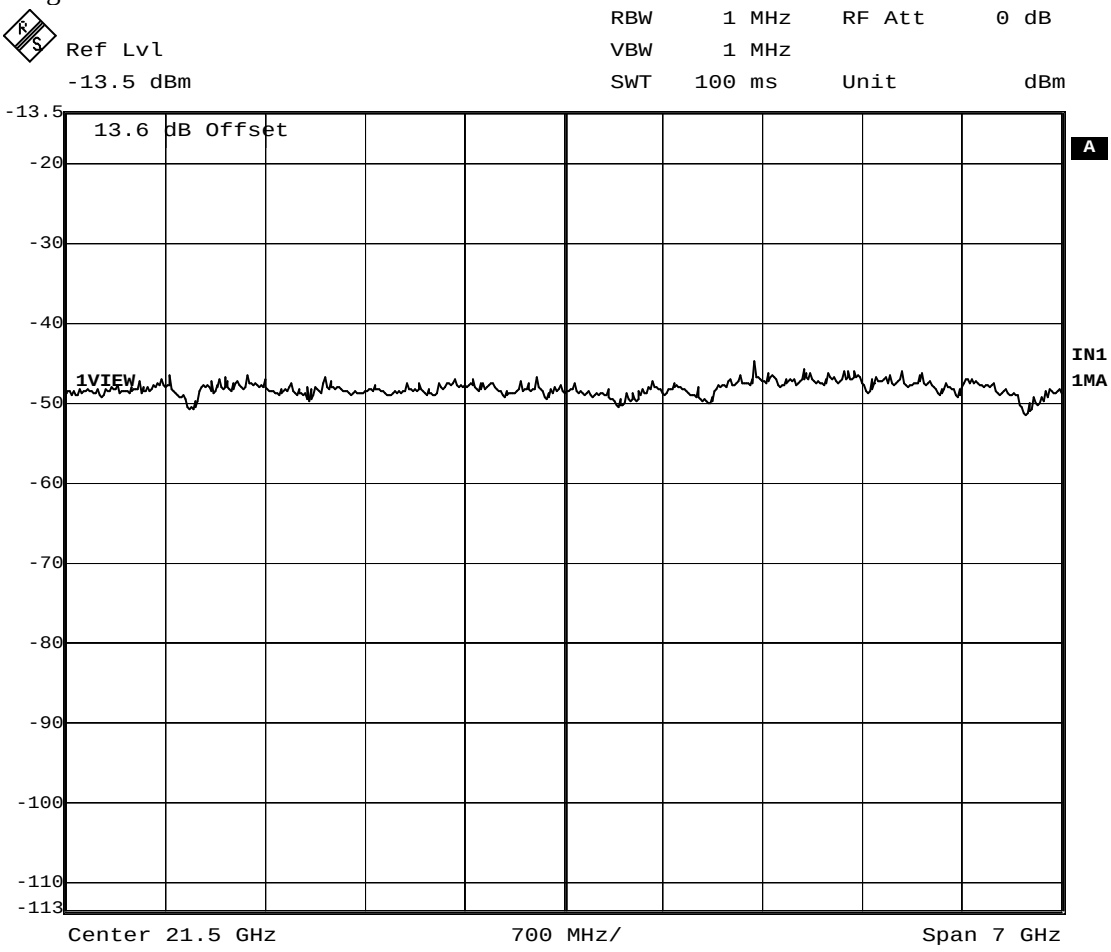


Diagram 1d:



FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 7

Frequency stability measurements according to CFR 47 §27.54 / IC RSS 139 6.3

Date	Temperature (test equipment)	Humidity (test equipment)
2012-06-08 to 2012-06-13	22-23°C ± 3 °C	36-47% ± 5 %

Test set-up and procedure

The measurement was made per 3GPP TS 36.141. The output was connected to a spectrum analyzer. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements.

Measurement equipment	SP number
Rohde & Schwarz signal analyzer FSQ40, EAB equipment	-
RF attenuator	503 870
Testo 635, Temperature and humidity meter	504 203
Temperature cabinet	503 360

Results

Nominal transmitter frequency was 2132.5 MHz in channel bandwidth configuration 5 MHz.
Rated output power level at connector RF A (maximum): 44.8 dBm (30 W).

Test conditions		Frequency error (Hz)
Supply voltage DC (V)	T (°C)	
-48.0	+20	-3
-55.2	+20	+6
-40.8	+20	-5
-48.0	+30	+16
-48.0	+40	+14
-48.0	+50	+6
-48.0	+10	-3
-48.0	0	-4
-48.0	-10	+4
-48.0	-20	-14
-48.0	-30	+25
Maximum freq. error (Hz)		25
Measurement uncertainty		$< \pm 1 \times 10^{-7}$

Remark

It was deemed sufficient to test one combination of TX frequency, channel bandwidth configuration and test model (modulation), as all combinations share a common internal reference to derive the TX frequency from.

Limits

According to 3GPP TS 36.141, section 6.5.1.5:
The frequency Error shall be within ±(0.05 PPM+12 Hz) (±110 Hz).

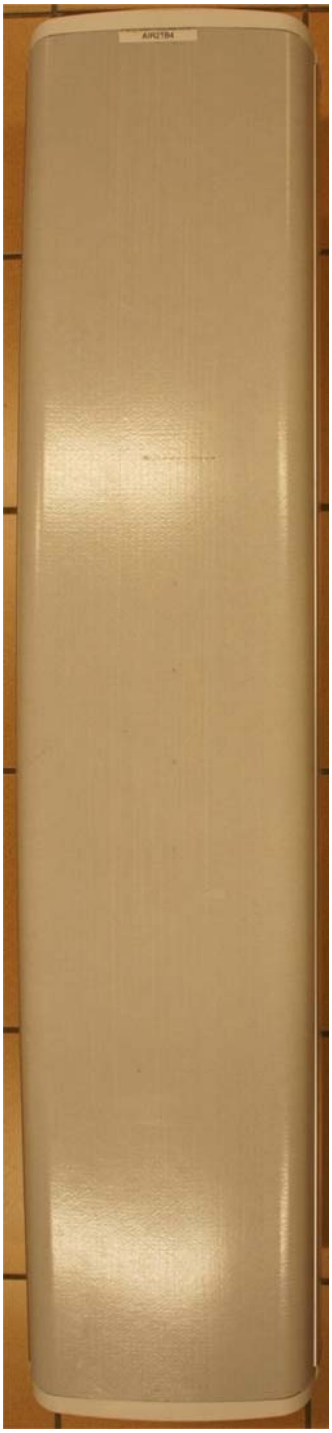
Complies?	Yes

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

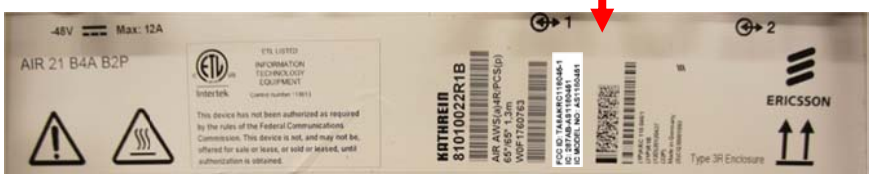
Appendix 8

External photos

Front side



Rear side



FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 8

Left side

Right side

FCC ID: TA8AKRC118046-1
IC: 287AB-AS1180461

Appendix 8

Top side

Bottom side