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Radio measurements on AIR 21 B2A/B4P 1900 MHz radio equipment with FCC ID: TA8AKRC118023-1 and IC: 287AB-AS1180231 (8 appendices)

Test object

AIR 21 B2A/B4P, KRC 118 023/1, revision R1C

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-133		
2.1046 / RSS-133 6.4 RF power output	Yes	2
2.1049 / RSS-Gen 4.6.1 Occupied bandwidth	Yes	3
2.1051 / RSS-133 6.5 Band edge	Yes	4
2.1051 / RSS-133 6.5 Spurious emission at antenna terminals	Yes	5
2.1053 / RSS-133 6.5 Field strength of spurious radiation	Yes	6
2.1055 / RSS-133 6.3 Frequency stability	Yes	7

Note: Above RSS-133 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



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Frequency stability	Appendix 7
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Appendix 1

Description of test object

Equipment:	Radio equipment AIR 21 B2A/B4P running in LTE mode
Frequency bands:	TX: 1930 – 1990 MHz RX: 1850 – 1910 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	Frequency [MHz]	Comment
Downlink		
607	1930.7	TX bottom (B) frequency in 1.4 MHz BW configuration
615	1931.5	TX bottom (B) frequency in 3 MHz BW configuration
625	1932.5	TX bottom (B) frequency in 5 MHz BW configuration
650	1935.0	TX bottom (B) frequency in 10 MHz BW configuration
675	1937.5	TX bottom (B) frequency in 15 MHz BW configuration
700	1940.0	TX bottom (B) frequency in 20 MHz BW configuration
900	1960.0	TX band mid (M) frequency in all BW configurations
1100	1980.0	TX top (T) frequency in 20 MHz BW configuration
1125	1982.5	TX top (T) frequency in 15 MHz BW configuration
1150	1985.0	TX top (T) frequency in 10 MHz BW configuration
1175	1987.5	TX top (T) frequency in 5 MHz BW configuration
1185	1988.5	TX top (T) frequency in 3 MHz BW configuration
1193	1989.3	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.



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Appendix 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-Gen Issue 3

RSS-133 Issue 5

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Appendix 1

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.



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Appendix 1

Delivery of test object

The test object was delivered: 2012-04-05.

Manufacturer's representative

Christer Gustavsson, Ericsson AB

Test engineers

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

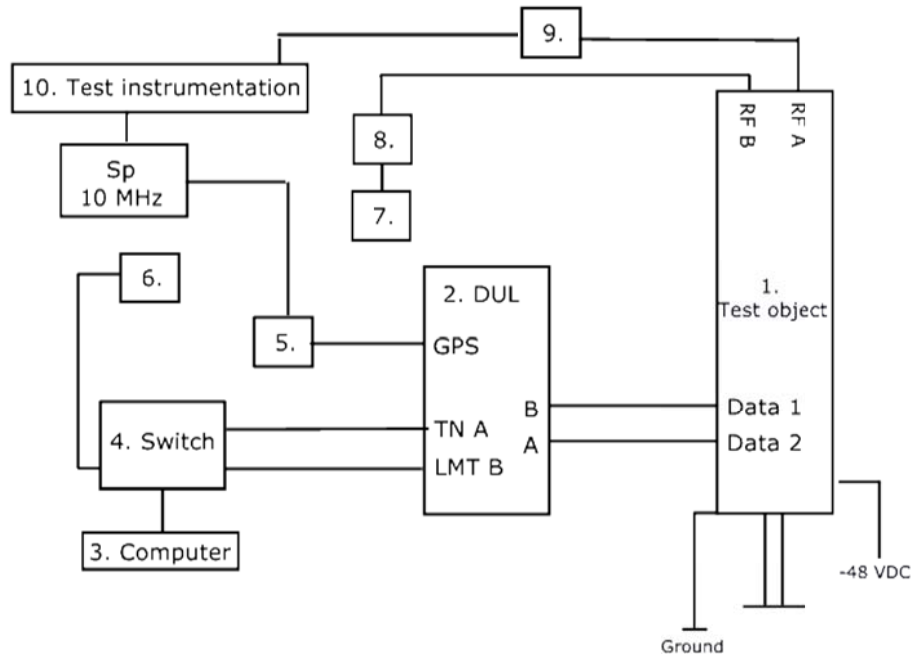
Test participant

Mikael Jansson, Ericsson AB (Partly present)

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Appendix 1

Test set-up conducted measurements TX



Test object

1. AIR 21 B2A/B4P, KRC 118 023/1, rev. R1C, s/n: CQ30000598 with software AIR (PIS): CXP 901 3268/6 rev. R44FX (FCC ID: TA8AKRC118023-1 / IC: 287AB-AS1180231)

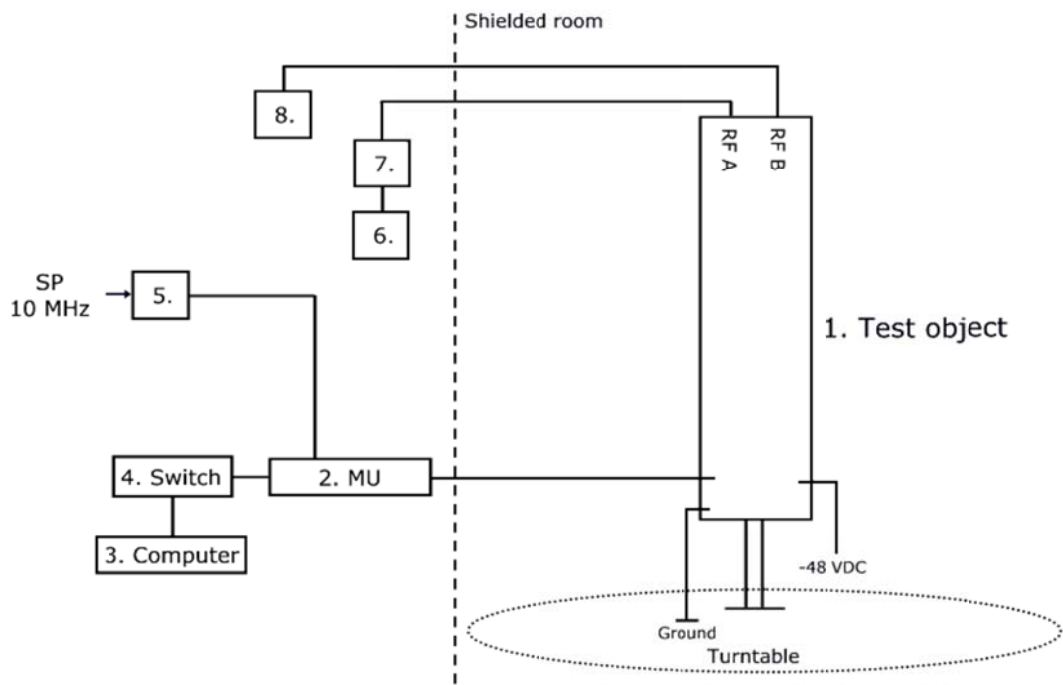
Functional test equipment

2. DUL 20 01, KDU 137 533/4, revision R1F, S/N: C825557510
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

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Appendix 1

Test set-up, radiated measurements



Test object

1. AIR 21 B2A/B4P, KRC 118 023/1, rev. R1C, s/n: CQ30000598
with software AIR (PIS): CXP 901 3268/6 rev. R44FX
(FCC ID: TA8AKRC118023-1 / IC: 287AB-AS1180231)

Functional test equipment

2. DUL 20 01, KDU 137 533/4, revision R1F, S/N: C825557510
SUP 6601 1/BFL 901 009/1 Rev R1B, S/N. BR80867188
3. Computer HP Elitebook 8540w, BAMS – 1001052043
4. Fast Ethernet switch, Netgear GS108E
5. Jointing box NCD 901 40/1 R1A A401222750
6. Attenuator
7. R&S FSIQ 40 for monitoring the RF signal
8. Terminator



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Appendix 1

Test object ports

Interface:	Type of port:
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

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Appendix 2

RF power output measurements according to CFR 47 §24.232 / IC RSS-133 6.4

Date 2012-06-15	Temperature 23 °C ± 3 °C	Humidity 37 % ± 5 %
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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 FSQ 40	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	44.8	47.8	47.4
B	20.0	44.8	47.8	35.3
M	1.4	44.7	47.7	47.3
M	3.0	44.9	47.9	43.6
M	5.0	44.8	47.8	41.3
M	10.0	44.8	47.8	38.3
M	15.0	44.9	47.9	36.6
M	20.0	44.8	47.8	35.3
T	1.4	44.8	47.8	47.4
T	20.0	44.8	47.8	35.3

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

EARFCN	Carrier BW (MHz)	Result RMS (dBm)	10log(N) ¹⁾ (dBm)	Result RMS (dBm/ MHz) ²⁾
B	1.4	44.8	47.8	47.4
B	20.0	44.8	47.8	35.3

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)



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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



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Appendix 2

Limits

§24.232 Federal Register / Vol. 73, No. 86

The maximum output power may not exceed 1640 W/MHz (EIRP).

The Peak to Average Ratio (PAR) may not exceed 13 dB.

RSS-133: The average equivalent isotropically radiated power (e.i.r.p.) for transmitters shall not exceed the limits given in SRSP-510. Moreover, base station transmitters operating in the band 1930-1995 MHz shall not have output power exceeding 100 watts.

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio(PAR) of the power shall not exceed 13 dB.

Complies?	Yes
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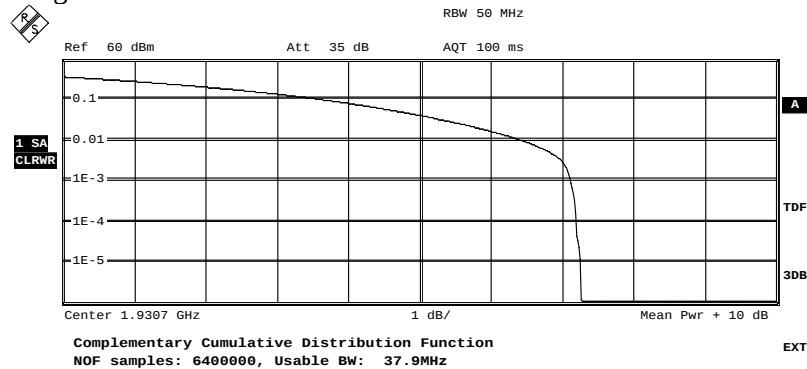
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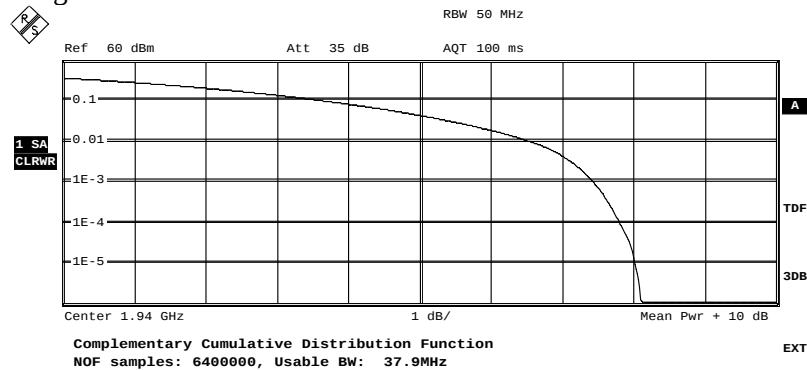
Diagram 1



Trace 1	
Mean	44.84 dBm
Peak	52.18 dBm
Crest	7.34 dB
10 %	3.69 dB
1 %	6.43 dB
.1 %	7.12 dB
.01 %	7.20 dB

Date: 15.JUN.2012 07:54:55

Diagram 2



Trace 1	
Mean	44.80 dBm
Peak	52.97 dBm
Crest	8.16 dB
10 %	3.70 dB
1 %	6.55 dB
.1 %	7.44 dB
.01 %	7.80 dB

Date: 15.JUN.2012 07:59:24



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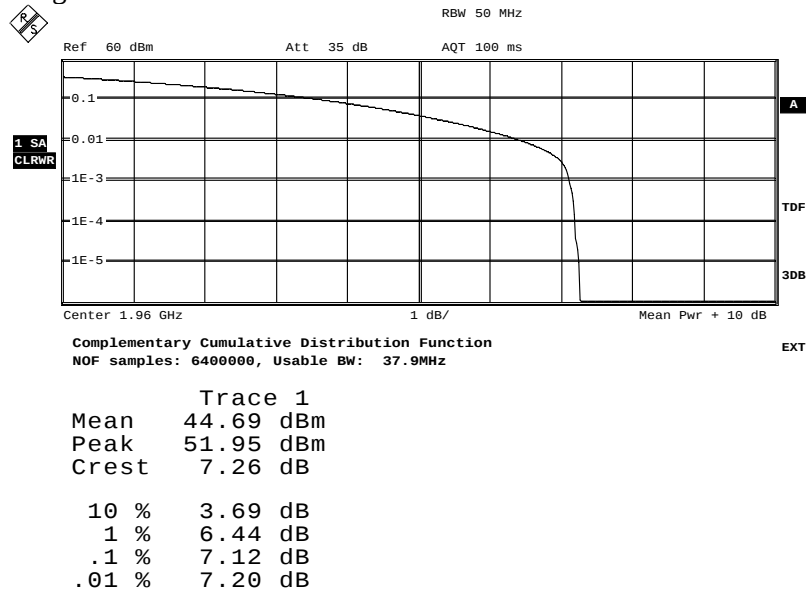
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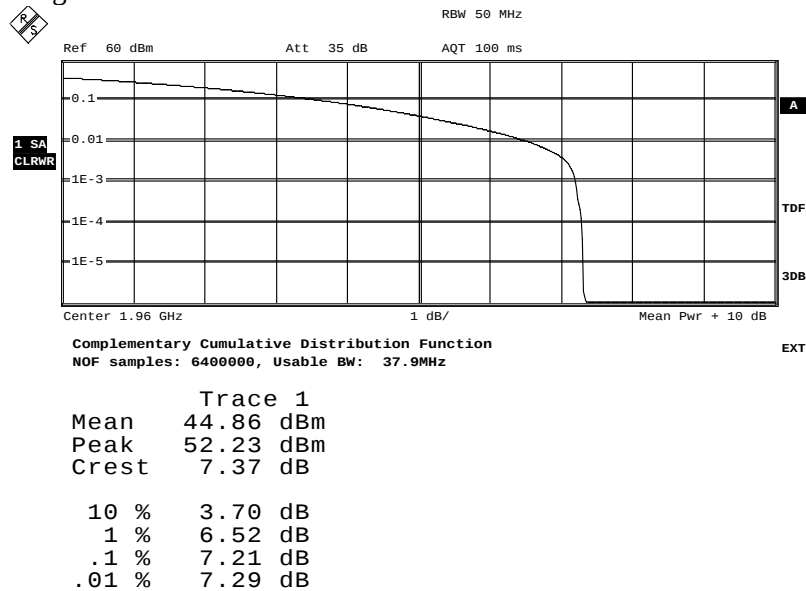
Appendix 2

Diagram 3



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Diagram 4



Date: 15.JUN.2012 07:18:19



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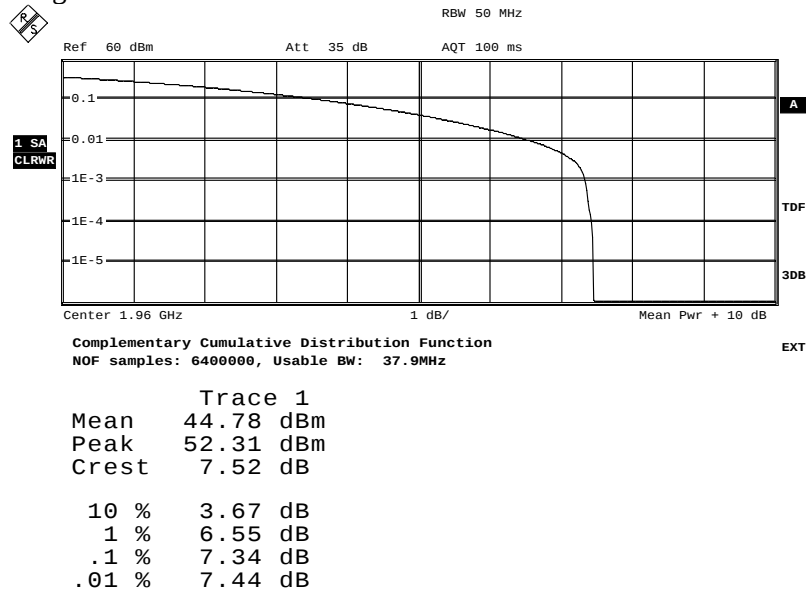
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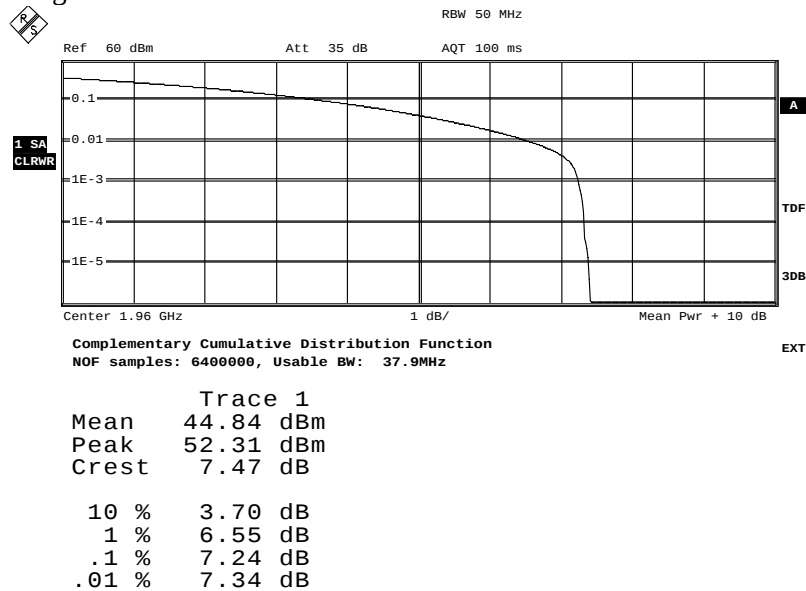
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Diagram 5



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Diagram 6



Date: 15.JUN.2012 07:28:23



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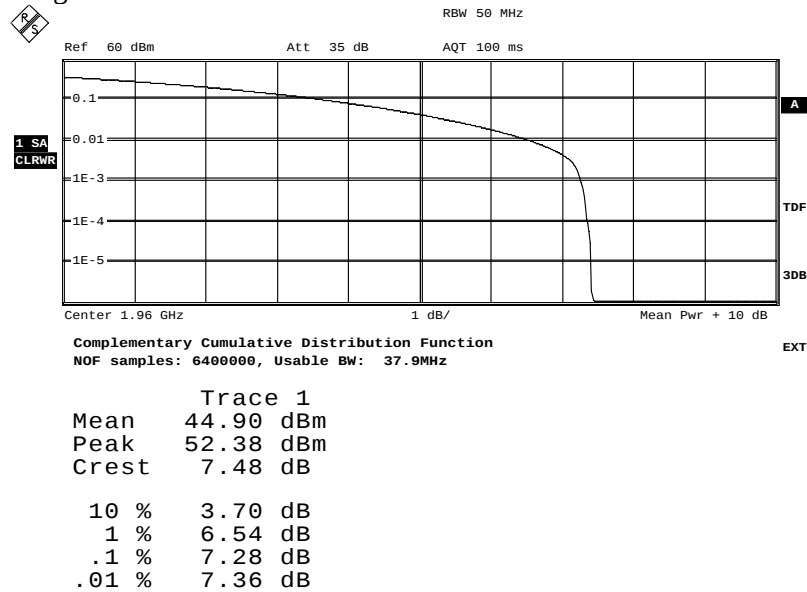
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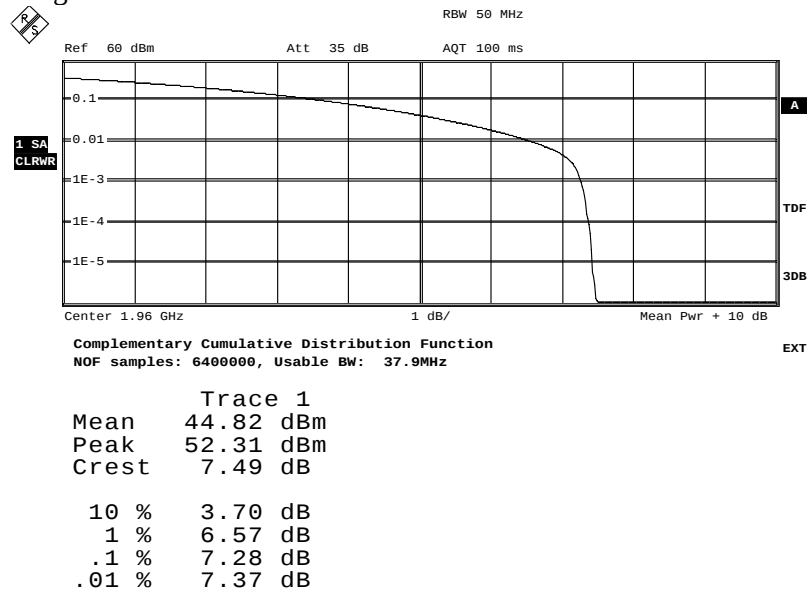
Appendix 2

Diagram 7



Date: 15.JUN.2012 07:35:31

Diagram 8



Date: 15.JUN.2012 07:39:14



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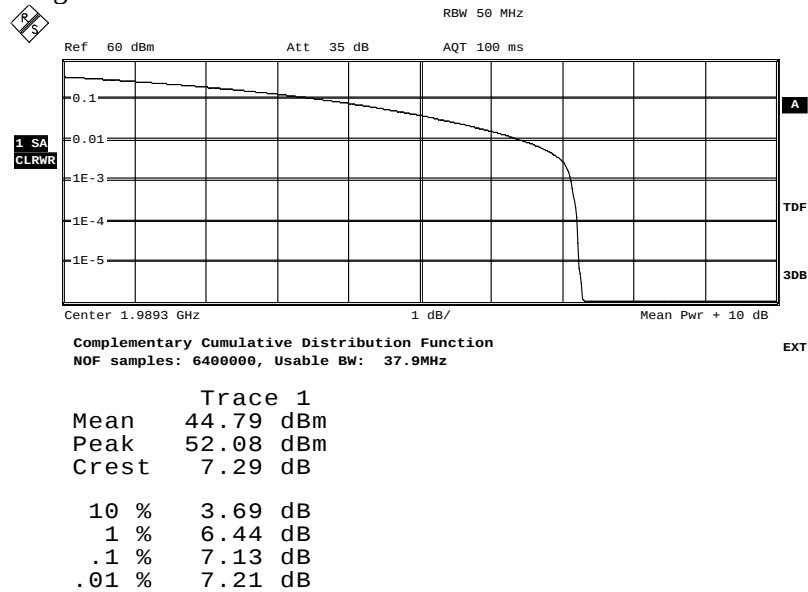
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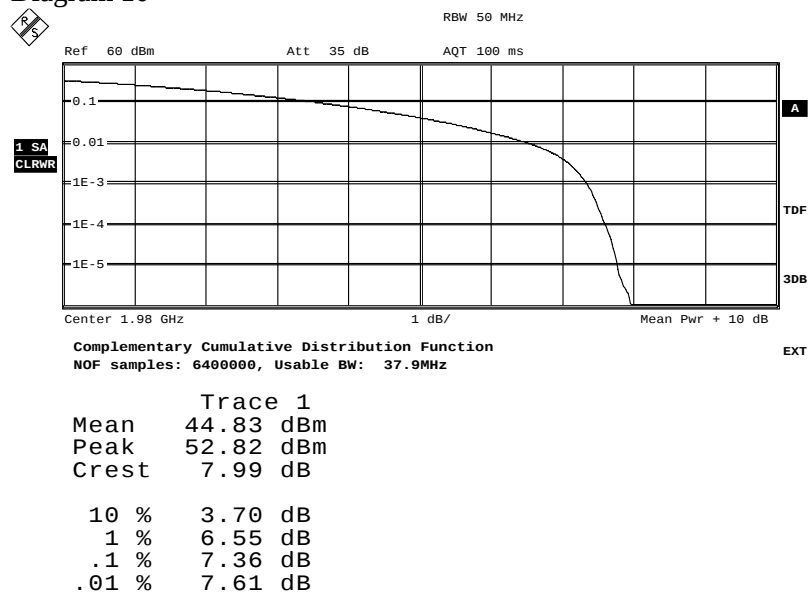
Appendix 2

Diagram 9



Date: 15.JUN.2012 08:16:14

Diagram 10

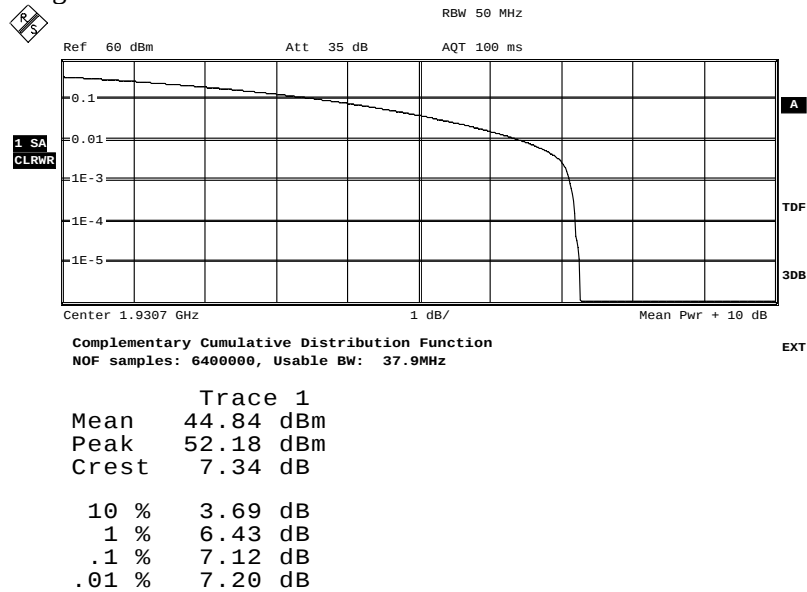


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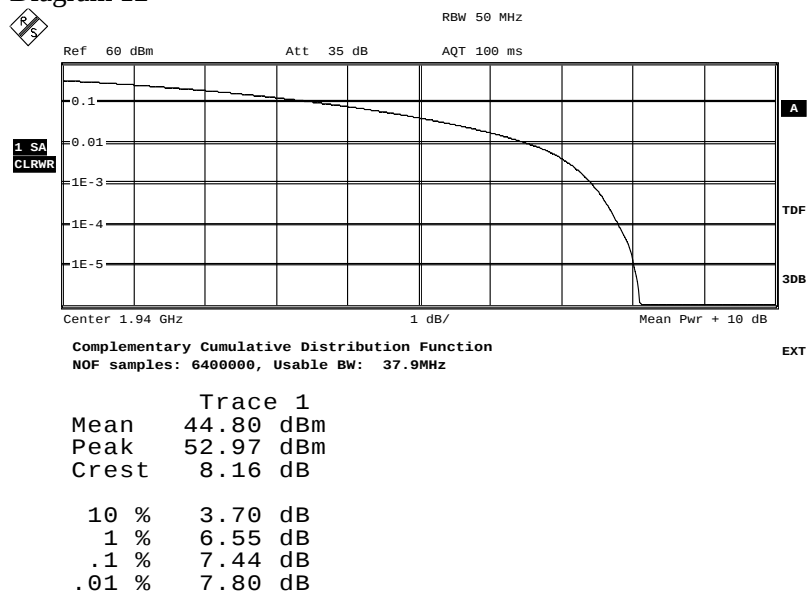
Appendix 2

Diagram 11



Date: 15.JUN.2012 07:54:55

Diagram 12



Date: 15.JUN.2012 07:59:24

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Appendix 3

Occupied bandwidth measurements according to CFR 472.1049 / IC RSS-Gen 4.6.1

Date	Temperature	Humidity
2012-05-25	22 °C ± 3 °C	24 % ± 5 %
2012-06-01	22 °C ± 3 °C	35 % ± 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
Rohde & Schwarz signal analyzer FSW	--
RF attenuator	504 159
Testo 615 temperature and humidity meter	503 498

Measurement uncertainty: 3.7 dB

Results

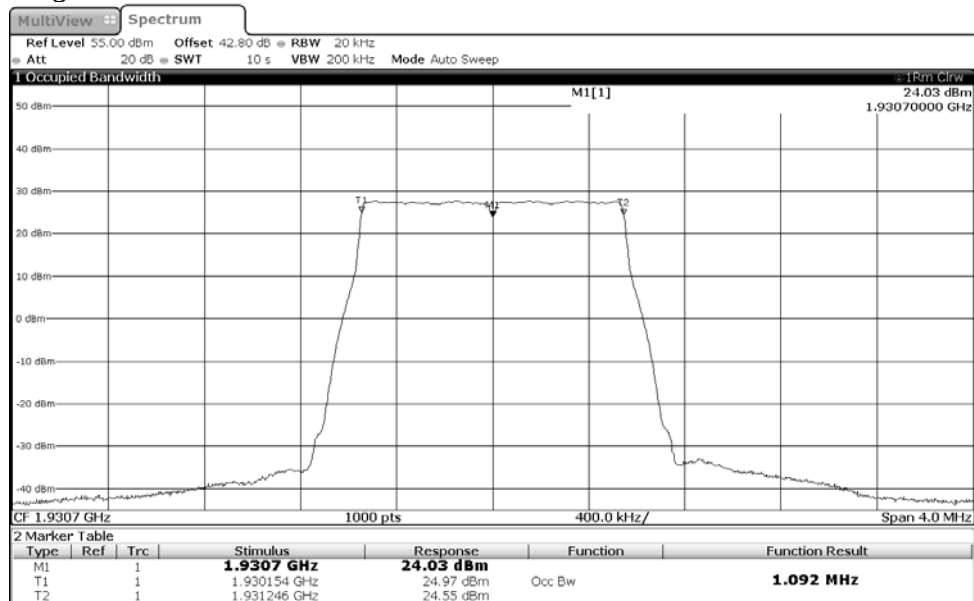
The results are shown in appendix 3.1

Diagram	BW configuration	Tested frequency	OBW / [MHz]
1	1.4 MHz	B	1.09
2	20 MHz	B	17.84
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	13.44
8	20 MHz	M	17.88
9	1.4 MHz	T	1.09
10	20 MHz	T	17.84
11 RF B	1.4MHz	M	1.09
12 RF B	20MHz	M	17.88

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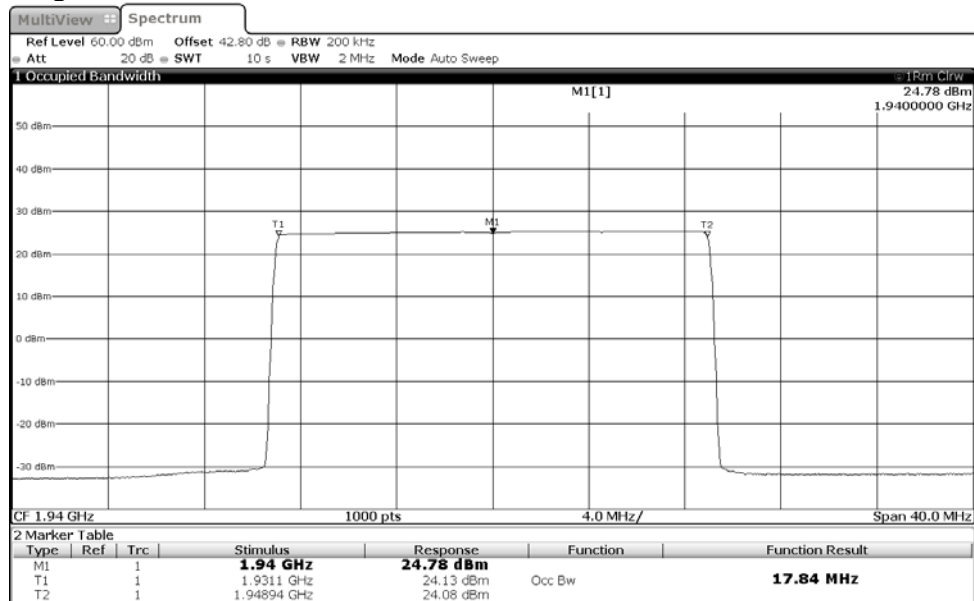
Appendix 3

Diagram 1



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Diagram 2



Date: 1 JUN 2012 10:23:52



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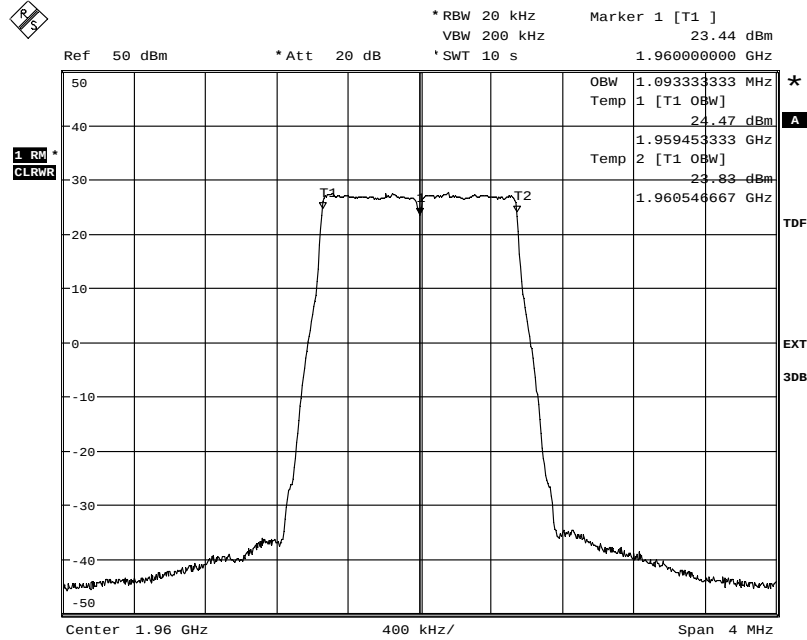
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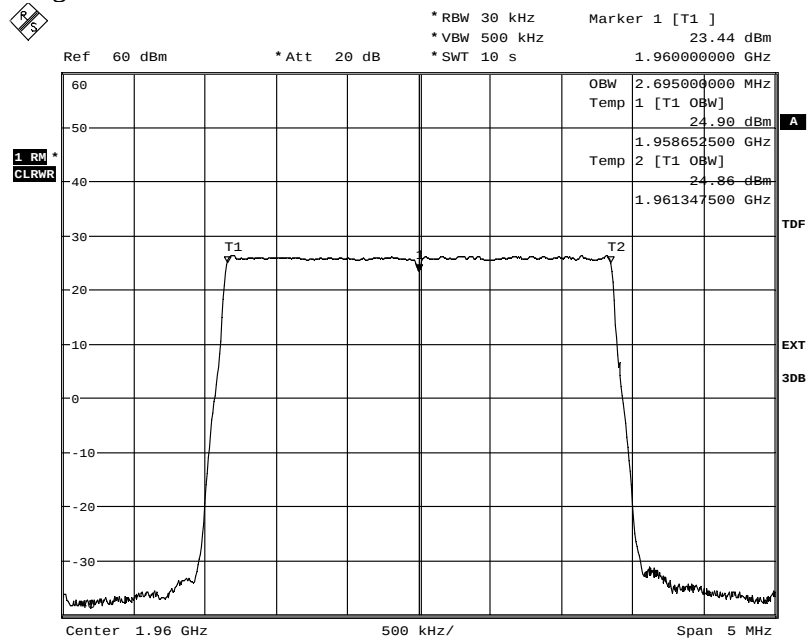
Appendix 3

Diagram 3



Date: 25.MAY.2012 08:57:01

Diagram 4

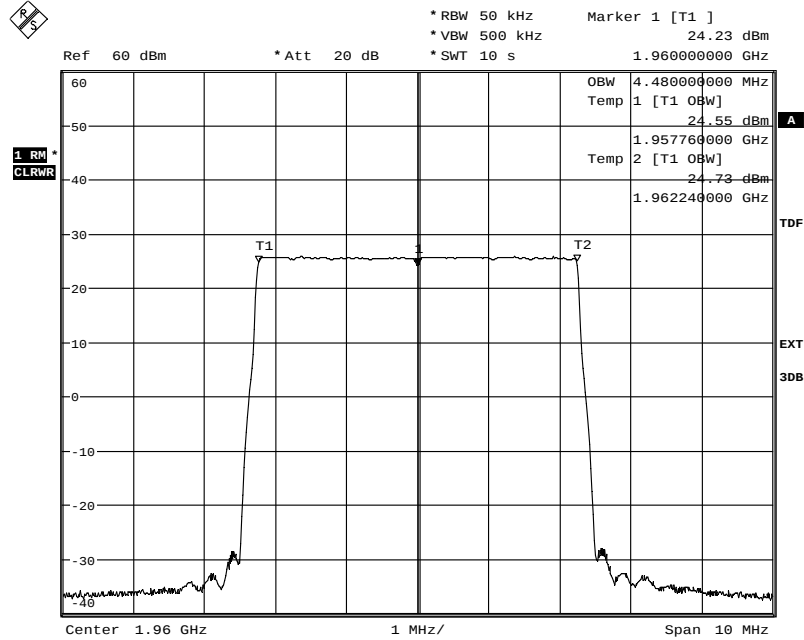


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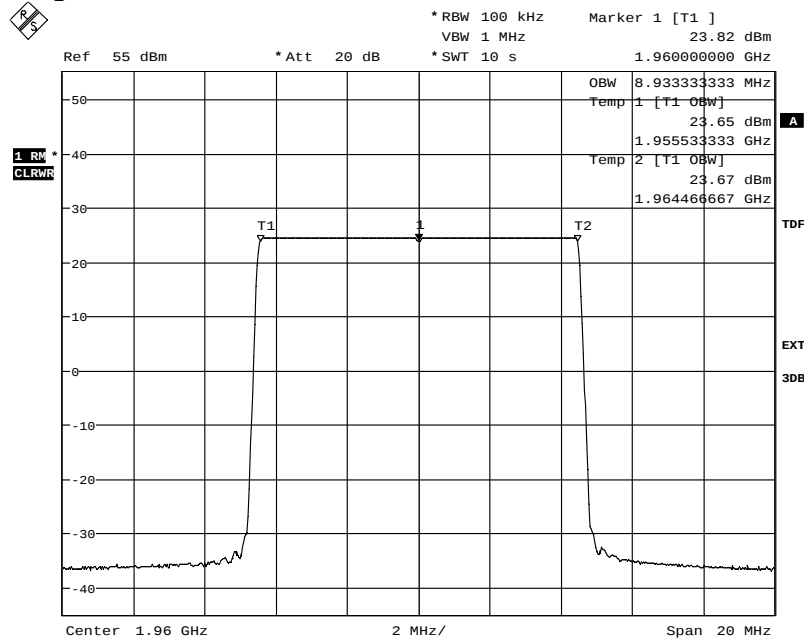
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Diagram 5



Date: 25.MAY.2012 08:26:06

Diagram 6



Date: 25.MAY.2012 08:13:10



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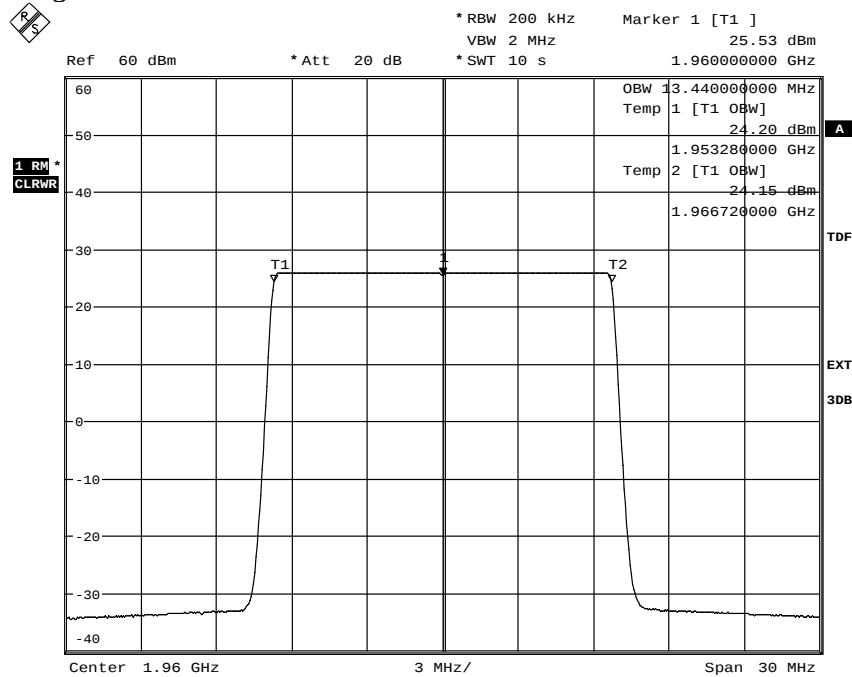
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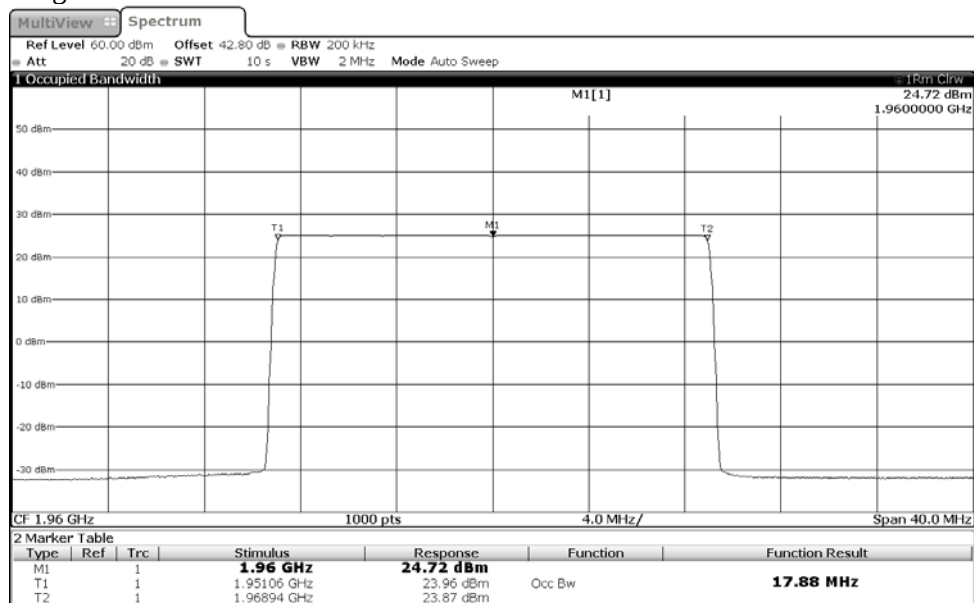
Appendix 3

Diagram 7



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Diagram 8

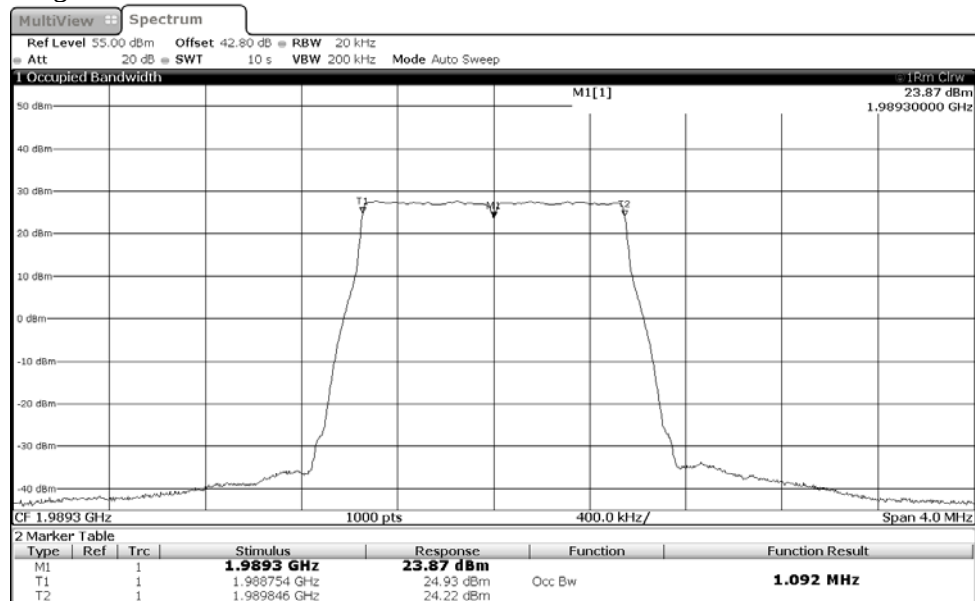


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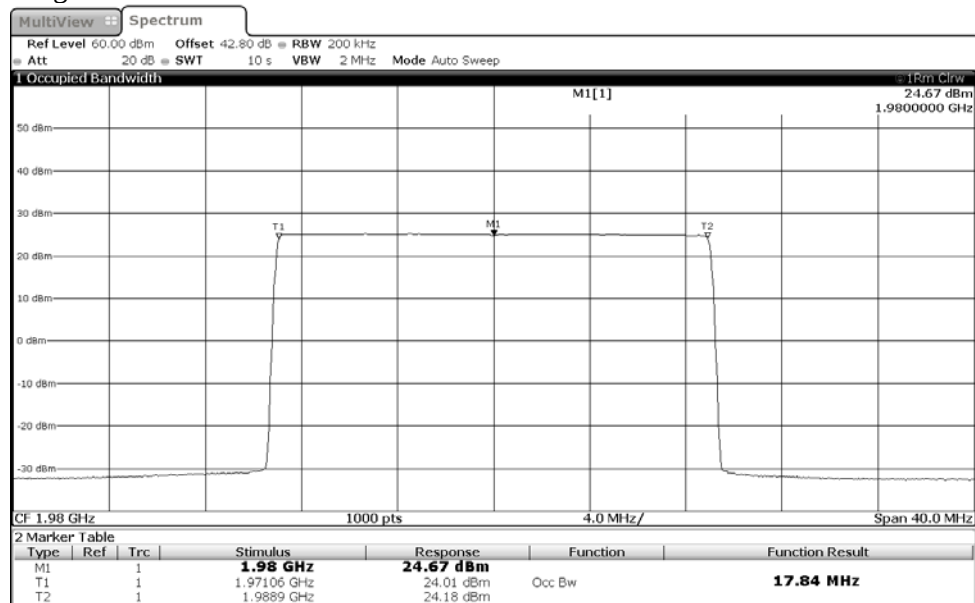
Appendix 3

Diagram 9



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Diagram 10

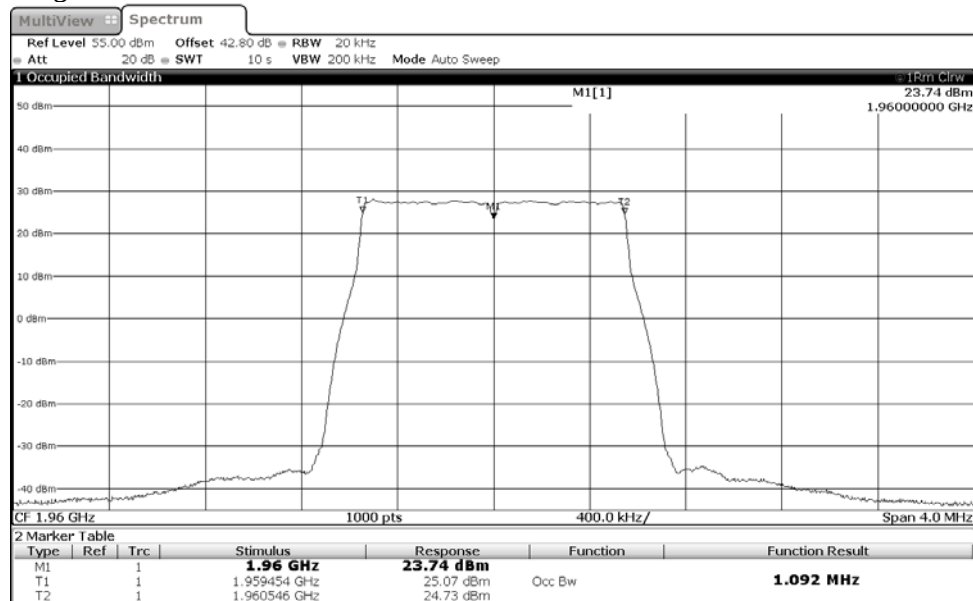


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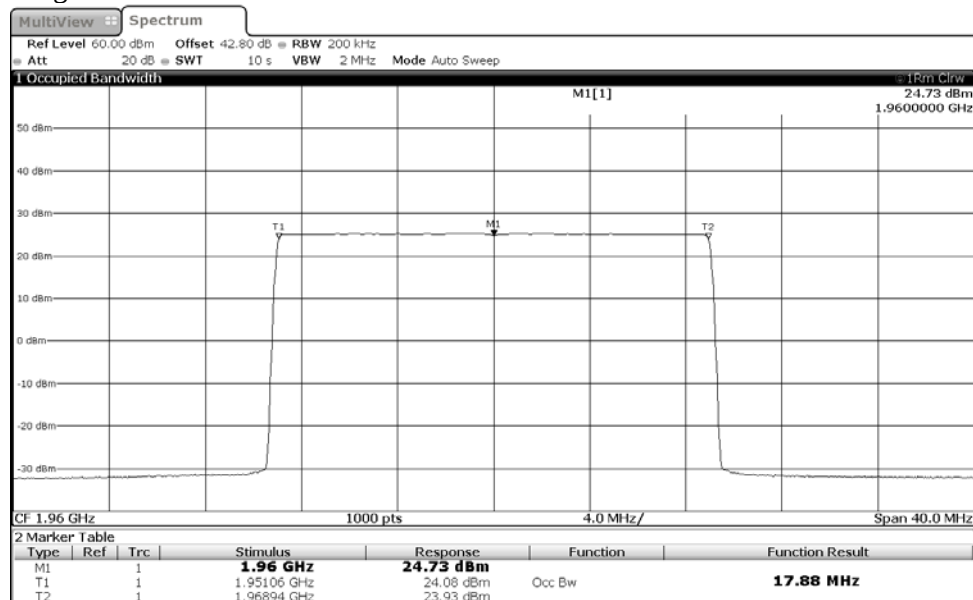
Appendix 3

Diagram 11



Date: 1 JUN 2012 13:11:12

Diagram 12



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Appendix 4

Band edge measurements according to CFR 47 §24.238 / IC RSS-133 6.5

Date	Temperature	Humidity
2012-05-25	22 °C ± 3 °C	24 % ± 5 %
2012-06-01	22 °C ± 3 °C	35 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §24.238 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 FSW	--
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
11a+b+c	15 MHz	T
12a+b+c	20 MHz	T
13a+b+c	1.4MHz	B, RF B
14a+b+c	1.4MHz	T, RF B



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Appendix 4

Limits

CFR 47 §24.238 and RSS-133 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
-----------	-----



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Appendix 4

Diagram 1 a

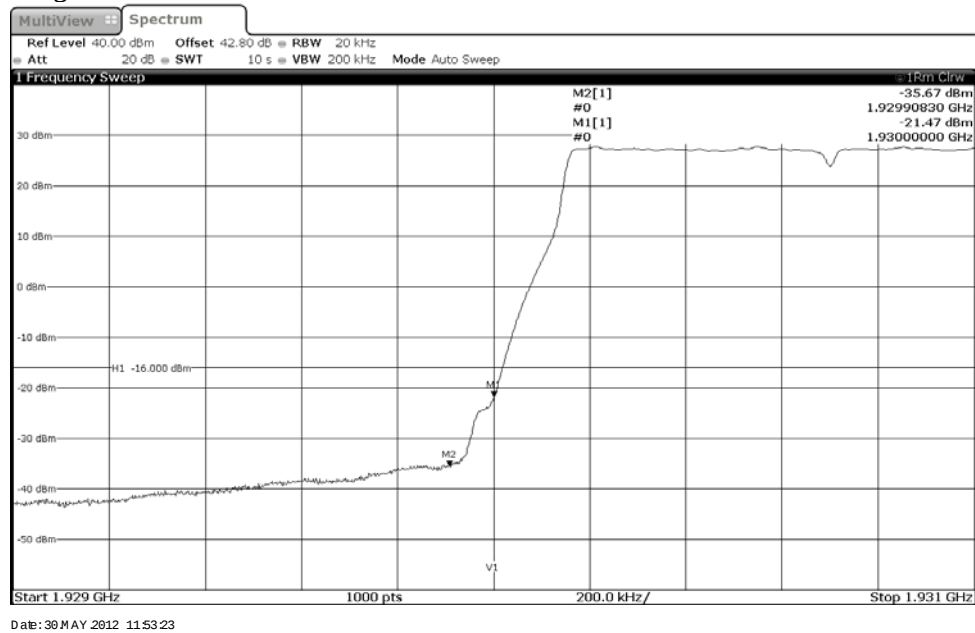
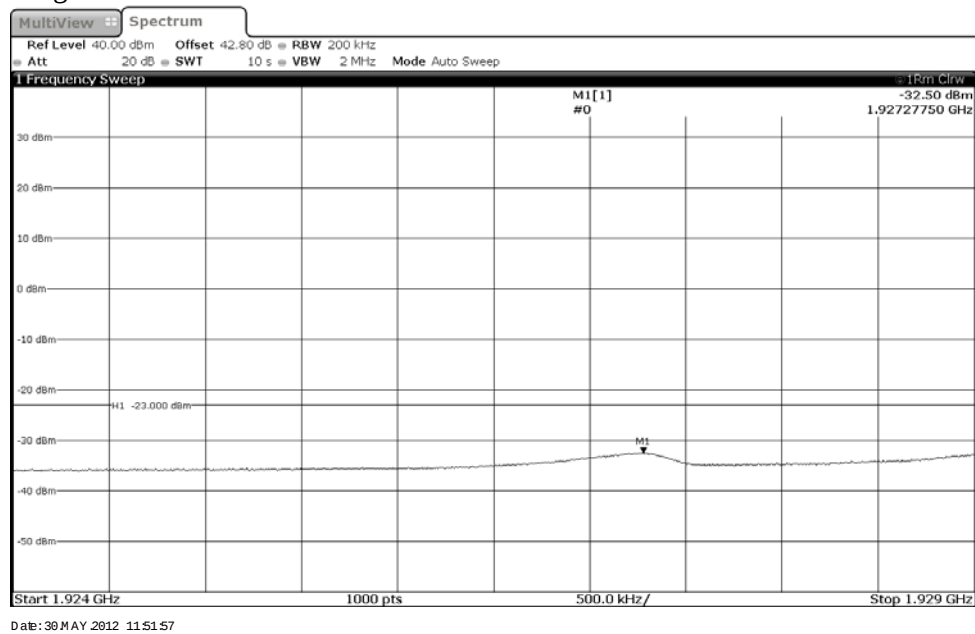


Diagram 1 b





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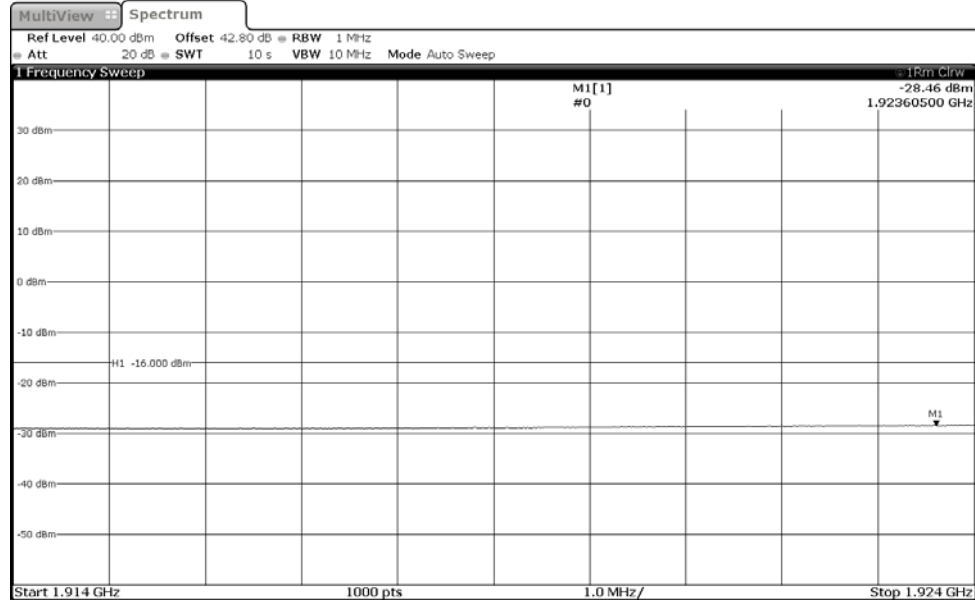
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Appendix 4

Diagram 1 c:



Date: 30 MAY 2012 11:49:45



FCC ID: TA8AKRC118023-1
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Appendix 4

Diagram 2 a

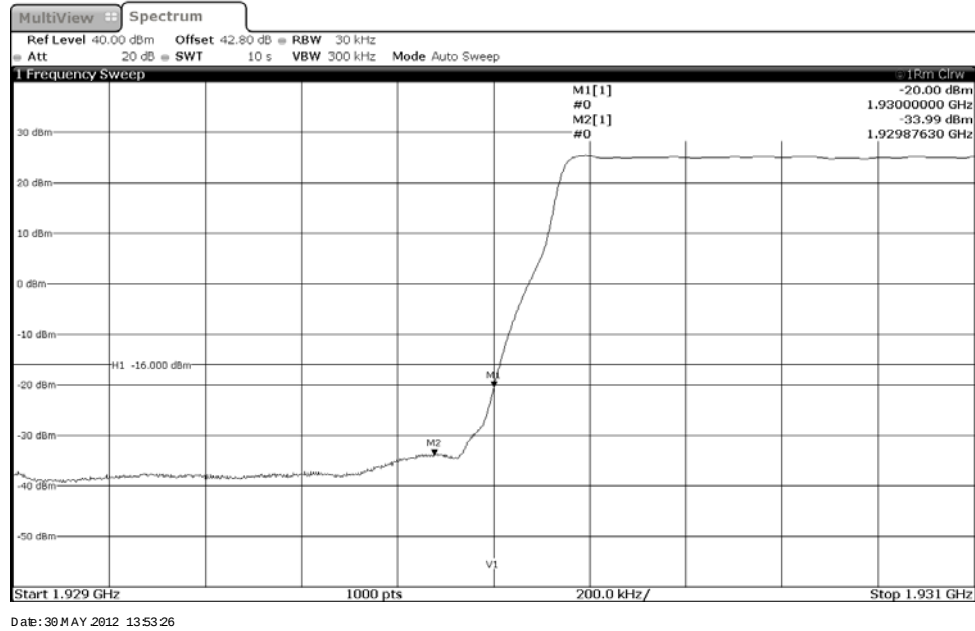
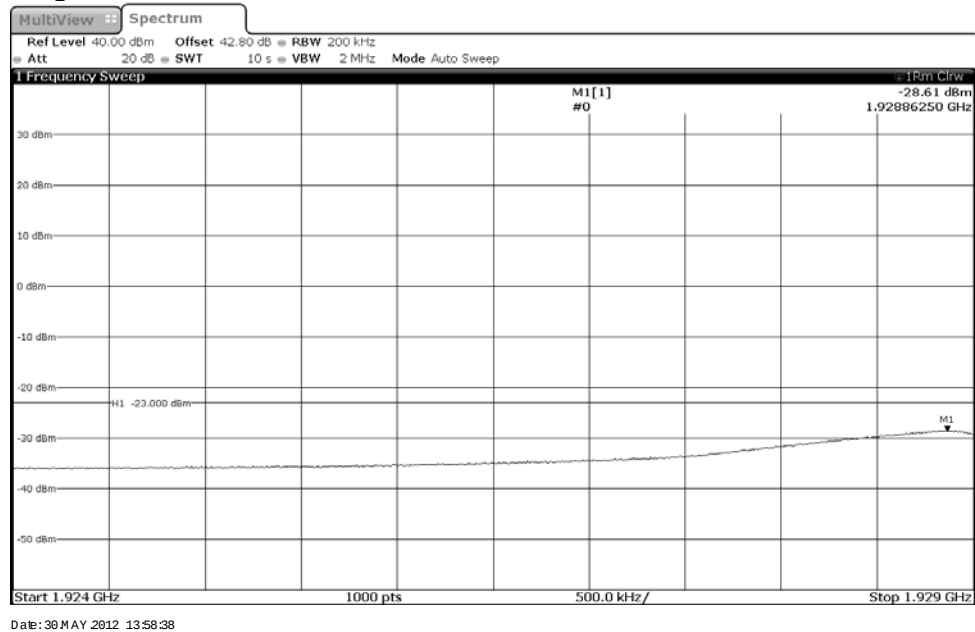


Diagram 2 b





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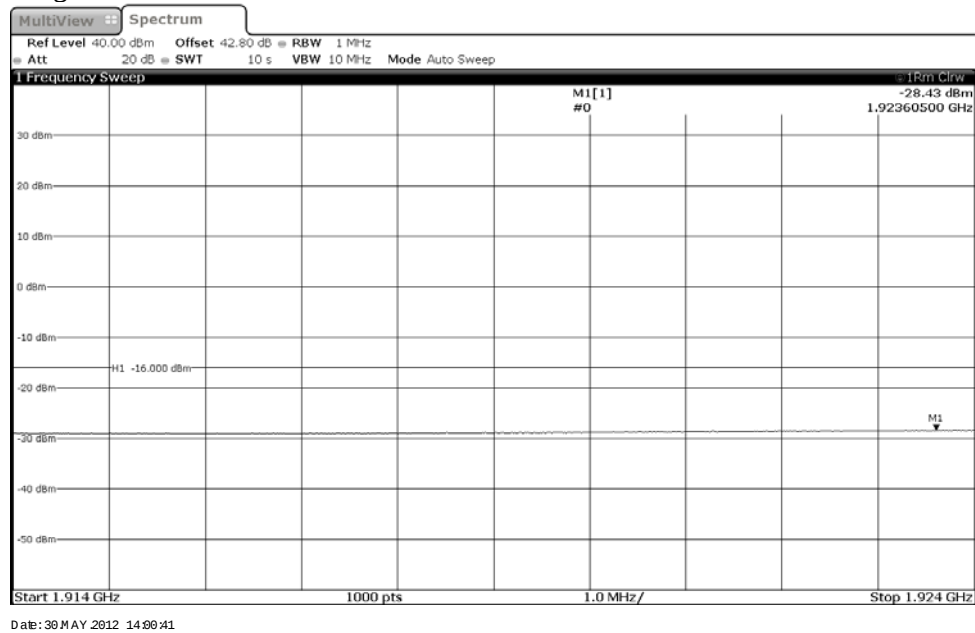
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Appendix 4

Diagram 2 c





FCC ID: TA8AKRC118023-1
IC: 287AB-AS1180231

Appendix 4

Diagram 3 a

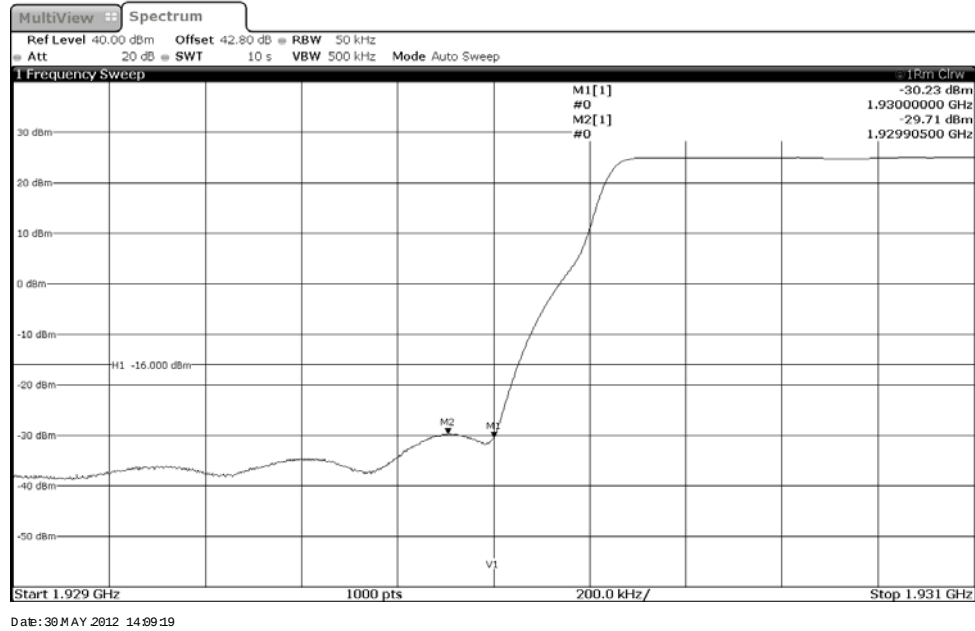
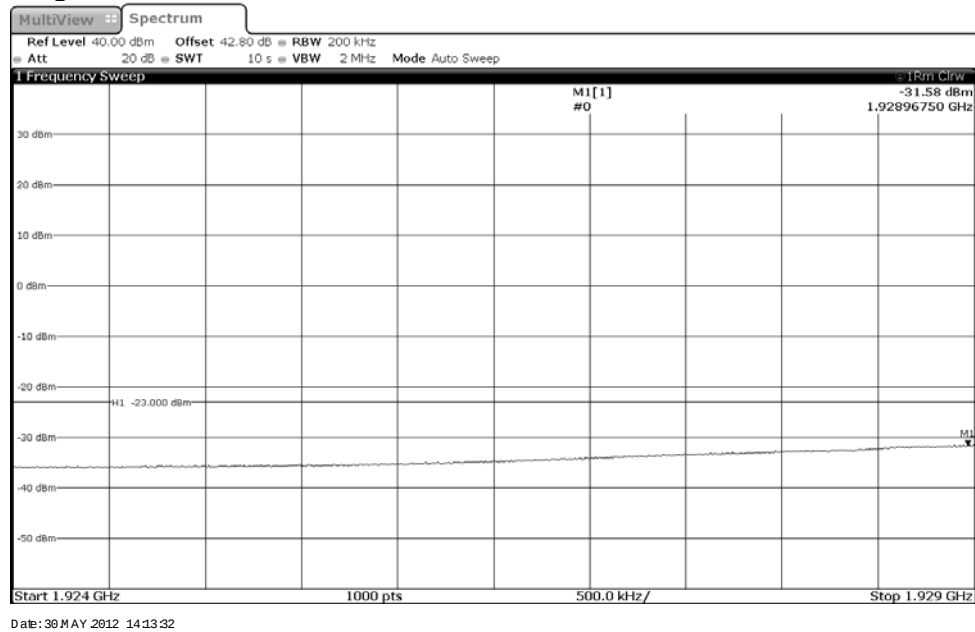


Diagram 3 b





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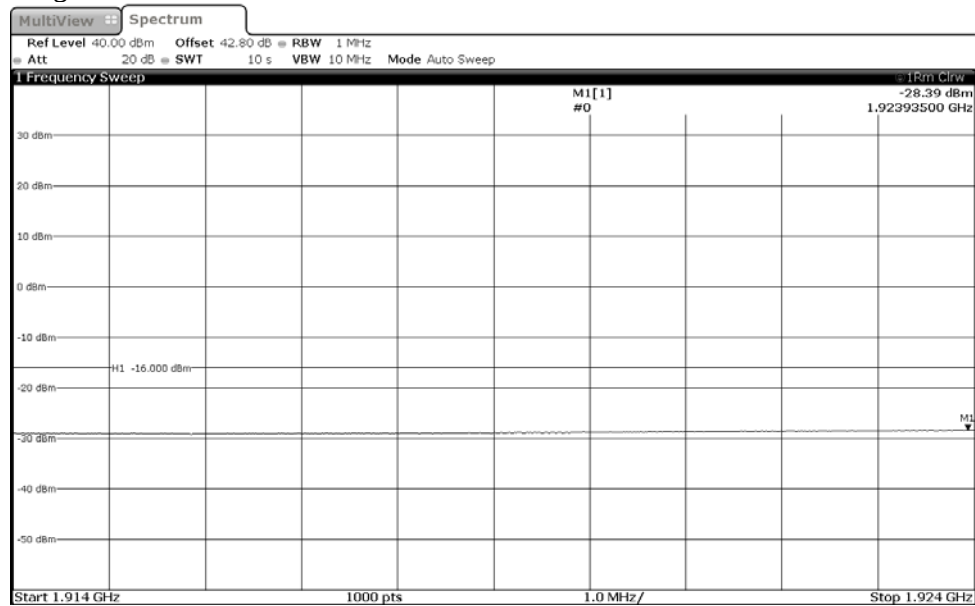
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Diagram 3 c



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FCC ID: TA8AKRC118023-1
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Appendix 4

Diagram 4 a

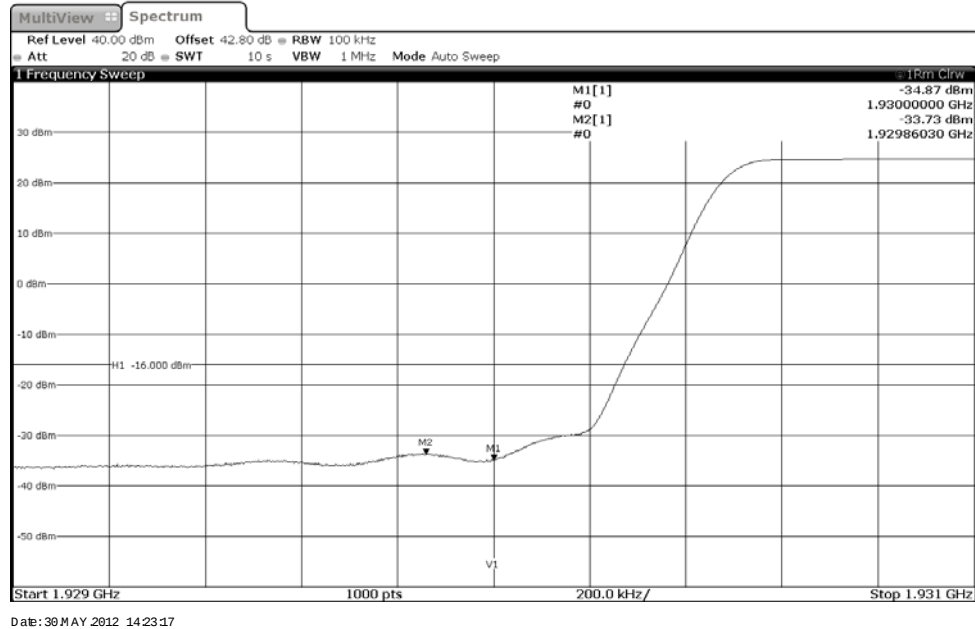
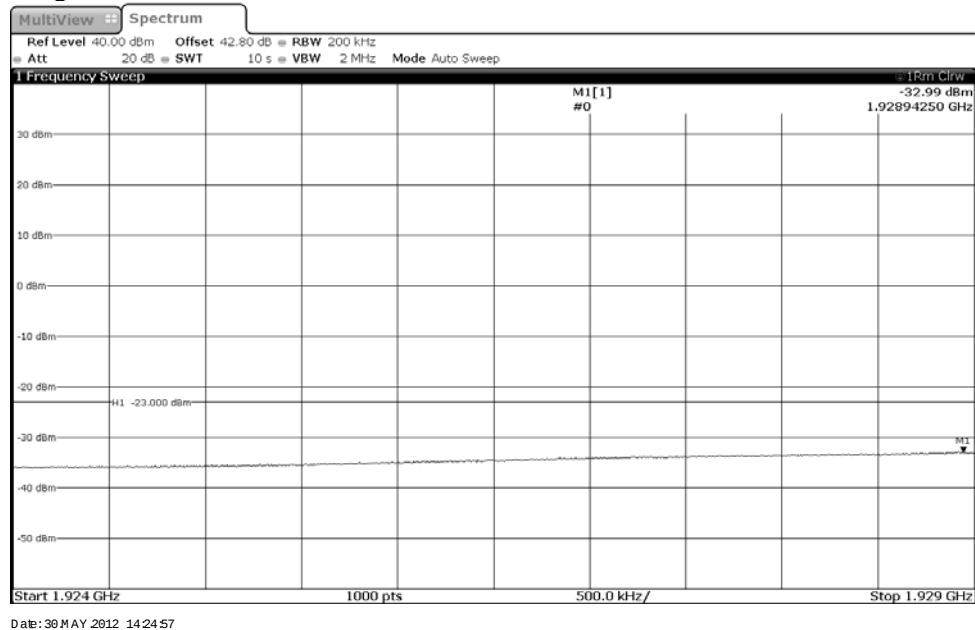


Diagram 4 b





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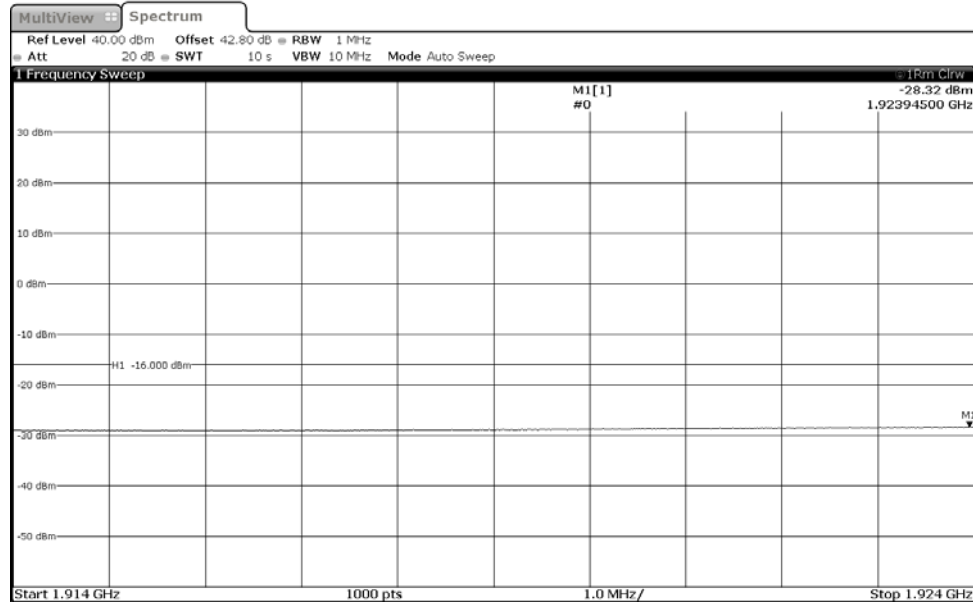
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10 (30)

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Appendix 4

Diagram 4 c



Date: 30 MAY 2012 14:26:44



FCC ID: TA8AKRC118023-1
IC: 287AB-AS1180231

Appendix 4

Diagram 5 a

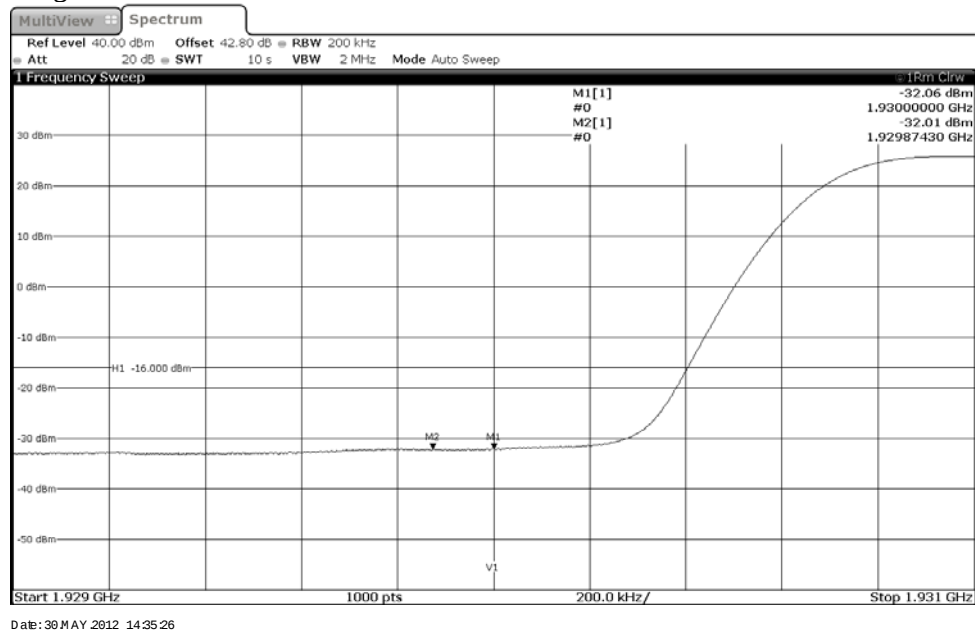
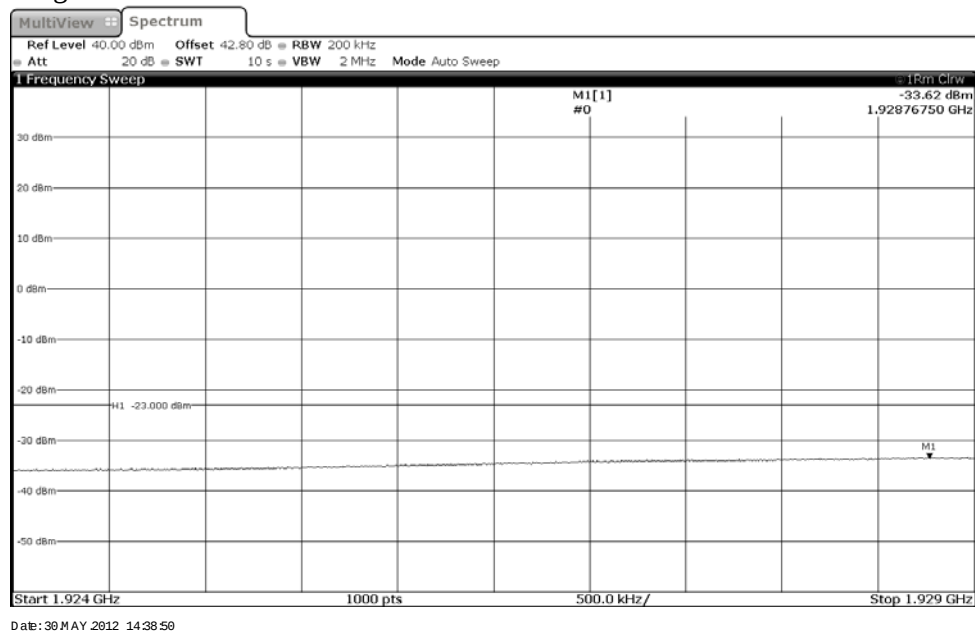


Diagram 5 b





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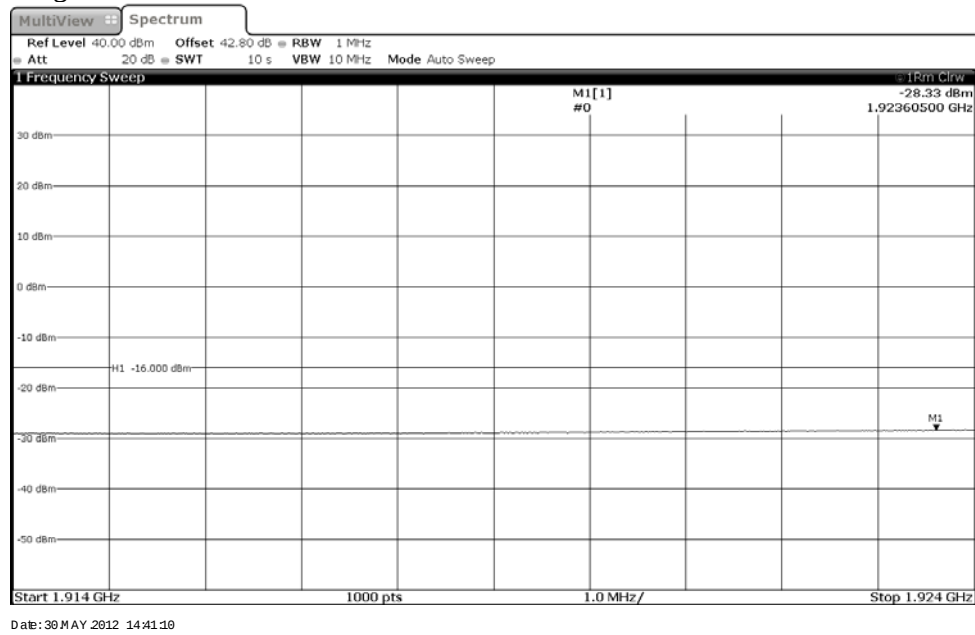
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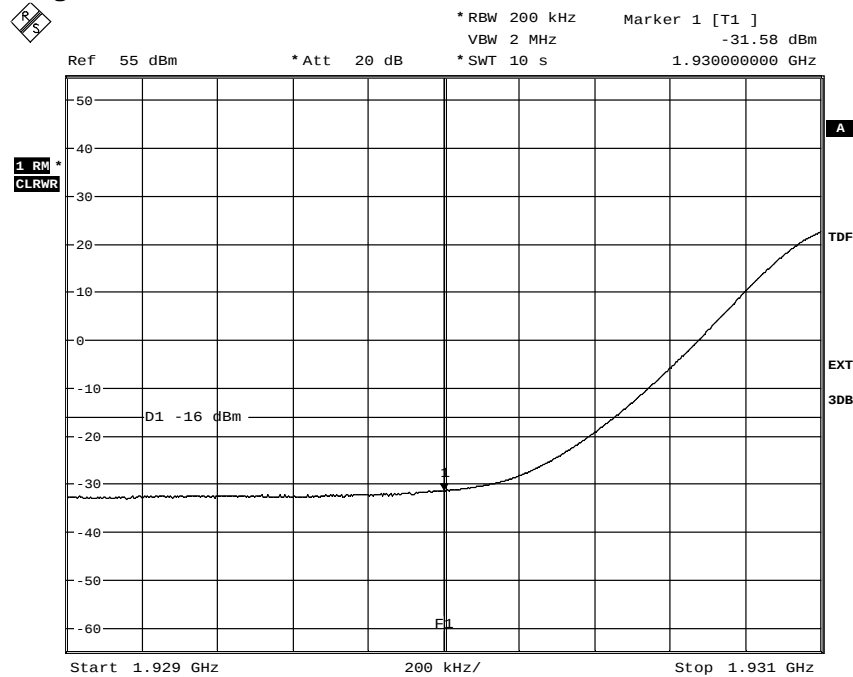
Diagram 5 c



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IC: 287AB-AS1180231

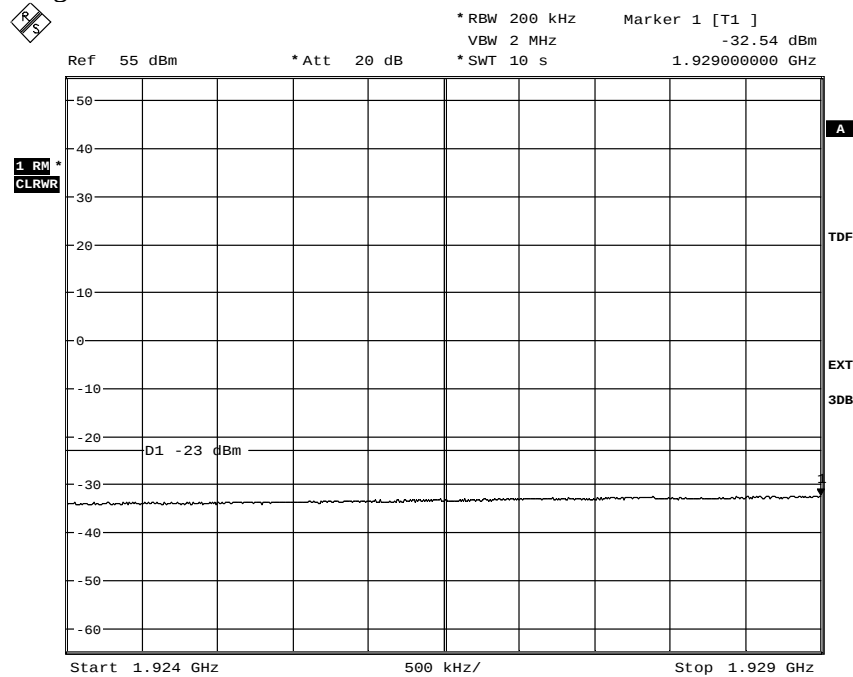
Appendix 4

Diagram 6 a



Date: 18.JUN.2012 11:06:00

Diagram 6 b



Date: 18.JUN.2012 11:09:46



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2012-06-18

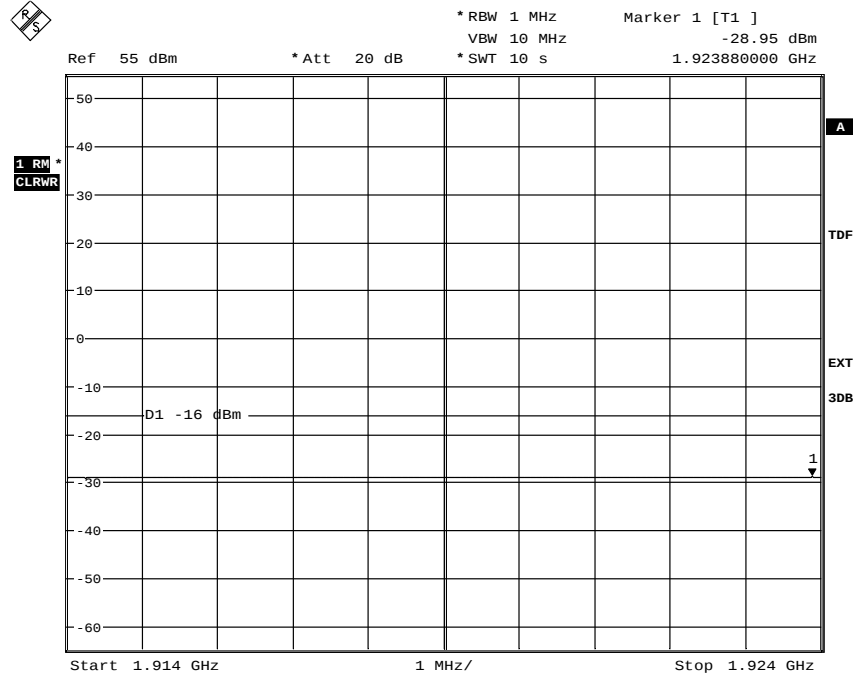
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Diagram 6 c



Date: 18.JUN.2012 11:11:42



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Appendix 4

Diagram 7 a

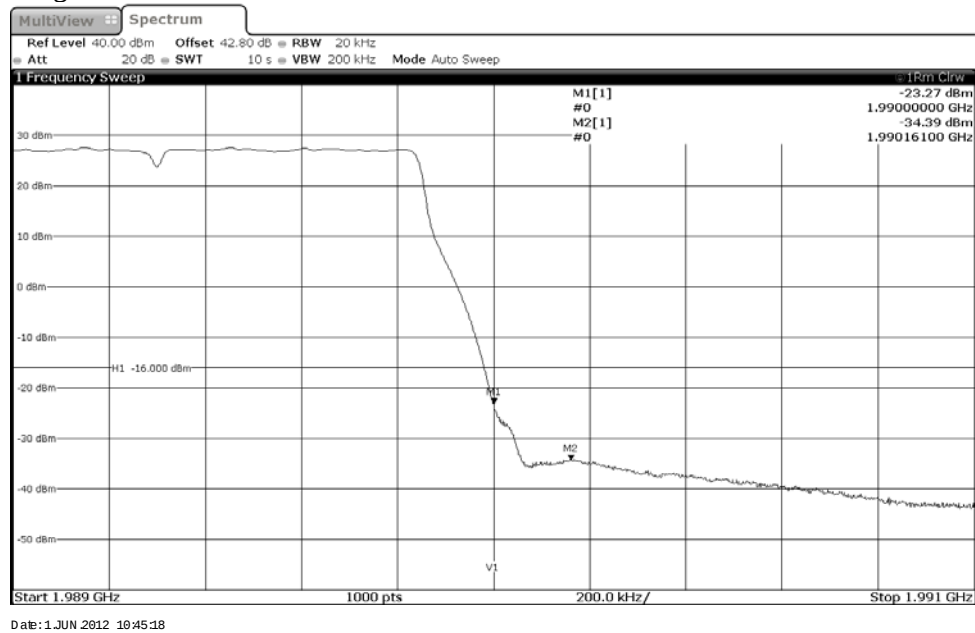
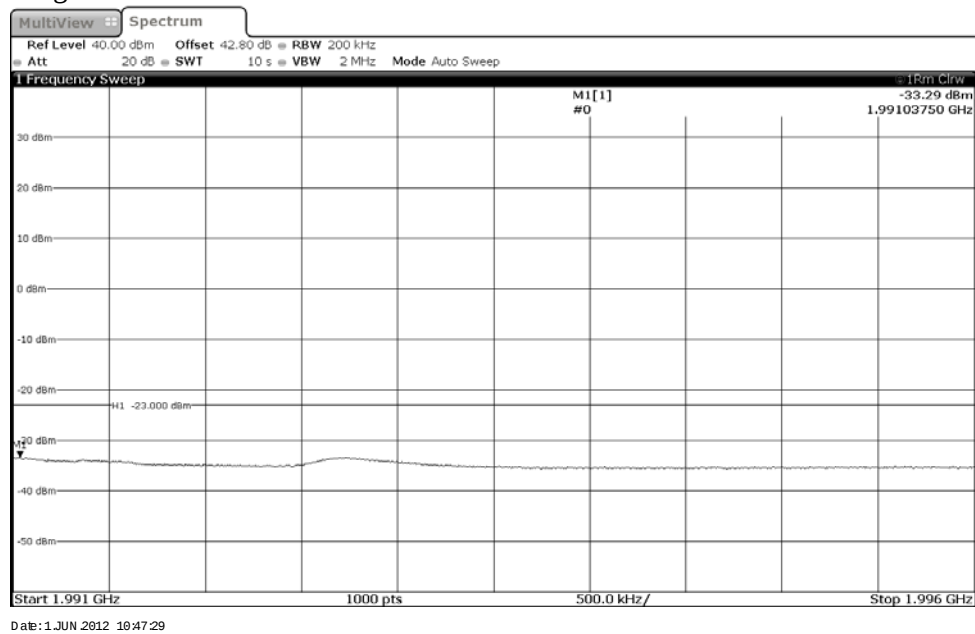


Diagram 7 b





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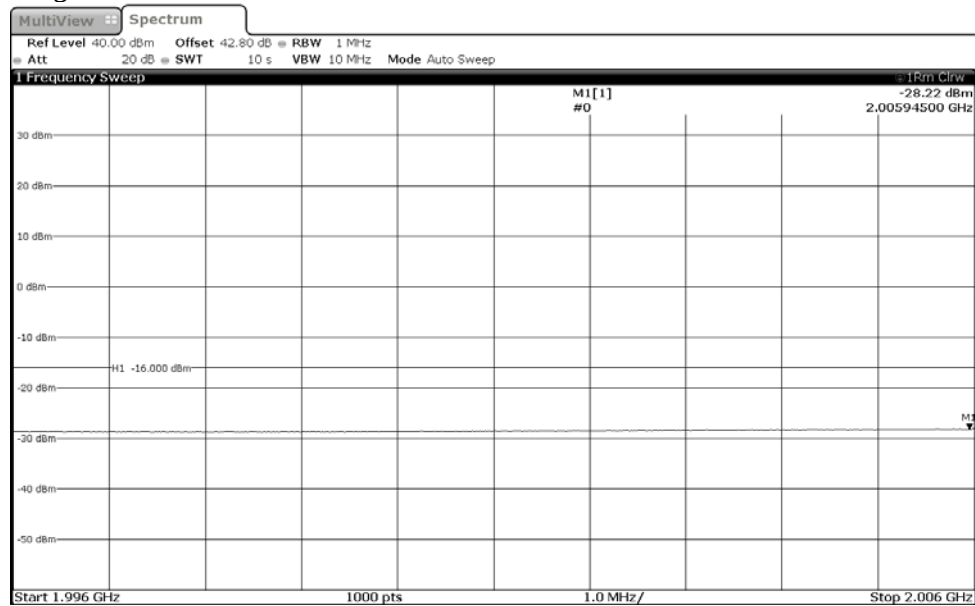
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Diagram 7 c



Date: 1 JUN 2012 10:49:02



FCC ID: TA8AKRC118023-1
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Appendix 4

Diagram 8 a

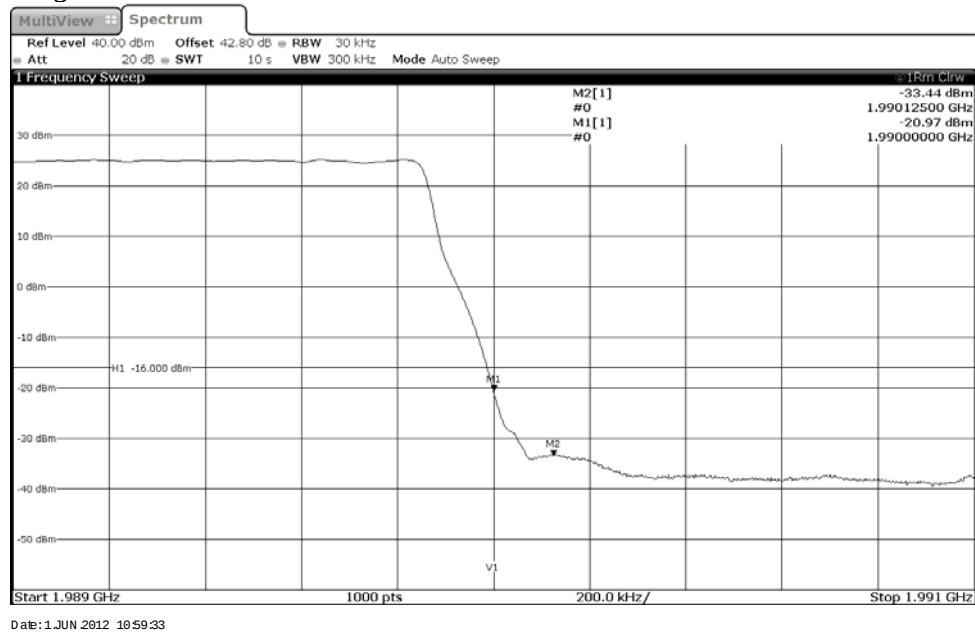
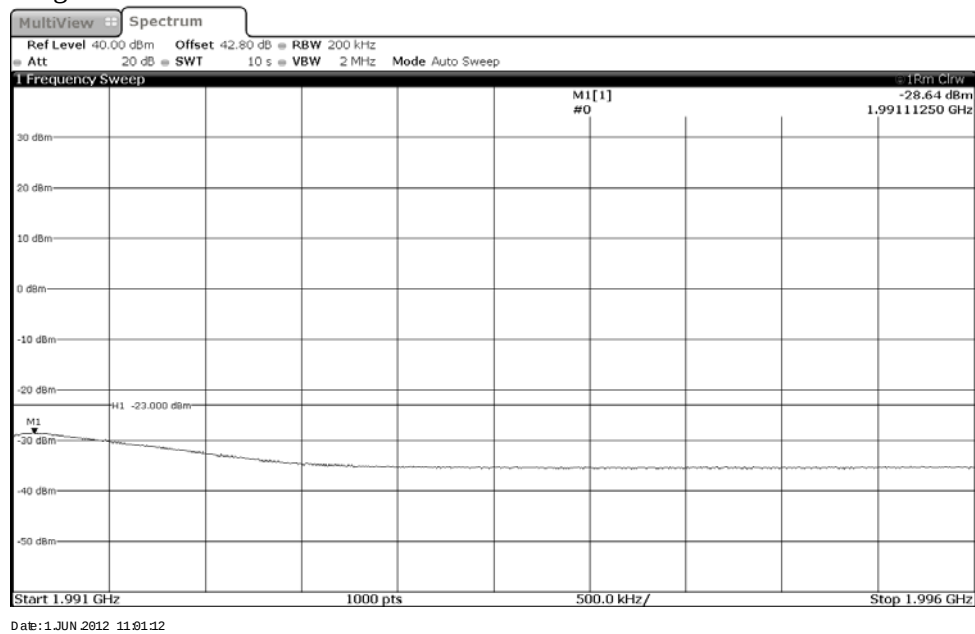


Diagram 8 b





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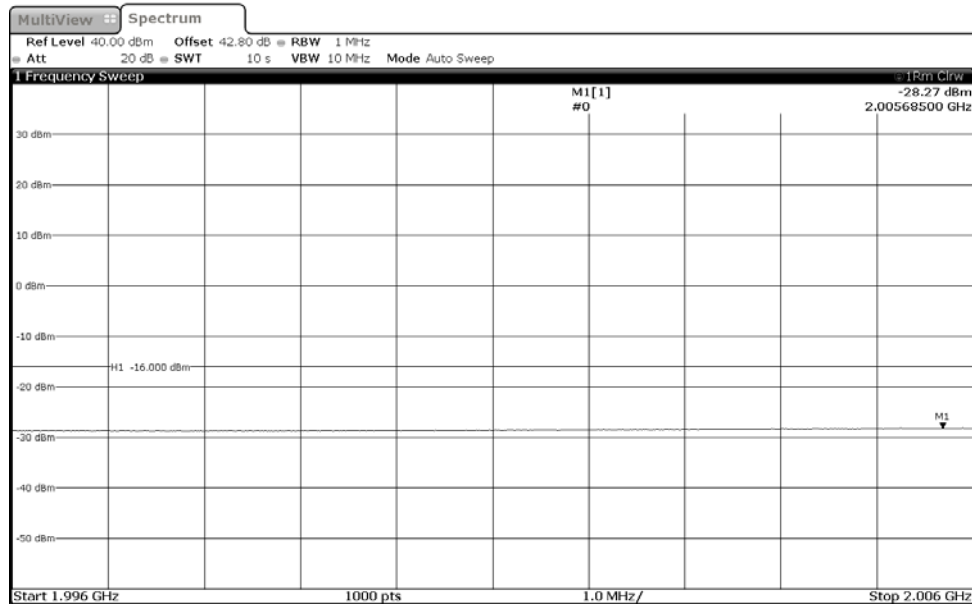
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IC: 287AB-AS1180231

Appendix 4

Diagram 8 c



Date: 1 JUN 2012 11:02:58



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Appendix 4

Diagram 9 a

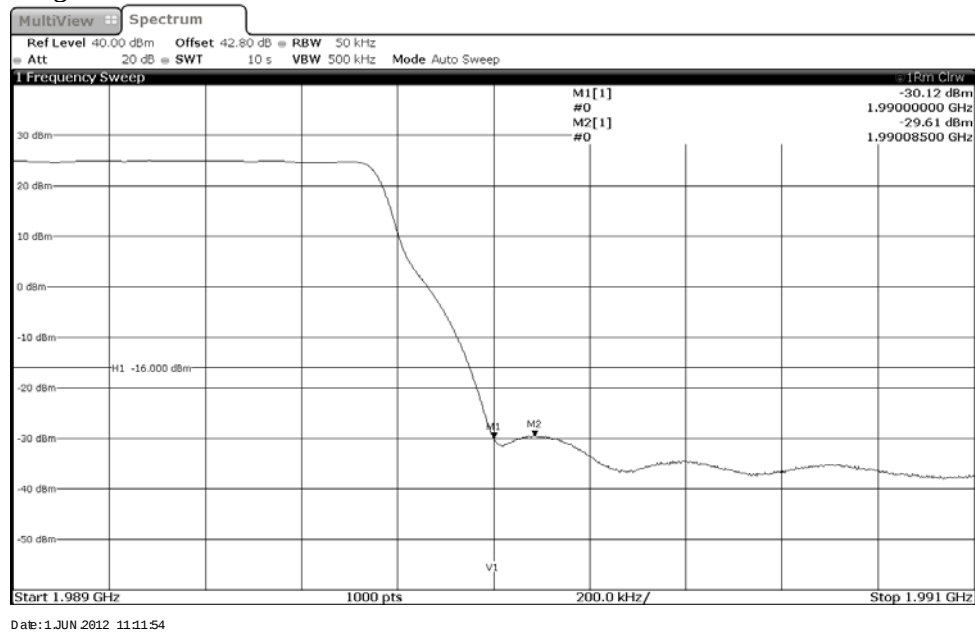
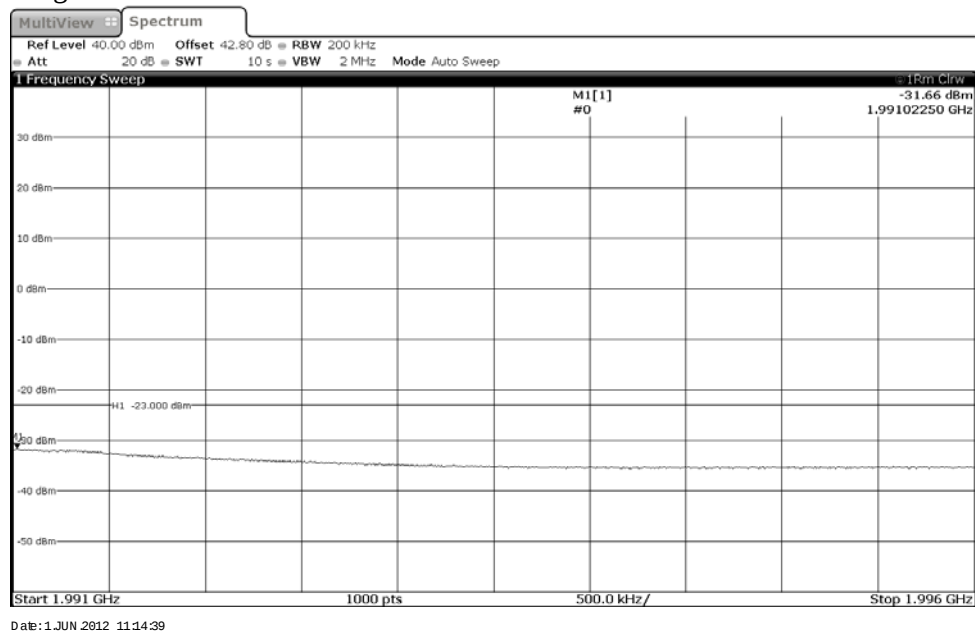


Diagram 9 b





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Date
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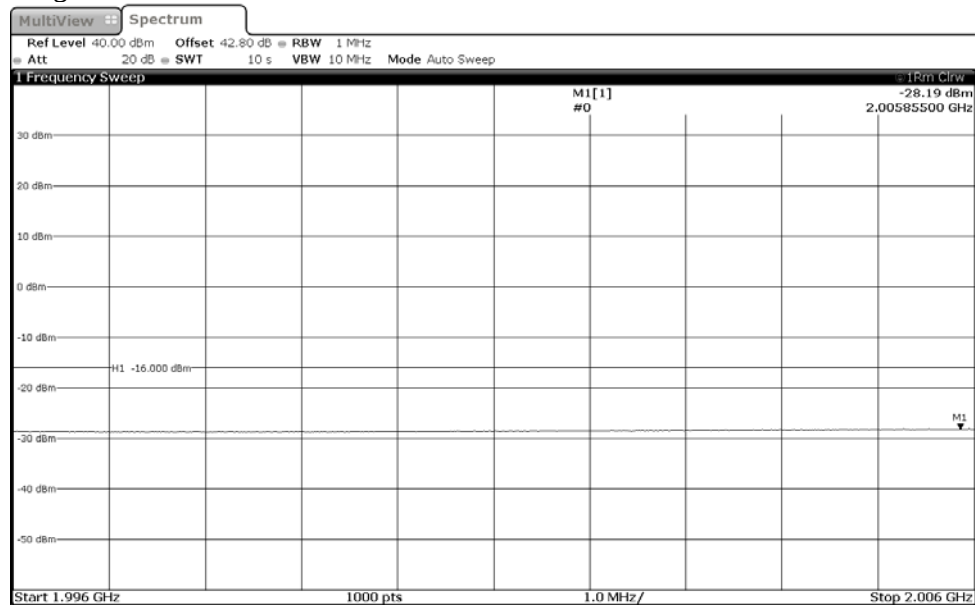
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IC: 287AB-AS1180231

Appendix 4

Diagram 9 c



Date: 1 JUN 2012 11:17:08



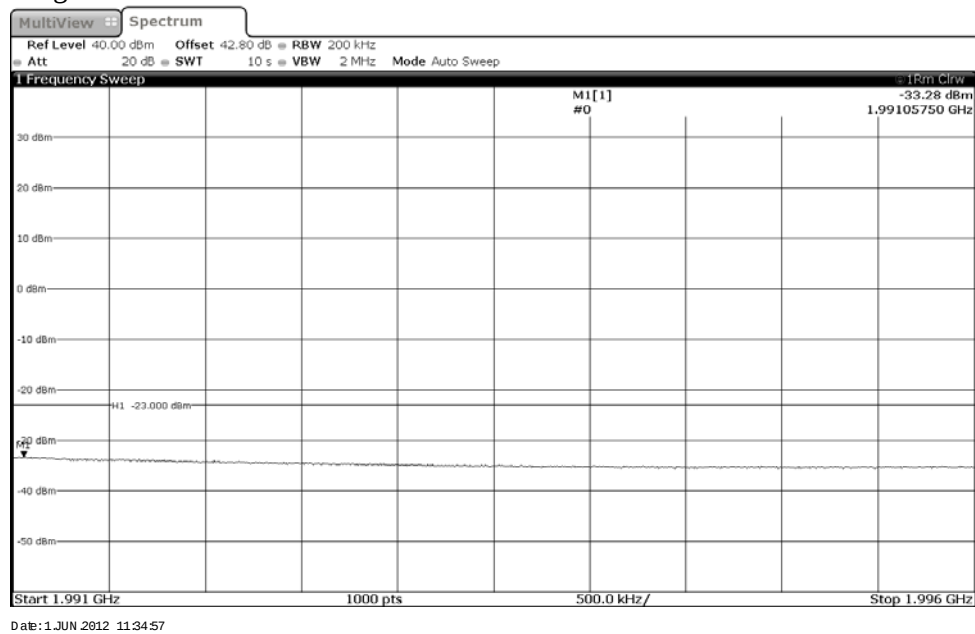
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Appendix 4

Diagram 10 a



Diagram 10 b





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2012-06-18

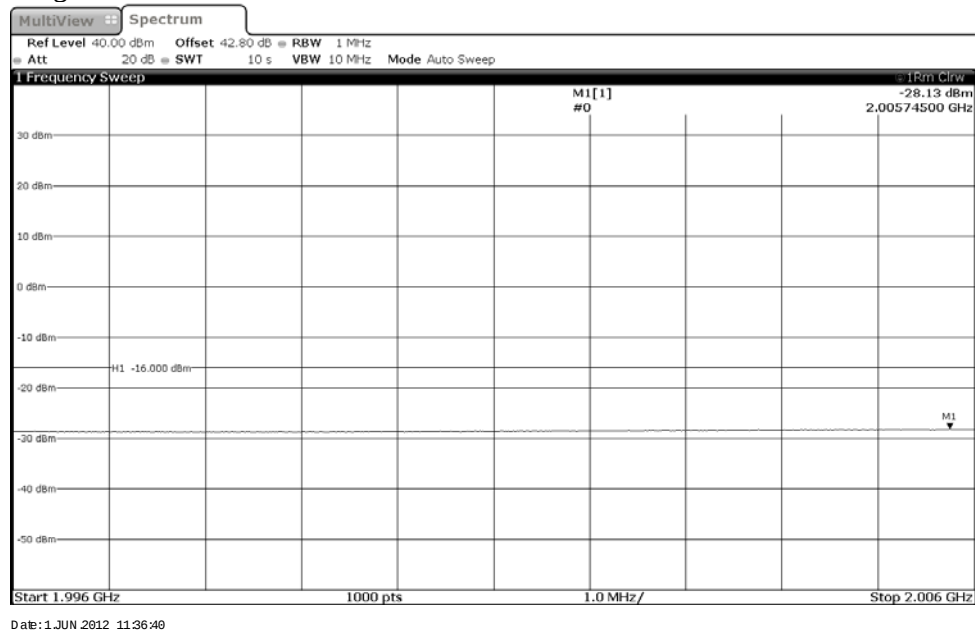
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IC: 287AB-AS1180231

Appendix 4

Diagram 10 c





FCC ID: TA8AKRC118023-1
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Appendix 4

Diagram 11 a

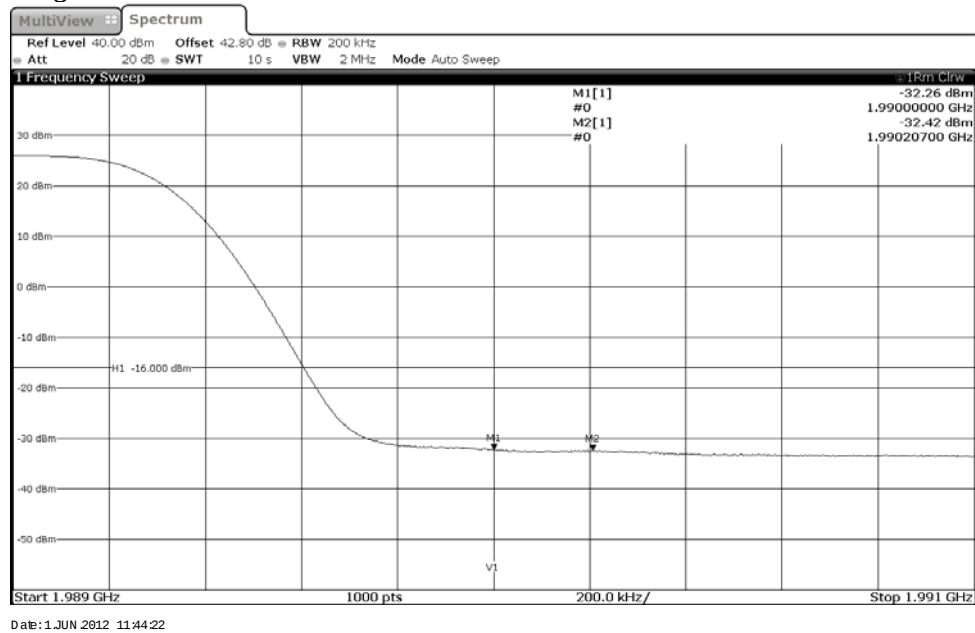
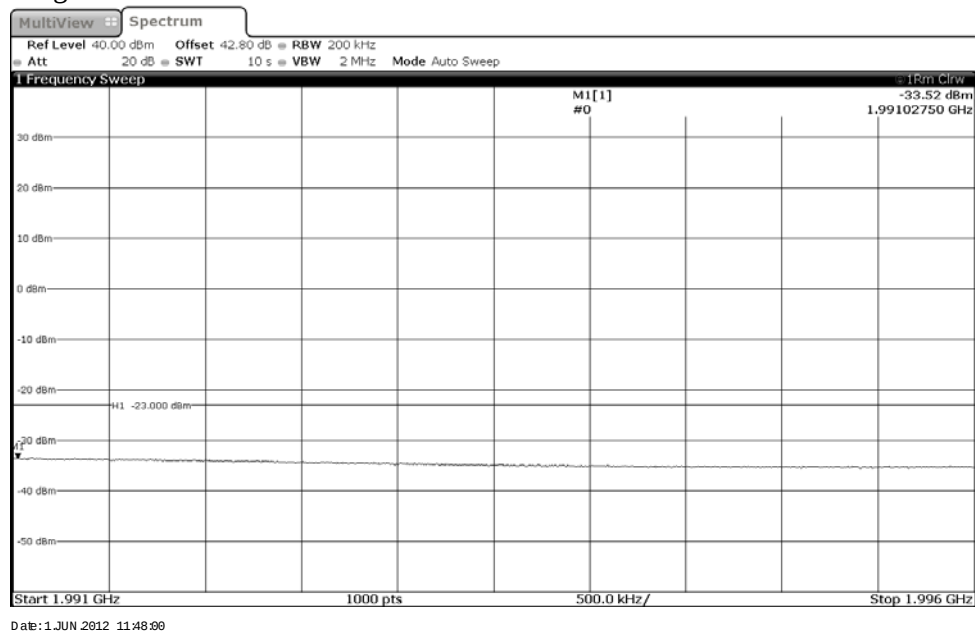


Diagram 11 b





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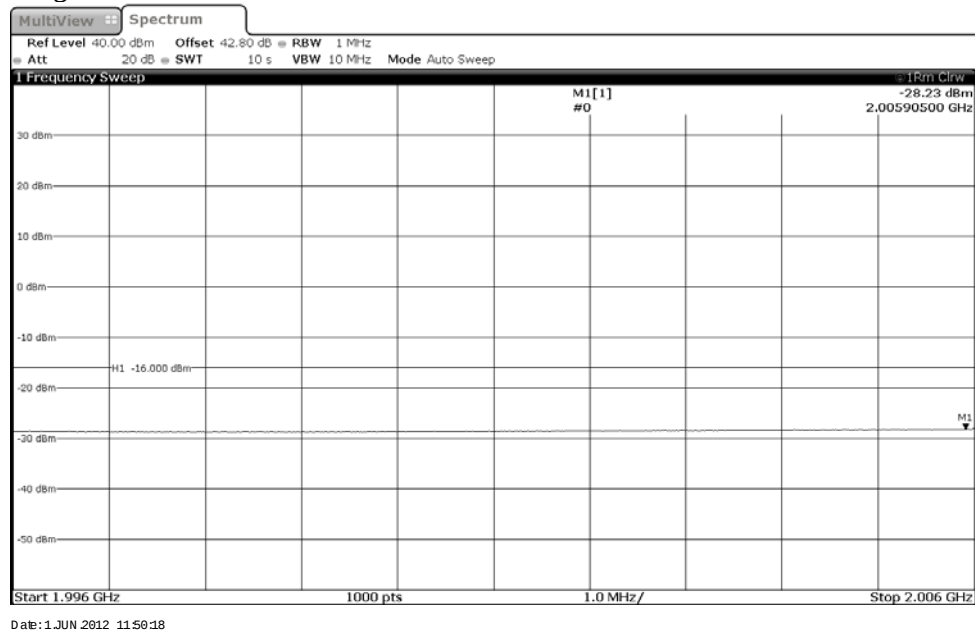
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IC: 287AB-AS1180231

Appendix 4

Diagram 11 c





FCC ID: TA8AKRC118023-1
IC: 287AB-AS1180231

Appendix 4

Diagram 12 a

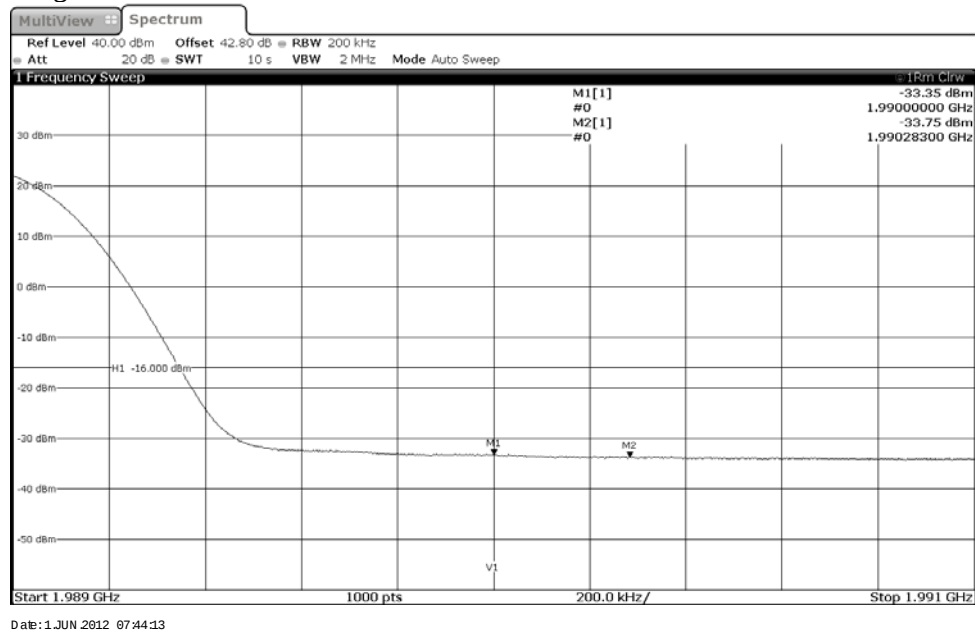
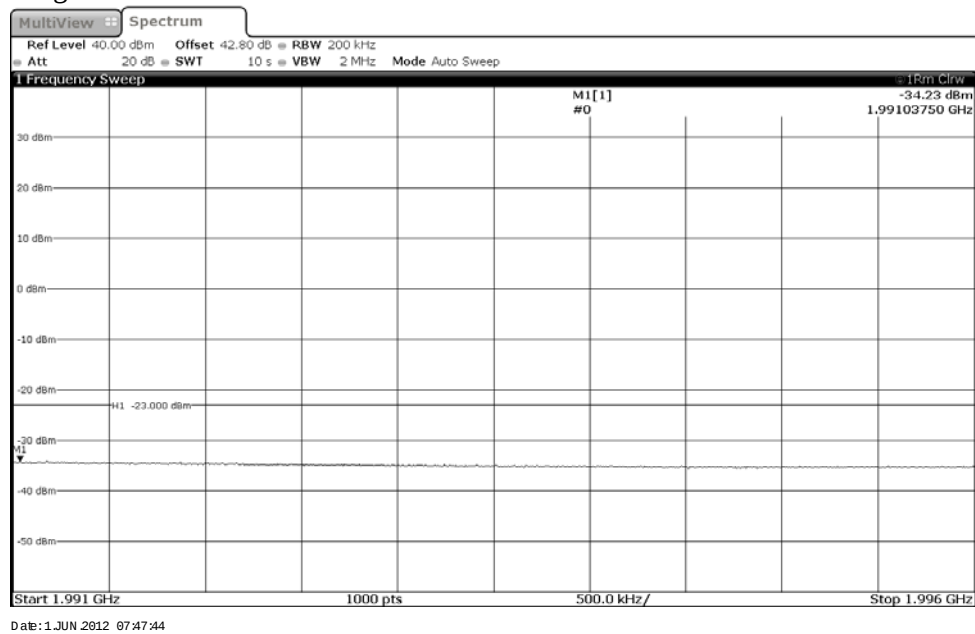


Diagram 12 b





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Date
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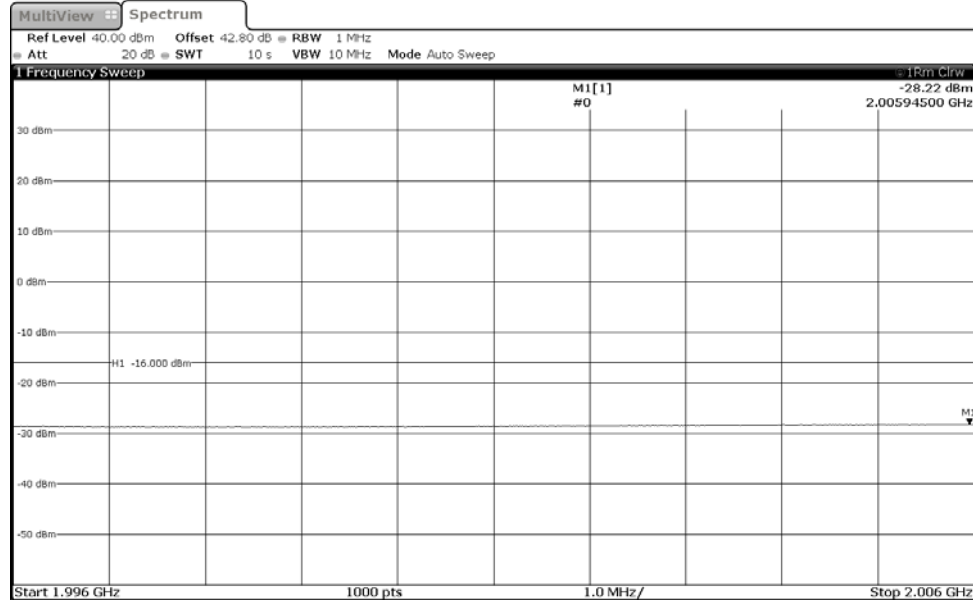
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IC: 287AB-AS1180231

Appendix 4

Diagram 12 c



Date: 1 JUN 2012 07:50:09



FCC ID: TA8AKRC118023-1
IC: 287AB-AS1180231

Appendix 4

Diagram 13 a

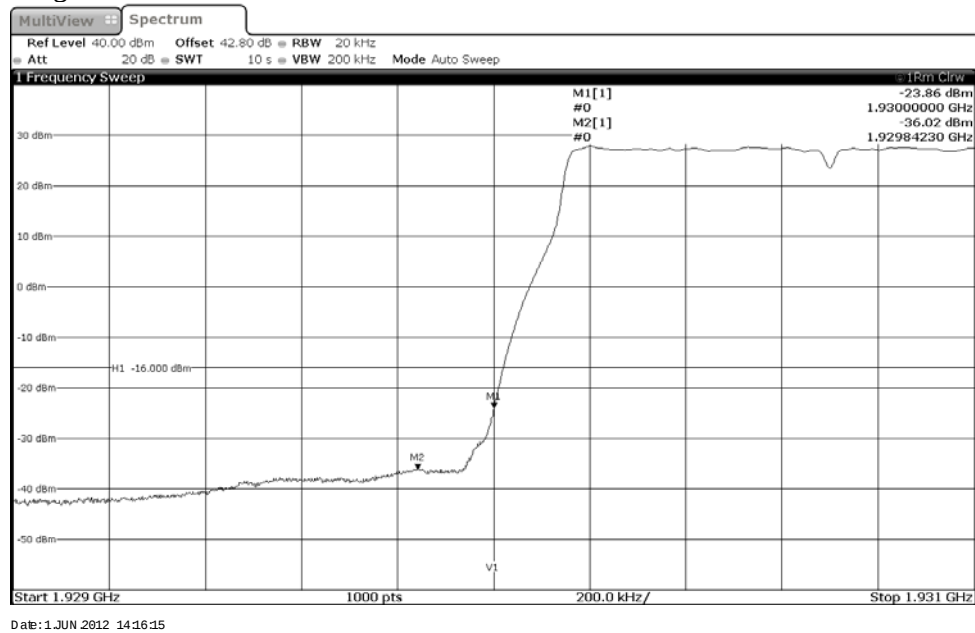
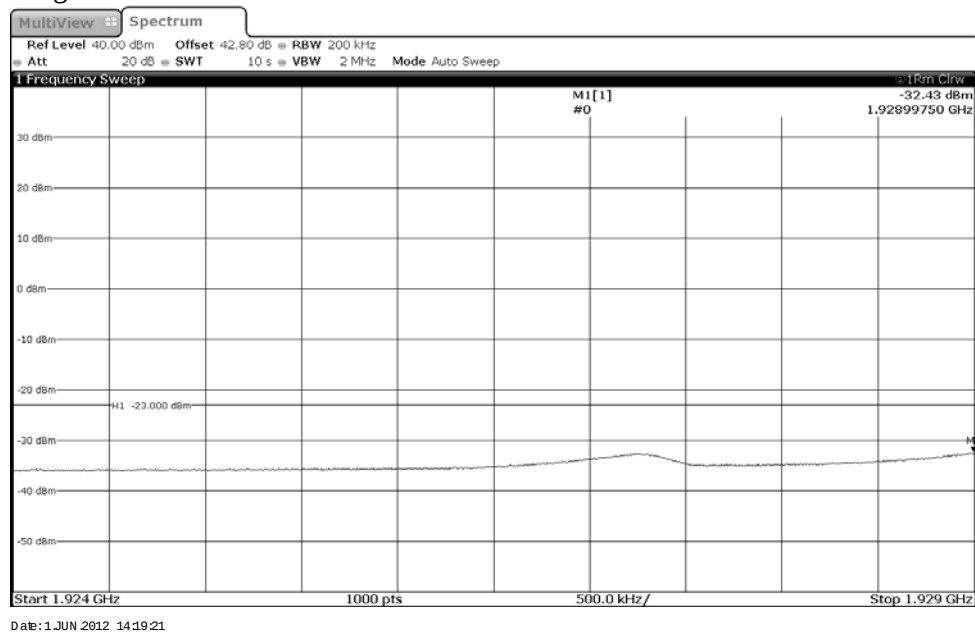


Diagram 13 b





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Date
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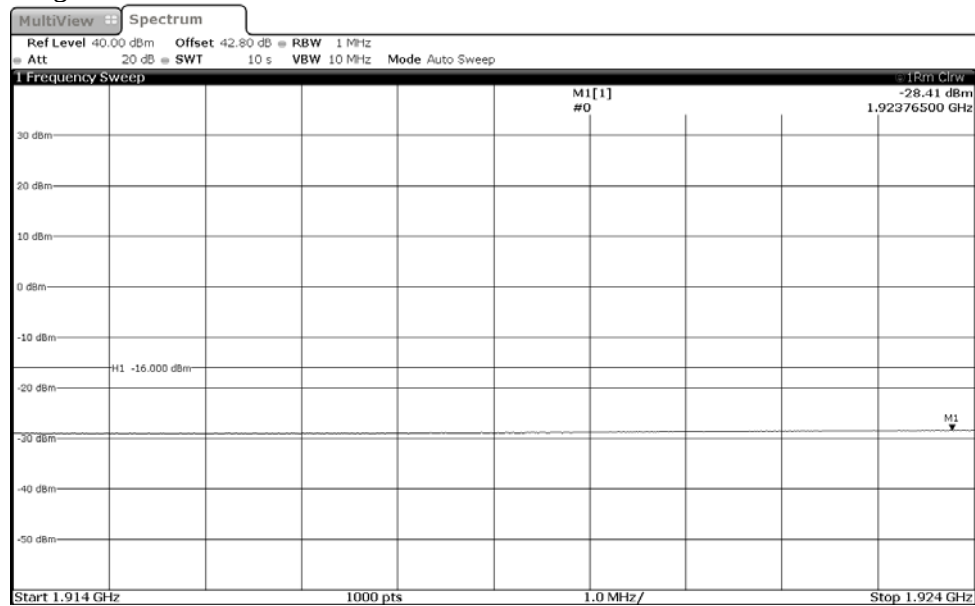
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28 (30)

FCC ID: TA8AKRC118023-1
IC: 287AB-AS1180231

Appendix 4

Diagram 13 c



Date: 1 JUN 2012 14:20:34



FCC ID: TA8AKRC118023-1
IC: 287AB-AS1180231

Appendix 4

Diagram 14 a

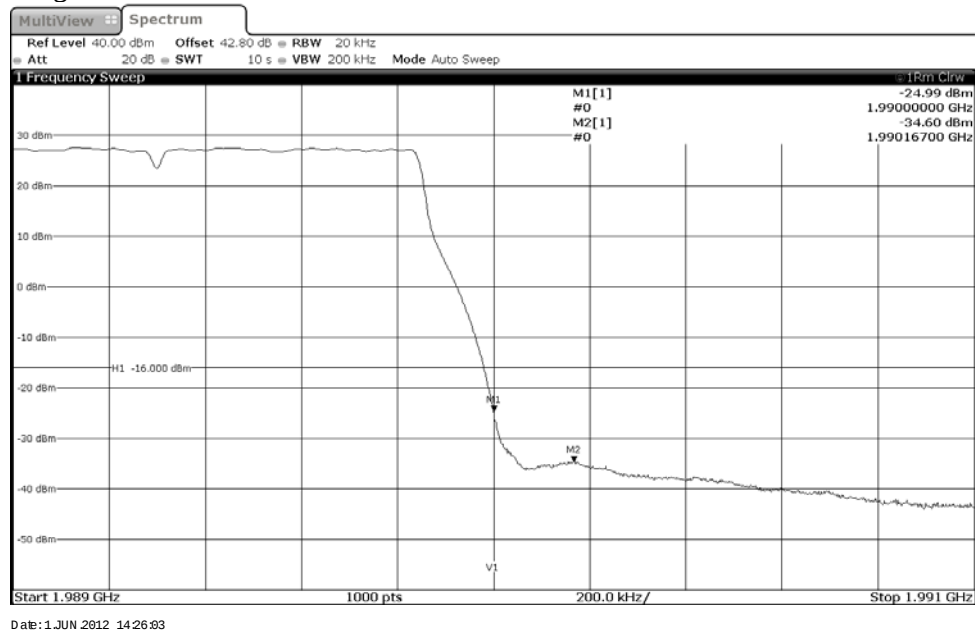
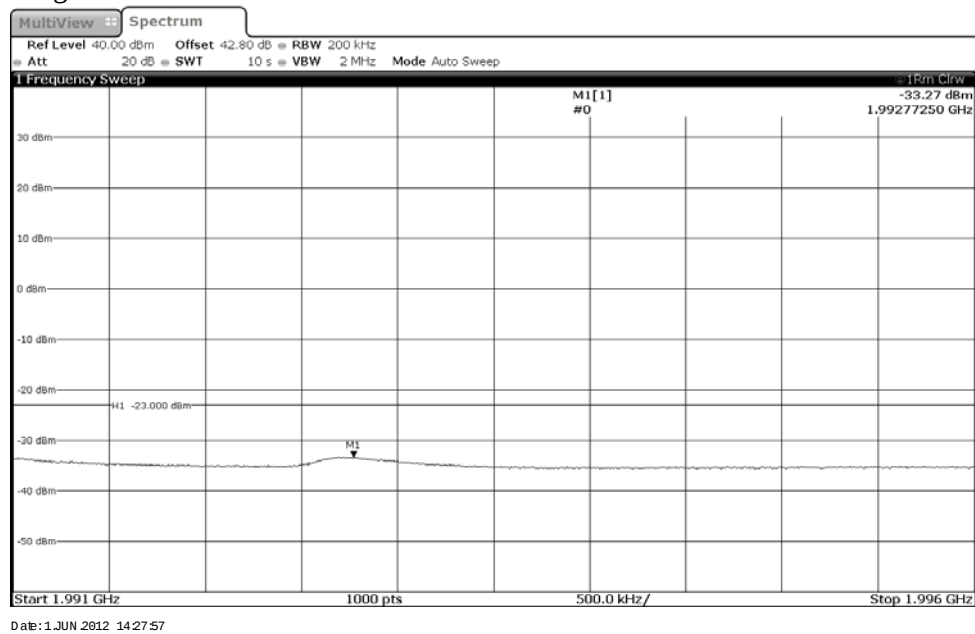


Diagram 14 b





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Date
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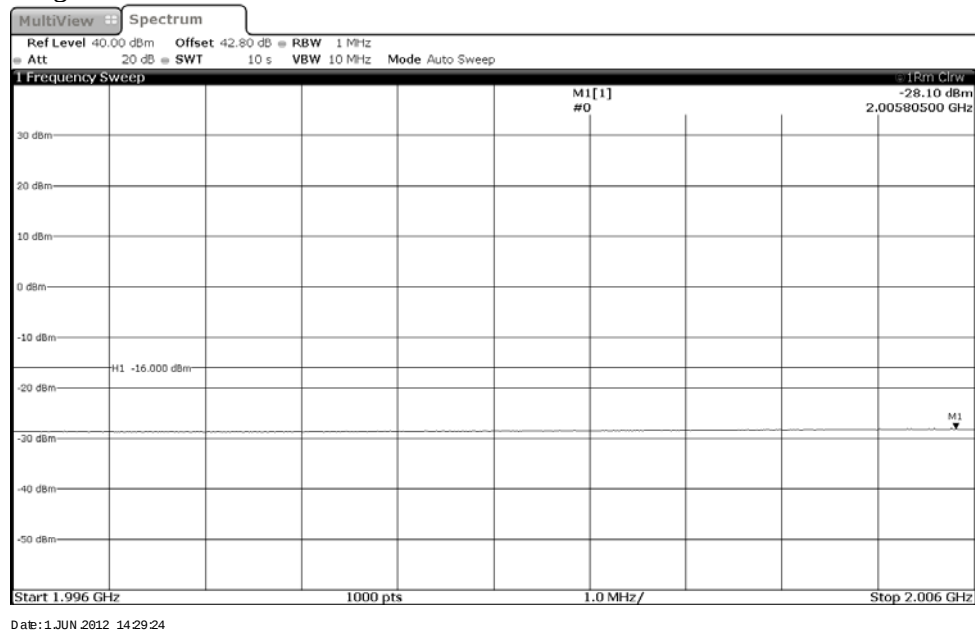
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FCC ID: TA8AKRC118023-1
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Appendix 4

Diagram 14 c



FCC ID: TA8AKRC118023-1
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Appendix 5

Conducted spurious emission measurements according to CFR 47 §24.238 / IC RSS-133 6.5

Date	Temperature	Humidity
2012-05-24	22 °C ± 3 °C	53 % ± 5 %
2012-05-25	22 °C ± 3 °C	44 % ± 5 %
2012-05-29	22 °C ± 3 °C	30 % ± 5 %
2012-05-30	22 °C ± 3 °C	35 % ± 5 %
2012-06-01	22 °C ± 3 °C	35 % ± 5 %
2012-06-15	23 °C ± 3 °C	37 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §24.238. 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 FSW	--
Rohde & Schwarz signal analyzer FSQ40	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
11a-d	1.4	M, RF B
12 a-d	20	M, RF B



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Appendix 5

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 $10 \times 2.5 \text{ GHz} = 25 \text{ GHz}$ for emission measurements.

Limits

§24.238 and RSS-133 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 $43 + 10 \log (P) \text{ dB}$, resulting in a limit of -13 dBm per 1 MHz RBW.

Complies?	Yes
-----------	-----



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Date
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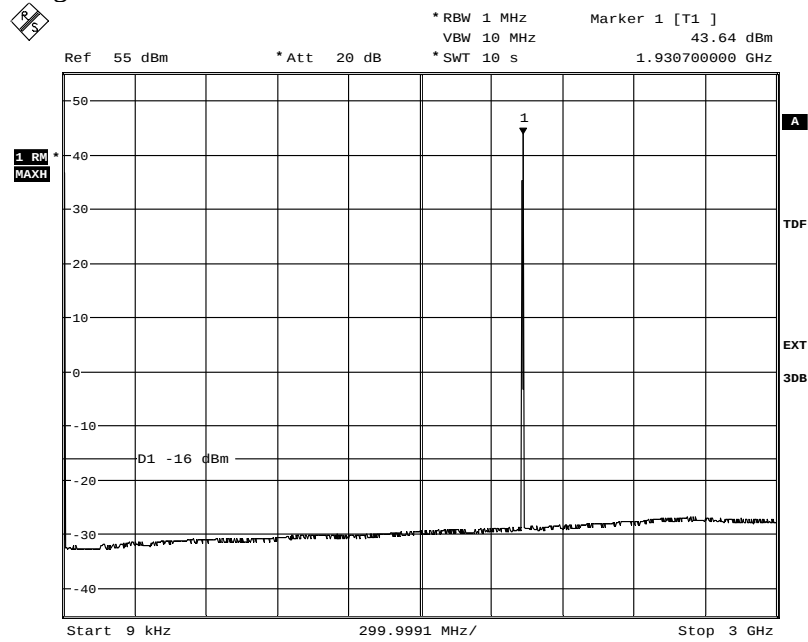
Reference
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IC: 287AB-AS1180231

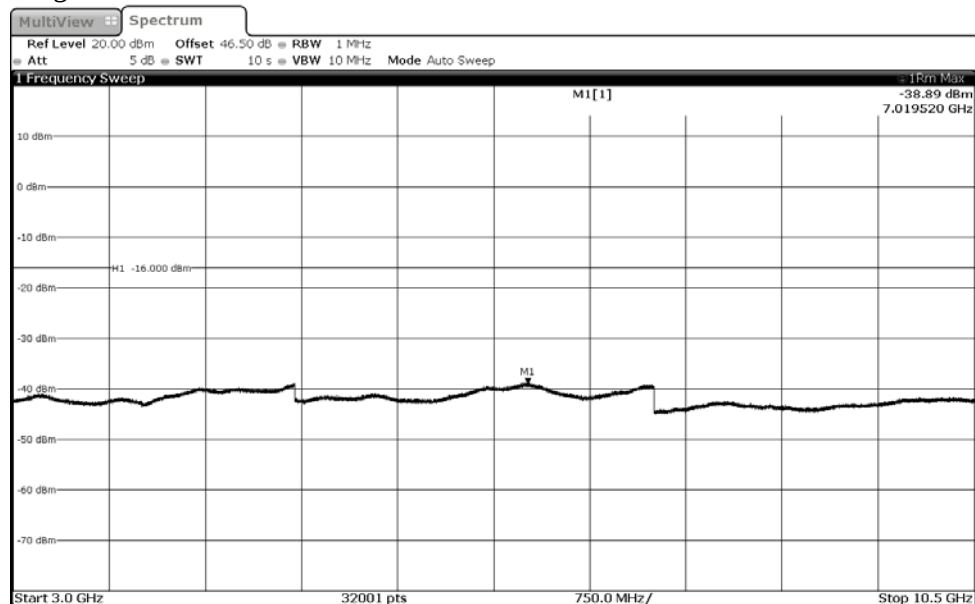
Appendix 5

Diagram 1a:



Date: 15.JUN.2012 07:54:14

Diagram 1b:



Date: 30 MAY 2012 09:19:44



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Reference
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Appendix 5

Diagram 1c:

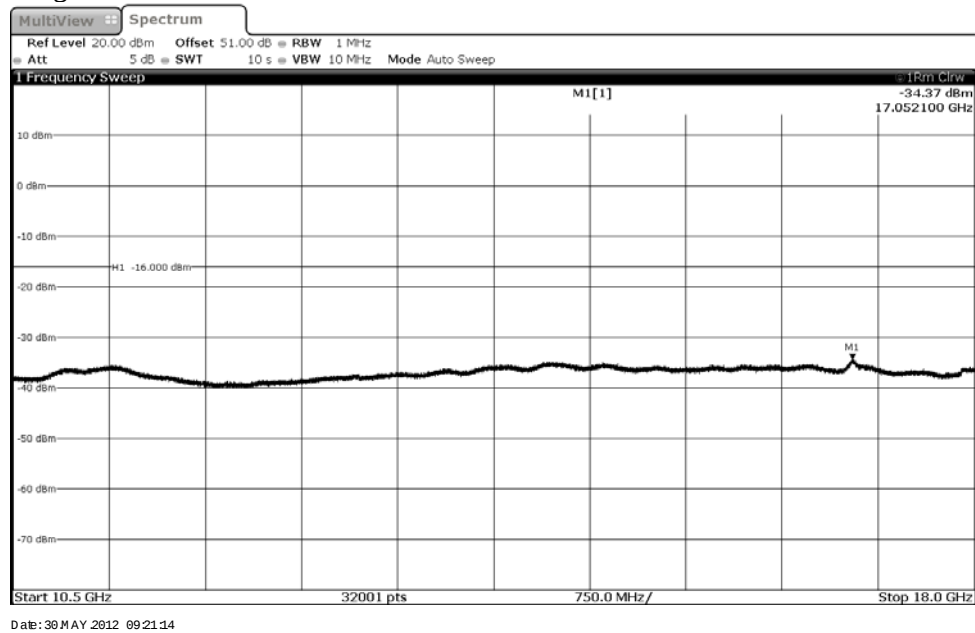
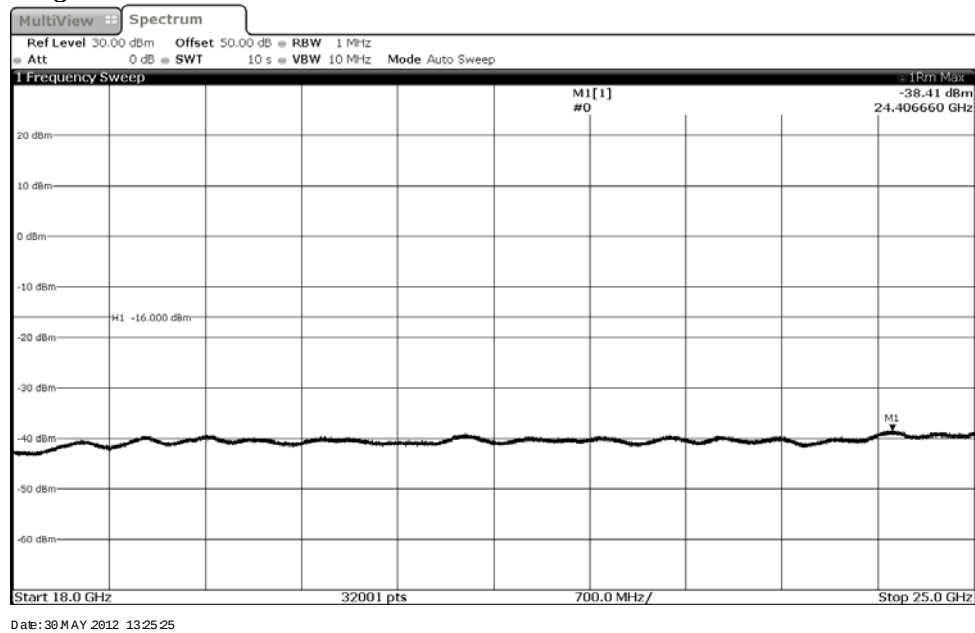


Diagram 1d:





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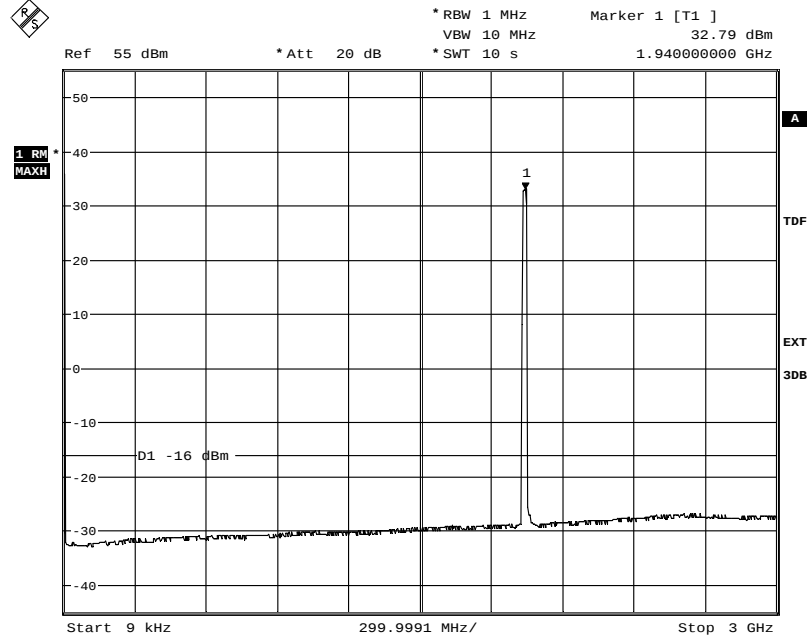
Reference
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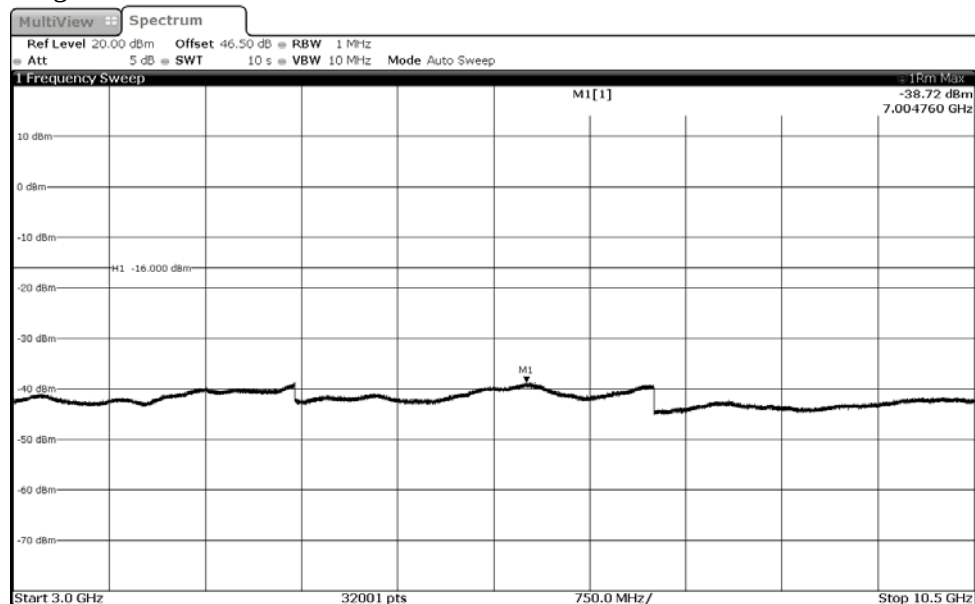
Appendix 5

Diagram 2a:



Date: 15.JUN.2012 08:00:12

Diagram 2b:



Date: 30 MAY 2012 13:11:38



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FCC ID: TA8AKRC118023-1
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Appendix 5

Diagram 2c:

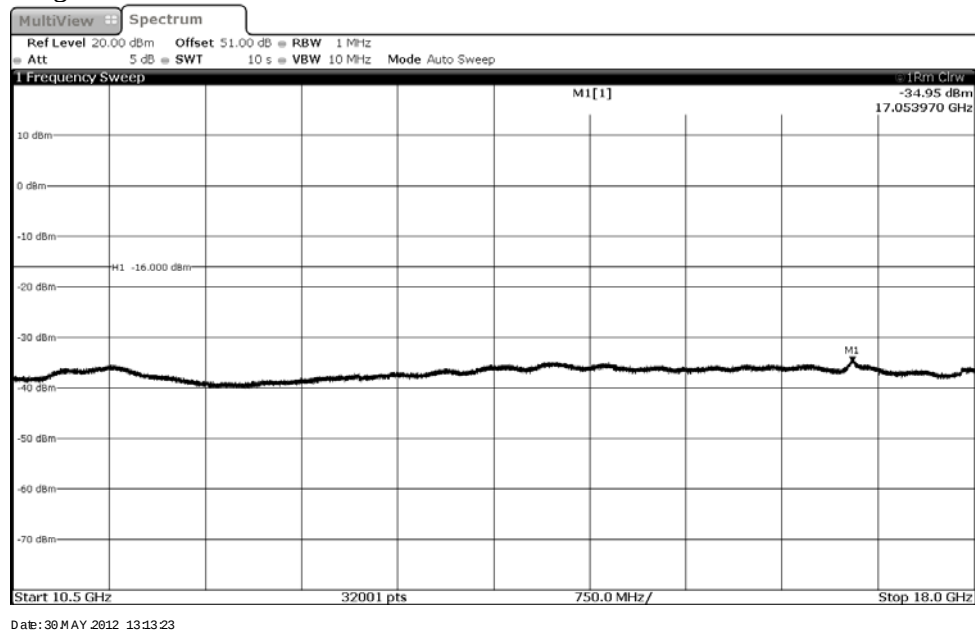
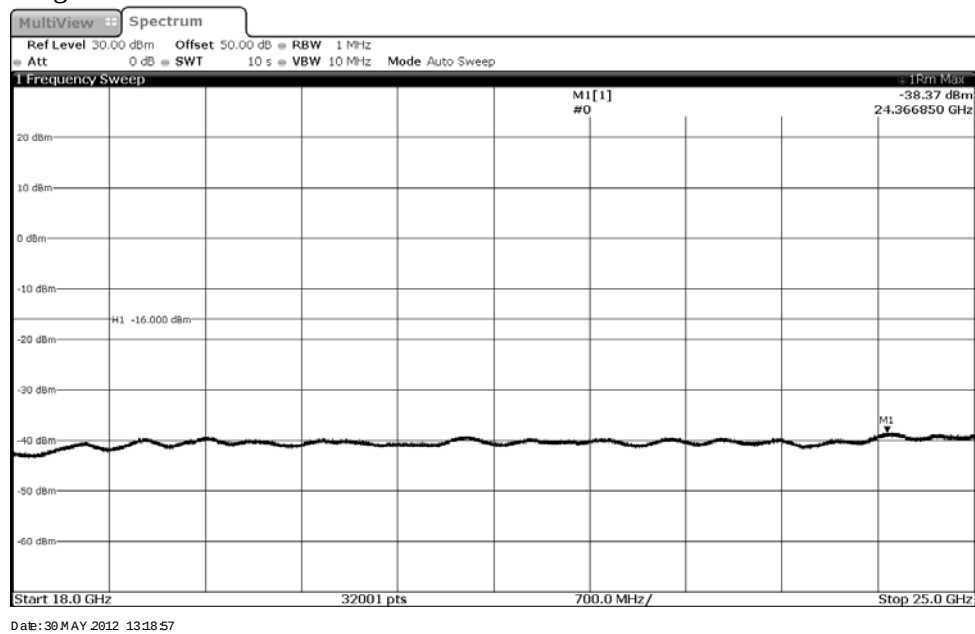


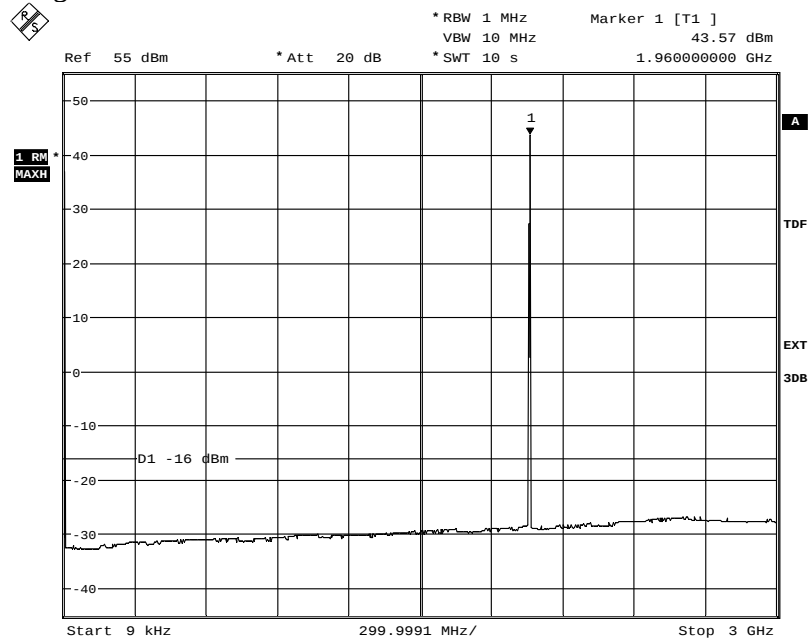
Diagram 2d:



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IC: 287AB-AS1180231

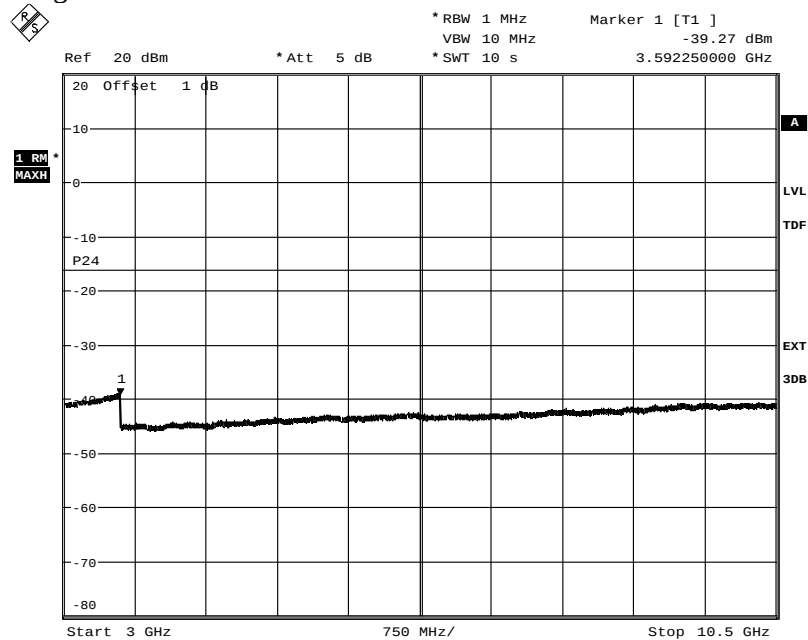
Appendix 5

Diagram 3a:



Date: 15.JUN.2012 07:10:49

Diagram 3b:



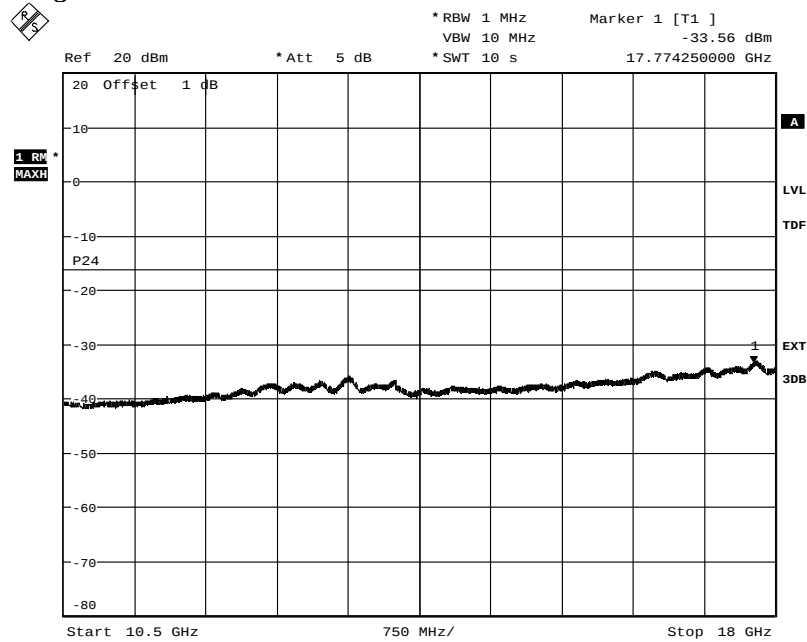
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IC: 287AB-AS1180231

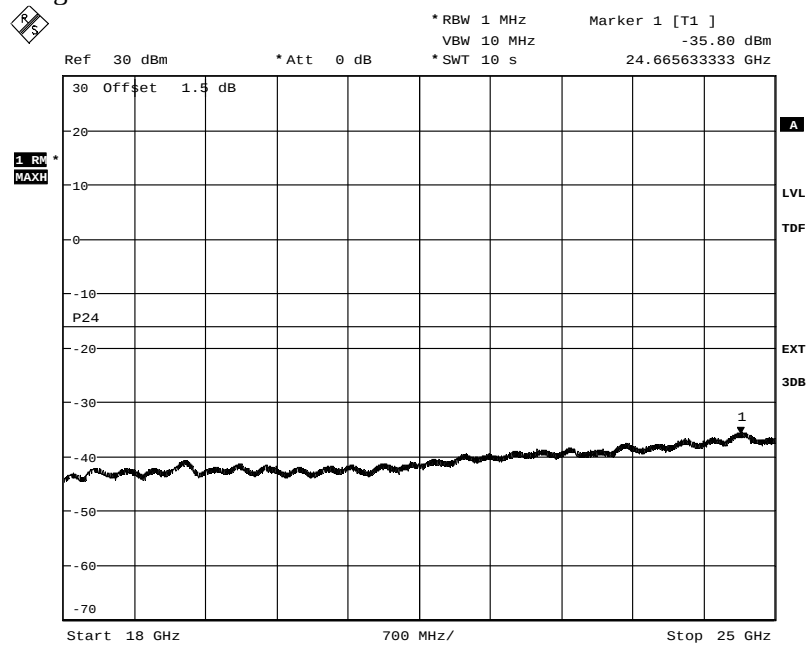
Appendix 5

Diagram 3c:



Date: 24.MAY.2012 15:11:13

Diagram 3d:

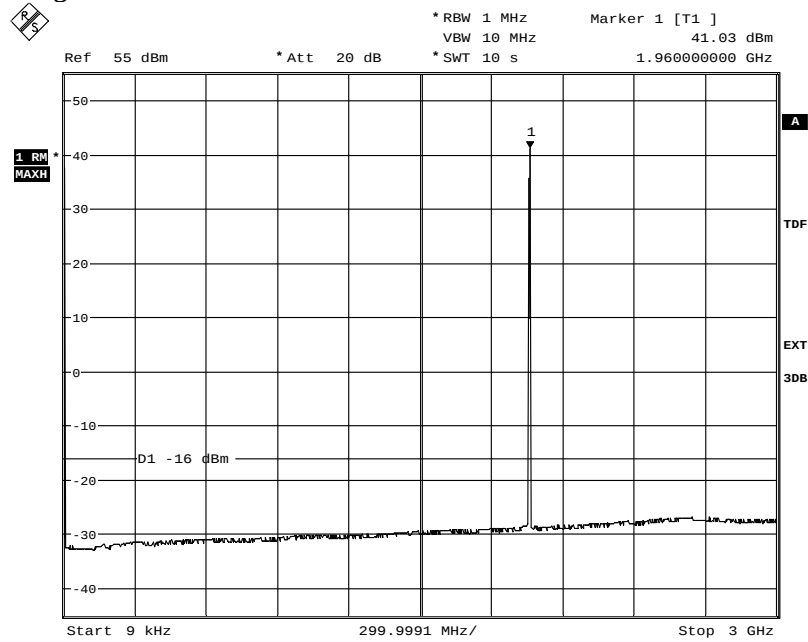


Date: 24.MAY.2012 15:15:07

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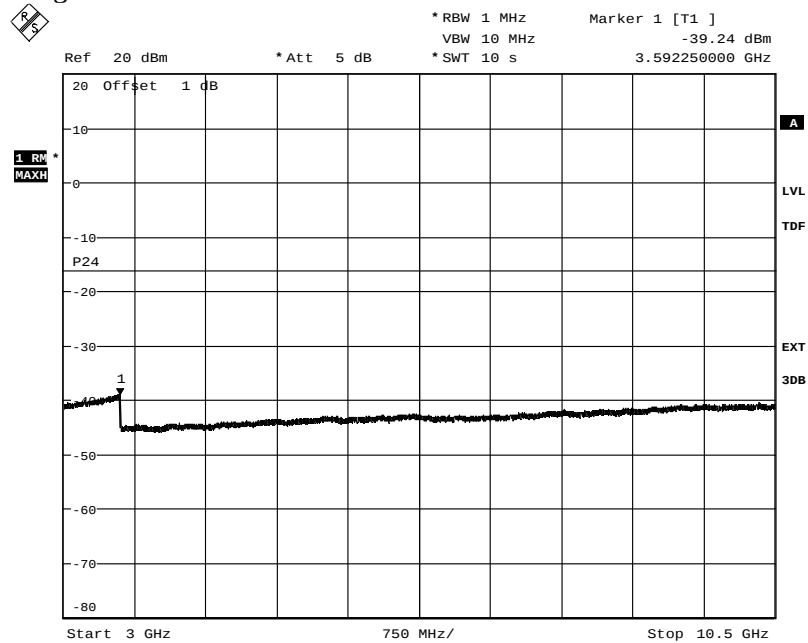
Appendix 5

Diagram 4a:



Date: 15.JUN.2012 07:17:31

Diagram 4b:



Date: 24.MAY.2012 15:25:35



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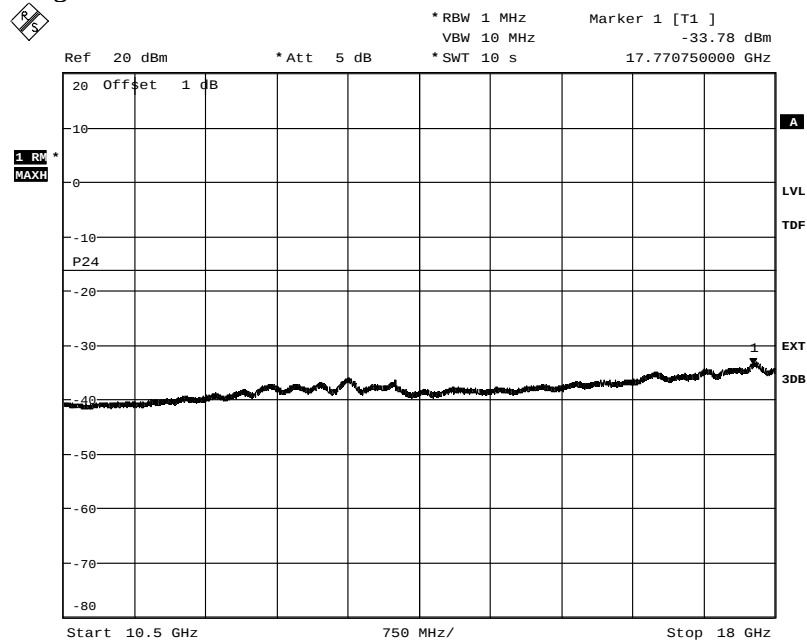
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FCC ID: TA8AKRC118023-1
IC: 287AB-AS1180231

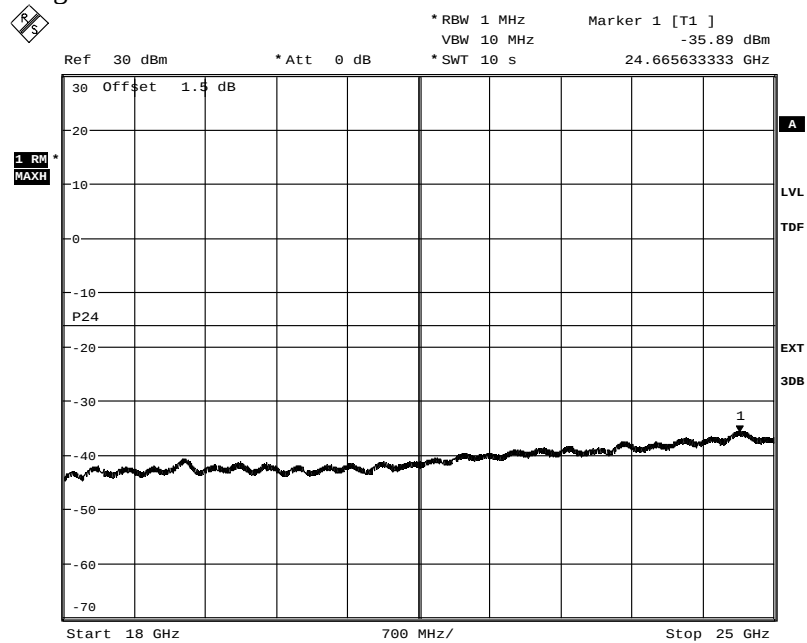
Appendix 5

Diagram 4c:



Date: 24.MAY.2012 15:27:00

Diagram 4d:

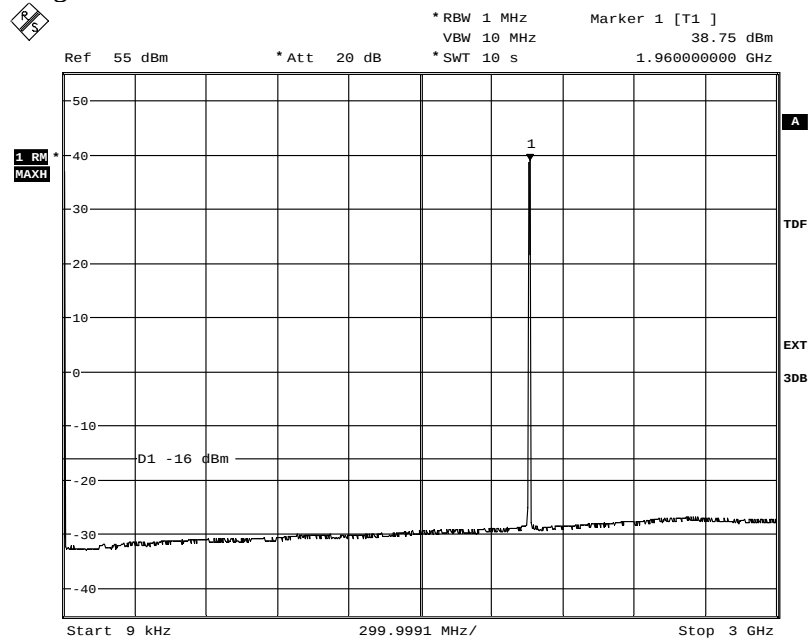


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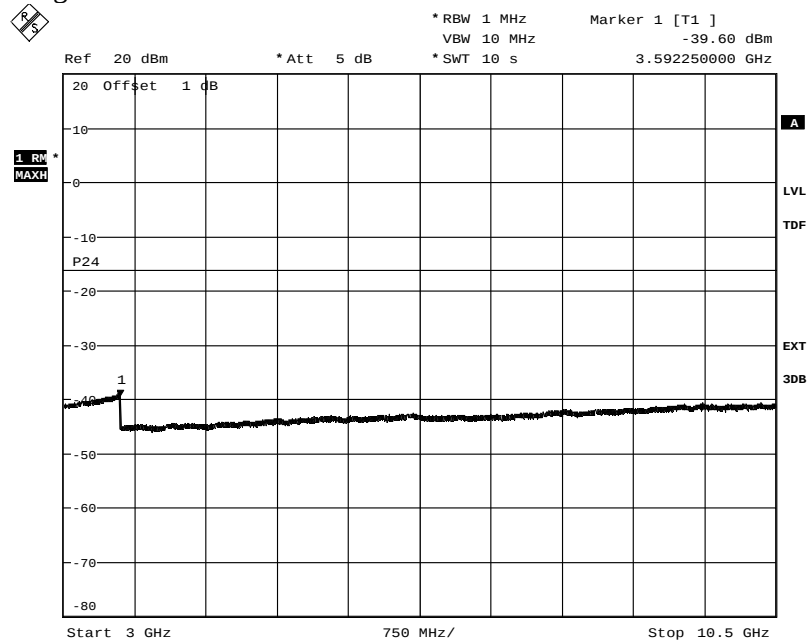
Appendix 5

Diagram 5a:



Date: 15.JUN.2012 07:21:44

Diagram 5b:

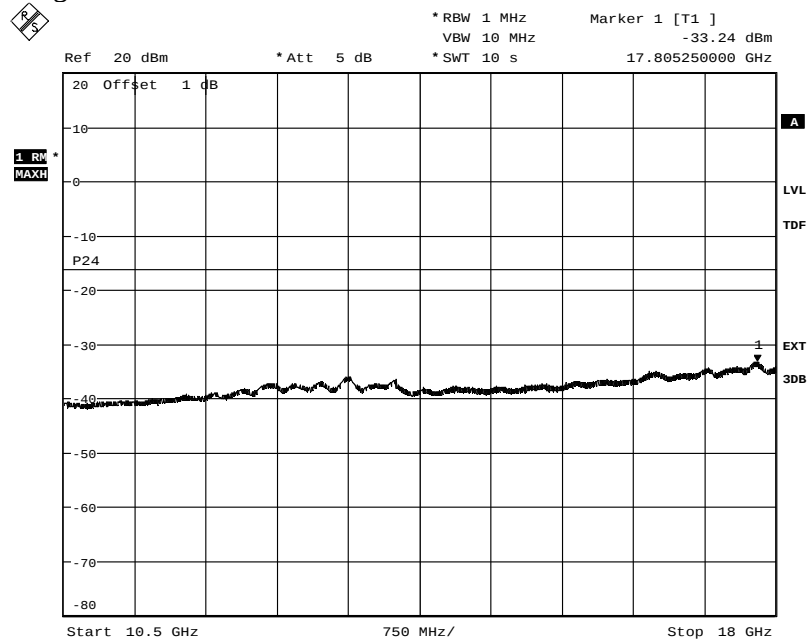


Date: 25.MAY.2012 07:55:18

FCC ID: TA8AKRC118023-1
IC: 287AB-AS1180231

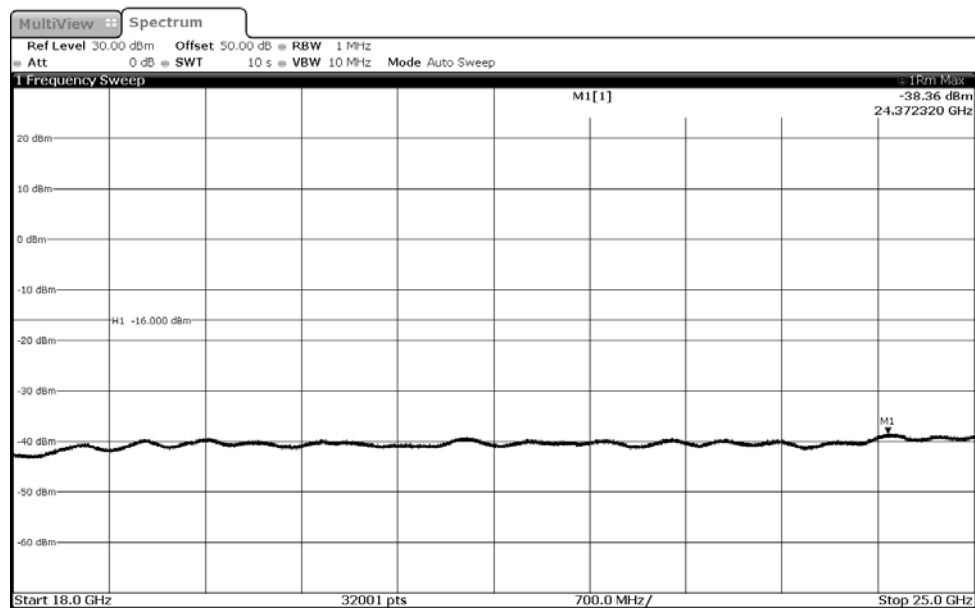
Appendix 5

Diagram 5c:



Date: 25.MAY.2012 07:56:55

Diagram 5d:

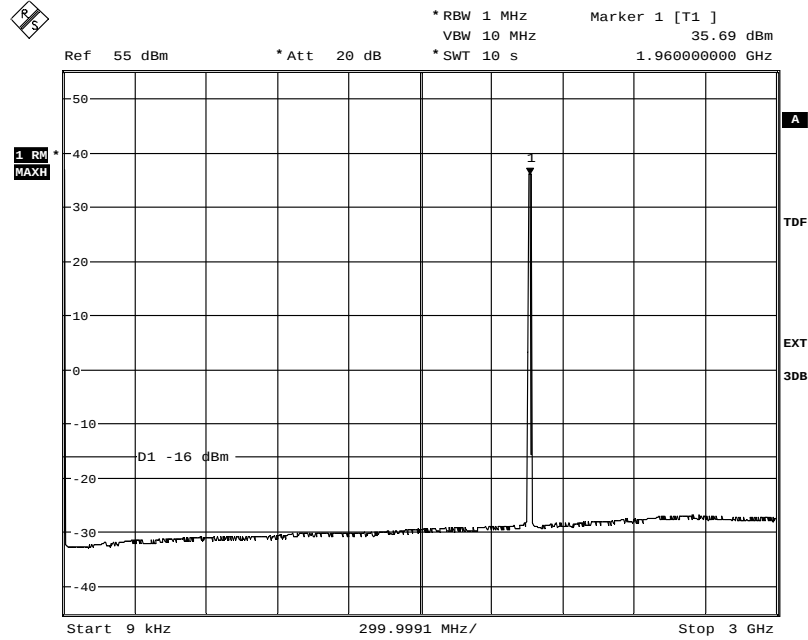


Date: 29 MAY 2012 13:11:20

FCC ID: TA8AKRC118023-1
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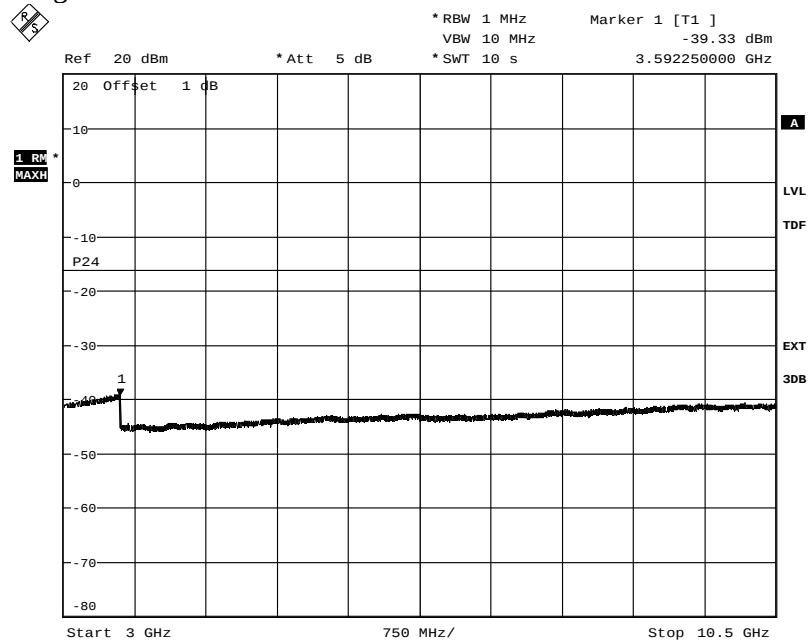
Appendix 5

Diagram 6a:



Date: 15.JUN.2012 07:29:27

Diagram 6b:

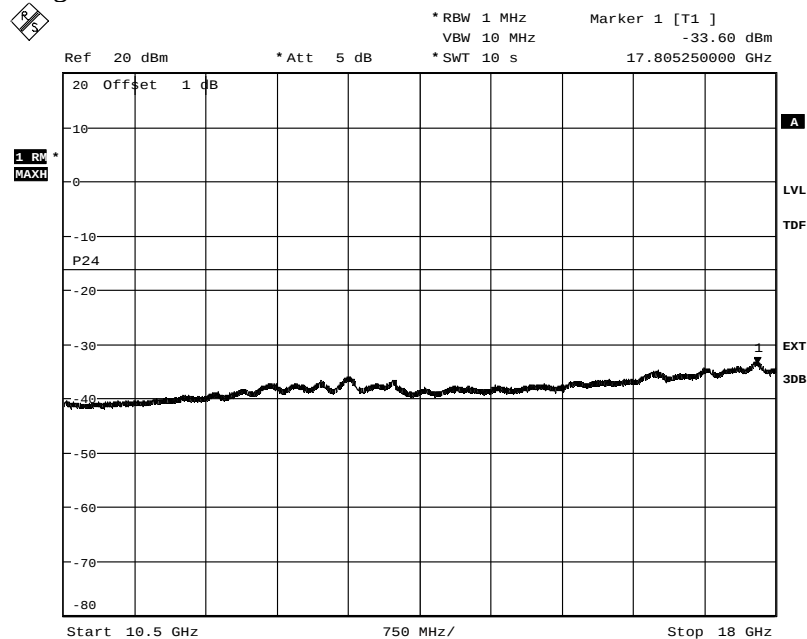


Date: 25.MAY.2012 08:05:16

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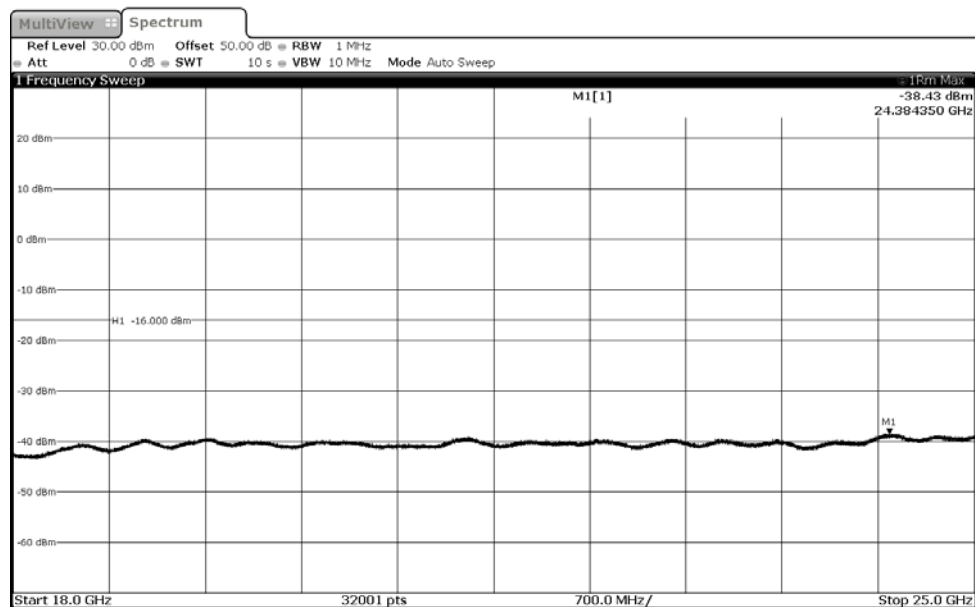
Appendix 5

Diagram 6c:



Date: 25.MAY.2012 08:02:54

Diagram 6d:

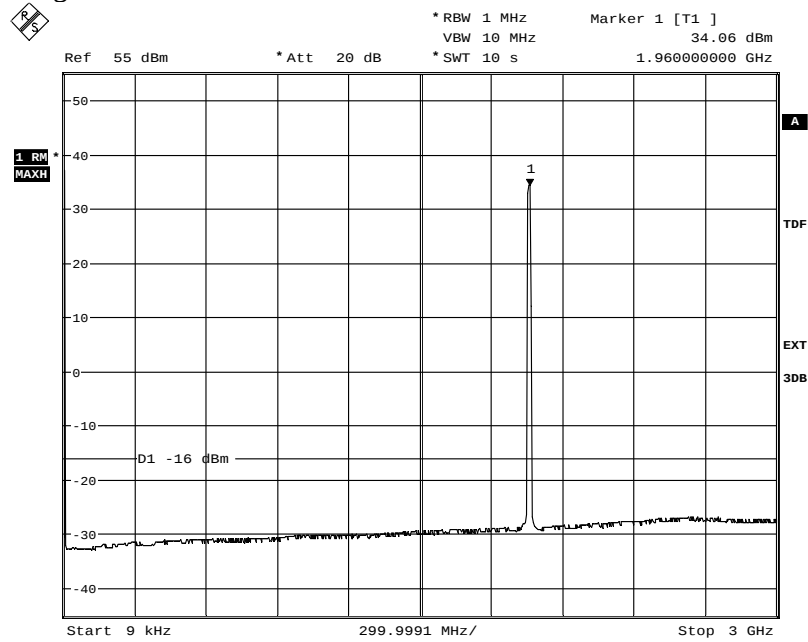


Date: 29 MAY 2012 13:20:48

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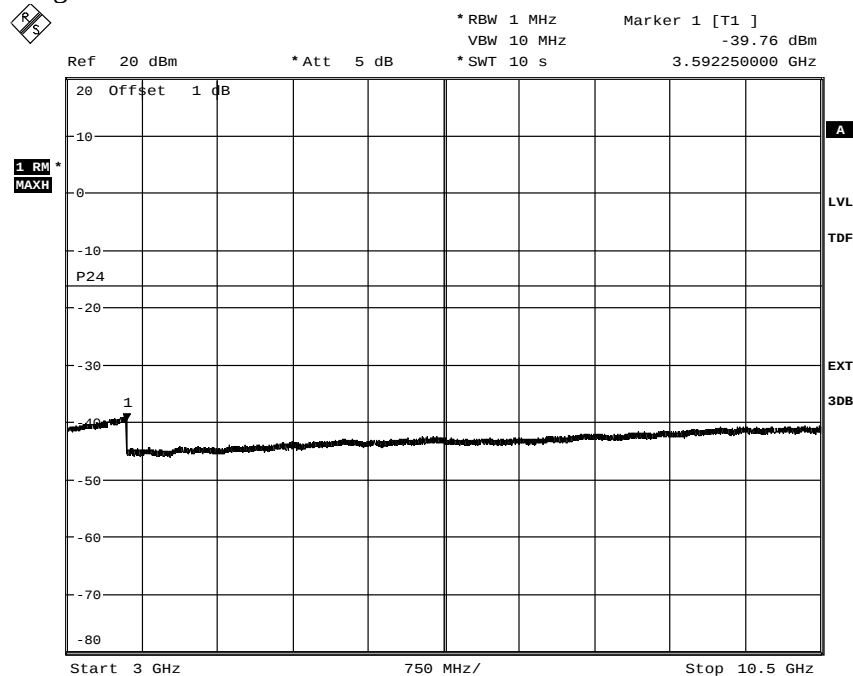
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Diagram 7a:



Date: 15.JUN.2012 07:34:08

Diagram 7b:



Date: 25.MAY.2012 09:18:43



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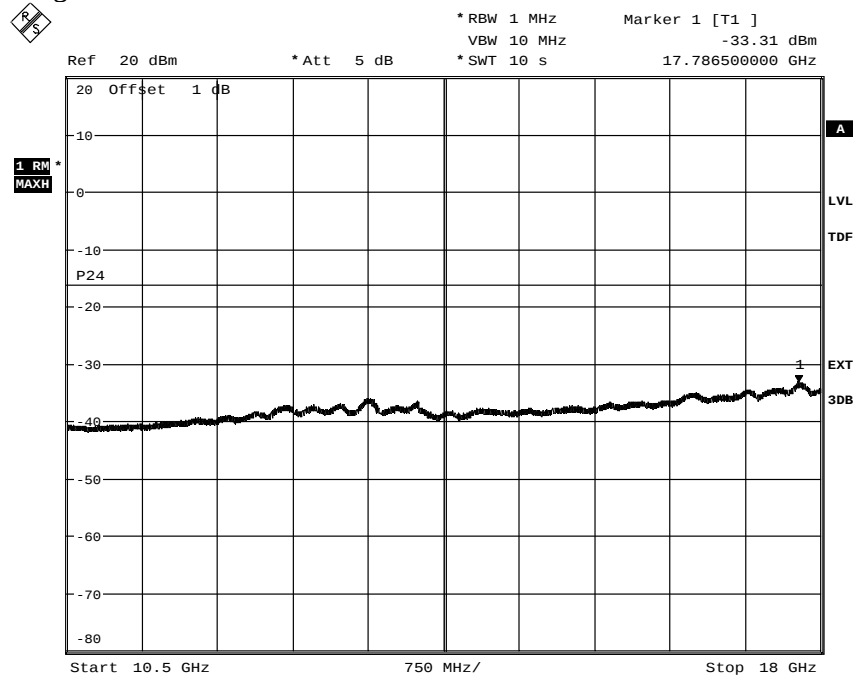
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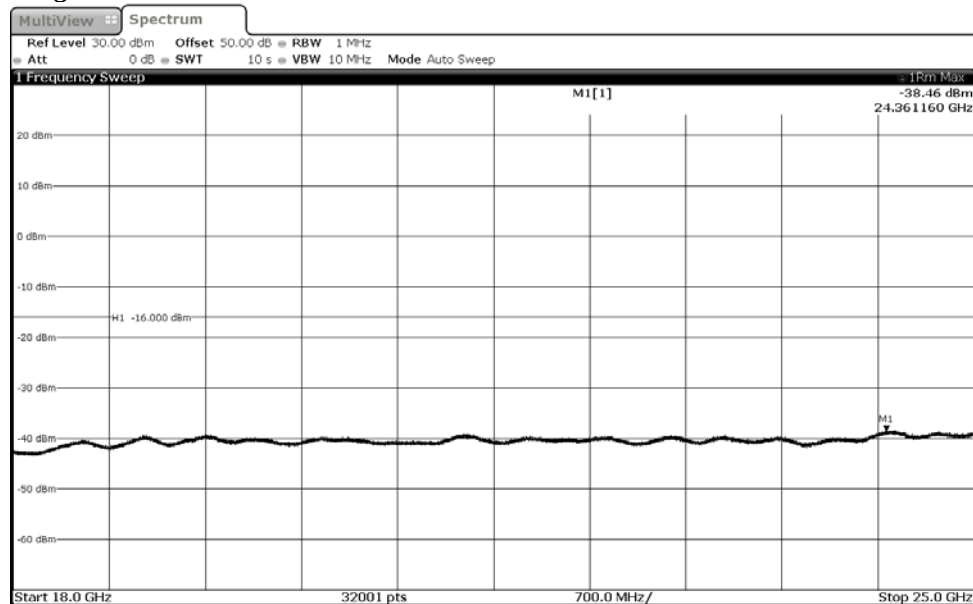
Appendix 5

Diagram 7c:



Date: 25.MAY.2012 09:19:45

Diagram 7d:



Date: 29 MAY 2012 13:33:04



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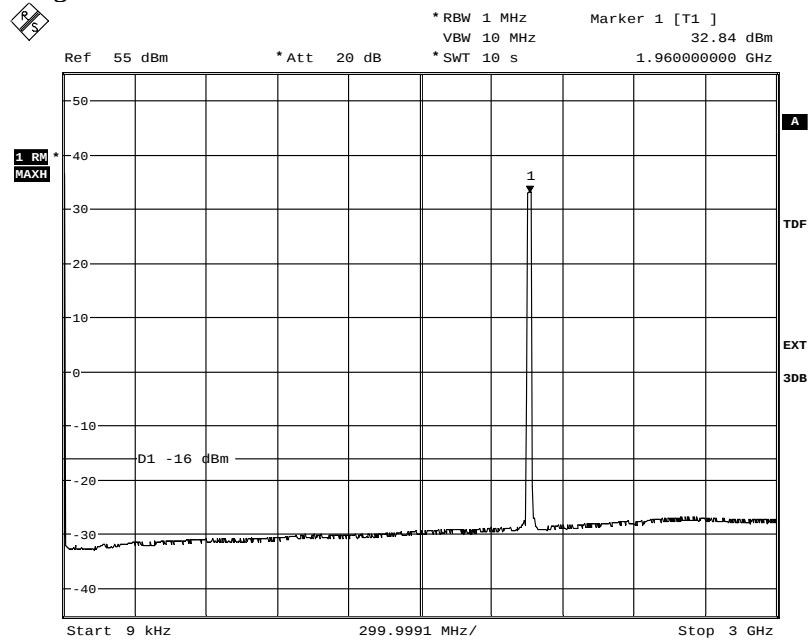
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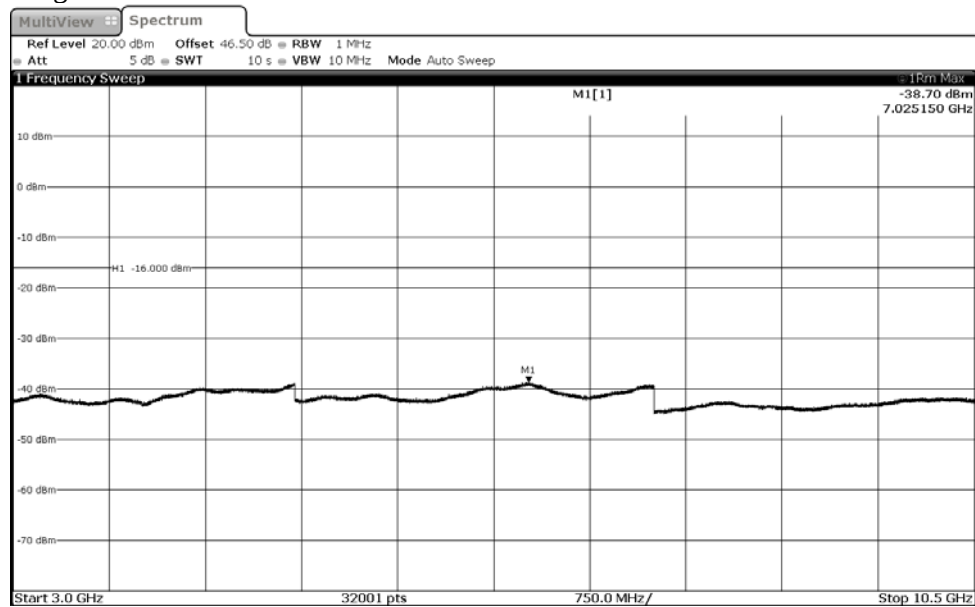
Appendix 5

Diagram 8a:



Date: 15.JUN.2012 07:40:12

Diagram 8b:



Date: 30 MAY 2012 08:26:20



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Diagram 8c:

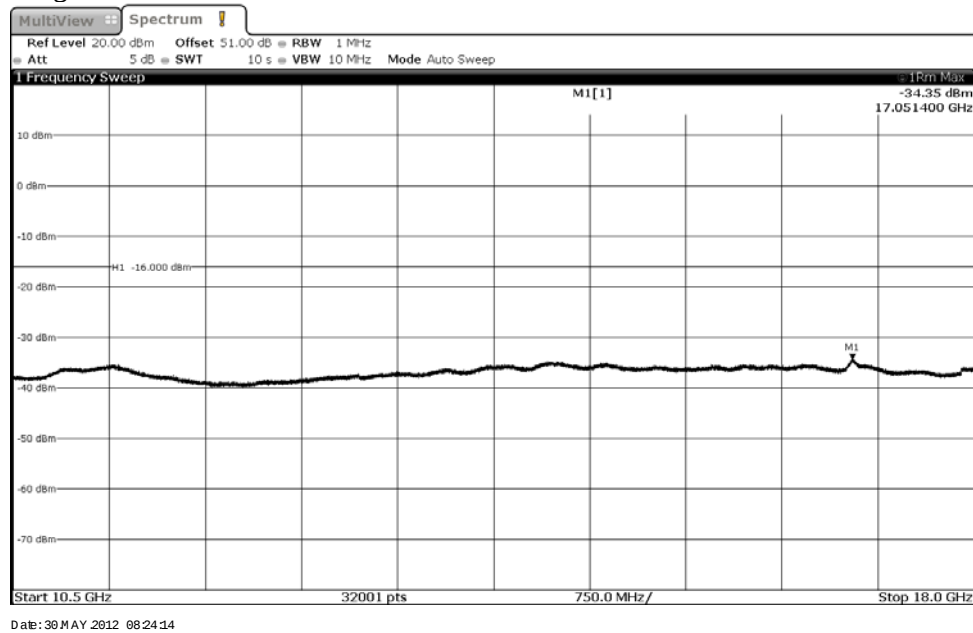
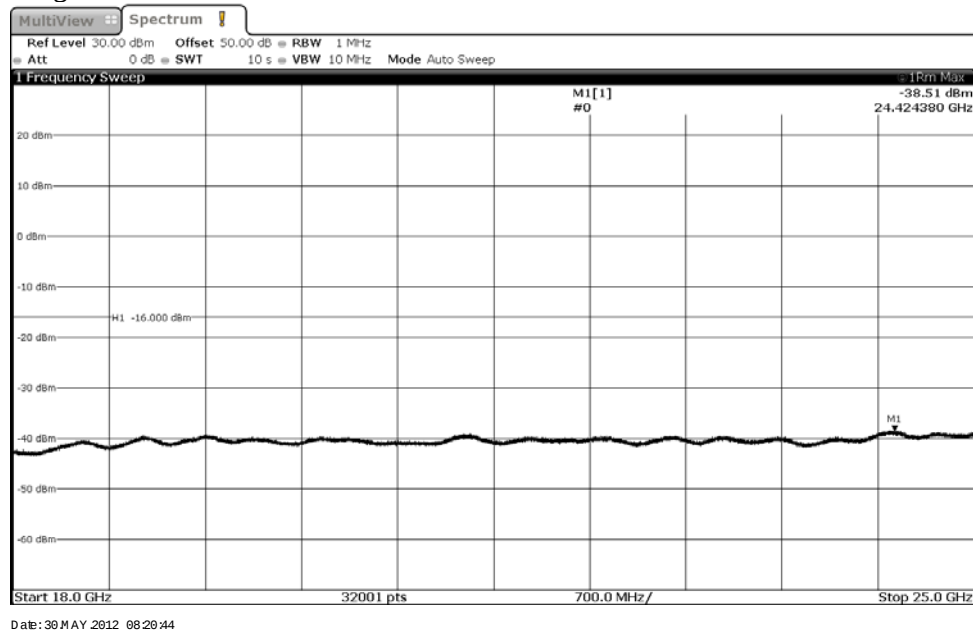


Diagram 8d:





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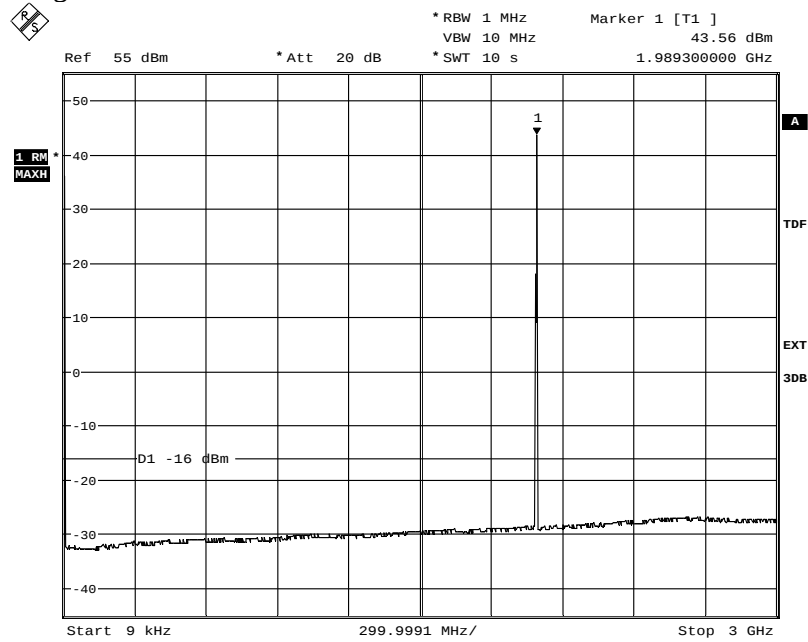
Reference
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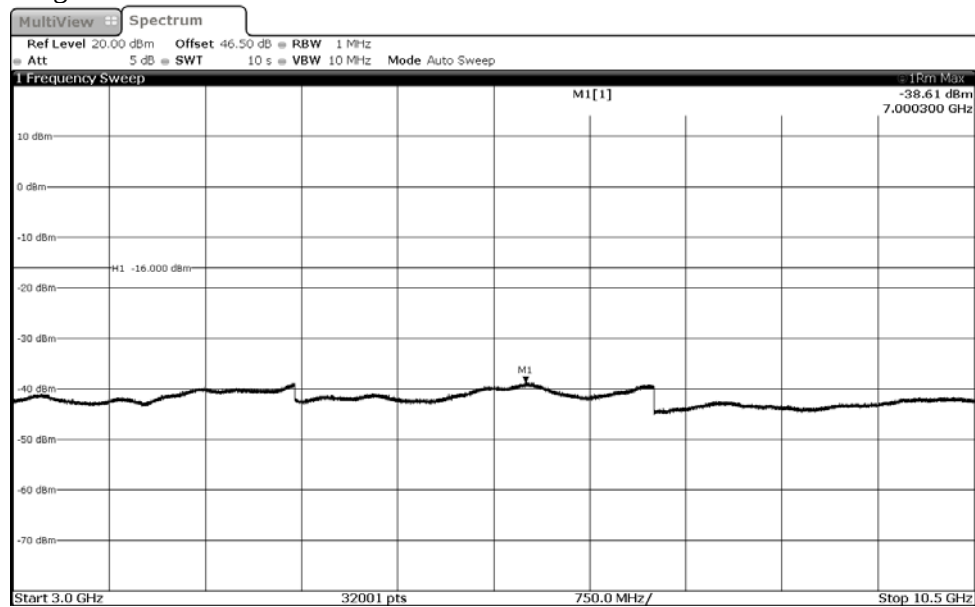
Appendix 5

Diagram 9a:



Date: 15.JUN.2012 08:15:28

Diagram 9b:



Date: 1 JUN 2012 12:50:32



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IC: 287AB-AS1180231

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Diagram 9c:

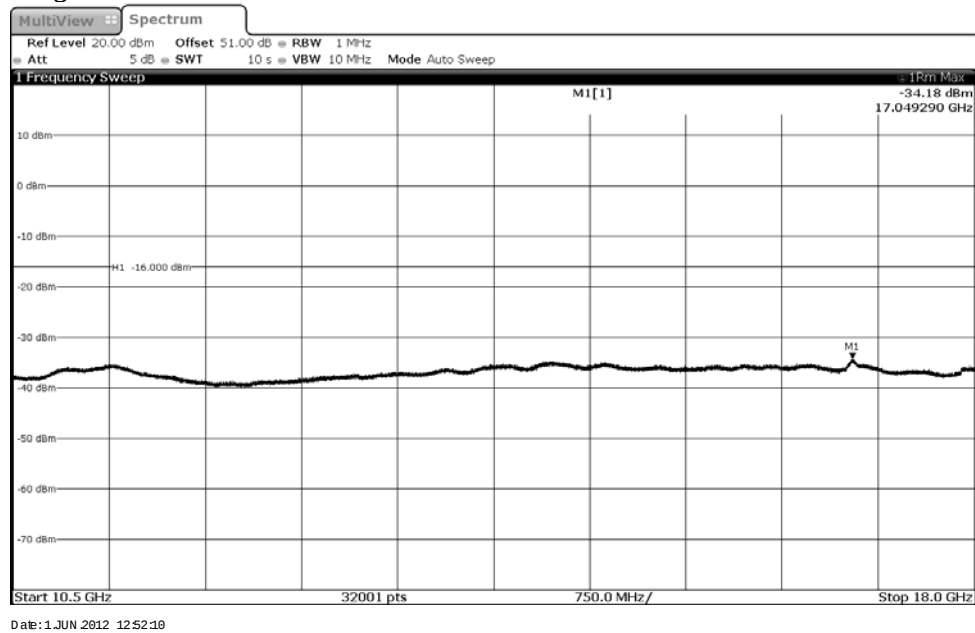
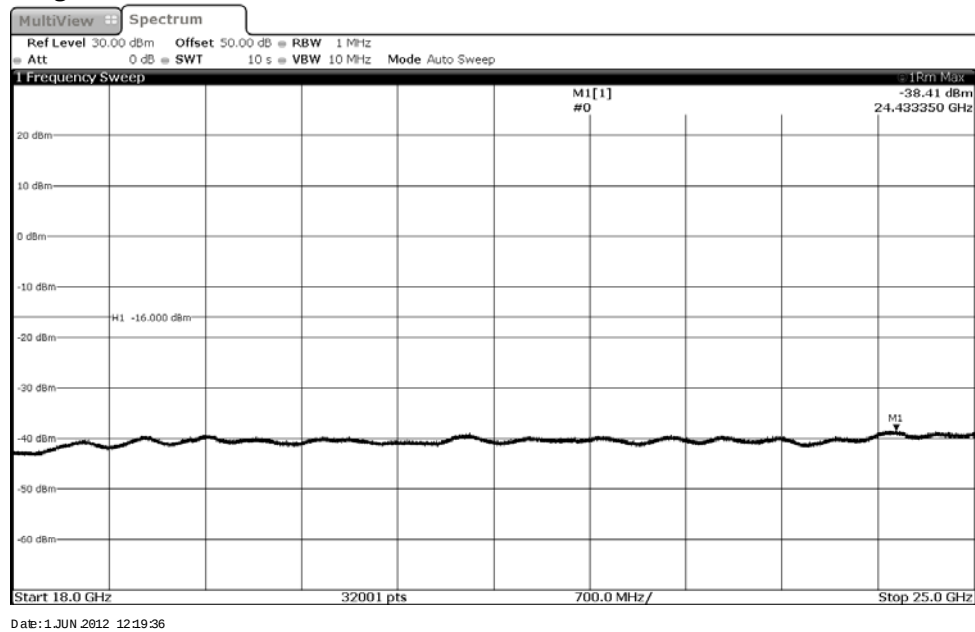


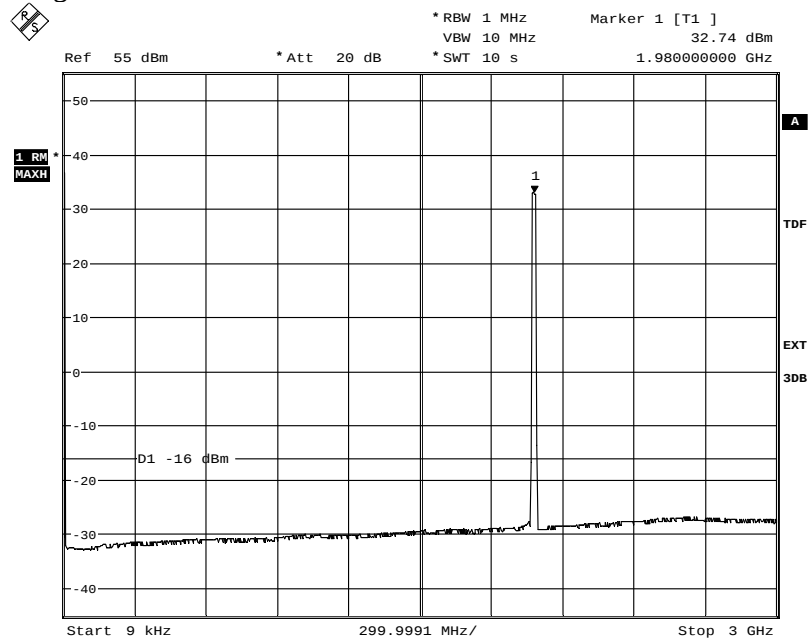
Diagram 9d:



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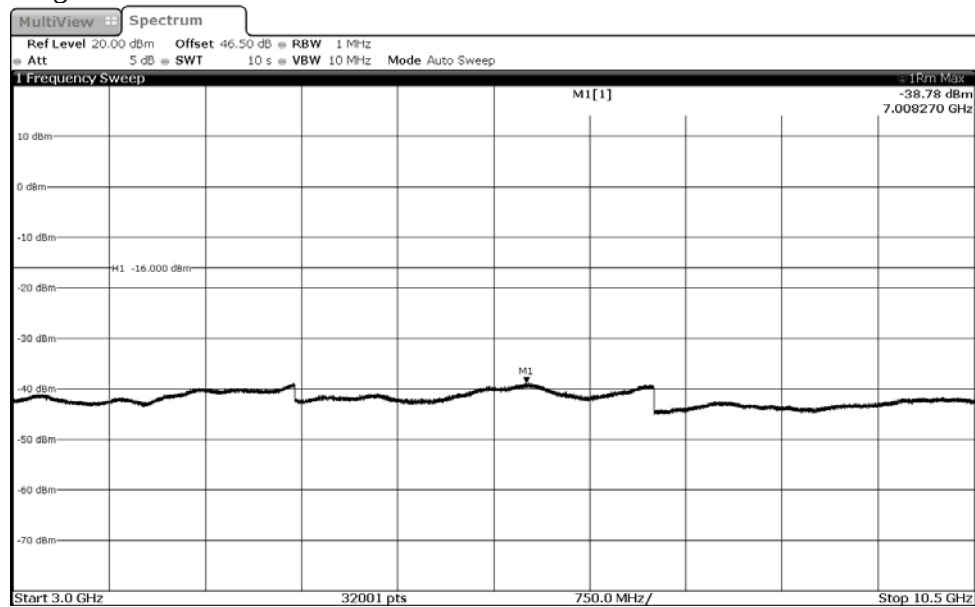
Appendix 5

Diagram 10a:



Date: 15.JUN.2012 08:06:23

Diagram 10b:



Date: 1 JUN 2012 12:04:01



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Diagram 10c:

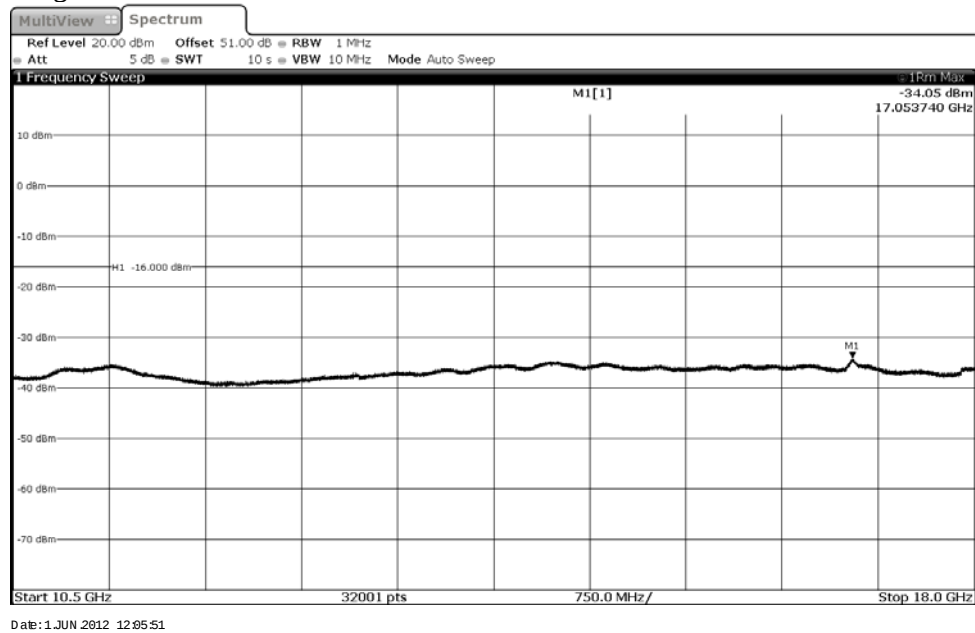
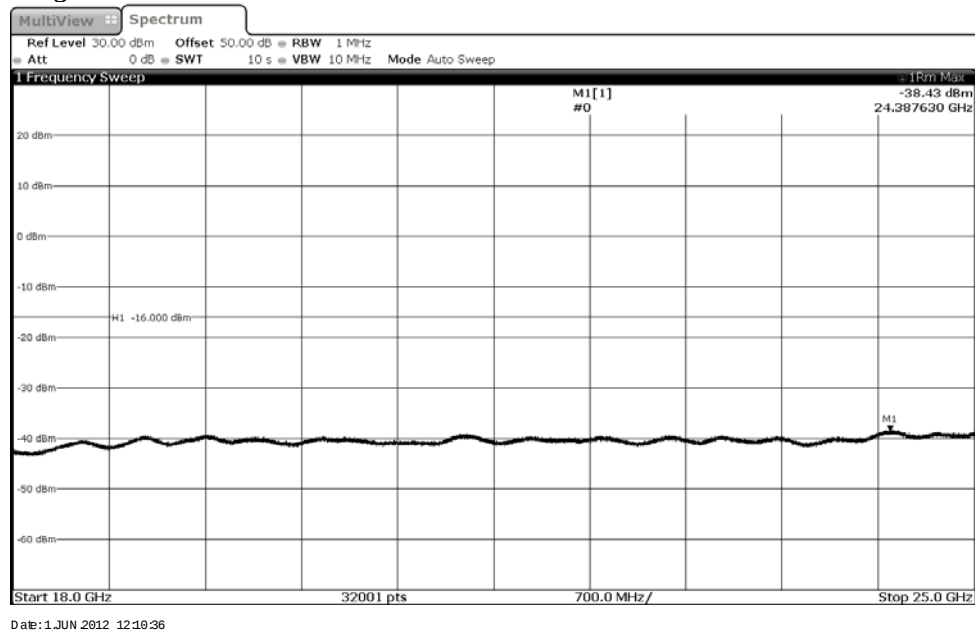


Diagram 10d:





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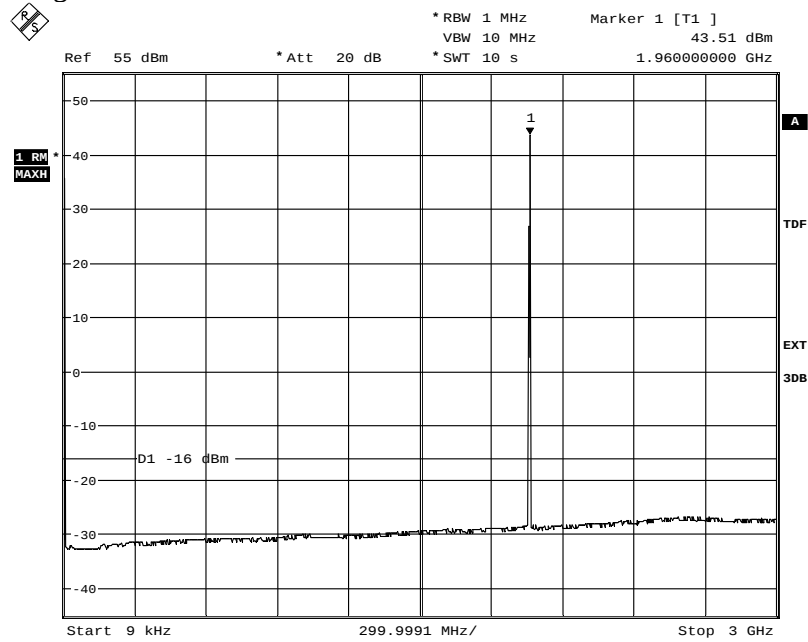
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IC: 287AB-AS1180231

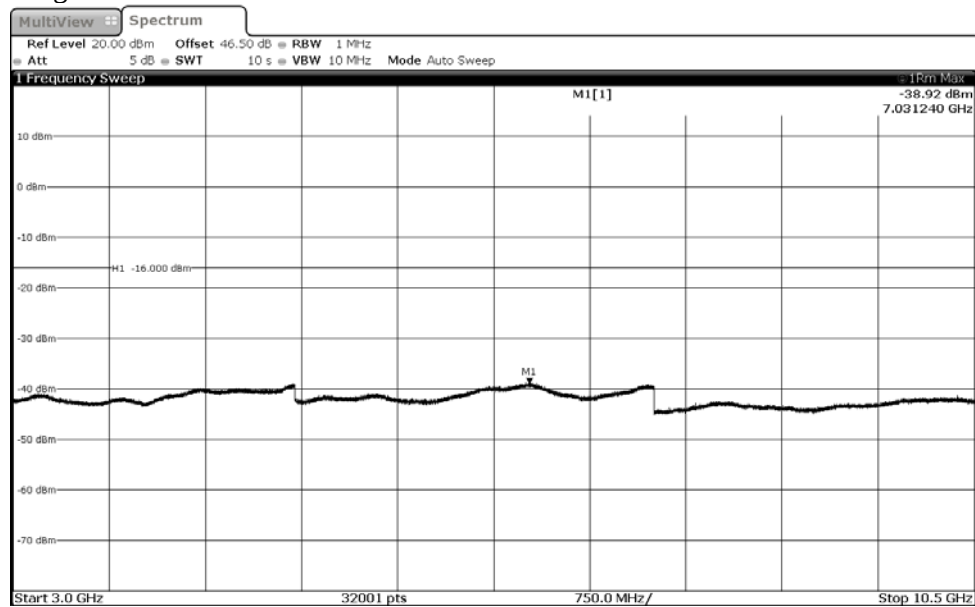
Appendix 5

Diagram 11a:



Date: 15.JUN.2012 08:56:46

Diagram 11b:



Date: 1 JUN 2012 13:20:16



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Diagram 11c:

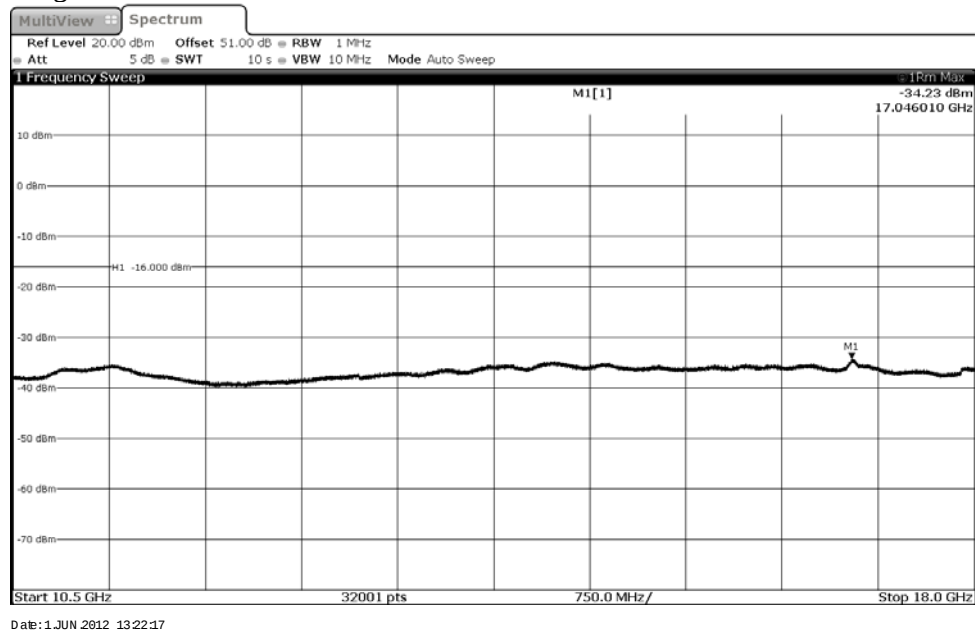
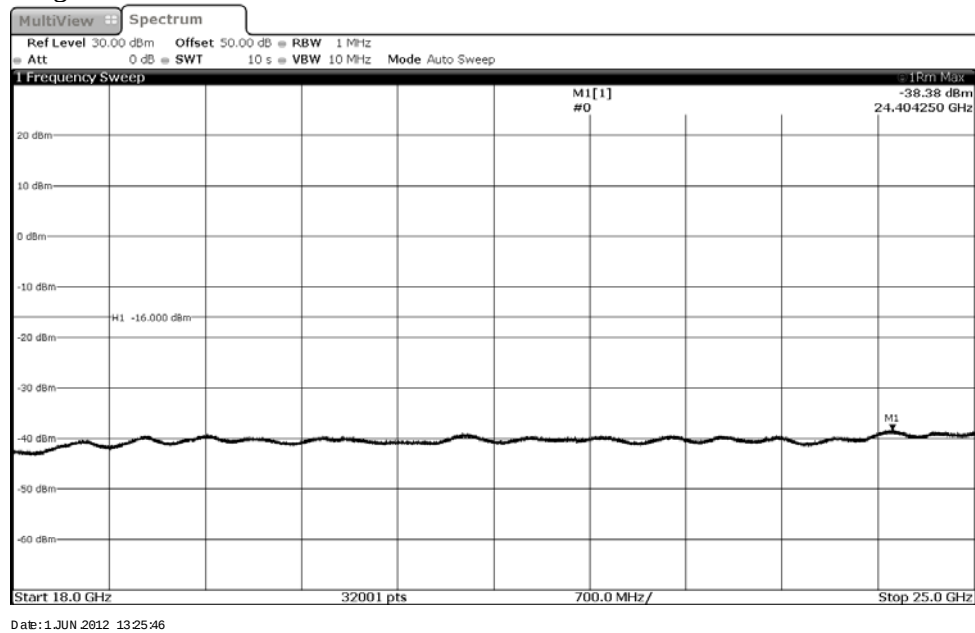


Diagram 11d:





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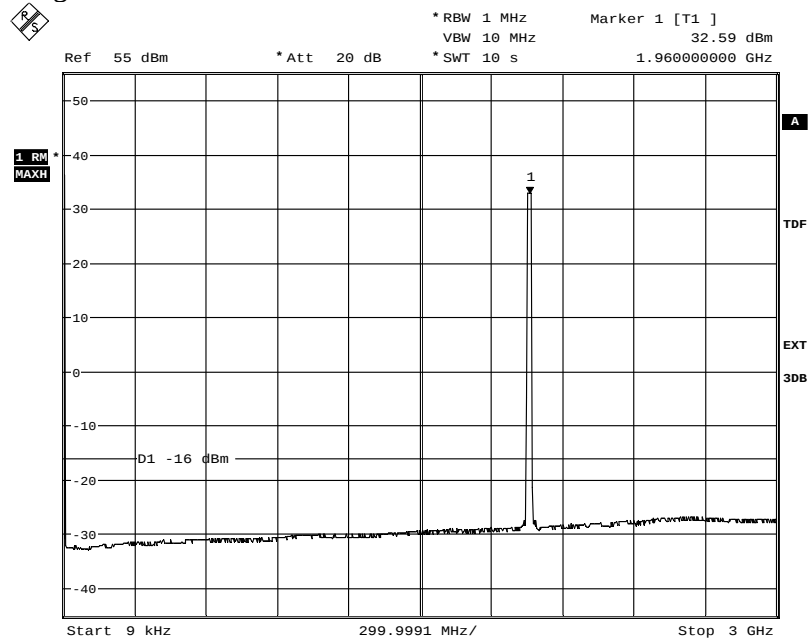
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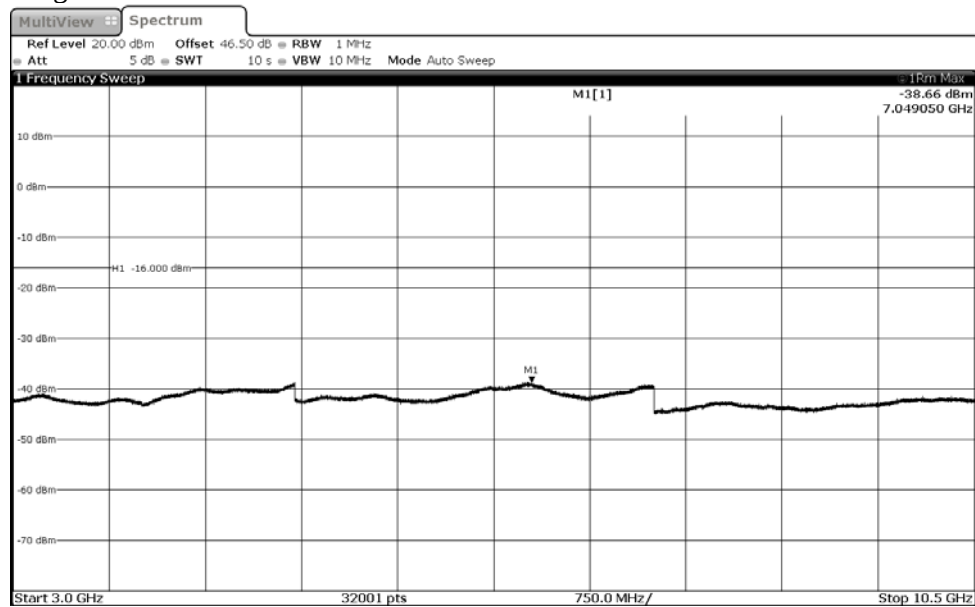
Appendix 5

Diagram 12a:



Date: 15.JUN.2012 09:04:22

Diagram 12b:



Date: 1 JUN 2012 13:38:56



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Appendix 5

Diagram 12c:

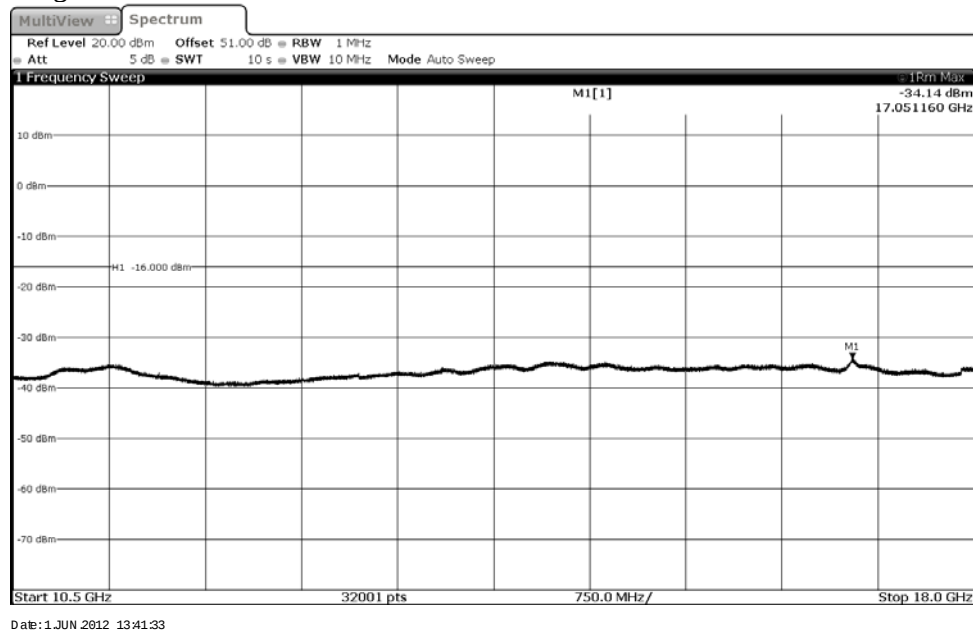
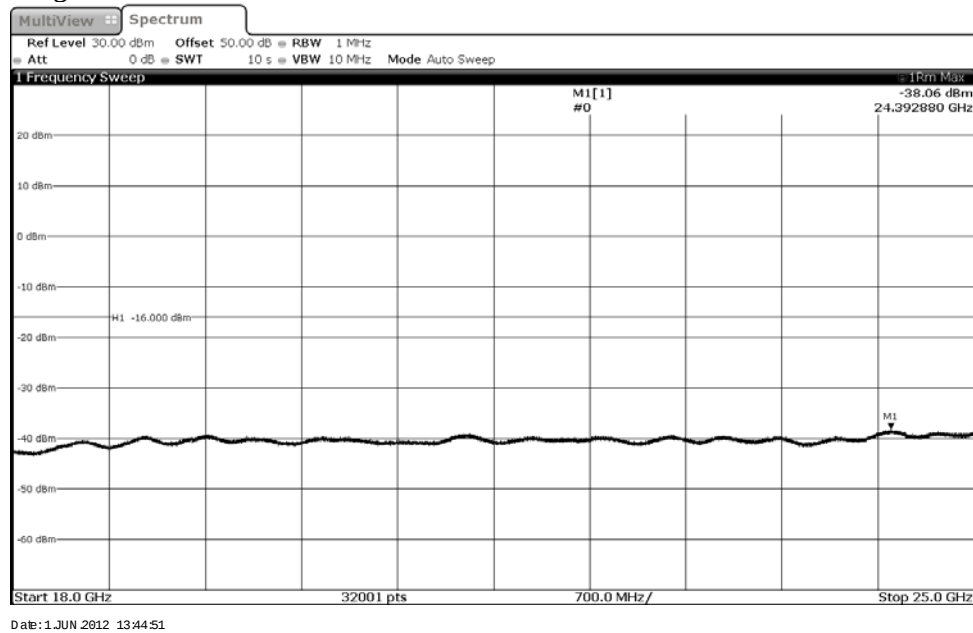


Diagram 12d:



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Appendix 6

Field strength of spurious radiation measurements according to CFR 47 §24.238 / IC RSS-133 6.5

Date	Temperature	Humidity
2012-04-27	23°C ± 3°C	35 % ± 5 %
2012-05-02	23°C ± 3°C	41 % ± 5 %
2012-05-03	22°C ± 3°C	33 % ± 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

$$\gamma = 20 \log \left(\frac{4\pi D}{\lambda} \right), \gamma \text{ is the propagation loss and } D \text{ is the antenna distance.}$$

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.

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Appendix 6

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 ESU 26	901 553
EMC 32 ver. 8.52.0	503 745
Chase Bilog antenna CBL 6111A	502 182
EMCO Horn Antenna 3115	502 175
FLANN Std gain 16240-25	503 939
HP-filter 3-18 GHz	503 739
µComp Nordic, Low Noise Amplifier	901 545
Schwarzbeck BBV9742, Low Noise Amplifier	504 085
Temperature and humidity meter, Testo 635	504 203



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Appendix 6

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

§24.238 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
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Appendix 6

Diagram 1a:

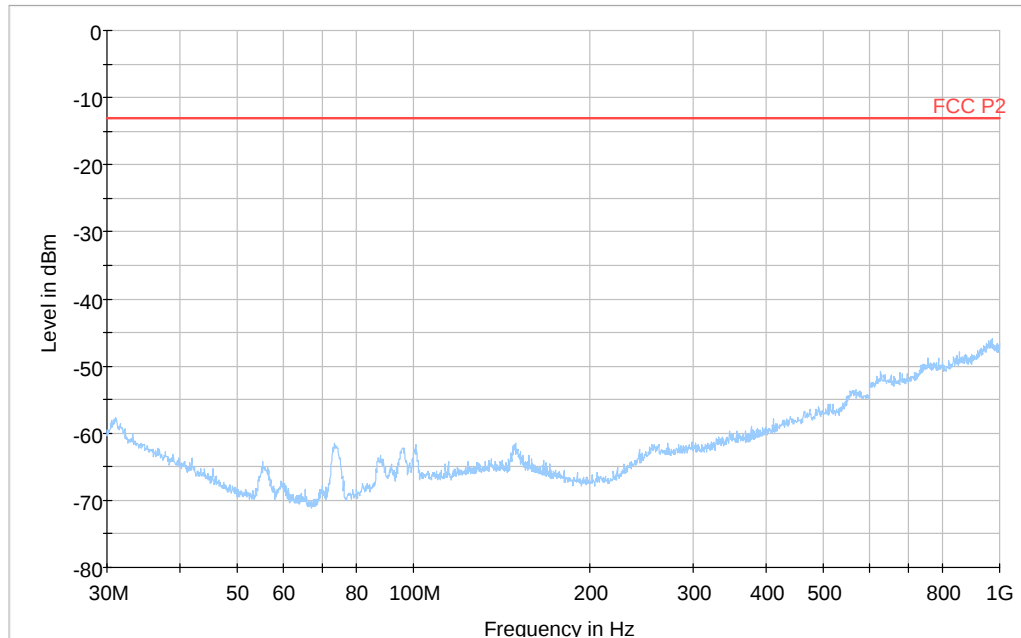
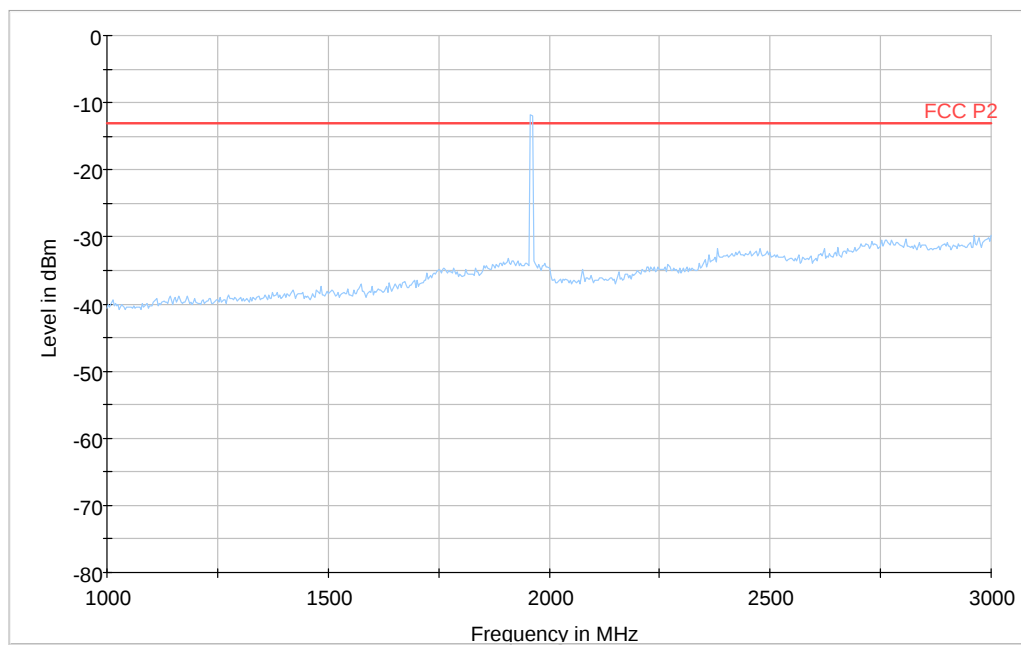


Diagram 1b:



Note: The emission at 1960 MHz is the carrier frequency and shall be ignored in the context.



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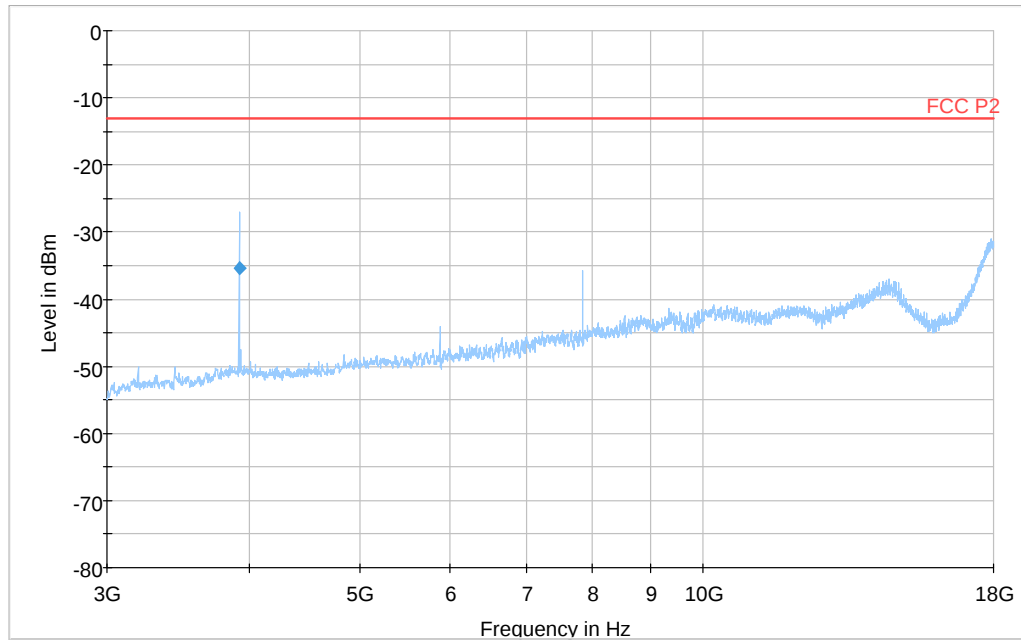
Reference
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Appendix 6

Diagram 1c:



Final RMS Result

Frequency (MHz)	RMS (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
3919.793	-35.3	5000.0	1000.000	104.0	H	272.0	-103.4	22.3	-13.0



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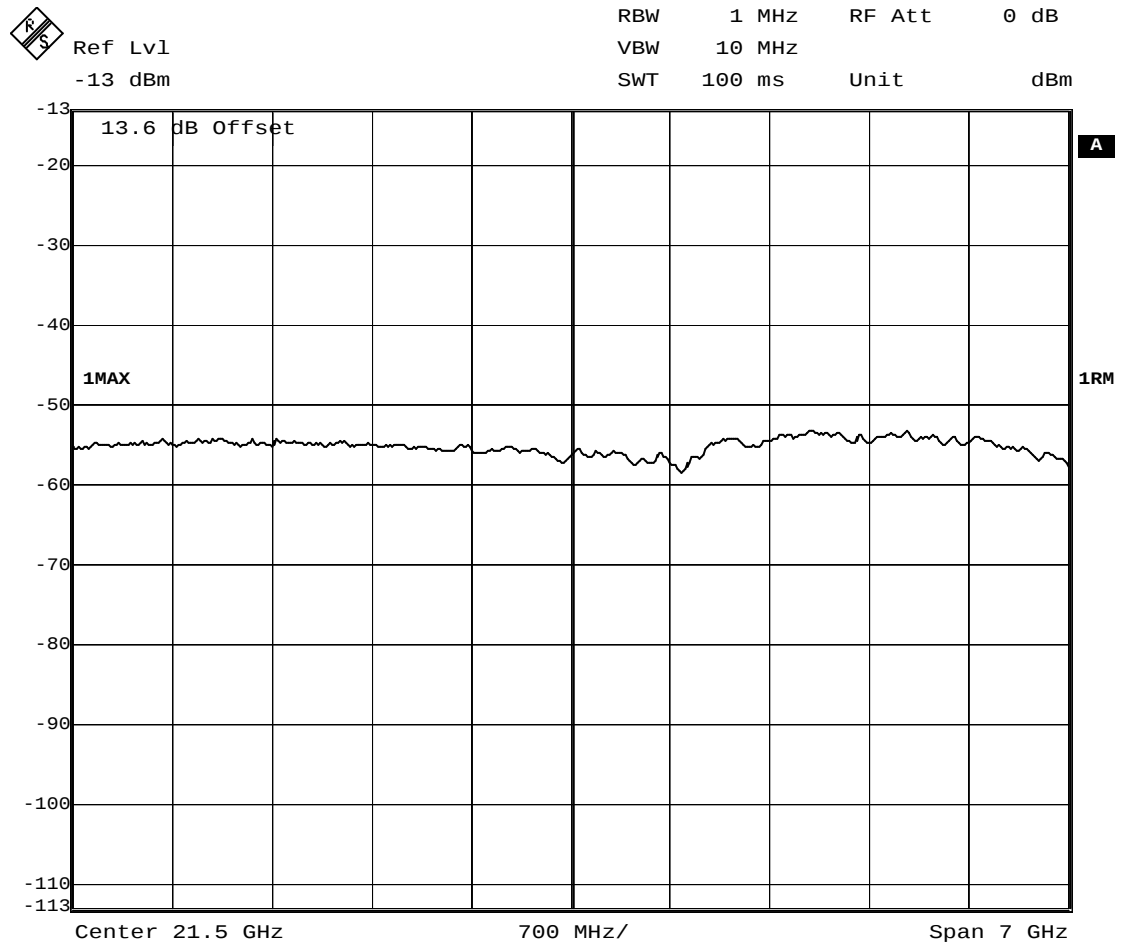
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Appendix 6

Diagram 1d:



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Appendix 7

Frequency stability measurements according to CFR 47 §24.235 / IC RSS 133 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
Climate chamber 2	501 031
Rohde & Schwarz signal analyzer FSQ40	--
RF attenuator	504 159
Testo 635, Temperature and humidity meter	504 203

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IC: 287AB-AS1180231

Appendix 7

Results

Nominal transmitter frequency was 1960.0 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	-2
-55.2	+20	+8
-40.8	+20	+7
-48.0	+30	+15
-48.0	+40	+13
-48.0	+50	-6
-48.0	+10	+3
-48.0	0	+3
-48.0	-10	+2
-48.0	-20	+11
-48.0	-30	+19
Maximum freq. error (Hz)		19
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 $\pm(0.05 \text{ PPM} + 12 \text{ Hz})$ ($\pm 110 \text{ Hz}$).

§24.235 The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

RSS-133 The carrier frequency shall not depart from the reference frequency, in excess of ± 1.0 ppm for base stations.

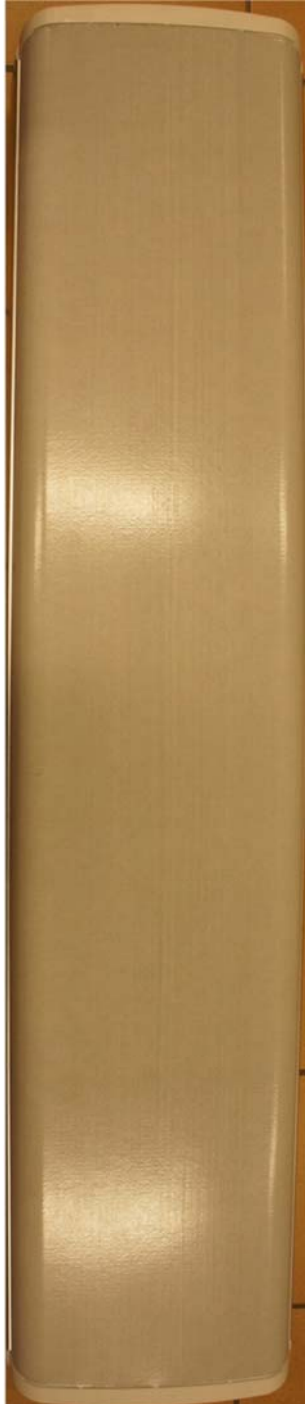
Complies?	Yes
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FCC ID: TA8AKRC118023-1
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Appendix 8

External photos

Front side



Rear side



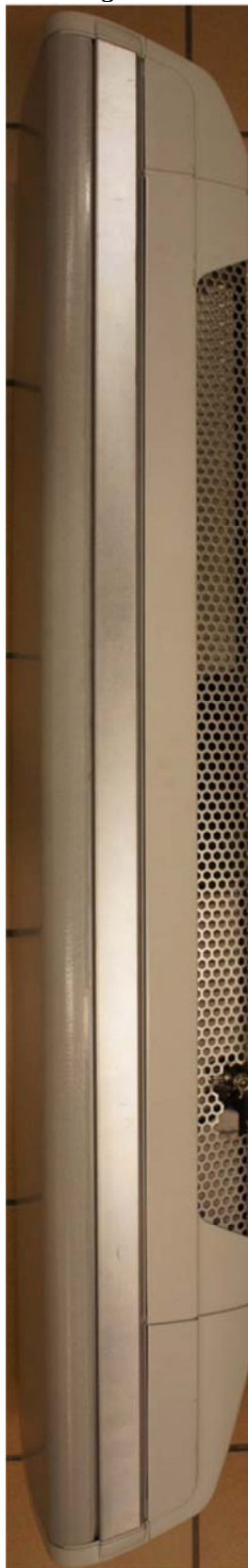
FCC ID: TA8AKRC118023-1
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Appendix 8

Left side



Right side



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Appendix 8

Top side



Bottom side

