



REPORT

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The test site complies with RSS-Gen, IC file no: 3482A

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2011-03-17

Reference
FX102687-F27

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Radio measurements on cellular equipment 1700/2100 MHz with FCC ID: TA8AKRC161254-1 and IC: 287AB-AS1612541 (8 appendices)

Test object

RRUS 11 B4, product KRC 161 254/1, revision RIC

Appendix 1 provides information about the test object and the test set-up.
Appendix 8 provides external photos of the test object.

Summary

Standard	Compliant	Appendix	Remarks
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	-
Industry Canada RSS-139			
RSS-139 6.6 Receiver spurious emissions	N.A.	-	Note 1

Note 1: The client declared that the test object has no stand-by mode. Both TX are always active. RX measurements are claimed not applicable.

Note 2: 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.

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Appendix 1

Description of test object

Equipment:	Radio equipment RRUS 11 B4 operating in LTE mode
Frequency band	TX: 2110 – 2155 MHz RX: 1710 – 1755 MHz Highest and lowest configurable EARFCNs per 3GPP bandwidth configuration are specified below
Supported channel bandwidth configuration	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz and 20 MHz according 3GPP TS 36.141
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.
Maximum rated output power:	2x 44.8 dBm (2x 30 W)
Number of antenna ports:	2 TX/RX ports
Supported configuration:	Dual single carrier. Both RF chains are identical.
Nominal power voltage:	-48 VDC

Tested frequencies and EARFCNs for TX measurements

EARFCN	Frequency	Comment
Downlink	/ [MHz]	
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, 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

Both test object RF chains were always configured to the same EARFCN. The RX were set to the corresponding RX EARFCN offset by a value of +18000 in respect to the TX EARFCN.

Note: EARFCN are derived from 3GPP TS 36.141 Version 8.5.0, table 5.7.3-1.

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Appendix 1

Operation mode during measurements

The test object was powered with -48 VDC. Measurements were performed with both TRX RF chains activated and both TX transmitting at maximum nominal power the test models 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 RF port not tested was via an attenuator terminated into 50 ohm.

The setting maximum nominal output power 44.8 dBm (30 W) in channel bandwidth configuration 1.4 MHz transmitting E-TM1.1 was found to be representative for all traffic scenarios when several settings with the different modulations were tested to find the worst case setting. This setting was used for all measurements unless noted otherwise.

Conducted measurements

Complete TX measurements were done at port RF A. Limited complementary TX measurements were done at port RF B to verify identical performance for both transmitter chains. RX measurements were considered not applicable, as the client claims the test object can not provide a stand-by mode. Both TX are always active.

Radiated measurements

During the measurements both output ports RF A and RF B were via RF attenuators and a directional coupler connected to functional test equipment outside the shielded chamber for supervision of the transmitted signals.

Purpose of test

The purpose of the tests is to verify compliance to the performance characteristics specified in applicable items of FCC CFR 47.

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 27, October 1st, 2010
RSS-139 Issue 2
RSS-Gen Issue 3

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Appendix 1

Measurement equipment

Measurement equipment	Calibration Due	SP number
Test site Tesla	2012-10	503 881
Rohde & Schwarz FSQ 40	2011-07	504 143
Rohde & Schwarz FSIQ 40	2011-07	503 738
Rohde & Schwarz ESI 26	2011-08	503 292
HP filter 3-18 GHz , RLC Electronics	2012-07	503 739
HP filter 18-27 GHz, RLC Electronics	2011-07	503 740
RF attenuator	2011-07	504 159
RF attenuator	2011-08	900 233
Boonton RF Peak power meter/analyzer	2011-10	503 144
Boonton Power sensor 56518-S/4	2012-10	503 145
Chase Bilog antenna CBL 6111A	2011-10	503 182
EMCO Horn Antenna 3115	2014-01	502 175
Std. gain horn mod. 20240-20	--	503 674
MITEQ Low Noise Amplifier	2011-07	503 285
µComp Nordic, Low Noise Amplifier	2011-07	504 160
Climate chamber 2	2013-11	501 031
Multimeter Fluke 87	2011-04	502 190
Testo 635 temperature and humidity meter	2011-04	504 203
Testo 625 temperature and humidity meter	2011-06	504 188

Uncertainties

Measurement and test instrument uncertainties are described in the quality assurance documentation "SP-QD 10885". The measurement uncertainties can be found in the table below. The uncertainties are calculated with a coverage factor k=2 (95% level of confidence).

Reservation

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

Delivery of test object

The test object was delivered 2011-02-11.

Manufacturer's representative

Mats Falk, Ericsson AB

Test engineers

Jörgen Wassholm, Jonas Bremholt and Reinhold Reul

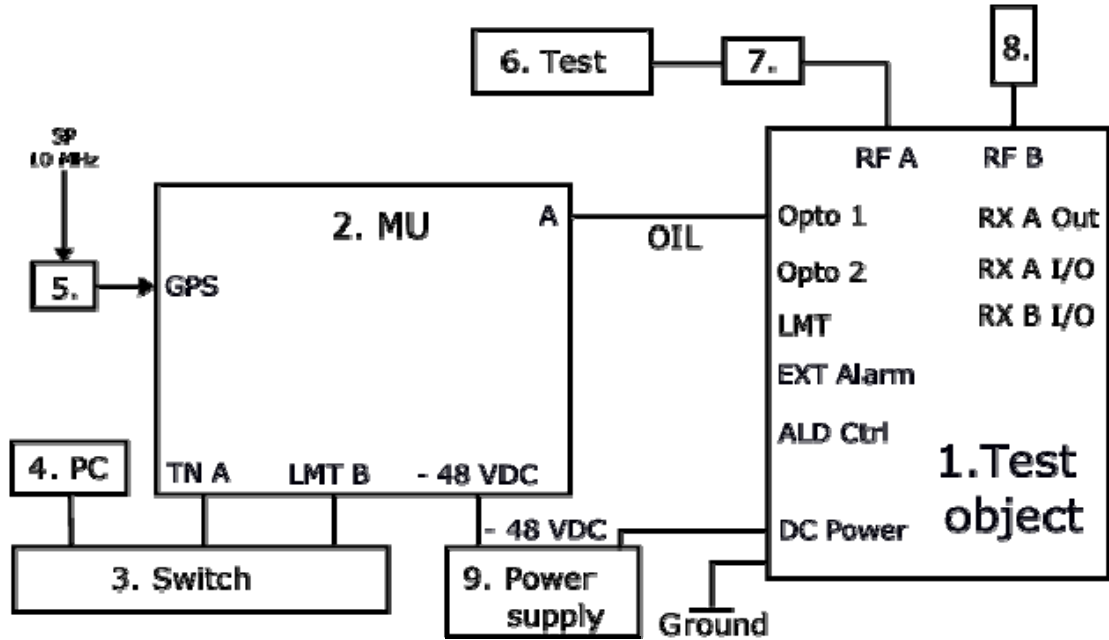
Test participant

Christer Hjorth, Ericsson AB

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Appendix 1

Test set-up conducted measurements



Test object

1.	RRUS 11 B4, KRC 161 254/1, revision R1C, S/N: CB4G205980 FCC ID: TA8AKRC161254-1 and IC: 287AB-AS1612541 with software CXP 102 051/10 rev. R5FZ
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Functional test equipment

2.	Main unit, for details see section RBS 6601 Main unit below
3.	Switch, Netgear ProSafe GSM 7224, BAMS – 1000850754
4.	Computer, Sun Ultra 27, BAMS – 1000758436
5.	Trigger, LTY 1510799/2 R1A
6.	SP test instrument according measurement quipment list
7.	RF attenuator, SP 504 159 and SP 900 233
8.	Attenuator, Weinschel model 48-30-33, Terminator, Weinschel model 1433-4-LIM, NC023BH8677

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Appendix 1

Test object ports

Interface:	Type of port:
Ground connection	Ground
Supply power -48 VDC	DC Power
Antenna port "RF A", 7/16 connector, female, combined TX/RX	Antenna
Antenna port "RF B", 7/16 connector, female, combined TX/RX	Antenna
Opto 1, connected via optical data link to DUL port A	Signal
Opto 2, not supported	Signal
LMT, not supported	Signal
RX A I/O, not supported	Signal
RX A Out, not supported	Signal
RX B I/O, not supported	Signal
EXT Alarm, external alarm, not connected during conducted measurements, connected to 15 m shielded multiwire during radiated measurements	Signal
ALD Ctrl, not connected during conducted measurements, connected to remote electrical tilt unit during radiated measurements	Signal

RBS 6601 Main unit

Product name	Product number	R-state	Serial number
DUL 20 01	KDU 137 533/4	R1A	(S)C823774053
SUP 6601	1/BFL 901 009/1	R3B	(S)BR80911163
DUMMY 31	SXX 109 8971/1	-	-



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Appendix 2

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

Date	Temperature	Humidity
2011-02-17	23 °C ± 13 °C	13 % ± 5 %
2011-02-18	22 °C ± 13 °C	11 % ± 5 %
2011-02-21	22 °C ± 13 °C	10 % ± 5 %

The test object was connected to a power analyzer measuring peak and RMS output power in CDF mode.

Measurement equipment	SP number
Boonton RF Peak power meter/analyzer	503 144
Boonton Power sensor 56518-S/4	503 145
RF attenuator	900 229
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty: 0.7 dB

Results

Rated output power level at tested connector RF A (maximum): 44.8 dBm (30 W).

Test conditions, Test model in BW configuration	Transmitter power RMS (dBm) / PAR (dB)		
	Channel B	Channel M	Channel T
E-TM1.1 in 1.4 MHz at RF A	44.4 / 6.8	44.2 / 6.9	44.2 / 6.9
E-TM1.1 in 3 MHz at RF A	44.3 / 6.7	44.2 / 6.7	44.1 / 6.6
E-TM1.1 in 5 MHz at RF A	44.3 / 6.6	44.2 / 6.6	44.1 / 6.6
E-TM1.1 in 10 MHz at RF A	44.3 / 6.6	44.1 / 6.6	44.0 / 6.6
E-TM1.1 in 15 MHz at RF A	44.0 / 6.8	44.0 / 6.7	43.9 / 6.7
E-TM1.1 in 20 MHz at RF A	43.9 / 6.9	43.9 / 6.8	43.9 / 6.7
E-TM1.1 in 1.4 MHz at RF B	N.T	44.2 / 6.8	N.T
E-TM1.1 in 20 MHz at RF B	N.T	43.9 / 6.7	N.T

Limit

47 CFR 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
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Appendix 3

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

Date	Temperature	Humidity
2011-02-17	23 °C ± 13 °C	13 % ± 5 %
2011-02-18	22 °C ± 13 °C	11 % ± 5 %
2011-02-21	22 °C ± 13 °C	10 % ± 5 %

Test set-up and procedure

The measurements were made as defined in §2.1049. The output 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.

Measurement instrument	SP number
Rohde & Schwarz FSQ40	504 143
RF attenuator	900 233
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

The results are shown in appendix 3.1

	BW configuration	Tested port	Channel	OBW
Diagram 1	1.4 MHz	RF A	B	1.094 MHz
Diagram 2	20 MHz	RF A	B	17.875 MHz
Diagram 3	1.4 MHz	RF A	M	1.094 MHz
Diagram 4	3 MHz	RF A	M	2.696 MHz
Diagram 5	5 MHz	RF A	M	4.485 MHz
Diagram 6	10 MHz	RF A	M	8.950 MHz
Diagram 7	15 MHz	RF A	M	13.425 MHz
Diagram 8	20 MHz	RF A	M	17.875 MHz
Diagram 9	1.4 MHz	RF A	T	1.094 MHz
Diagram 10	20 MHz	RF A	T	17.875 MHz
Diagram 11	1.4 MHz	RF B	M	1.094 MHz
Diagram 12	20 MHz	RF B	M	17.875 MHz

Remark

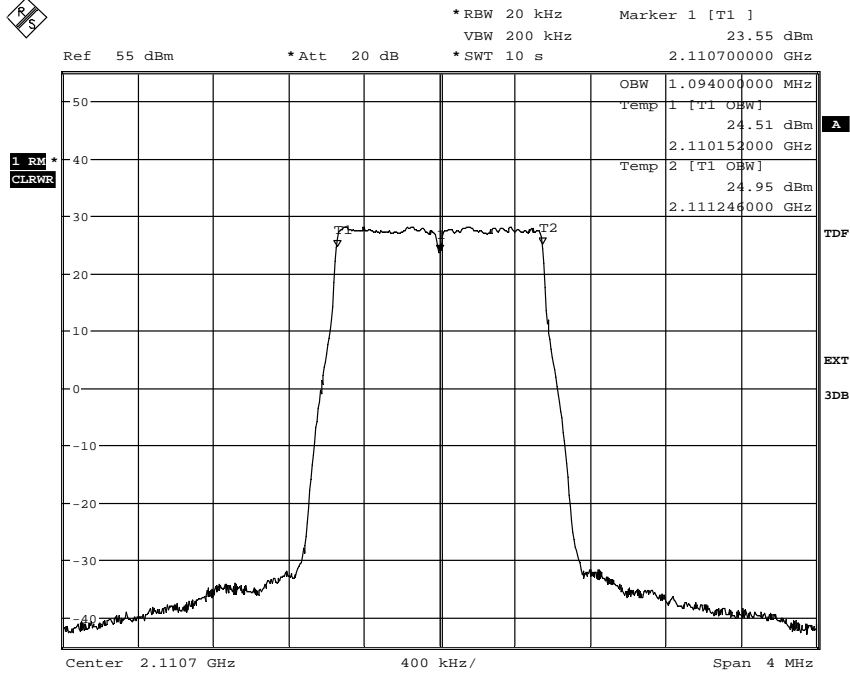
Test of one configuration was repeated for the transmitter chain at port RF B, giving identical results within measurement uncertainty.



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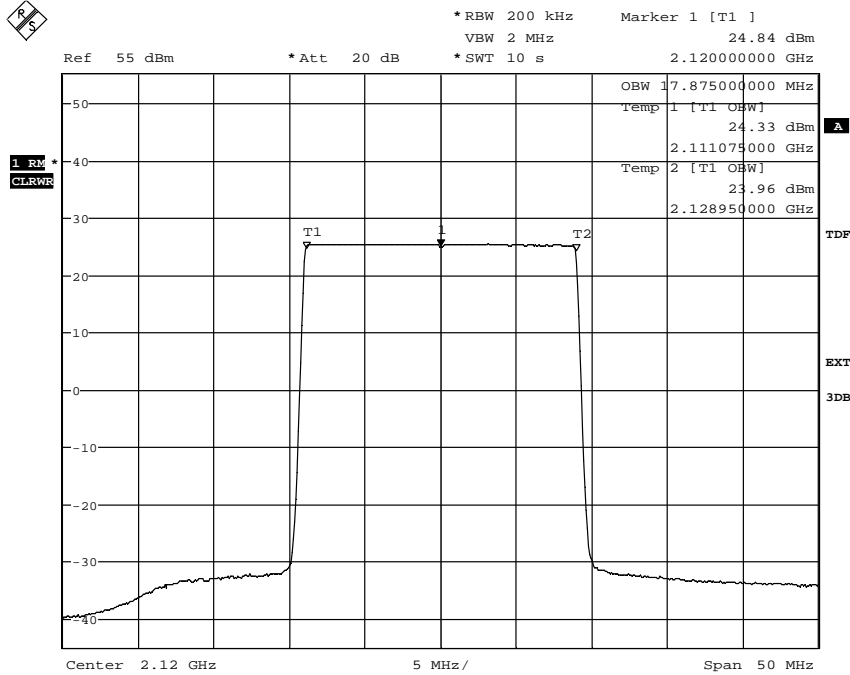
Appendix 3.1

Diagram 1:



Date: 17.FEB.2011 13:17:57

Diagram 2:



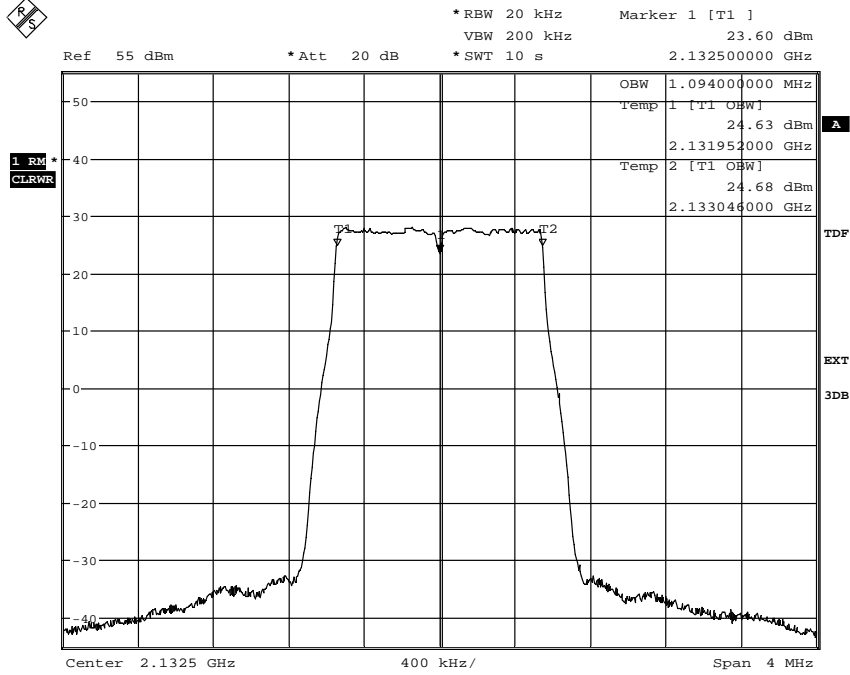
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FCC ID: TA8AKRC161254-1
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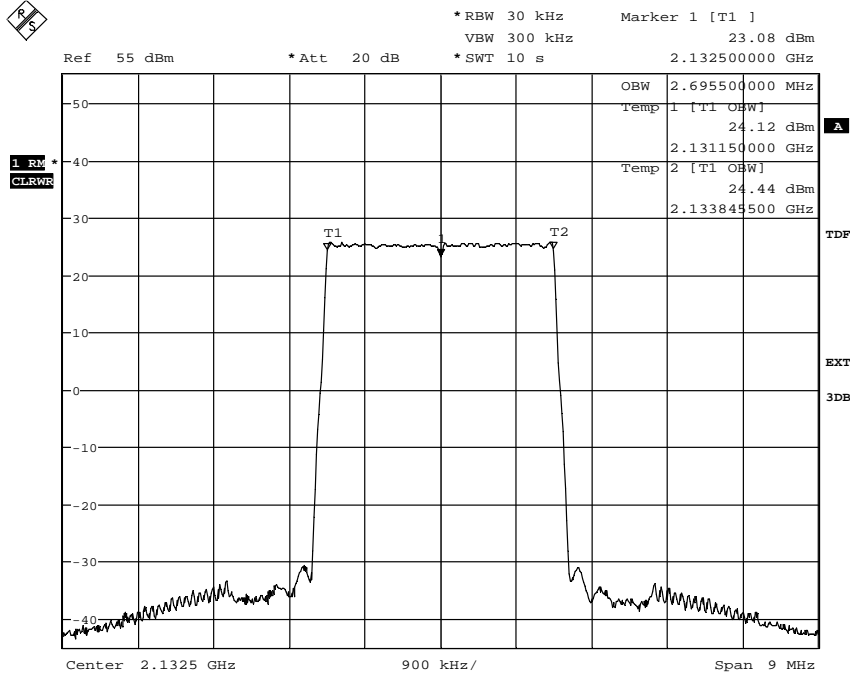
Appendix 3.1

Diagram 3:



Date: 17.FEB.2011 12:22:37

Diagram 4:



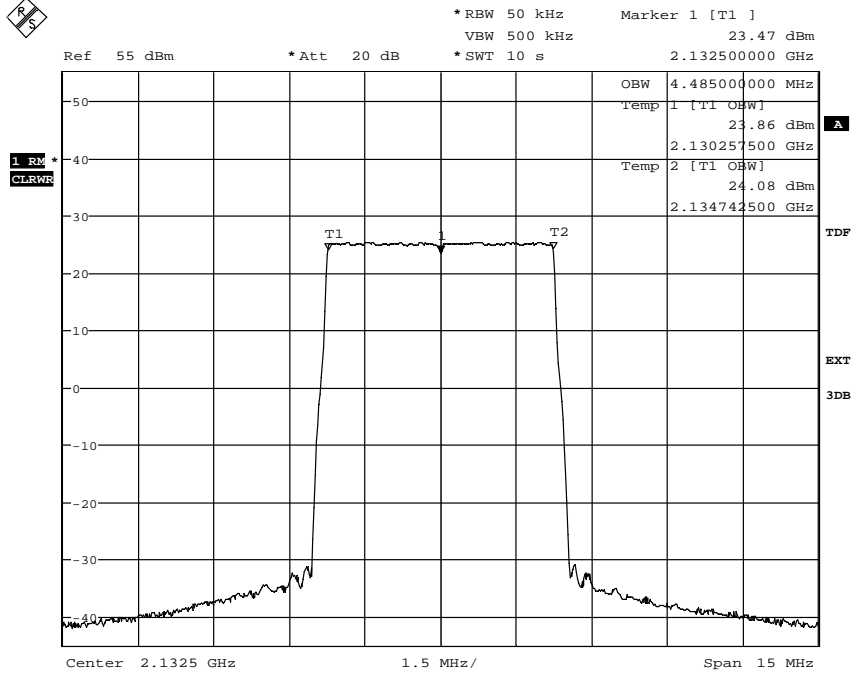
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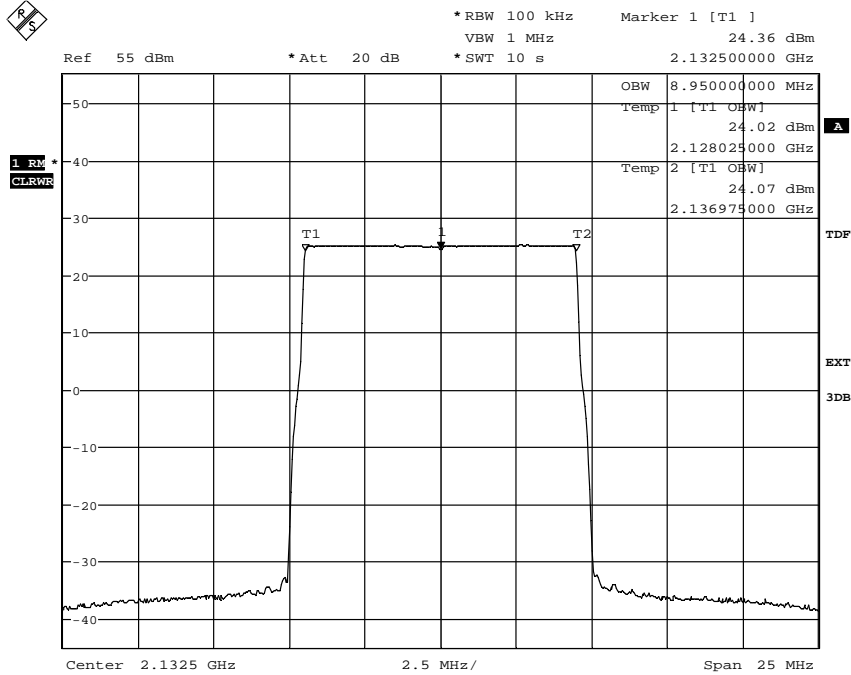
Appendix 3.1

Diagram 5:



Date: 17.FEB.2011 15:06:47

Diagram 6:



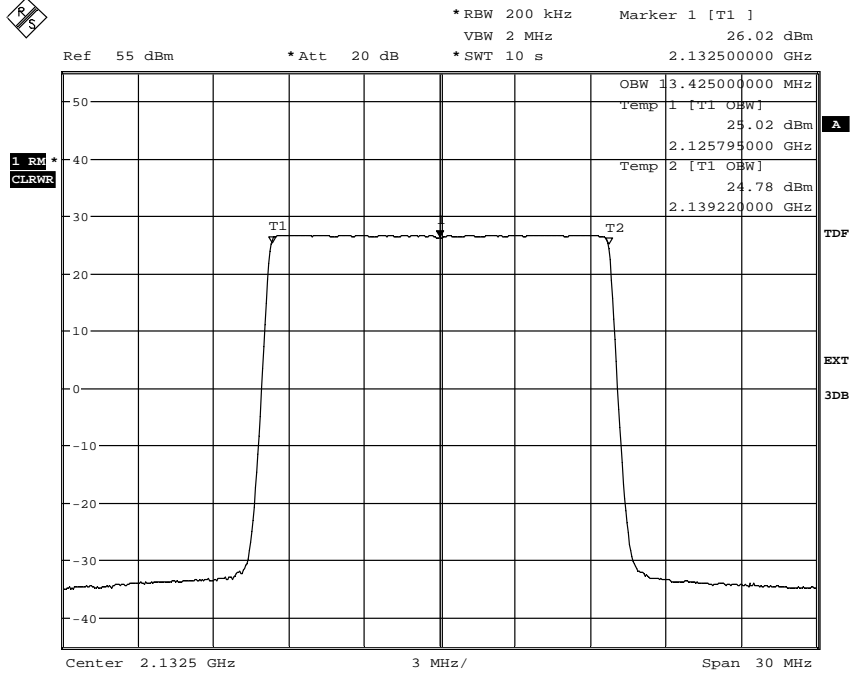
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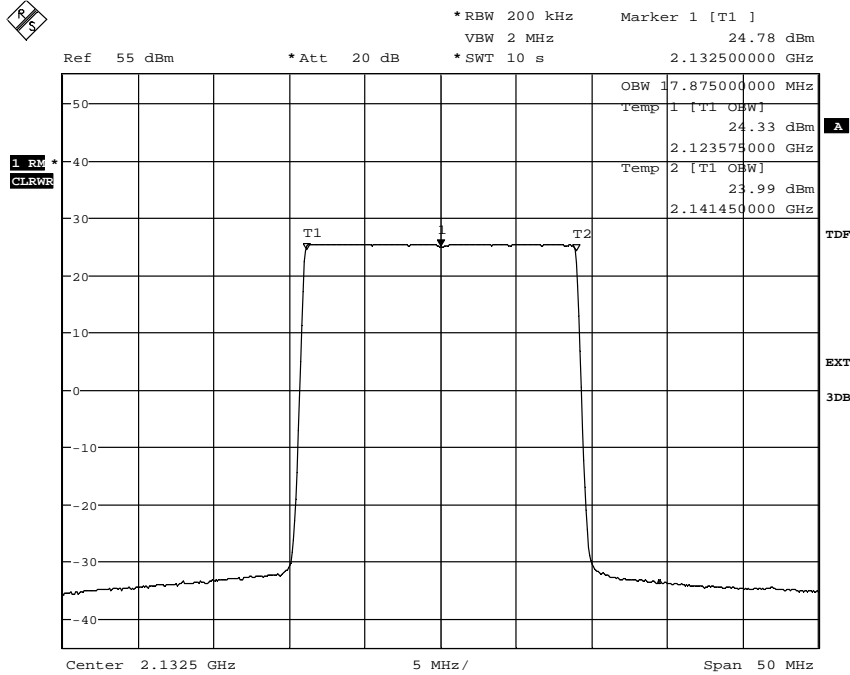
Appendix 3.1

Diagram 7:



Date: 17.FEB.2011 11:35:02

Diagram 8:



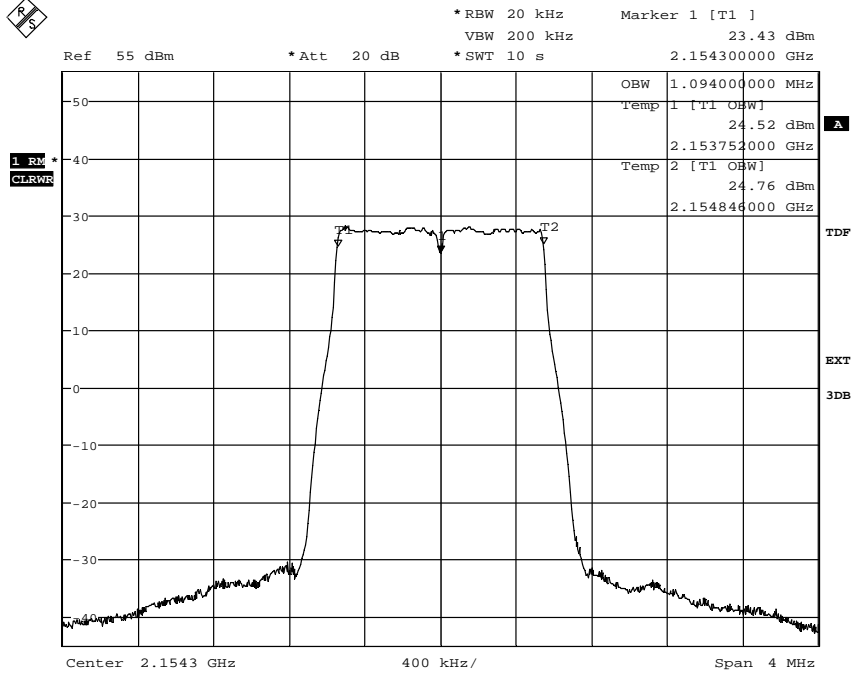
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FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

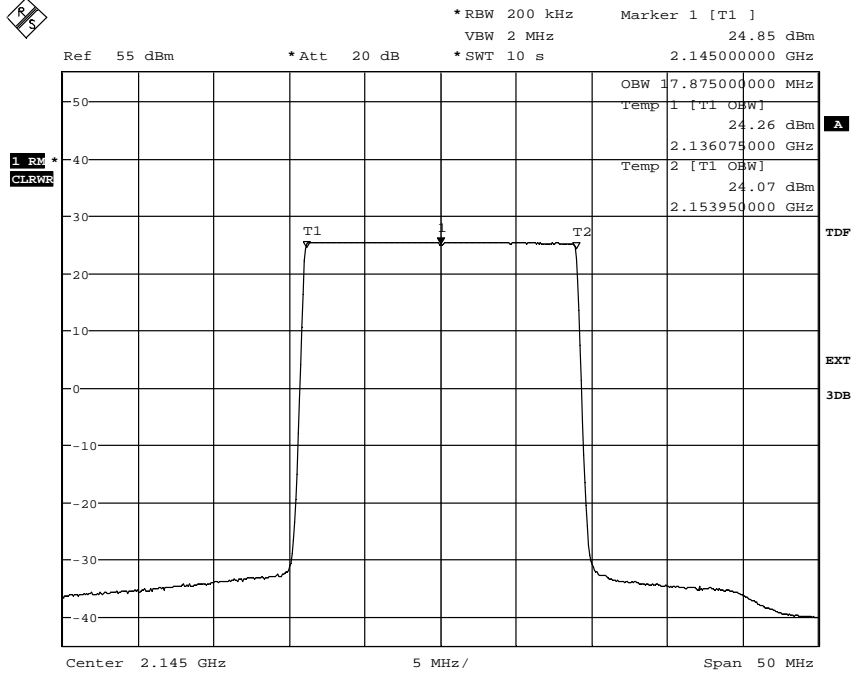
Appendix 3.1

Diagram 9:



Date: 17.FEB.2011 14:00:50

Diagram 10:



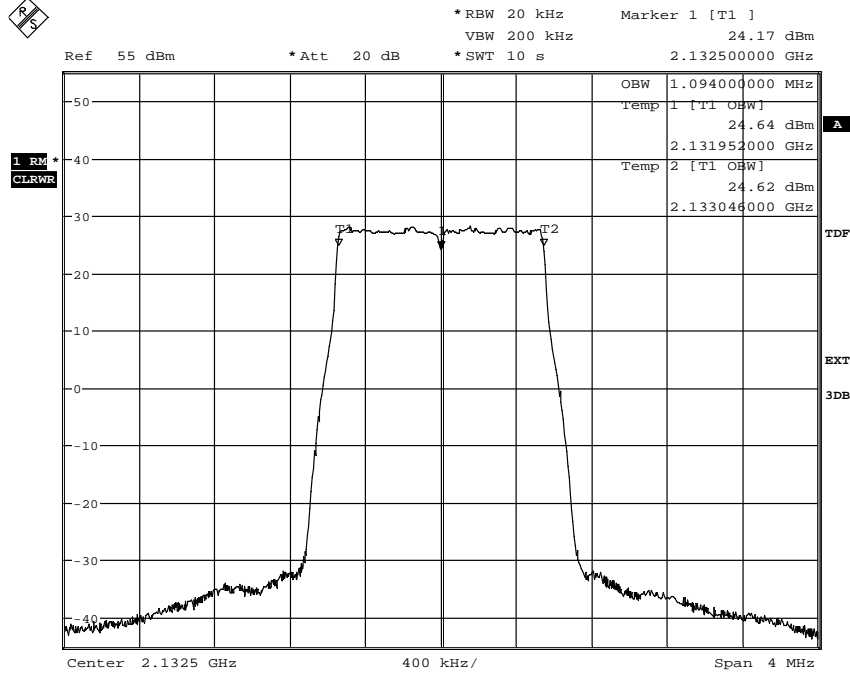
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FCC ID: TA8AKRC161254-1
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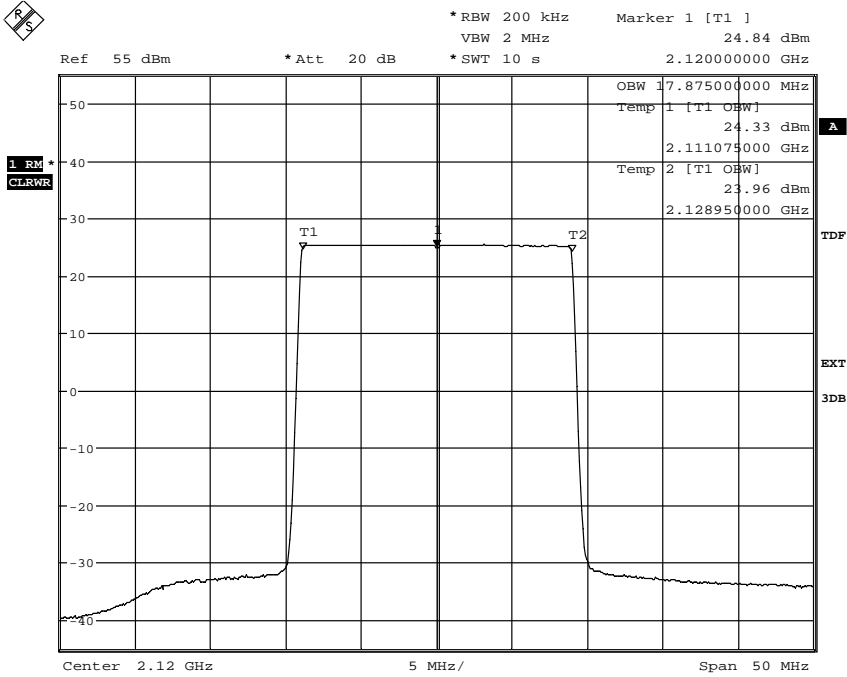
Appendix 3.1

Diagram 11:



Date: 22.FEB.2011 13:23:59

Diagram 12:



Date: 18.FEB.2011 14:17:16

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Appendix 4

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

Date	Temperature	Humidity
2011-02-17	23 °C ± 13 °C	13 % ± 5 %
2011-02-18	22 °C ± 13 °C	11 % ± 5 %
2011-02-21	22 °C ± 13 °C	10 % ± 5 %

Test set-up and procedure

The test object output 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.

The measurements were made as defined in §27.53 (h). Beyond the 1st MHz off the band edges the limit was adjusted to compensate for reduced measurement bandwidths where applicable, 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 at least 1 MHz for measurements of emissions more than 1 MHz away from the band edges. For used RBWs smaller than the reference measurement bandwidth required by the applicable standards the limit was determined according fomula [1],

$$\text{Limit} = -13 \text{ dBm} + 10 \log (\text{RBW}_{\text{used}} / \text{Bandwidth required by the applicable standard}) \quad [1]$$

resulting in following limits for frequencies offset 1 MHz to 5 MHz from the band edges:

Channel BW configuration [MHz]	RBW used [kHz]	limit [dBm]
1.4	20	-20.0
3	30	-18.2
5	30 (*)	-28.2
10	100	-23.0
15	200	-20.0
20	200	-20.0

(*) The RBW 30 kHz is less than 1% of the measured emission bandwidth of 4.515 MHz for this BW configuration, thus the limit line in the plot was adapted by -1.8 dB (10 log[30/45]) to -14.8 dBm up to 1 MHz from the band edge.

Beyond 5 MHz off the band edges RBW 1 MHz was used.

Measurement instrument	SP number
Rohde & Schwarz FSQ40	504 143
RF attenuator	900 233
Testo 635 temperature and humidity meter	504 188

Measurement uncertainty: 3.7 dB



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Appendix 4

Results

The results are shown in appendix 4.1

	Bandwidth configuration	Channel	Tested port
Diagram 1 a & b	1.4 MHz	B	RF A
Diagram 2 a & b	3 MHz	B	RF A
Diagram 3 a & b	5 MHz	B	RF A
Diagram 4 a & b	10 MHz	B	RF A
Diagram 5 a & b	15 MHz	B	RF A
Diagram 6 a & b	20 MHz	B	RF A
Diagram 7 a & b	1.4 MHz	T	RF A
Diagram 8 a & b	3 MHz	T	RF A
Diagram 9 a & b	5 MHz	T	RF A
Diagram 10 a & b	10 MHz	T	RF A
Diagram 11 a & b	15 MHz	T	RF A
Diagram 12 a & b	20 MHz	T	RF A
Diagram 13 a & b	1.4 MHz	B	RF B
Diagram 14 a & b	1.4 MHz	T	RF B

Limits

Derived from CFR 47 § 27.53 (h)/ RSS-139: 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.

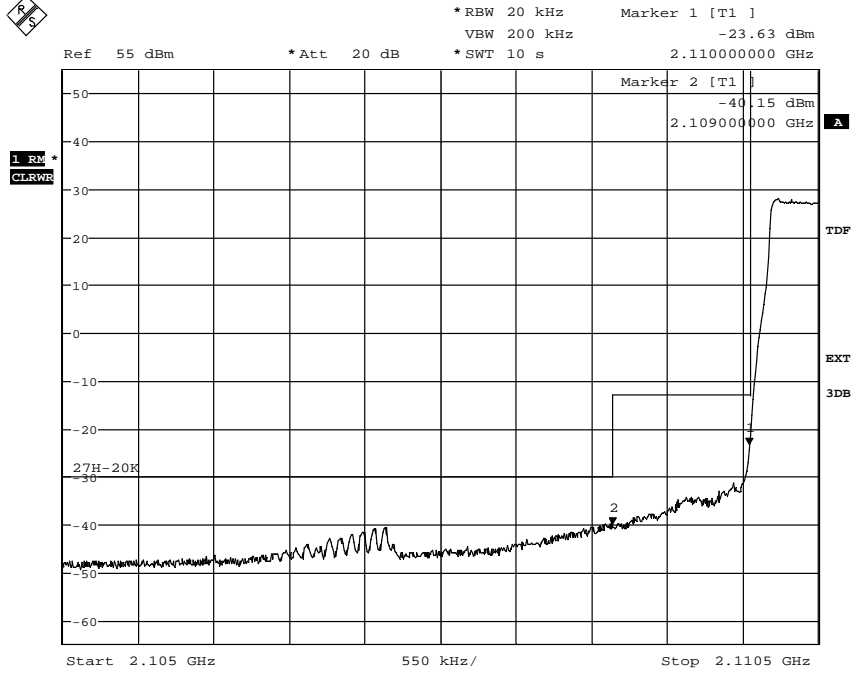
Complies?	Yes
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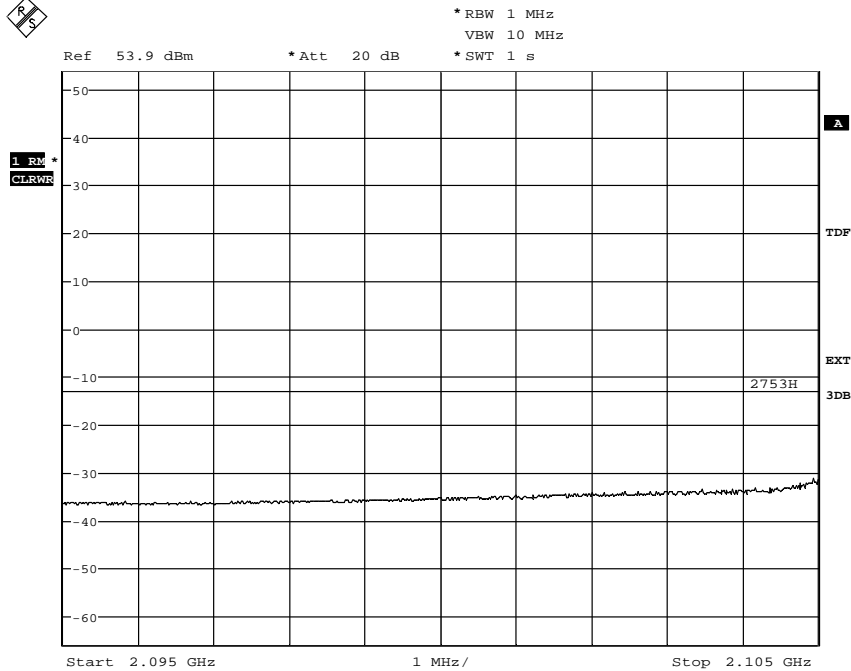
Appendix 4.1

Diagram 1 a:



Date: 17.FEB.2011 13:21:04

Diagram 1 b:



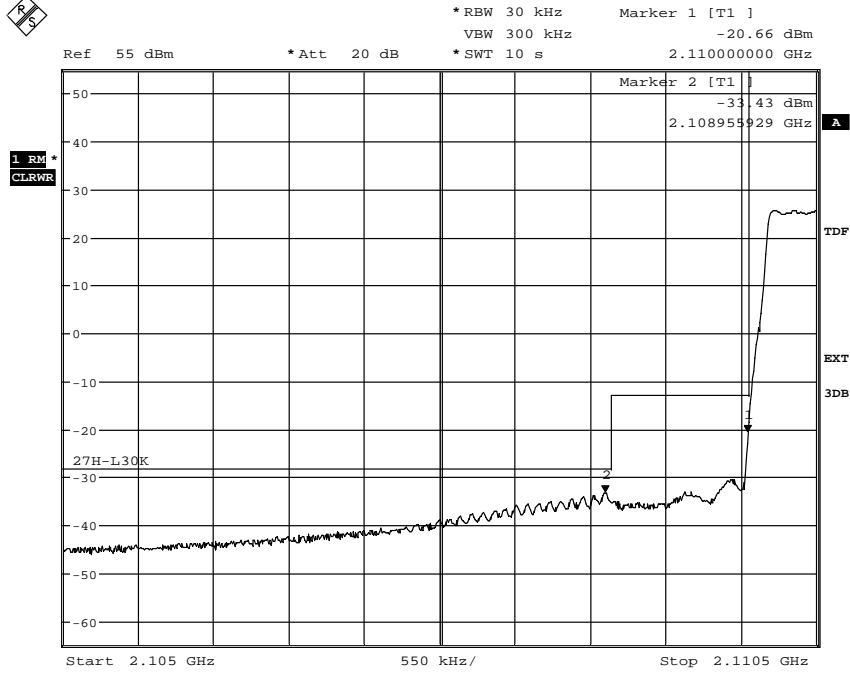
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IC: 287AB-AS1612541

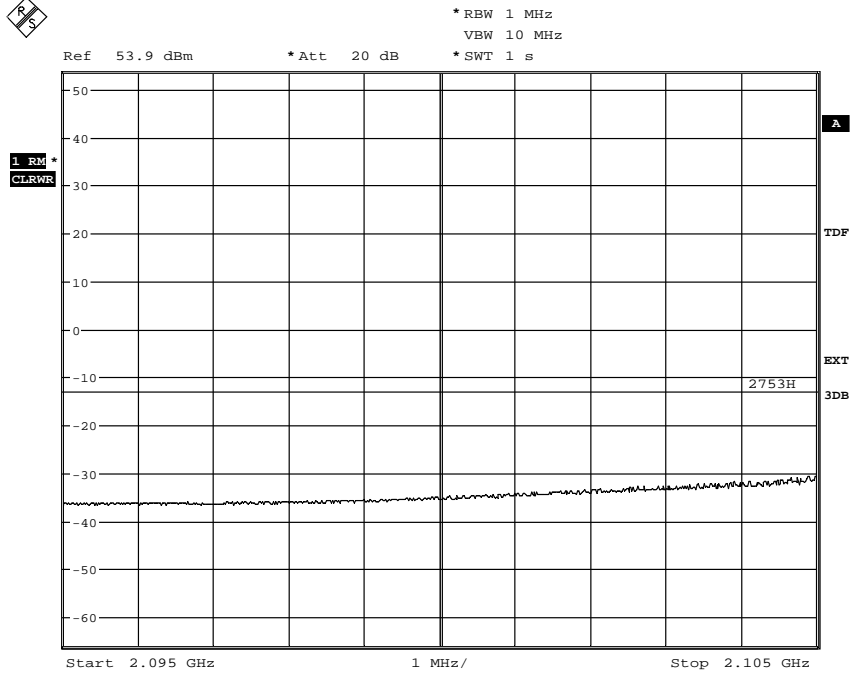
Appendix 4.1

Diagram 2 a:



Date: 18.FEB.2011 13:19:29

Diagram 2 b:



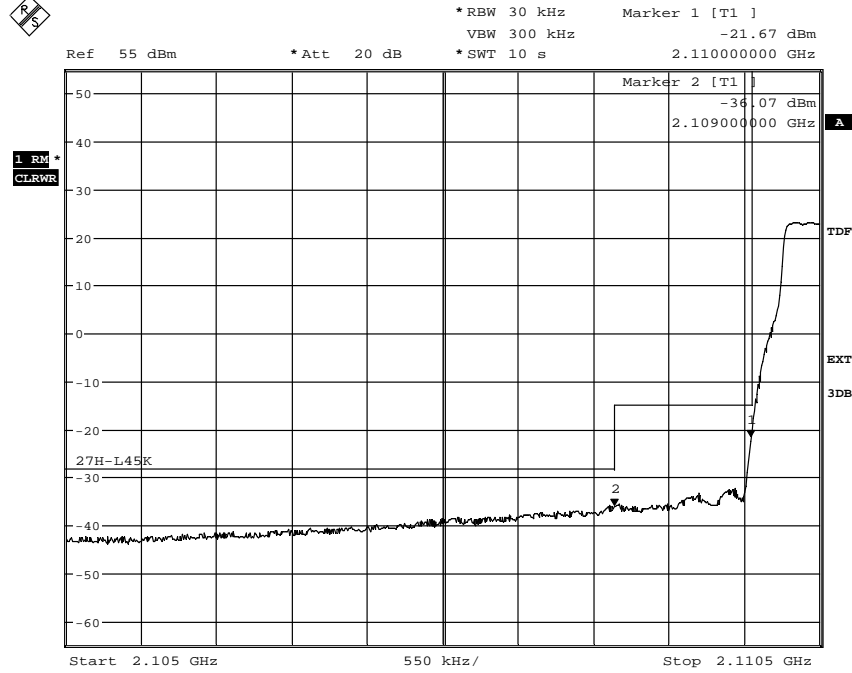
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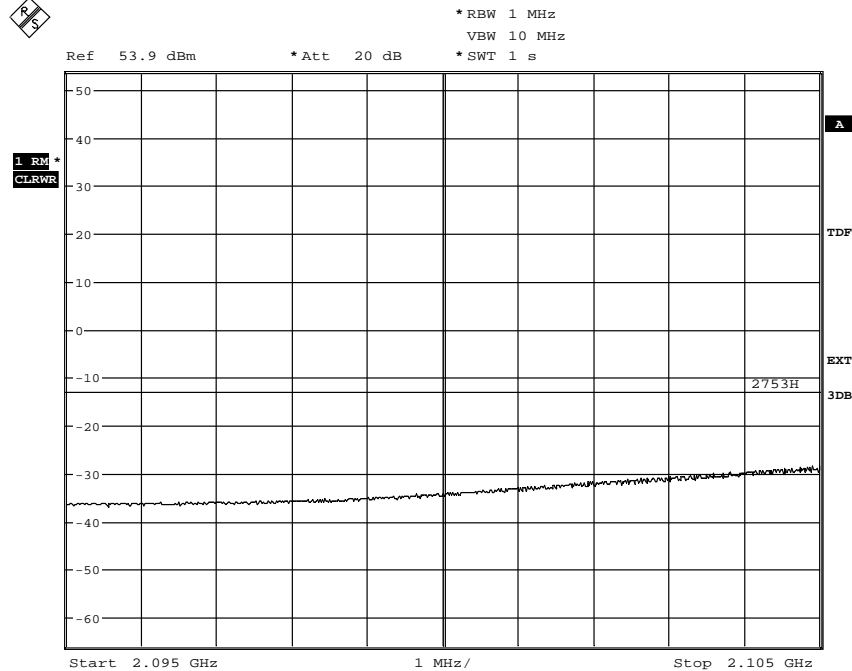
Appendix 4.1

Diagram 3 a:



Date: 22.FEB.2011 14:54:59

Diagram 3 b:



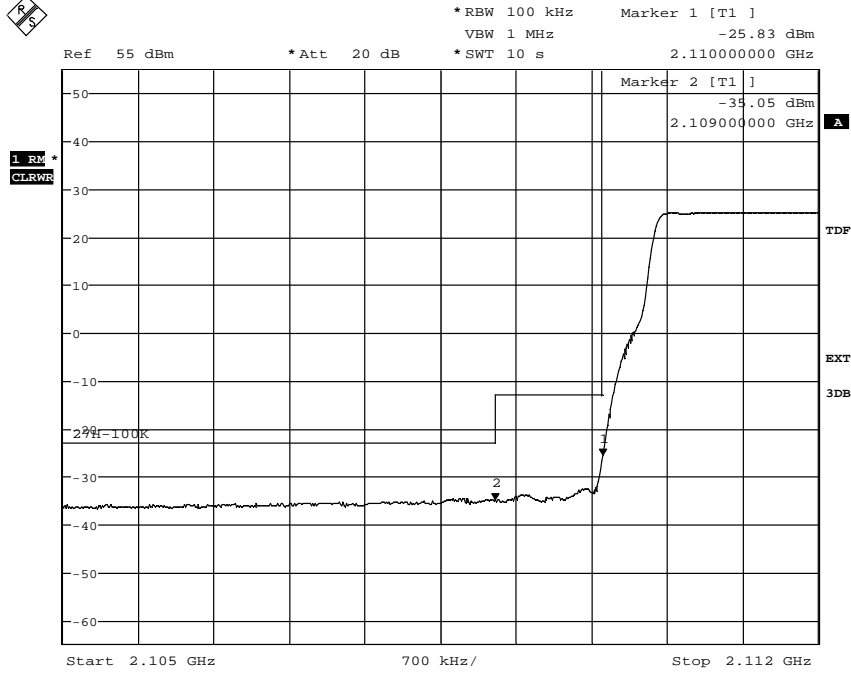
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IC: 287AB-AS1612541

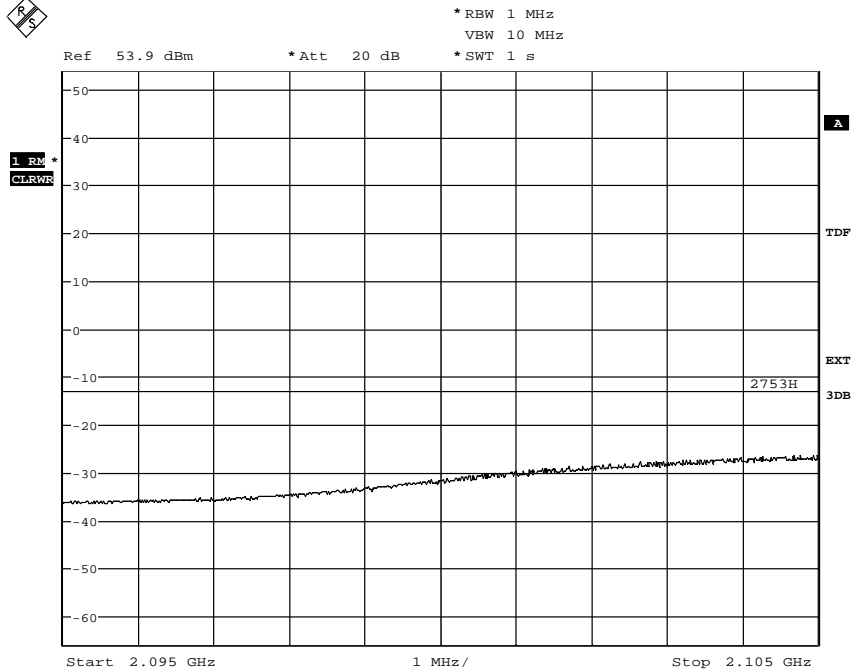
Appendix 4.1

Diagram 4 a:



Date: 18.FEB.2011 13:36:40

Diagram 4 b:



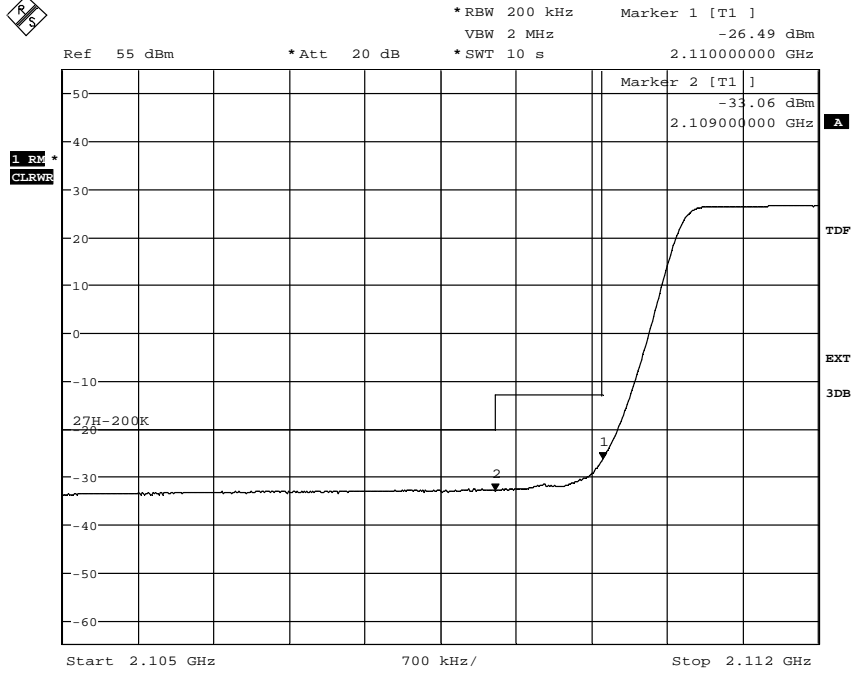
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FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

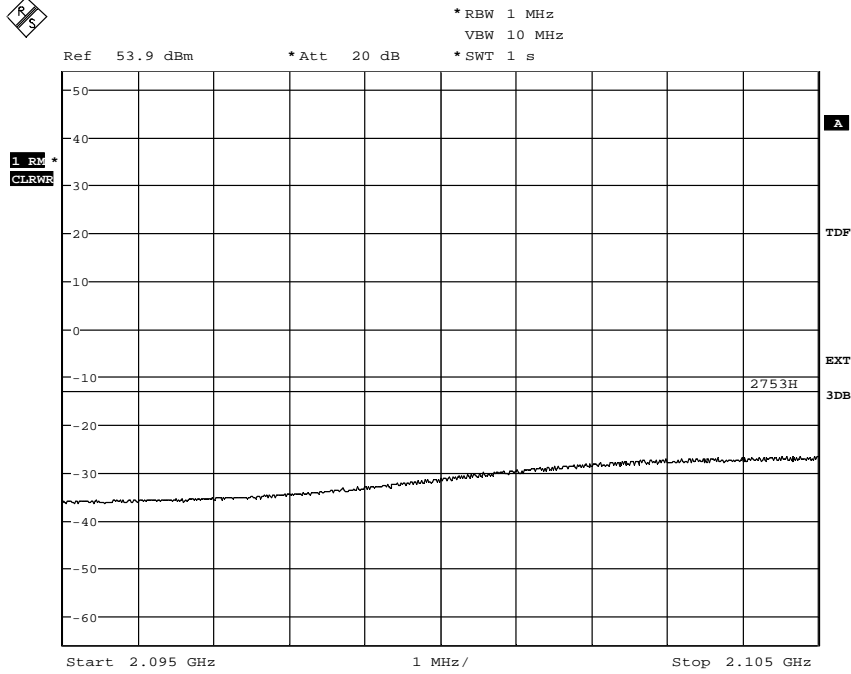
Appendix 4.1

Diagram 5 a:



Date: 18.FEB.2011 13:42:17

Diagram 5 b:



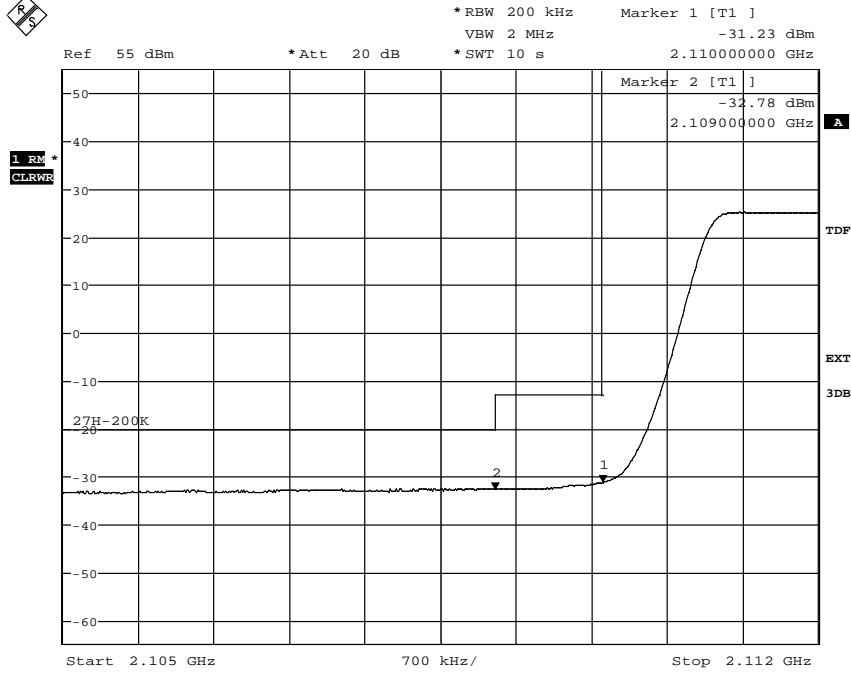
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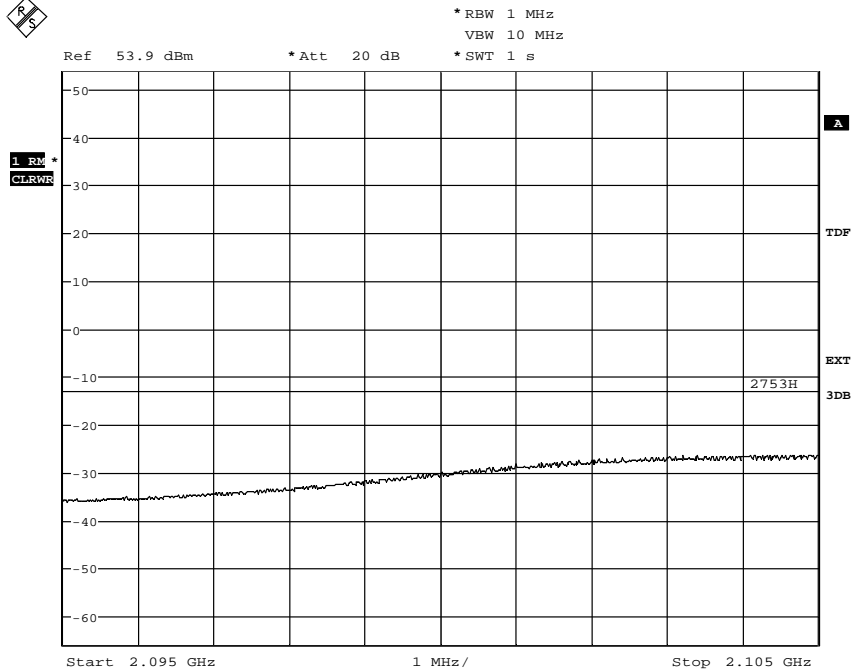
Appendix 4.1

Diagram 6 a:



Date: 18.FEB.2011 14:12:17

Diagram 6 b:



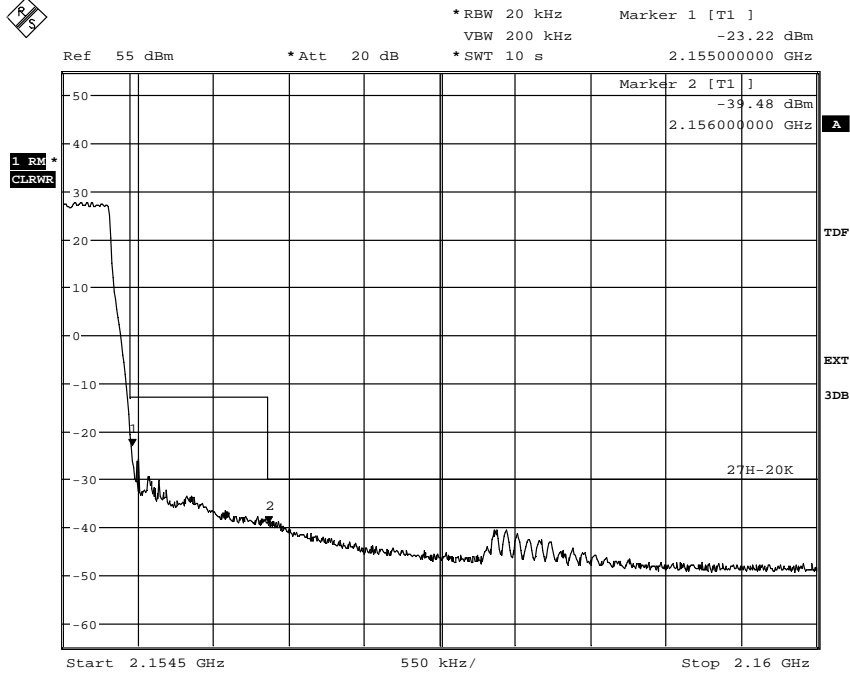
Date: 18.FEB.2011 14:10:11



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

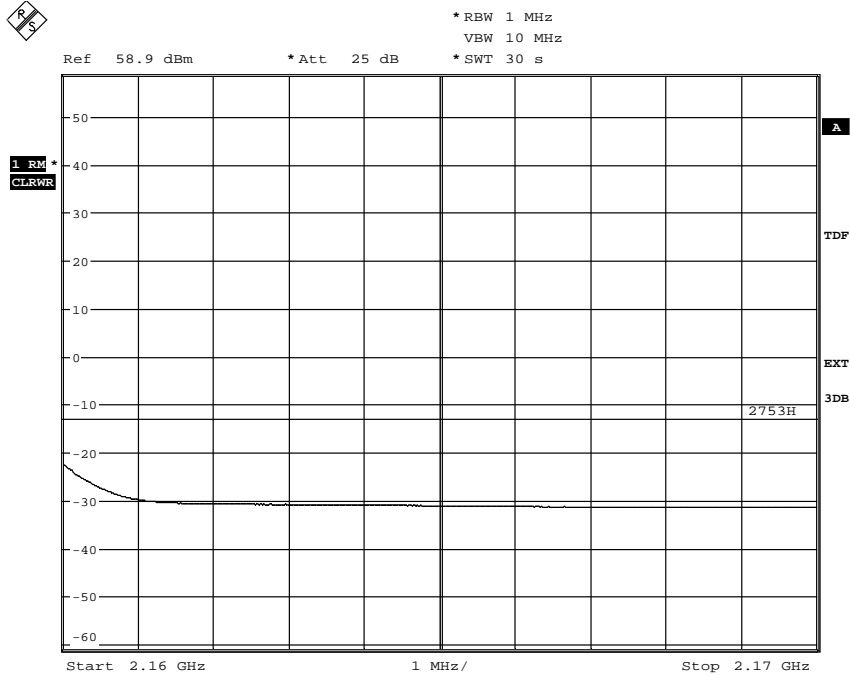
Appendix 4.1

Diagram 7 a:



Date: 17.FEB.2011 14:02:38

Diagram 7 b:



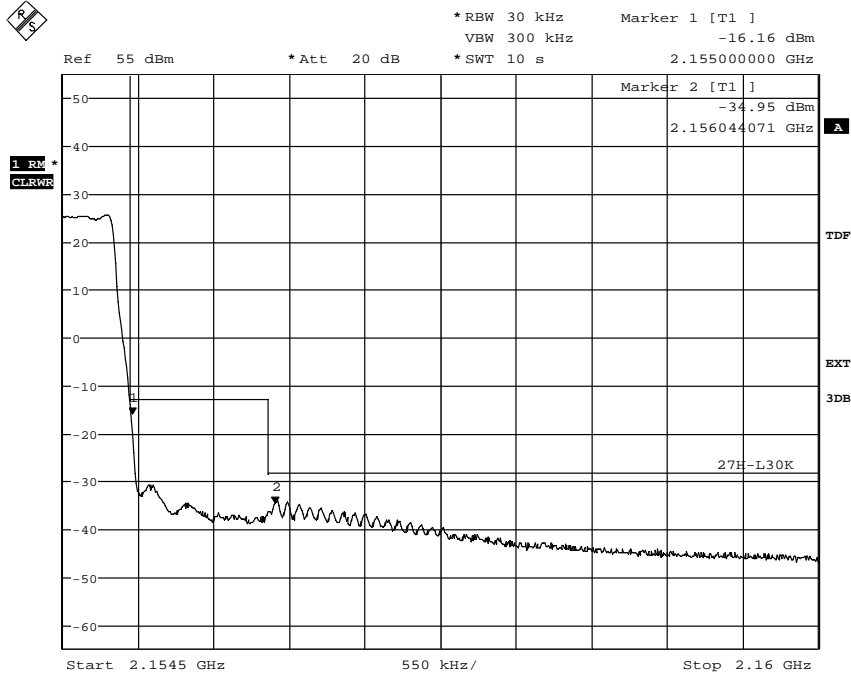
Date: 17.FEB.2011 14:05:07



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

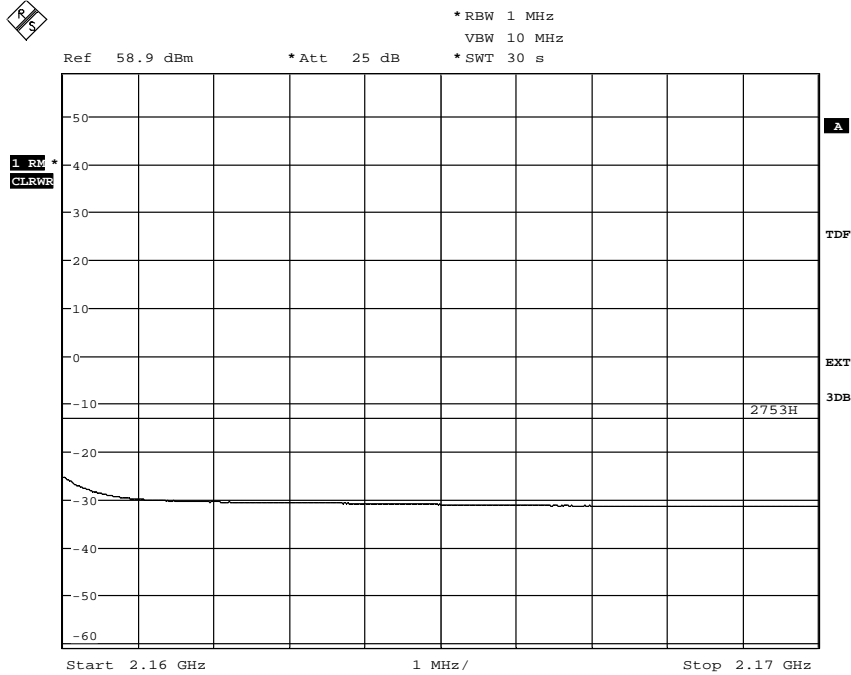
Appendix 4.1

Diagram 8 a:



Date: 21.FEB.2011 12:18:42

Diagram 8 b:



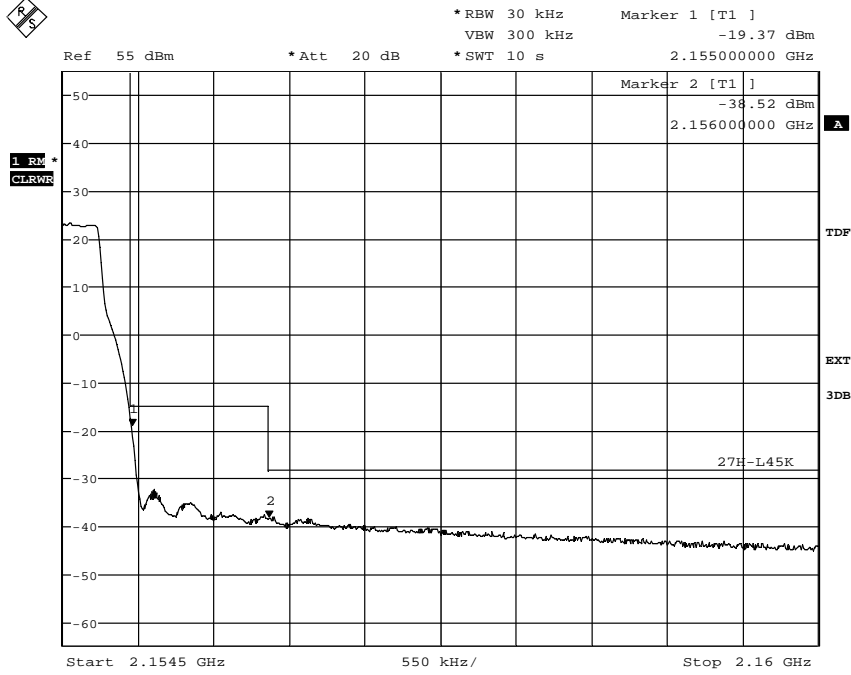
Date: 21.FEB.2011 12:20:36



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

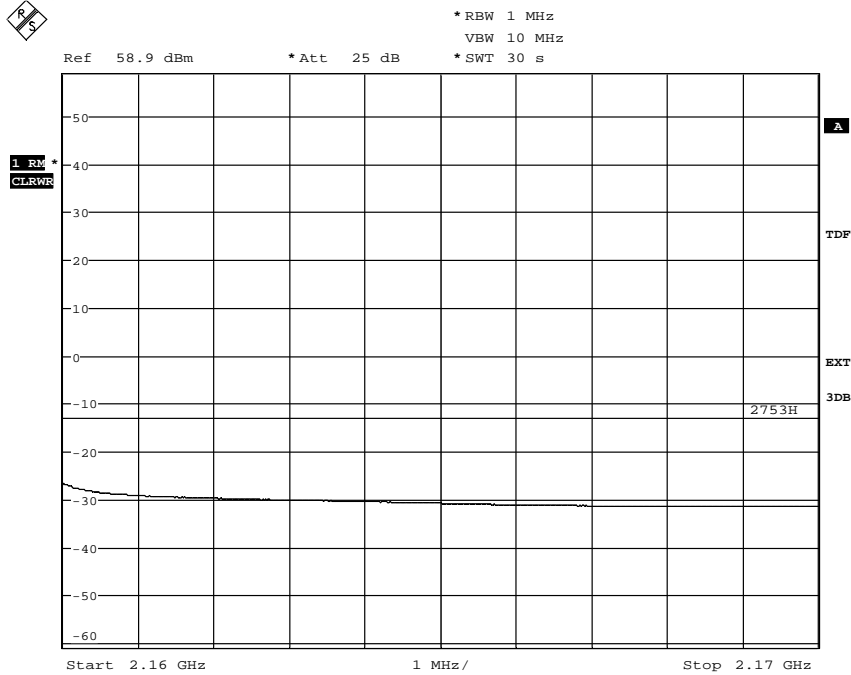
Appendix 4.1

Diagram 9 a:



Date: 21.FEB.2011 12:13:25

Diagram 9 b:



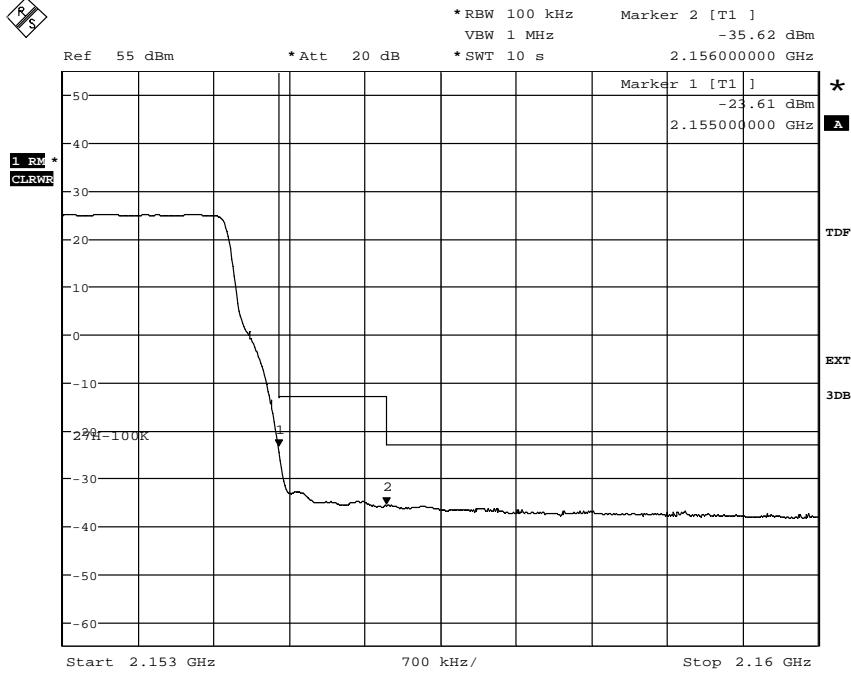
Date: 21.FEB.2011 11:52:02



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

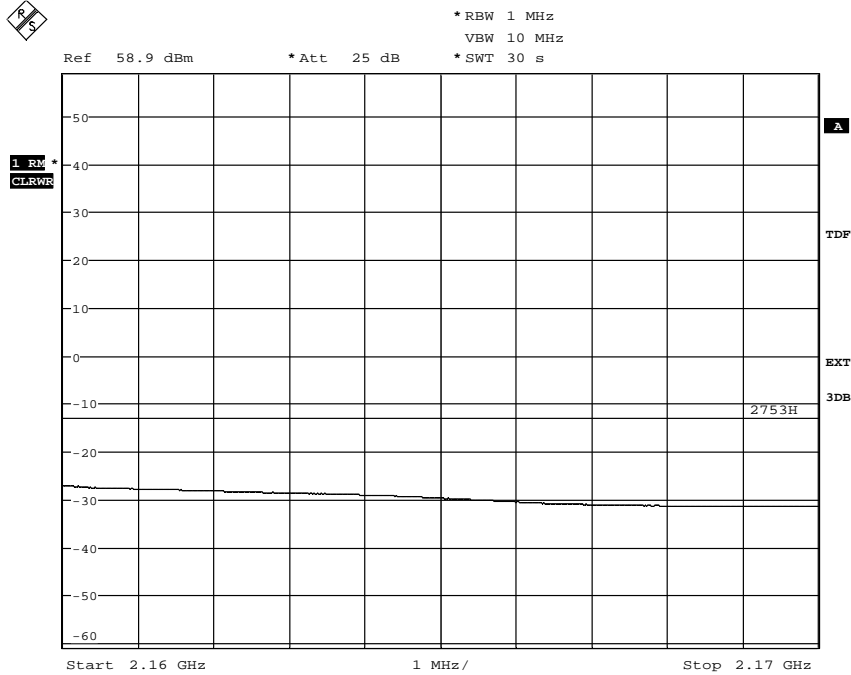
Appendix 4.1

Diagram 10 a:



Date: 21.FEB.2011 11:46:57

Diagram 10 b:



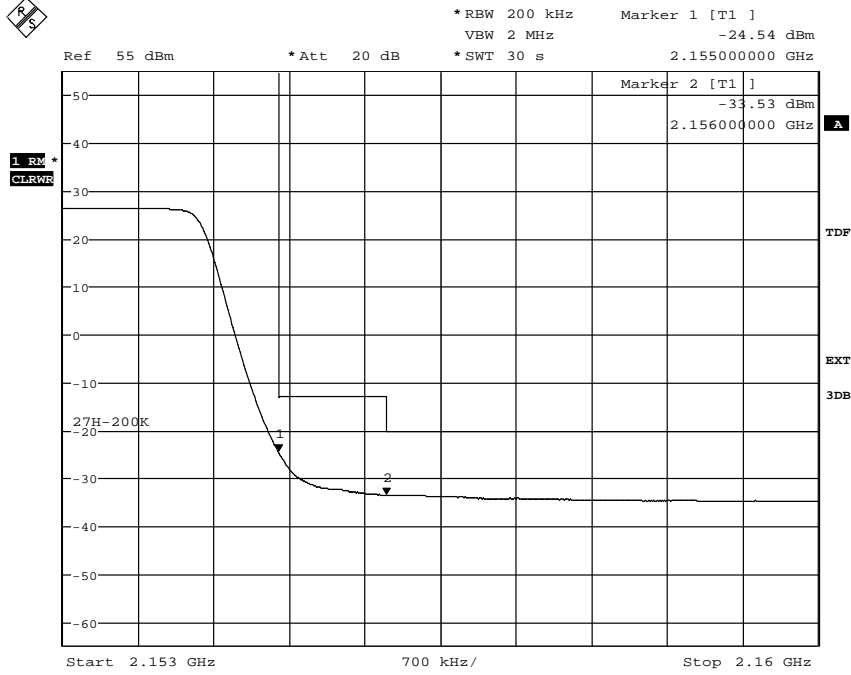
Date: 21.FEB.2011 11:49:03



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

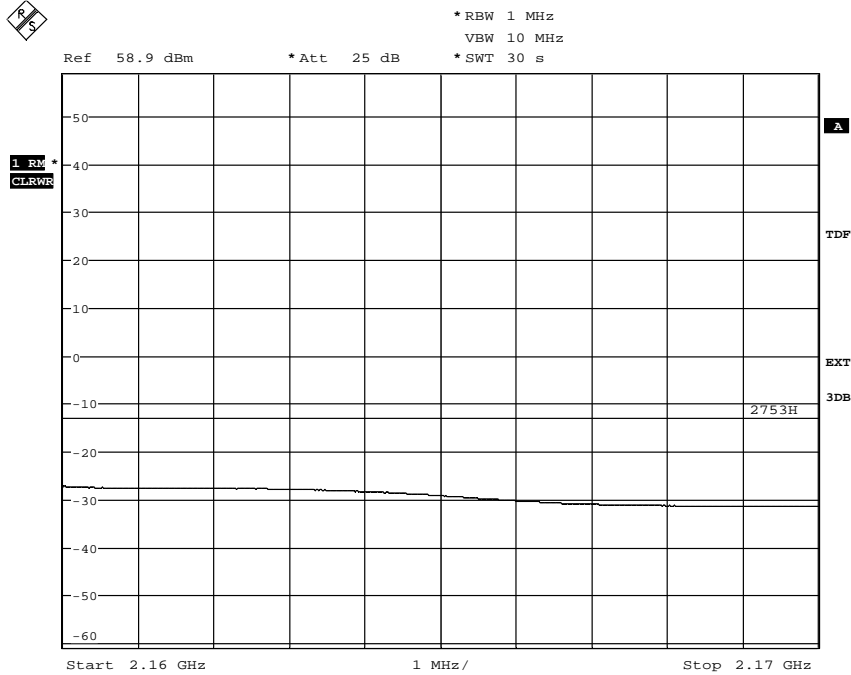
Appendix 4.1

Diagram 11 a:



Date: 21.FEB.2011 10:51:56

Diagram 11 b:



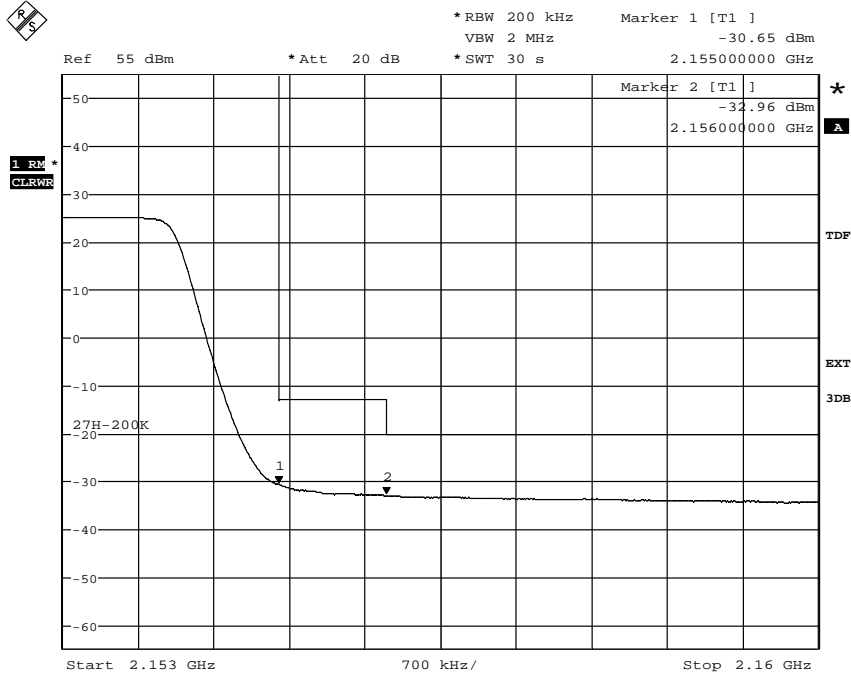
Date: 21.FEB.2011 10:49:46



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

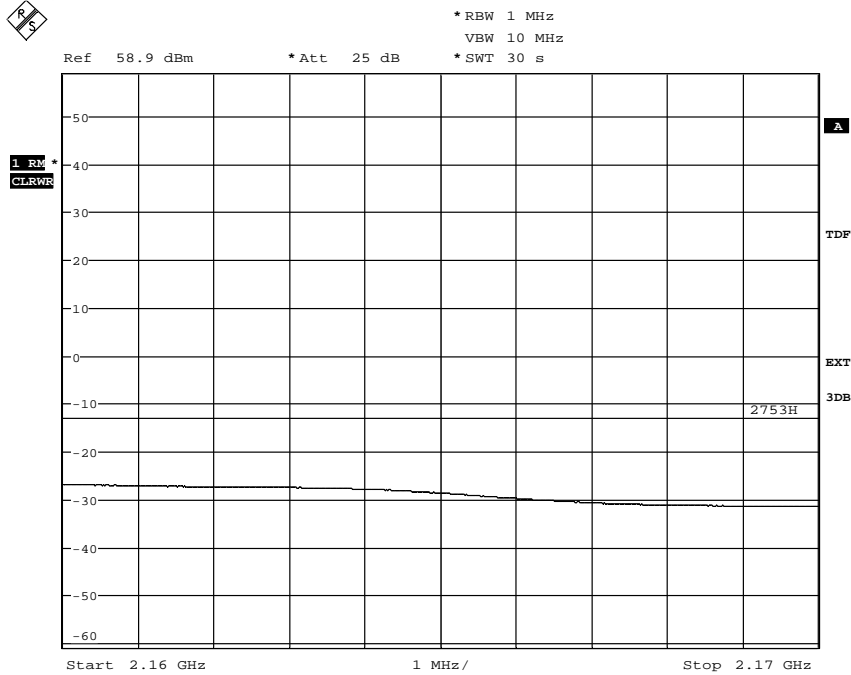
Appendix 4.1

Diagram 12 a:



Date: 21.FEB.2011 10:41:47

Diagram 12 b:



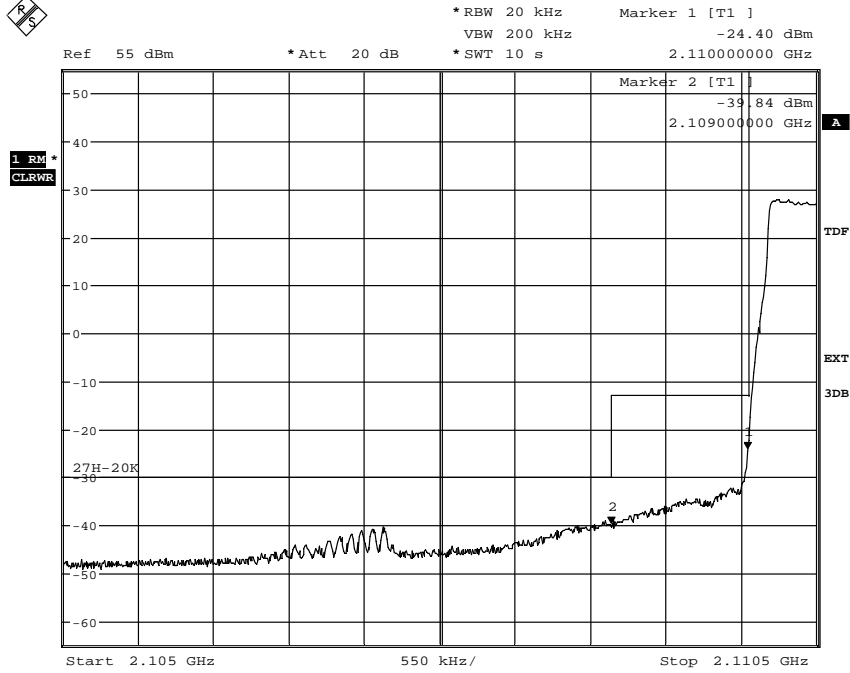
Date: 21.FEB.2011 10:44:19



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

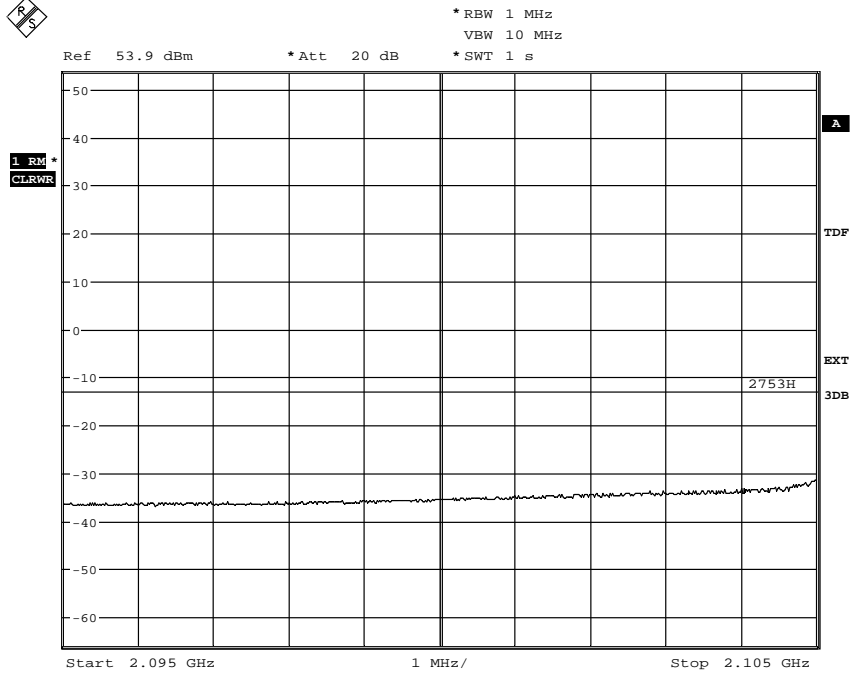
Appendix 4.1

Diagram 13 a:



Date: 22.FEB.2011 13:14:36

Diagram 13 b:



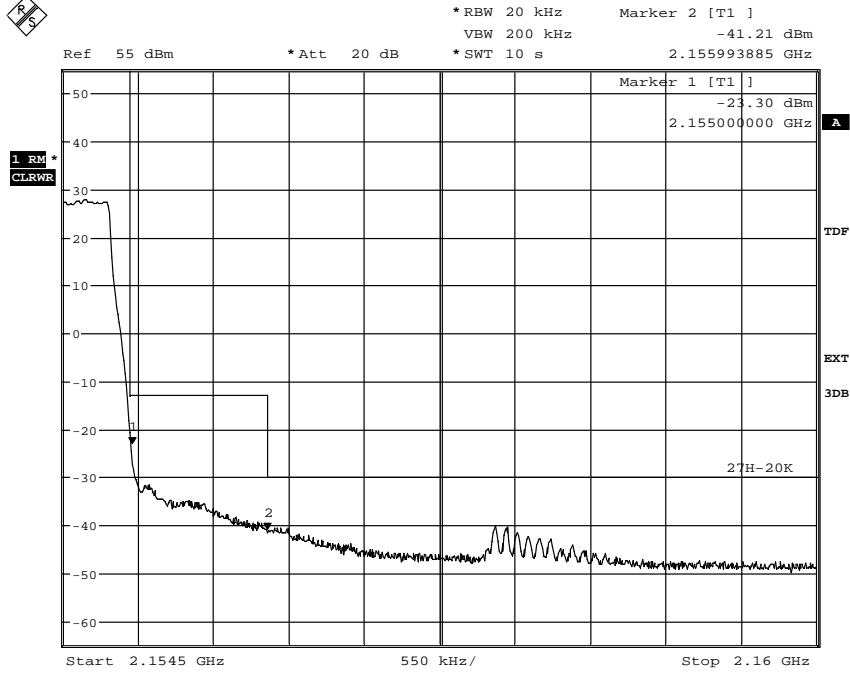
Date: 22.FEB.2011 13:16:36



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

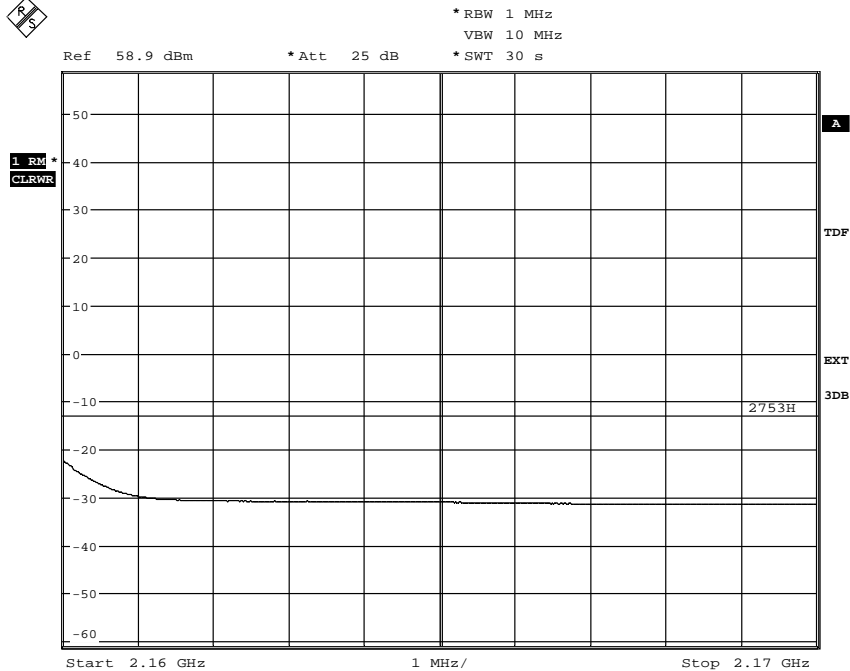
Appendix 4.1

Diagram 14 a:



Date: 22.FEB.2011 13:01:39

Diagram 14 b:



Date: 22.FEB.2011 12:52:30

FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 5.1

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

Date	Temperature	Humidity
2011-02-17	23 °C ± 13 °C	13 % ± 5 %
2011-02-18	22 °C ± 13 °C	11 % ± 5 %
2011-02-21	22 °C ± 13 °C	10 % ± 5 %

Test set-up and procedure

The measurements were made as defined in §27.53 (h). The output was connected to a spectrum analyzer. First a pre-measurement with activated peak detector was performed. Emissions close to or above the limit is measured with activated RMS detector and the RMS measurement result is noted. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements.

Measurement equipment	SP number
Rohde & Schwarz FSQ40	504 143
RF attenuator	900 233
HP filter	503 739
HP filter	503 740
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

The results are shown in appendix 5.1

	Bandwidth configuration	Tested port	TX channel	Measured range
Diagram 1	1.4 MHz	RF A	B	9 kHz – 25 GHz
Diagram 2	20 MHz	RF A	B	9 kHz – 25 GHz
Diagram 3	1.4 MHz	RF A	M	9 kHz – 25 GHz
Diagram 4	3 MHz	RF A	M	9 kHz – 25 GHz
Diagram 5	5 MHz	RF A	M	9 kHz – 25 GHz
Diagram 6	10 MHz	RF A	M	9 kHz – 25 GHz
Diagram 7	15 MHz	RF A	M	9 kHz – 25 GHz
Diagram 8	20 MHz	RF A	M	9 kHz – 25 GHz
Diagram 9	1.4 MHz	RF A	T	9 kHz – 25 GHz
Diagram 10	20 MHz	RF A	T	9 kHz – 25 GHz
Diagram 11	1.4 MHz	RF B	M	9 kHz – 25 GHz
Diagram 12	20 MHz	RF B	M	9 kHz – 25 GHz



REPORT

FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 5.1

Remarks

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 to $10 \times 2.5 \text{ GHz} = 25 \text{ GHz}$ for TX emission measurements. A comparative test of one configuration was done for the transmitter chain at port RF B to verify identical performance.

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 per 1 MHz RBW.

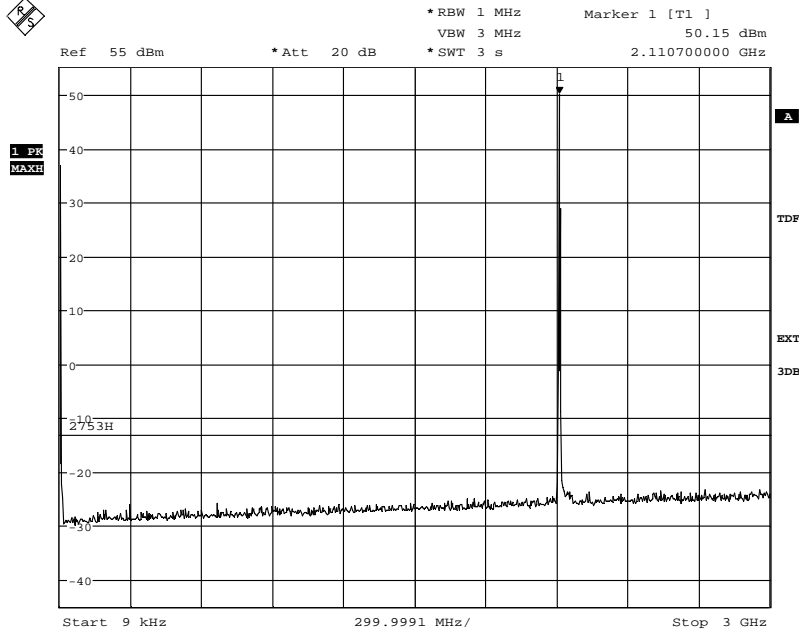
Complies?	Yes
-----------	-----



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

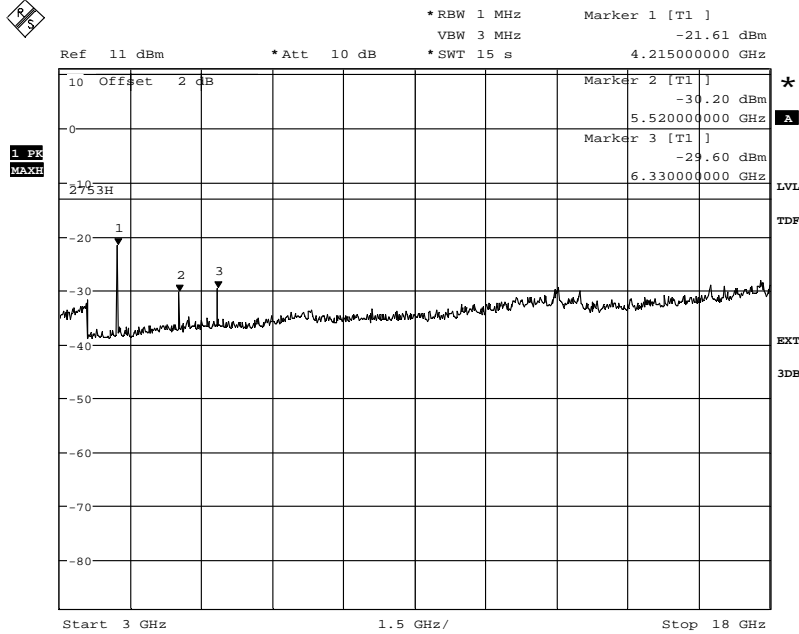
Appendix 5.1

Diagram 1a:



Date: 17.FEB.2011 13:24:13

Diagram 1b:



Date: 17.FEB.2011 13:43:18

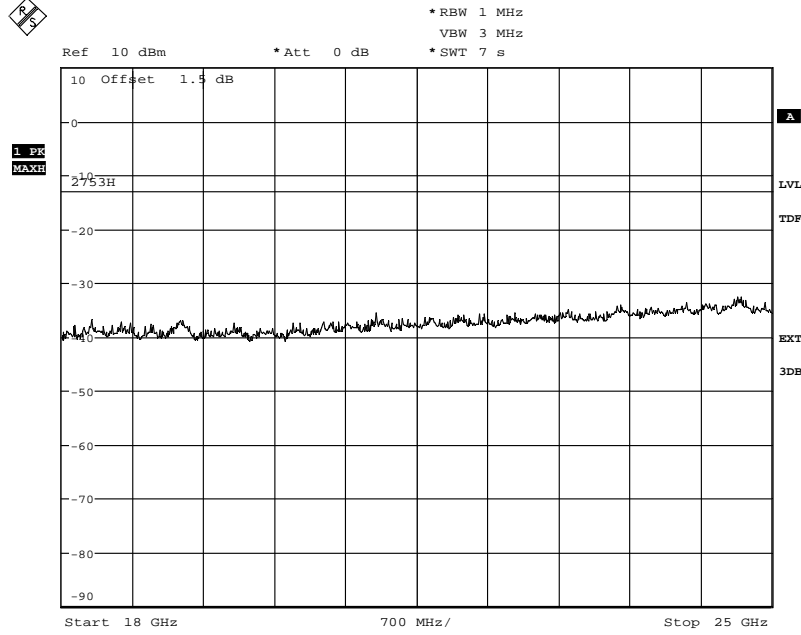
Note: None of above marked emissions did exceed a RMS level of -33 dBm.



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 5.1

Diagram 1c:



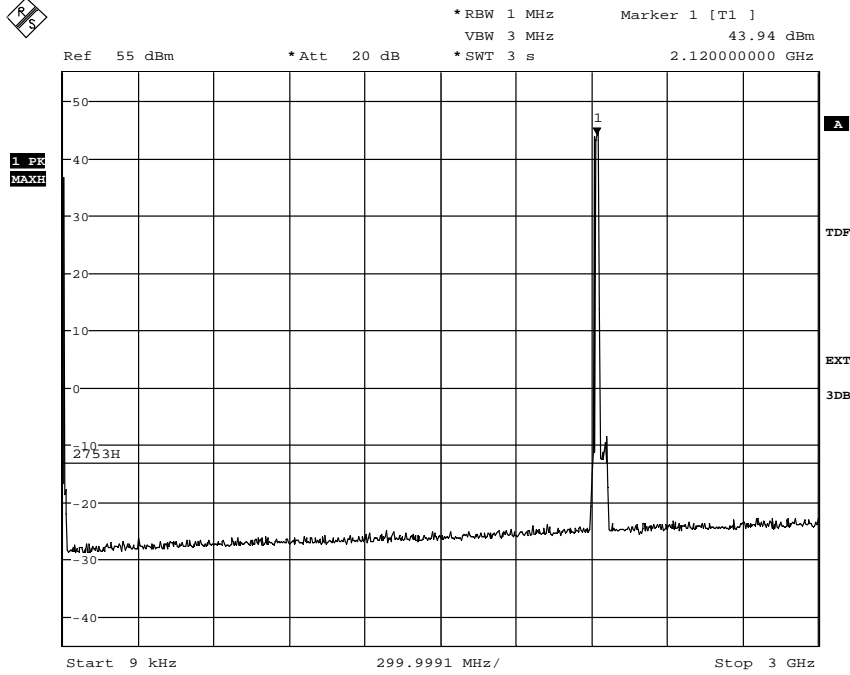
Date: 17.FEB.2011 13:35:21



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 5.1

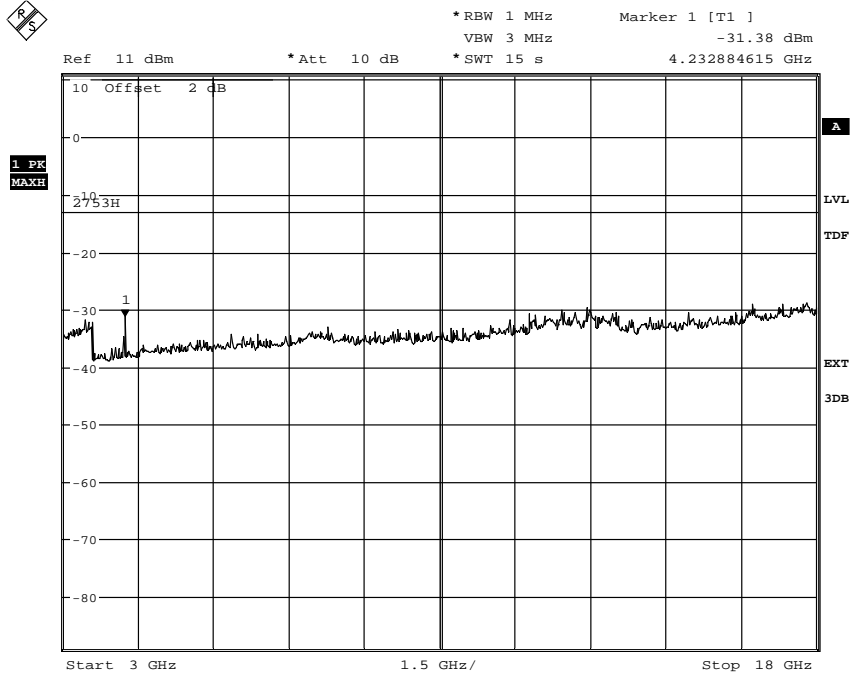
Diagram 2a:



Date: 18.FEB.2011 14:23:06

Note: The emissions around the carrier are within the operating frequency band.

Diagram 2b:



Date: 21.FEB.2011 09:58:37

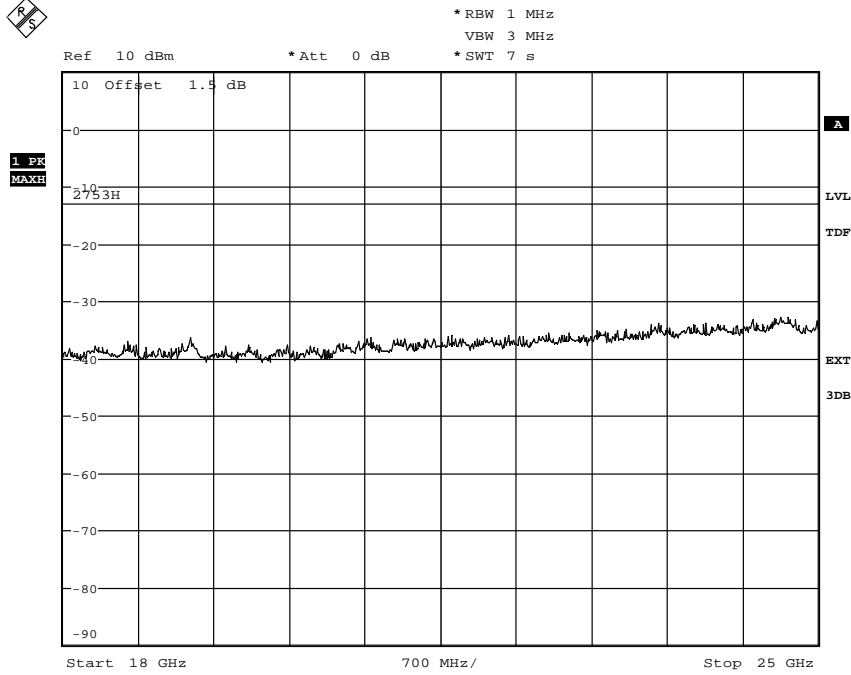
Note: The above marked emission did not exceed a RMS level of -33 dBm



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 5.1

Diagram 2c:



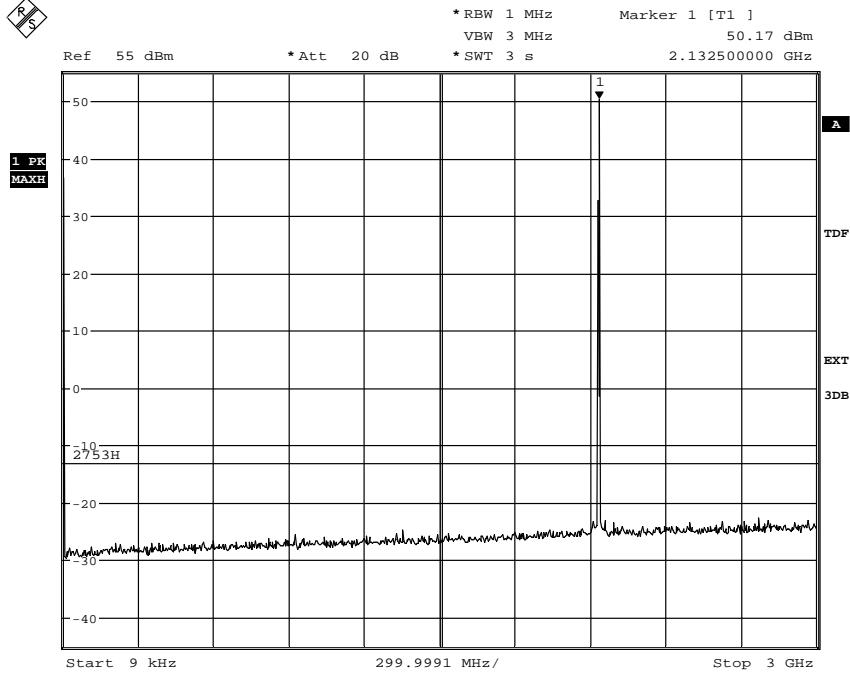
Date: 21.FEB.2011 10:03:14



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

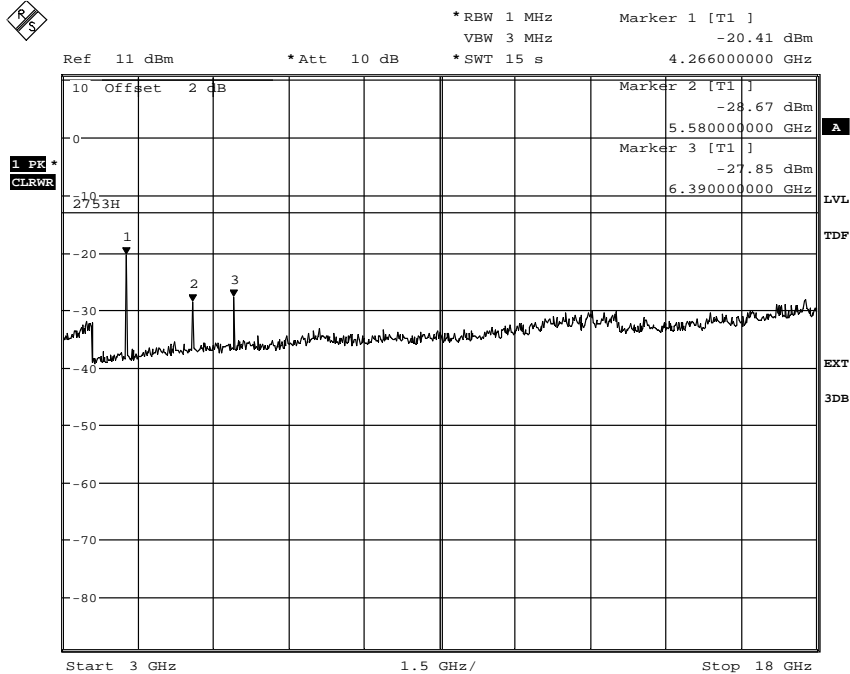
Appendix 5.1

Diagram 3a:



Date: 17.FEB.2011 12:43:33

Diagram 3b:



Date: 17.FEB.2011 12:53:17

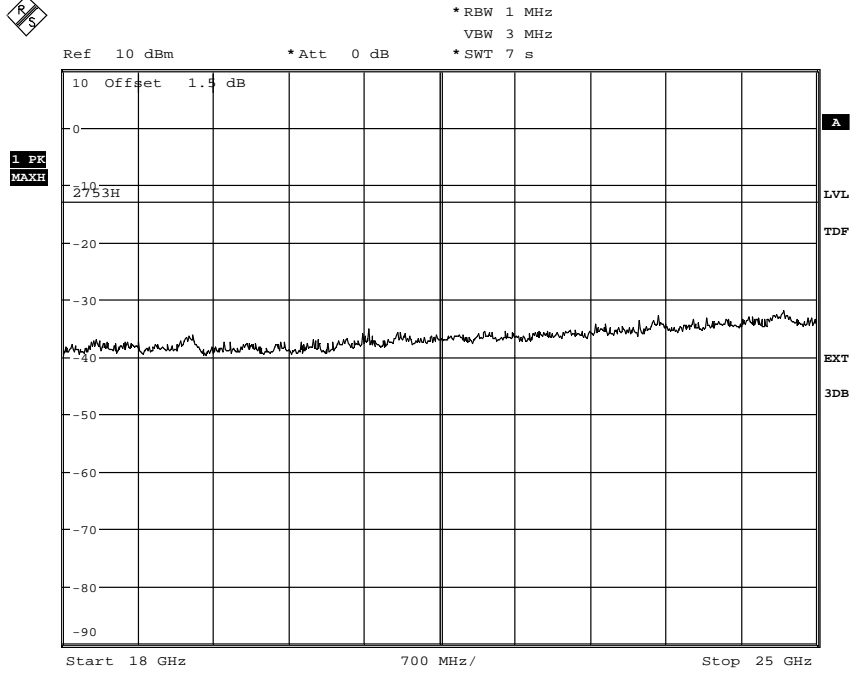
Note: The emission at 4.27 GHz did not exceed a RMS value of -32.0 dBm. Other above marked emissions did not exceed a RMS level of -33 dBm.



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 5.1

Diagram 3c:



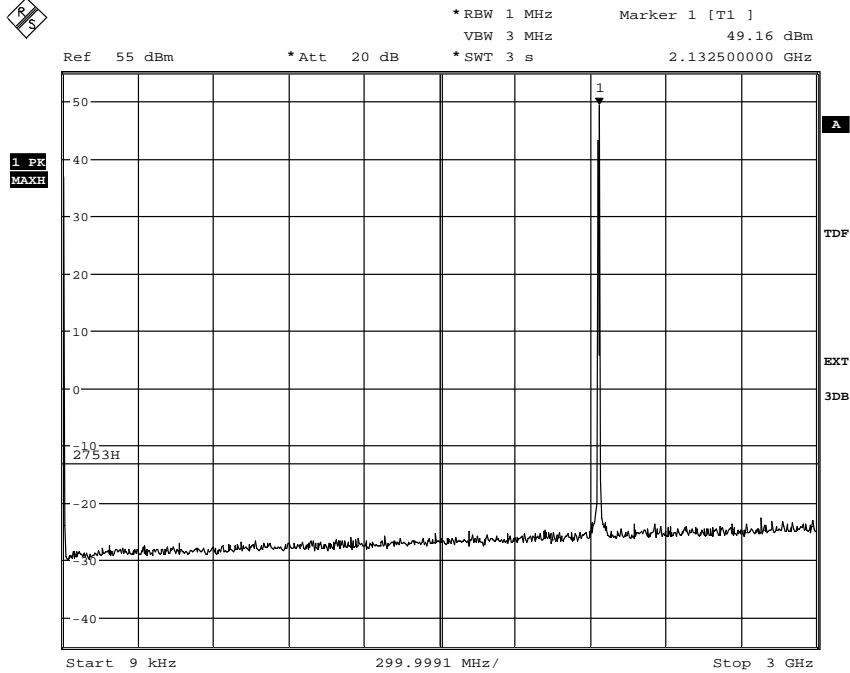
Date: 17.FEB.2011 13:08:04



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

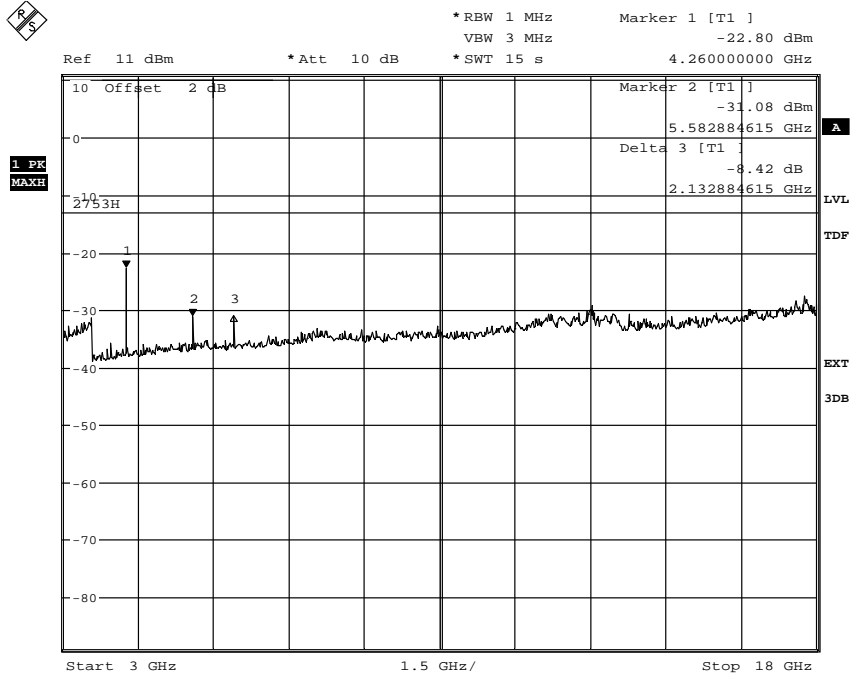
Appendix 5.1

Diagram 4a:



Date: 17.FEB.2011 14:35:47

Diagram 4b:



Date: 17.FEB.2011 14:32:51

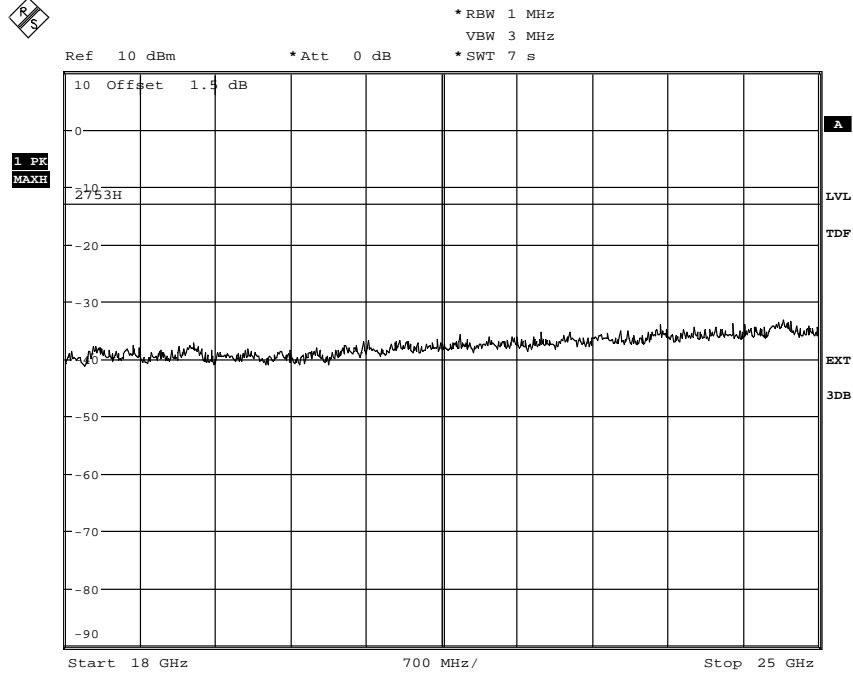
Note: None of above marked emissions did exceed a RMS level of -33 dBm.



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 5.1

Diagram 4c:



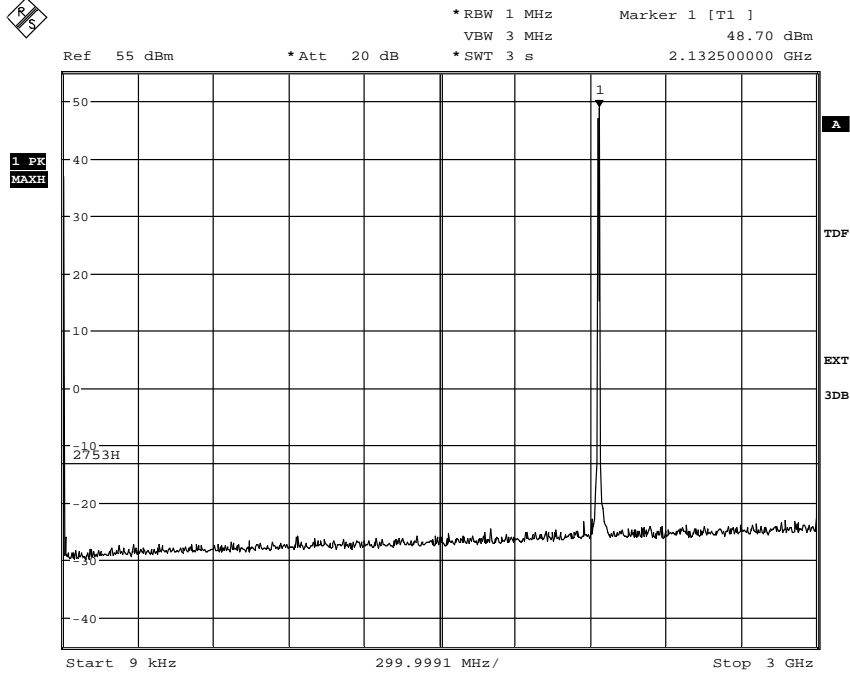
Date: 17.FEB.2011 14:28:08



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

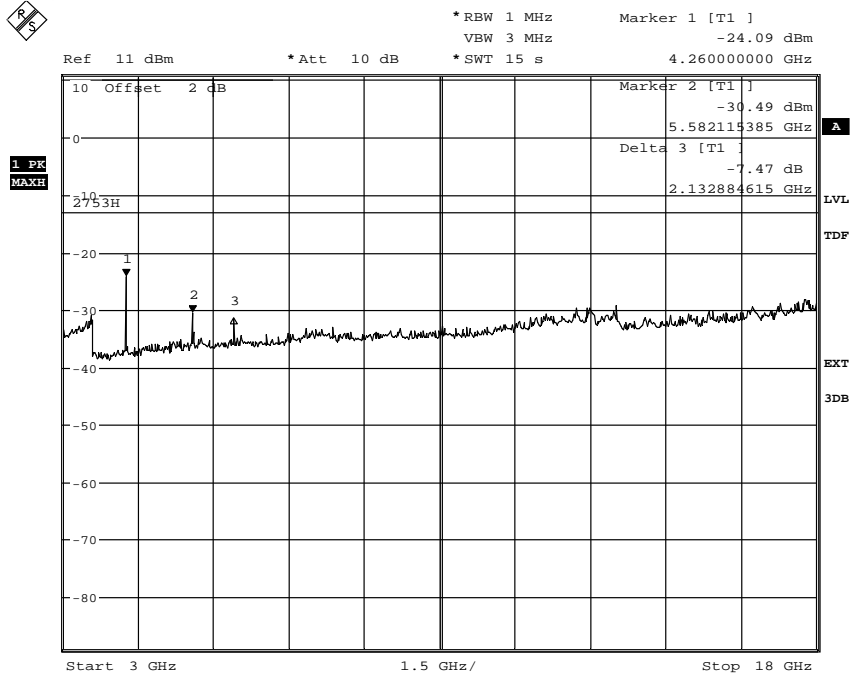
Appendix 5.1

Diagram 5a:



Date: 17.FEB.2011 14:55:33

Diagram 5b:



Date: 17.FEB.2011 15:10:08

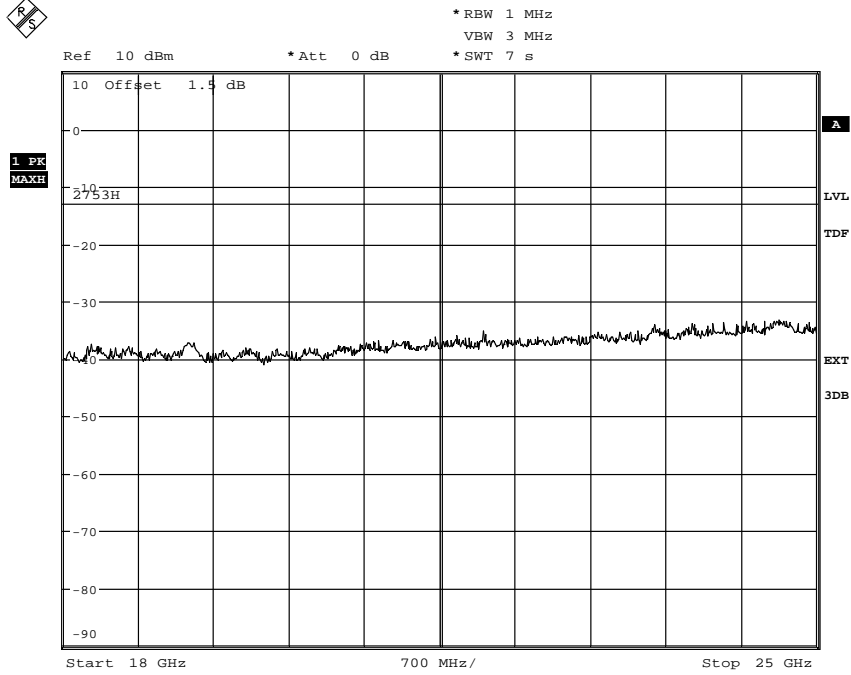
Note: None of above marked emissions did exceed a RMS level of -33 dBm.



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 5.1

Diagram 5c:



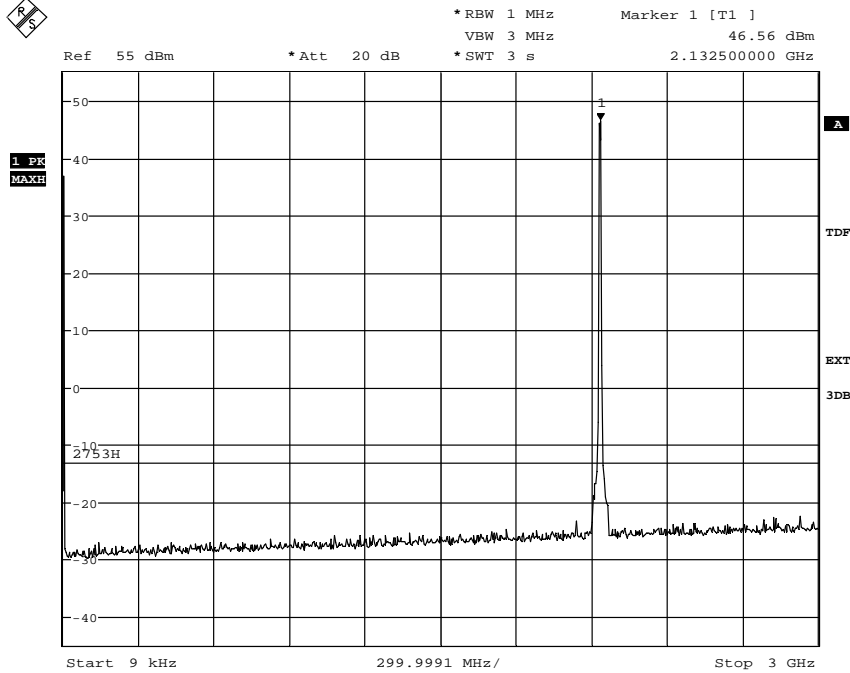
Date: 17.FEB.2011 15:18:11



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 5.1

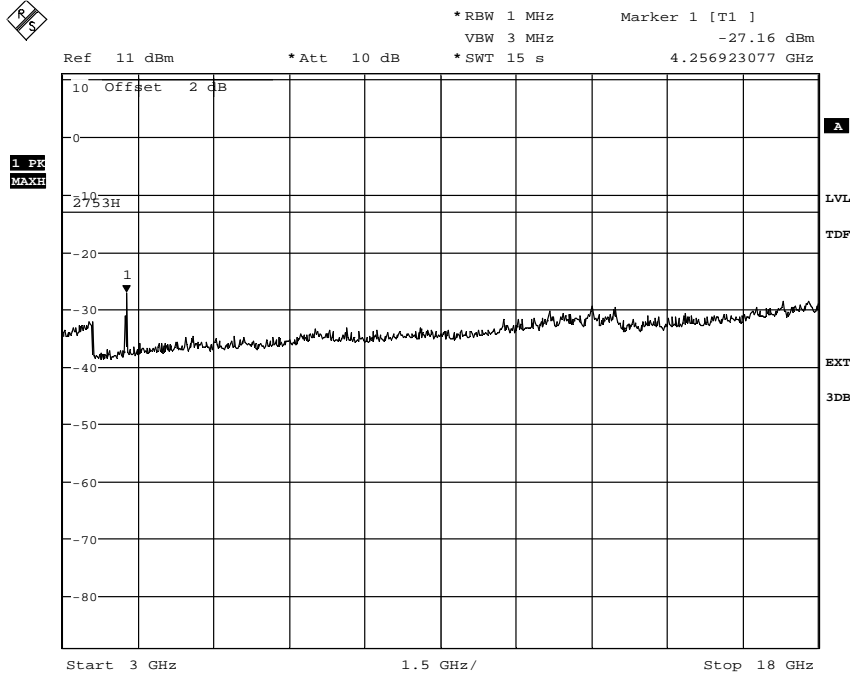
Diagram 6a:



Date: 17.FEB.2011 16:08:24

The emissions around the carrier are within the operating frequency band

Diagram 6b:



Date: 17.FEB.2011 16:12:34

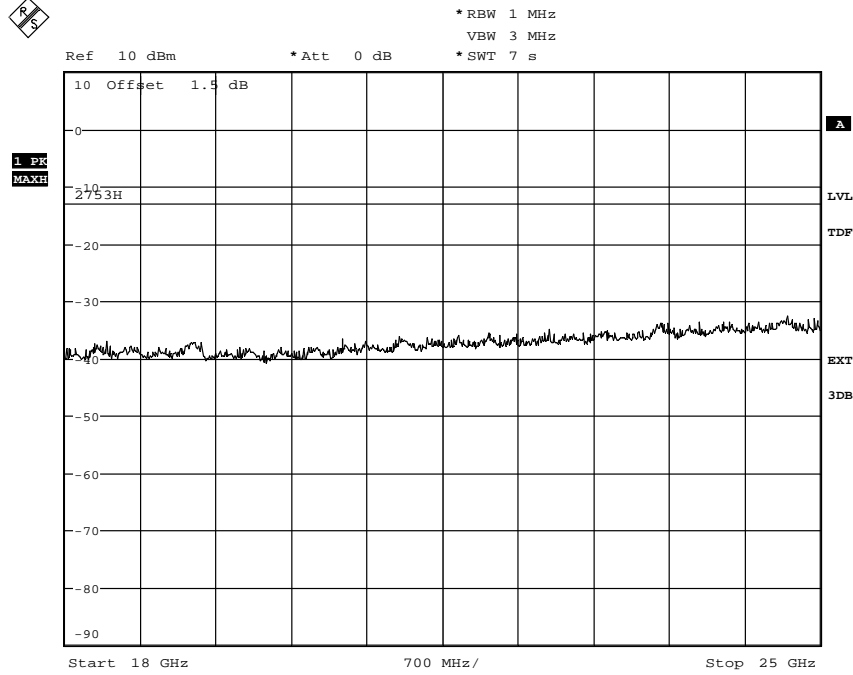
Note: The above marked emission did not exceed a RMS level of -33 dBm



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 5.1

Diagram 6c:



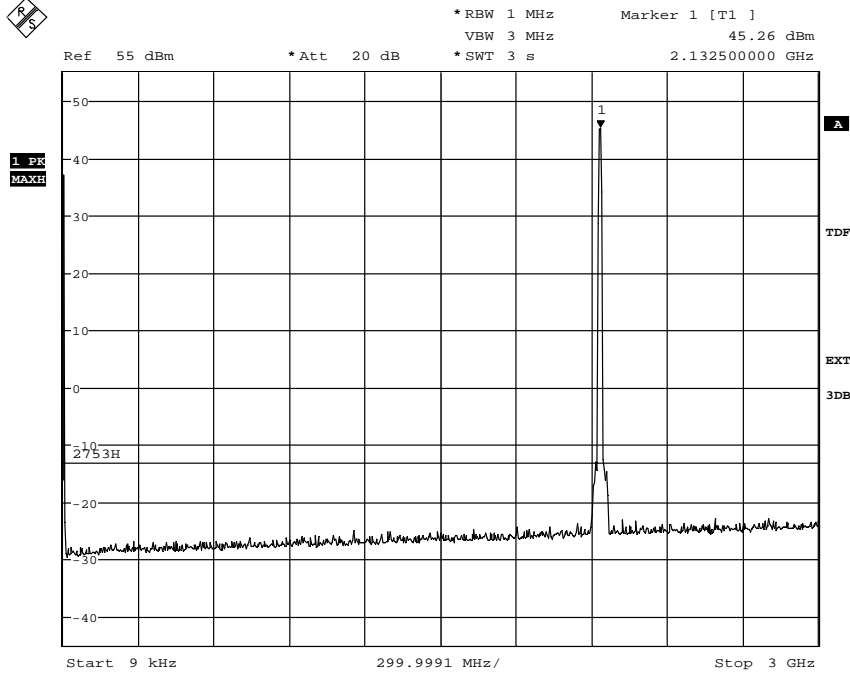
Date: 17.FEB.2011 16:10:30



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 5.1

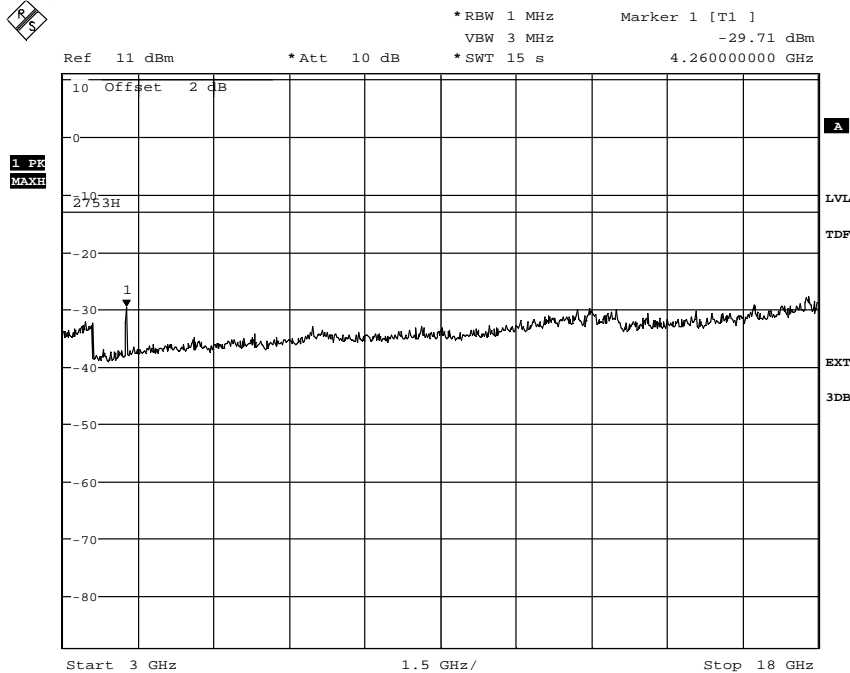
Diagram 7a:



Date: 18.FEB.2011 08:48:58

Note: The emissions around the carrier are within the operating frequency band

Diagram 7b:



Date: 18.FEB.2011 08:41:53

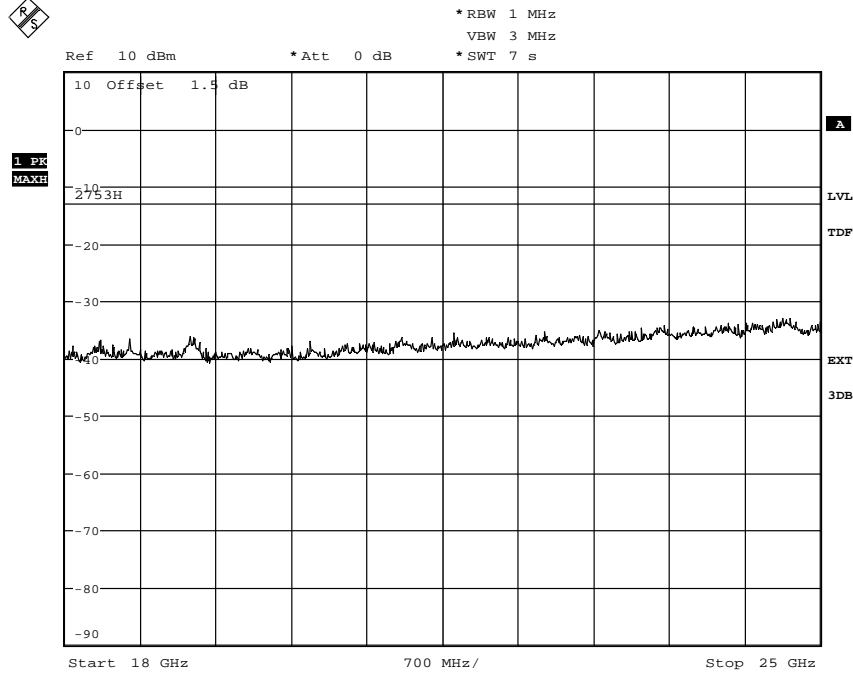
Note: The above marked emission did not exceed a RMS level of -33 dBm.



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 5.1

Diagram 7c:



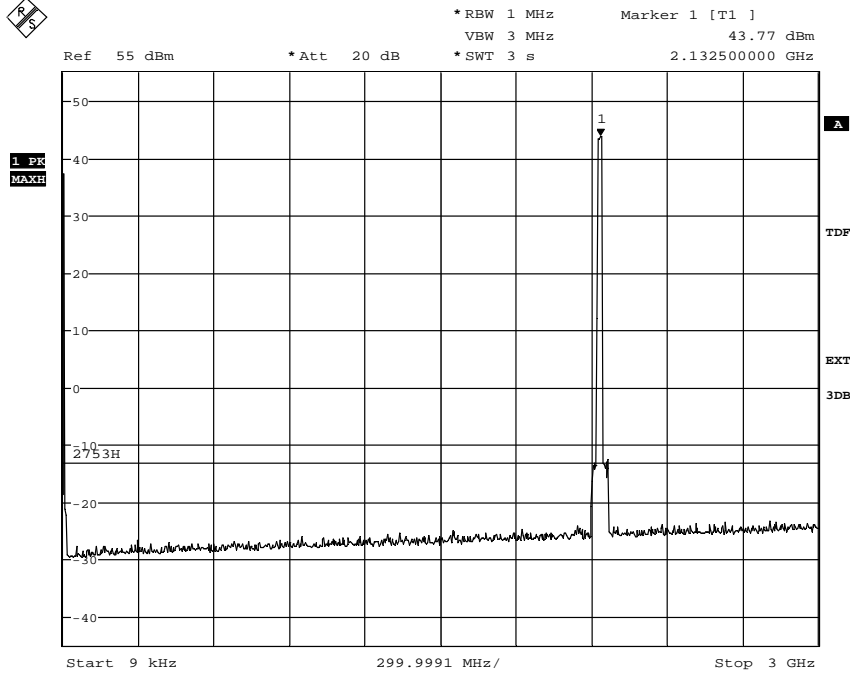
Date: 18.FEB.2011 09:28:04



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 5.1

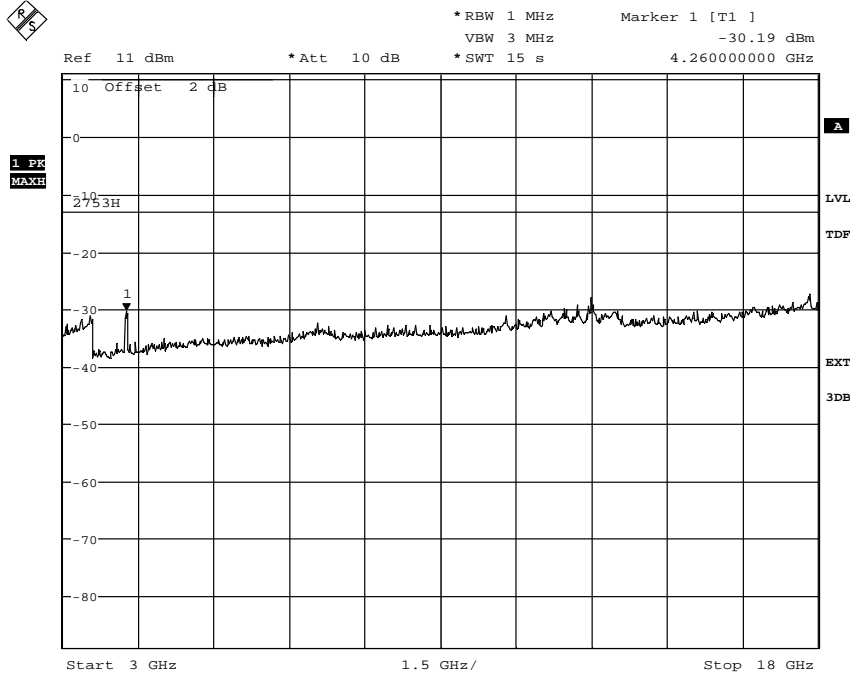
Diagram 8a:



Date: 18.FEB.2011 10:24:51

Note: The emissions around the carrier are within the operating frequency band

Diagram 8b:



Date: 18.FEB.2011 10:10:39

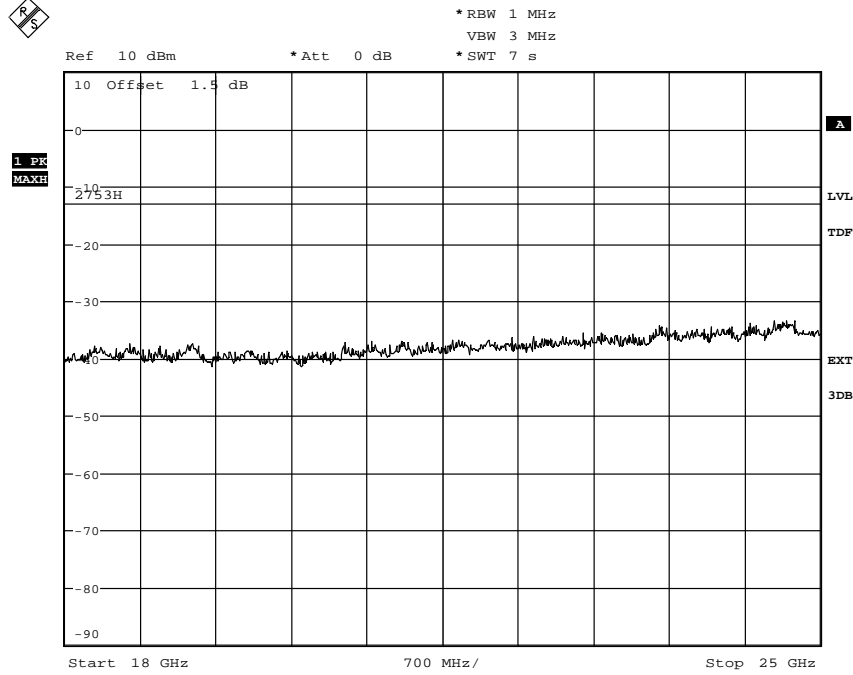
Note: The above marked emission did not exceed a RMS level of -33 dBm.



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 5.1

Diagram 8c:



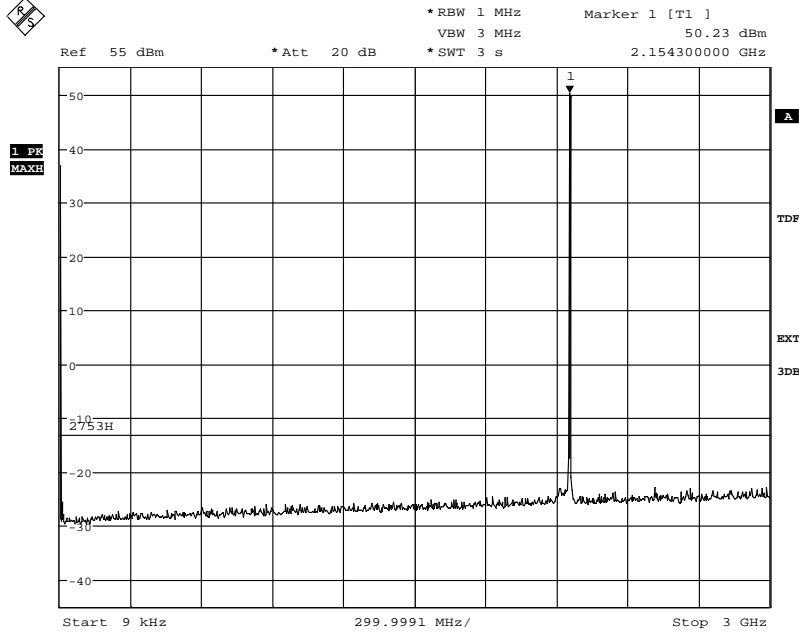
Date: 18.FEB.2011 10:07:13



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

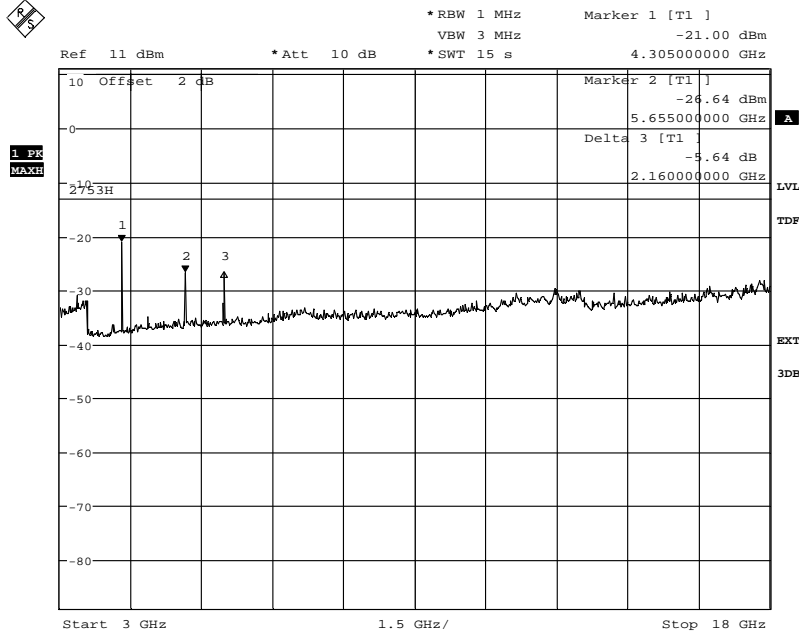
Appendix 5.1

Diagram 9a:



Date: 17.FEB.2011 13:59:06

Diagram 9b:



Date: 17.FEB.2011 14:09:07

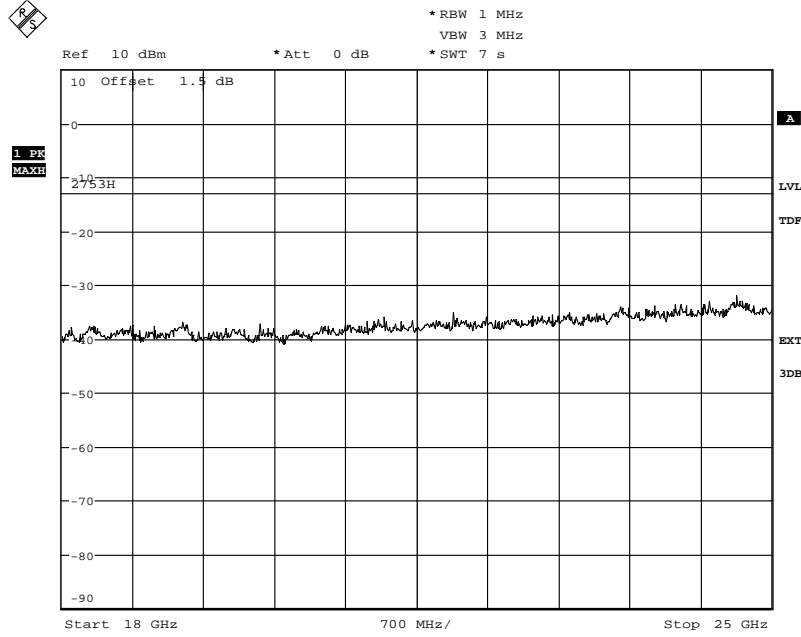
Note: The emission at 4.31 GHz did not exceed a RMS value of -32.1 dBm. Other above marked emissions did not exceed a RMS level of -33 dBm.



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 5.1

Diagram 9c:



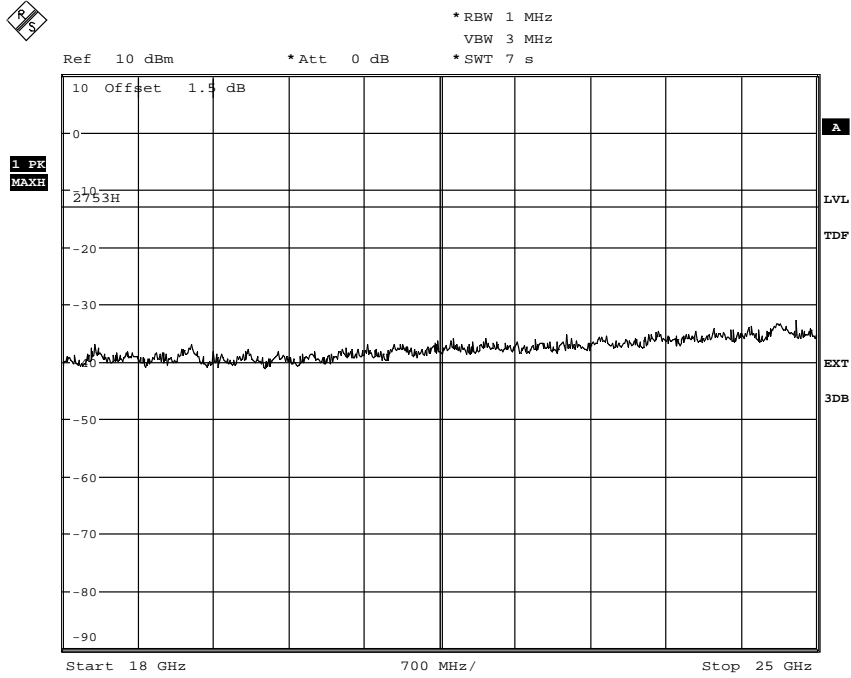
Date: 17.FEB.2011 14:14:49



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 5.1

Diagram 10c:



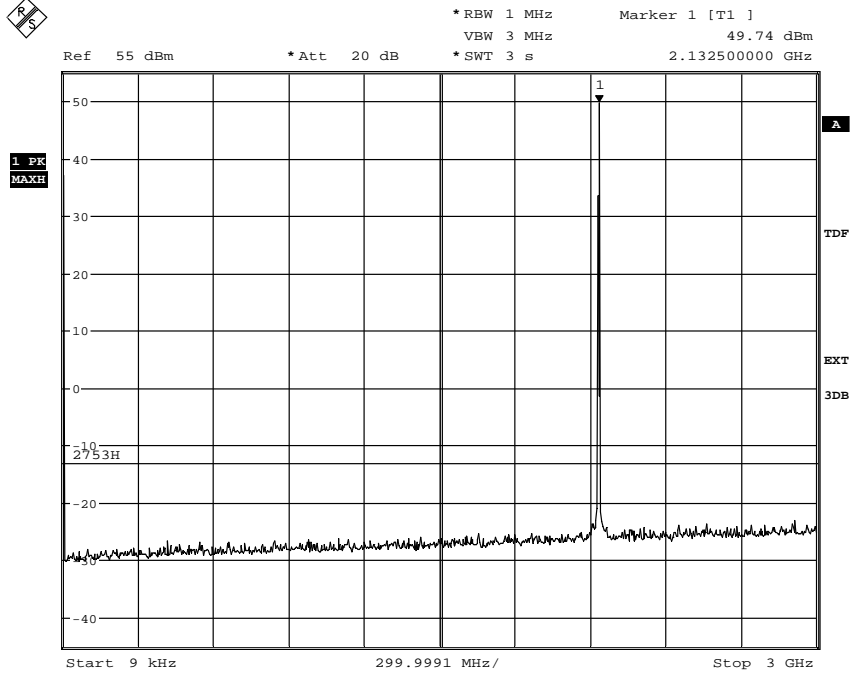
Date: 21.FEB.2011 10:22:59



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

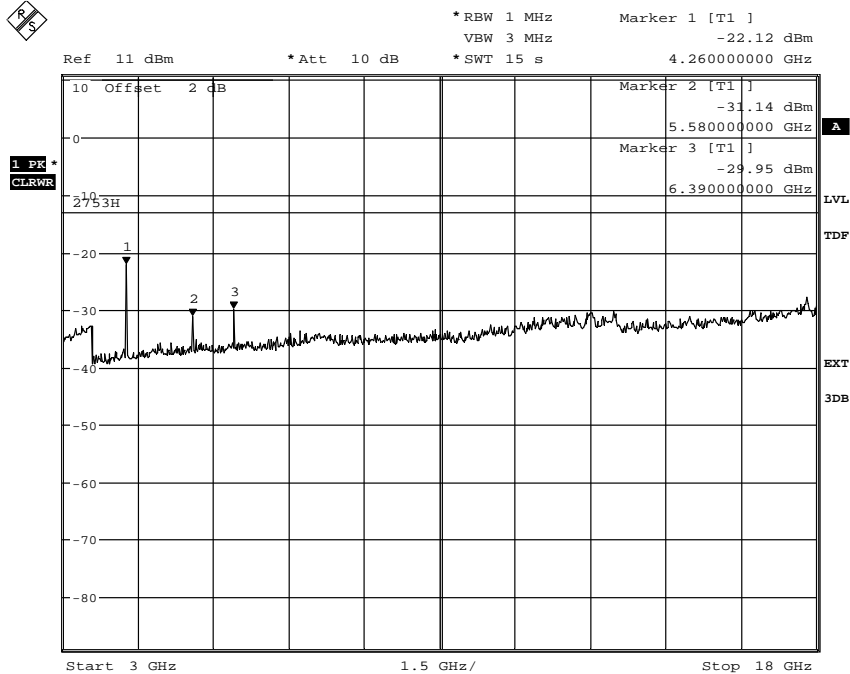
Appendix 5.1

Diagram 11a:



Date: 22.FEB.2011 13:25:41

Diagram 11b:



Date: 22.FEB.2011 14:24:59

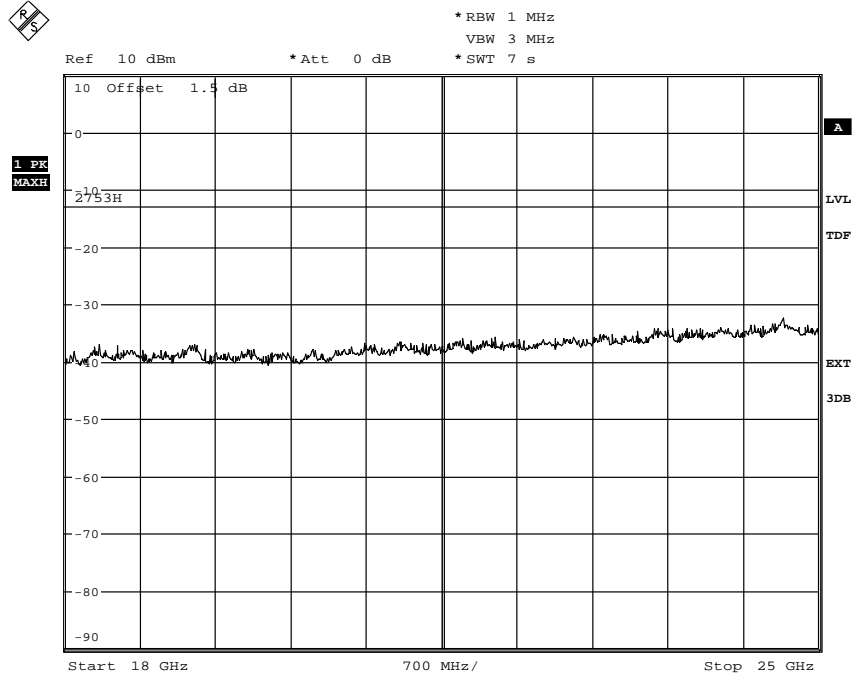
Note: The emission at 4.26 GHz did not exceed a RMS value of -32.9 dBm. Other above marked emissions did not exceed a RMS level of -33 dBm.



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 5.1

Diagram 11c:



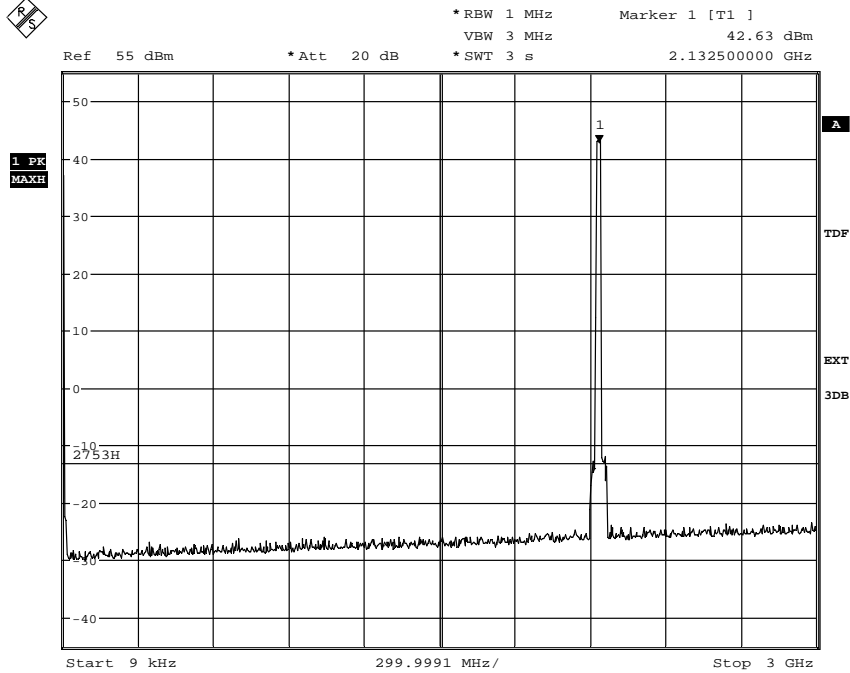
Date: 22.FEB.2011 14:29:11



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 5.1

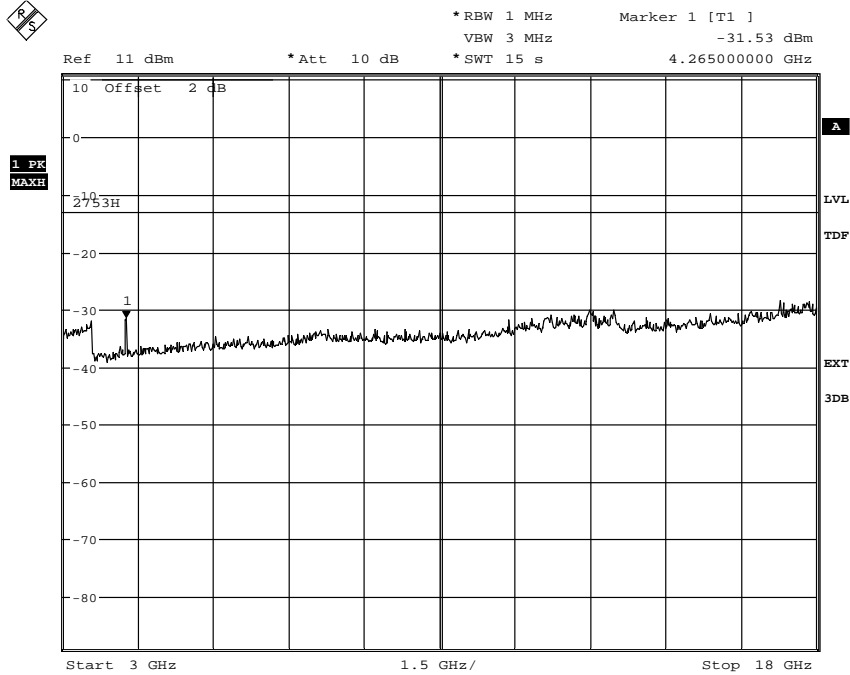
Diagram 12 a:



Date: 22.FEB.2011 14:46:08

Note: The emissions around the carrier are within the operating frequency band.

Diagram 12 b:



Date: 22.FEB.2011 14:44:10

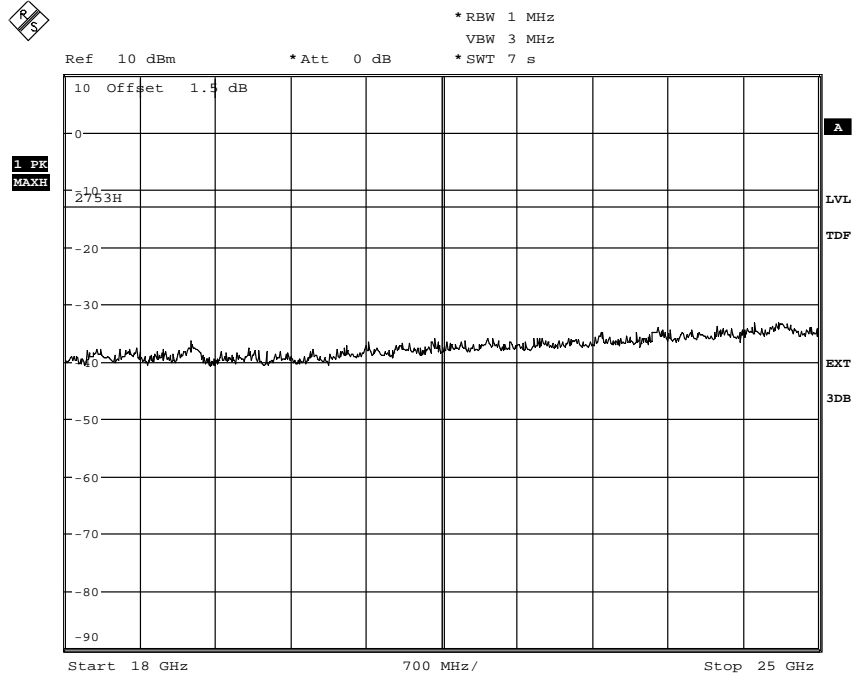
Note: The above marked emission did not exceed a RMS level of -33 dBm



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 5.1

Diagram 12 c:



Date: 22.FEB.2011 14:39:44

FCC ID: TA8AKRC161254-1
 IC: 287AB-AS1612541

Appendix 6

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

Date	Temperature	Humidity
2011-02-14	23 °C ± 3 °C	13% ± 5 %
2011-02-15	23 °C ± 3 °C	15% ± 5 %
2011-02-16	23 °C ± 3 °C	16% ± 5 %
2011-02-18	23 °C ± 3 °C	16% ± 5 %
2011-02-21	22 °C ± 3 °C	14% ± 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. A 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:



FCC ID: TA8AKRC161254-1
IC: 287AB-AS1612541

Appendix 6

Measurement equipment

Measurement equipment	SP number
Test site Tesla	503 881
Rohde & Schwarz ESI 26	503 292
Rohde & Schwarz FSIQ 40	503 738
Control computer	503 479
Software: Rohde & Schwarz EMC32, ver. 8.20.1	-
Chase Bilog antenna CBL 6111A	503 182
Std. gain horn mod. 20240-20	503 674
EMCO Horn Antenna 3115	502 175
µComp Nordic, Low Noise Amplifier	504 160
MITEQ Low Noise Amplifier	503 285
Testo 625 temperature and humidity meter	504 188

Results

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

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 per 1 MHz RBW.

Complies?	Yes
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Appendix 7

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

Date 2011-02-22 to 2011-02-28	Temperature 22 to 24 °C ± 3 °C	Humidity 8 to 19 % ± 5 %
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Test set-up and procedure

The measurement was made per 3GPP TS 36.141. Port RF A was connected to a spectrum analyzer. Port RF B was terminated in a 50 ohm load. The spectrum analyzer was connected to an external 10 MHz reference standard.

Measurement equipment	SP number
Rohde & Schwarz FSQ 40	504 143
Climate chamber 2	501 031
Testo 635 temperature and humidity meter	504 203

Results

Nominal supply voltage: -48.0 V DC. E-TM1.1 in 5 MHz channel BW configuration was transmitted at port RF A at the TX band center frequency (M) at maximum nominal output power.

Test conditions		Frequency error (Hz)
Supply voltage DC (V)	T (°C)	
-48.0	+22	-6
-55.2	+22	-7
-40.8	+22	-5
-48.0	+30	+3
-48.0	+40	+3
-48.0	+50	-3
-48.0	+10	-2
-48.0	0	-3
-48.0	-10	-3
-48.0	-20	-4
-48.0	-30	+4
Maximum freq. error (Hz)		7
Measurement uncertainty		< ± 1 x 10 ⁻⁷



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Appendix 7

Limits

Limit according to 3GPP TS 36.141 Version 8.5.0:
The frequency error shall be within ± 0.05 PPM ± 12 Hz (± 118.63).

RSS-139 6.3 Frequency:

The frequency stability shall be sufficient to ensure that the emission bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

Complies?	Yes
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Appendix 8

External photos of the test object

Front side



Rear side





REPORT

Date
2011-03-17

Reference
FX102687-F27

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Appendix 8

Left side



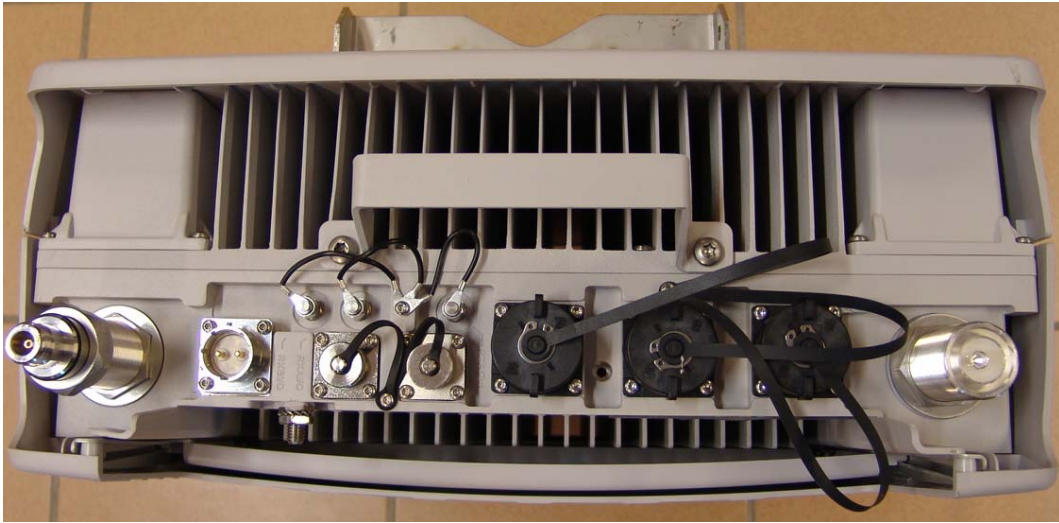
Right side



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Appendix 8

Bottom side



Top side

