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Permissible Change measurements on RUS 01 B4 1700/2100 MHz radio equipment with FCC ID: TA8BKRC11859-1 and IC: 287AB-BS118591 (9 appendices)

Test object

RUS 01 B4, product (1P)KRC 118 59/1, revision (21P)R3A

Summary

Appendix 1 describes the test object and set-ups during test.
Appendix 9 presents photos of the test object.

Standard	Compliant	Appendix	Remarks
FCC CFR 47 / IC RSS-139 Issue 2			
2.1046 / RSS-139 6.4 RF power output	Yes	2	-
2.1049 / RSS-139 6.5 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	-
FCC CFR 47 / IC RSS-Gen Issue 2			
15.111 / RSS-Gen 4.10 Receiver spurious emissions	Yes	8	

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

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FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

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Appendix 1

Description of test object

Equipment:	Radio equipment RUS 01 B4 1700/2100 MHz running in LTE mode.	
Frequency bands:	TX: 2110 – 2155 MHz RX: 1710 – 1755 MHz	
	Highest and lowest configurable EARFCNs per 3GPP bandwidth configuration are specified below	
Supported channel bandwidth configurations	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz and 20 MHz according 3GPP TS 36.141 section 5.6	
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 is used.	
Maximum rated output power:	Single carrier 1x 47.8 dBm (1x60 W)	
Number of antenna ports:	TX/RX: 1	RX: 1
Nominal power voltage:	-48 VDC	

Tested frequencies and EARFCNs for TX measurements

EARFCN	Frequency / [MHz]	Comment
1957	2110.7	TX bottom (B) frequency in 1.4 MHz BW configuration
1965	2111.5	TX bottom (B) frequency in 3 MHz BW configuration
1975	2112.5	TX bottom (B) frequency in 5 MHz BW configuration
2000	2115.0	TX bottom (B) frequency in 10 MHz BW configuration
2025	2117.5	TX bottom (B) frequency in 15 MHz BW configuration
2050	2120.0	TX bottom (B) frequency in 20 MHz BW configuration
2175	2132.5	TX band mid (M) frequency, 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

Tested frequencies and EARFCNs for RX measurement

RX spurious emissions conducted were measured at the RX band center frequency in 1.4 MHz channel bandwidth configuration only.

EARFCN	Frequency / [MHz]	Comment
20175	1732.5	RX band center frequency (M)



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Appendix 1

Note: EARFCN are derived according 3GPP TS 36.141, table 5.7.3-1.
The TX-RX EARFCN-offset is 18000.

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 TX setting 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. All measurements were performed with the test object configured for maximum transmit power. These settings were used for all measurements unless noted otherwise.

Conducted measurements

The EUT was mounted into a RBS 6201 cabinet and supplied by the cabinet's internal -48 V DC. TX parameters were measured at port RF A with port RF B terminated into 50 ohm. RX spurious emission conducted was measured at port RF B with port RF A activated with E-TM1.1 in channel BW configuration 1.4 MHz on the TX band center frequency (M). Port RF A was terminated into 50 ohm.

Radiated measurements

The test object was tested stand-alone and supplied by functional test equipment with -48 VDC. The active port RF A was terminated into 50 ohm outside the test chamber. Port RF B was in stand-by mode and terminated into 50 ohm directly at the port.

Purpose of test

The purpose of the test is to justify a Class II permissive change. The test object was earlier filed with another radio access technology (W-CDMA). The samples tested now apply a different radio access technology, LTE. This report verifies maintained performance characteristics by testing the updated equipment against relevant parts of FCC CFR 47, IC RSS 139 and IC RSS-Gen.

References

Measurements were done according to relevant parts of the following standards:

ANSI C63.4-2003

ANSI/TIA/EIA-603-B-2002

3GPP TS 36.141, version 8.5.0

CFR 47 part 2, October 1st, 2009

CFR 47 part 27, October 1st, 2009 as amended by Federal Register / Vol. 75, No. 141

RSS-139 Issue 2

RSS-Gen Issue 2

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Appendix 1

Measurement equipment

Measurement equipment	Calibration Due	SP number
Test site Tesla	2010-10	503 881
R&S FSIQ 40	2011-07	503 738
R&S FSQ 40	2011-07	504 143
R&S ESI 26	2011-07	503 292
Control computer with R&S software EMC32 version 8.20.1	-	503 479
High pass filter 3 GHz	2011-07	503 739
High pass filter 3 GHz	2011-03	504 200
RF attenuator 40 dB	2011-06	504 159
RF attenuator 30 dB	2011-07	900 229
RF step attenuator	2011-06	503 096
Boonton RF Peak power meter/analyzer	2010-10	503 144
Boonton Power sensor 56518-S/4	2012-02	503 146
Chase Bilog antenna CBL 6111A	2011-10	503 182
EMCO Horn Antenna 3115	2011-01	502 175
Std.gain horn mod 20240-20	-	503 674
MITEQ Low Noise Amplifier	2011-06	503 285
µComp Nordic Low Noise Amplifier	2011-07	504 160
Climate chamber 2	2010-11	501 031
Multimeter Fluke 87	2011-03	502 190
Testo 635 temperature and humidity meter	2011-03	504 203
Testo 625 temperature and humidity meter	2011-08	504 188
Testo 615 temperature and humidity meter	2012-04	503 498

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).

Reservation

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

Delivery of test object

The test object was delivered: 2010-09-13.

Manufacturer's representative

Anders Johansson, Ericsson AB

Test engineers

Jörgen Wassholm, Andreas Johnson, Jonas Bremholt and Reinhold Reul

Test participants

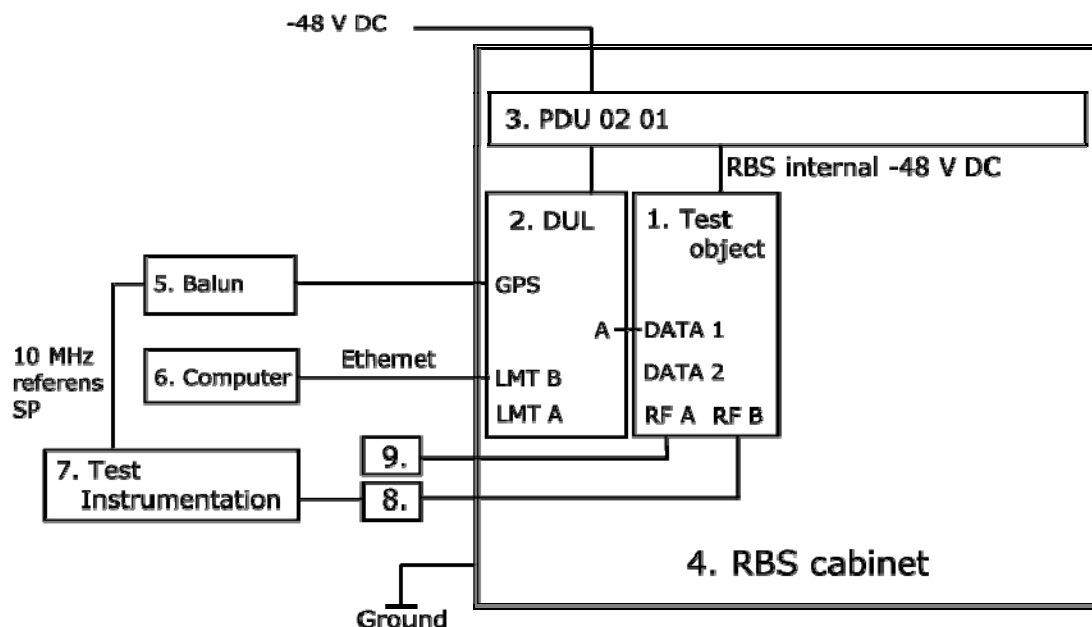
Samir Catic and David Wälchli, Ericsson AB

2. DUL 20 01, product (1P)KDU 137 533/4, revision (21P)R1A, SN (S)C823562999
3. PDU 02 01, product BMG 980 336/4, revision R2A, SN (S)BJ31528316
4. RBS 6201 cabinet, BAMS 1000778792, 1/BFM 901 290/2
5. Balun for 10 MHz reference, converting BNC to RJ-45 connector
6. Controlling laptop HP Elitebook 8730w, SN CNU 942532V, BAMS 1000757967
running software MOSHELL V8.0k
7. SP test instrument according measurement equipment list
8. Attenuator and filter according measurement equipment list

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Appendix 1

Test set-up conducted RX measurements at port RF B



Test object

1. RUS 01 B4, product (1P)KRC 118 59/1, revision (21P)R3A, SN(S)C823555257
FCC ID: TA8BKRC11859-1 and IC: 287AB-BS118591
with software CXP 102 051/10 Rev R5DM

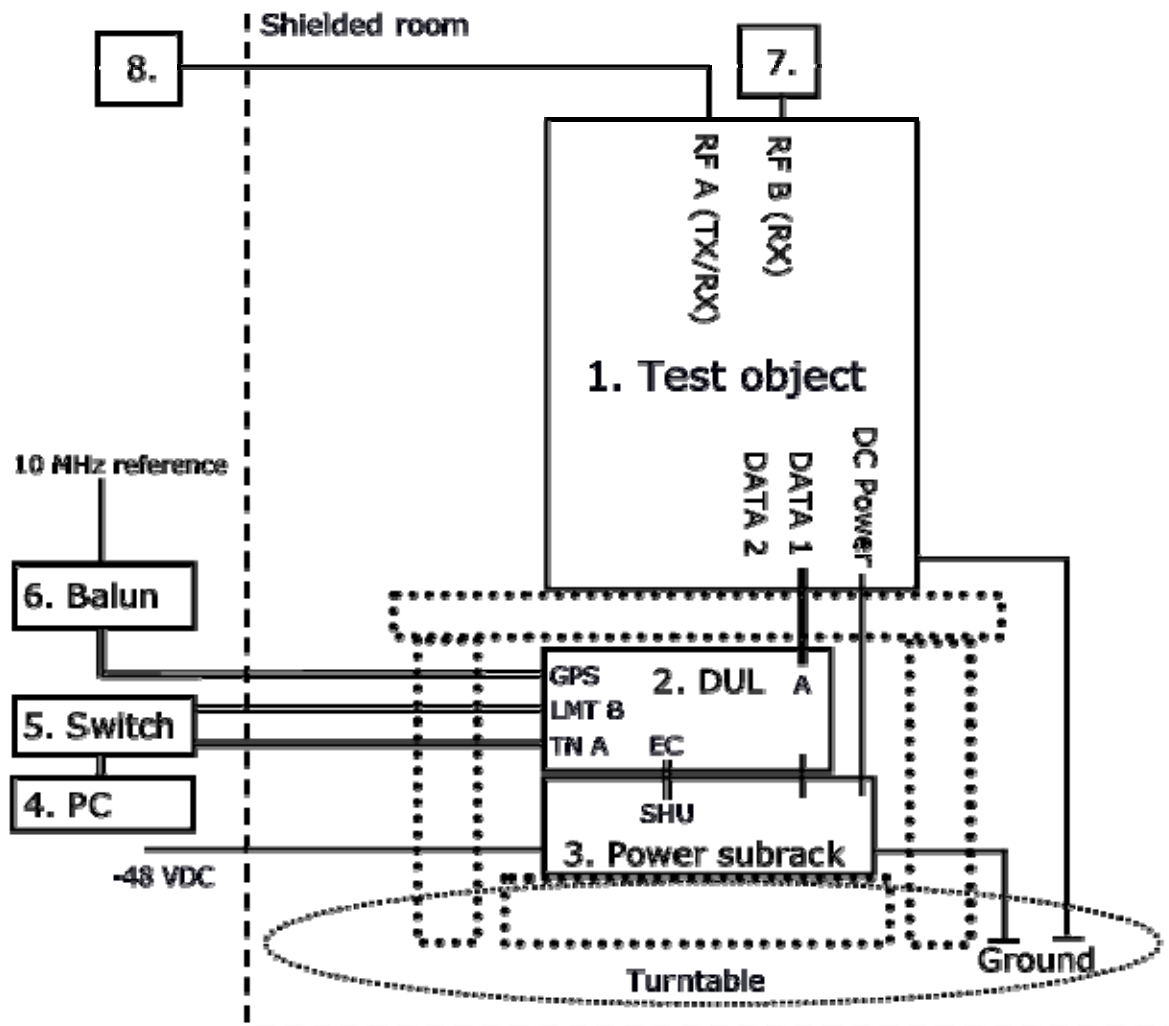
Functional test equipment

2. DUL 20 01, product (1P)KDU 137 533/4, revision (21P)R1A, SN (S)C823562999
3. PDU 02 01, product BMG 980 336/4, revision R2A, SN (S)BJ31528316
4. RBS 6201 cabinet, BAMS 1000778792, 1/BFM 901 290/2
5. Balun for 10 MHz reference, converting BNC to RJ-45 connector
6. Controlling laptop HP Elitebook 8730w, SN CNU 942532V, BAMS 1000757967
running software MOSHELL V8.0k
7. SP test instrument according equipment list
8. Attenuator and filter according measurement equipment list
9. Attenuator according measurement equipment list and 50 ohm termination

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Appendix 1

Test set-up, radiated measurements



Test object

- 1 RUS 01 B4, product (1P)KRC 118 59/1, revision (21P)R3A, SN (S)C823555251
FCC ID: TA8BKRC11859-1 and IC: 287AB-BS118591
with software CXP 102 051/10 Rev R5DM

Functional test equipment

2. DUL 2001, product (1P)KDU 137 533/4, revision (21P)R1A, SN (S)C823562988
3. Power subrack, individual components are listed below
4. Laptop computer: Mobile Workstation, HP Elite book BAMS 1000757968
with MOSHELL Ver. 8.0k
5. Fast Ethernet Switch NETGEAR 10/100 Mbps, model FS108
6. Balun for 10 MHz reference, converting BNC to RJ-45 connector
7. 50 ohm termination
8. Attenuator 40 dB according test equipment list and 50 ohm termination

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Appendix 1

Test object ports

Interface:	Type of port:
Ground connection during stand alone radiated emission test, in normal use grounded via cabinet	Ground
Supply power -48 VDC	DC Power
Antenna port 1 "RF A", 7/16 connector, female, combined TX/RX	Antenna
Antenna port 2 "RF B", 7/16 connector, female, RX only	Antenna
Data 1, connected to Port "A" at DUL	Signal
Data 2, unused	Signal
RXA I/O cross connector, unused	Signal
RXA OUT cross connector, unused	Signal
RXB I/O cross connector, unused	Signal

Components of Power Subrack

Position	Product name	Product number	R-state	Serial number
	Power Subrack	SXK 109 8115/1	R2A	-
1	PDU 01 01	BMG 980 336/2	R4F	(S)BJ31532384
2	PDU 01 01	BMG 980 336/2	R4F	(S)BJ31532382
3	SHU 01 01	BGK 901 18/1	R3C	(S)BJ31446269
4	DUMMY	SXK 109 8257/1	R1F	-
5	DUMMY	SXK 109 8257/1	R1F	-
6	DUMMY	SXK 109 8257/1	R1F	-
7	DUMMY	SXK 109 8257/1	R1F	-
8	DUMMY	SXK 109 8257/1	R1F	-
9	PCF 02 01	KFE 101 1157/1	R1C	(S)BW95301450

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Appendix 2

RF power output measurements according to 47 CFR 2.1046 / IC RSS-139 6.4

Date	Temperature	Humidity
2010-09-22	22 °C ± 3 °C	33 % ± 5 %
2010-09-23	22 °C ± 3 °C	34 % ± 5 %

Test set-up and procedure

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	503 146
RF attenuator	900 229
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty: 0.7 dB

Results

Measured output power level at connector RF A

Test conditions T _{nom} 22 °C / V _{nom} -48.0 V DC	Transmitter power RMS (dBm) / PAR (dB)		
	B Frequency	M frequency	T Frequency
BW configuration 1.4 MHz	47.9 / 7.1	47.7 / 7.1	47.6 / 7.1
BW configuration 3 MHz	47.9 / 6.8	47.7 / 6.9	47.7 / 6.9
BW configuration 5 MHz	47.8 / 6.7	47.7 / 6.6	47.6 / 6.6
BW configuration 10 MHz	47.8 / 6.7	47.7 / 6.6	47.7 / 6.6
BW configuration 15 MHz	47.7 / 6.9	47.5 / 6.6	47.5 / 6.7
BW configuration 20 MHz	47.6 / 6.8	47.5 / 6.6	47.5 / 6.9

Limits

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

RSS-139: 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-139 6.5

Date	Temperature	Humidity
2010-09-22	22 °C ± 3 °C	33 % ± 5 %
2010-09-23	22 °C ± 3 °C	34 % ± 5 %

Test set-up and procedure

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

Measurement equipment	SP number
Rohde & Schwarz signal analyzer FSQ40	504 143
RF attenuator	900 229
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

The results are shown in appendix 3.1

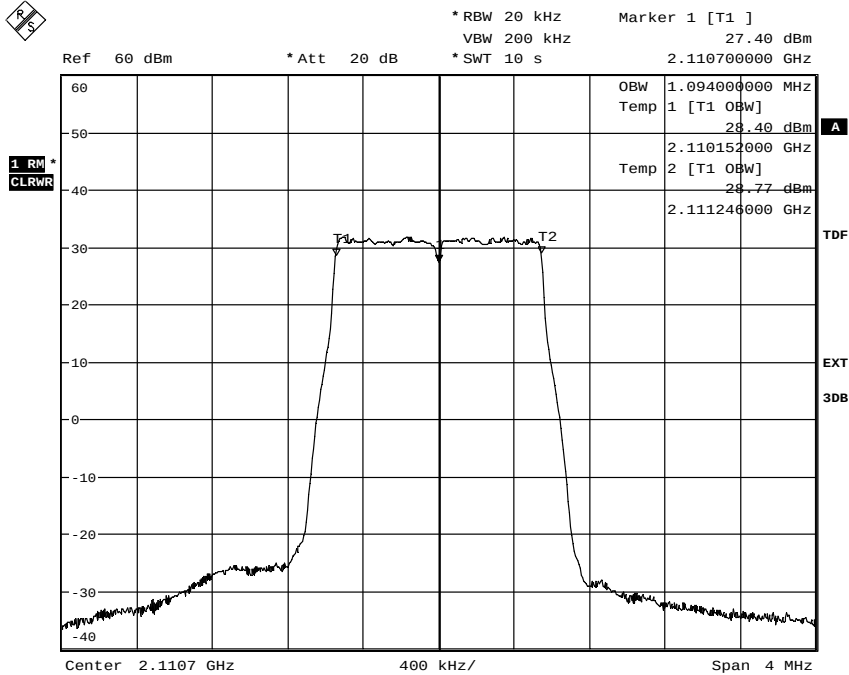
Diagram	BW configuration	Tested channel	OBW [MHz]
1	1.4 MHz	B	1.094
2	20 MHz	B	17.865
3	1.4 MHz	M	1.094
4	3 MHz	M	2.698
5	5 MHz	M	4.485
6	10 MHz	M	8.940
7	15 MHz	M	13.425
8	20 MHz	M	17.865
9	1.4 MHz	T	1.094
10	20 MHz	T	17.865



FCC ID: TA8BKRC11859-1
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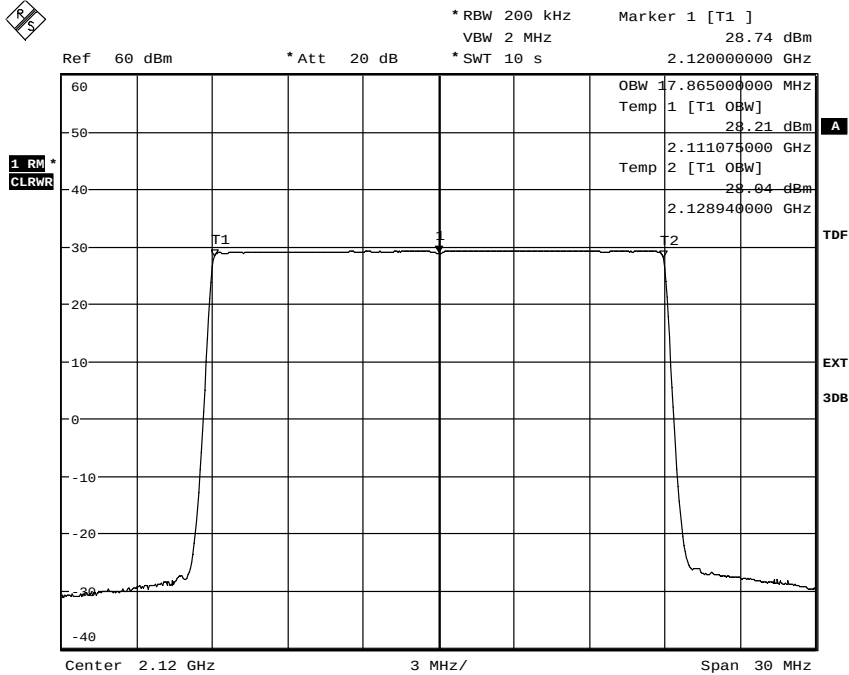
Appendix 3.1

Diagram 1



Date: 22.SEP.2010 10:43:07

Diagram 2

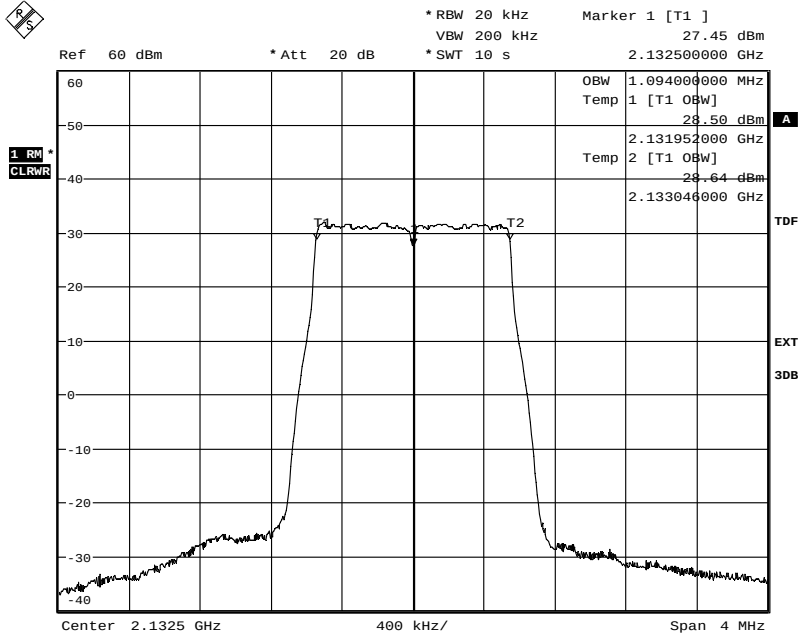


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IC: 287AB-BS118591

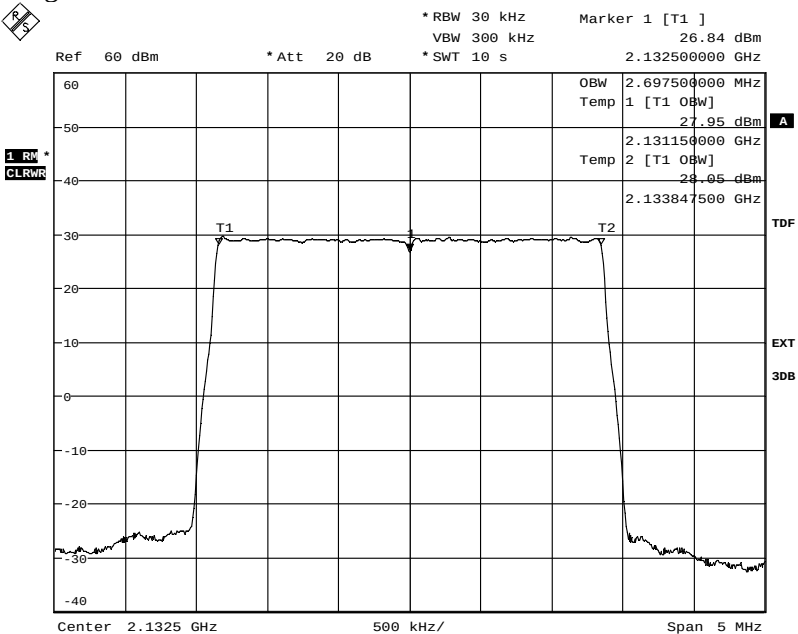
Appendix 3.1

Diagram 3



Date: 23.SEP.2010 14:29:29

Diagram 4



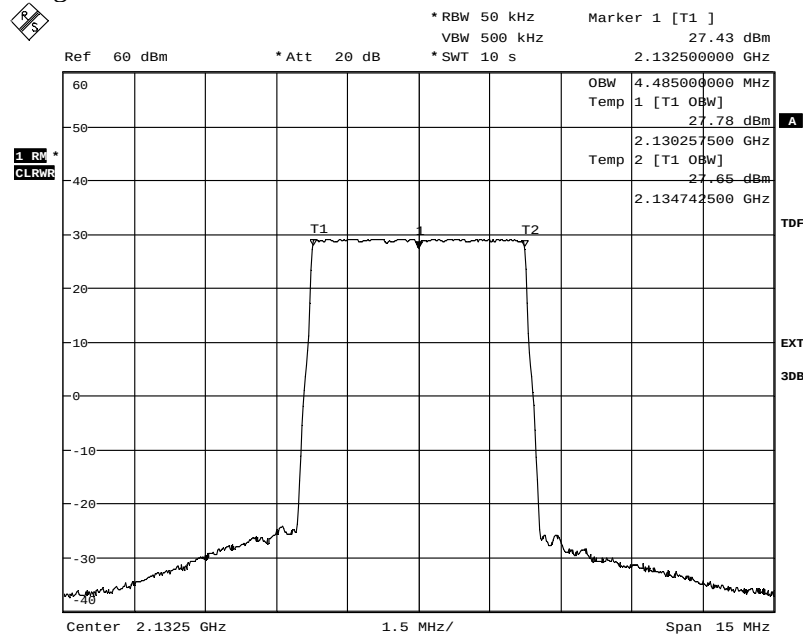
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FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

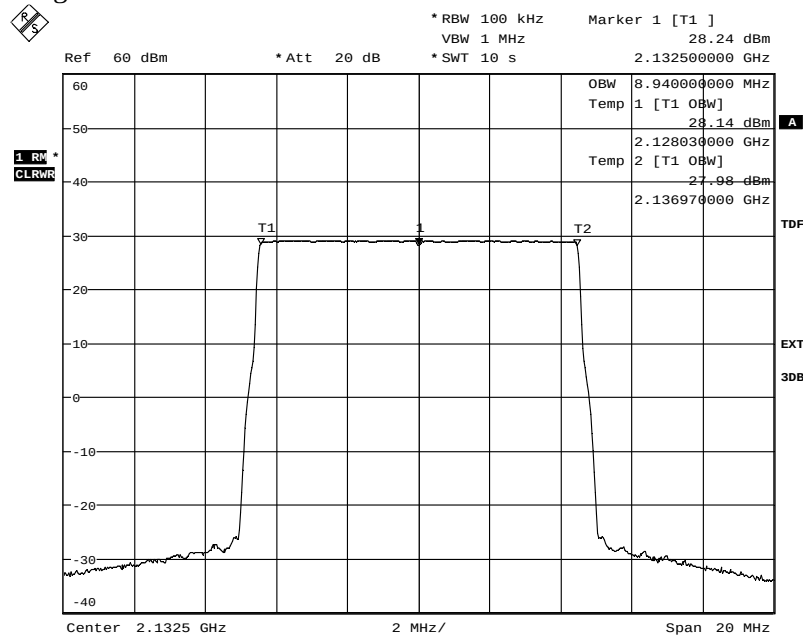
Appendix 3.1

Diagram 5



Date: 24.SEP.2010 13:13:17

Diagram 6



Date: 24.SEP.2010 16:01:44



REPORT

Date
2010-10-05

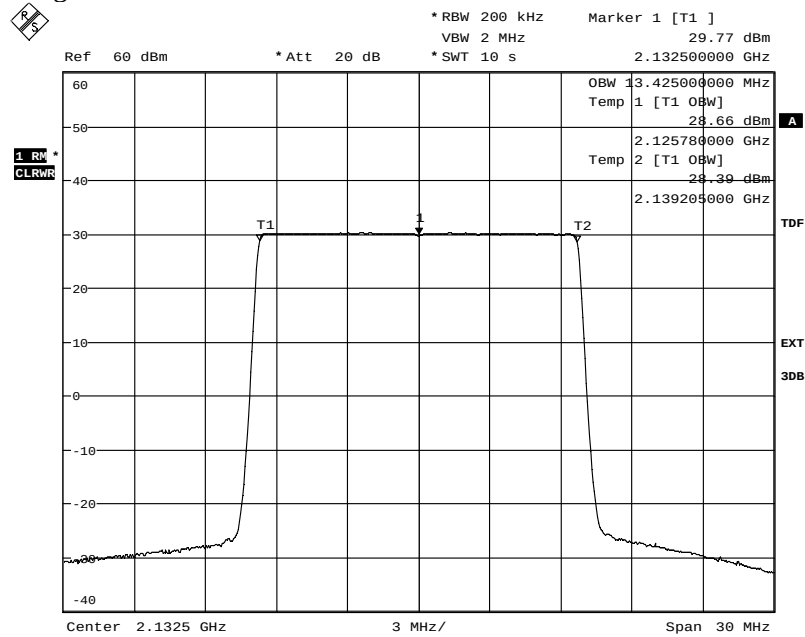
Reference
FX015916-F27

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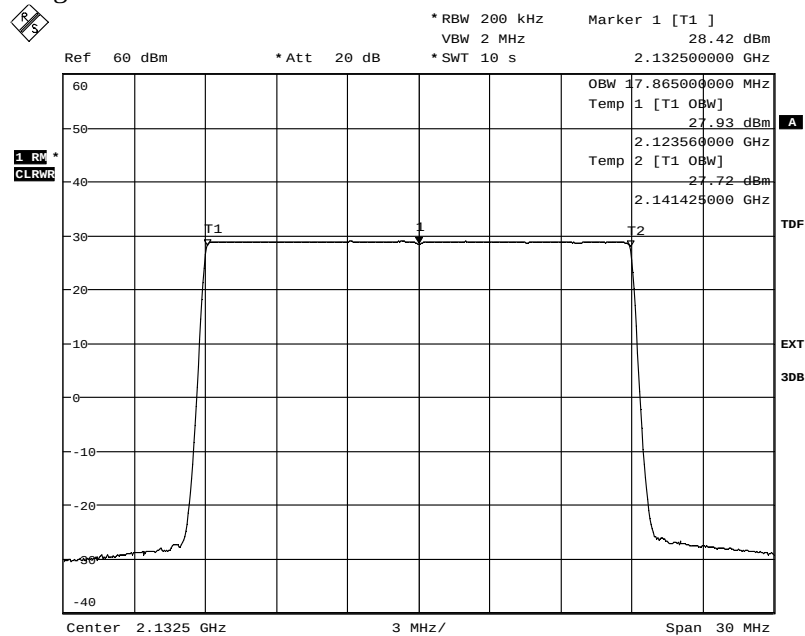
Appendix 3.1

Diagram 7



Date: 26.SEP.2010 17:18:32

Diagram 8



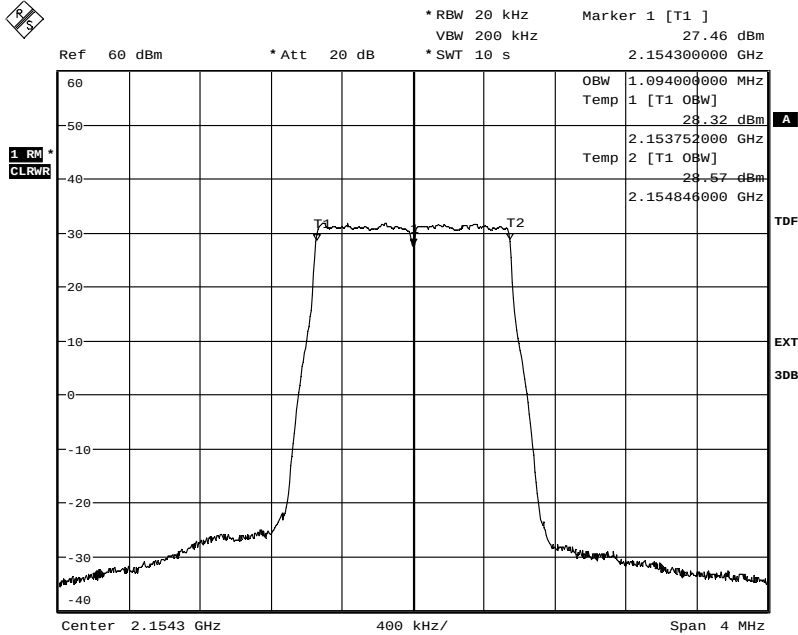
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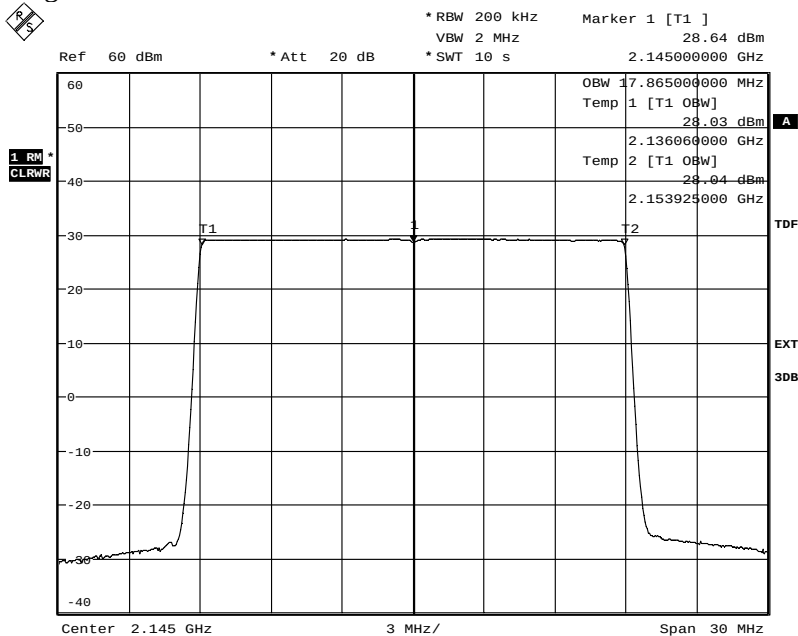
Appendix 3.1

Diagram 9



Date: 23.SEP.2010 10:29:15

Diagram 10



Date: 23.SEP.2010 13:23:23

FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

Appendix 4

Band edge measurements according to 47 CFR 2.1051 / IC RSS-139 6.5

Date	Temperature	Humidity
2010-09-22	22 °C ± 3 °C	33 % ± 5 %
2010-09-23	22 °C ± 3 °C	34 % ± 5 %

Test set-up and procedure

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

The limit was adjusted to compensate for the used reduced measurement bandwidth 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. For band edge offsets > 1 MHz the limit to apply was calculated as

$$\text{Adjusted limit} = \{-13 - 10 * \log(1000 / \text{RBW}[\text{kHz}])\} \text{ dBm}$$

Measurement equipment	SP number
R&S FSQ	504 143
RF attenuator	900 229
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

The results are shown in appendix 4.1

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

Limits

The power of any emission outside the frequency band shall be attenuated below the transmitter power (P) by at least $43 + 10 \log P$ dB.

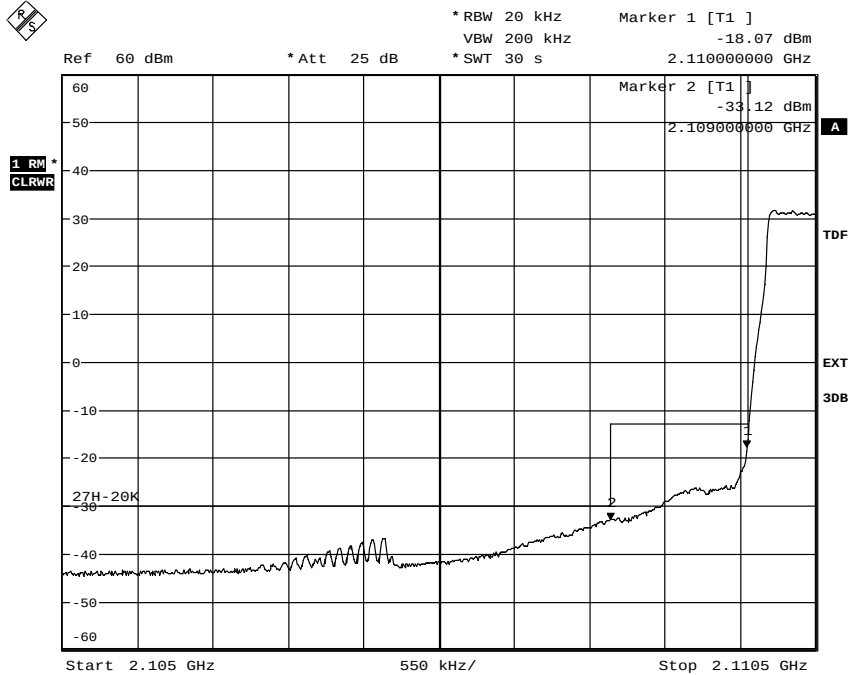
Complies?	Yes
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IC: 287AB-BS118591

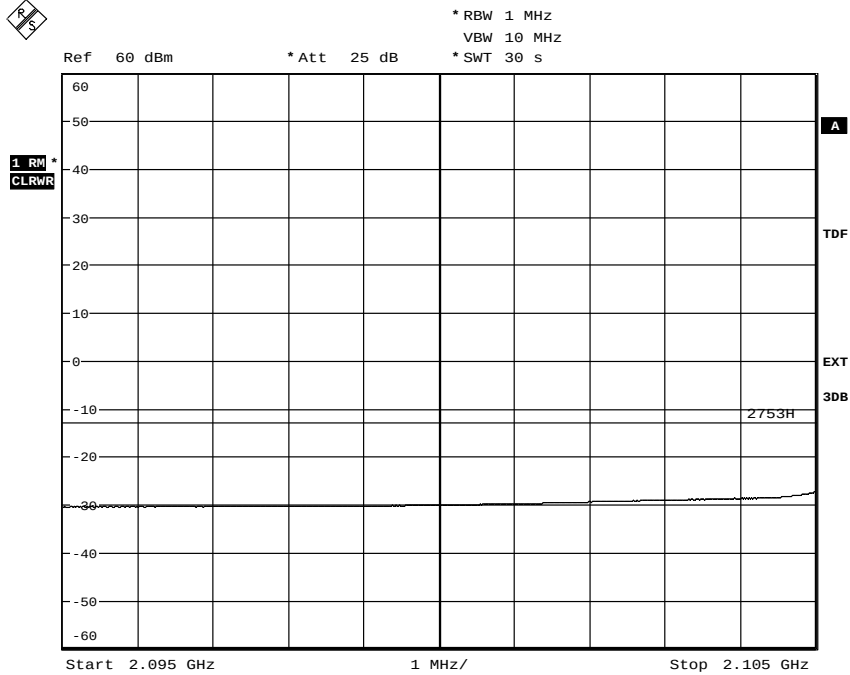
Appendix 4.1

Diagram 1 a



Date: 22.SEP.2010 13:15:10

Diagram 1 b



Date: 22.SEP.2010 13:18:50



REPORT

Date
2010-10-05

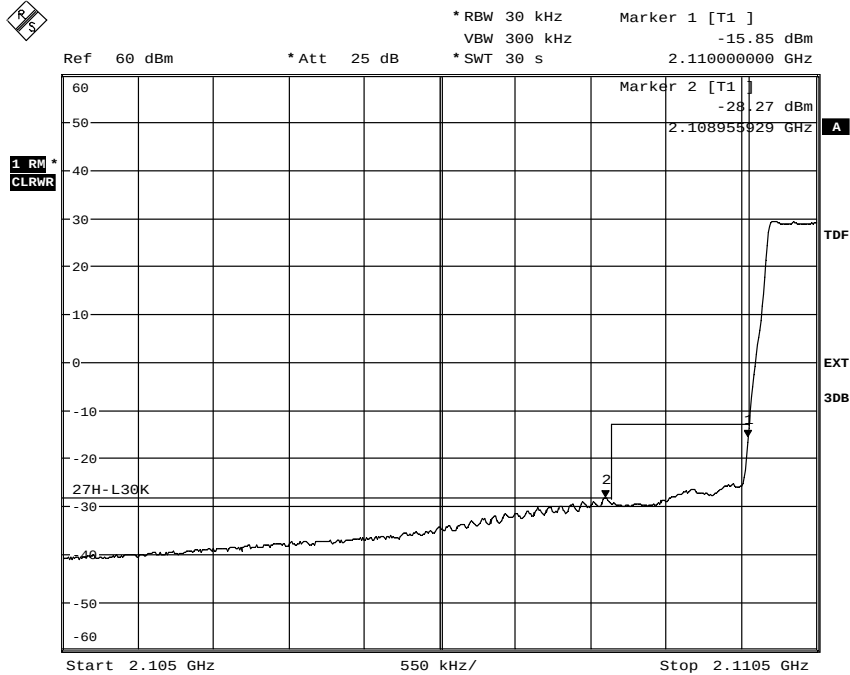
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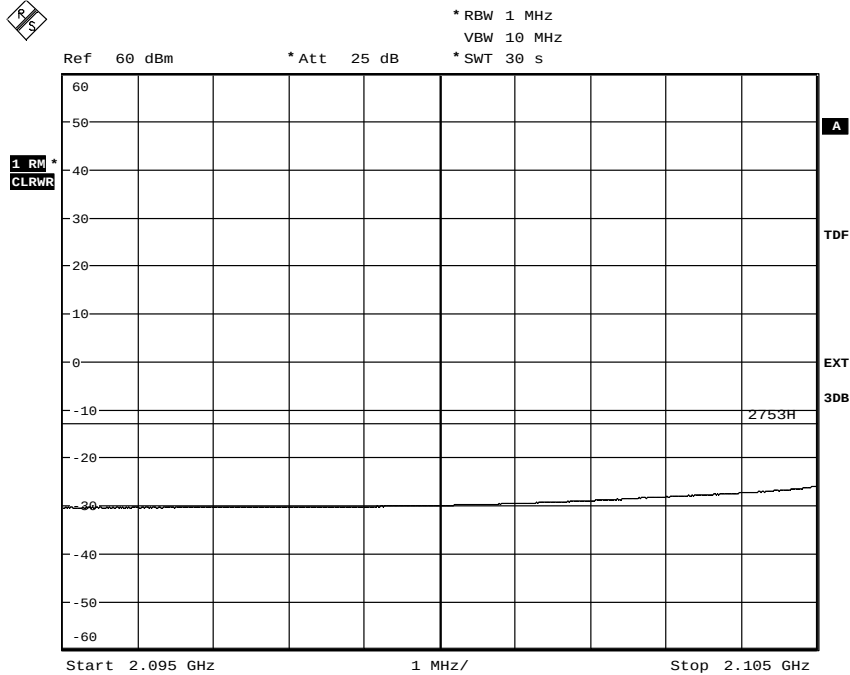
Appendix 4.1

Diagram 2 a



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Diagram 2 b



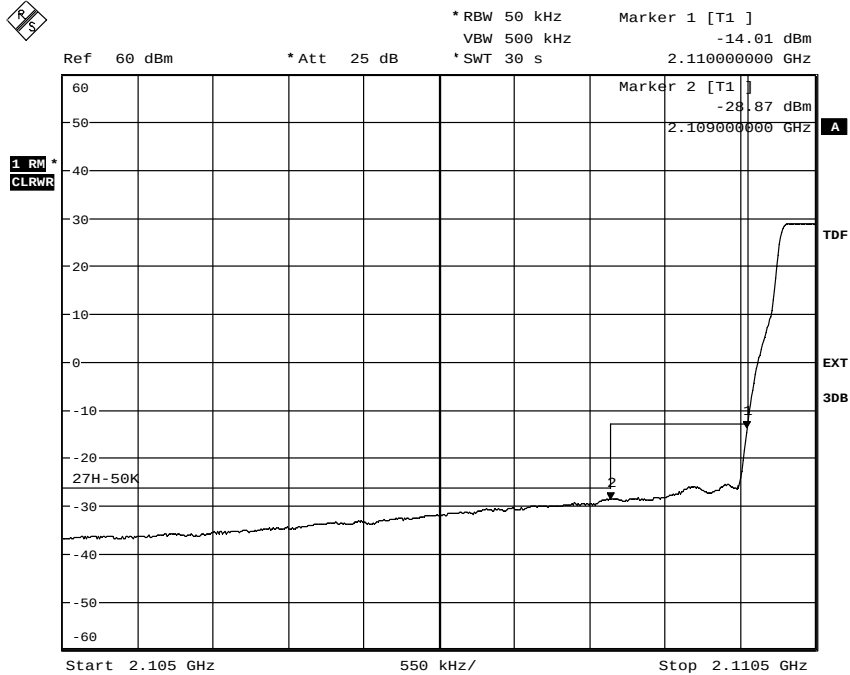
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IC: 287AB-BS118591

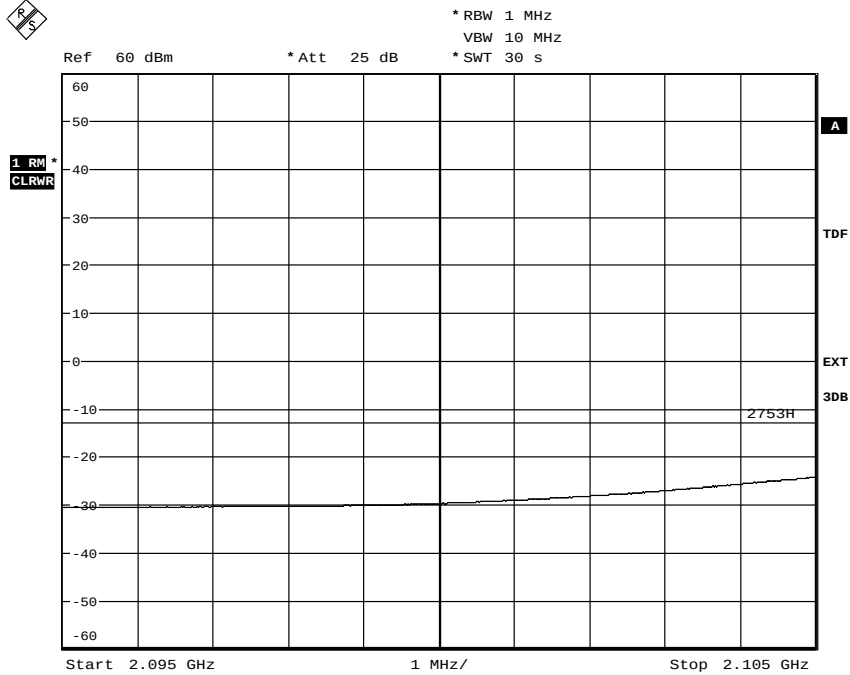
Appendix 4.1

Diagram 3 a



Date: 22.SEP.2010 12:50:16

Diagram 3 b



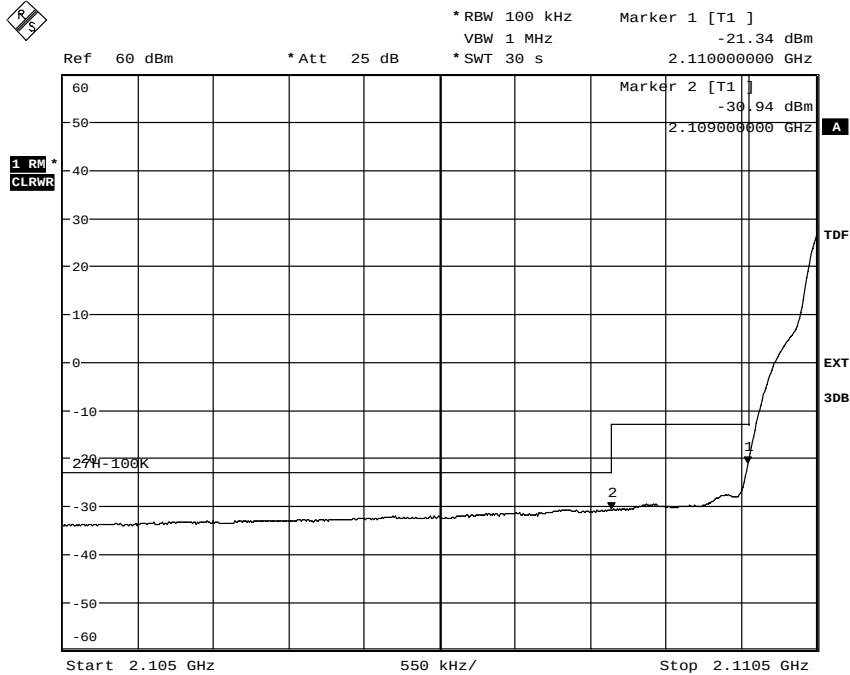
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IC: 287AB-BS118591

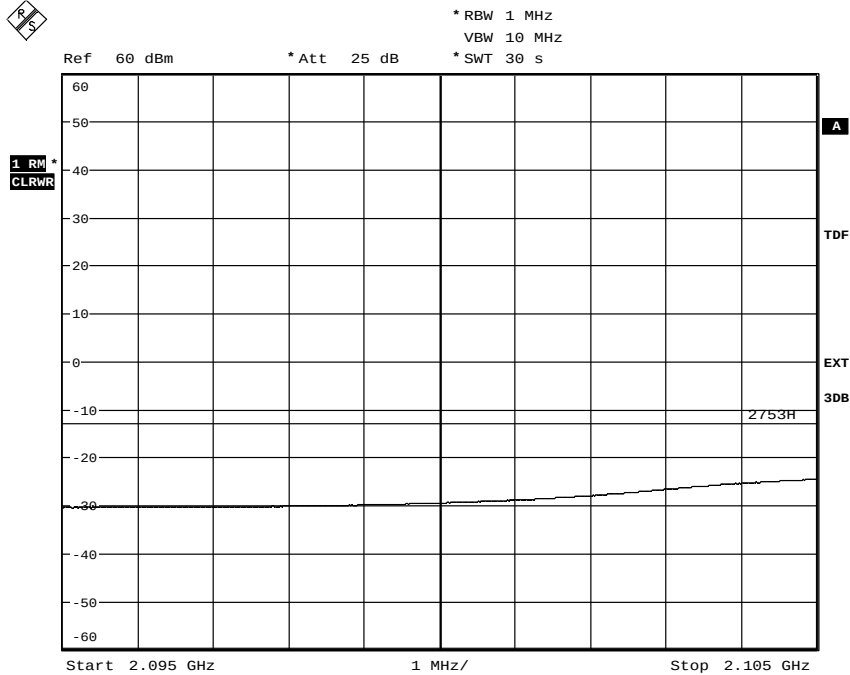
Appendix 4.1

Diagram 4 a



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Diagram 4 b

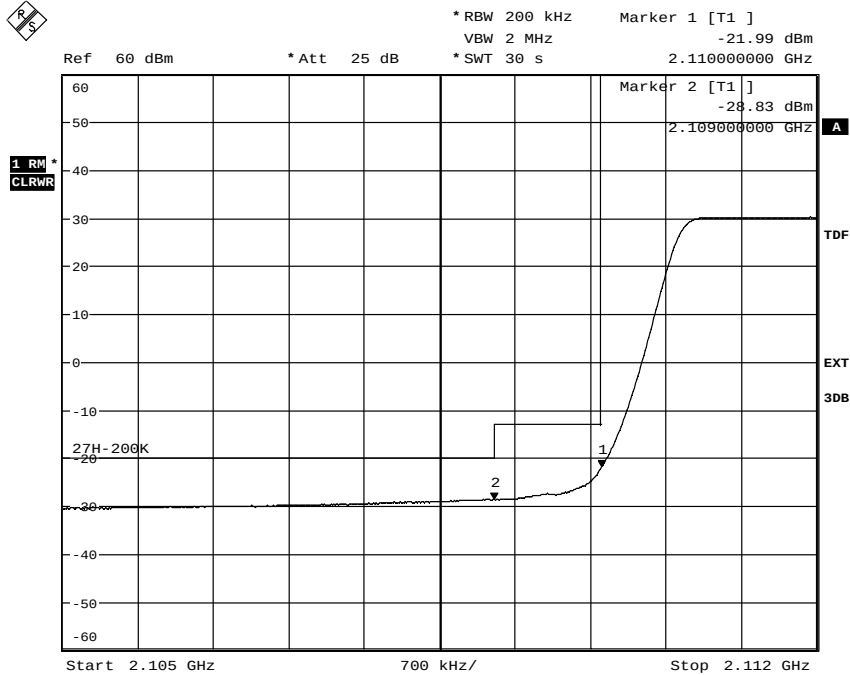


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IC: 287AB-BS118591

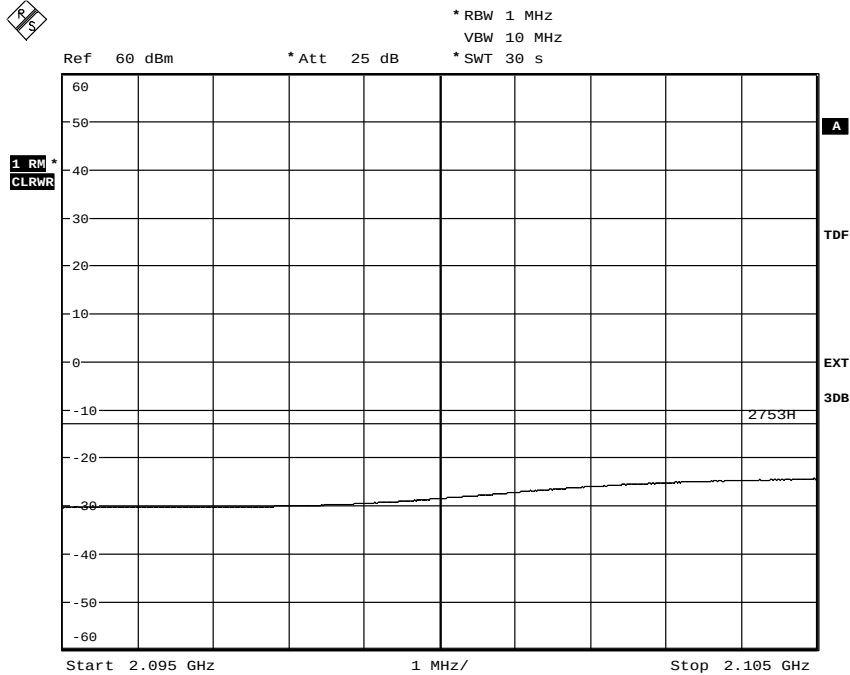
Appendix 4.1

Diagram 5 a



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Diagram 5 b

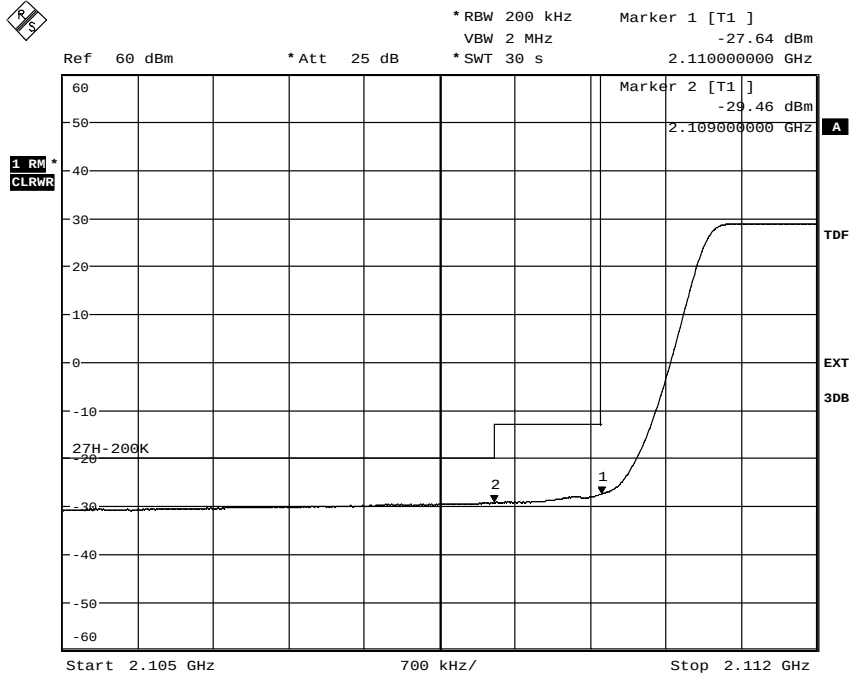


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IC: 287AB-BS118591

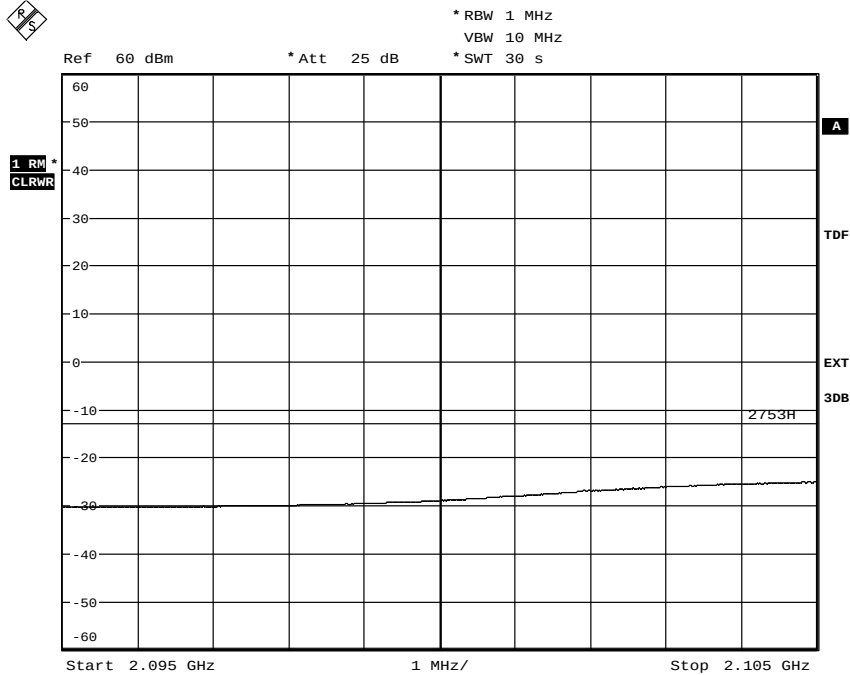
Appendix 4.1

Diagram 6 a



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Diagram 6 b



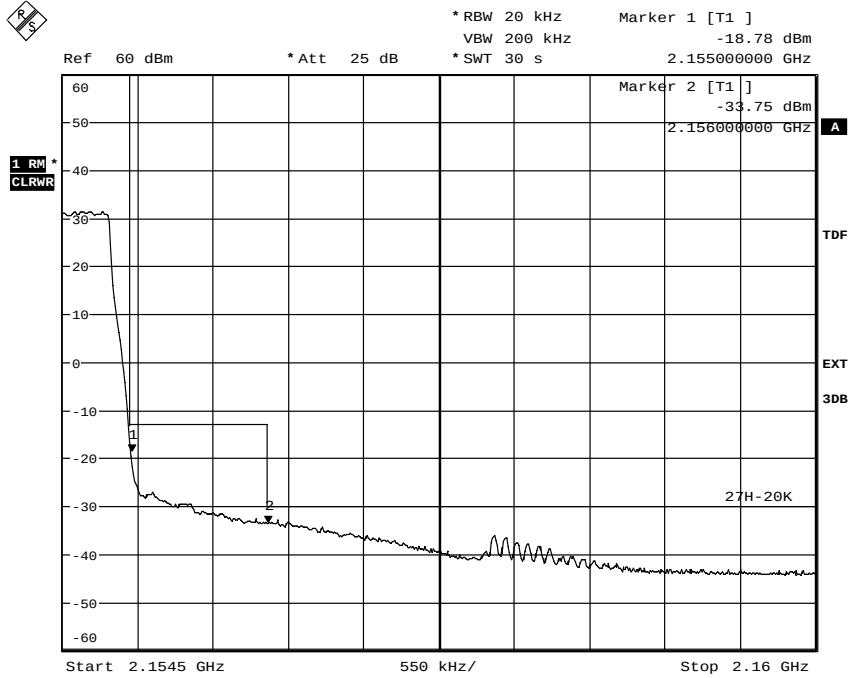
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FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

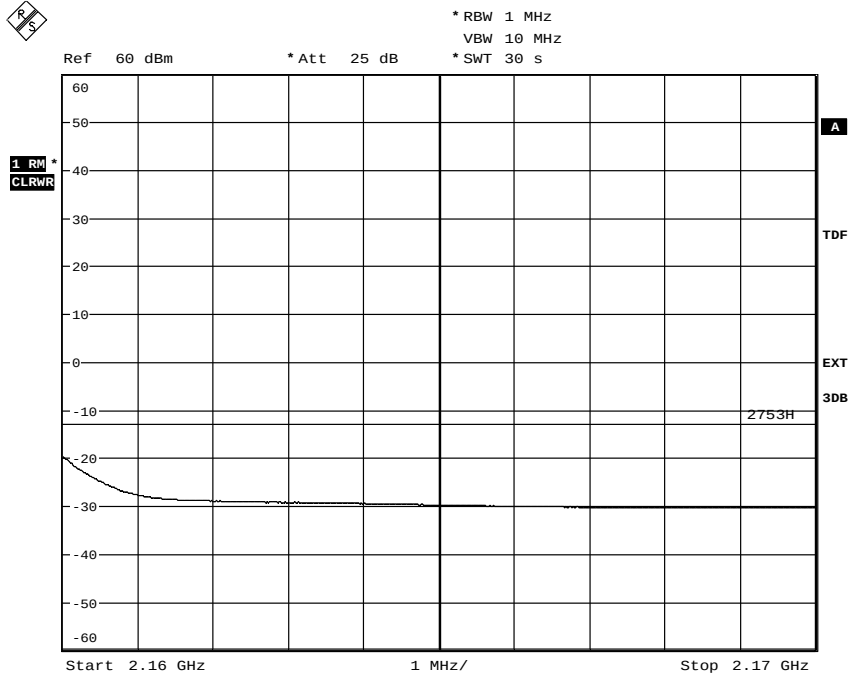
Appendix 4.1

Diagram 7 a



Date: 23.SEP.2010 10:17:48

Diagram 7 b

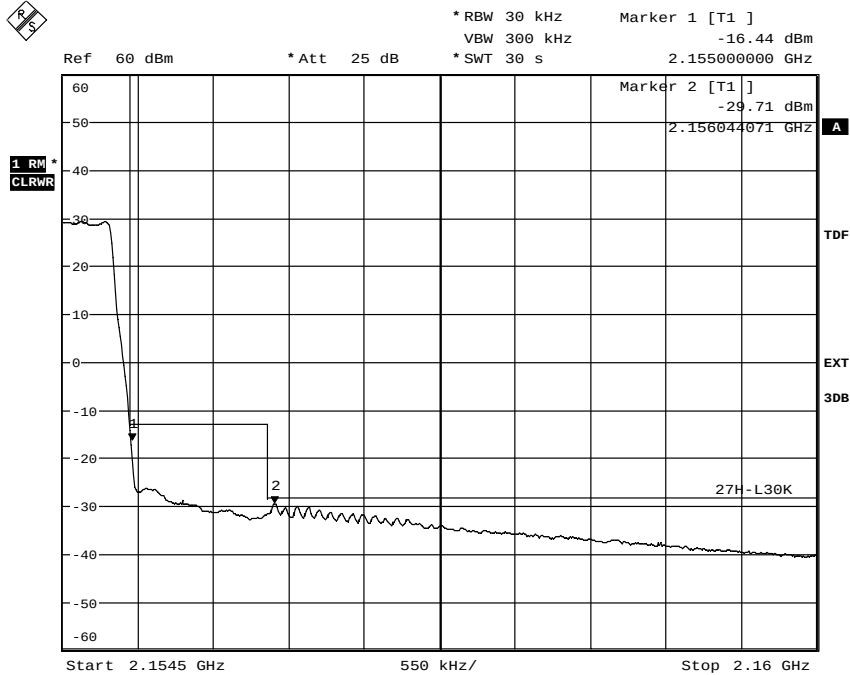


Date: 23.SEP.2010 10:21:22

FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

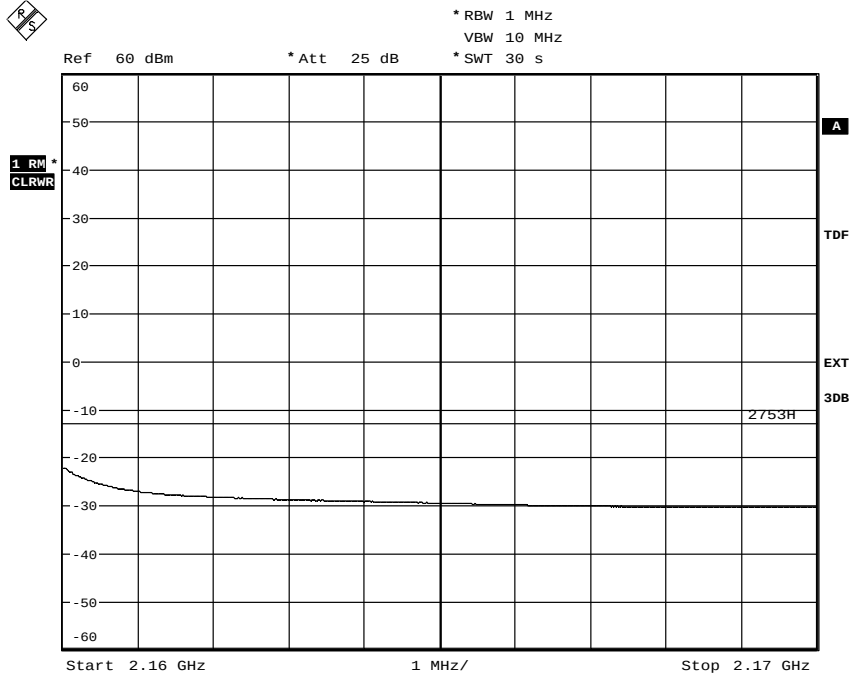
Appendix 4.1

Diagram 8 a



Date: 23.SEP.2010 11:02:29

Diagram 8 b



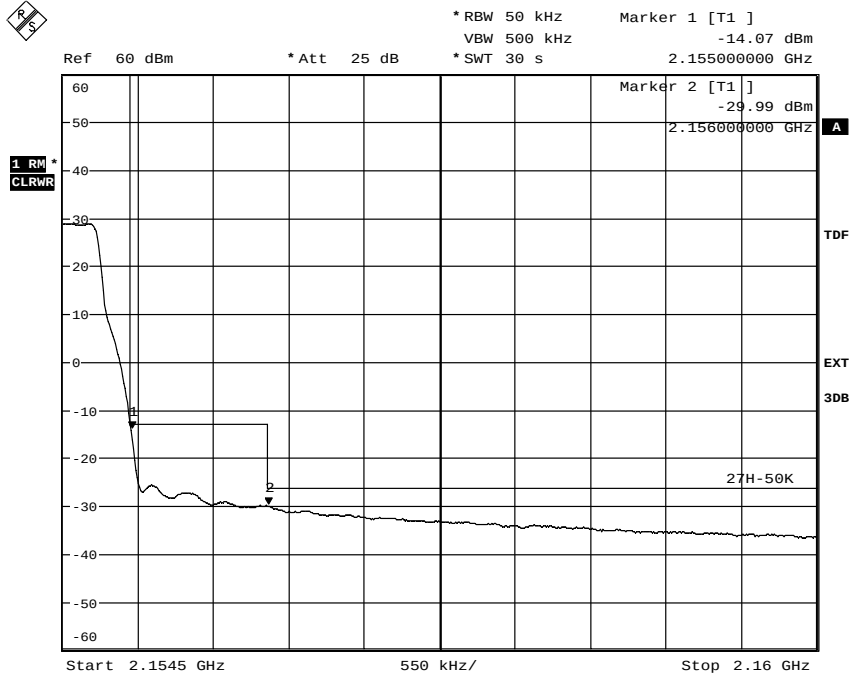
Date: 23.SEP.2010 11:05:01



FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

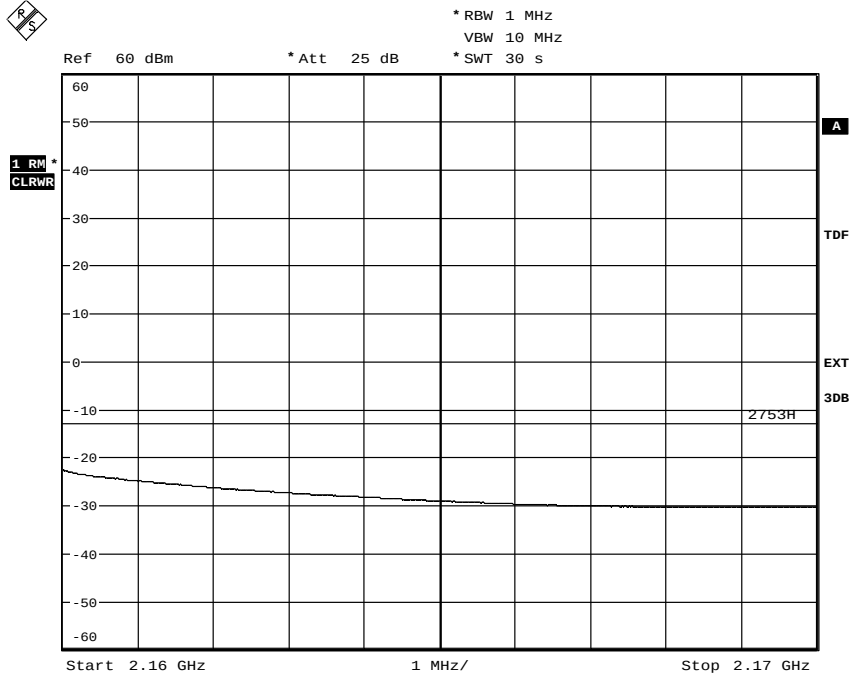
Appendix 4.1

Diagram 9 a



Date: 23.SEP.2010 11:20:00

Diagram 9 b



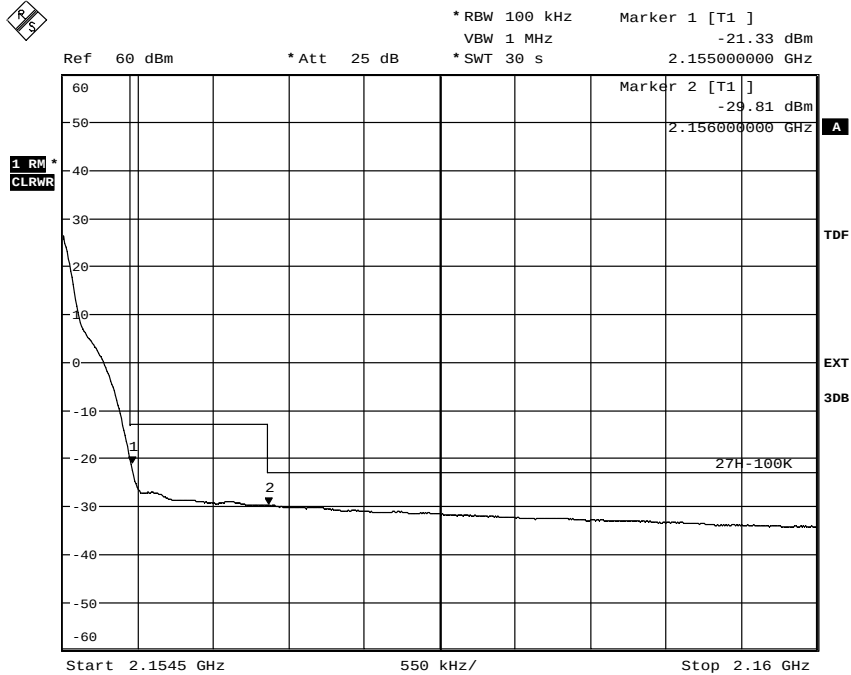
Date: 23.SEP.2010 11:22:28



FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

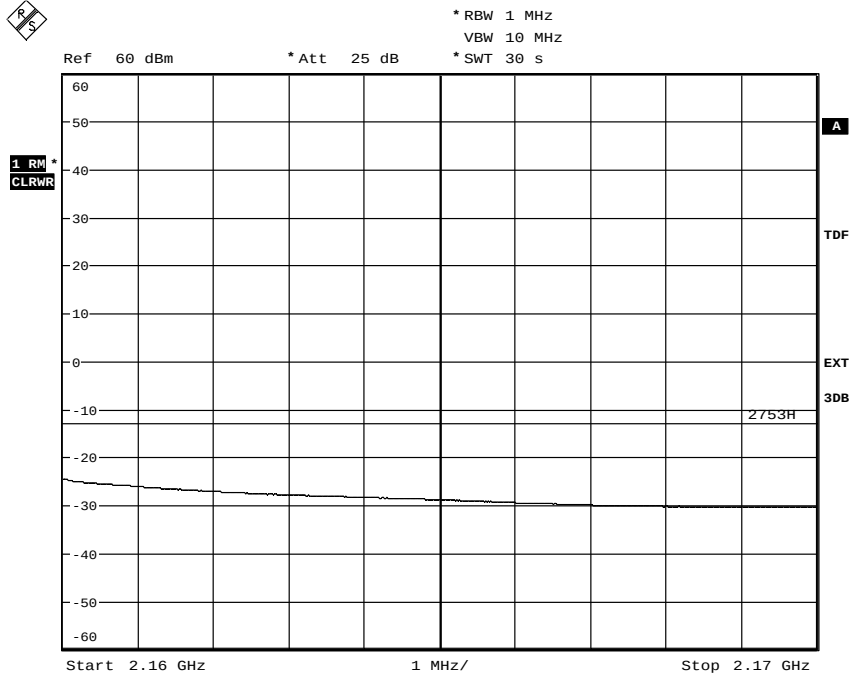
Appendix 4.1

Diagram 10 a



Date: 23.SEP.2010 11:35:53

Diagram 10 b



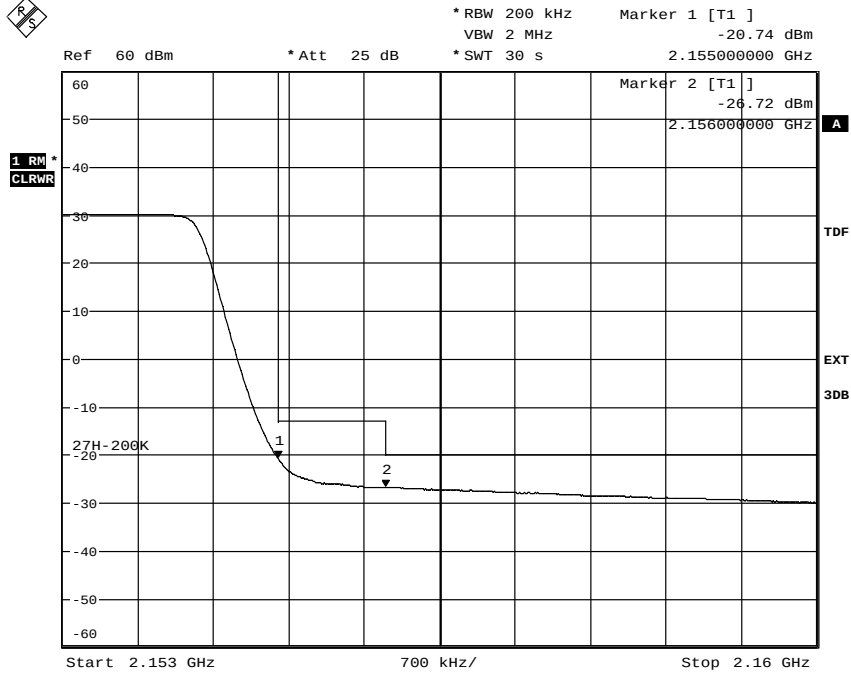
Date: 23.SEP.2010 11:37:38



FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

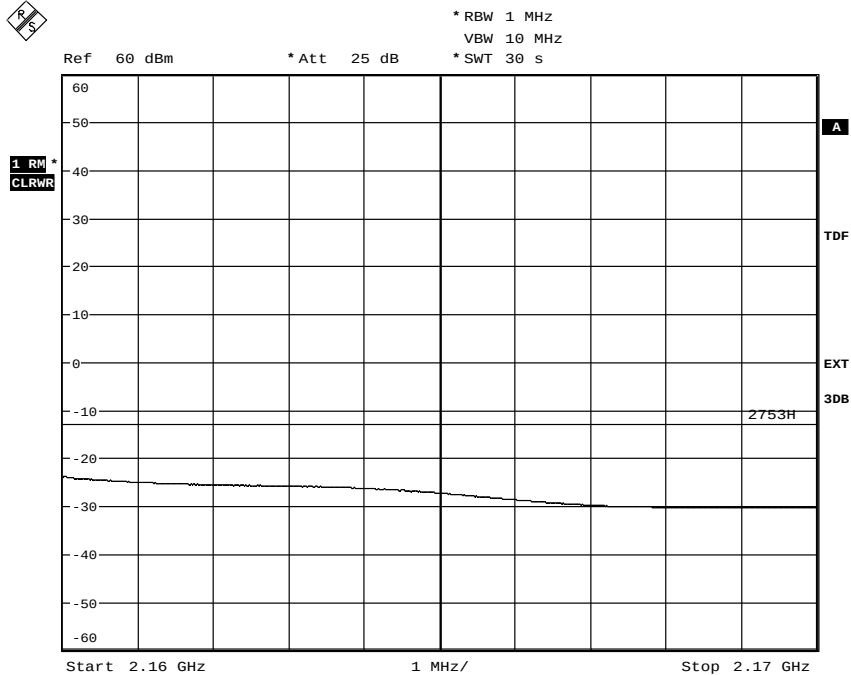
Appendix 4.1

Diagram 11 a



Date: 23.SEP.2010 13:08:58

Diagram 11 b

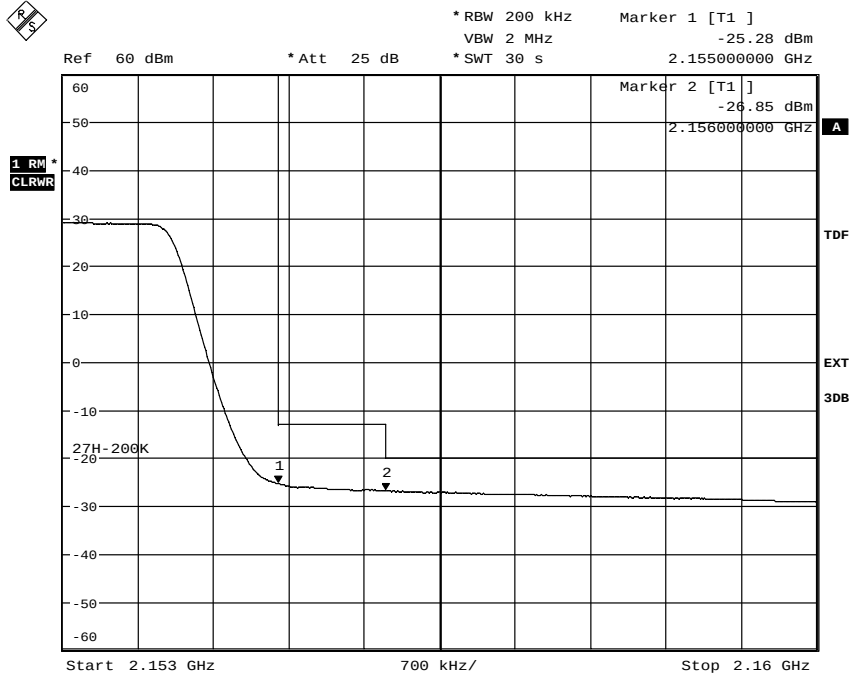


Date: 23.SEP.2010 13:11:14

FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

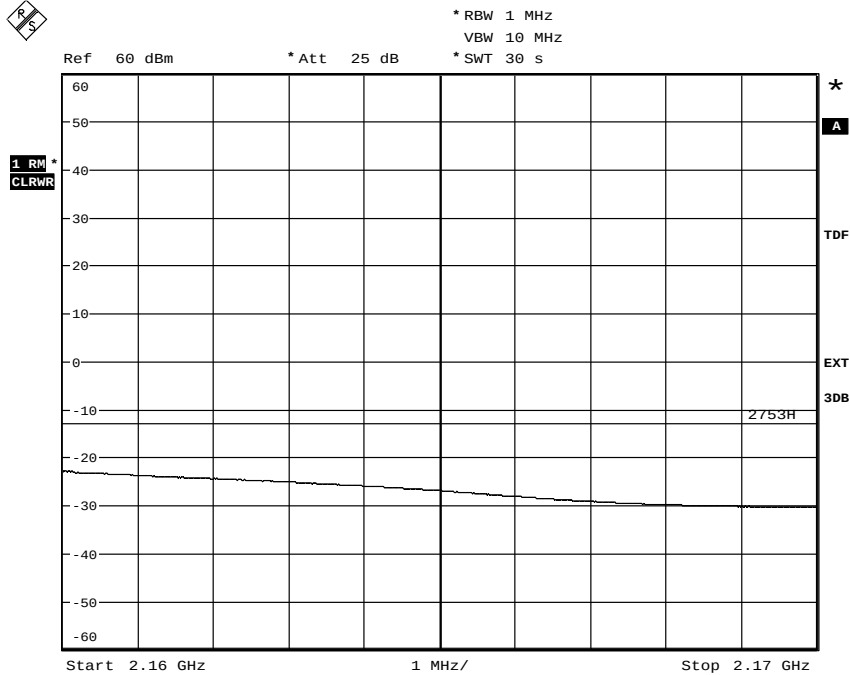
Appendix 4.1

Diagram 12 a



Date: 23.SEP.2010 13:30:19

Diagram 12 b



Date: 23.SEP.2010 13:31:44

FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

Appendix 5

Conducted spurious emission measurements according to 47 CFR 2.1051 / IC RSS-139 6.5

Date	Temperature	Humidity
2010-09-22	22 °C ± 3 °C	33 % ± 5 %
2010-09-23	22 °C ± 3 °C	34 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §27.53 (h). The output was connected to a spectrum analyzer. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements. A pre-measurement was performed with the PEAK detector activated. Emission close to or above the limit with the PEAK detector is measured with the RMS detector activated and the level of the emission is determined with the substitution method.

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

Measurement uncertainty: 3.7 dB

Results

Diagram	BW configuration / [MHz]	Frequency
1	1.4	B
2	20	B
3	1.4	M
4	3	M
5	5	M
6	10	M
7	15	M
8	20	M
9	1.4	T
10	20	T

The diagrams are shown in appendix 5.1

Limits

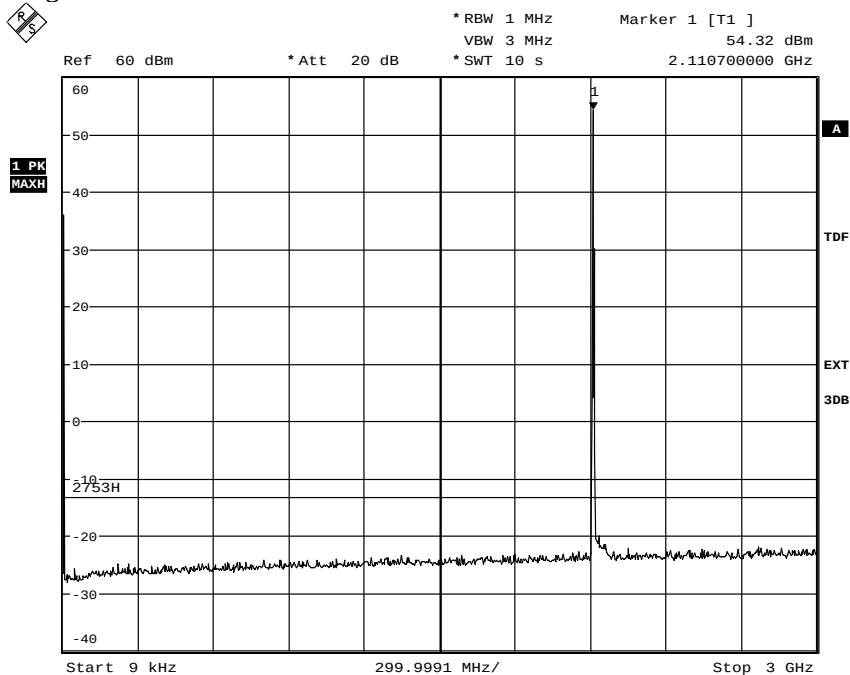
The power of any emission outside the frequency band shall be attenuated below the transmitter power (P) by at least $43 + 10 \log P$ dB.

Complies?	Yes
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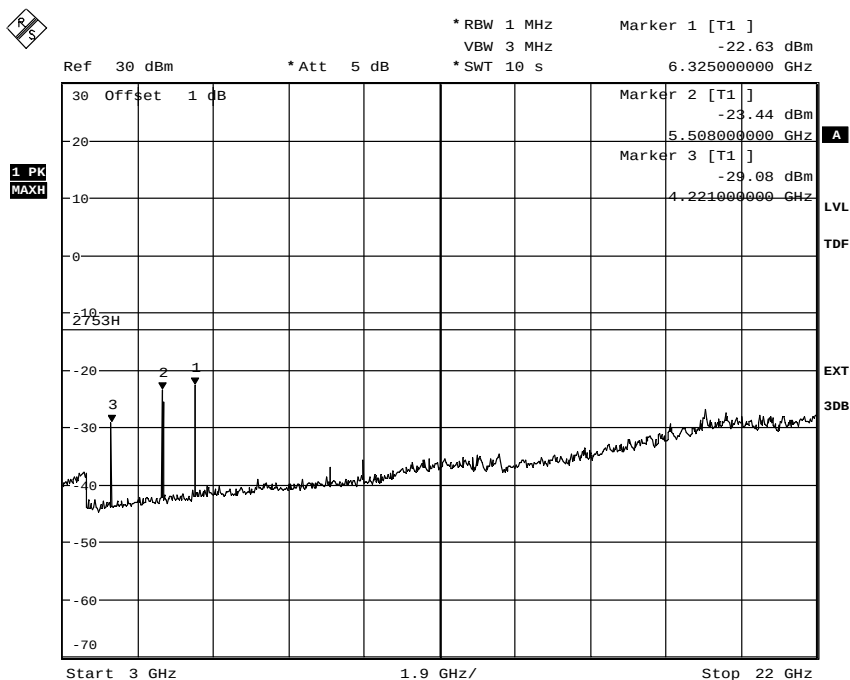
FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

Appendix 5.1

Diagram 1:



Date: 22.SEP.2010 11:19:02



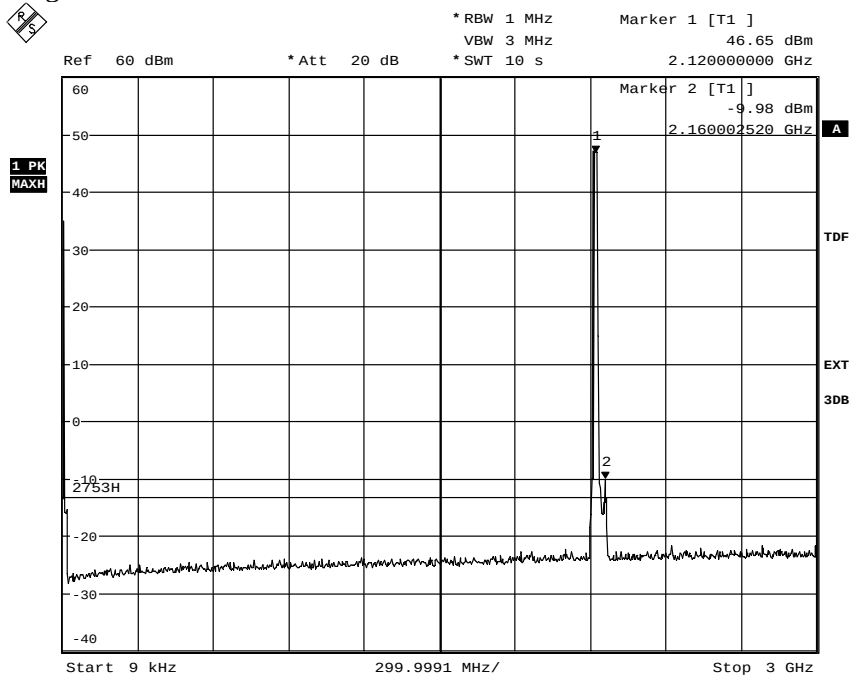
Date: 22.SEP.2010 11:28:33

Note: Above marked emissions did not exceed an RMS-value of -33 dBm.

FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

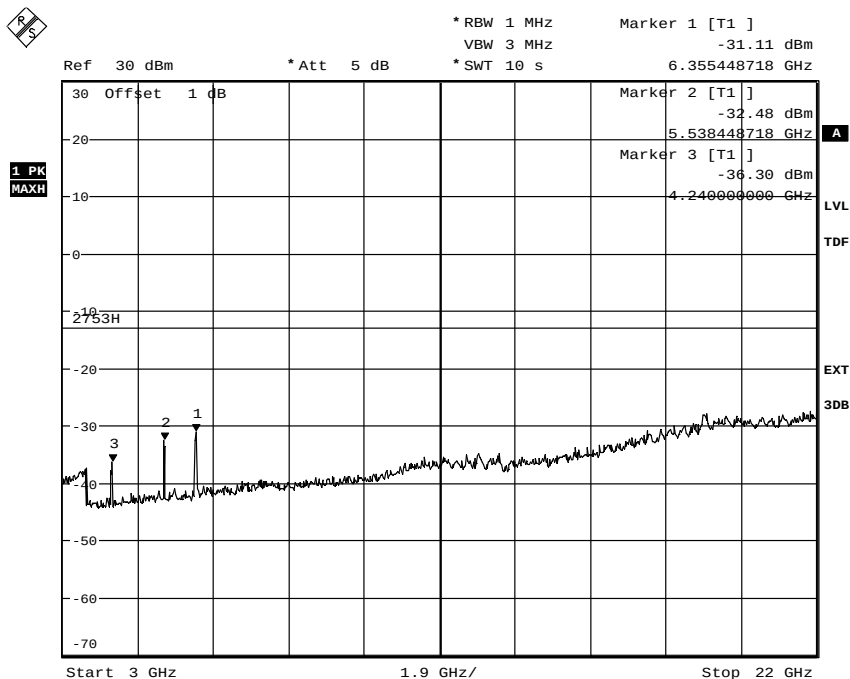
Appendix 5.1

Diagram 2:



Date: 22.SEP.2010 14:46:39

Note: The marked emission at 2160 MHz did not exceed an RMS value of -29.5 dBm. It was related to intermittent noise peaks from the test object.



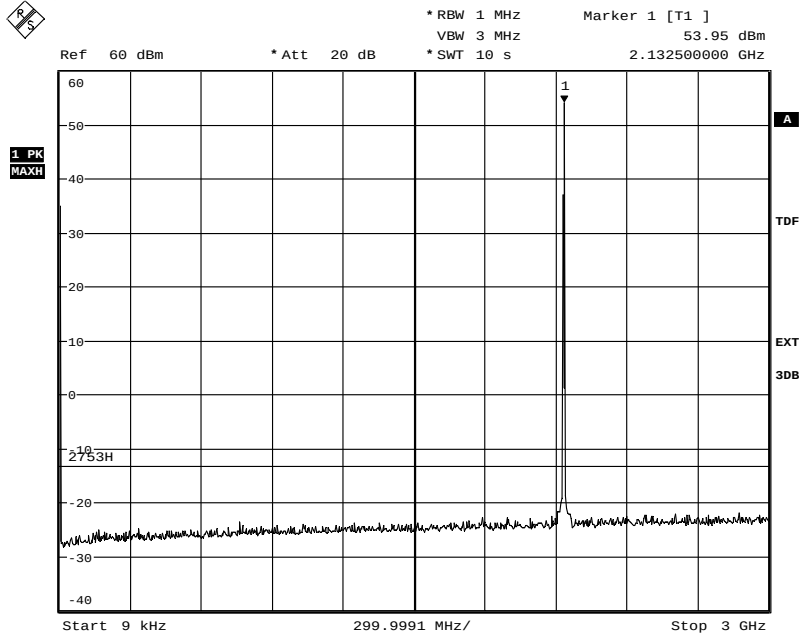
Date: 22.SEP.2010 15:08:24

Note: Above marked emissions did not exceed an RMS-value of -33 dBm.

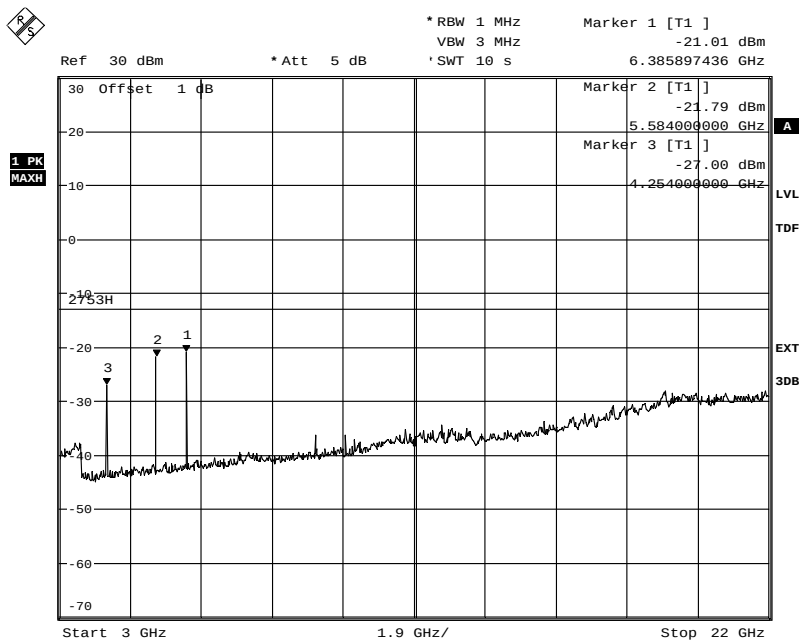
FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

Appendix 5.1

Diagram 3:



Date: 23.SEP.2010 14:30:59



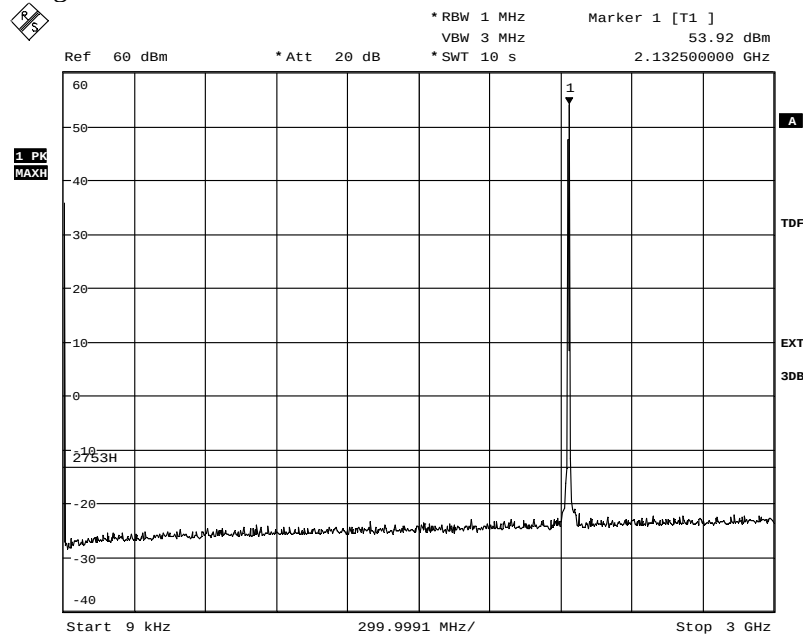
Date: 23.SEP.2010 14:34:31

Note: Above marked emissions did not exceed an RMS-value of -33.0 dBm.

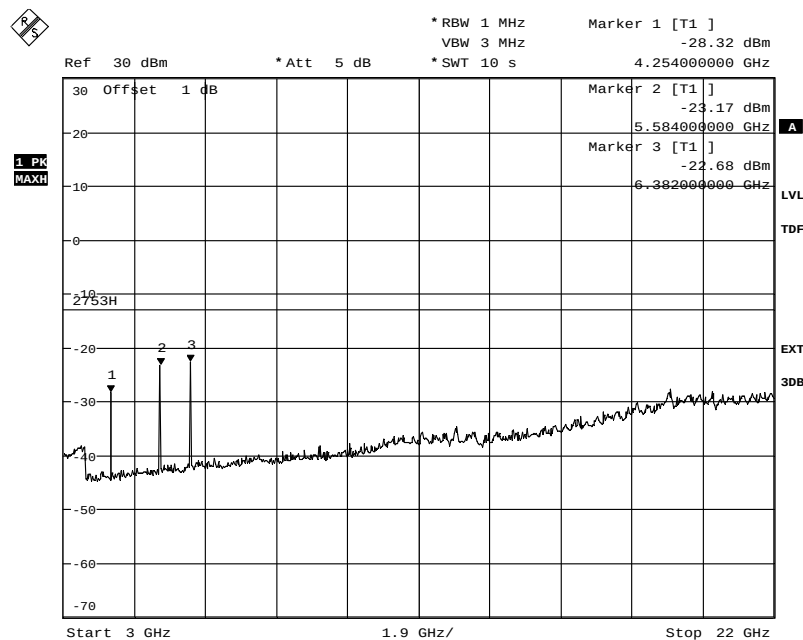
FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

Appendix 5.1

Diagram 4:



Date: 24.SEP.2010 11:44:14



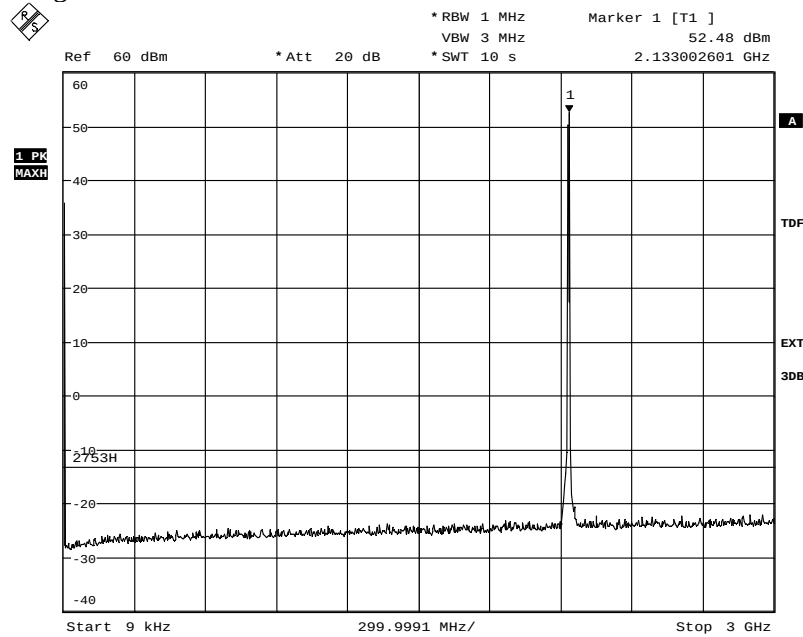
Date: 24.SEP.2010 11:47:28

Note: Above marked emissions did not exceed an RMS-value of -36 dBm.

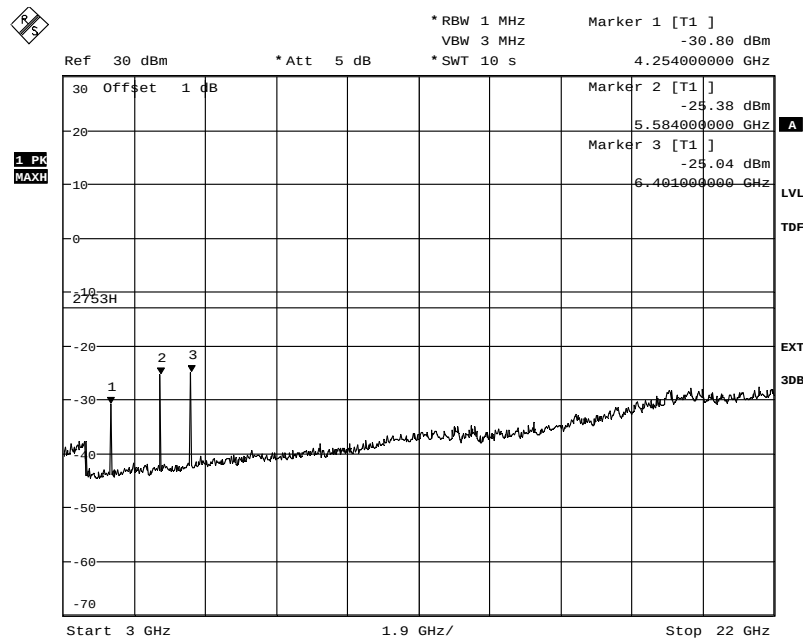
FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

Appendix 5.1

Diagram 5:



Date: 24.SEP.2010 13:15:31



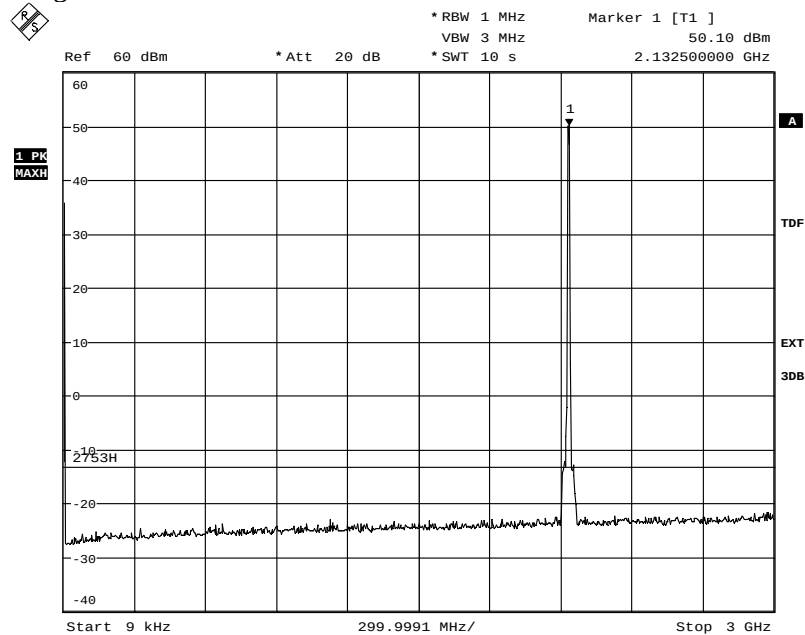
Date: 24.SEP.2010 13:18:23

Note: Above marked emissions did not exceed an RMS-value of -38 dBm.

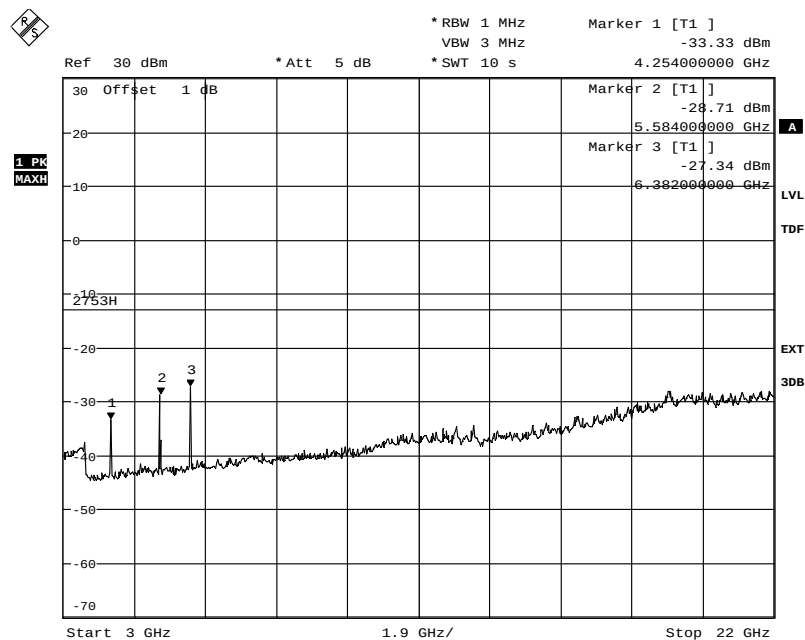
FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

Appendix 5.1

Diagram 6:



Date: 24.SEP.2010 16:06:23



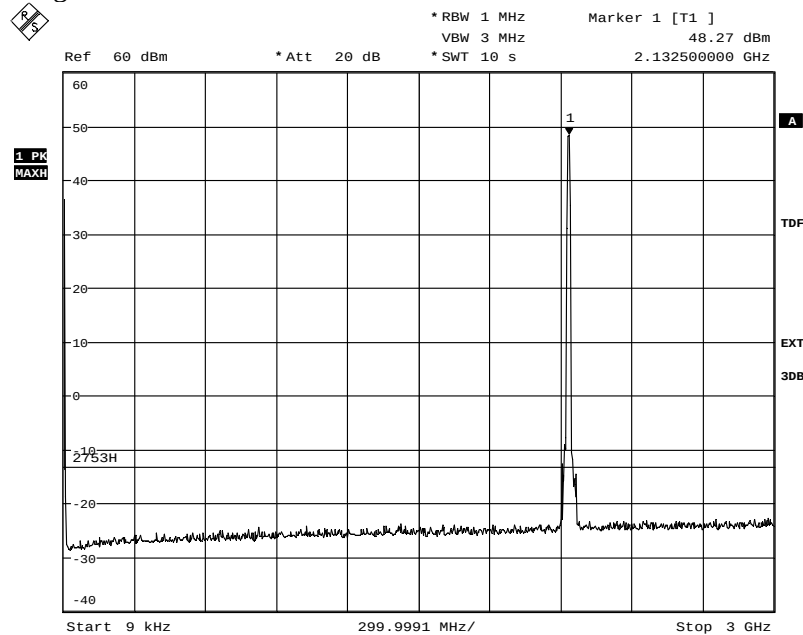
Date: 24.SEP.2010 16:09:24

Note: Above marked emissions did not exceed an RMS-value of -41 dBm.

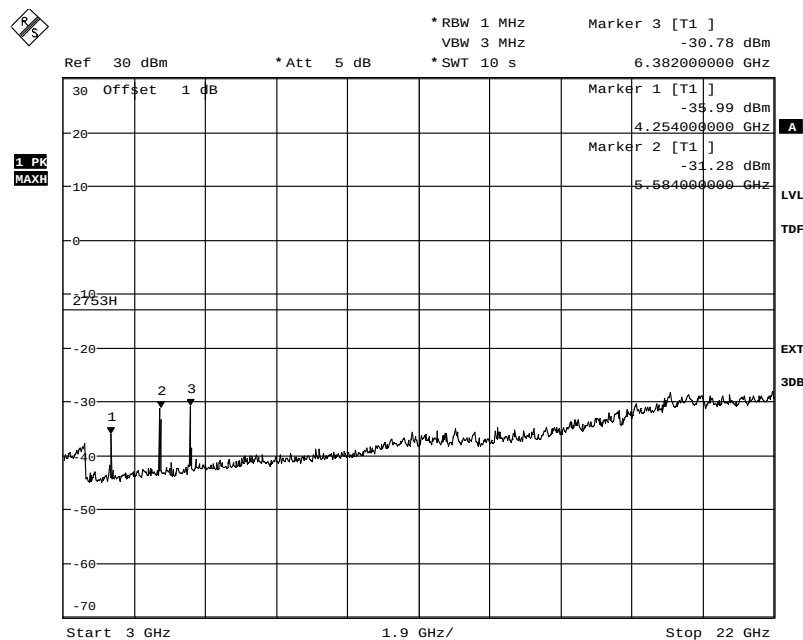
FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

Appendix 5.1

Diagram 7:



Date: 26.SEP.2010 17:07:46



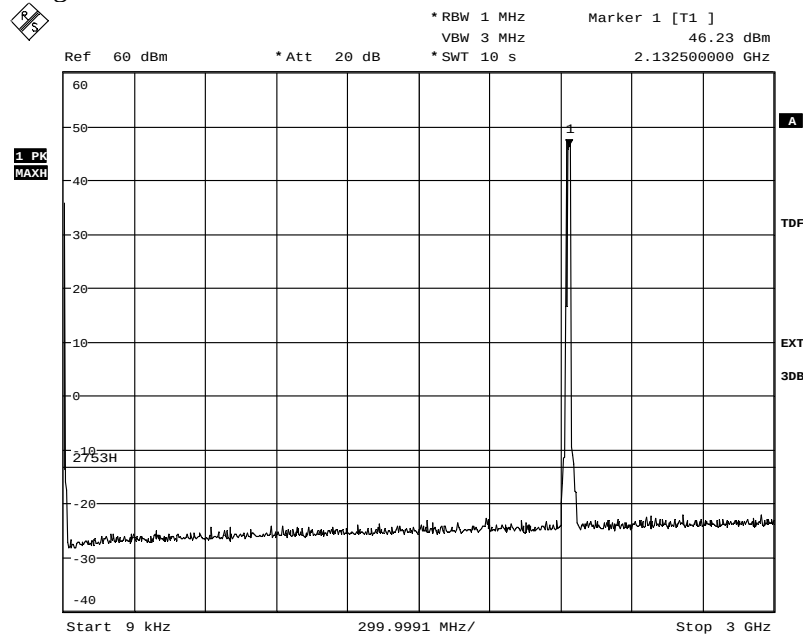
Date: 26.SEP.2010 17:21:37

Note: Above marked emissions did not exceed an RMS-value of -33 dBm.

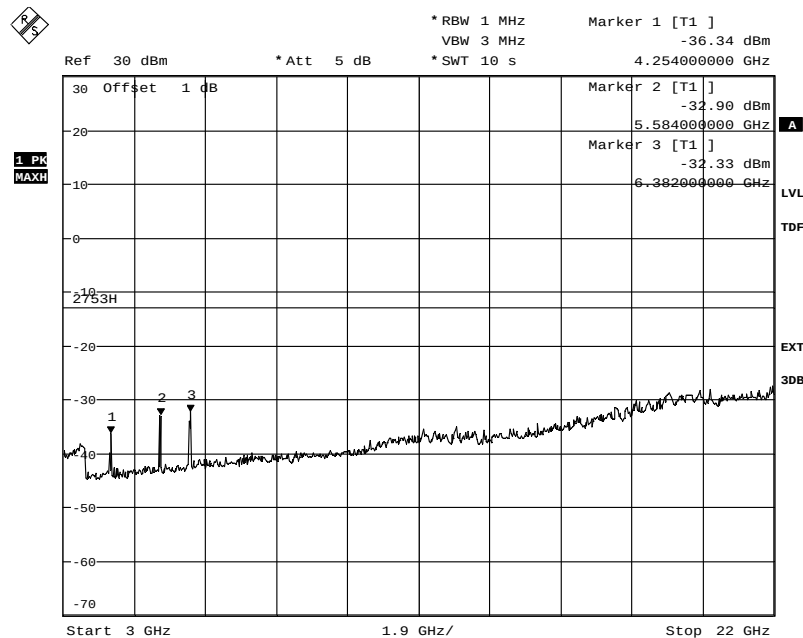
FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

Appendix 5.1

Diagram 8:



Date: 26.SEP.2010 17:56:24



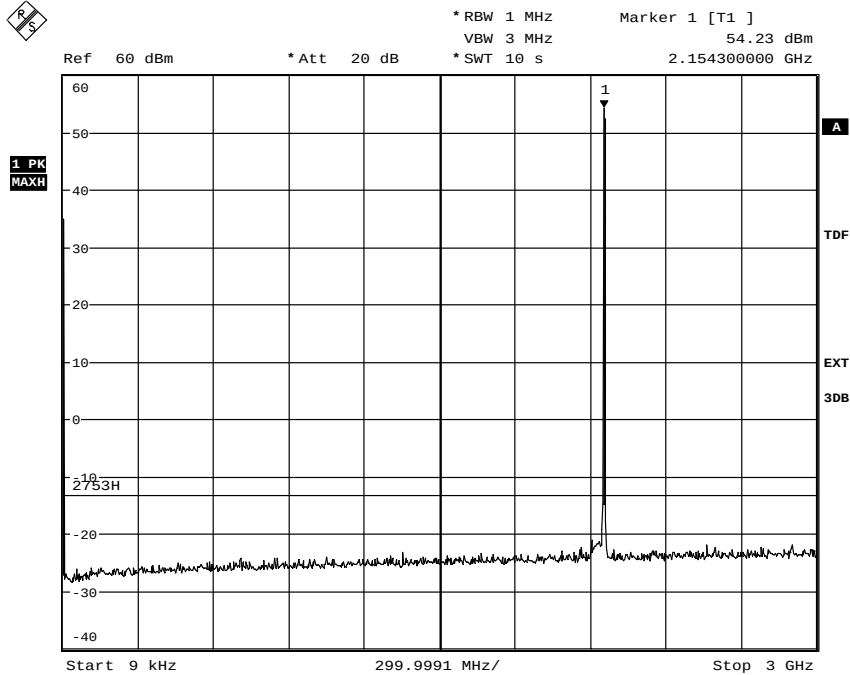
Date: 26.SEP.2010 18:05:24

Note: Above marked emissions did not exceed an RMS-value of -33 dBm.

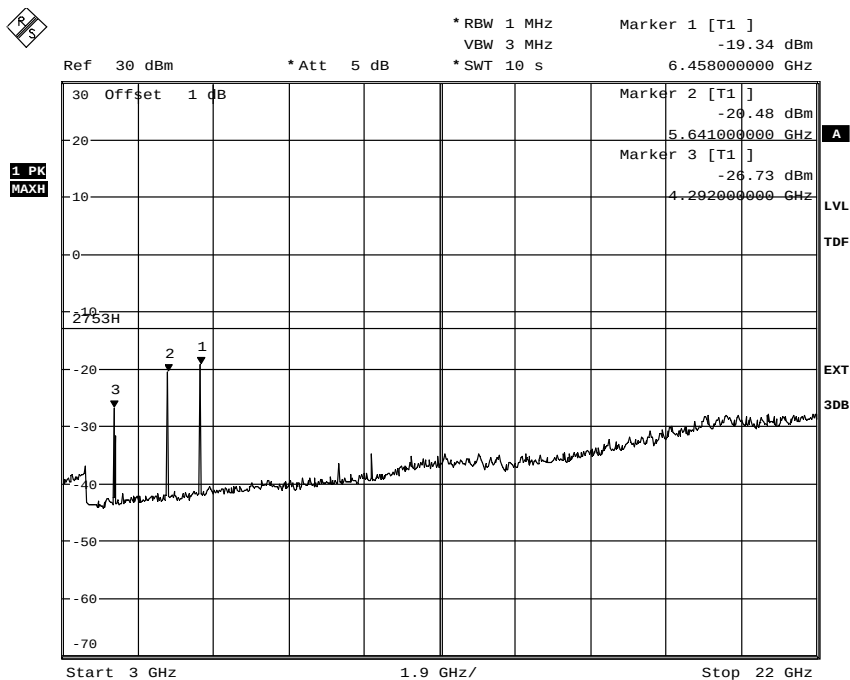
FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

Appendix 5.1

Diagram 9:



Date: 23.SEP.2010 10:31:19



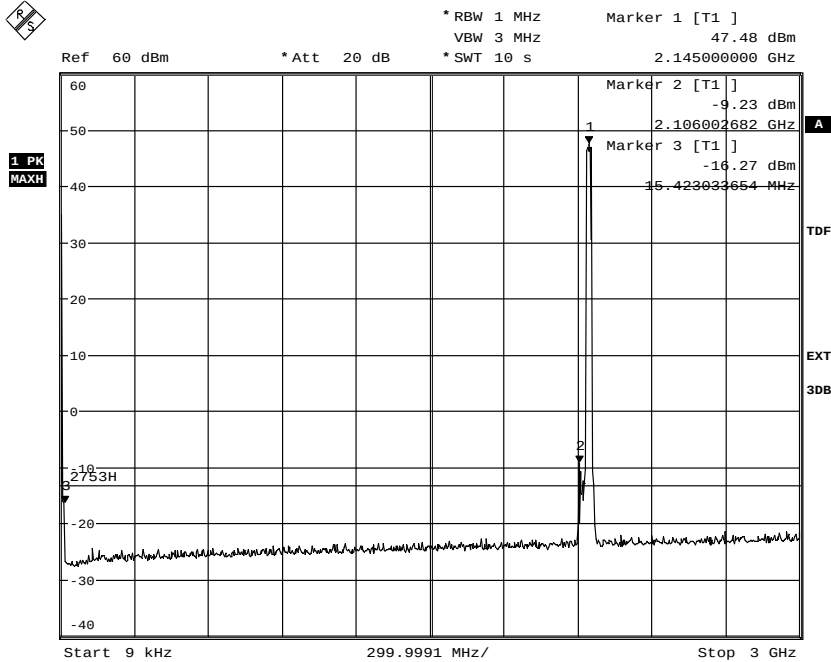
Date: 23.SEP.2010 10:34:51

Note: Above marked emissions did not exceed an RMS-value of -32.2 dBm.

FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

Appendix 5.1

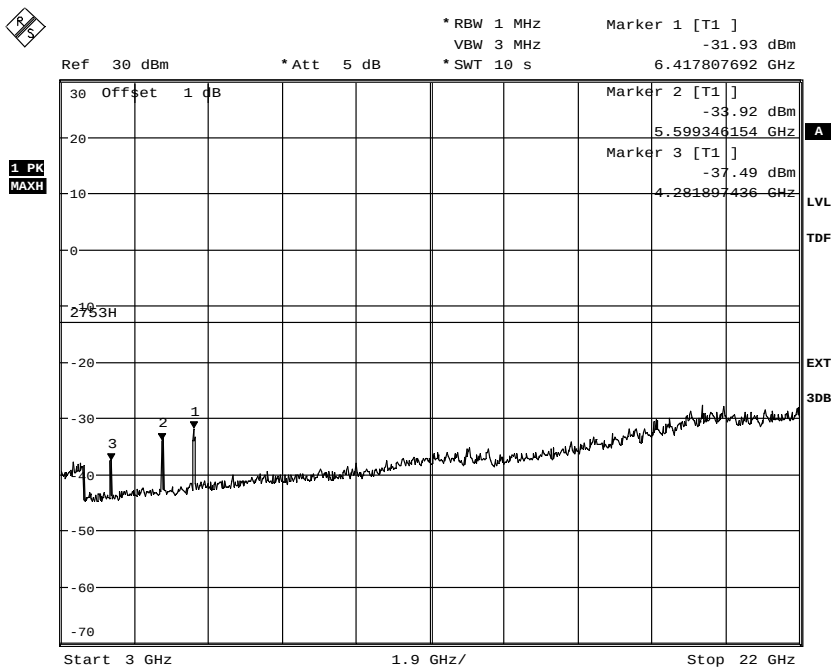
Diagram 10:



Date: 23.SEP.2010 13:34:12

Note: The emission at 2.106 MHz is covered by the Bandedge measurement range. The RMS value of this emission was -30.0 dBm.

The emission at marker 3 shall be ignored, it was related to LO-leakage as verified by an additional narrowband measurement with smaller RBW.



Date: 23.SEP.2010 13:53:25

Note: Above marked emissions did not exceed an RMS-value of -33 dBm.

FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

Appendix 6

Field strength of spurious radiation measurements according to 47 CFR 2.1053 / IC RSS-139 6.5

Date	Temperature	Humidity
2010-09-16	22 °C ± 3 °C	45 % ± 5 %
2010-09-17	23 °C ± 3 °C	48 % ± 5 %
2010-09-20	23 °C ± 3 °C	37 % ± 5 %
2010-09-21	23 °C ± 3 °C	44 % ± 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, Issue 2, Industry Canada file no. IC 3482A-1.

The measurements were performed with both horizontal and vertical polarisation of the antenna. The antenna distance was 3 m in the frequency range 30 MHz – 18 GHz and 1m in the frequency range 18-22 GHz.

A pre-measurement was first performed:

In the frequency range 30 MHz-20 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:

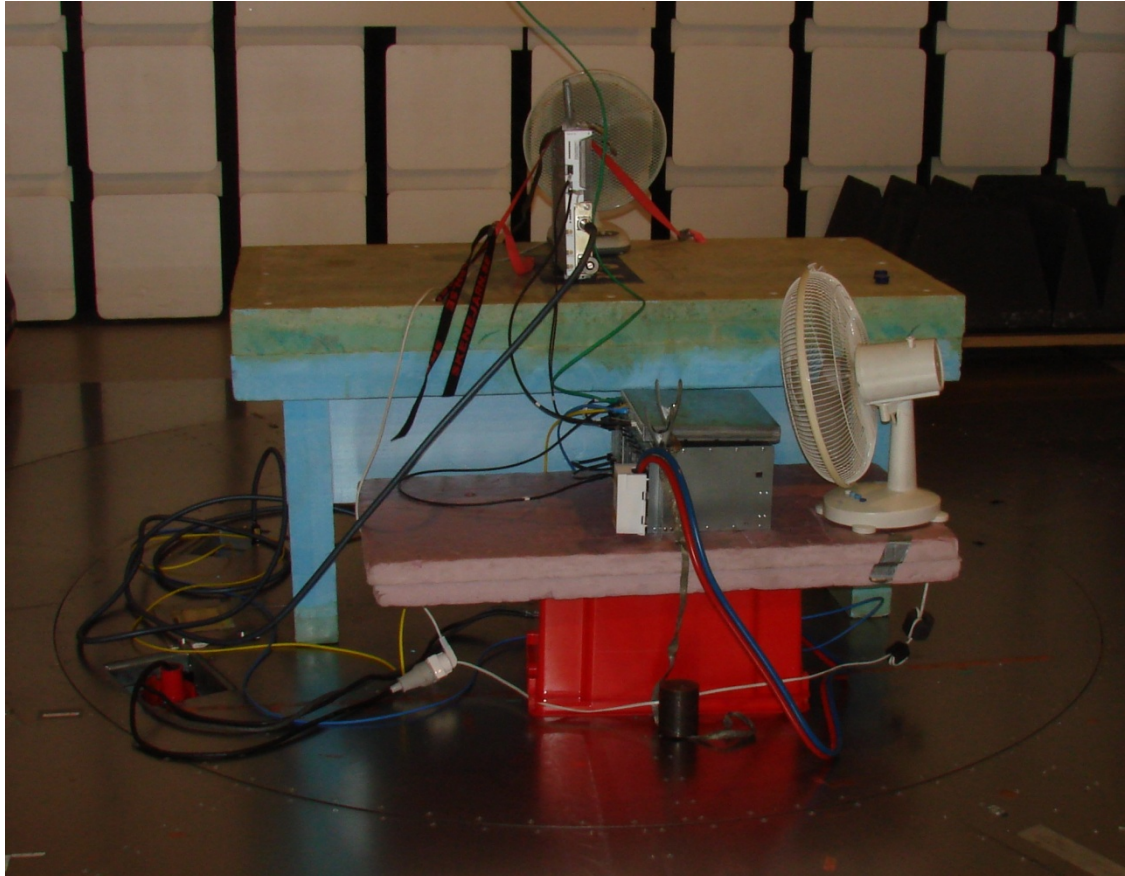
1. The pre-measurement was first performed with peak detector. The EUT was measured in eight directions and with the antenna at three heights, 1.0 m, 1.5 m and 2.0 m.
2. Spurious radiation on frequencies closer than 20 dB to the limit is scanned 0-360 degrees and the antenna is scanned 1-4 m for maximum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

Measurement equipment	SP number
Test site Tesla	503 881
R&S ESI 26	503 292
Control computer with EMI software: R&S EMC32, ver. 8.20.1	503 479
Low Noise Amplifier	503 285
Low Noise Amplifier	504 160
Chase Bilog antenna CBL 6111A	503 182
EMCO Horn Antenna 3115	502 175
Standard gain antenna 20240-20	503 674
RLC Electronics, high pass filter	503 739
Testo 625 temperature and humidity meter	504 188

FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

Appendix 6

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



Note: The fans are required for thermal relief. The equipment lacks sufficient passive cooling capacity when tested stand-alone outside a RBS cabinet.

Results

Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
30-22 000	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

The power of any emission outside the frequency band shall be attenuated below the transmitter power (P) by at least $43 + 10 \log P$ dB.

Complies?	Yes
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FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

Appendix 7

Frequency stability measurements according to 47 CFR 2.1055 / IC RSS 139 6.3

Date 2010-09-16 - 2010-09-21	Temperature 23 °C ± 3 °C (valid for test equipment)	Humidity 37-48 % ± 5 % (valid for test equipment)
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Test set-up and procedure

The measurement was made per 3GPP TS 36.141 version 8.5.0. 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	504 143
RF attenuator	900 229
RF attenuator	504 159
Testo 635 temperature and humidity meter	504 203
Testo 625 temperature and humidity meter	504 188
Rotronic temperature and humidity meter	502 946
Multimeter Fluke 87	502 190

FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

Appendix 7

Results

Nominal transmitter frequency was 2132.5 MHz in channel bandwidth configuration 1.4 MHz.
Rated output power level at connector RF A (maximum): 47.8 dBm (60 W).

Test conditions		Frequency error (Hz)
Supply voltage DC (V)	T (°C)	E-TM1.1
-48.0	+20	+4
-55.2	+20	-4
-40.8	+20	+8
-48.0	+30	+7
-48.0	+40	+6
-48.0	+50	+3
-48.0	+10	+6
-48.0	0	+12
-48.0	-10	TX disabled (Note 1)
-48.0	-20	N.T.
-48.0	-30	N.T.
Maximum freq. error (Hz)		+12
Measurement uncertainty		$< \pm 1 \times 10^{-7}$

Note 1: The test object firmware successfully disabled TX transmission outside the temperature range specified by the manufacturer.

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)

6.5.1.5 The frequency Error shall be within $\pm(0.05 \text{ PPM} + 12 \text{ Hz})$ ($\pm 118.625 \text{ Hz}$).

Complies?	Yes
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FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

Appendix 8

Receiver spurious emissions measurements according to 47 CFR 15.111 and RSS-Gen Issue 2

Date 2010-09-23	Temperature 22 °C ± 3 °C	Humidity 34 % ± 5 %
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Test set-up and procedure

The measurements were performed according to ANSI C63.4.

Measurements were performed on port “RF B”. The measurement was first performed with peak detector. Emission on frequencies close to or above the limit was re-measured with quasi-peak detector below 1 GHz and with average detector above 1GHz.

During the measurement at the receiver port “RF B” the combined TX/RX port “RF A” was terminated into 50 ohm. The TX was active at maximum power at the TX band center frequency with test model E-TM1.1 in channel bandwidth configuration 1.4 MHz.

Measurement equipment	SP number
R&S FSQ40	504 143
RF attenuator (at port RF A)	900 229
RF step attenuator, 10 dB setting	503 096
Testo 635 temperature and humidity meter	504 203

Result

The results are shown in appendix 8.1:

The nominal RX frequency was 1732.5 MHz.

	Tested port, frequency range
Diagram 1	RX B, 9 KHz – 1 GHz
Diagram 2	RX B, 1 GHz – 11 GHz

Remarks

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

It was deemed sufficient to measure RX conducted emissions with only the worst case TX configuration. The upper frequency bound 11 GHz was chosen to cover 5x 2155 MHz, the upper TX frequency band edge and client declared highest frequency.

Limit

The power of any spurious output signals appearing at the antenna terminals must not exceed -57 dBm (2 nanowatt).

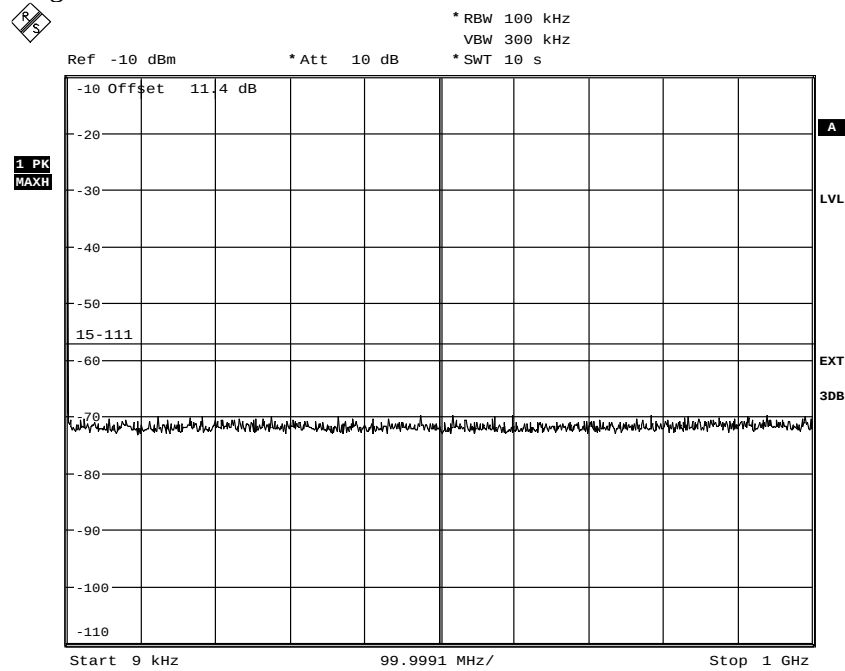
Emission below limit?	Yes
-----------------------	-----



FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

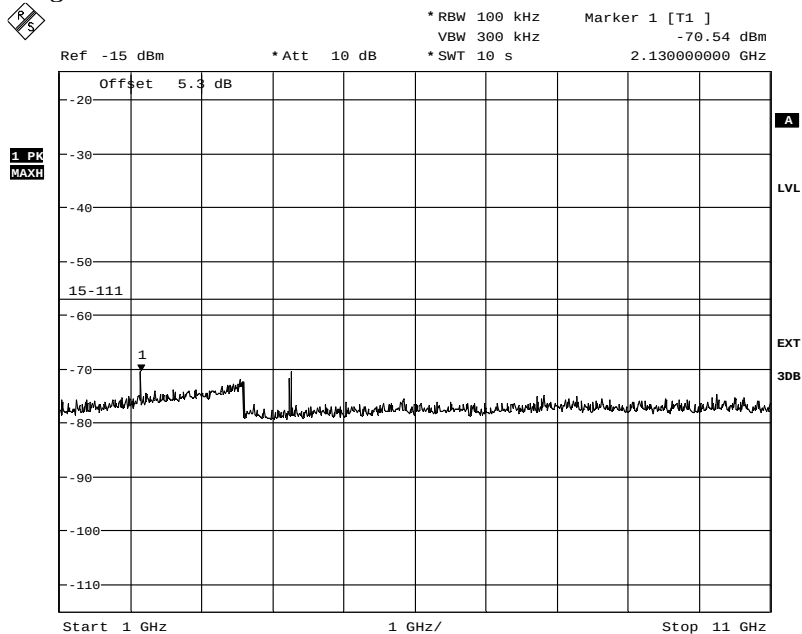
Appendix 8.1

Diagram 1:



Date: 26.SEP.2010 19:16:05

Diagram 2:



Date: 26.SEP.2010 19:13:08

FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

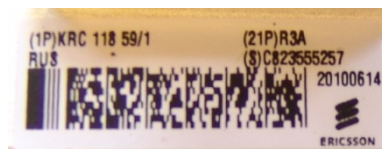
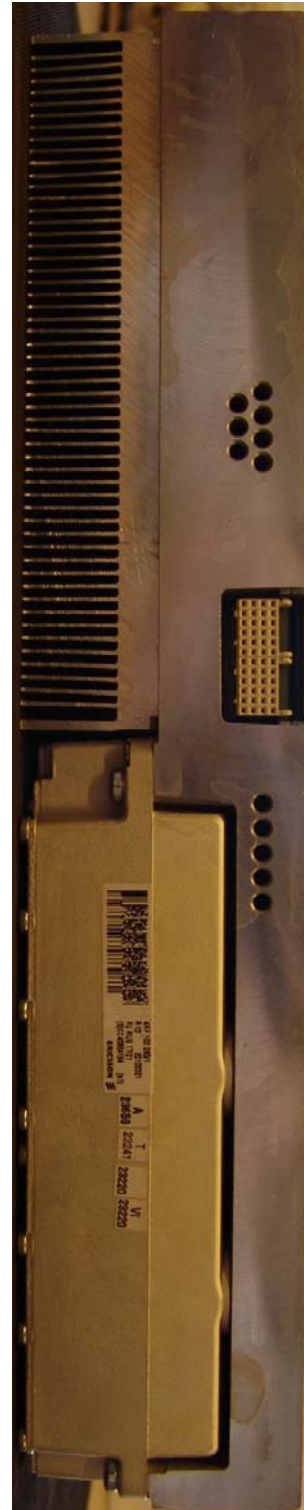
Appendix 9

External photos

Front side



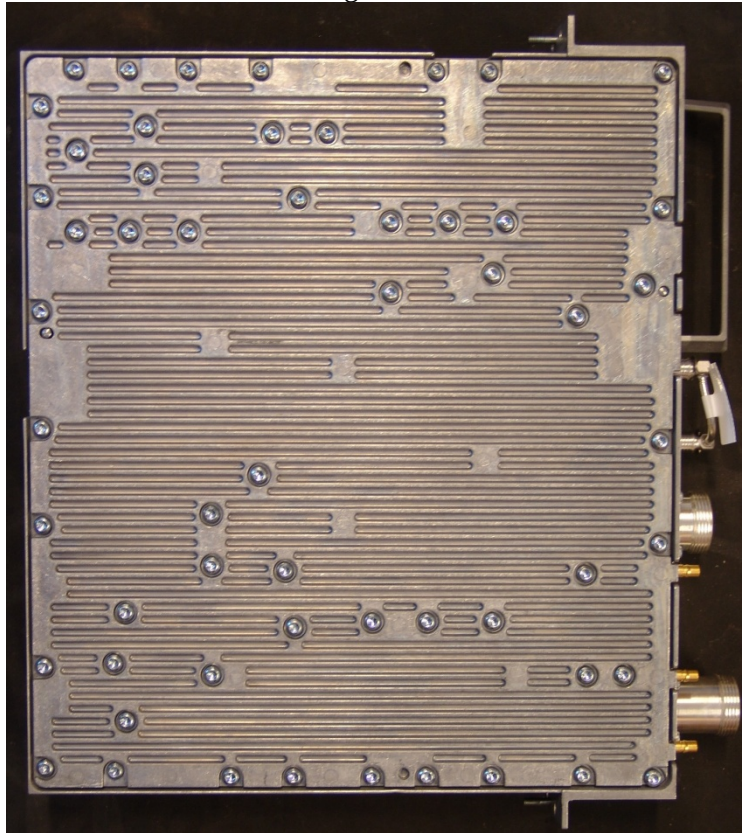
Rear side



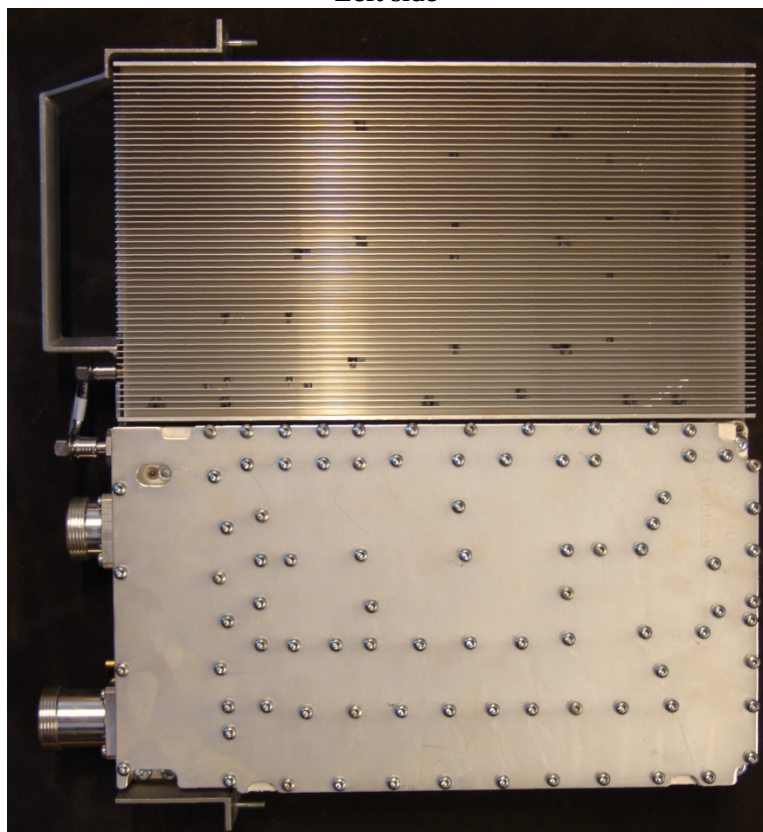
FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

Appendix 9

Right side



Left side



FCC ID: TA8BKRC11859-1
IC: 287AB-BS118591

Appendix 9

Bottom side



Top side

