



Product Service

Choose certainty.
Add value.



Report On

FCC and Industry Canada Testing of the
Ericsson AB (850MHz) RRUS 01 B5 KRC 118 70/3 Remote Radio Unit
In accordance with FCC CFR 47 Part 22 and Industry Canada RSS-
132 : Issue 3.

COMMERCIAL-IN-CONFIDENCE

FCC ID: TA8AKRC11870-3

IC: 287AB-AS118703

PREPARED BY

Guangdi Dong
Project Engineer

APPROVED BY

Simon Bennett
Authorised Signatory

DATED

15 August 2014

Document 75927313 Report 01 Issue 1

August 2014

CONTENTS

Section	Page No
1	REPORT INFORMATION 2
1.1	Report Details 3
1.2	Brief Summary of Results 4
1.3	Configuration Description 5
1.4	Declaration of Build Status 6
1.5	Product Information 7
1.6	Test Setup 8
1.7	Test Conditions 20
1.8	Deviation From The Standard 20
1.9	Modification Record 20
1.10	Alternative Test Site 20
2	TEST DETAILS 21
2.1	Maximum Peak Output Power and Peak to Average Ratio - Conducted 22
2.2	Occupied Bandwidth 29
2.3	Spurious Emission at Band Edge 48
2.4	Radiated Spurious Emissions 76
2.5	Conducted Spurious Emissions 83
2.6	Frequency Stability 118
3	TEST EQUIPMENT USED 120
3.1	Test Equipment Used 121
3.2	Measurement Uncertainty 123
4	ACCREDITATION, DISCLAIMERS AND COPYRIGHT 124
4.1	Accreditation, Disclaimers and Copyright 125



Product Service

SECTION 1

REPORT INFORMATION

1.1 REPORT DETAILS

Testing was carried out in support of a C2PC application for Grant of RRUS 01 B5 KRC 118 70/3 to include LTE Single RAT, MSR for WCDMA and LTE, GSM and LTE.

Manufacturer	Ericsson AB
Address	Isafjordsgatan 10 SE-164 80 Stockholm 16480 Sweden
Product Name	RRUS 01 B5
Product Number	KRC 118 70/3
IC Model Number	AS118703
Serial Number(s)	D168196972 D168196991
Software Version	CXP 902 1719 Rev R2JA61 for WCDMA CXP 102 051/19 Rev R30H for LTE CXP9017316/1 Rev R39UL for GSM
Hardware Version	R1E
Test Specification/Issue/Date	FCC CFR 47 Part 22: 2013 RSS-132 Issue 3: 2013
Start of Test	03 July 2014
Finish of Test	05 August 2014
Name of Engineer(s)	Guangdi Dong
Related Document(s)	ANSI C63.4: 2009 ANSI/TIA-603-C-2004 FCC CFR 47 Part 2: 2013 Industry Canada SRSP-503 Issue 7: 2008 Industry Canada RSS-GEN Issue 3: 2010

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results for each configuration, in accordance with FCC CFR 47 Part 2, Part 22 and RSS-132 is shown below.

Section	Spec Clause			Test Description	Result
	FCC Part 2	Part 22	RSS 132		
2.1	2.1046	22.913(a)	5.4	Maximum Peak Output Power and Peak to Average Ratio – Conducted	Pass
2.2	2.1049(h)	22.917(b)	RSS-Gen 4.6.1	Occupied Bandwidth	Pass
2.3	2.1051	22.917(b)	5.5	Spurious Emissions at Band Edge	Pass
2.4	2.1053	22.917(a)	5.5	Radiated Spurious Emissions	Pass
2.5	2.1051	22.917(a)	5.5	Conducted Spurious Emissions	Pass
2.6	2.1055	22.355	5.3	Frequency Stability	Pass
-	-	-	-	Receiver Spurious Emissions	N/A

N/A – Not Applicable

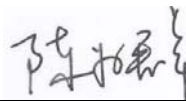
1.3 CONFIGURATION DESCRIPTION

Configuration Code	Carrier(s)	Configuration Description
L-MIMO-SC	1C	LTE MIMO, Single Carrier
L-MIMO-MC 1	2C	LTE MIMO, Multi Carrier x2
G+L-MIMO-MC 1	1G+1L	GSM+LTE MIMO, 1GSM+1LTE
G+L-MIMO-MC 2	2G+1L	GSM+LTE MIMO, 2GSM+1LTE
G+L-MIMO-MC 3	2G+2L	GSM+LTE MIMO, 2GSM+2LTE
G+L-MIMO-MC 4	3G+1L	GSM+LTE MIMO, 3GSM+1LTE
W+L-MIMO-MC 1	1W+1L	WCDMA+LTE MIMO, 1WCDMA+1LTE
W+L-MIMO-MC 2	2W+2L	WCDMA+LTE MIMO, 2WCDMA+2LTE
W+L-MIMO-MC 3	2W+1L	WCDMA+LTE MIMO, 2WCDMA+1LTE

1.4 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	Remote Radio Unit
MANUFACTURER	Ericsson AB
PRODUCT NAME	RRUS 01 B5
PART NUMBER	KRC 118 70/3
IC Model Number	AS118703
TRANSMITTER OPERATING RANGE	TX: 869MHz - 894MHz RX: 824MHz - 849MHz
MODULATIONS	GSM: GMSK, 8-PSK, 16QAM, 32QAM, AQPSK WCDMA: QPSK, 16QAM, 64QAM LTE: QPSK, 16QAM, 64QAM
INTERMEDIATE FREQUENCIES	-
ITU DESIGNATION OF EMISSION	GSM: 250KGXW, 250KG7W WCDMA: 5M00F9W LTE: 1M40F9W, 3M00F9W, 5M00F9W and 10M0F9W
SUPPORTED CHANNEL BANDWIDTH CONFIGURATION	GSM: 250KHz WCDMA: 4.2 to 5MHz (configurable in steps of 100/200kHz) LTE: 1.4MHz, 3MHz, 5MHz and 10MHz
OUTPUT POWER (RMS) (W or dBm)	Maximum 49.0dBm (80W) per port
INSTANTANEOUS BANDWIDTH	20MHz
NUMBER OF ANTENNA PORTS	1 TX/RX port and 1 RX port
FCC ID	TA8AKRC11870-3
IC ID	287AB-AS118703
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	The equipment is the Radio Part of GSM / WCDMA / LTE / GSM & WCDMA / GSM & LTE / WCDMA & LTE MSR Base Station

Signature



Date

06 August 2014

D of B S Serial No

75927313/01

No responsibility will be accepted by TÜV SÜD Product Service UK Limited as to the accuracy of the information declared in this document by the manufacturer.

1.5 PRODUCT INFORMATION

1.5.1 Technical Description

The Equipment Under Test (EUT) RRUS 01 B5, KRC 118 70/3 is an Ericsson Radio Equipment working in the public mobile service 850MHz band which provides communication connections to 850 network in GSM / WCDMA / LTE Modes and GSM & WCDMA / GSM & LTE / WCDMA & LTE MSR modes. The RRUS 01 B5, KRC 118 70/3 operates from a -48V DC supply.

By combining two EUTs together, the EUTs were configured to transmit in MIMO mode with two TX/RX ports (RF A1, RF A2) and two RX ports (RF B1, RF B2). MIMO mode was used for measurements as the worst configuration.

The Maximum Output Power was tested on both TX/RX output connector RF A1 and RF A2, all other TX measurements were performed on the combined TX/RX output connector RF A1 of the EUT as the representative port.

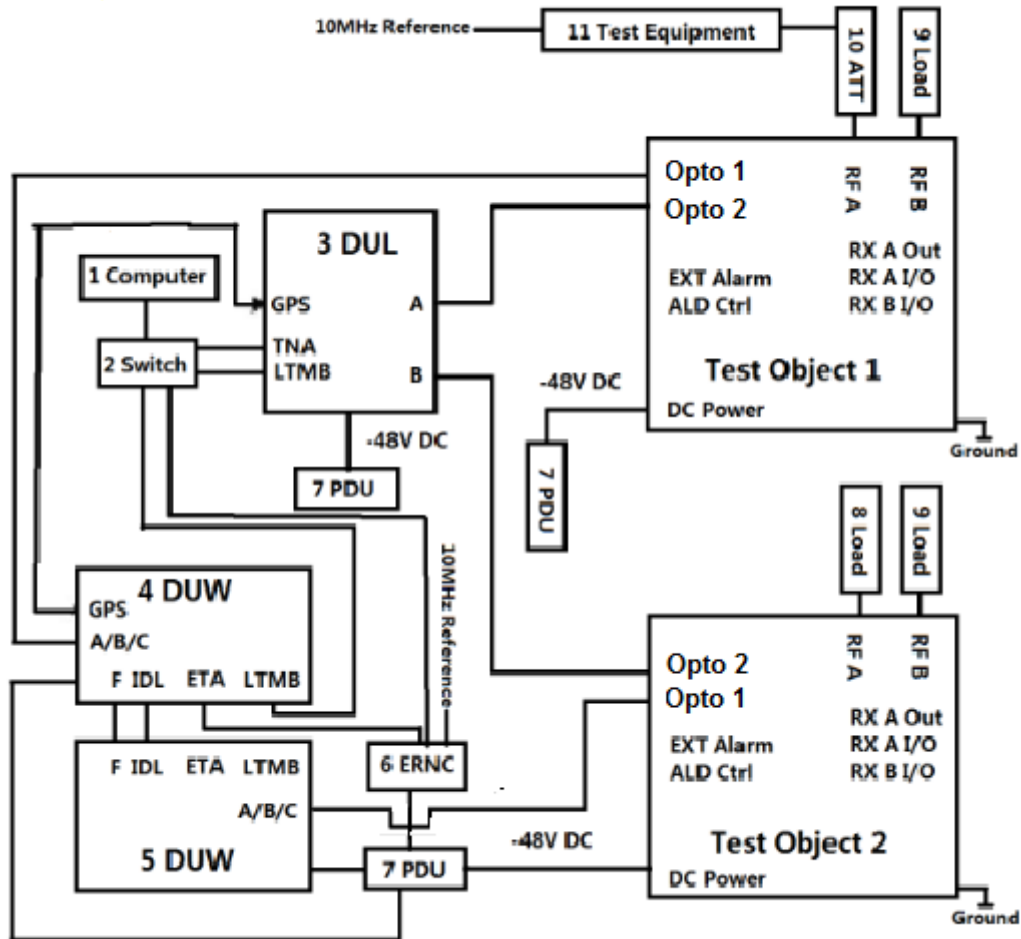
The complete testing was performed with the EUT transmitting at maximum RF power unless otherwise stated. The Equipment under Test (EUT) is shown in the photograph below. A full technical description can be found in the Manufacturer's documentation.



Equipment Under Test

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	HP EliteBook 8530w	--	AP103078
2	Switch	TL-HP8MU	--	05300902892
3	RBS 6601	BFL 901 009/1	--	--
	DUL 20 01	KDU 137 533/4	R1C	CB4H451296
	SUP 6601	1/BFL 901 009/1	R3B	BR81005675
4	Load	TF100	--	09121648
5	Load	TFE5-3	--	090323194
	Load	TFE5-3	--	090323220
6	Power Supply	DH1716-5D	--	2008040041
	Power Supply	DH1716A-10	--	ETQ-123
7	40dB Attenuator	66-40-43	--	CD4019
8	Power Meter	Rohde & Schwarz NRP	--	101593
	Power Sensor	Rohde & Schwarz NRP-Z51	--	102310
	Spectrum Analyzer	FSQ26	--	100244

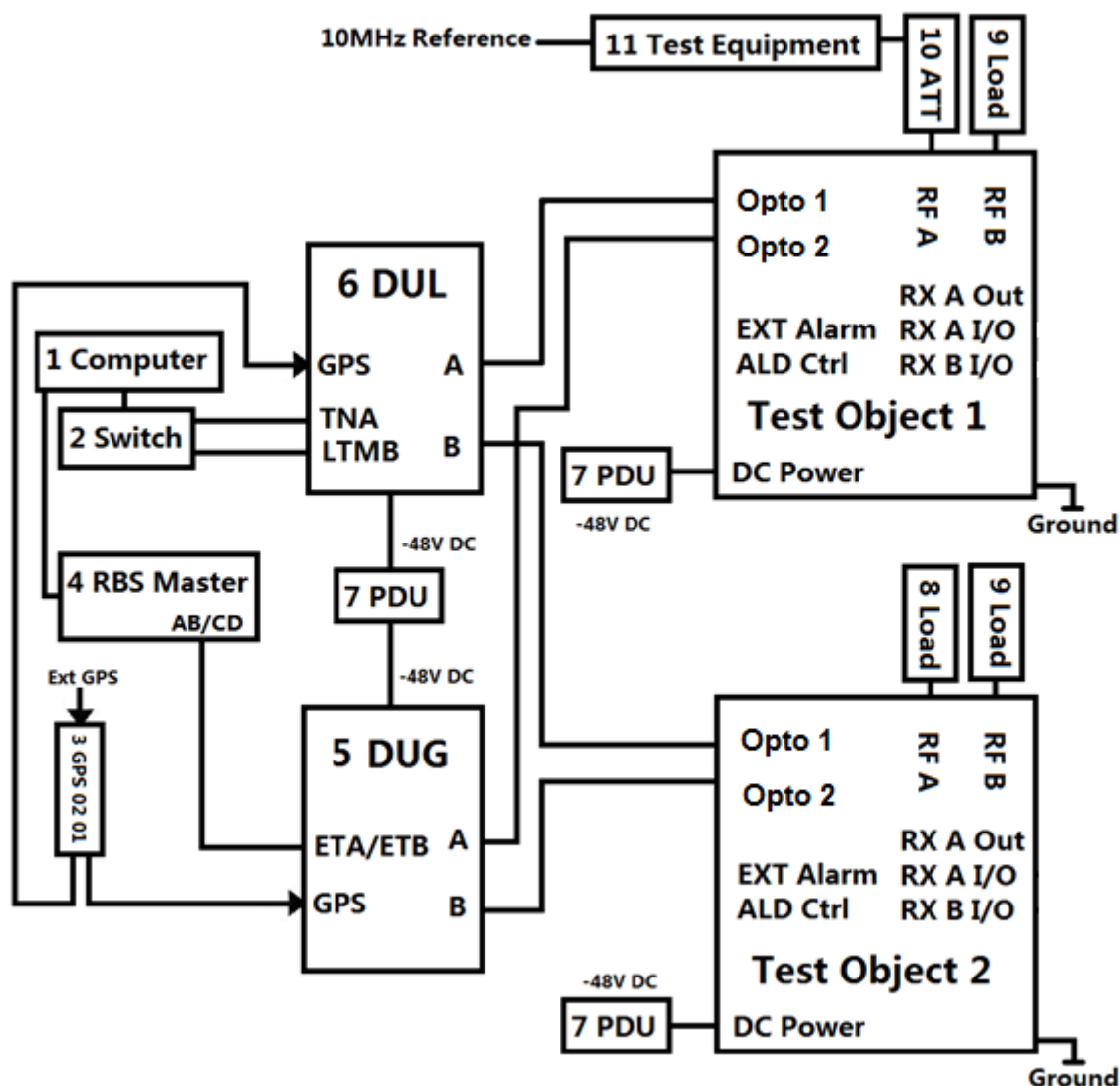
WCDMA and LTE Mix Mode Test Setup, Conducted Measurement:



Product Name	Product Number	Version	Serial Number
RRUS 01 B5	KRC 118 70/3	R1E	D168196972
RRUS 01 B5	KRC 118 70/3	R1E	D168196991

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	HP EliteBook 8530w	--	AP103078
2	Switch	TL-HP8MU	--	05300902892
3	RBS 6601	BFL 901 009/1	--	--
	DUL 20 01	KDU 137 533/4	R1C	CB4H451296
	SUP 6601	1/BFL 901 009/1	R3B	BR81005675
3	GPS 02 01	NCD 901 41/1	R1D	TU8K595208
4	RBS 6601	BFL 901 009/1	--	--
	DUW 30 01	KDU 127 161/3	R4F	TU8X960825
	SUP 6601	1/BFL 901 009/1	R3B	BR81005675
5	RBS 6601	BFL 901 009/1	--	--
	DUW 30 01	KDU 127 161/3	R4F	TU8X959107
	SUP 6601	1/BFL 901 009/1	R3B	BR81262578
6	E-RNC	BKV 301 487/1	R3F	X76CP04312
7	Power Supply	DH1716-5D	--	2008040041
	Power Supply	DH1716A-10	--	ETQ-123
8	Load	TF100	--	09121648
9	Load	TFE5-3	--	090323194
	Load	TFE5-3	--	090323220
10	40dB Attenuator	66-40-43	--	CD4019
11	Power Meter	Rohde & Schwarz NRP	--	101593
	Power Sensor	Rohde & Schwarz NRP-Z51	--	102310
	Spectrum Analyzer	FSQ26	--	100244

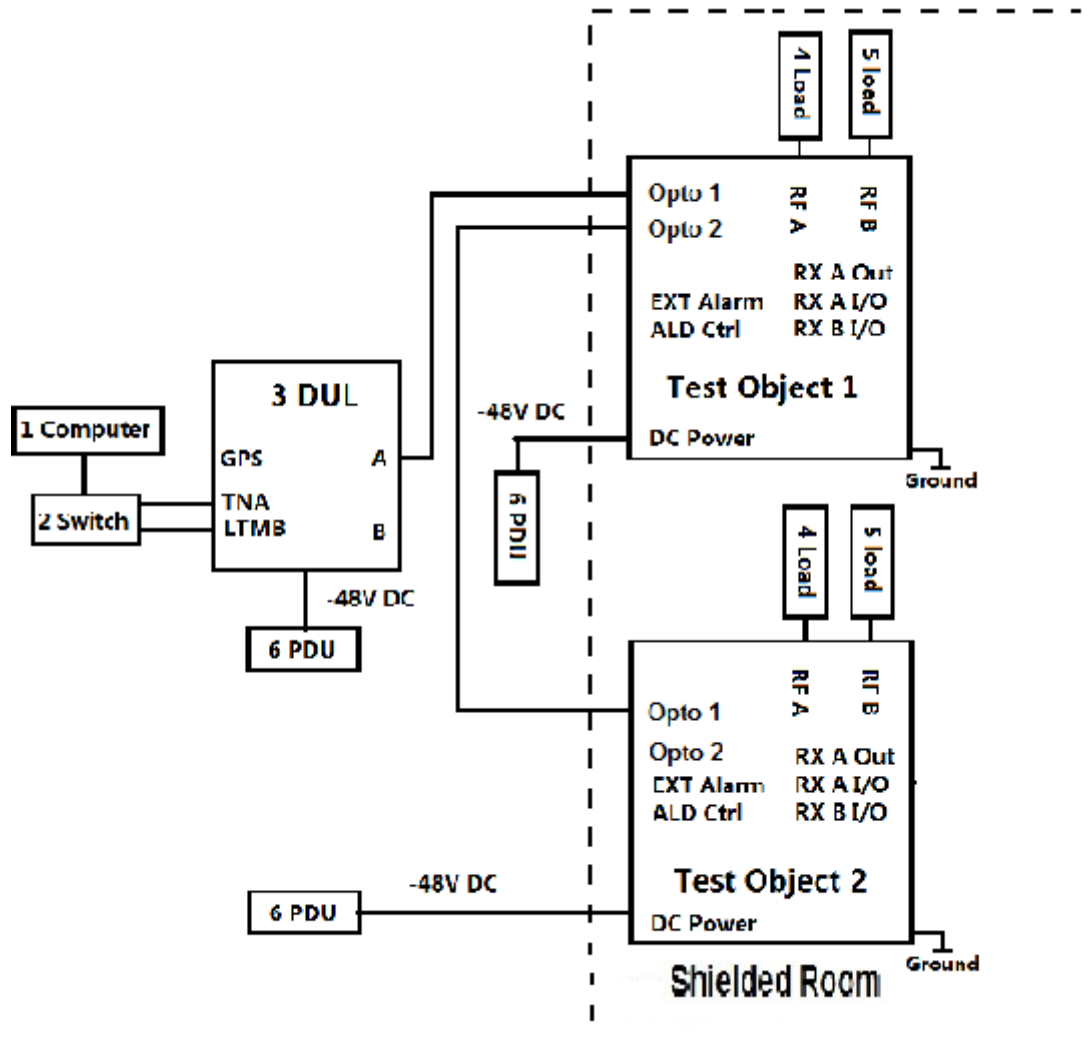
GSM and LTE Mix Mode Test Setup, Conducted Measurement:



Product Name	Product Number	Version	Serial Number
RRUS 01 B5	KRC 118 70/3	R1E	D168196972
RRUS 01 B5	KRC 118 70/3	R1E	D168196991

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	HP EliteBook 8530w	--	AP103078
2	Switch	TL-HP8MU	--	05300902892
3	GPS 02 01	NCD 901 41/1	R1D	TU8K595208
4	RBS Master	LPY 107 1007/3	R1C	T01E050944
5	RBS 6601	BFL 901 009/1	--	--
	DUG 20 01	KDU 137 569/1	R2B	C824496764
	SUP 6601	1/BFL 901 009/1	R3B	BR81005675
6	RBS 6601	BFL 901 009/1	--	--
	DUL 20 01	KDU 137 533/4	R1C	CB4H451296
	SUP 6601	1/BFL 901 009/1	R3B	BR81005675
7	Power Supply	DH1716-5D	--	2008040041
	Power Supply	DH1716A-10	--	ETQ-123
8	Load	TF100	--	09121648
9	Load	TFE5-3	--	090323194
	Load	TFE5-3	--	090323220
10	40dB Attenuator	66-40-43	--	CD4019
11	Power Meter	Rohde & Schwarz NRP	--	101593
	Power Sensor	Rohde & Schwarz NRP-Z51	--	102310
	Spectrum Analyzer	FSQ26	--	100244

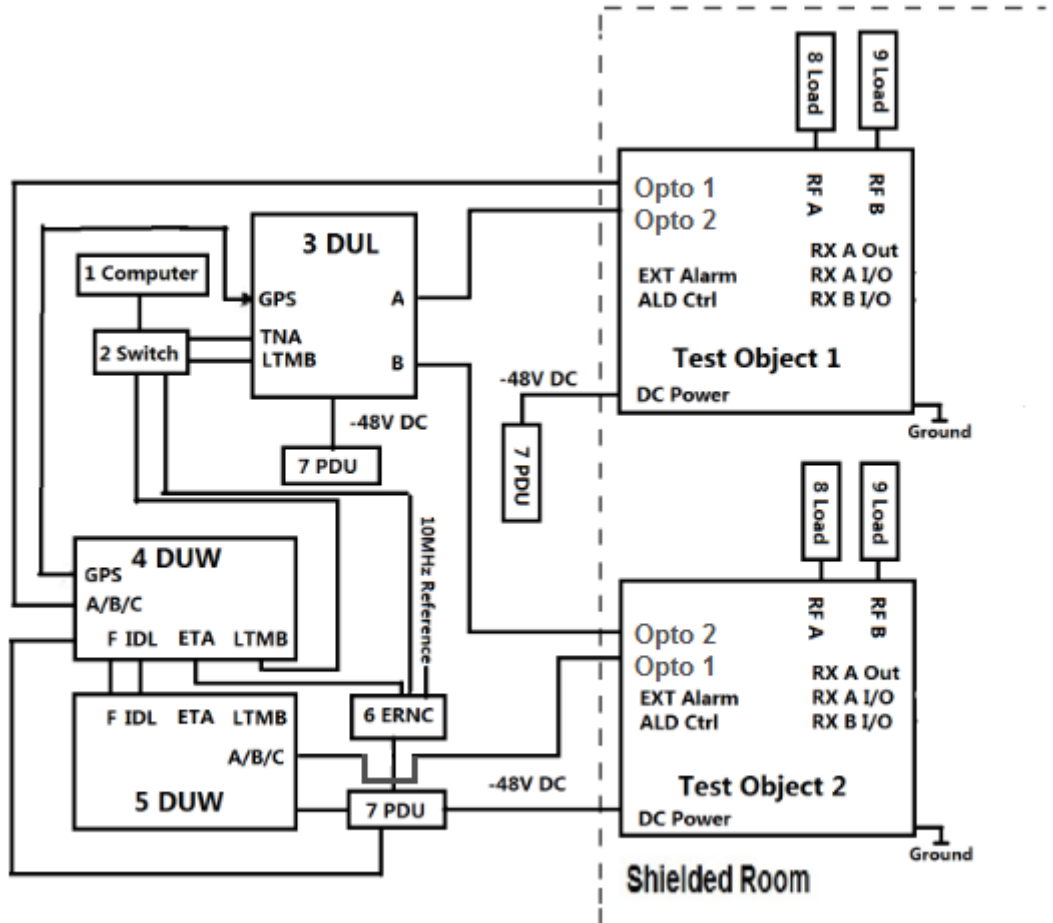
LTE Test Setup, Radiated Measurement:



Product Name	Product Number	Version	Serial Number
RRUS 01 B5	KRC 118 70/3	R1E	D168196972
RRUS 01 B5	KRC 118 70/3	R1E	D168196991

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	HP EliteBook 8530w	--	AP103078
2	Switch	TL-HP8MU	--	05300902892
3	RBS 6601	BFL 901 009/1	--	--
	DUL 20 01	KDU 137 533/4	R1C	CB4H451296
	SUP 6601	1/BFL 901 009/1	R3B	BR81005675
4	Load	TF100	--	09121648
	Load	TF100	--	09121642
5	Load	TFE5-3	--	090323194
	Load	TFE5-3	--	090323220
6	Power Supply	DH1716-5D	--	2008040041
	Power Supply	DH1716A-10	--	ETQ-123

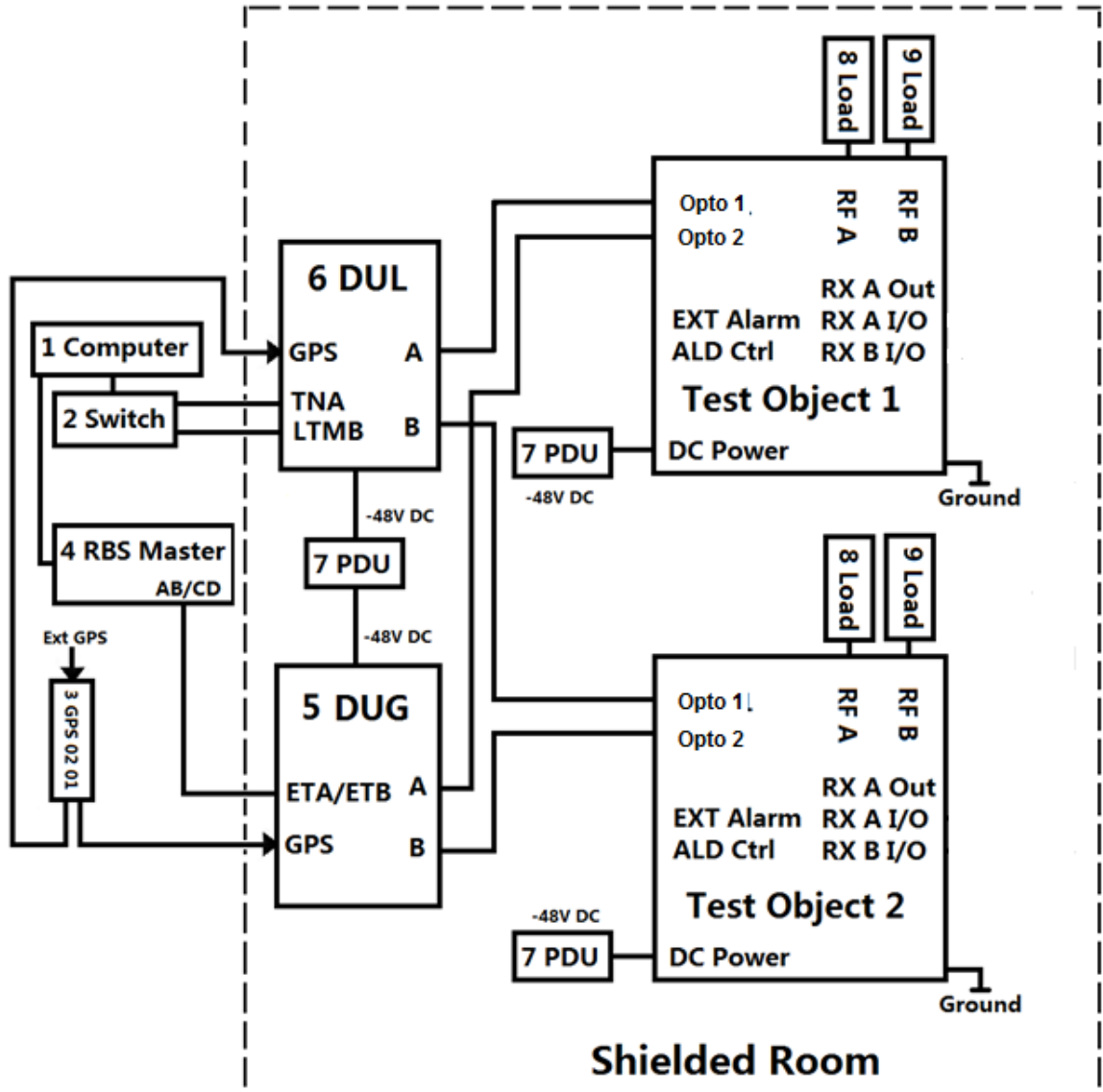
WCDMA and LTE Mix Mode Test Setup, Radiated Measurement:



Product Name	Product Number	Version	Serial Number
RRUS 01 B5	KRC 118 70/3	R1E	D168196972
RRUS 01 B5	KRC 118 70/3	R1E	D168196991

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	HP EliteBook 8530w	--	AP103078
2	Switch	TL-HP8MU	--	05300902892
3	RBS 6601	BFL 901 009/1	--	--
	DUL 20 01	KDU 137 533/4	R1C	CB4H451296
	SUP 6601	1/BFL 901 009/1	R3B	BR81005675
3	GPS 02 01	NCD 901 41/1	R1D	TU8K595208
4	RBS 6601	BFL 901 009/1	--	--
	DUW 30 01	KDU 127 161/3	R4F	TU8X960825
	SUP 6601	1/BFL 901 009/1	R3B	BR81005675
5	RBS 6601	BFL 901 009/1	--	--
	DUW 30 01	KDU 127 161/3	R4F	TU8X959107
	SUP 6601	1/BFL 901 009/1	R3B	BR81262578
6	E-RNC	BKV 301 487/1	R3F	X76CP04312
7	Power Supply	DH1716-5D	--	2008040041
	Power Supply	DH1716A-10	--	ETQ-123
8	Load	TF100	--	09121648
	Load	TF100	--	09121642
9	Load	TFE5-3	--	090323194
	Load	TFE5-3	--	090323220

GSM and LTE Mix Mode Test Setup, Radiated Measurement:



Product Name	Product Number	Version	Serial Number
RRUS 01 B5	KRC 118 70/3	R1E	D168196972
RRUS 01 B5	KRC 118 70/3	R1E	D168196991

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	HP EliteBook 8530w	--	AP103078
2	Switch	TL-HP8MU	--	05300902892
3	GPS 02 01	NCD 901 41/1	R1D	TU8K595208
4	RBS Master	LPY 107 1007/3	R1C	T01E050944
5	RBS 6601	BFL 901 009/1	--	--
	DUG 20 01	KDU 137 569/1	R2B	C824496764
	SUP 6601	1/BFL 901 009/1	R3B	BR81005675
6	RBS 6601	BFL 901 009/1	--	--
	DUL 20 01	KDU 137 533/4	R1C	CB4H451296
	SUP 6601	1/BFL 901 009/1	R3B	BR81005675
7	Power Supply	DH1716-5D	--	2008040041
	Power Supply	DH1716A-10	--	ETQ-123
8	Load	TF100	--	09121648
	Load	TF100	--	09121642
9	Load	TFE5-3	--	090323194
	Load	TFE5-3	--	090323220

1.7 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure, test laboratories or a chamber as appropriate.

The EUT was powered from a -48V DC supply.

1.8 DEVIATION FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.9 MODIFICATION RECORD

Modification State 0 - No modifications were made to the EUT during testing.

1.10 ALTERNATIVE TEST SITE

Under our group UKAS Accreditation, TÜV SÜD Product Service conducted the following tests at Ericsson in Beijing, China:

- Maximum Peak Output Power and Peak to Average Ratio – Conducted
- Occupied Bandwidth
- Band Edge
- Conducted Spurious Emissions
- Frequency Stability

Only Radiated Spurious Emissions testing has been performed under the following site registrations:

FCC Accreditation 413514:

TA Beijing Limited, Building B-4, No.1 JingHai 3rd Road, BDA East Park, Beijing, 100176, China

Industry Canada Accreditation 10852A-1:

TA Beijing Limited, Building B-4, No.1 JingHai 3rd Road, BDA East Park, Beijing, 100176, China



Product Service

SECTION 2

TEST DETAILS

2.1 MAXIMUM PEAK OUTPUT POWER AND PEAK TO AVERAGE RATIO - CONDUCTED

2.1.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1046
FCC CFR 47 Part 22, Clause 22.913 (a)
Industry Canada RSS-132, Clause 5.4

2.1.2 Equipment Under Test

RRUS 01 B5, KRC 118 70/3, S/N: D168196972
RRUS 01 B5, KRC 118 70/3, S/N: D168196991

2.1.3 Date of Test and Modification State

03 to 10 July 2014 - Modification State 0

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Environmental Conditions

Ambient Temperature	24.5 – 25.5°C
Relative Humidity	21.5 – 24.5%

2.1.6 Test Method

The test was applied in accordance with the test method requirements of FCC Part 22 and Industry Canada RSS-132.

Using a power meter and attenuator(s), the output power of the EUT was measured at the antenna terminal. The EUT was configured to transmit on maximum power on the configurations defined in the tables below. Since the EUT transmits on two antennas simultaneously in the same frequency range for MIMO devices, i.e, TX MIMO mode, using the Measure-and-Sum approach, the output power at both antennas were tested, and the total output power were then summed mathematically in linear power units According to FCC KDB 662911 D01.

A peak to average ratio measurement is performed at the conducted ports of the EUT for single carrier of single RAT mode. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) were used and 0.1% probability value recorded.

The RMS Power and Peak to Average Ratio was measured and recorded with the results being compared with the limits.

2.1.7 Test Results

Configuration L-MIMO-SC

Maximum Output Power 49dBm per carrier

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position B 869.7MHz		Channel Position M 881.5MHz		Channel Position T 893.3MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	QPSK / 1.4 MHz	48.45	7.18	48.64	7.27	48.52	7.40
A2		48.44	7.28	48.53	7.19	48.35	7.28
Total		51.45	-	51.59	-	51.44	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position B 870.5MHz		Channel Position M 881.5MHz		Channel Position T 892.5MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	QPSK / 3.0 MHz	-	-	48.71	7.28	-	-
A2		-	-	48.60	7.32	-	-
Total		-	-	51.66	-	-	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position B 871.5MHz		Channel Position M 881.5MHz		Channel Position T 891.5MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	QPSK / 5.0 MHz	-	-	48.71	7.39	-	-
A2		-	-	48.61	7.32	-	-
Total		-	-	51.67	-	-	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position B 874.0MHz		Channel Position M 881.5MHz		Channel Position T 889.0MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	QPSK / 10.0 MHz	48.62	7.94	48.68	7.40	48.58	7.68
A2		48.58	7.96	48.61	7.34	48.54	7.83
Total		51.61	-	51.66	-	51.57	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position B 869.7MHz		Channel Position M 881.5MHz		Channel Position T 893.3MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	16QAM / 1.4 MHz	-	-	48.62	7.18	-	-
A2		-	-	48.50	7.21	-	-
Total		-	-	51.57	-	-	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position B 870.5MHz		Channel Position M 881.5MHz		Channel Position T 892.5MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	16QAM / 3.0 MHz	-	-	48.68	7.22	-	-
A2		-	-	48.56	7.38	-	-
Total		-	-	51.63	-	-	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position B 871.5MHz		Channel Position M 881.5MHz		Channel Position T 891.5MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	16QAM / 5.0 MHz	-	-	48.65	7.40	48.65	-
A2		-	-	48.54	7.37	48.54	-
Total		-	-	51.61	-	51.61	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position B 874.0MHz		Channel Position M 881.5MHz		Channel Position T 889.0MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	16QAM / 10.0 MHz	-	-	48.63	7.41	-	-
A2		-	-	48.55	7.39	-	-
Total		-	-	51.60	-	-	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position B 869.7MHz		Channel Position M 881.5MHz		Channel Position T 893.3MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	64QAM / 1.4 MHz	-	-	48.59	7.43	-	-
A2		-	-	48.49	7.31	-	-
Total		-	-	51.55	-	-	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position B 870.5MHz		Channel Position M 881.5MHz		Channel Position T 892.5MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	64QAM / 3.0 MHz	-	-	48.69	7.33	-	-
A2		-	-	48.59	7.26	-	-
Total		-	-	51.65	-	-	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position B 871.5MHz		Channel Position M 881.5MHz		Channel Position T 891.5MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	64QAM / 5.0 MHz	-	-	48.70	7.44	-	-
A2		-	-	48.60	7.38	-	-
Total		-	-	51.66	-	-	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position B 874.0MHz		Channel Position M 881.5MHz		Channel Position T 889.0MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	64QAM / 10.0 MHz	-	-	48.70	7.37	-	-
A2		-	-	48.58	7.37	-	-
Total		-	-	51.65	-	-	-

Configuration L-MIMO-MC 1 (2C)

Maximum Output Power 46dBm per carrier

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position BRFBW 869.7MHz + 888.3MHz		Channel Position MRFBW 872.2MHz + 890.8MHz		Channel Position TRFBW 874.7MHz + 893.3MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	QPSK / 1.4 MHz	48.39	-	48.41	-	48.42	-
A2		48.28	-	48.33	-	48.29	-
Total		51.35	-	51.38	-	51.37	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position BRFBW 870.5MHz + 887.5MHz		Channel Position MRFBW 873.0MHz + 890.0MHz		Channel Position TRFBW 875.5MHz + 892.5MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	QPSK / 3.0 MHz	-	-	48.54	-	-	-
A2		-	-	48.45	-	-	-
Total		-	-	51.50	-	-	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position BRFBW 871.5MHz + 886.5MHz		Channel Position MRFBW 874.0MHz + 889.0MHz		Channel Position TRFBW 876.5MHz + 891.5MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	QPSK / 5.0 MHz	-	-	48.58	-	-	-
A2		-	-	48.49	-	-	-
Total		-	-	51.55	-	-	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position BRFBW 874.0MHz + 884.0MHz		Channel Position MRFBW 876.5MHz + 886.5MHz		Channel Position TRFBW 879.0MHz + 889.0MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	QPSK / 10.0 MHz	48.63	-	48.63	-	48.65	-
A2		48.53	-	48.54	-	48.55	-
Total		51.59	-	51.60	-	51.61	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position BRFBW 869.7MHz + 888.3.3MHz		Channel Position MRFBW 872.2MHz + 890.8MHz		Channel Position TRFBW 874.7.7MHz + 893.3MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	16QAM / 1.4 MHz	-	-	48.41	-	-	-
A2		-	-	48.35	-	-	-
Total		-	-	51.39	-	-	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position BRFBW 870.5MHz + 887.5MHz		Channel Position MRFBW 873.0MHz + 890.0MHz		Channel Position TRFBW 875.5MHz + 892.5MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	16QAM / 3.0 MHz	-	-	48.55	-	-	-
A2		-	-	48.46	-	-	-
Total		-	-	51.52	-	-	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position BRFBW 871.5MHz + 886.5MHz		Channel Position MRFBW 874.0MHz + 889.0MHz		Channel Position TRFBW 876.5MHz + 891.5MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	16QAM / 5.0 MHz	-	-	48.52	-	-	-
A2		-	-	48.43	-	-	-
Total		-	-	51.48	-	-	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position BRFBW 874.0MHz + 884.0MHz		Channel Position MRFBW 876.5MHz + 886.5MHz		Channel Position TRFBW 879.0MHz + 889.0MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	16QAM / 10.0 MHz	-	-	48.59	-	-	-
A2		-	-	48.50	-	-	-
Total		-	-	51.56	-	-	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position BRFBW 869.7MHz + 888.3.3MHz		Channel Position MRFBW 872.2MHz + 890.8MHz		Channel Position TRFBW 874.7.7MHz + 893.3MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	64QAM / 1.4 MHz	-	-	48.38	-	-	-
A2		-	-	48.32	-	-	-
Total		-	-	51.36	-	-	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position BRFBW 870.5MHz + 887.5MHz		Channel Position MRFBW 873.0MHz + 890.0MHz		Channel Position TRFBW 875.5MHz + 892.5MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	64QAM / 3.0 MHz	-	-	48.54	-	-	-
A2		-	-	48.32	-	-	-
Total		-	-	51.44	-	-	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position BRFBW 871.5MHz + 886.5MHz		Channel Position MRFBW 874.0MHz + 889.0MHz		Channel Position TRFBW 876.5MHz + 891.5MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	64QAM / 5.0 MHz	-	-	48.58	-	-	-
A2		-	-	48.49	-	-	-
Total		-	-	51.55	-	-	-

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position BRFBW 874.0MHz + 884.0MHz		Channel Position MRFBW 876.5MHz + 886.5MHz		Channel Position TRFBW 879.0MHz + 889.0MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	64QAM / 10.0 MHz	-	-	48.62	-	-	-
A2		-	-	48.54	-	-	-
Total		-	-	51.59	-	-	-

Configuration G+L-MIMO-MC 1 (1G + 1L)

Maximum Output Power 46dBm per carrier

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position BRFBW (G) 869.4MHz + (L) 884.0MHz		Channel Position MRFBW (G) 871.6MHz + (L) 886.5MHz		Channel Position TRFBW (G) 874.2MHz + (L) 889.0MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	GMSK/QPSK 10.0MHz	48.40	-	48.51	-	48.55	-
A2		48.45	-	48.52	-	48.55	-
Total		51.44	-	51.53	-	51.56	-

Configuration G+L-MIMO-MC 3 (2G + 2L)

Maximum Output Power 43dBm per carrier

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position BRFBW (G) 869.4MHz + (G) 870.6MHz +(L) 881.5MHz + (L) 886.5MHz		Channel Position MRFBW (G) 871.6MHz + (G) 872.8MHz +(L) 884.0MHz + (L) 889.0MHz		Channel Position TRFBW (G) 874.2MHz + (G) 875.4MHz +(L) 886.5MHz + (L) 891.5MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	GMSK/QPSK 5.0MHz	48.37	-	48.42	-	48.51	-
A2		48.42	-	48.46	-	48.50	-
Total		51.41	-	51.45	-	51.52	-

Configuration G+L-MIMO-MC 4 (3G + 1L)

Maximum Output Power 43dBm per carrier

Antenna	Carrier Bandwidth (MHz)	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position BRFBW (G) 869.4MHz + (G) 870.6MHz +(G) 871.8MHz + (L) 886.5MHz		Channel Position MRFBW (G) 871.6MHz + (G) 872.8MHz +(G) 874.0MHz + (L) 889.0MHz		Channel Position TRFBW (G) 874.2MHz + (G) 875.4MHz +(G) 876.6MHz + (L) 891.5MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	GMSK/QPSK 5.0MHz	48.07	-	48.23	-	48.27	-
A2		48.18	-	48.26	-	48.33	-
Total		51.54	-	51.26	-	51.31	-

Configuration W+L-MIMO-MC 1 (1W + 1L)

Maximum Output Power 46dBm per carrier

Antenna	WCDMA Modulation / LTE Modulation Bandwidth	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position BRFBW (W) 871.4MHz + (L)884.0MHz		Channel Position MRFBW (W) 874.0MHz + (L)886.5MHz		Channel Position TRFBW (W) 876.4MHz + (L)889.0MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	16QAM / QPSK 10.0 MHz	48.61	-	48.63	-	48.67	-
A2	16QAM / QPSK 10.0 MHz	48.53	-	48.57	-	48.59	-
Total		51.58	-	51.61	-	51.64	-

Configuration W+L-MIMO-MC 2 (2W + 2L)

Maximum Output Power 43dBm per carrier

Antenna	WCDMA Modulation / LTE Modulation Bandwidth	Peak Output Power / Peak to Average Ratio (PAR)					
		Channel Position BRFBW (W) 871.4MHz + (W) 876.4MHz + (L)884.5MHz + (L)887.5MHz		Channel Position MRFBW (W) 874.0MHz + (W) 879.0MHz + (L)887.0MHz + (L)890.0MHz		Channel Position TRFBW (W) 876.4MHz + (W) 881.4MHz + (L)889.5MHz + (L)892.5MHz	
		Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)	Power (dBm)	PAR (dB)
A1	16QAM / QPSK 3.0 MHz	48.64	-	48.62	-	48.64	-
A2	16QAM / QPSK 3.0 MHz	48.58	-	48.56	-	48.58	-
Total		51.62	-	51.60	-	51.62	-

Note :

This unit is tested without antenna. ERP/EIRP compliance is addressed at the time of licensing, as required by the responsible IC Bureau(s). Licensees are required to take into account maximum allowed antenna gain used in combination with above power settings to prevent the radiated output power to exceed the limits.

Limit	
Peak Power	≤820W or ≤+59.1dBm
Peak to Average Ratio	13 dB

2.2 OCCUPIED BANDWIDTH

2.2.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049 (h)
FCC CFR 47 Part 22, Clause 22.917 (b)
Industry Canada RSS-GEN, Clause 4.6.1

2.2.2 Equipment Under Test

RRUS 01 B5, KRC 118 70/3, S/N: D168196972
RRUS 01 B5, KRC 118 70/3, S/N: D168196991

2.2.3 Date of Test and Modification State

03 and 04 July 2014 - Modification State 0

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Environmental Conditions

Ambient Temperature	22.5 – 23.4°C
Relative Humidity	22.6 – 23.1%

2.2.6 Test Method

The test was applied in accordance with the test method requirements of FCC Part 22 and Industry Canada RSS-132.

The EUT was set to transmit at maximum power and testing was carried out on Bottom, Middle and Top Channels. Using the Occupied Bandwidth measurement function in the Spectrum Analyser, the Occupied Bandwidth is defined as the width of the signal between two points, one below the carrier centre frequency and one above the carrier centre frequency. For IC requirement, the 99% Occupied Bandwidth was measured. For FCC requirement, outside of which all emissions are attenuated by at least X dB below the transmitter power, where the value of X is typically specified as 26. The -26dBc Occupied Bandwidth was measured from each antenna port in accordance with FCC KDB 971168 D01 v02r01.

The results are shown in the plots below.

2.2.7 Test Results

Configuration L-MIMO-SC

Maximum Output Power 49dBm per carrier

-26dBc Occupied Bandwidth for FCC requirement

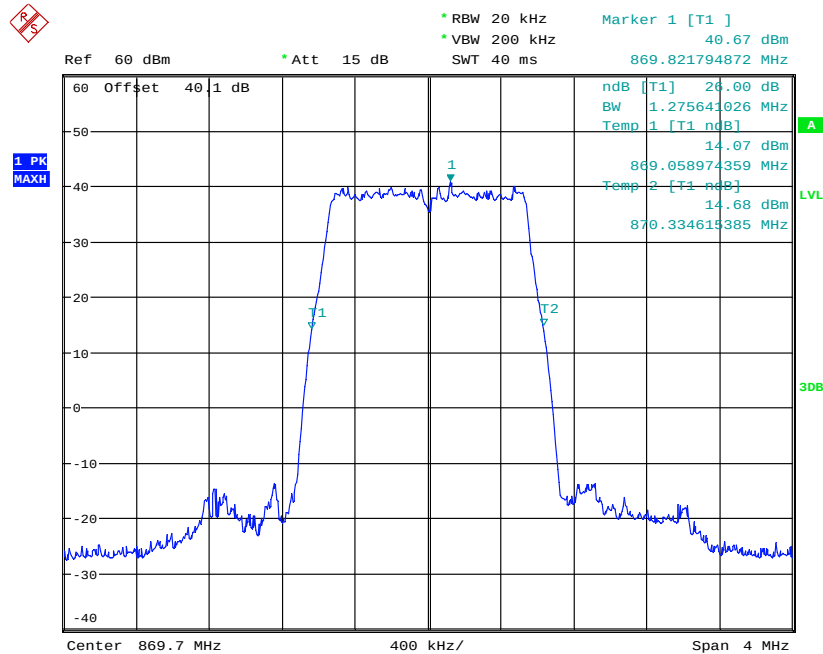
Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 869.7MHz	Channel Position M 881.5MHz	Channel Position T 893.3MHz
QPSK / 1.4 MHz	1.28	1.28	1.28
16QAM / 1.4 MHz	-	1.28	-
64QAM / 1.4 MHz	-	1.26	-

Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 870.5MHz	Channel Position M 881.5MHz	Channel Position T 892.5MHz
QPSK / 3.0 MHz	-	2.91	-
16QAM / 3.0 MHz	-	2.91	-
64QAM / 3.0 MHz	-	2.91	-

Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 871.5MHz	Channel Position M 881.5MHz	Channel Position T 871.5MHz
QPSK / 5.0 MHz	-	4.83	-
16QAM / 5.0 MHz	-	4.81	-
64QAM / 5.0 MHz	-	4.86	-

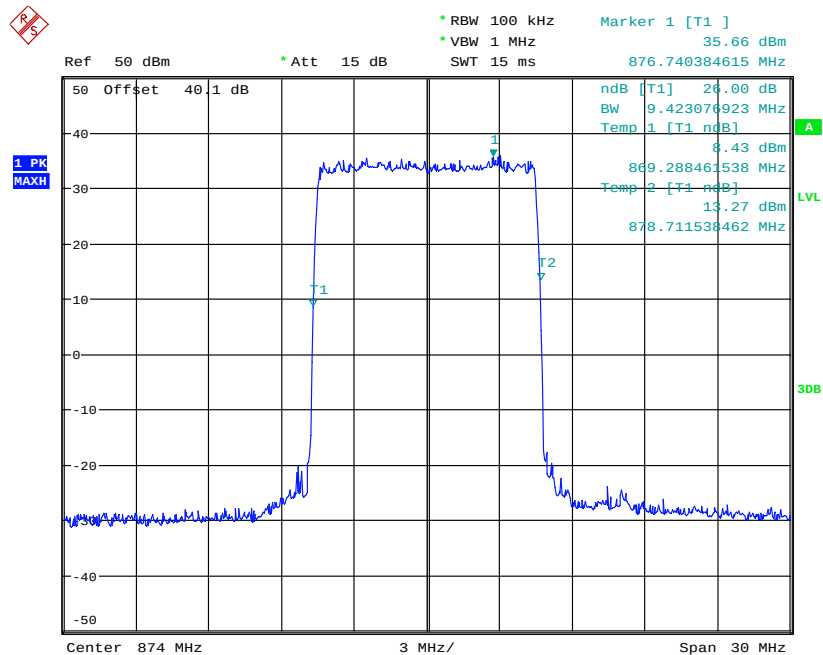
Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 874.0MHz	Channel Position M 881.5MHz	Channel Position T 889MHz
QPSK / 10.0 MHz	9.42	9.42	9.42
16QAM / 10.0 MHz	-	9.42	-
64QAM / 10.0 MHz	-	9.42	-

Channel Position B - QPSK / Bandwidth 1.4 MHz



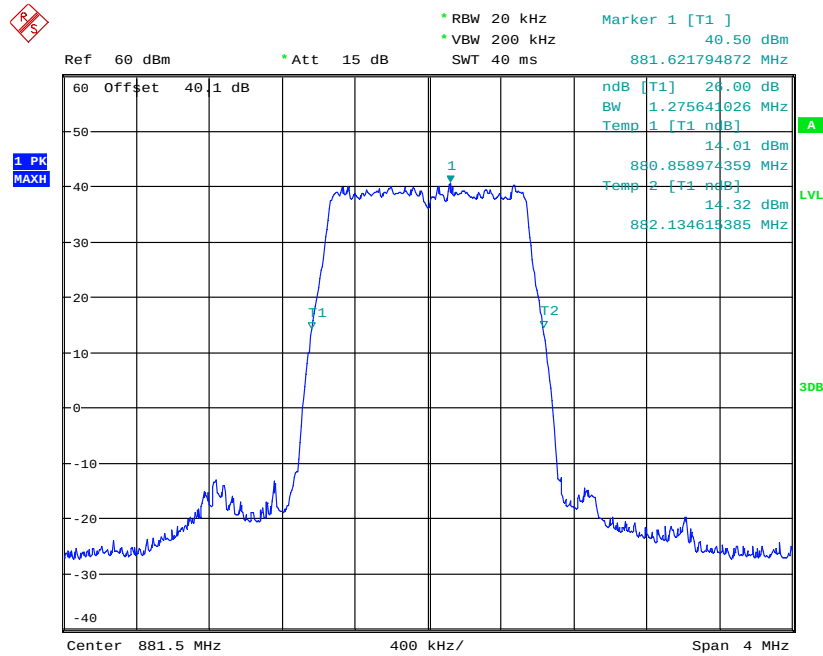
Date: 16.JUL.2014 10:48:08

Channel Position B - QPSK / Bandwidth 10.0 MHz



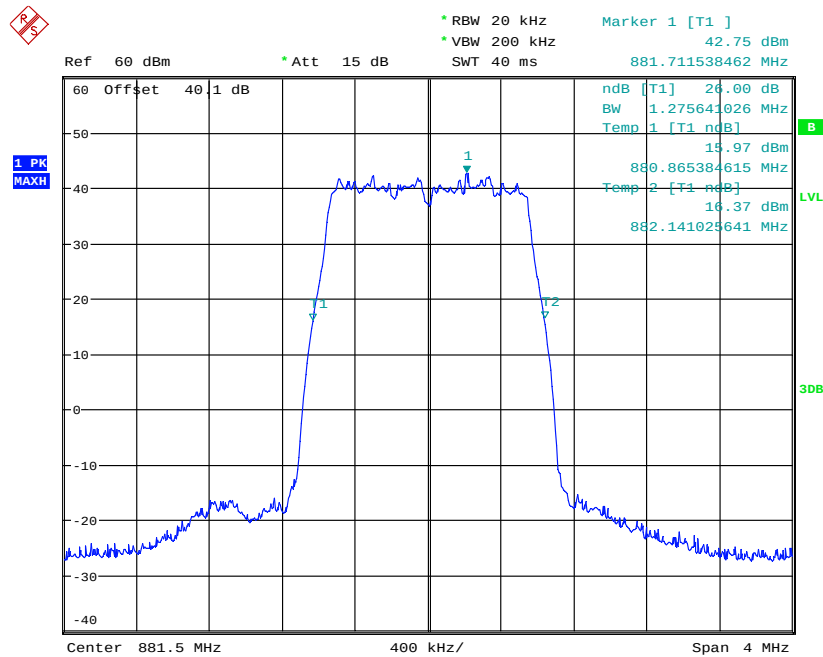
Date: 24.JUL.2014 13:10:56

Channel Position M - QPSK / Bandwidth 1.4 MHz



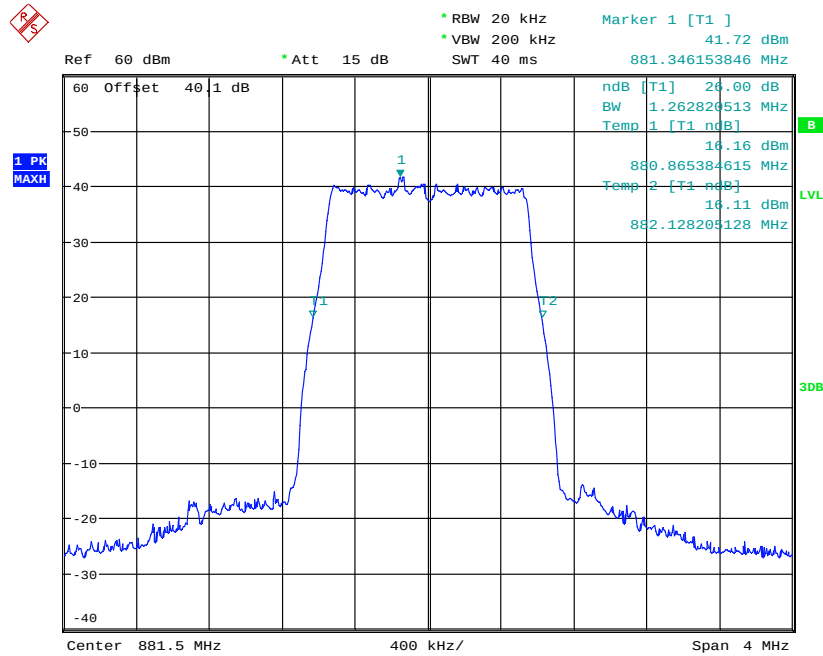
Date: 16.JUL.2014 10:49:19

Channel Position M – 16QAM / Bandwidth 1.4 MHz



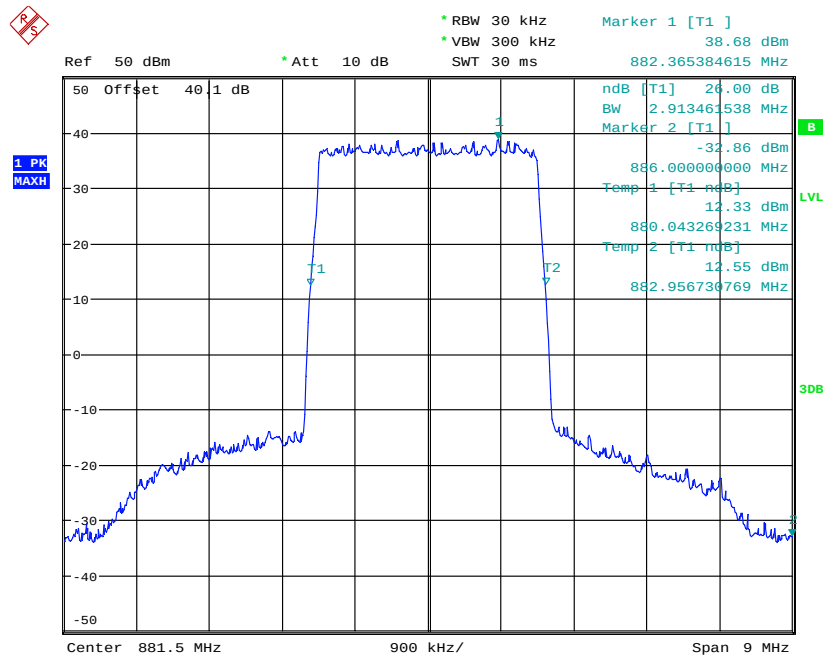
Date: 3.JUL.2014 17:02:06

Channel Position M – 64QAM / Bandwidth 1.4 MHz



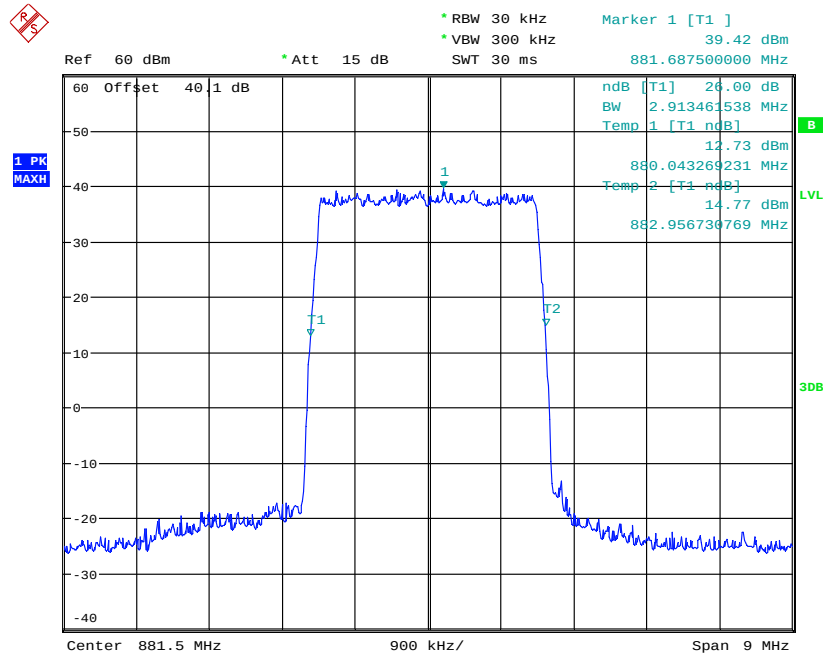
Date: 3.JUL.2014 17:04:38

Channel Position M - QPSK / Bandwidth 3.0 MHz



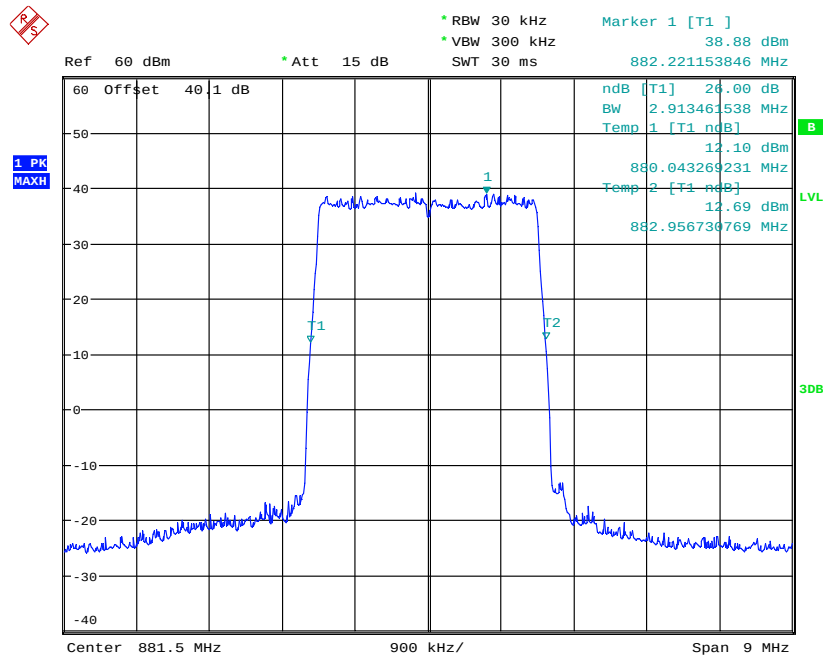
Date: 3.JUL.2014 14:57:07

Channel Position M – 16QAM / Bandwidth 3.0 MHz



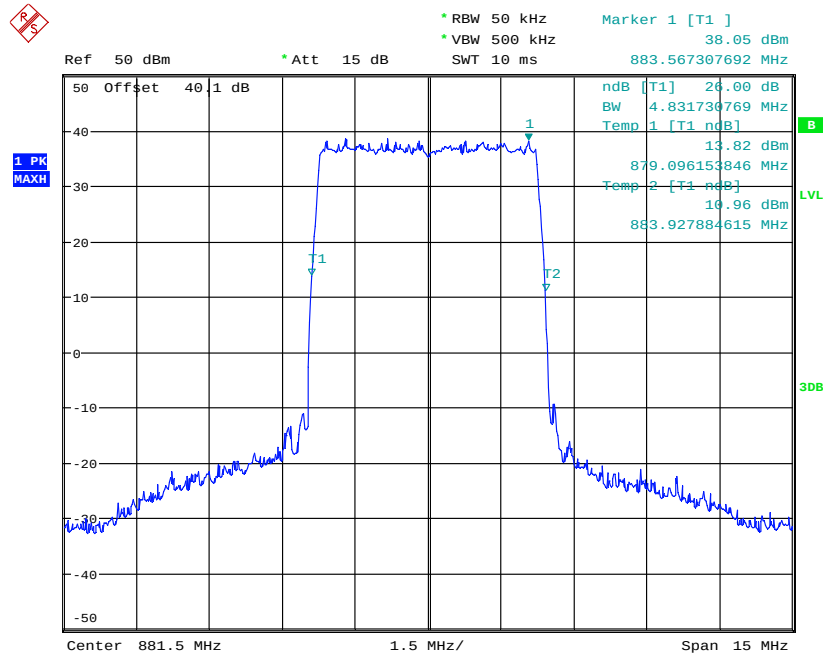
Date: 3.JUL.2014 16:55:47

Channel Position M – 64QAM / Bandwidth 3.0 MHz



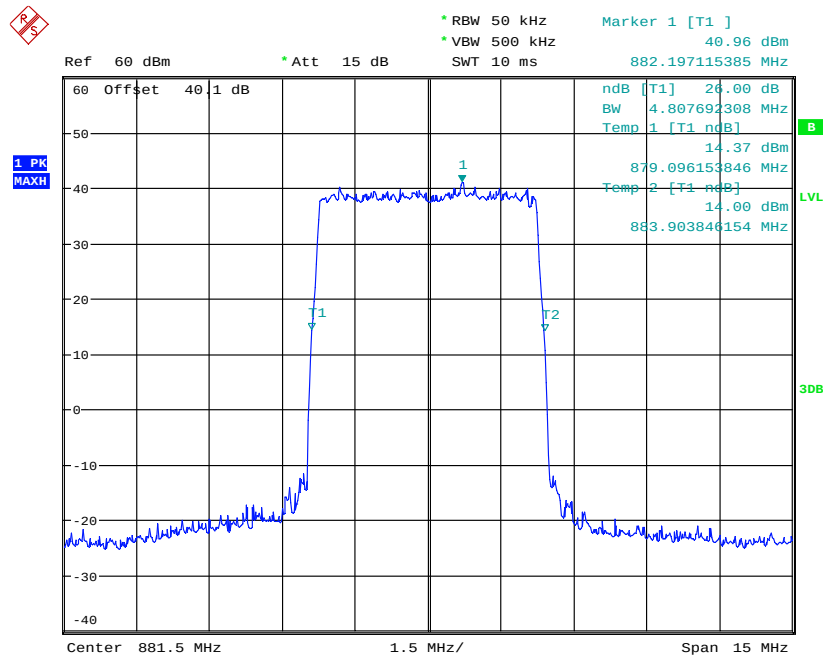
Date: 3.JUL.2014 16:57:37

Channel Position M - QPSK / Bandwidth 5.0 MHz



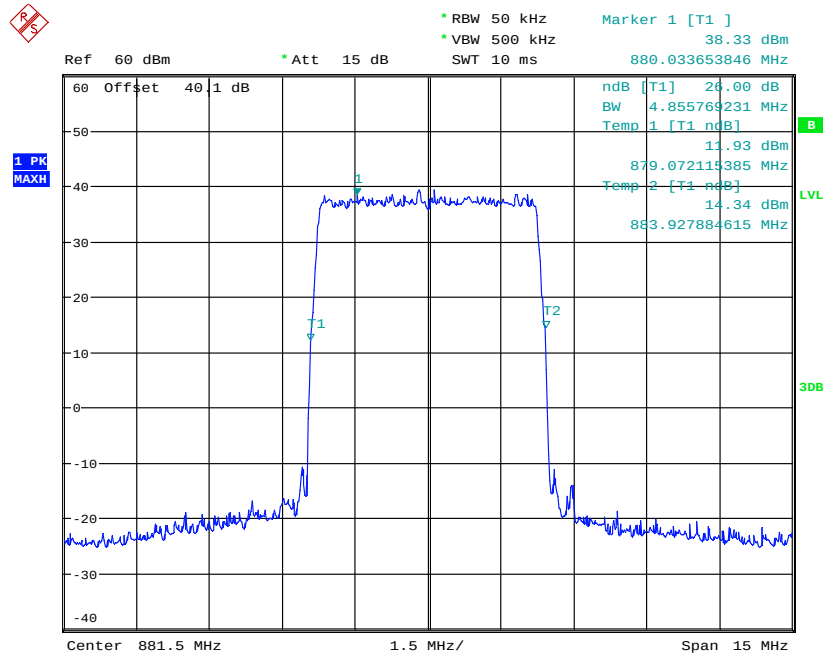
Date: 3.JUL.2014 15:44:20

Channel Position M – 16QAM / Bandwidth 5.0 MHz



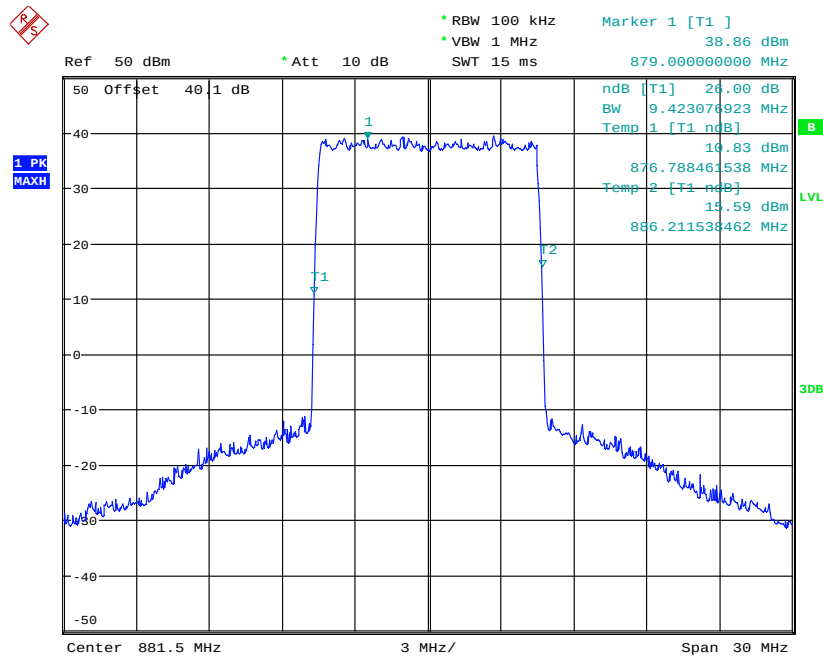
Date: 3.JUL.2014 16:49:53

Channel Position M – 64QAM / Bandwidth 5.0 MHz



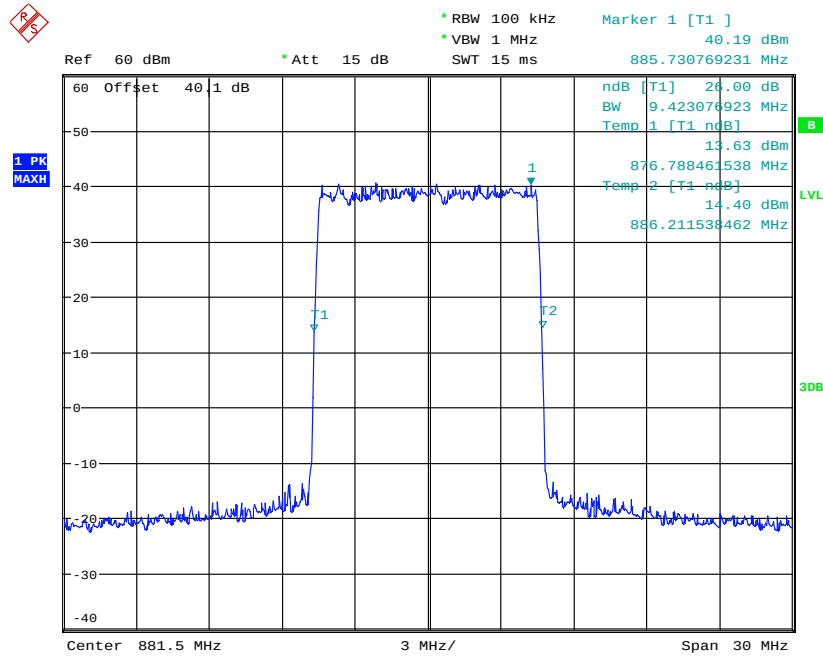
Date: 3.JUL.2014 16:51:52

Channel Position M - QPSK / Bandwidth 10.0 MHz



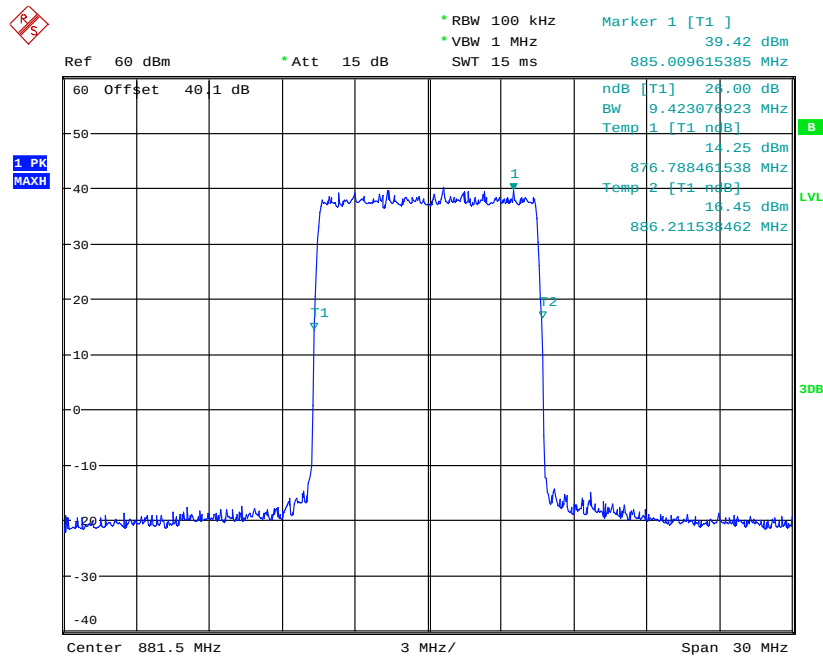
Date: 3.JUL.2014 15:48:42

Channel Position M – 16QAM / Bandwidth 10.0 MHz



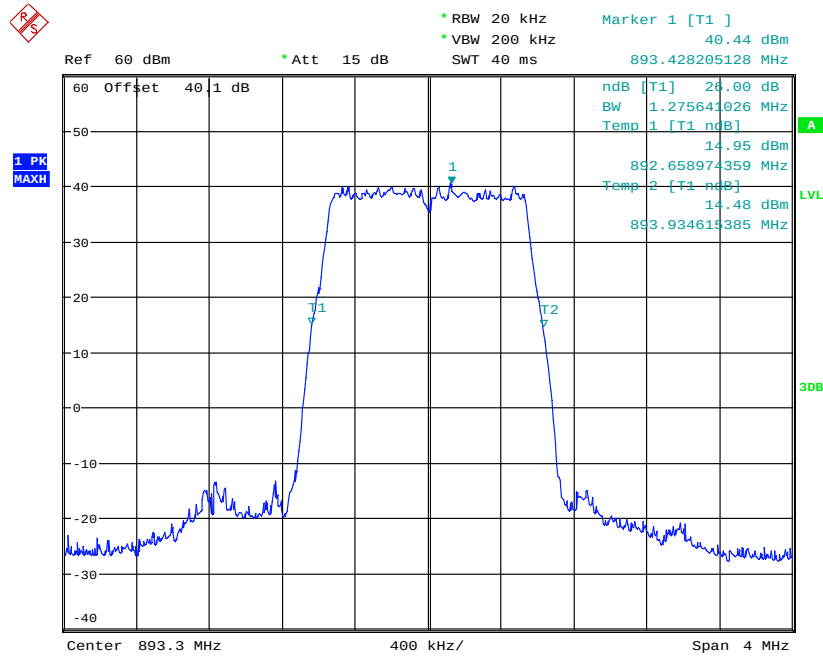
Date: 3.JUL.2014 16:33:01

Channel Position M – 64QAM / Bandwidth 10.0 MHz



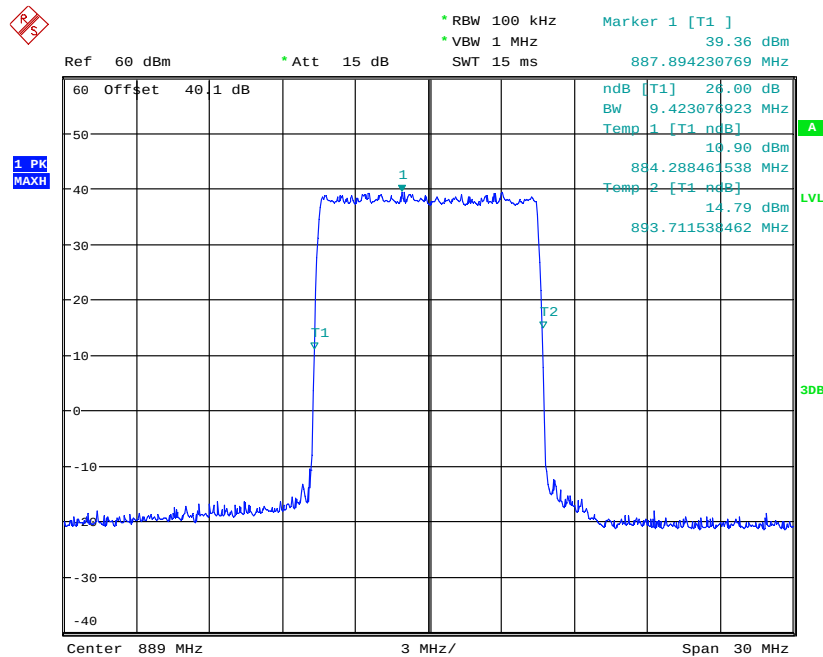
Date: 3.JUL.2014 16:35:05

Channel Position T - QPSK / Bandwidth 1.4 MHz



Date: 16.JUL.2014 10:51:09

Channel Position T - QPSK / Bandwidth 10.0 MHz



Date: 16.JUL.2014 11:18:23

99% Occupied Bandwidth for IC requirement

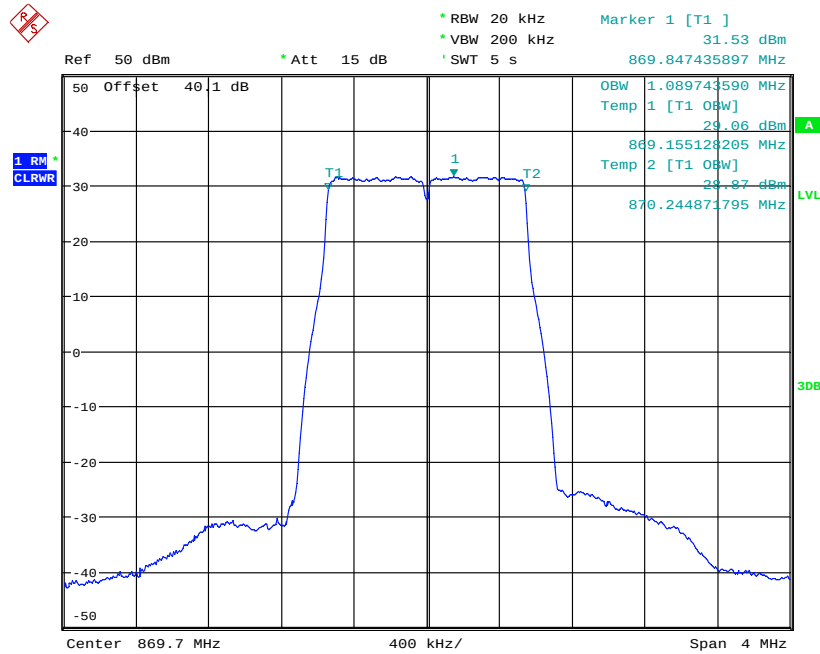
Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 869.7MHz	Channel Position M 881.5MHz	Channel Position T 893.3MHz
QPSK / 1.4 MHz	1.09	1.09	1.09
16QAM / 1.4 MHz	-	1.09	-
64QAM / 1.4 MHz	-	1.09	-

Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 870.5MHz	Channel Position M 881.5MHz	Channel Position T 892.5MHz
QPSK / 3.0 MHz	-	2.68	-
16QAM / 3.0 MHz	-	2.70	-
64QAM / 3.0 MHz	-	2.70	-

Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 871.5MHz	Channel Position M 881.5MHz	Channel Position T 871.5MHz
QPSK / 5.0 MHz	-	4.47	-
16QAM / 5.0 MHz	-	4.47	-
64QAM / 5.0 MHz	-	4.47	-

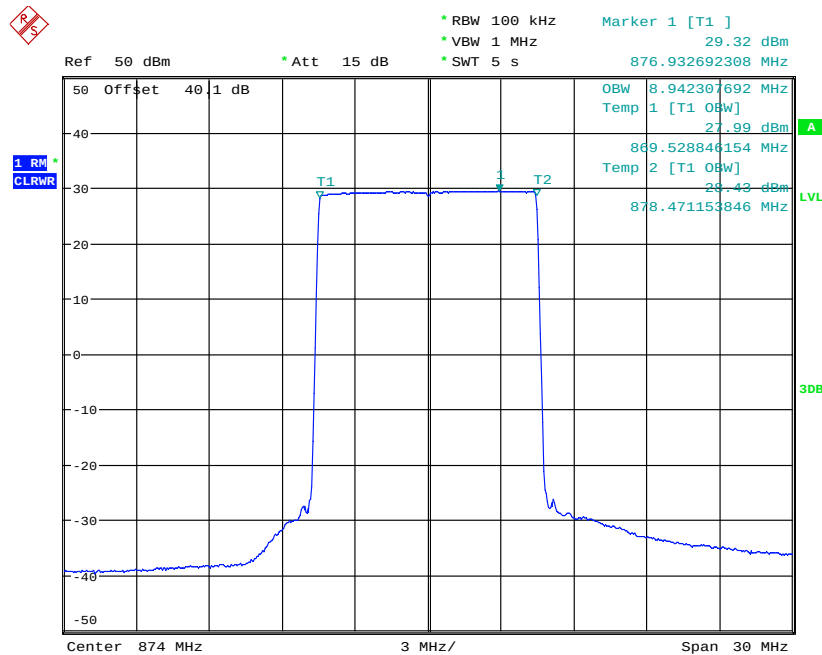
Modulation / Bandwidth	Occupied Bandwidth (MHz)		
	Channel Position B 874.0MHz	Channel Position M 881.5MHz	Channel Position T 889MHz
QPSK / 10.0 MHz	8.94	8.94	8.94
16QAM / 10.0 MHz	-	8.94	-
64QAM / 10.0 MHz	-	8.94	-

Channel Position B - QPSK / Bandwidth 1.4 MHz



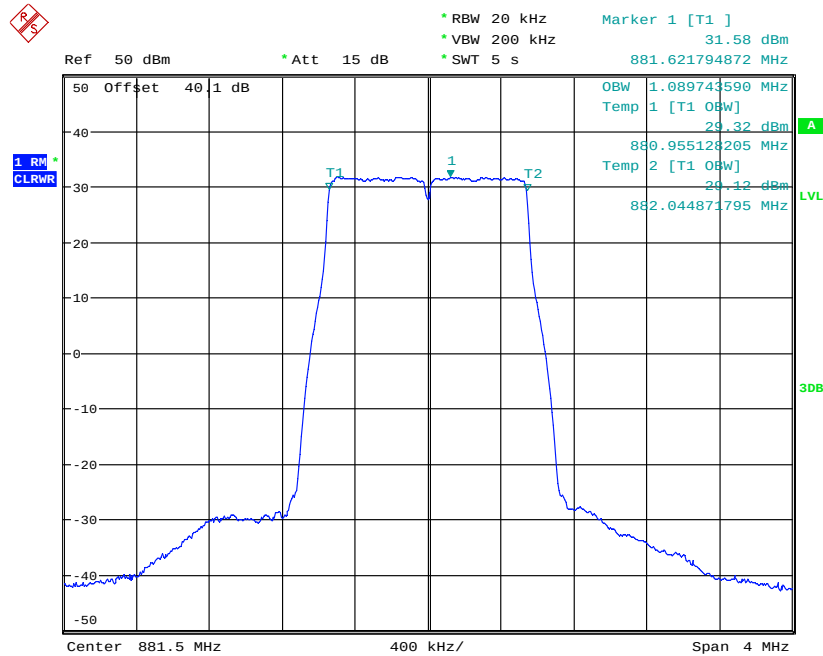
Date: 16.JUL.2014 10:47:13

Channel Position B - QPSK / Bandwidth 10.0 MHz



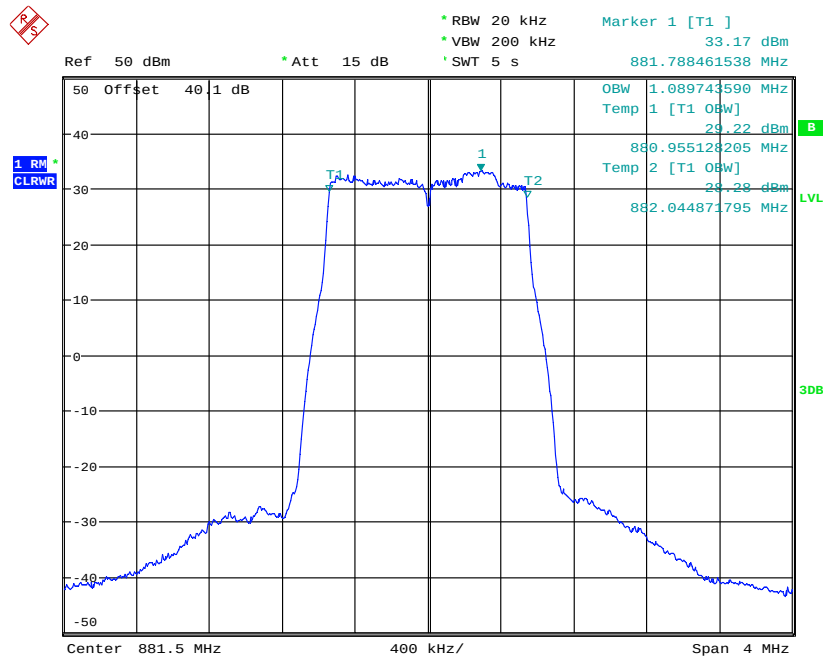
Date: 16.JUL.2014 11:09:39

Channel Position M - QPSK / Bandwidth 1.4 MHz



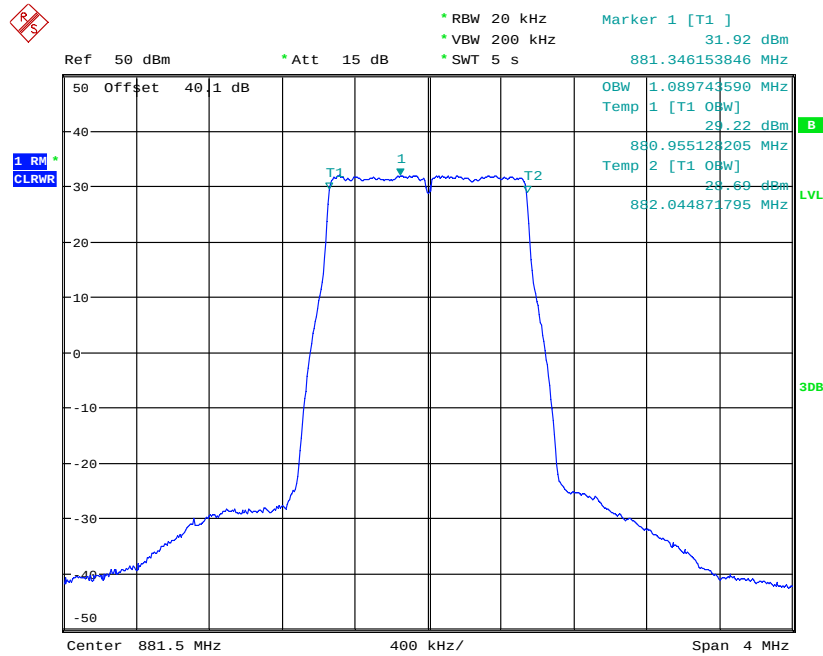
Date: 16.JUL.2014 10:49:48

Channel Position M – 16QAM / Bandwidth 1.4 MHz



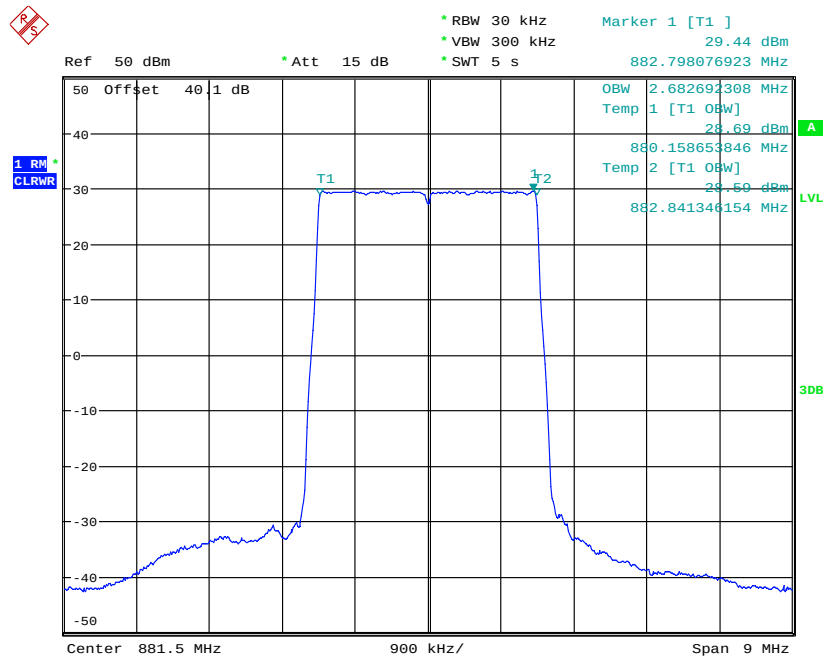
Date: 3.JUL.2014 17:01:11

Channel Position M – 64QAM / Bandwidth 1.4 MHz



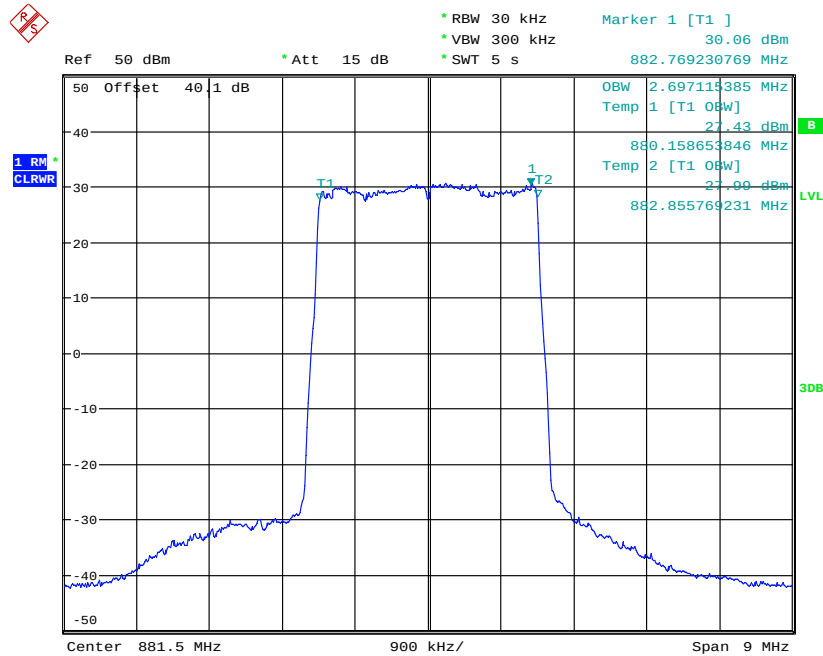
Date: 3.JUL.2014 17:05:12

Channel Position M - QPSK / Bandwidth 3.0 MHz



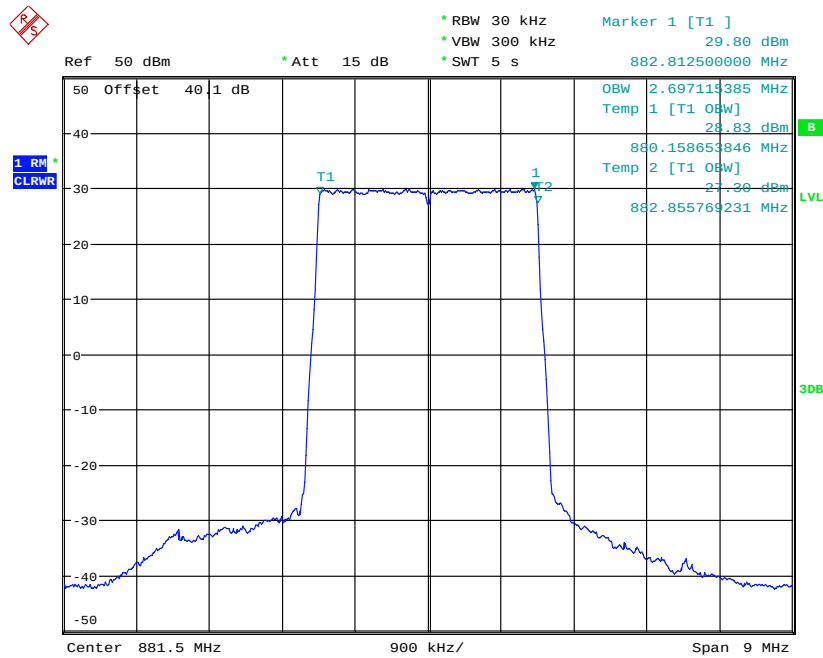
Date: 16.JUL.2014 10:54:06

Channel Position M – 16QAM / Bandwidth 3.0 MHz



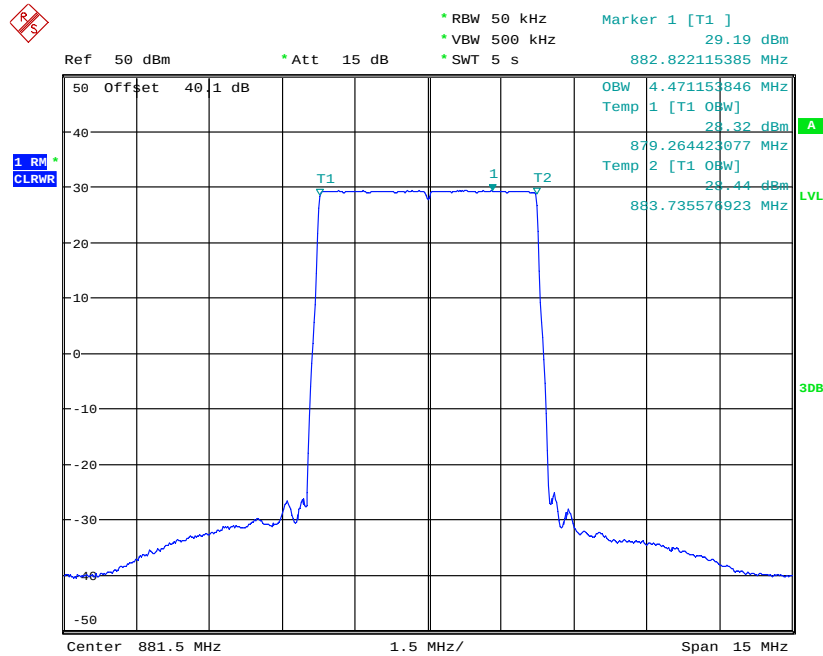
Date: 3.JUL.2014 16:55:00

Channel Position M – 64QAM / Bandwidth 3.0 MHz



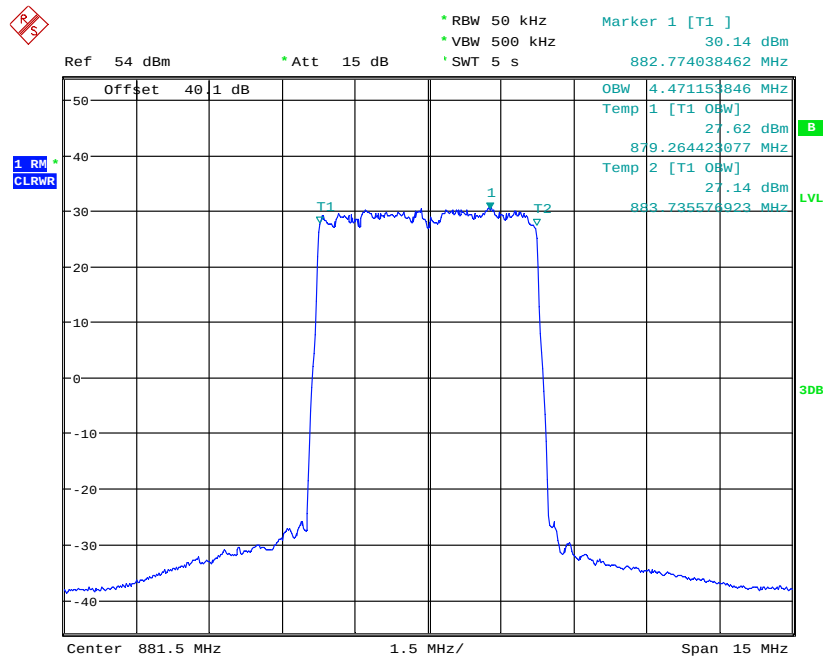
Date: 3.JUL.2014 16:59:12

Channel Position M - QPSK / Bandwidth 5.0 MHz



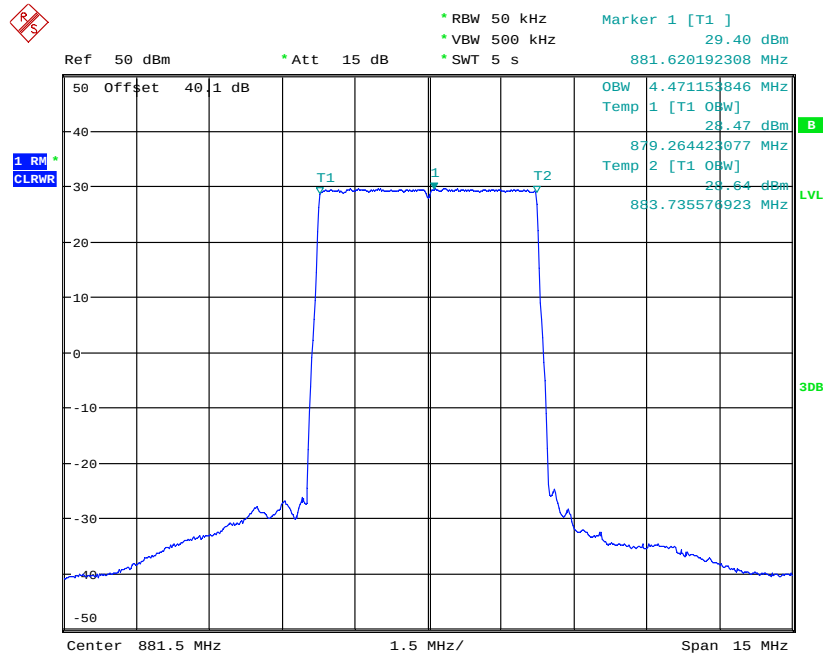
Date: 16.JUL.2014 10:55:31

Channel Position M – 16QAM / Bandwidth 5.0 MHz



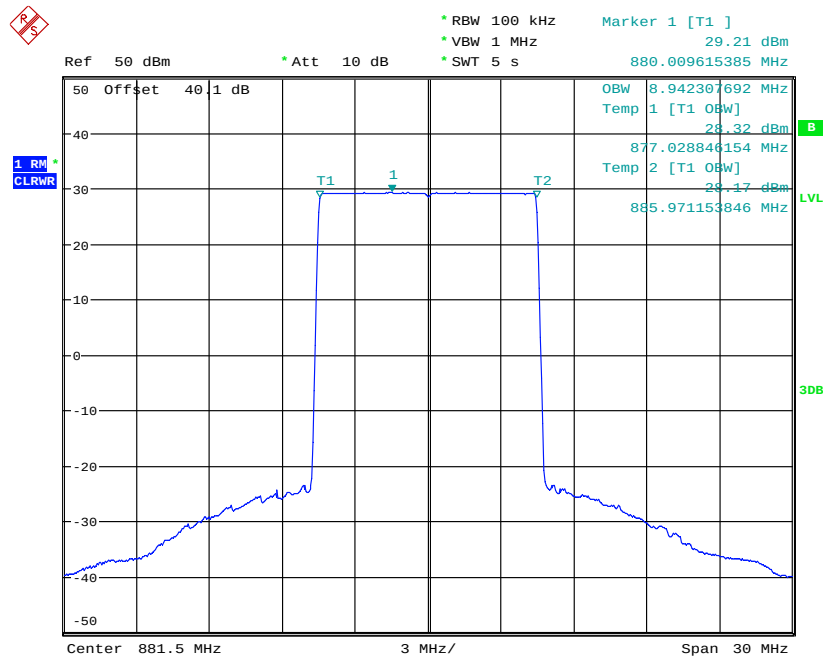
Date: 3.JUL.2014 16:46:45

Channel Position M – 64QAM / Bandwidth 5.0 MHz



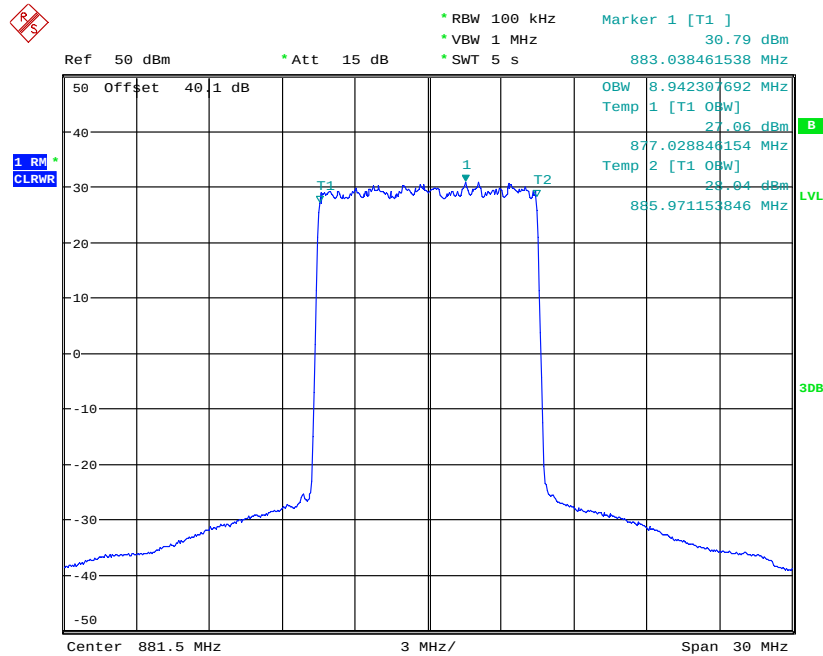
Date: 3.JUL.2014 16:52:47

Channel Position M - QPSK / Bandwidth 10.0 MHz



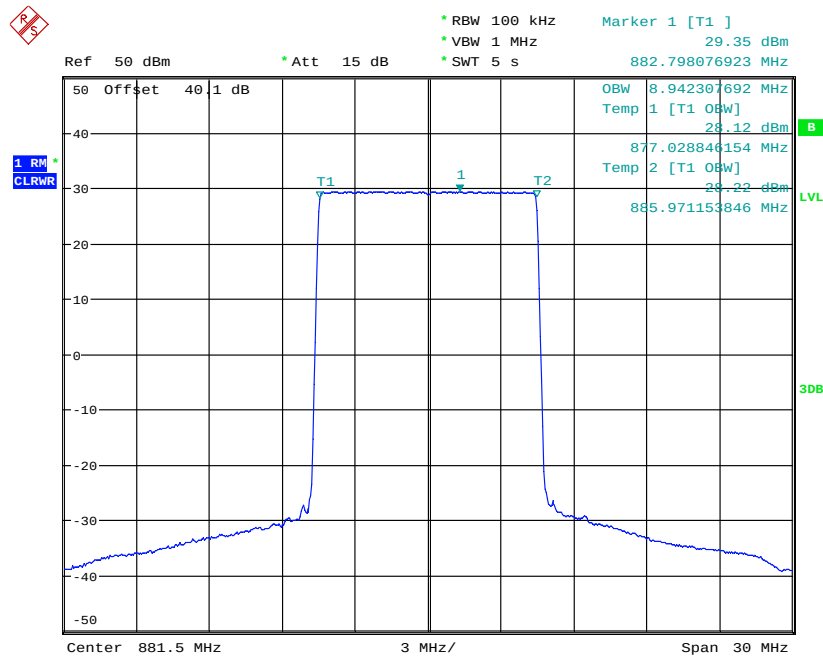
Date: 3.JUL.2014 15:49:34

Channel Position M – 16QAM / Bandwidth 10.0 MHz



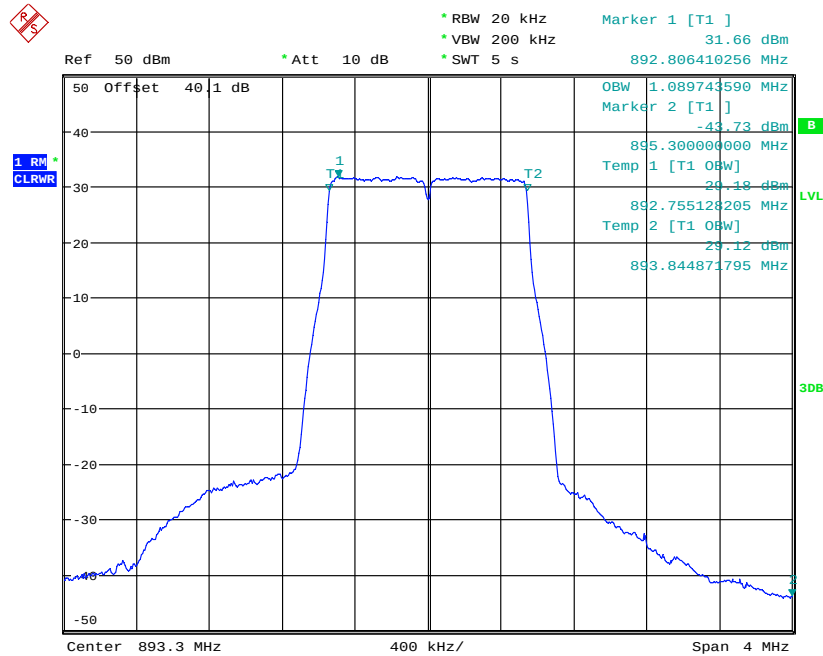
Date: 3.JUL.2014 16:31:28

Channel Position M – 64QAM / Bandwidth 10.0 MHz



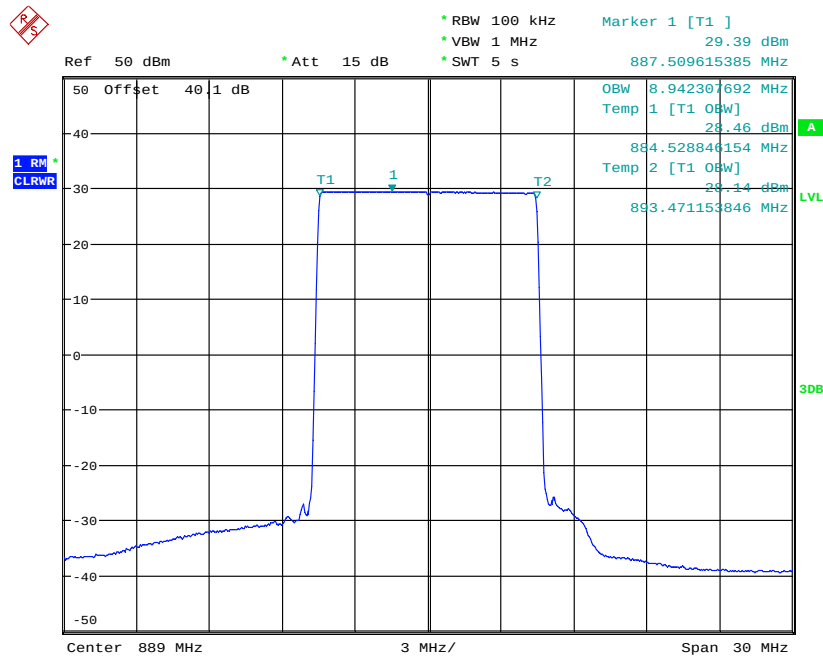
Date: 3.JUL.2014 16:35:46

Channel Position T - QPSK / Bandwidth 1.4 MHz



Date: 3.JUL.2014 14:47:32

Channel Position T - QPSK / Bandwidth 10.0 MHz



Date: 16.JUL.2014 11:16:18

2.3 SPURIOUS EMISSION AT BAND EDGE

2.3.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 22, Clause 22.917 (b)
Industry Canada RSS-132, Clause 5.5

2.3.2 Equipment Under Test

RRUS 01 B5, KRC 118 70/3, S/N: D168196972
RRUS 01 B5, KRC 118 70/3, S/N: D168196991

2.3.3 Date of Test and Modification State

04 to 11 June 2014 - Modification State 0

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Environmental Conditions

Ambient Temperature	23.6 - 25.7°C
Relative Humidity	22.5 - 24.5%

2.3.6 Test Method

In accordance with FCC CFR 47 Part 22, Clause 22.917 (b) and Industry Canada RSS-132, Clause 5.5, any emissions outside of the block edges shall be attenuated by at least $43 + 10 \log(P)$. In the 1MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1% of the emission bandwidth should be used.

For measurements of emissions > 1MHz away from the band edges, a RBW of 100KHz or greater should be used. the limit is -13dB.

For MIMO mode configurations, the limit was adjusted with a correction of -3dB $[10\log(2)]$ by using the Measure and Add $10\log(N)$ dB technique according to FCC KDB662911 D01 accounting for simultaneous transmission from antennas port RF A1 and RF A2.

The path loss measured and entered as a reference level offset. The EUT was set to transmit at its maximum rated output power in the configurations described in the tables below. Measurements were made at the Top and Bottom of the band.

The results are shown in the plots below.

2.3.7 Test Results

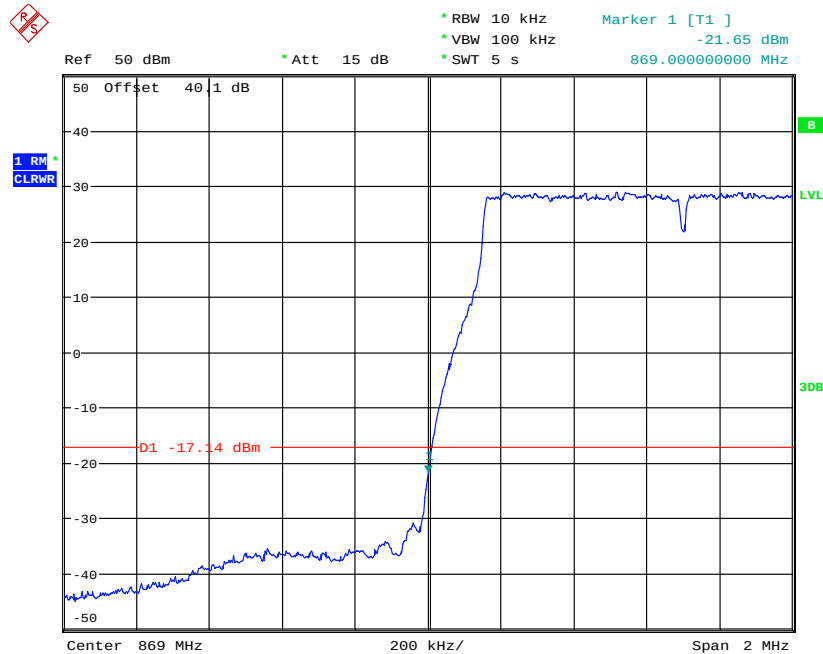
Configuration L-MIMO-SC

Maximum Output Power 49dBm per carrier

Band Edge Frequency	Channel Bandwidth	Edge Test with modulation QPSK Channel Frequencies
Channel Position B 869.0 MHz	1.4 MHz	869.7MHz
	3.0 MHz	870.5MHz
	5.0 MHz	871.5MHz
	10.0 MHz	874.0MHz
Channel Position T 894.0 MHz	1.4 MHz	893.3MHz
	3.0 MHz	892.5MHz
	5.0 MHz	891.5MHz
	10.0 MHz	889.0MHz

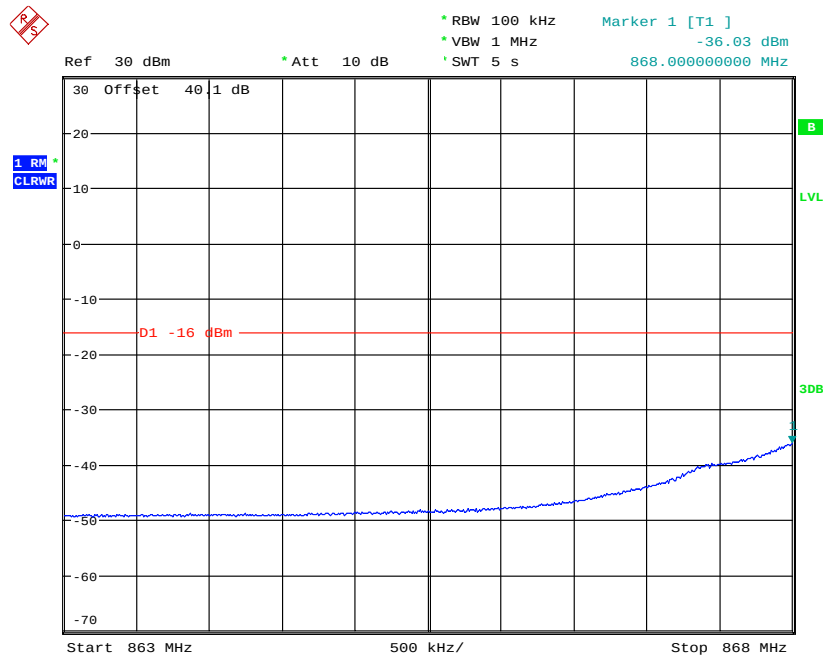
Note: For LTE, the channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels outside of the ranges shown in the above tables shall not be made available to the end user.

Channel Position B - QPSK / Bandwidth 1.4 MHz



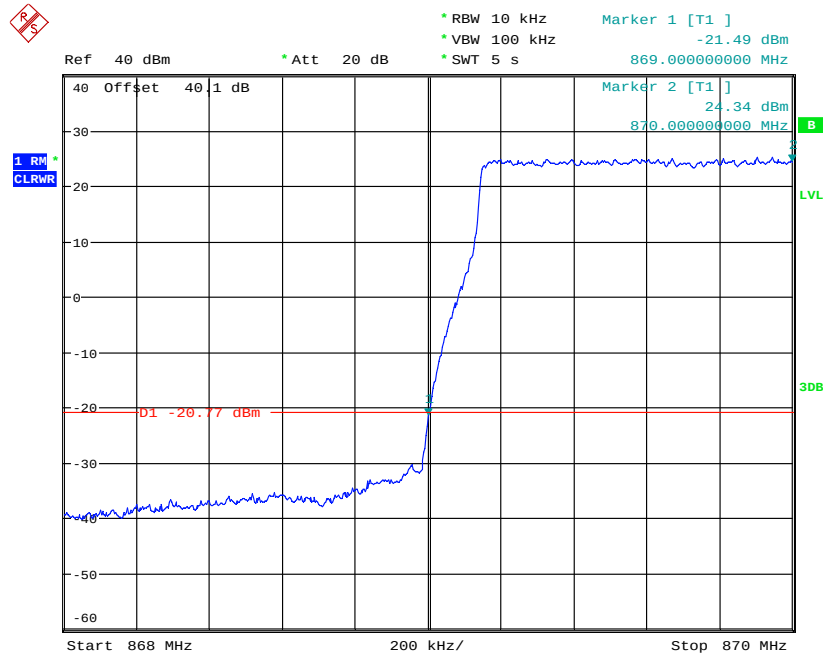
Date: 3.JUL.2014 14:15:01

Note: The resolution bandwidth was further reduced to 10 kHz. To compensate for this the limit has been reduced by a further 1.14dB $[10\log(10/20)]$ to -17.14dBm.



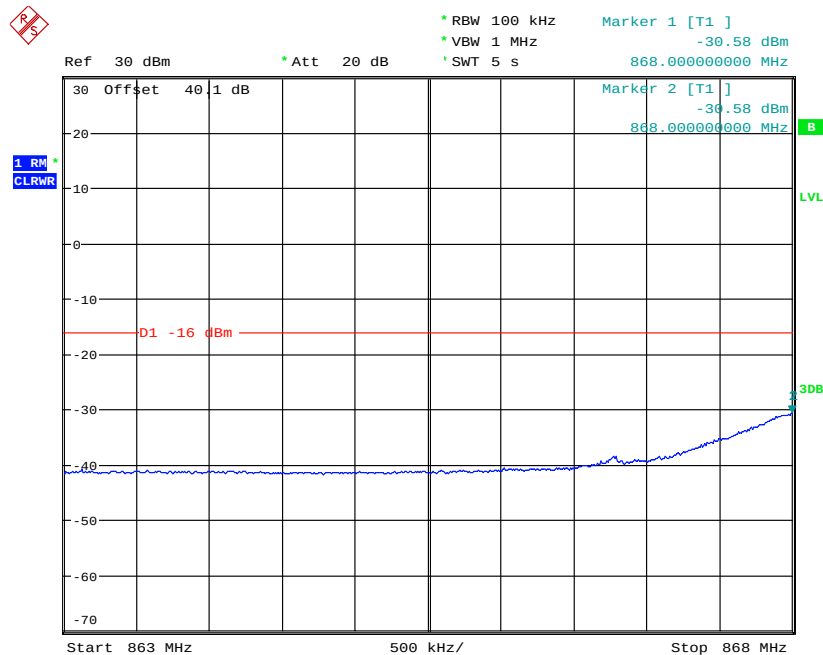
Date: 3.JUL.2014 14:16:32

Channel Position B - QPSK / Bandwidth 3.0 MHz



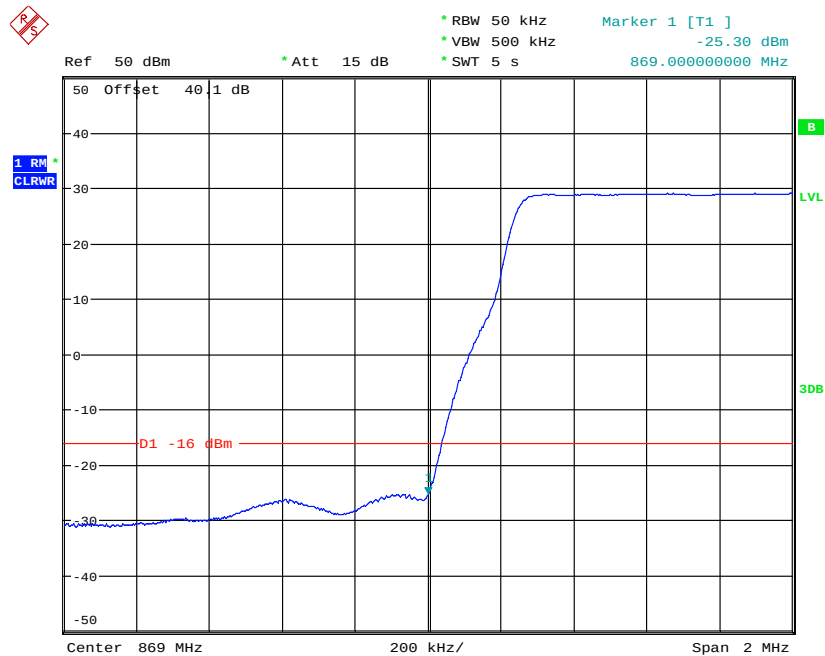
Date: 3.JUL.2014 15:07:47

Note: The resolution bandwidth was further reduced to 10 kHz. To compensate for this the limit has been reduced by a further 4.77dB [$10\log(10/30)$] to -20.77dBm.

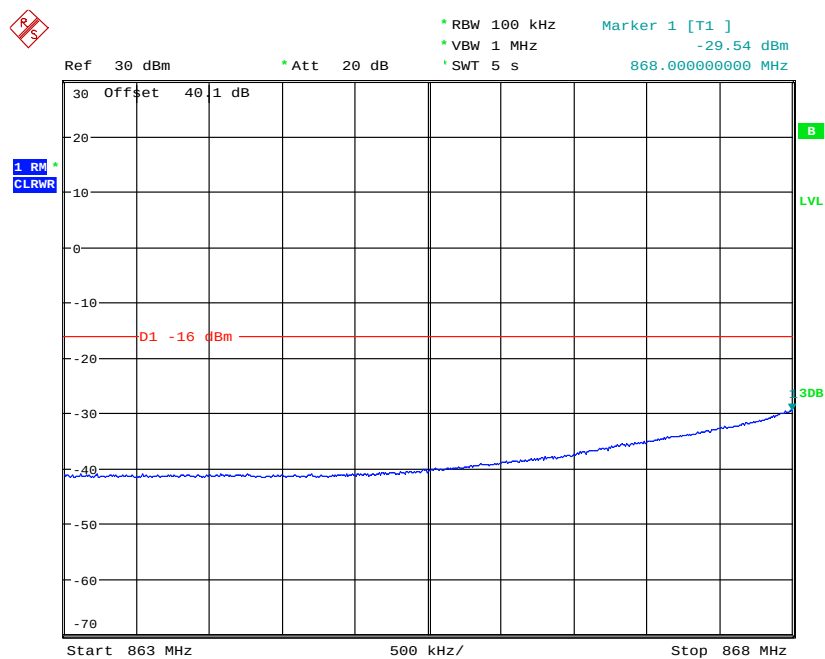


Date: 3.JUL.2014 15:09:26

Channel Position B - QPSK / Bandwidth 5.0 MHz

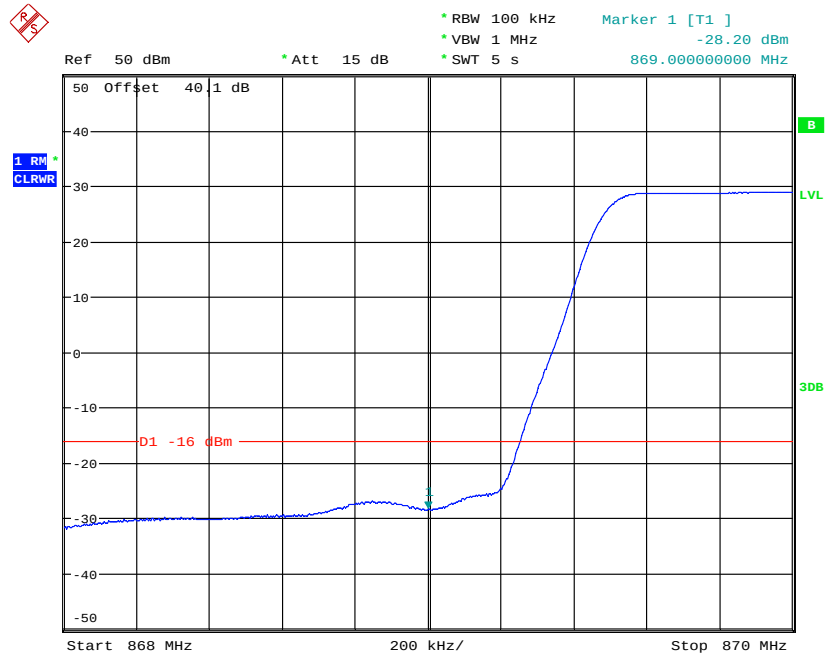


Date: 4.JUL.2014 10:30:57

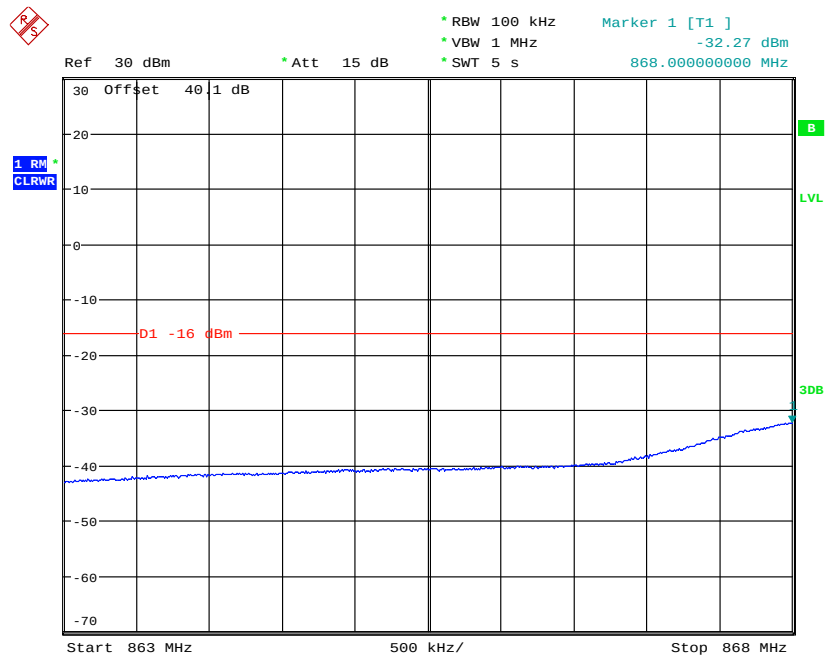


Date: 4.JUL.2014 10:31:57

Channel Position B - QPSK / Bandwidth 10.0 MHz

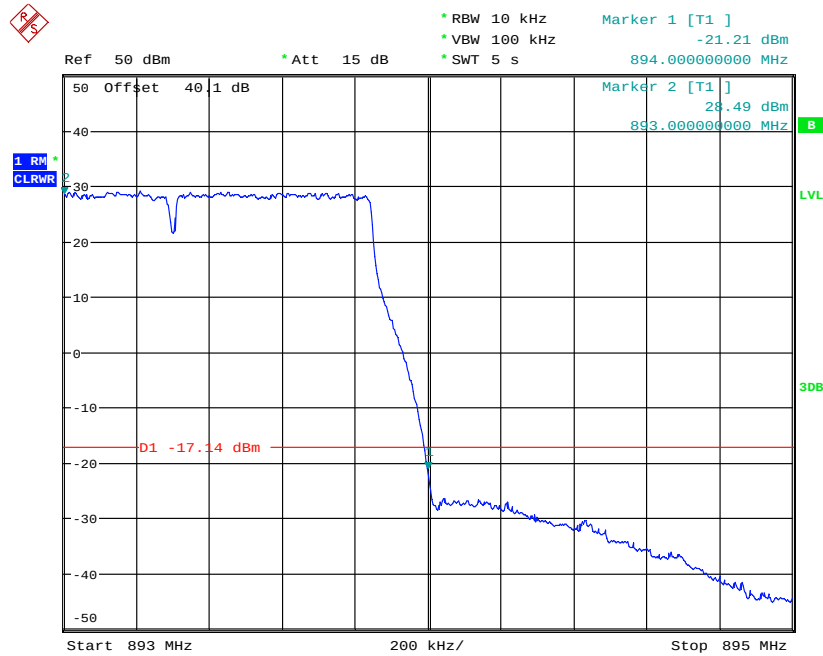


Date: 4.JUL.2014 10:56:25



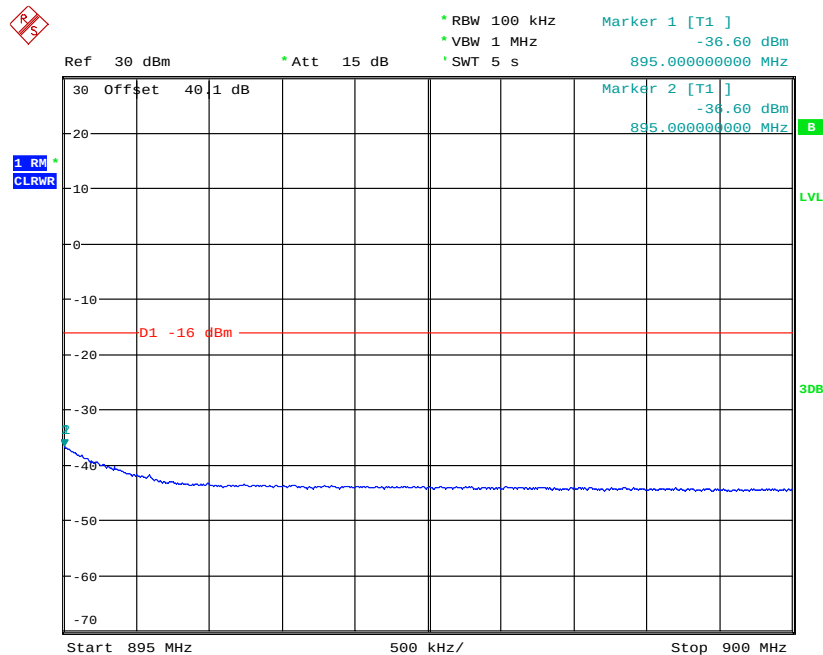
Date: 4.JUL.2014 10:57:12

Channel Position T - QPSK / Bandwidth 1.4 MHz



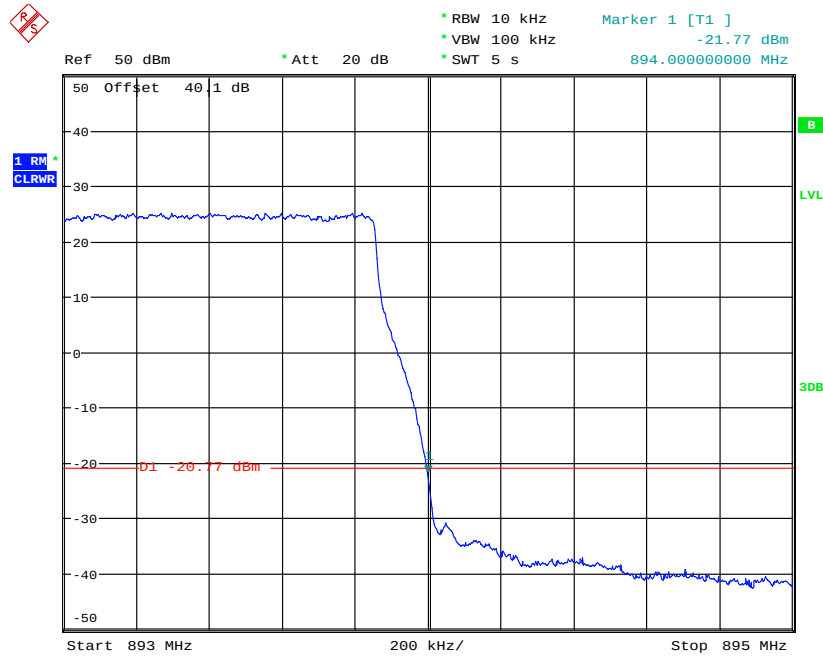
Date: 3.JUL.2014 14:50:45

Note: The resolution bandwidth was further reduced to 10 kHz. To compensate for this the limit has been reduced by a further 1.14dB $[10\log(10/20)]$ to -17.14dBm.



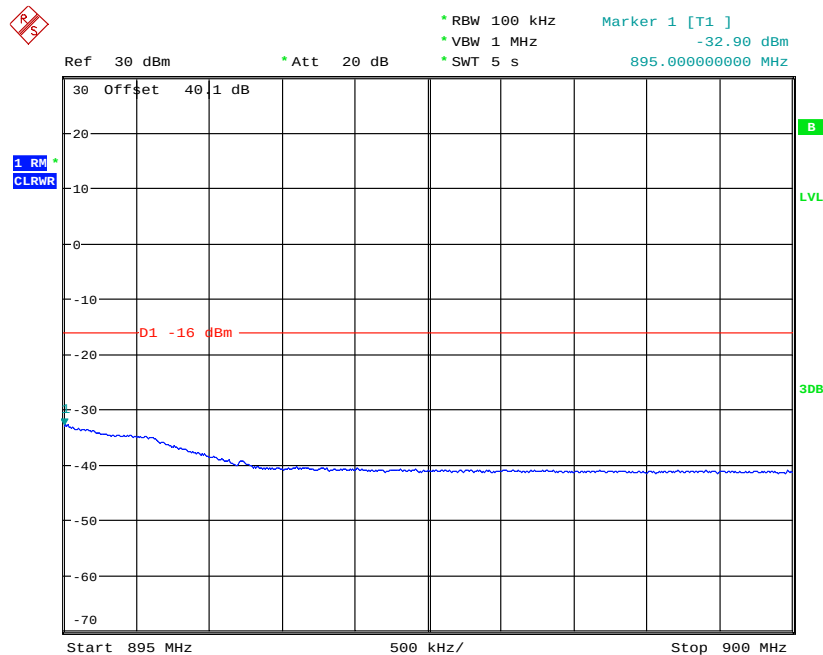
Date: 3.JUL.2014 14:51:56

Channel Position T - QPSK / Bandwidth 3.0 MHz



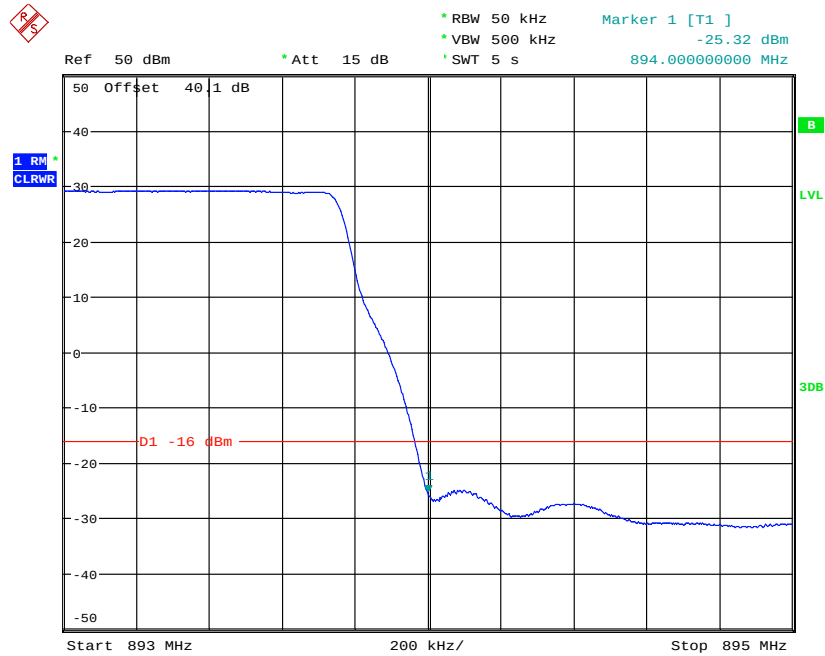
Date: 3.JUL.2014 15:13:01

Note: The resolution bandwidth was further reduced to 10 kHz. To compensate for this the limit has been reduced by a further 4.77dB [$10\log(10/30)$] to -20.77dBm.

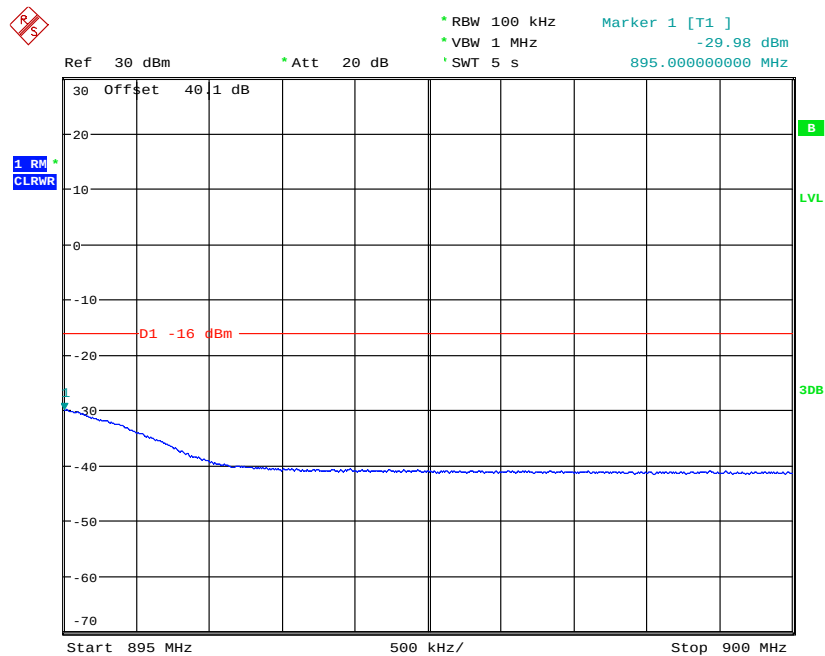


Date: 3.JUL.2014 15:10:38

Channel Position T - QPSK / Bandwidth 5.0 MHz

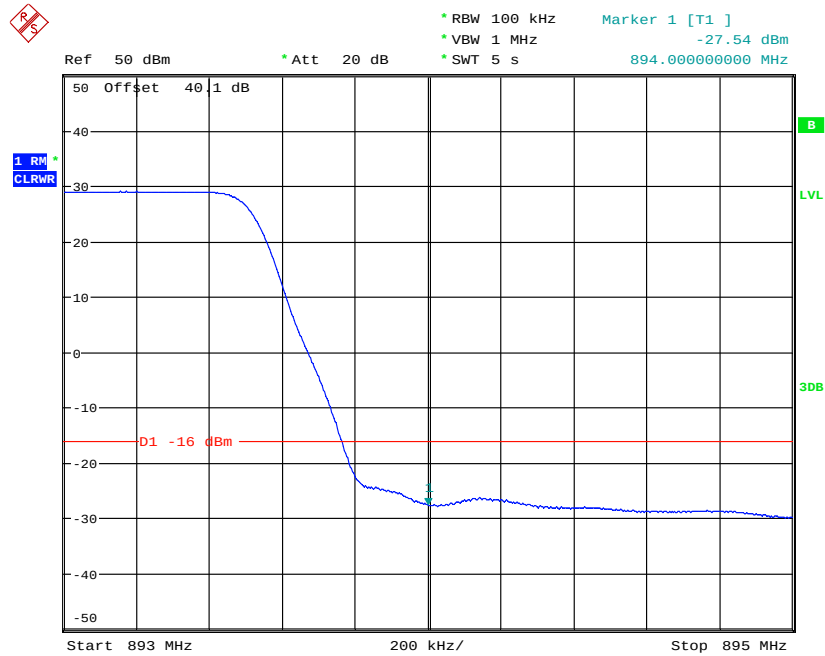


Date: 4.JUL.2014 10:51:52

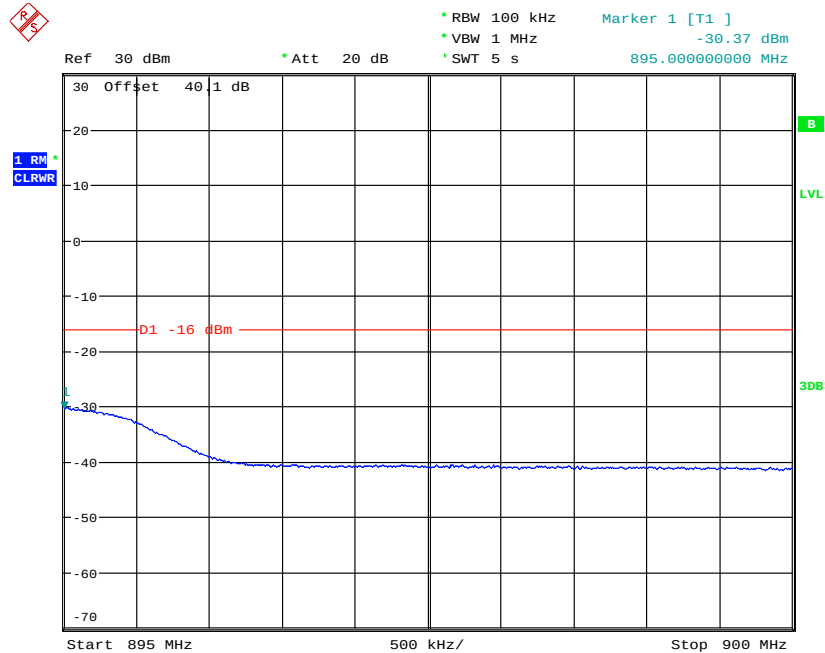


Date: 4.JUL.2014 10:50:47

Channel Position T - QPSK / Bandwidth 10.0 MHz



Date: 4.JUL.2014 11:04:01



Date: 4.JUL.2014 11:01:46

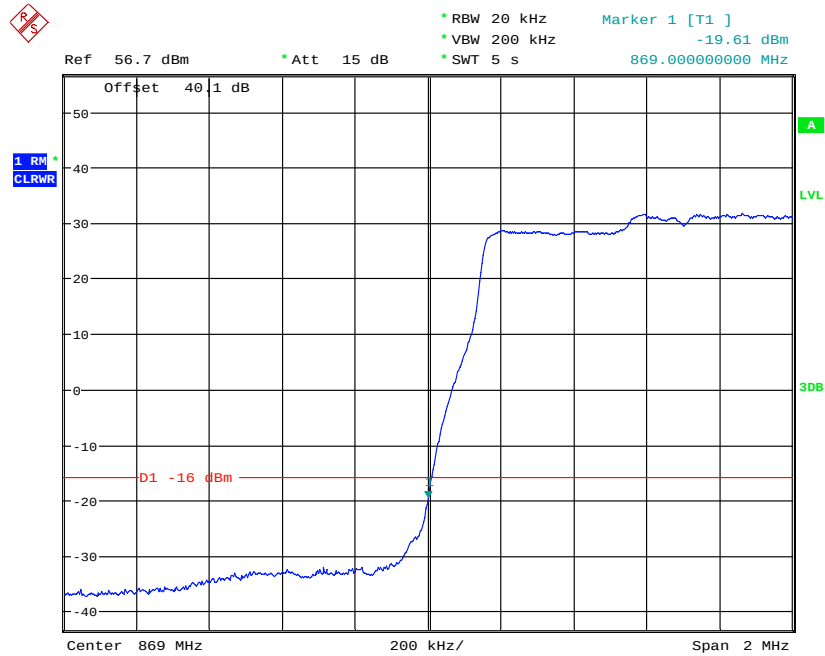
Configuration L-MIMO-MC 1 (2C)

Maximum Output Power 46dBm per carrier

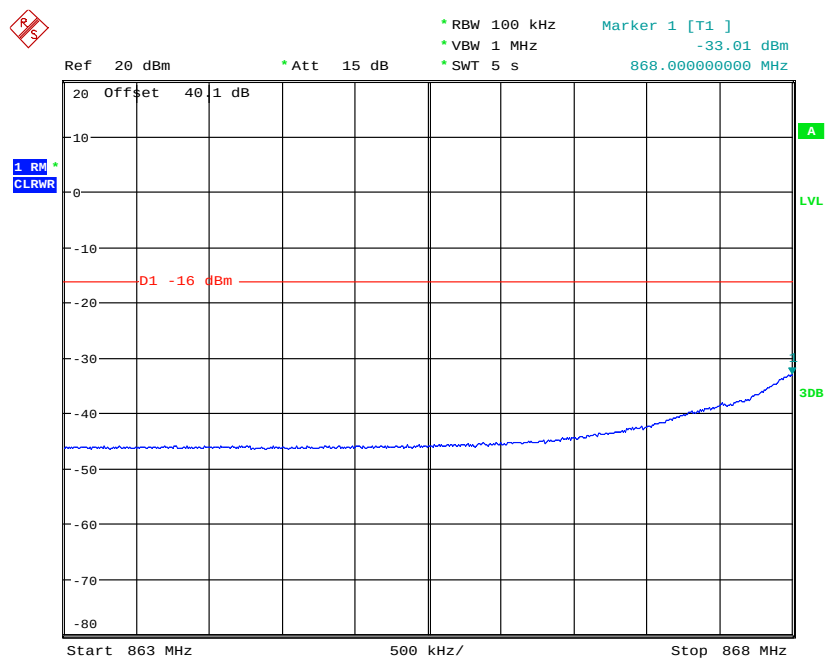
Band Edge Frequency	Channel Bandwidth	Edge Test with modulation QPSK Channel Frequencies
Channel Position B 869.0 MHz	1.4 MHz	869.7MHz + 871.1MHz
	3.0 MHz	870.5MHz + 873.5MHz
	5.0 MHz	871.5MHz + 876.5MHz
	10.0 MHz	874.0MHz + 884.0MHz
	15.0 MHz	-
	20.0 MHz	-
Channel Position T 894.0 MHz	1.4 MHz	893.3MHz + 891.9MHz
	3.0 MHz	892.5MHz + 889.5MHz
	5.0 MHz	891.5MHz + 886.5MHz
	10.0 MHz	889.0MHz + 879.0MHz
	15.0 MHz	-
	20.0 MHz	-

Note: For LTE, the channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels outside of the ranges shown in the above tables shall not be made available to the end user.

Channel Position B - QPSK / Bandwidth 1.4 MHz

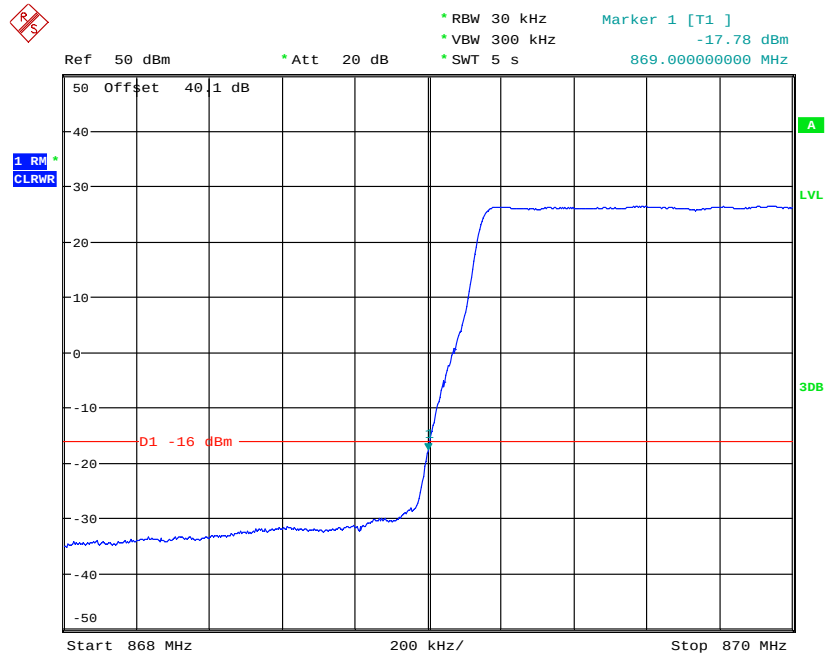


Date: 4.JUL.2014 14:22:58

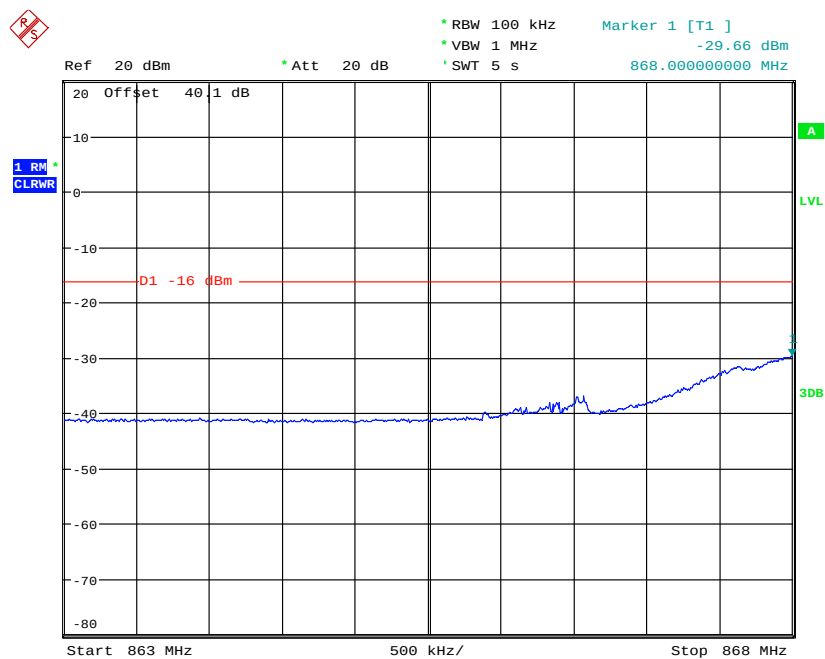


Date: 4.JUL.2014 14:24:05

Channel Position B – Modulation QPSK / Bandwidth 3.0 MHz

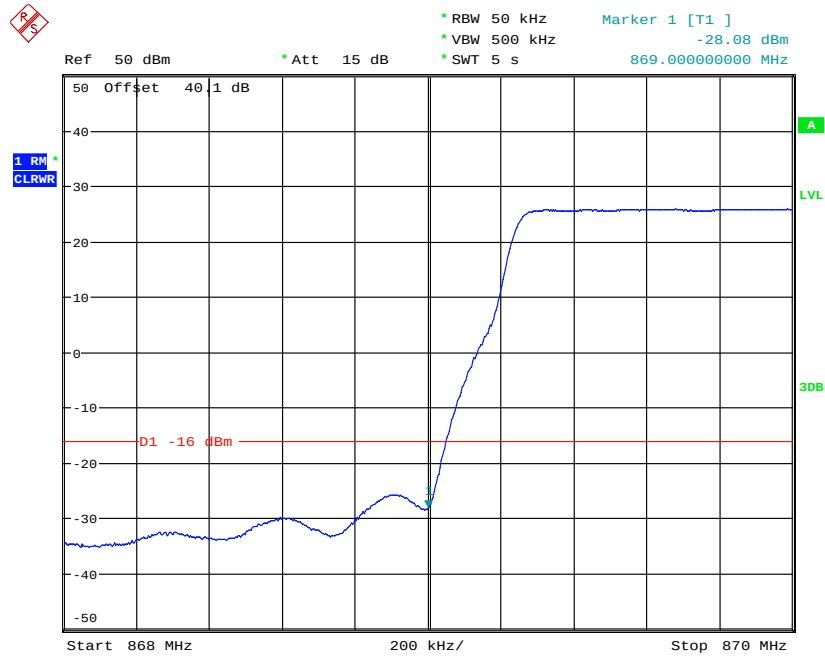


Date: 4.JUL.2014 14:33:20

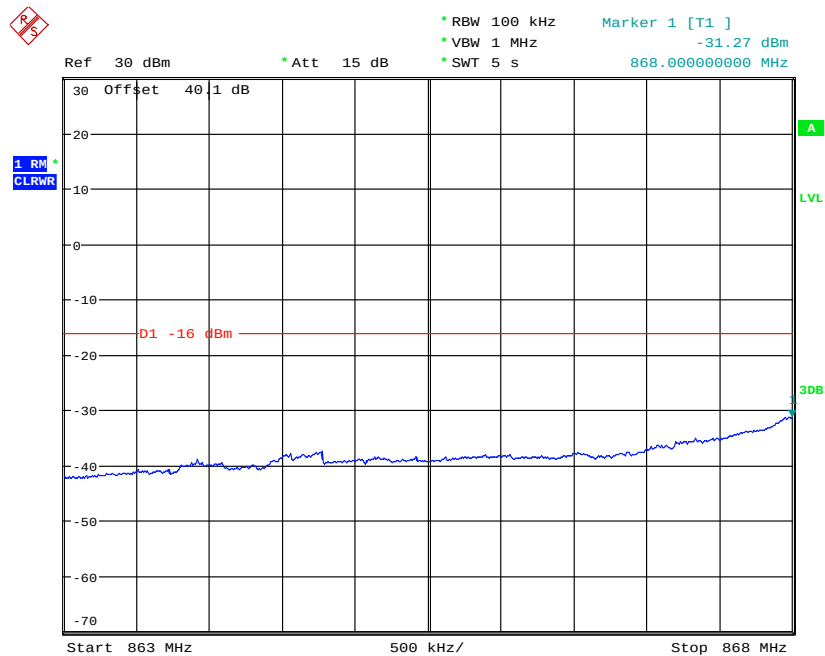


Date: 4.JUL.2014 14:35:24

Channel Position B - QPSK / Bandwidth 5.0 MHz

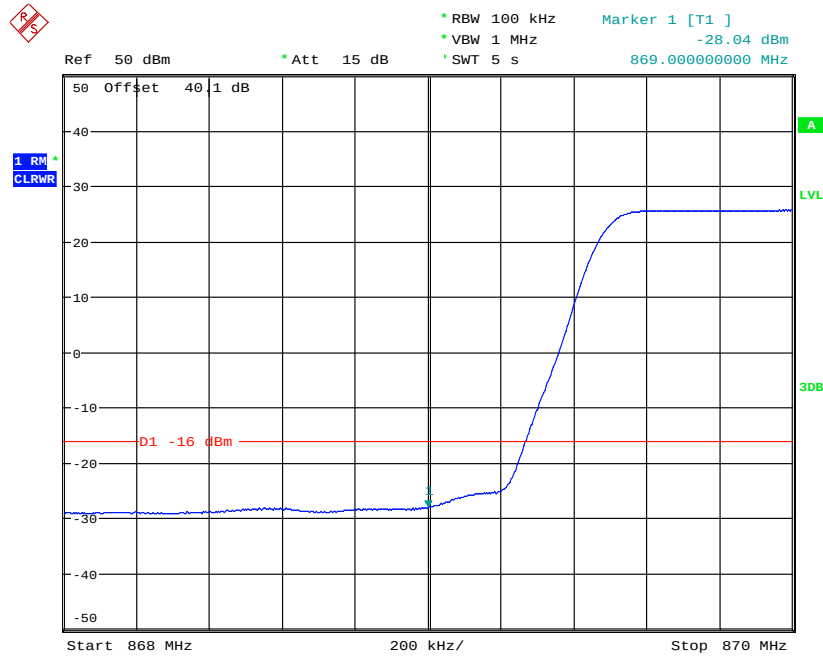


Date: 4.JUL.2014 14:46:32

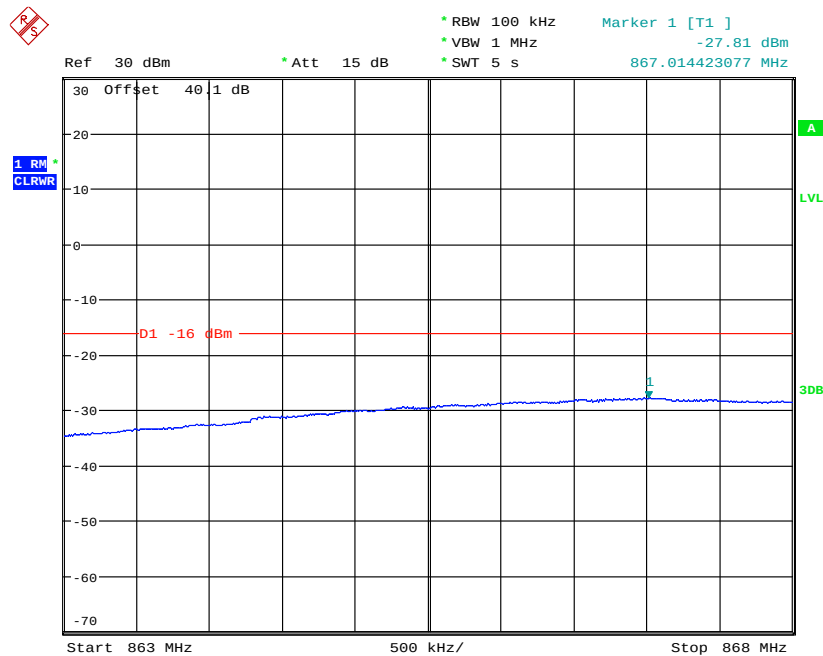


Date: 4.JUL.2014 14:47:25

Channel Position B - QPSK / Bandwidth 10.0 MHz

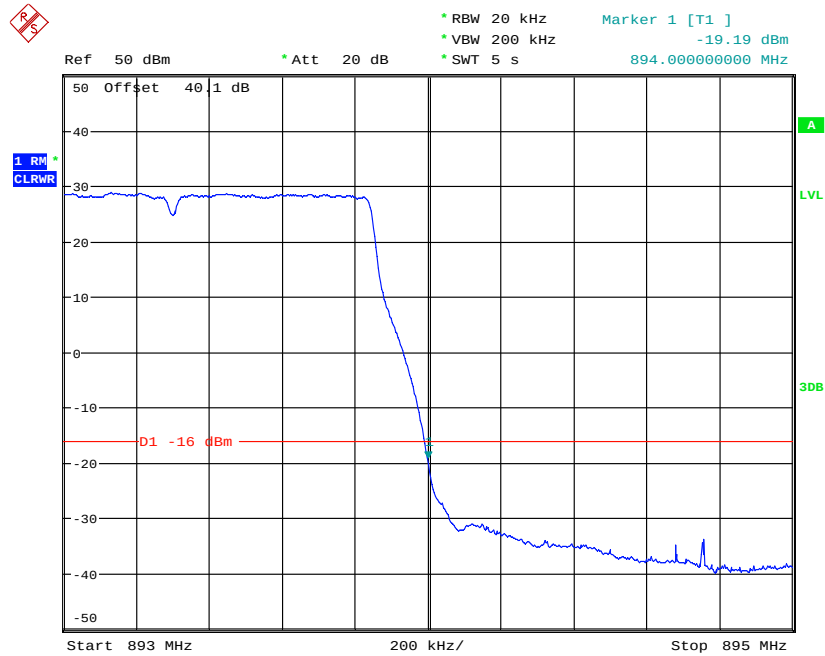


Date: 4.JUL.2014 15:07:47

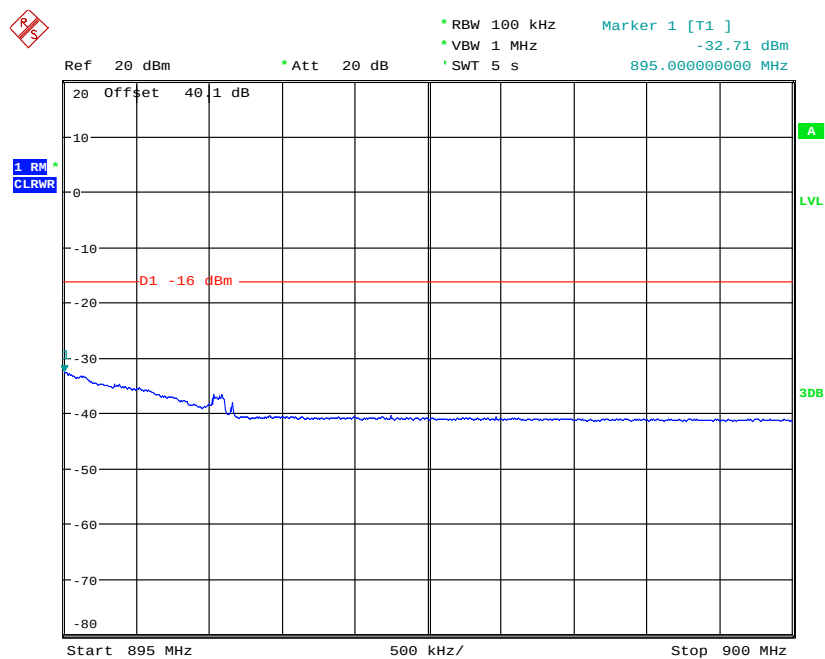


Date: 4.JUL.2014 15:09:22

Channel Position T - QPSK / Bandwidth 1.4 MHz

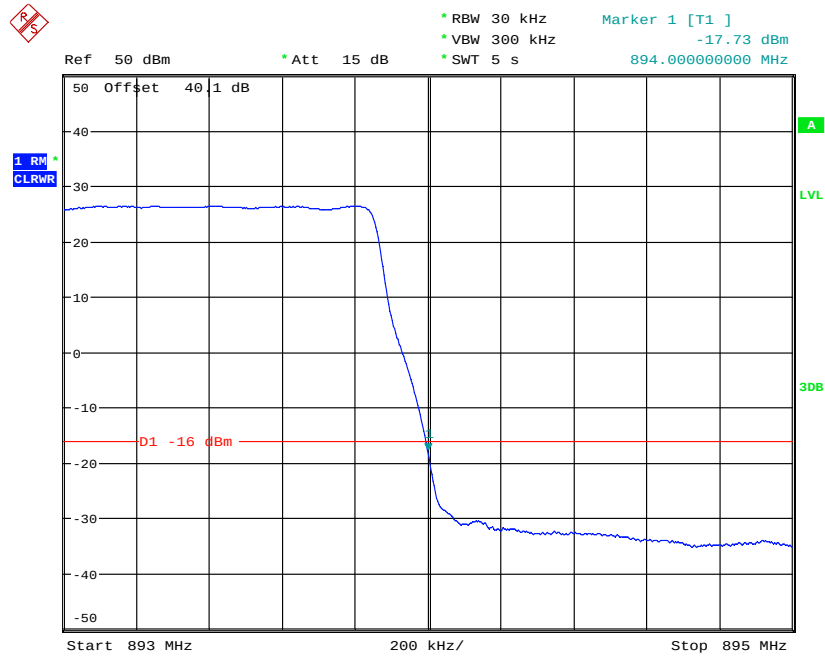


Date: 4.JUL.2014 14:28:19

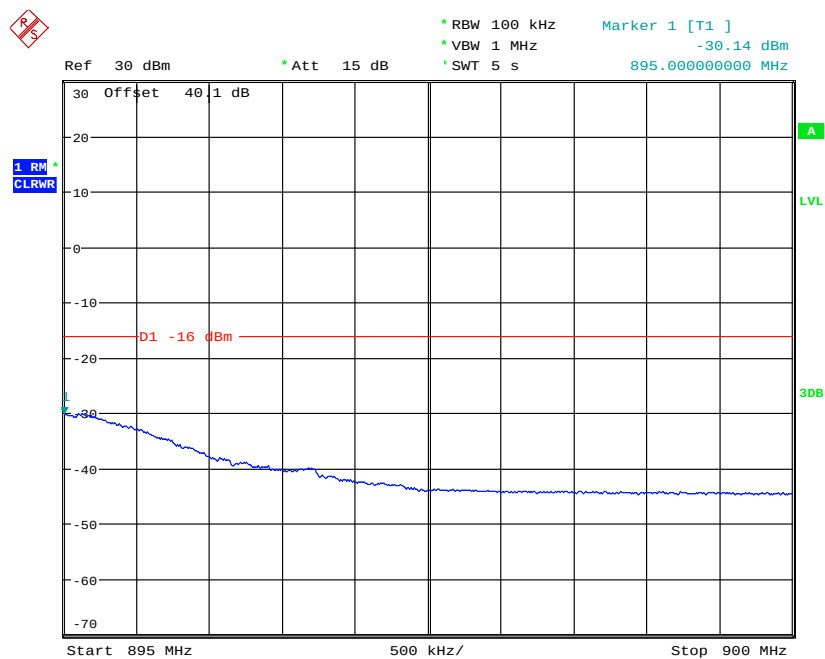


Date: 4.JUL.2014 14:27:09

Channel Position T - QPSK / Bandwidth 3.0 MHz

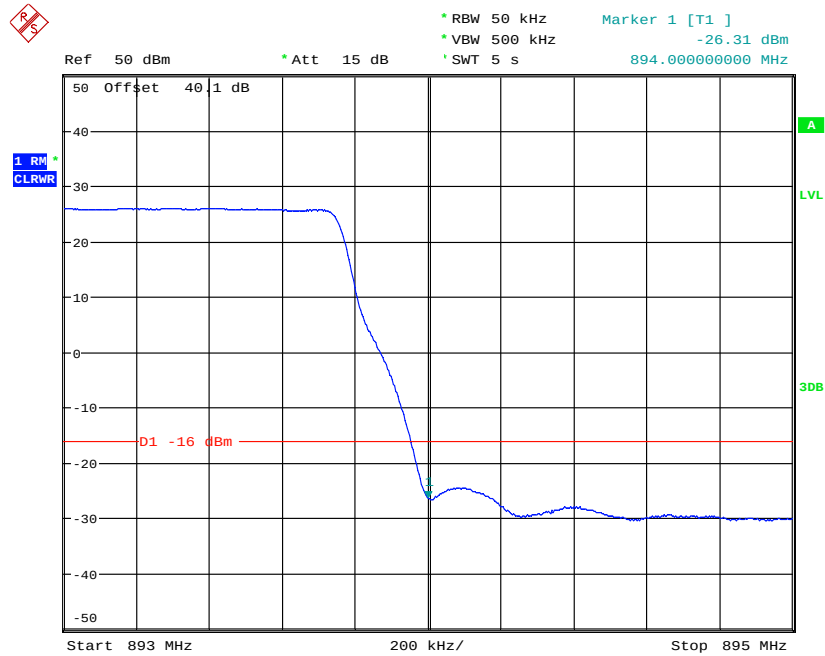


Date: 4.JUL.2014 14:43:06

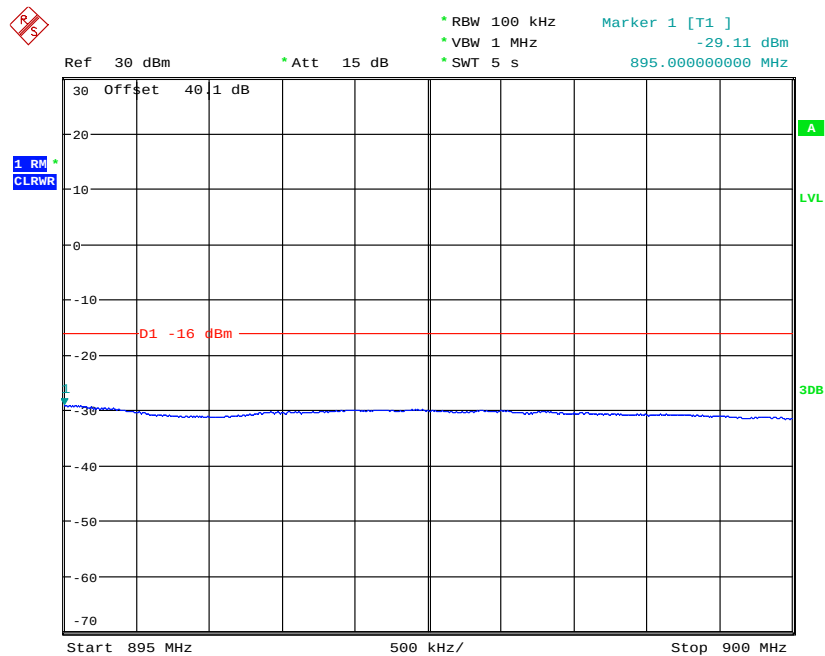


Date: 4.JUL.2014 14:41:56

Channel Position T - QPSK / Bandwidth 5.0 MHz

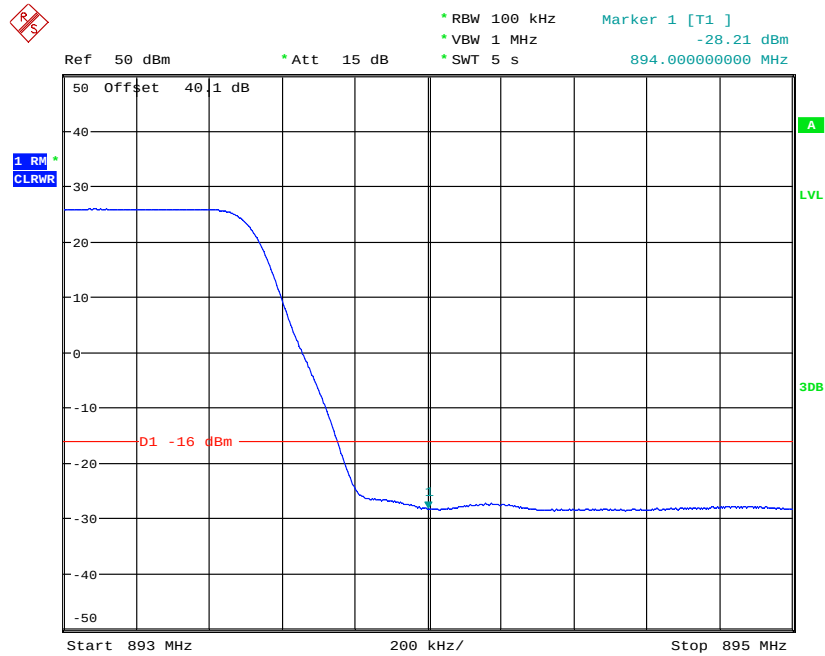


Date: 4.JUL.2014 15:04:21

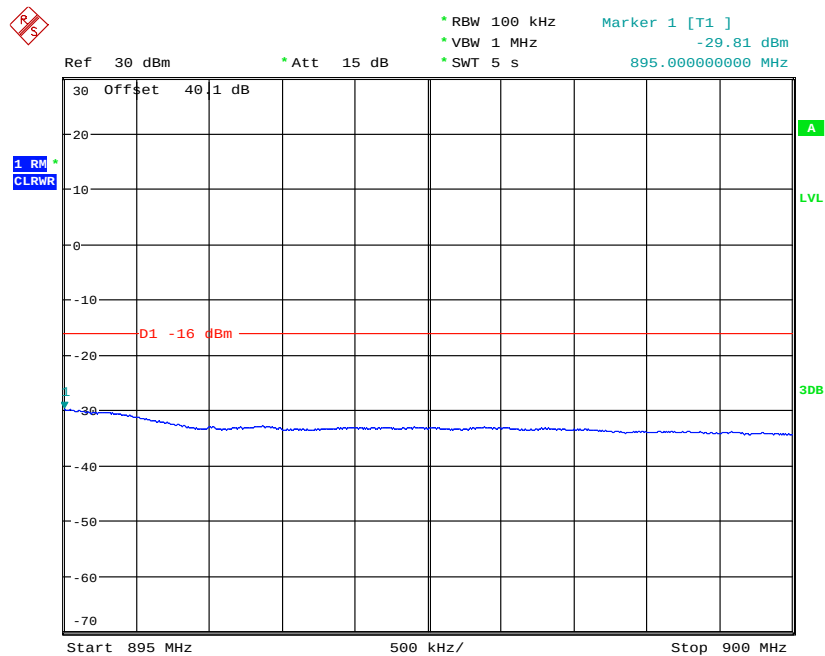


Date: 4.JUL.2014 15:11:38

Channel Position T - QPSK / Bandwidth 10.0 MHz



Date: 4.JUL.2014 15:15:53



Date: 4.JUL.2014 15:11:14

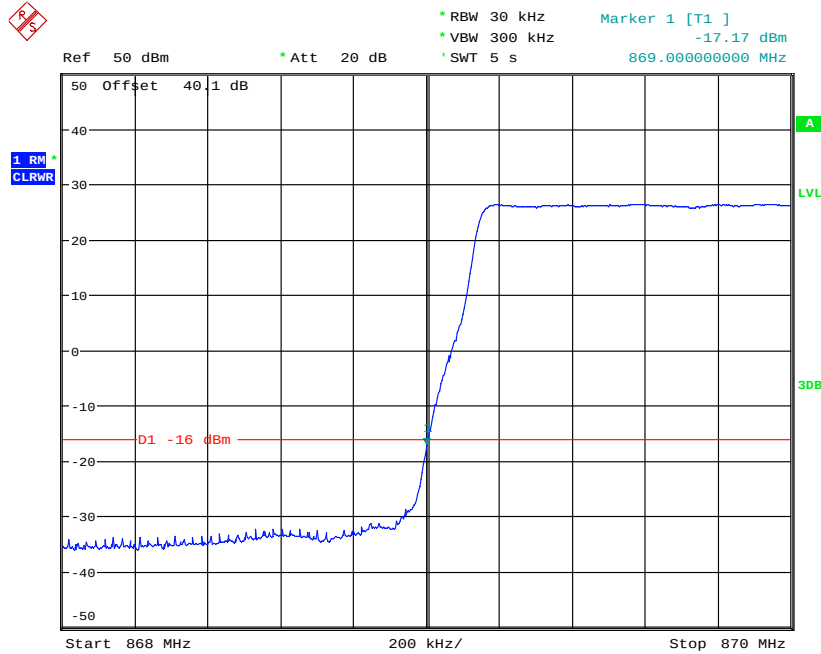
Configuration G+L-MIMO-MC 1 (1L + 1G)

Maximum Output Power 46dBm per carrier

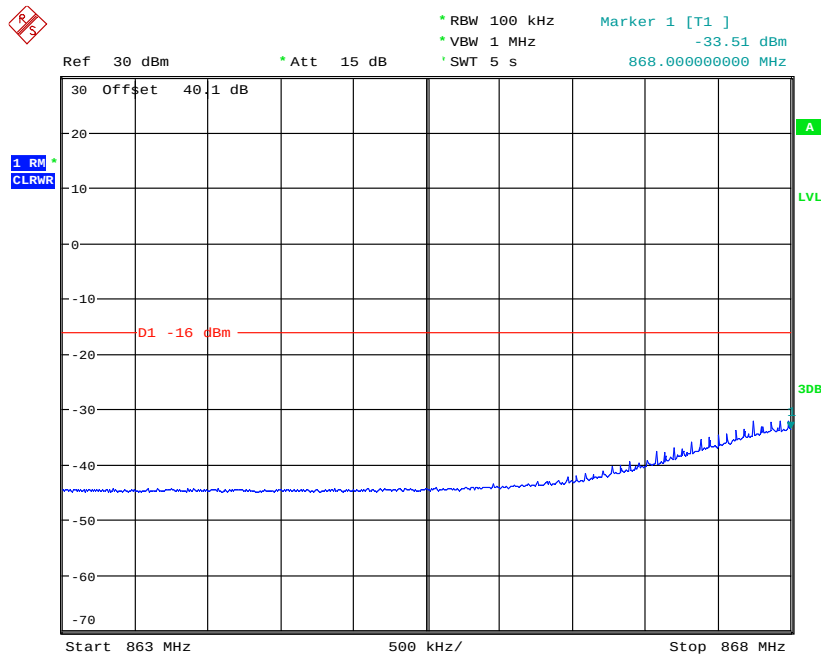
Band Edge Frequency	Edge Test with modulation (L) QPSK / 3.0MHz Bandwidth + (G) GMSK Channel Frequencies
Channel Position B_{RFBW} 869.0 MHz	Port A1: (L) 870.5MHz +(G) 872.2MHz Port A2: (L) 870.5MHz +(G) 872.8MHz
Channel Position T_{RFBW} 894.0 MHz	Port A1: (L) 892.5MHz + (G) 890.8MHz Port A2: (L) 892.5MHz + (G) 890.2MHz

Note: The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels outside of the ranges shown in the above tables shall not be made available to the end user.

Channel Position B_{RFBW} - LTE QPSK: Bandwidth 3.0MHz / GSM GMSK

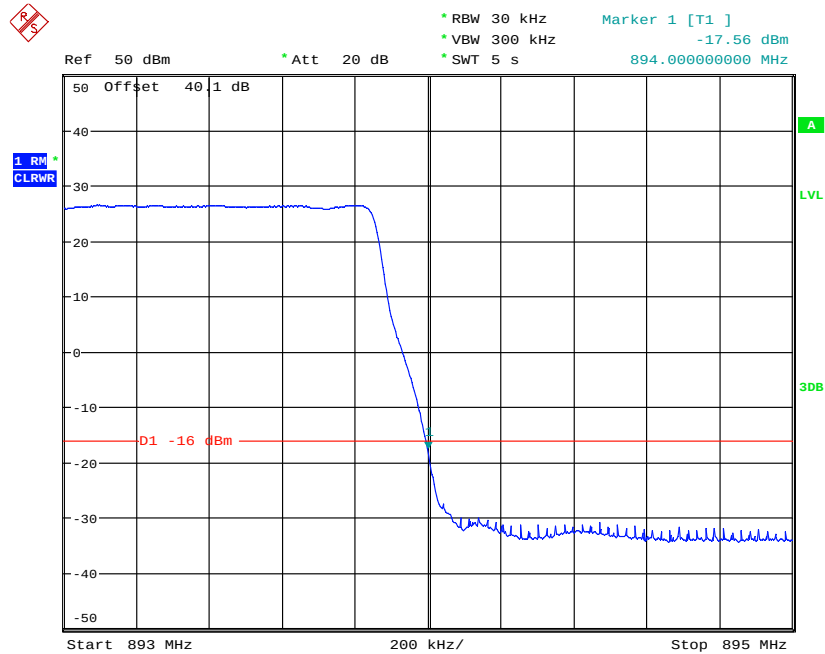


Date: 10.JUL.2014 14:19:38

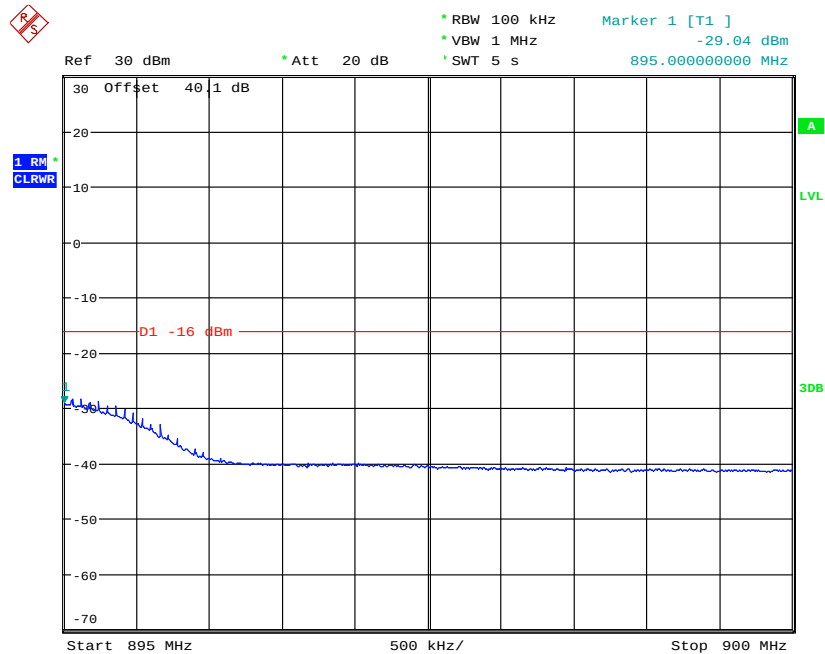


Date: 10.JUL.2014 13:53:22

Channel Position T_{RFBW} - LTE QPSK: Bandwidth 3.0MHz / GSM GMSK



Date: 10. JUL. 2014 14:26:45



Date: 10. JUL. 2014 14:28:01

Configuration G+L-MIMO-MC 2 (2G + 1L)

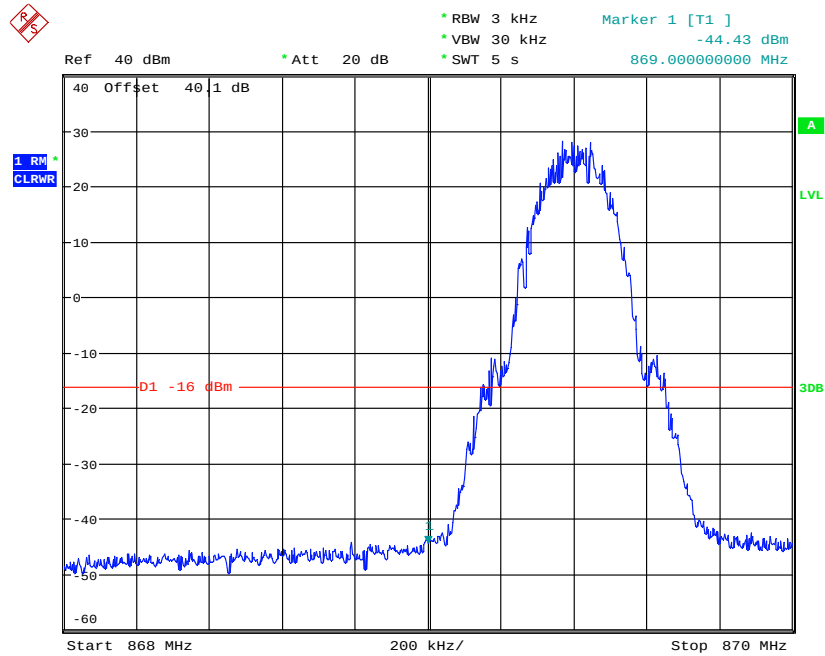
Maximum Output Power 43dBm per carrier for GSM

Maximum Output Power 46dBm per carrier for LTE

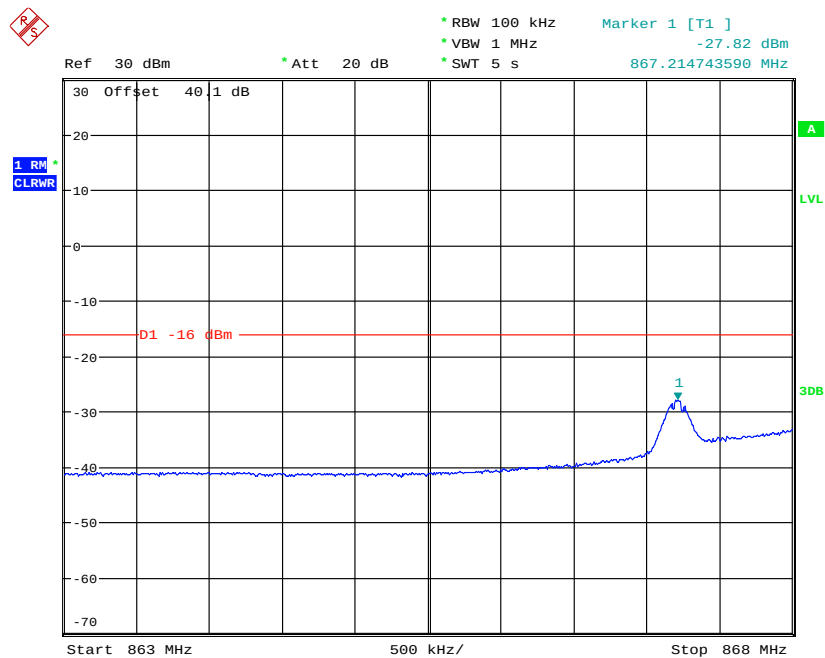
Band Edge Frequency	Edge Test with modulation (G) GMSK + (L) QPSK / 3.0MHz Bandwidth Channel Frequencies
Channel Position B_{RFBW} 869.0 MHz	Port A1: (G) 869.4MHz + (G) 870.6MHz + (L) 872.9MHz Port A2: (G) 870.0MHz + (G) 871.2MHz + (L) 872.9MHz
Channel Position T_{RFBW} 894.0 MHz	Port A1: (G) 893.6MHz + (G) 892.4MHz + (L) 890.1MHz Port A2: (G) 893.0MHz + (G) 891.8MHz + (L) 890.1MHz

Note: The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels outside of the ranges shown in the above tables shall not be made available to the end user.

Channel Position B_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 3.0MHz

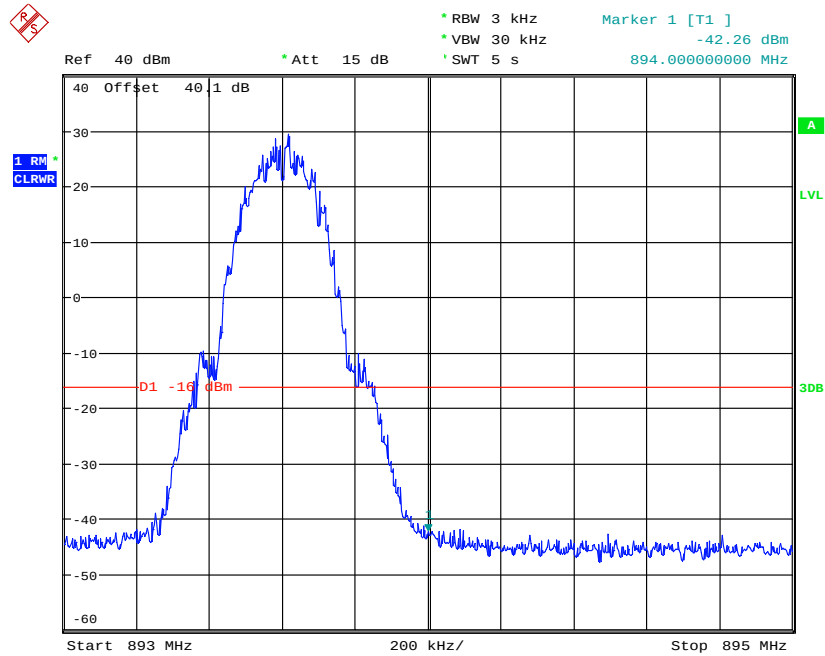


Date: 10.JUL.2014 14:49:56

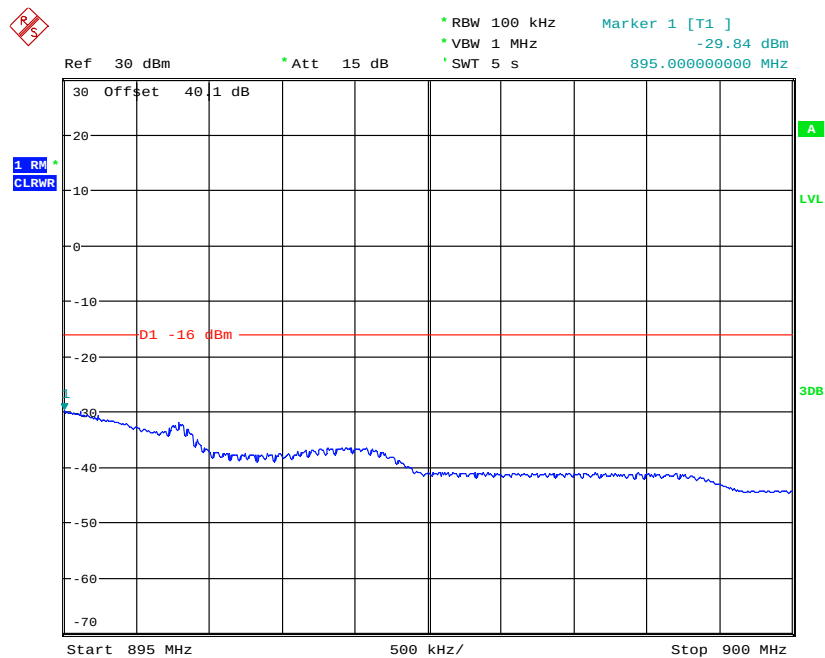


Date: 10.JUL.2014 14:48:25

Channel Position T_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 3.0MHz



Date: 10.JUL.2014 14:56:08



Date: 10.JUL.2014 14:57:23

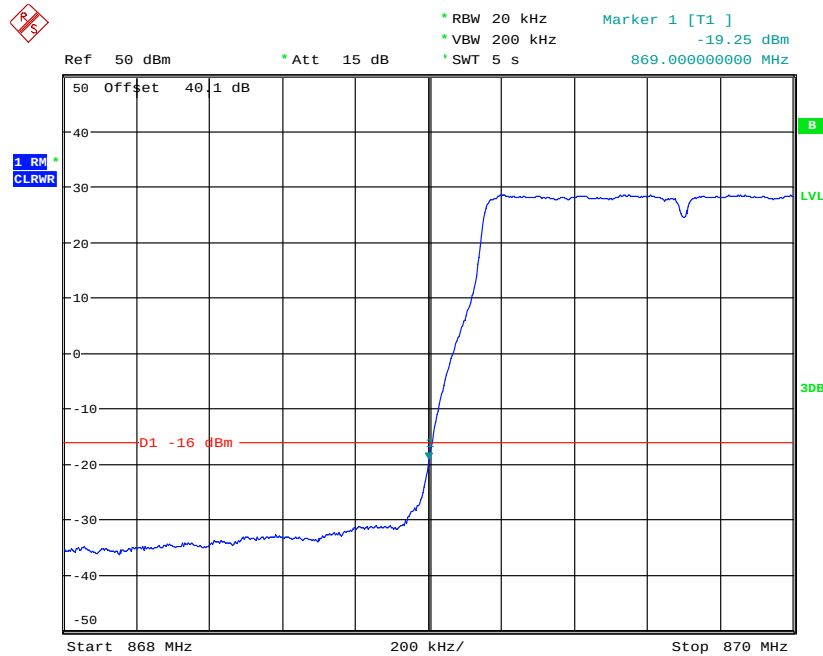
Configuration W+L-MIMO-MC 1 (1L + 1W)

Maximum Output Power 46dBm per carrier

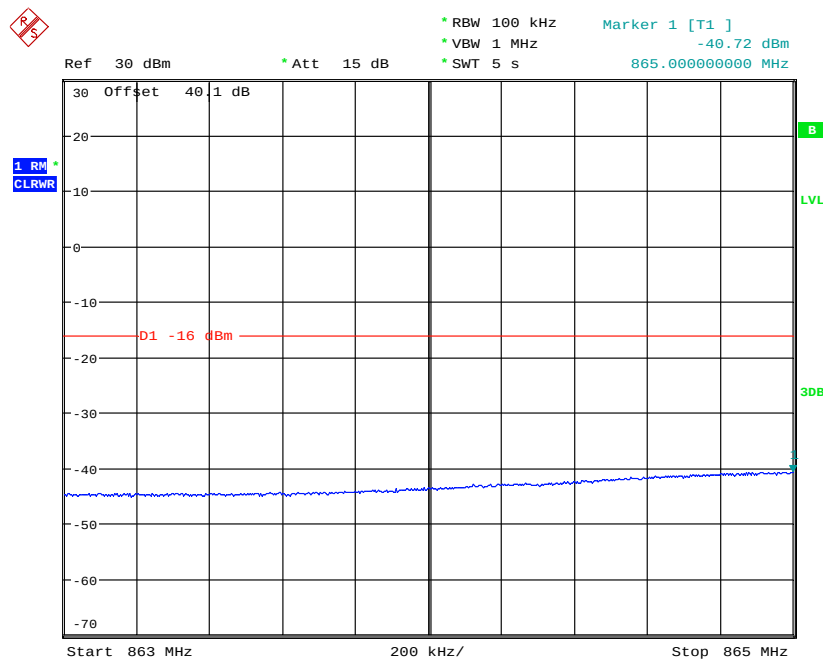
Band Edge Frequency	Edge Test with modulation (L) QPSK / 1.4MHz Bandwidth + (W) 16QAM Channel Frequencies
Channel Position B_{RFBW} 869.0 MHz	Port A1: (L) 869.7MHz + (W) 872.8MHz Port A2: (L) 869.7MHz + (W) 872.8MHz
Channel Position T_{RFBW} 894.0 MHz	Port A1: (L) 893.3MHz + (W) 890.2MHz Port A2: (L) 893.3MHz + (W) 890.2MHz

Note: The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels outside of the ranges shown in the above tables shall not be made available to the end user.

Channel Position B_{RFBW} - LTE QPSK: Bandwidth 1.4MHz / WCDMA 16QAM

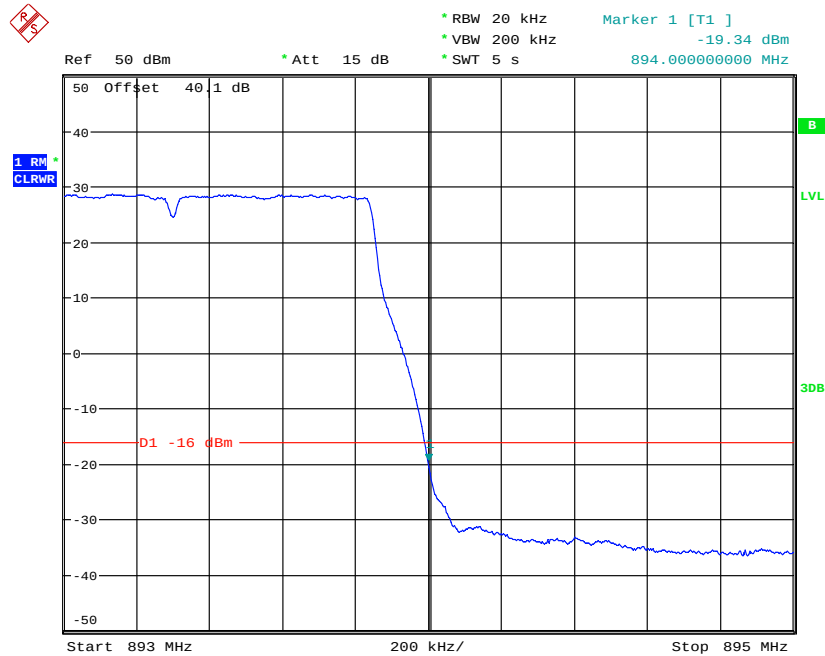


Date: 8.JUL.2014 13:48:46

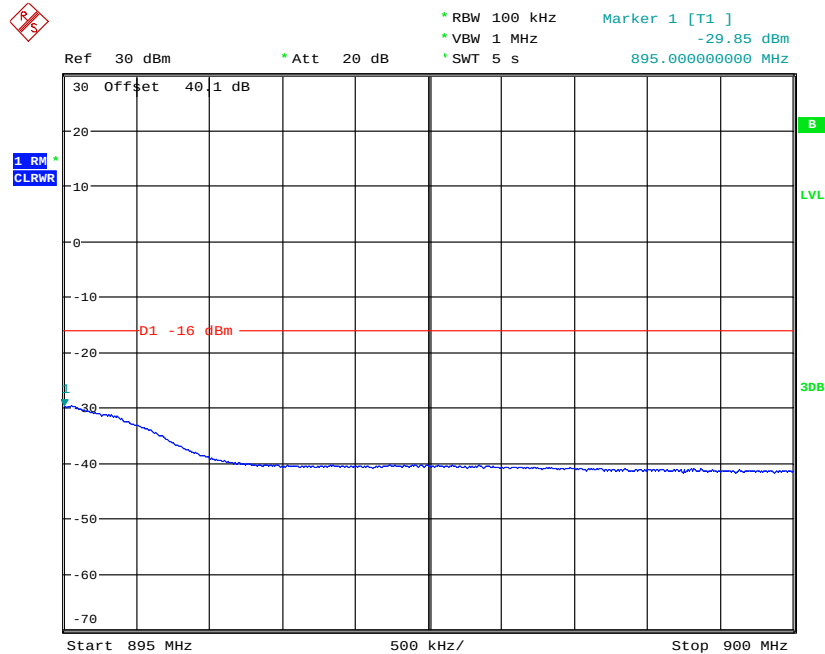


Date: 8.JUL.2014 13:49:40

Channel Position T_{RFBW} - LTE QPSK: Bandwidth 1.4MHz / WCDMA 16QAM



Date: 8.JUL.2014 13:58:31



Date: 8.JUL.2014 13:59:11

Limit	-13 dBm
-------	---------

2.4 RADIATED SPURIOUS EMISSIONS

2.4.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1053
FCC CFR 47 Part 22, Clause 22.917 (a)
Industry Canada RSS-132, Clause 5.5

2.4.2 Equipment Under Test

RRUS 01 B5, KRC 118 70/3, S/N: D168196972
RRUS 01 B5, KRC 118 70/3, S/N: D168196991

2.4.3 Date of Test and Modification State

16 and 17 July 2014 - Modification State 0

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Environmental Conditions

Ambient Temperature	25.0 – 26.5°C
Relative Humidity	27.0 – 29.6%

2.4.6 Test Method

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and Part 22 and Industry Canada RSS-132 and ANSI/TIA-603-C-2004.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within the chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations.

The measurement of radiated spurious emissions in the frequency range 30MHz to 10GHz was performed using a peak detector and a resolution bandwidth of 100 kHz which satisfied the minimum measurement bandwidth requirement of 100 kHz.

The EUTs were measured with the antenna height varied between 1 and 4 m with the turntable rotated between 0 and 360 degrees. The unwanted emissions of any frequencies within 10dB of the limit were measured with the substitution method used according to the standard.

The measurements were performed at a 3m distance unless otherwise stated

The limit for Spurious Emissions have been calculated, as shown below using the following formula:

Field Strength of Carrier - $(43 + 10\log(P))$ dB

Where:

Field Strength is measured in dBμV/m

P is measured Transmitter Power in Watts

Determination of Spurious Emission Limit

As the EUT does not have an integral antenna, the field strength of the carrier has been calculated assuming that the power is to be fed to a half-wave tuned dipoles as per 2.1053 (a).

$$E_{(v/m)} = (30 \times G_i \times P_o)^{0.5} / d$$

Where G_i is the antenna gain of ideal half-wave dipoles,

P_o is the power out of the transceiver in W,

d is the measurement distance in meter.

Therefore at 3m measurement distance the field strength using the lowest transceiver output power would be:

$$E_{(v/m)} = (30 \times 1.64 \times 133.66)^{0.5} / 3 = 27.03V/m = 148.68dB\mu V/m$$

As per 22.917 (a) the spurious emission must be attenuated by $43 + 10\log(P_o)$ dB this gives:

$$43 + 10\log(133.66) = 64.26dB$$

Therefore the limit at 3m measurement distance is:

$$148.68 - 64.26 = 84.4 \text{ dB}\mu V/m$$

This limit has been used to determine Pass or Fail for the harmonics measured and detailed in the following results.

The results are shown in the plots below.

2.4.7 Test Results

Note: Only the worst case results plots have been included as all of the emissions are greater than 20dB below the limit.

Configuration L-MIMO-SC

Maximum Output Power 49dBm per carrier, LTE Bandwidth 1.4MHz

Channel Position	Channel Frequencies
Channel Position B	869.7MHz
Channel Position M	881.5MHz
Channel Position T	893.3MHz

Channel Position B - LTE QPSK: Bandwidth 1.4MHz - 30MHz – 10GHz

No emissions were detected within 20dB of the limit.

Channel Position M - LTE QPSK: Bandwidth 1.4MHz - 30MHz – 10GHz

No emissions were detected within 20dB of the limit.

Channel Position T - LTE QPSK: Bandwidth 1.4MHz - 30MHz – 10GHz

No emissions were detected within 20dB of the limit.

Maximum Output Power 49dBm per carrier, LTE Bandwidth 3.0MHz

Channel Position M	881.5MHz
--------------------	----------

Channel Position M - LTE QPSK: Bandwidth 3.0MHz - 30MHz – 10GHz

No emissions were detected within 20dB of the limit.

Maximum Output Power 49dBm per carrier, LTE Bandwidth 5.0MHz

Channel Position M	881.5MHz
--------------------	----------

Channel Position M - LTE QPSK: Bandwidth 5.0MHz - 30MHz – 10GHz

No emissions were detected within 20dB of the limit.

Maximum Output Power 49dBm per carrier, LTE Bandwidth 10.0MHz

Channel Position M	881.5MHz
--------------------	----------

Channel Position M - LTE QPSK: Bandwidth 10.0MHz - 30MHz – 10GHz

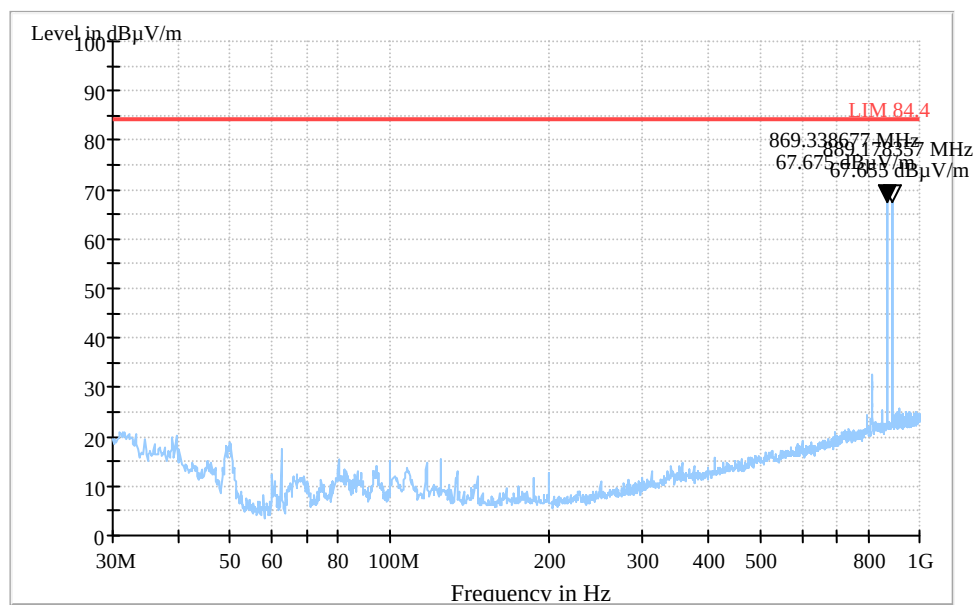
No emissions were detected within 20dB of the limit.

Configuration L-MIMO-MC 1 (2C)

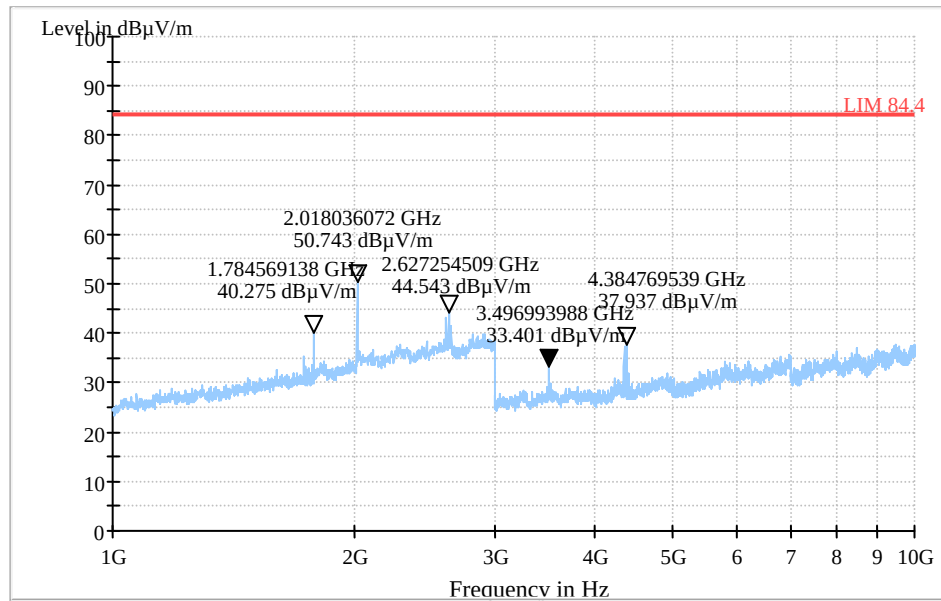
Maximum Output Power 46dBm per carrier , LTE Bandwidth 1.4MHz

Channel Position B _{RFBW}	869.7MHz + 888.3MHz
------------------------------------	---------------------

Channel Position B_{RFBW} - LTE QPSK: Bandwidth 1.4MHz - 30MHz – 1GHz



Channel Position B_{RFBW} - LTE QPSK: Bandwidth 1.4MHz - 1GHz – 10GHz



Configuration G+L-MIMO-MC 1 (1G+1L)

Maximum Output Power 46dBm per carrier , LTE Bandwidth 1.4MHz

Channel Position B _{RFBW}	Port A1: (G) 869.4MHz +(L) 888.3MHz
	Port A2: (G) 870.0MHz +(L) 888.3MHz
Channel Position M _{RFBW}	Port A1: (G) 871.6MHz +(L) 890.8MHz
	Port A2: (G) 872.2MHz +(L) 890.8MHz
Channel Position T _{RFBW}	Port A1: (G) 874.2MHz +(L) 893.3MHz
	Port A2: (G) 874.8MHz +(L) 893.3MHz

Channel Position B_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 30MHz – 10GHz

No emissions were detected within 20dB of the limit.

Channel Position M_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 30MHz – 10GHz

No emissions were detected within 20dB of the limit.

Channel Position T_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 30MHz – 10GHz

No emissions were detected within 20dB of the limit.

Configuration G+L-MIMO-MC 2 (2G+1L)

Maximum Output Power 43dBm per carrier for GSM

Maximum Output Power 46dBm per carrier for LTE, LTE Bandwidth 1.4MHz

Channel Position M _{RFBW}	Port A1: (G) 871.6MHz +(G) 872.8MHz +(L) 890.8MHz
	Port A2: (G) 872.2MHz +(G) 873.4MHz +(L) 890.8MHz

Channel Position M_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 30MHz – 10GHz

No emissions were detected within 20dB of the limit.

Configuration G+L-MIMO-MC 3 (2G+2L)

Maximum Output Power 43dBm per carrier, LTE Bandwidth 1.4MHz

Channel Position M _{RFBW}	Port A1: (G) 871.6MHz +(G) 872.8MHz +(L) 889.4MHz + (L) 890.8MHz
	Port A2: (G) 872.2MHz +(G) 873.4MHz +(L) 889.4MHz + (L) 890.8MHz

Channel Position M_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 30MHz – 10GHz

No emissions were detected within 20dB of the limit .

Configuration W+L-MIMO-MC 1 (1W+1L)

Maximum Output Power 46dBm per carrier, LTE Bandwidth 1.4MHz

Channel Position M _{RFBW}	Port A1: (W) 874.0MHz + (L) 890.8MHz
	Port A2: (W) 874.0MHz + (L) 890.8MHz

Channel Position M_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 1.4MHz - 30MHz – 10GHz

No emissions were detected within 20dB of the limit.

Configuration W+L-MIMO-MC 3 (2W+1L)

Maximum Output Power 43dBm per carrier for WCDMA

Maximum Output Power 46dBm per carrier for LTE, LTE Bandwidth 1.4MHz

Channel Position M _{RFBW}	Port A1: (W) 874.0MHz + (W) 879.0MHz + (L) 890.8MHz
	Port A2: (W) 874.0MHz + (W) 879.0MHz + (L) 890.8MHz

Channel Position M_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 1.4MHz - 30MHz – 10GHz

No emissions were detected within 20dB of the limit.

Configuration W+L-MIMO-MC 2 (2W+2L)

Maximum Output Power 43dBm per carrier, LTE Bandwidth 1.4MHz

Channel Position M _{RFBW}	Port A1: (W) 874.0MHz + (W) 879.0MHz + (L) 889.4MHz + (L) 890.8MHz
	Port A2: (W) 874.0MHz + (W) 879.0MHz + (L) 889.4MHz + (L) 890.8MHz

Channel Position M_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 1.4MHz - 30MHz – 10GHz

No emissions were detected within 20dB of the limit.

Limit	-13dBm / 84.4dBμV/m
-------	---------------------

Remarks

The EUT does not exceed -13dBm / 84.4dBμV/m at the measured frequencies.

2.5 CONDUCTED SPURIOUS EMISSIONS

2.5.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 22, Clause 22.917(a)(b)
Industry Canada RSS-132, Clause 5.5

2.5.2 Equipment Under Test

RRUS 01 B5, KRC 118 70/3, S/N: D168196972
RRUS 01 B5, KRC 118 70/3, S/N: D168196991

2.5.3 Date of Test and Modification State

04 to 11 July 2014 - Modification State 0

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.5 Environmental Conditions

Ambient Temperature	23.5 – 25.5°C
Relative Humidity	22.5 – 23.5%

2.5.6 Test Method

In accordance with FCC CFR 47 Part 2, Clause 2.1051, the spurious emissions from the antenna terminal were measured. In accordance with FCC CFR 47 Part 22, Clause 22.917(a) and Industry Canada RSS-132, Clause 5.5, any emissions outside of the block edges shall be attenuated by at least $43 + 10 \log (P)$.

The EUT was set to transmit at its maximum rated output power. The path loss between the Spectrum Analyser and the EUT was measured with the worst case level being entered as a Reference Level Offset. In accordance with 22.917(a)(b), the RBW was set to 100 kHz and a Peak detector with the trace set to Max Hold was used as the worst case. The frequency spectrum was then investigated between 9 kHz and 9GHz. Testing was carried out on the Bottom, Middle and Top channels.

For MIMO mode configurations, the limit was adjusted with a correction of -3dB $[10\log 2]$ by using the Measure and Add $10\log(N)$ dB technique according to FCC KDB662911 D01 accounting for simultaneous transmission from antenna ports RF A1 and RF A2.

The measurements were performed on the output connector RF A1. Limited complementary measurement were done at output conector RF A2 to verify identical performance for both transmitter chains in MIMO mode

The results are shown in the plots below.

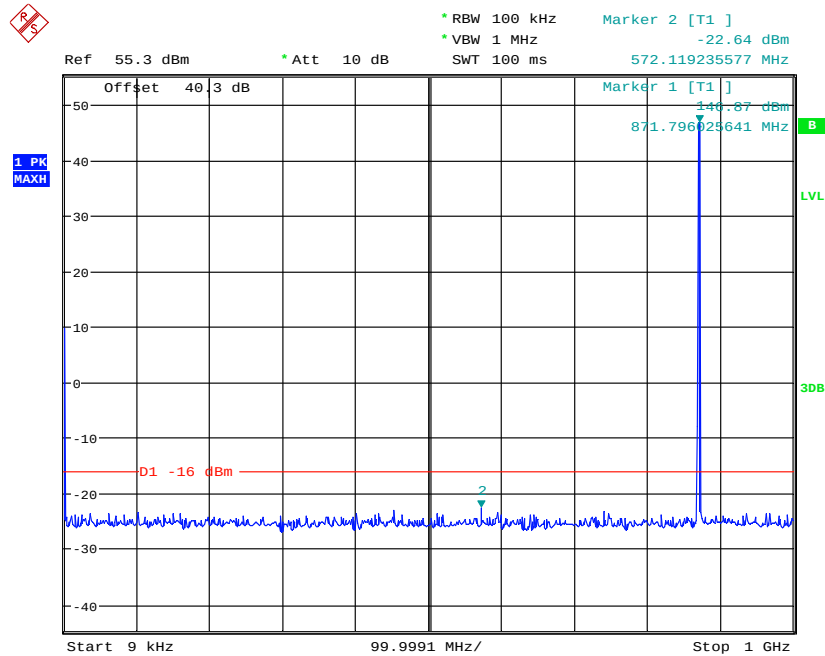
2.5.7 Test Results

Configuration L-MIMO-SC

Maximum Output Power 49dBm per carrier

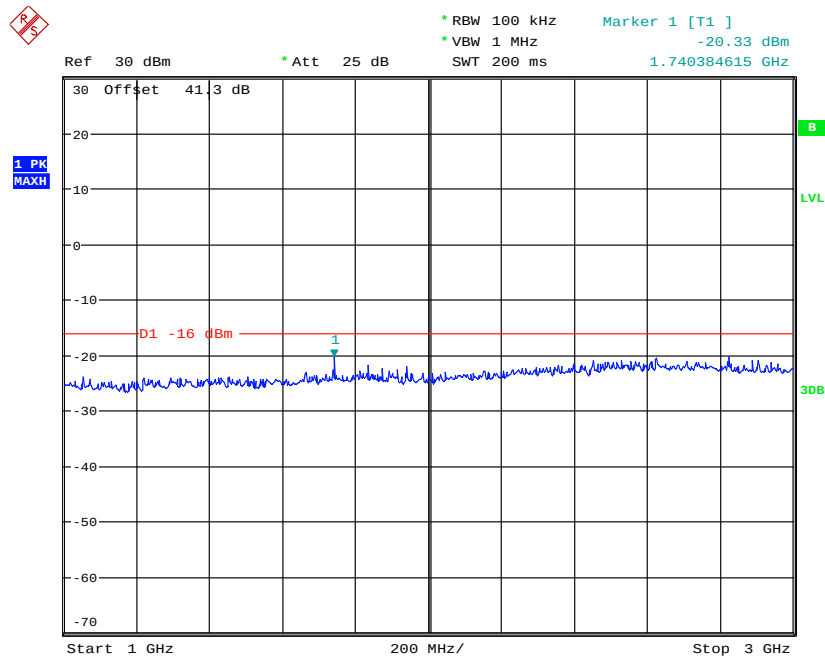
Channel Position	Bandwidth	Channel Frequency
Channel Position B	1.4MHz	869.7MHz
	10.0MHz	874.0MHz
Channel Position M	1.4MHz	881.5MHz
	10.0MHz	
Channel Position T	1.4MHz	893.3MHz
	10.0MHz	889.0MHz

Channel Position B - QPSK / Bandwidth 1.4MHz - 9kHz – 1GHz



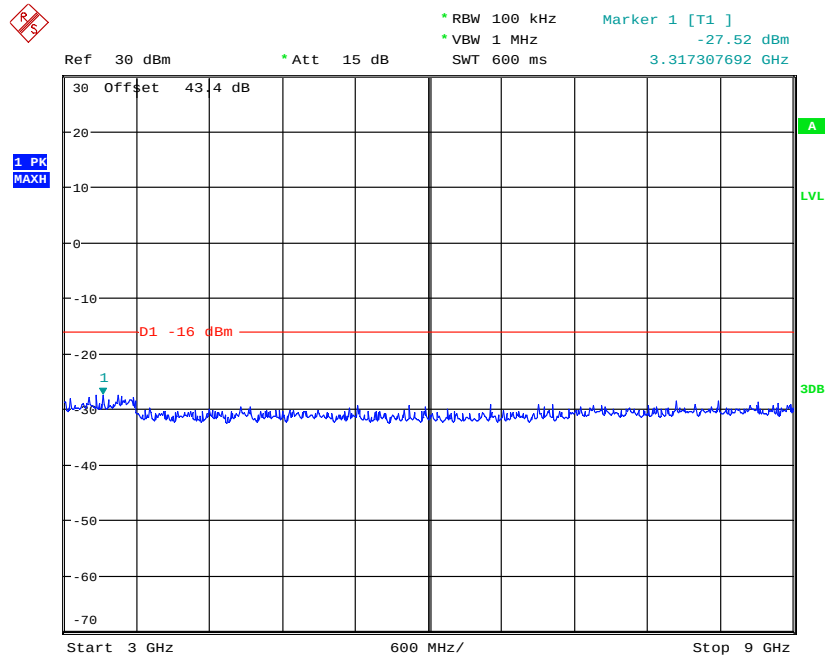
Date: 4.JUL.2014 13:46:07

Channel Position B - QPSK / Bandwidth 1.4MHz - 1GHz – 3GHz



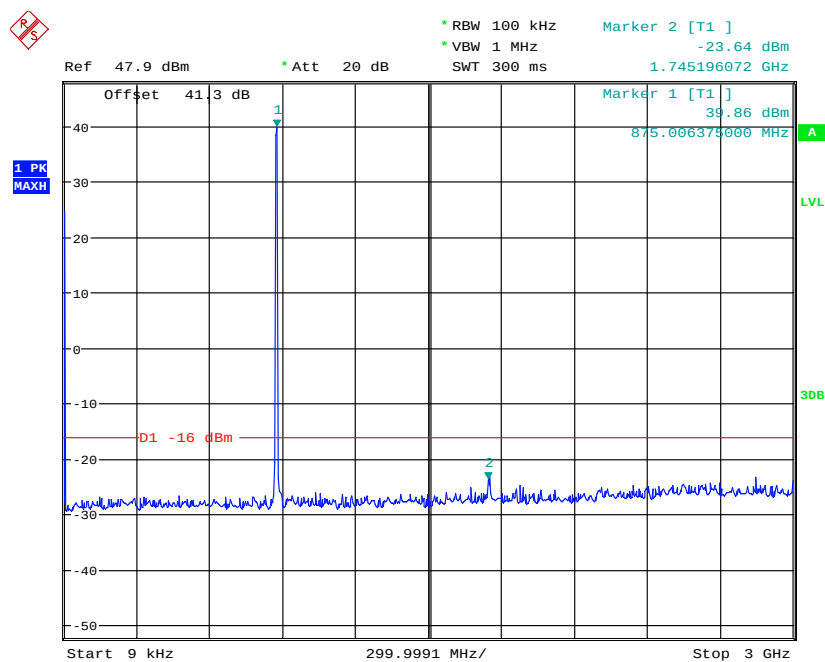
Date: 4.JUL.2014 13:48:21

Channel Position B - QPSK / Bandwidth 1.4MHz - 3GHz – 9GHz



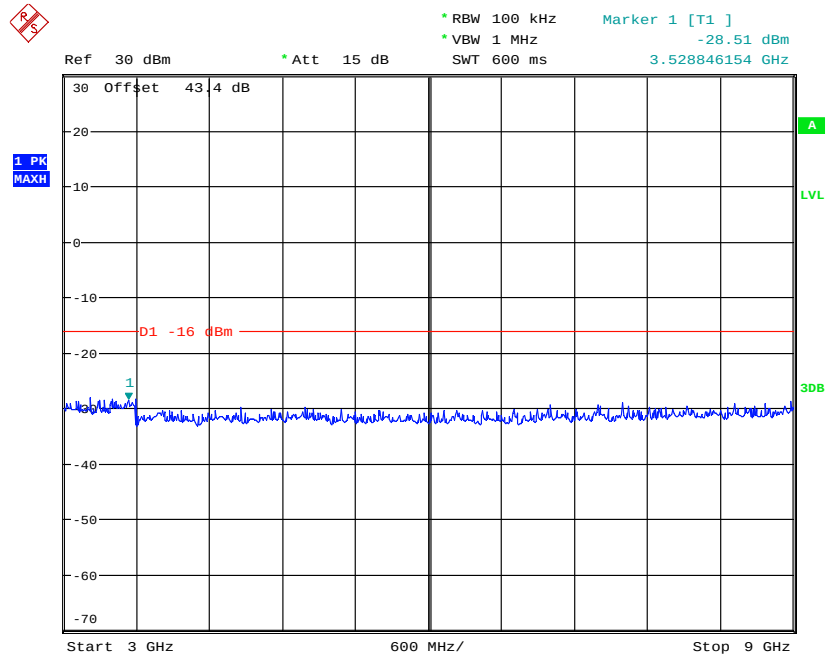
Date: 4.JUL.2014 13:49:26

Channel Position B - QPSK / Bandwidth 10.0MHz - 9kHz – 3GHz



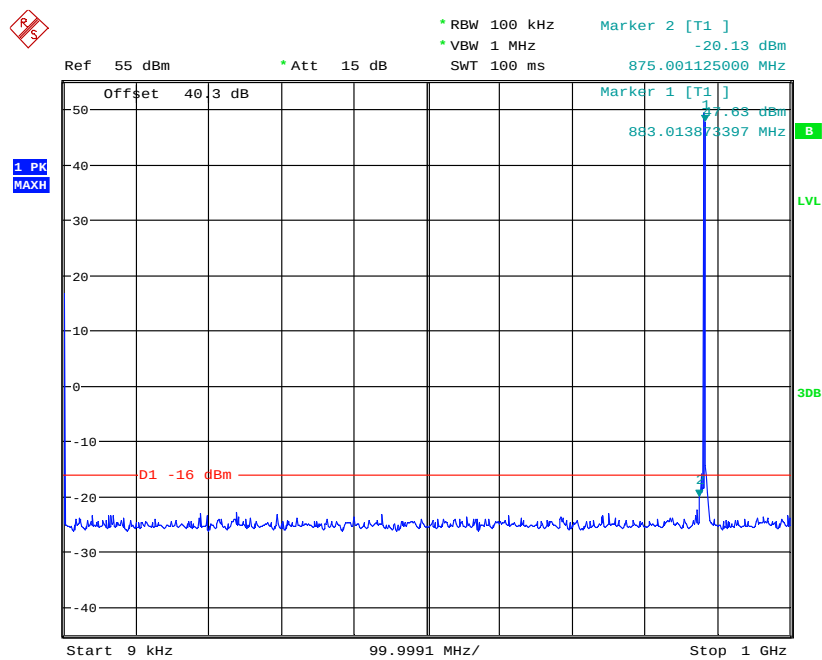
Date: 16.JUL.2014 11:29:36

Channel Position B - QPSK / Bandwidth 10.0MHz - 3GHz – 9GHz



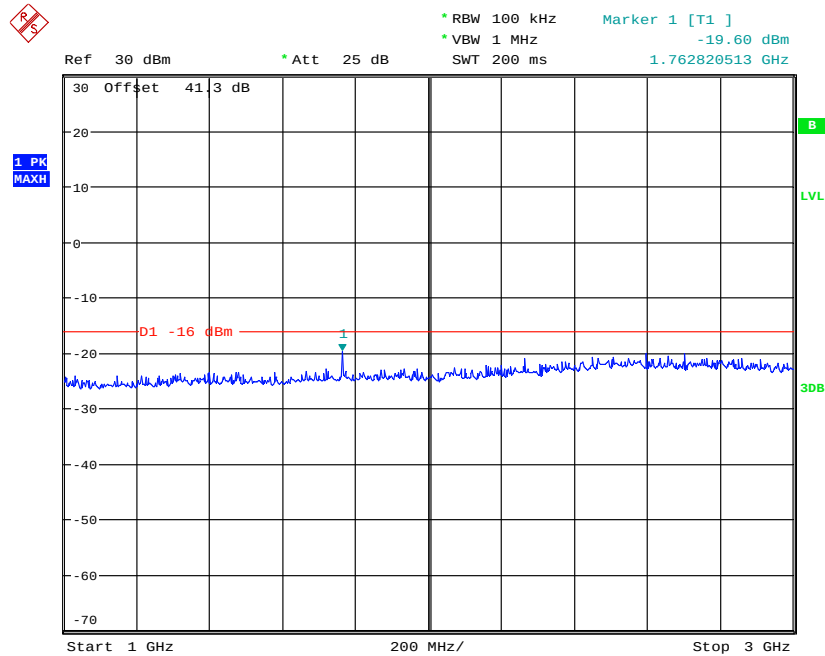
Date: 16.JUL.2014 11:30:29

Channel Position M - QPSK / Bandwidth 1.4MHz - 9kHz – 1GHz



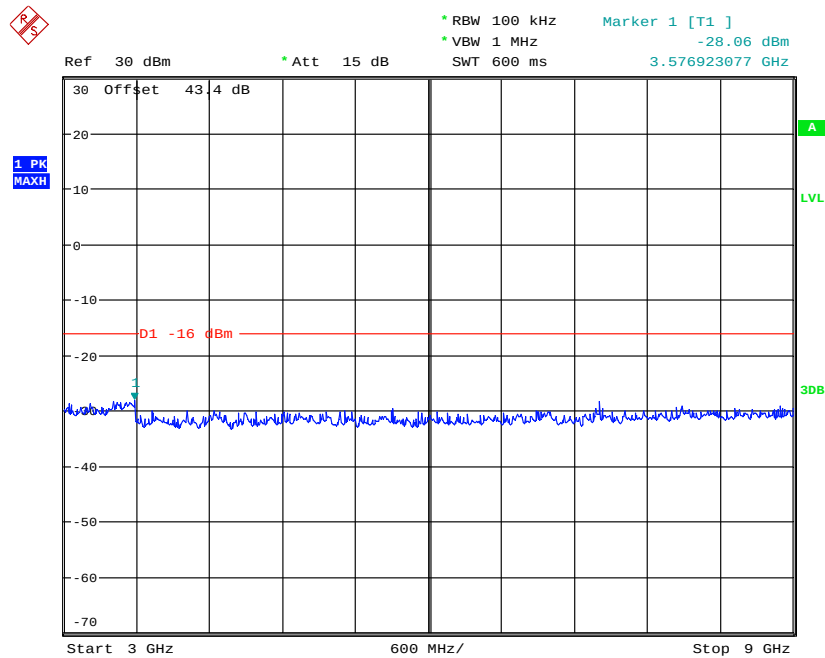
Date: 4.JUL.2014 13:54:35

Channel Position M - QPSK / Bandwidth 1.4MHz - 1GHz – 3GHz



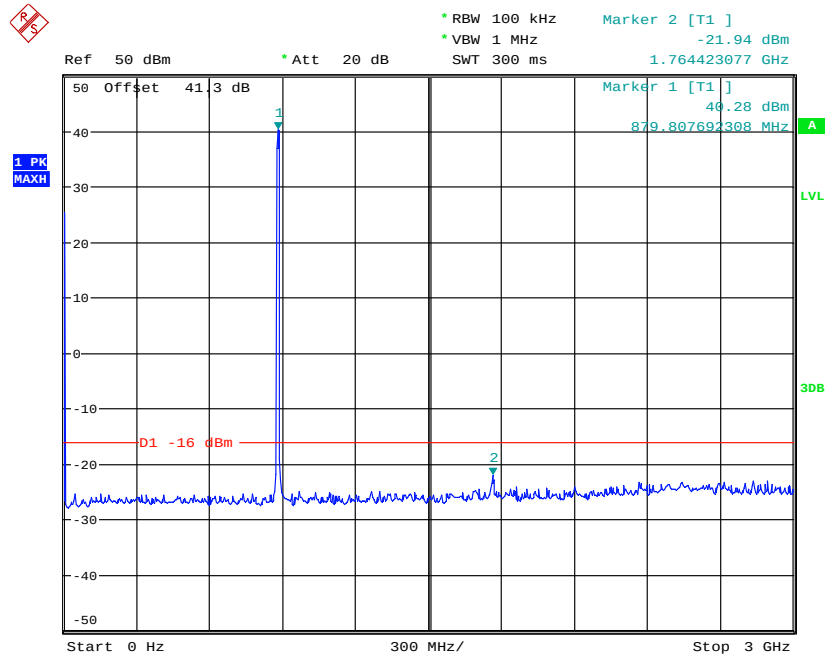
Date: 4.JUL.2014 13:51:36

Channel Position M - QPSK / Bandwidth 1.4MHz - 3GHz – 9GHz



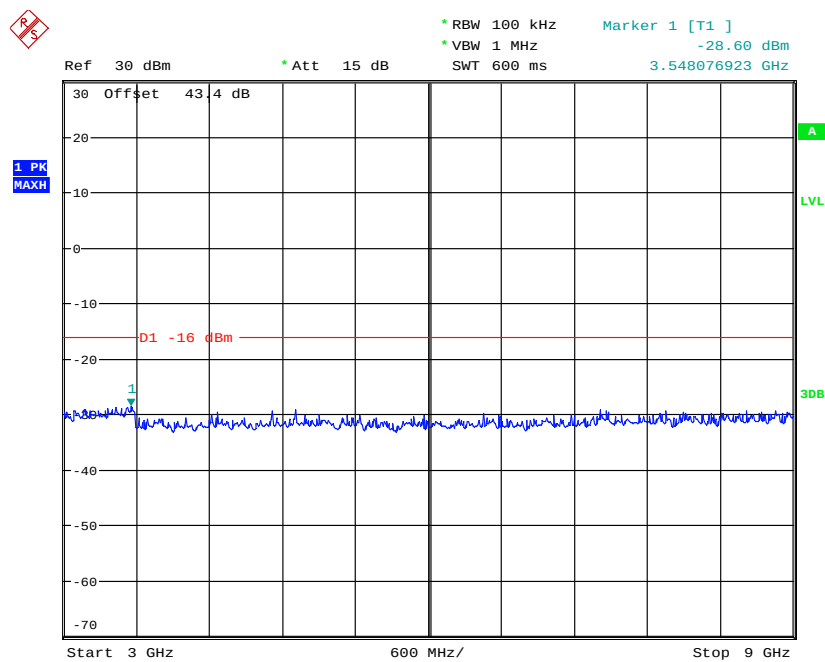
Date: 4.JUL.2014 13:50:33

Channel Position M - QPSK / Bandwidth 10.0MHz - 9kHz – 3GHz



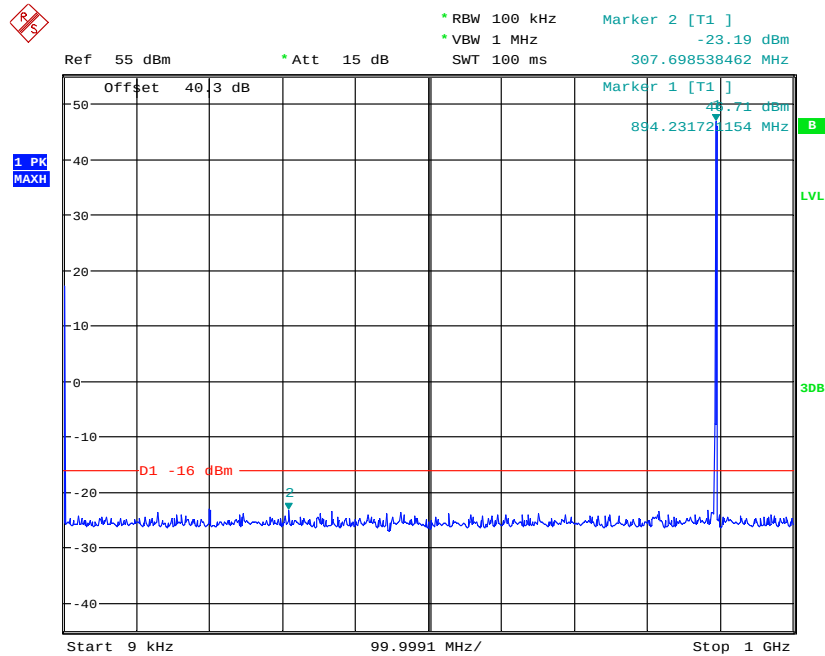
Date: 16.JUL.2014 11:25:10

Channel Position M - QPSK / Bandwidth 10.0MHz - 3GHz – 9GHz



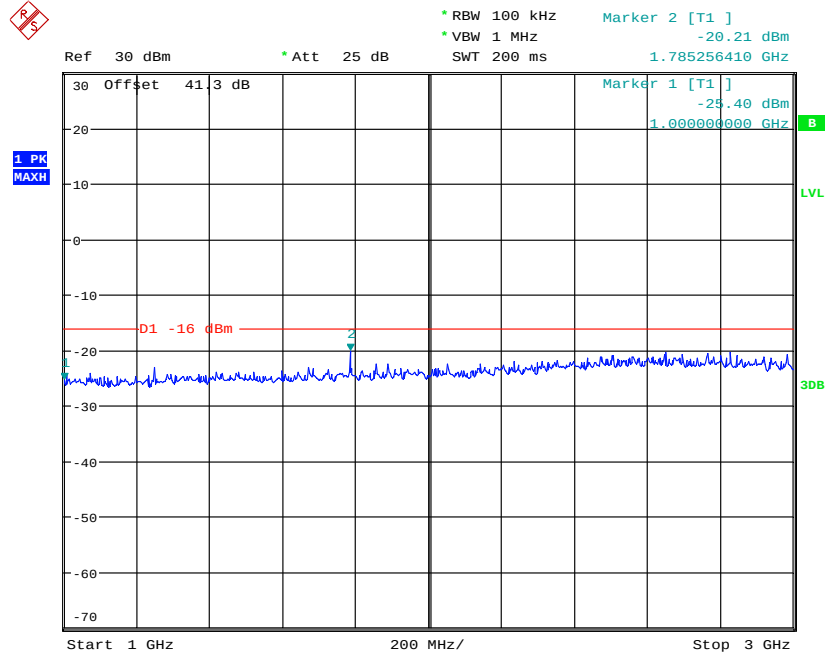
Date: 16.JUL.2014 11:25:51

Channel Position T- QPSK / Bandwidth 1.4MHz - 9kHz – 1GHz



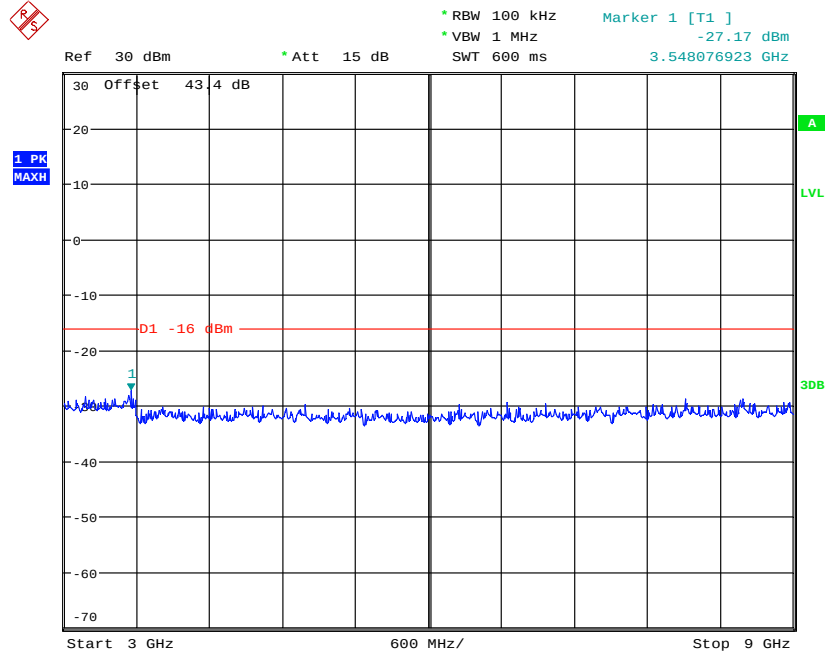
Date: 4.JUL.2014 13:57:00

Channel Position T- QPSK / Bandwidth 1.4MHz - 1GHz – 3GHz



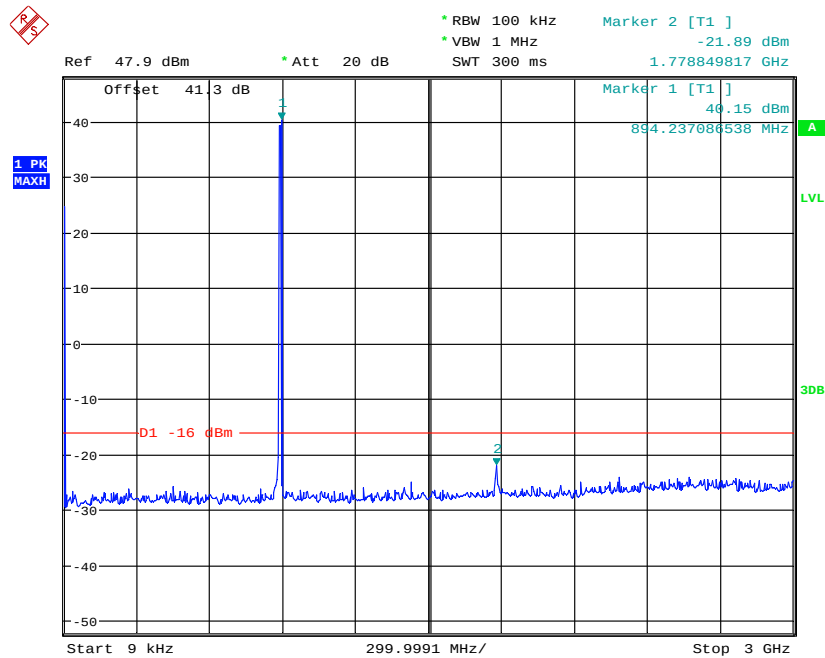
Date: 4.JUL.2014 13:59:56

Channel Position T - QPSK / Bandwidth 1.4MHz - 3GHz – 9GHz



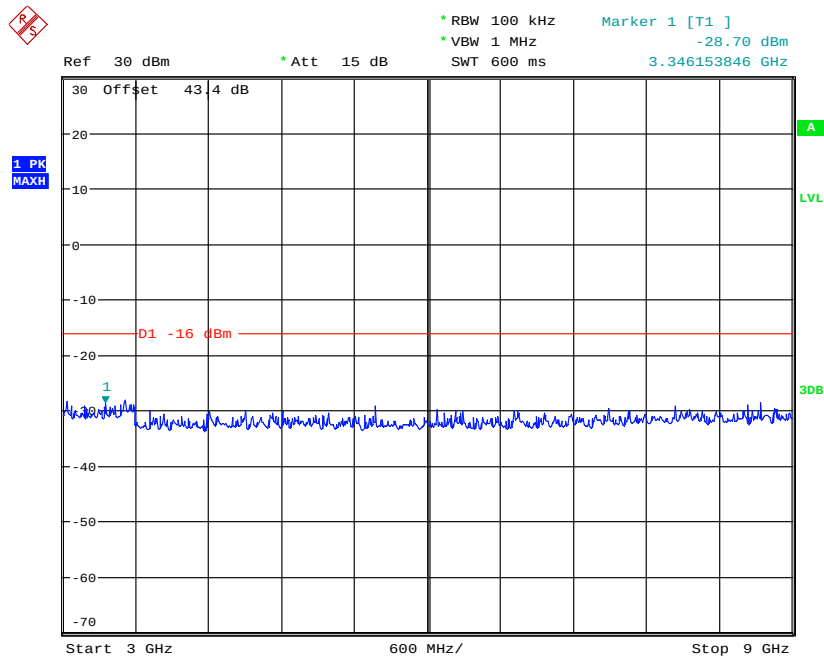
Date: 4.JUL.2014 14:00:47

Channel Position T - QPSK / Bandwidth 10.0MHz - 9kHz – 3GHz



Date: 16.JUL.2014 11:28:09

Channel Position T- QPSK / Bandwidth 10.0MHz - 3GHz – 9GHz



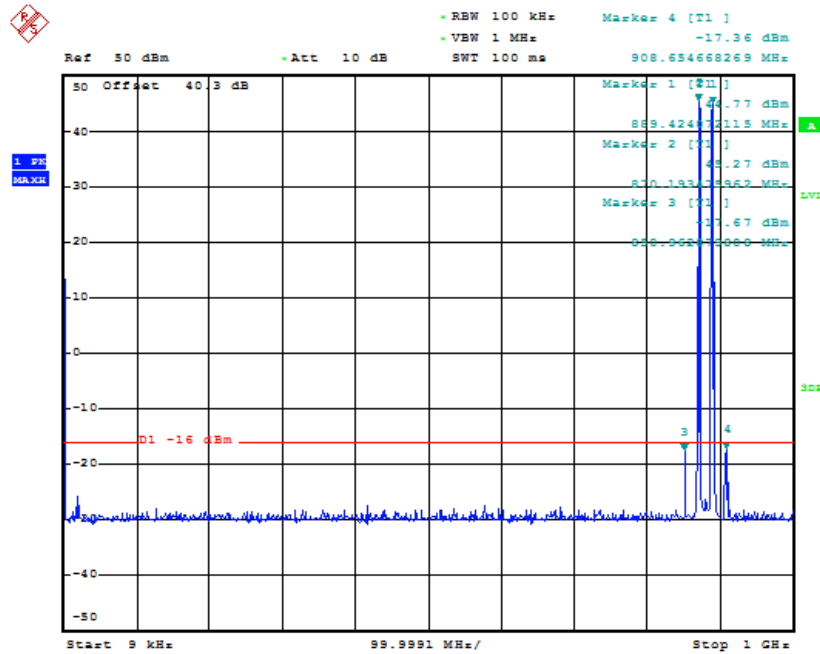
Date: 16.JUL.2014 11:26:43

Configuration L-MIMO-MC 1 (2C)

Maximum Output Power 46dBm per carrier

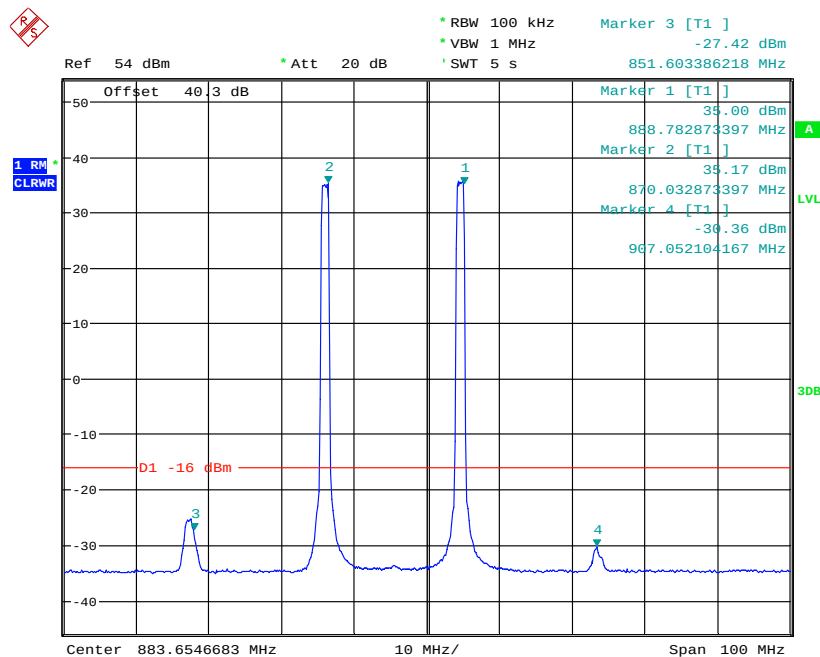
Channel Position	Bandwidth	Channel Frequency
Channel Position B_{RFBW}	1.4MHz	869.7 MHz +888.3 MHz
	10.0MHz	874.0 MHz +884.0 MHz
Channel Position M_{RFBW}	1.4MHz	872.2 MHz +890.8 MHz
	10.0MHz	876.5 MHz +886.5 MHz
Channel Position T_{RFBW}	1.4MHz	874.7 MHz +893.3 MHz
	10.0MHz	879.0 MHz +889.0 MHz

Channel Position B_{RFBW} - QPSK / Bandwidth 1.4MHz - 9kHz – 1GHz



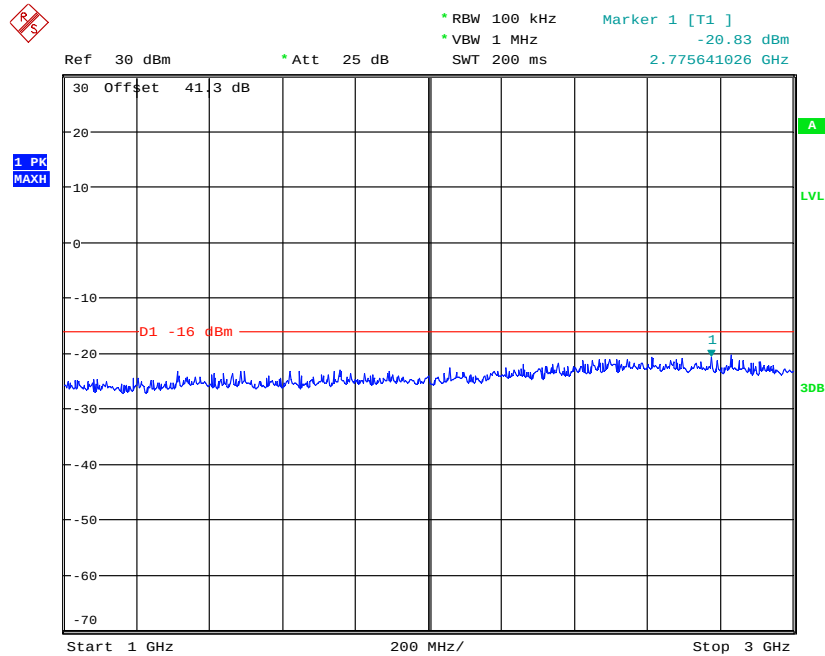
Date: 4.JUL.2014 15:51:32

Channel Position B_{RFBW} - QPSK / Bandwidth 1.4MHz - 833 MHz – 933MHz



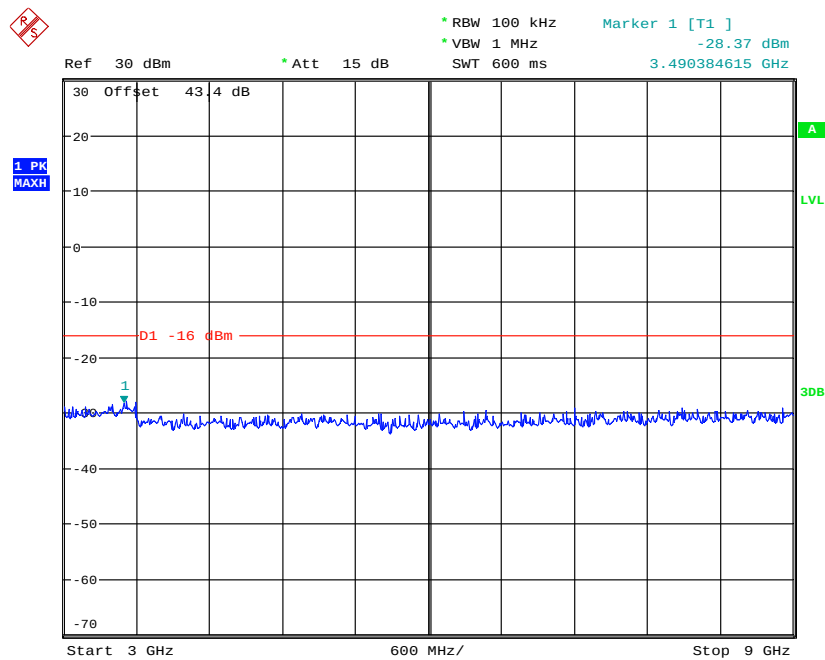
Date: 4.JUL.2014 15:54:14

Channel Position B_{RFBW} - QPSK / Bandwidth 1.4MHz - 1GHz – 3GHz



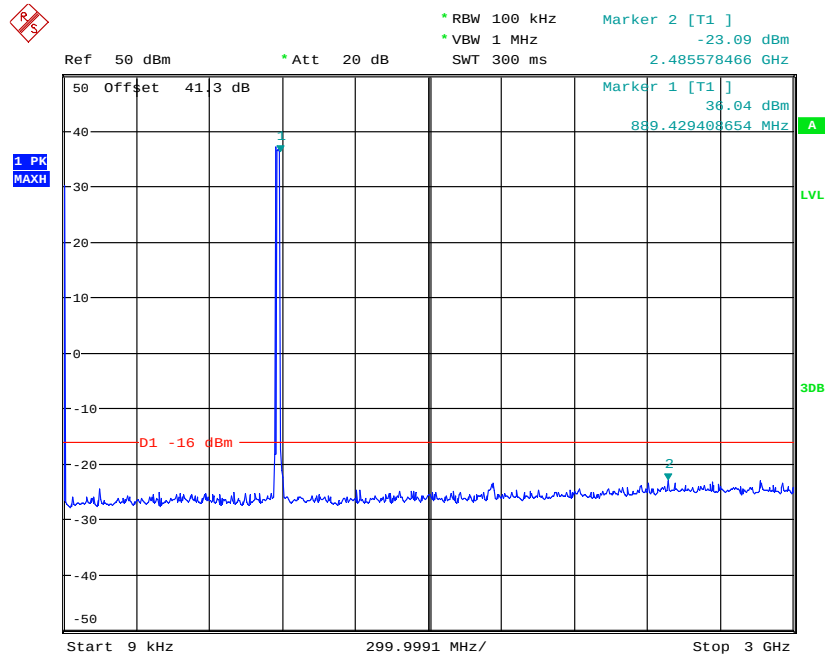
Date: 4.JUL.2014 15:55:54

Channel Position B_{RFBW} - QPSK / Bandwidth 1.4MHz - 3GHz – 9GHz



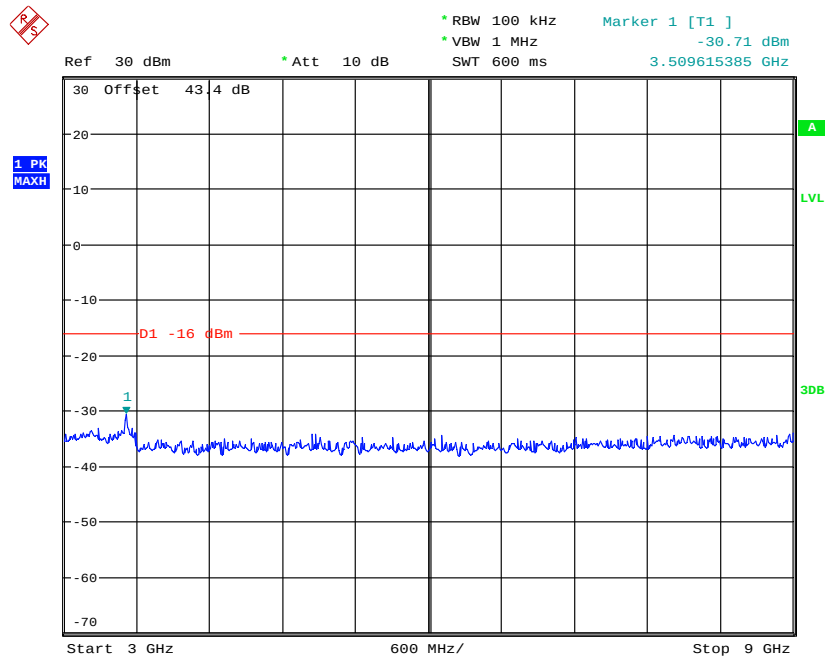
Date: 4.JUL.2014 15:38:31

Channel Position B_{RFBW} - QPSK / Bandwidth 10.0MHz - 9kHz – 3GHz



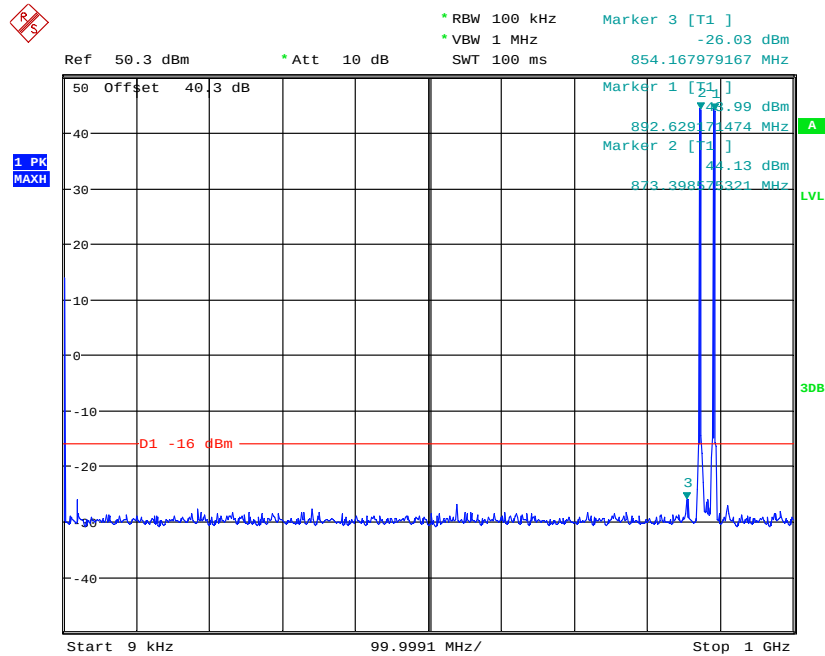
Date: 4.JUL.2014 15:35:21

Channel Position B_{RFBW} - QPSK / Bandwidth 10.0MHz - 3GHz – 9GHz



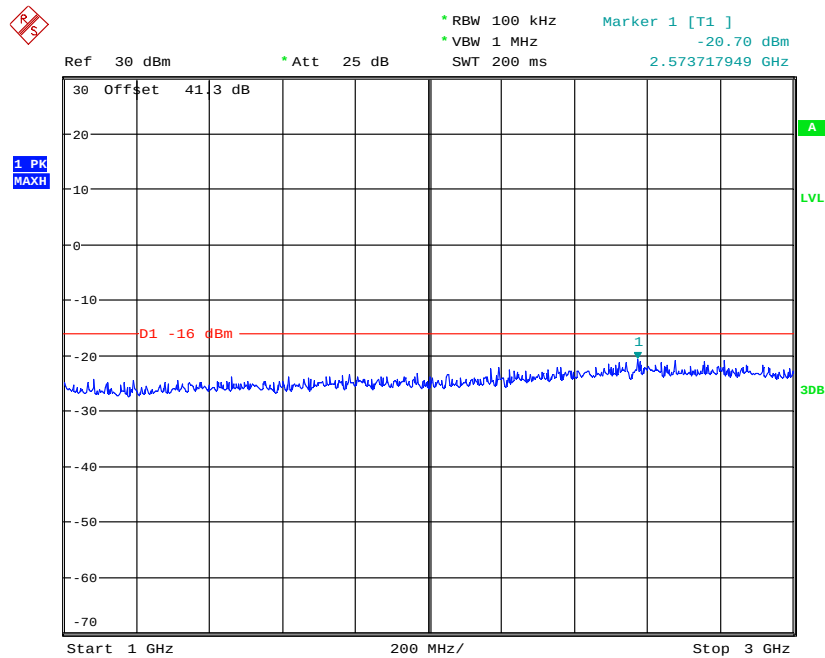
Date: 4.JUL.2014 15:36:11

Channel Position M_{RFBW} - QPSK / Bandwidth 1.4MHz - 9kHz – 1GHz



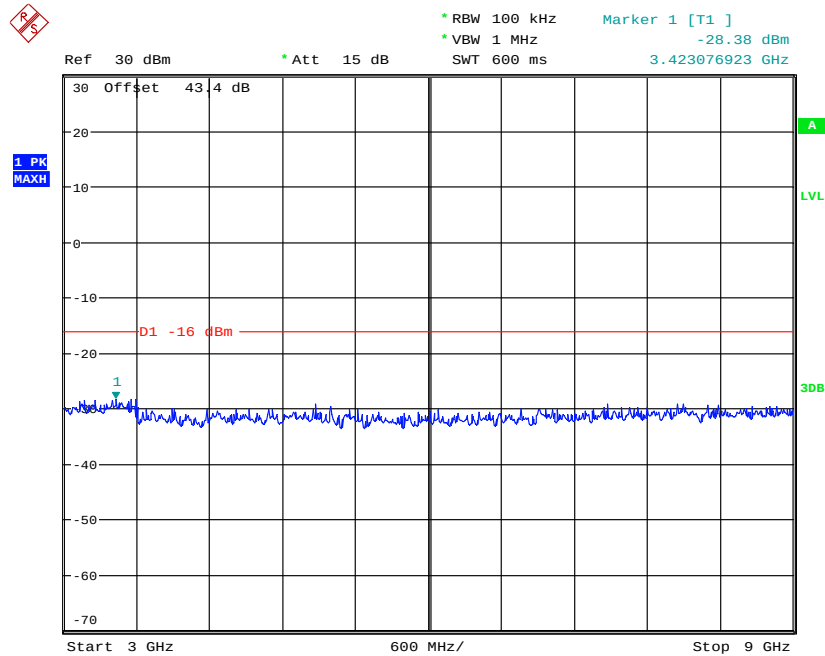
Date: 4.JUL.2014 15:59:25

Channel Position M_{RFBW} - QPSK / Bandwidth 1.4MHz - 1GHz – 3GHz



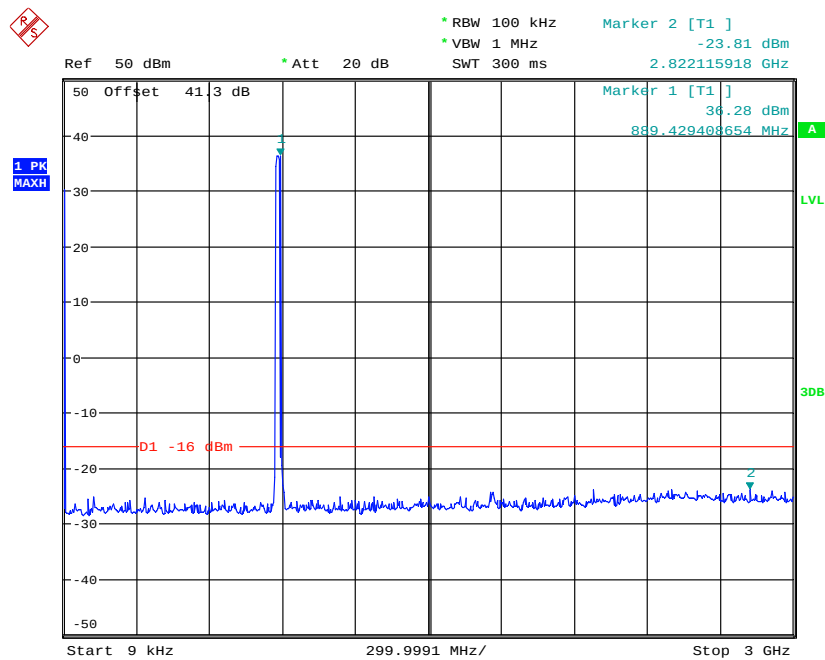
Date: 4.JUL.2014 15:57:46

Channel Position M_{RFBW} - QPSK / Bandwidth 1.4MHz - 3GHz – 9GHz



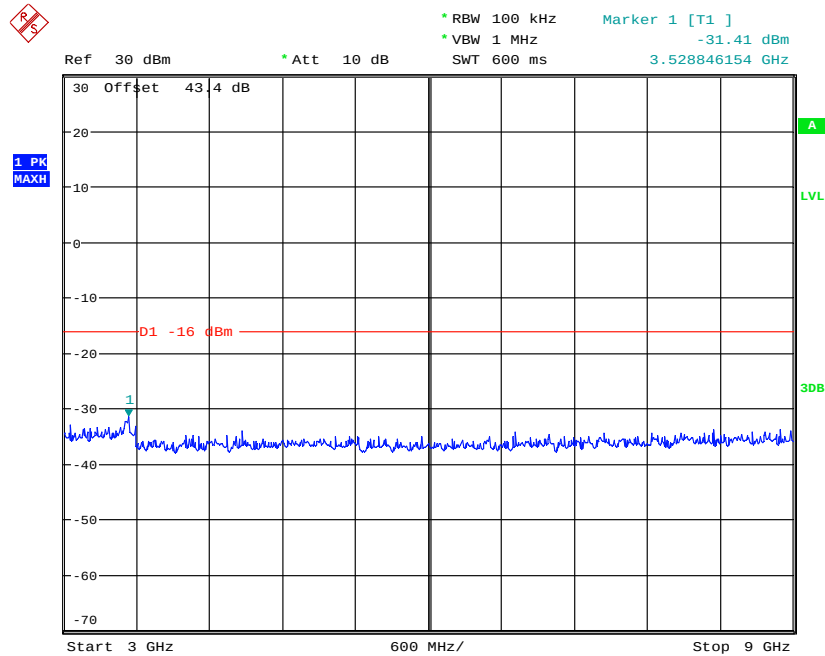
Date: 4.JUL.2014 15:58:23

Channel Position M_{RFBW} - QPSK / Bandwidth 10.0MHz - 9kHz – 3GHz



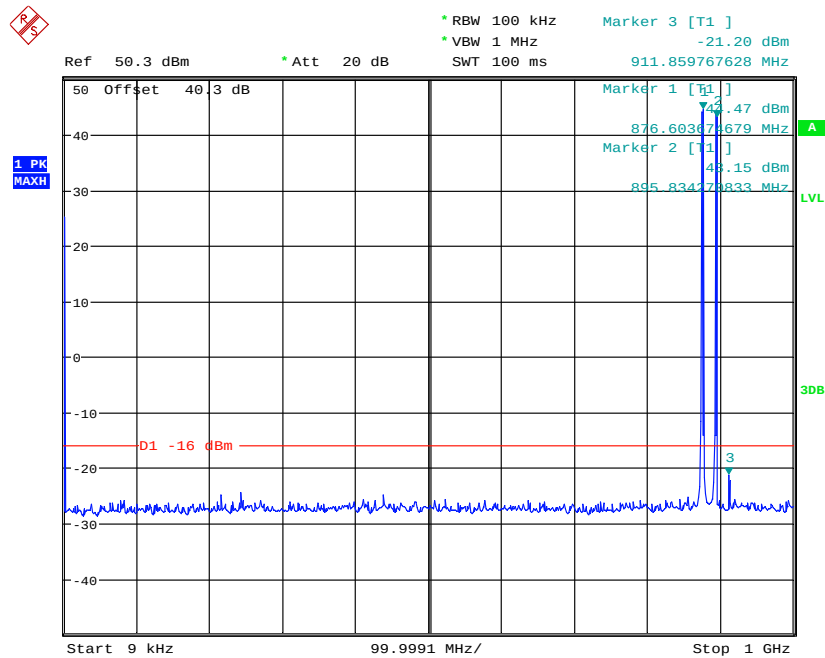
Date: 4.JUL.2014 15:32:39

Channel Position M_{RFBW} - QPSK / Bandwidth 10.0MHz - 3GHz – 9GHz



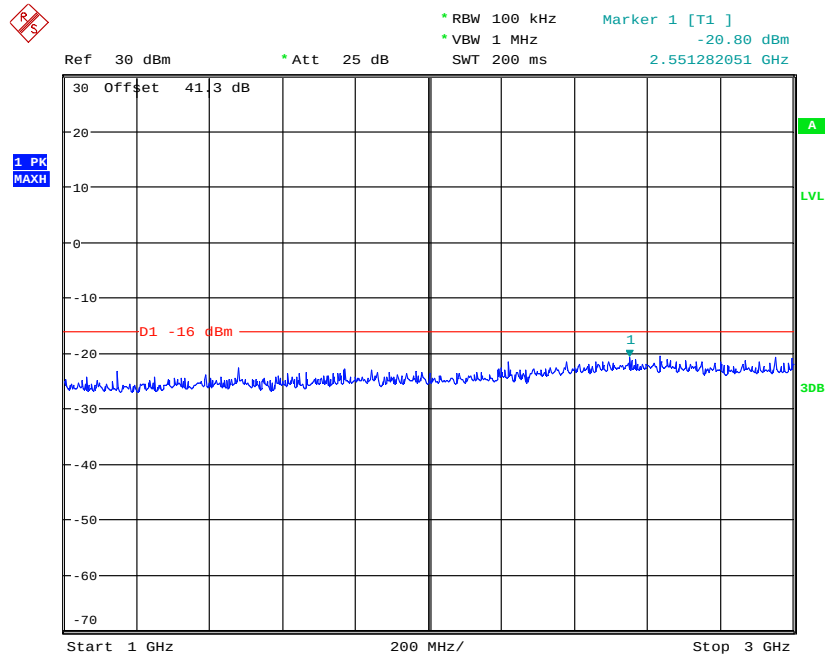
Date: 4.JUL.2014 15:31:49

Channel Position T_{RFBW} - QPSK / Bandwidth 1.4MHz - 9kHz – 1GHz



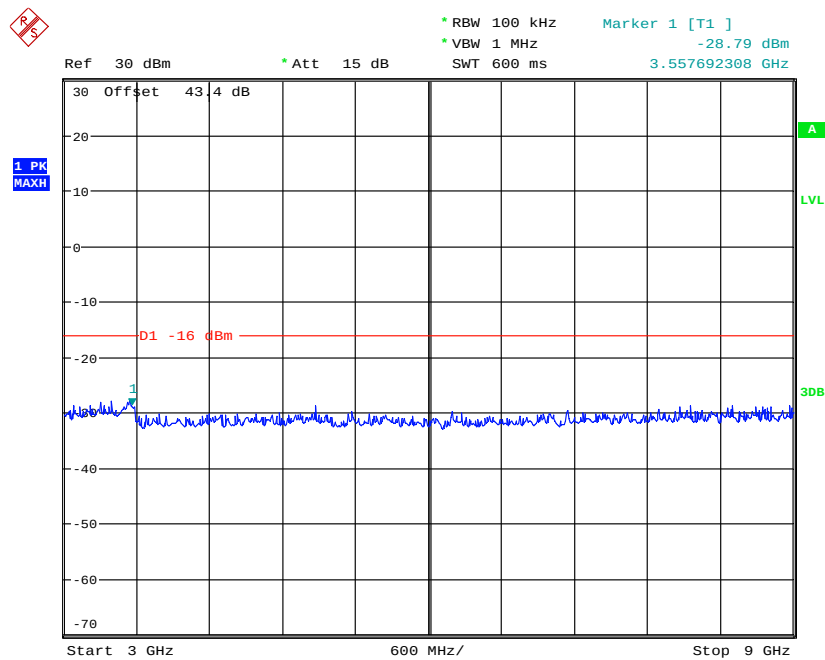
Date: 4.JUL.2014 16:01:34

Channel Position T_{RFBW} - QPSK / Bandwidth 1.4MHz - 1GHz – 3GHz



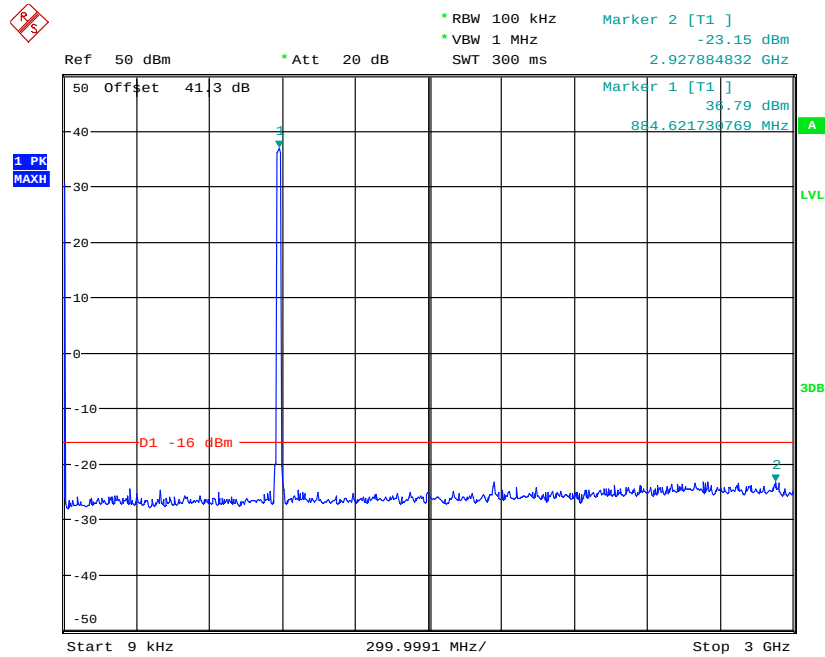
Date: 4.JUL.2014 16:02:15

Channel Position T_{RFBW} - QPSK / Bandwidth 1.4MHz - 3GHz – 9GHz



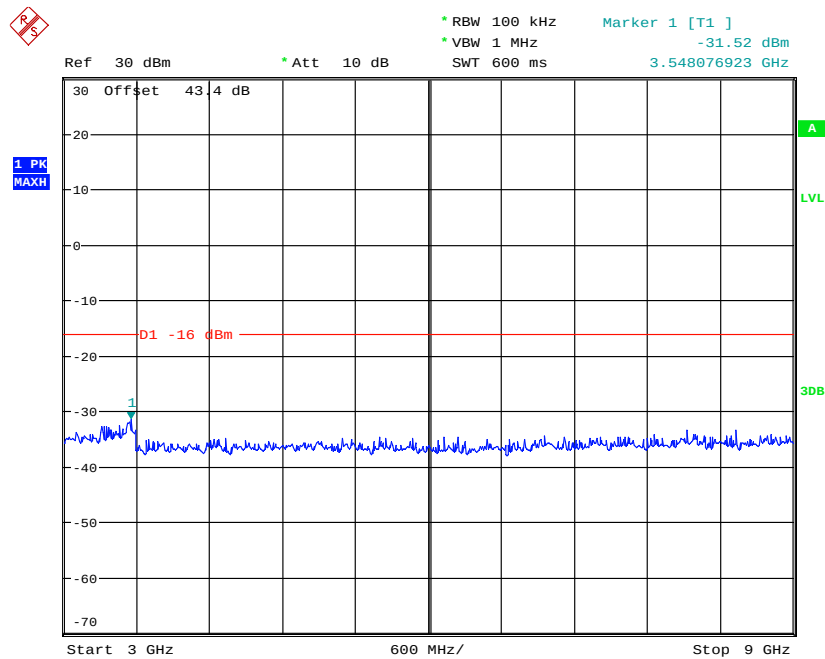
Date: 4.JUL.2014 16:02:54

Channel Position T_{RFBW} - QPSK / Bandwidth 10.0MHz - 9kHz – 3GHz



Date: 4.JUL.2014 15:28:03

Channel Position T_{RFBW} - QPSK / Bandwidth 10.0MHz - 3GHz – 9GHz



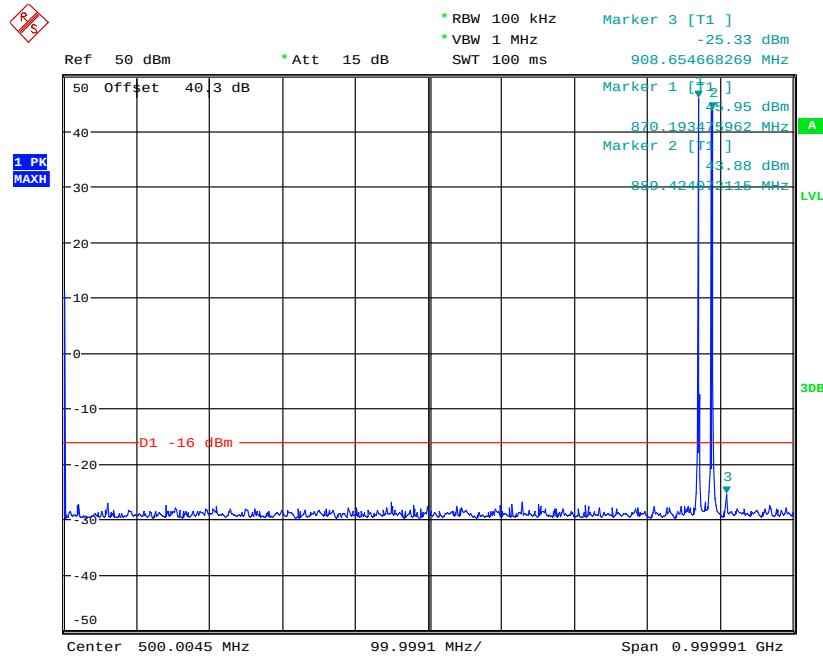
Date: 4.JUL.2014 15:28:48

Configuration G+L-MIMO-MC 1 (1G + 1L)

Maximum Output Power 46dBm per carrier, LTE Bandwidth 1.4MHz

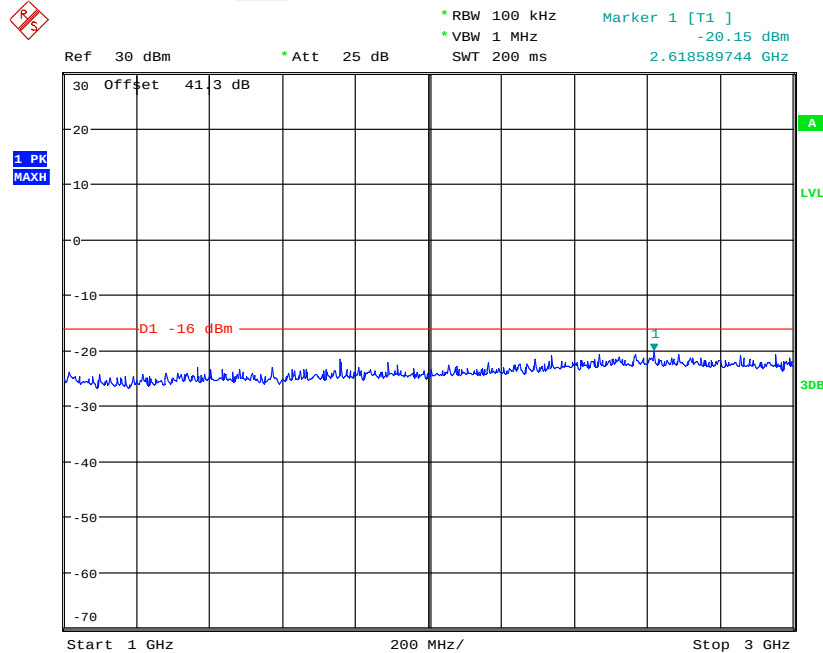
Channel Position	Channel Frequencies
Channel Position B_{RFBW}	Port A1: (G) 869.4MHz + (L) 883.3MHz Port A2: (G) 870.0MHz + (L) 883.3MHz
Channel Position M_{RFBW}	Port A1: (G) 871.6MHz + (L) 890.8MHz Port A2: (G) 872.2MHz + (L) 890.8MHz
Channel Position T_{RFBW}	Port A1: (G) 874.2MHz + (L) 893.3MHz Port A2: (G) 874.8MHz + (L) 893.3MHz

Channel Position B_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 9kHz – 1GHz



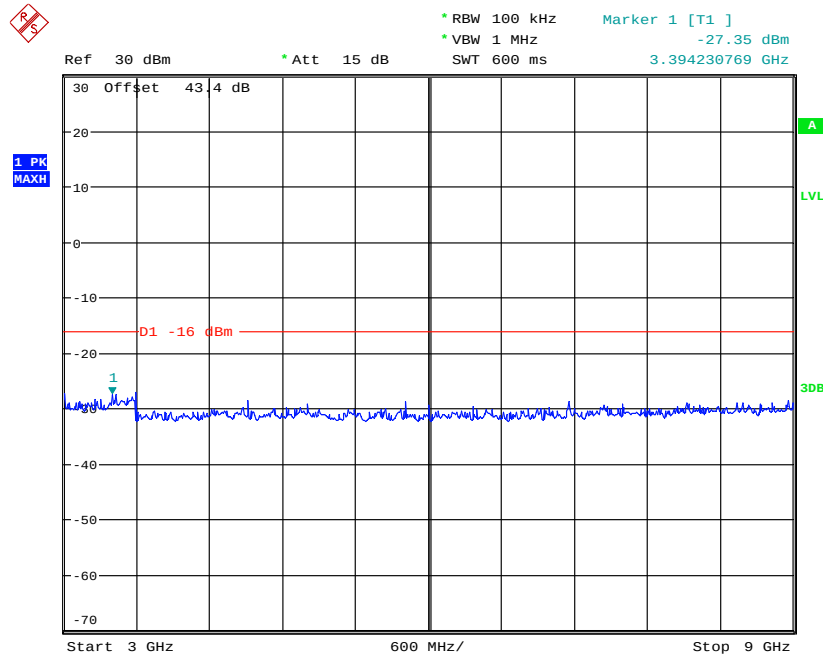
Date: 10.JUL.2014 10:36:28

Channel Position B_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 1GHz – 3GHz



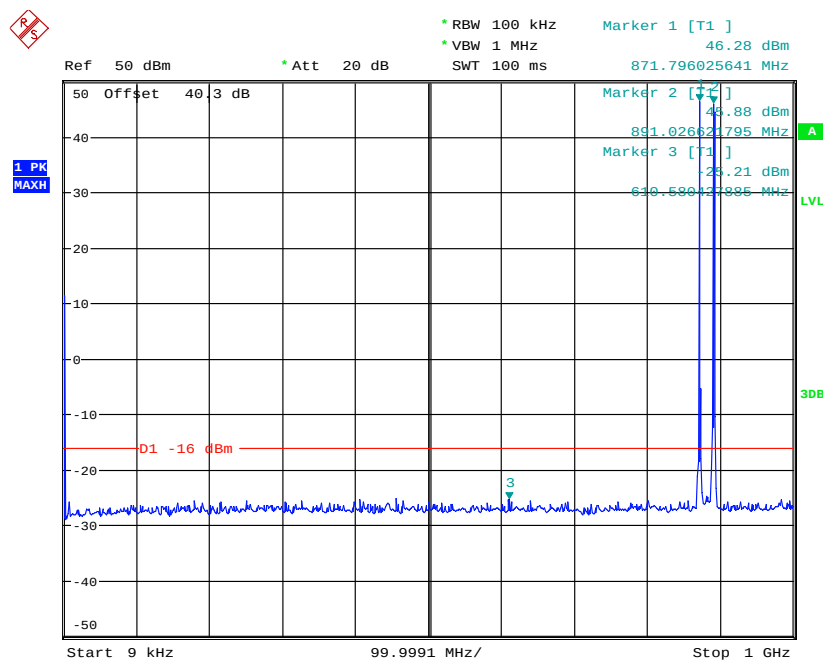
Date: 10.JUL.2014 10:38:35

Channel Position B_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 3GHz – 9GHz



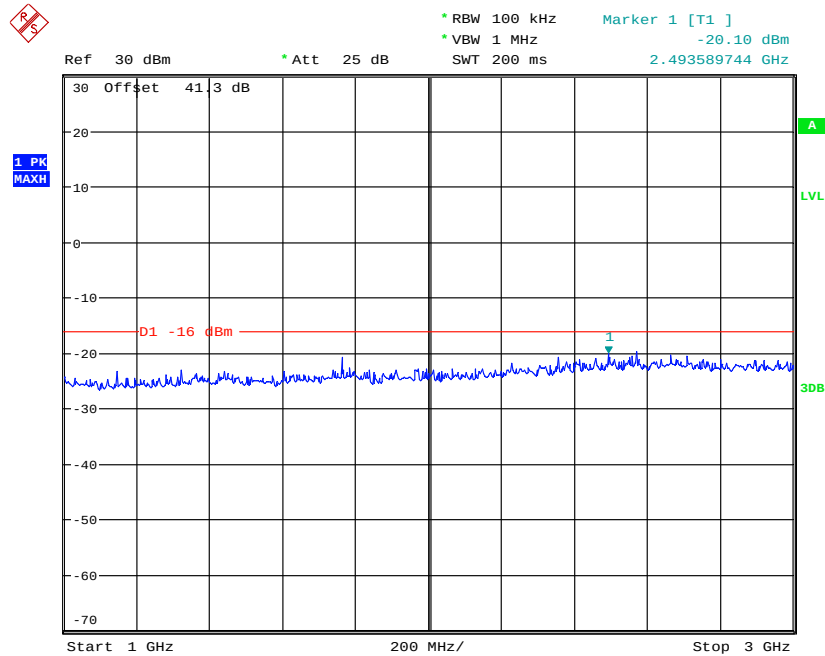
Date: 10.JUL.2014 10:40:21

Channel Position M_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 9kHz – 1GHz



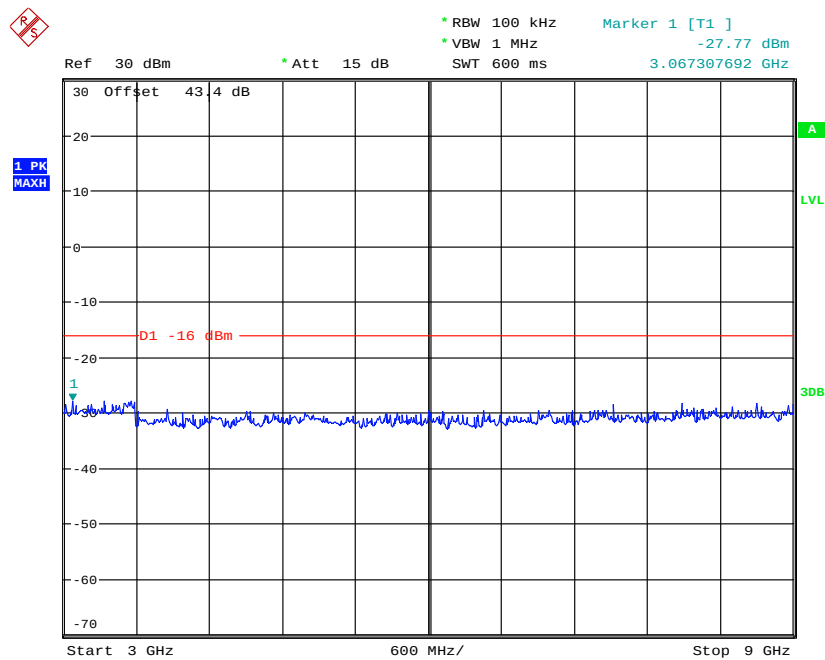
Date: 10.JUL.2014 10:44:15

Channel Position M_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 1GHz – 3GHz



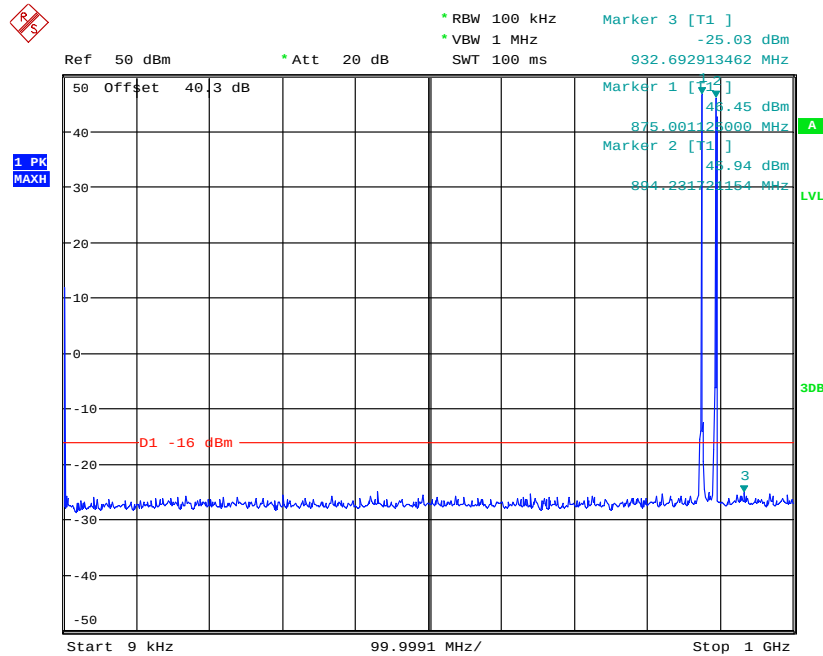
Date: 10.JUL.2014 10:45:50

Channel Position M_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 3GHz – 9GHz



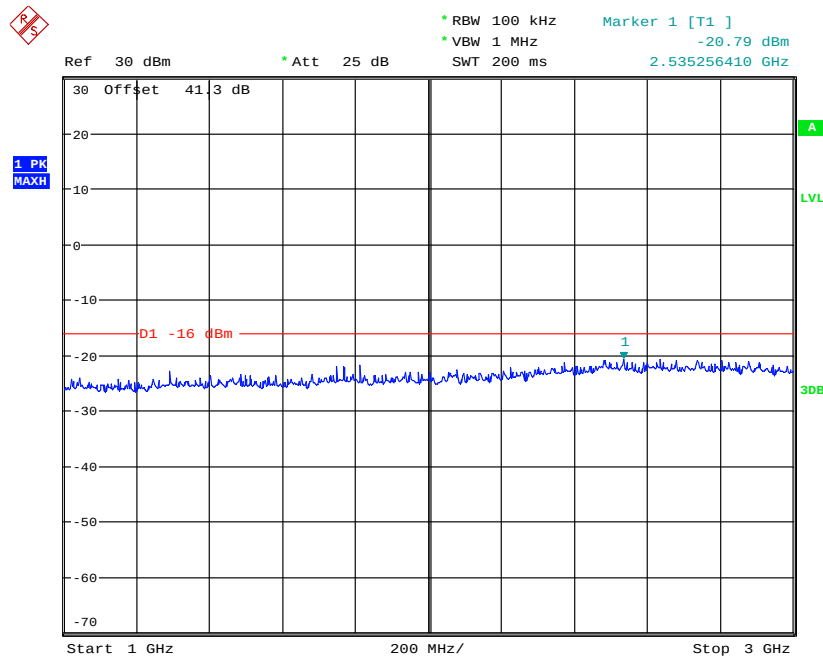
Date: 10.JUL.2014 10:47:33

Channel Position T_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 9kHz – 1GHz



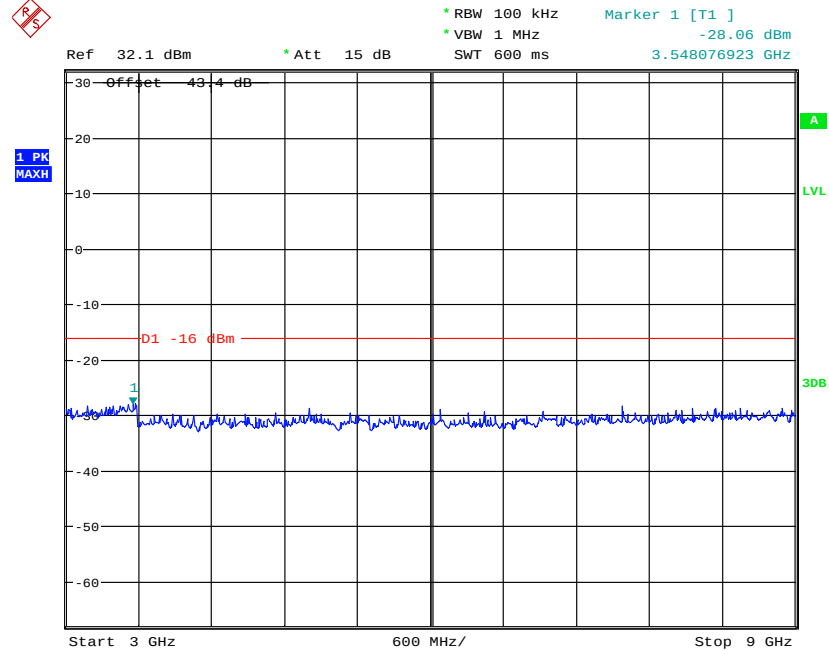
Date: 10.JUL.2014 10:50:33

Channel Position T_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 1GHz – 3GHz



Date: 10.JUL.2014 10:52:00

Channel Position T_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 3GHz - 9GHz



Date: 10.JUL.2014 10:53:58

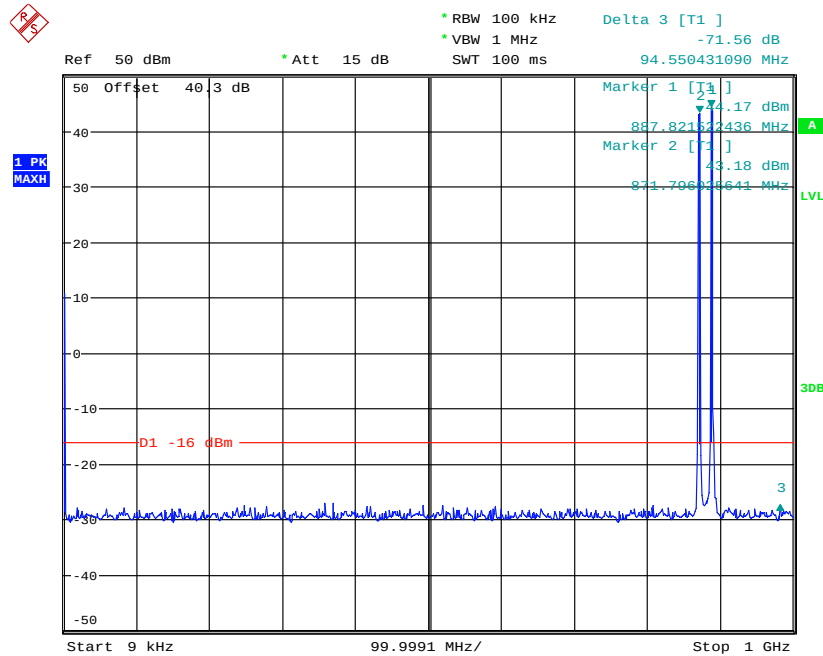
Configuration G+L-MIMO-MC 2 (2G + 1L)

Maximum Output Power 43dBm per carrier for GSM

Maximum Output Power 46dBm per carrier for LTE, LTE Bandwidth 1.4MHz

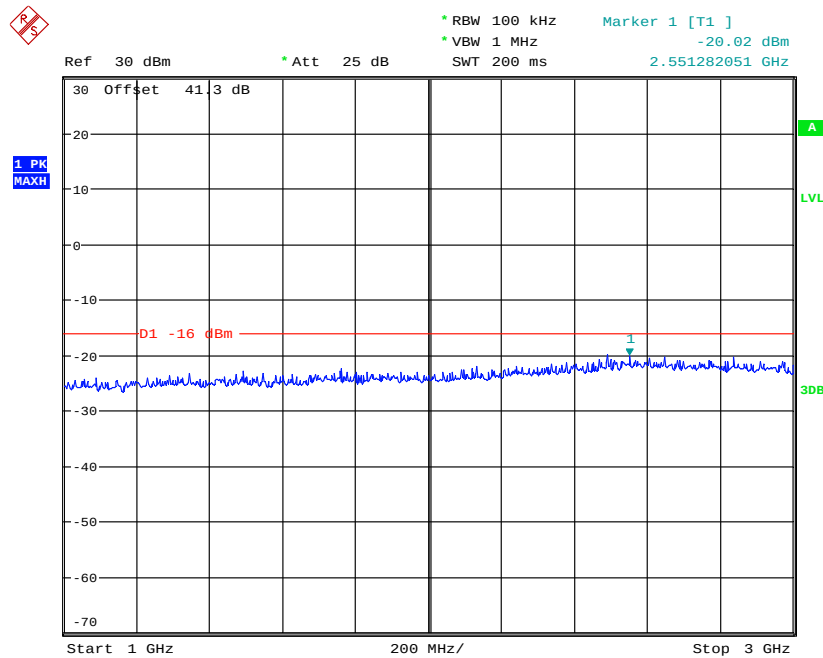
Channel Position	Channel Frequencies
Channel Position B_{RFBW}	Port A1: (G) 869.4MHz +(G) 870.6MHz +(L) 888.3MHz Port A2: (G) 870.0MHz +(G) 871.2MHz +(L) 888.3MHz
Channel Position M_{RFBW}	Port A1: (G) 871.6MHz +(G) 872.8MHz +(L) 890.8MHz Port A2: (G) 872.2MHz +(G) 873.4MHz +(L) 890.8MHz
Channel Position T_{RFBW}	Port A1: (G) 874.2MHz +(G) 875.4MHz +(L) 893.3MHz Port A2: (G) 874.8MHz +(G) 876.0MHz +(L) 893.3MHz

Channel Position B_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 9kHz – 1GHz



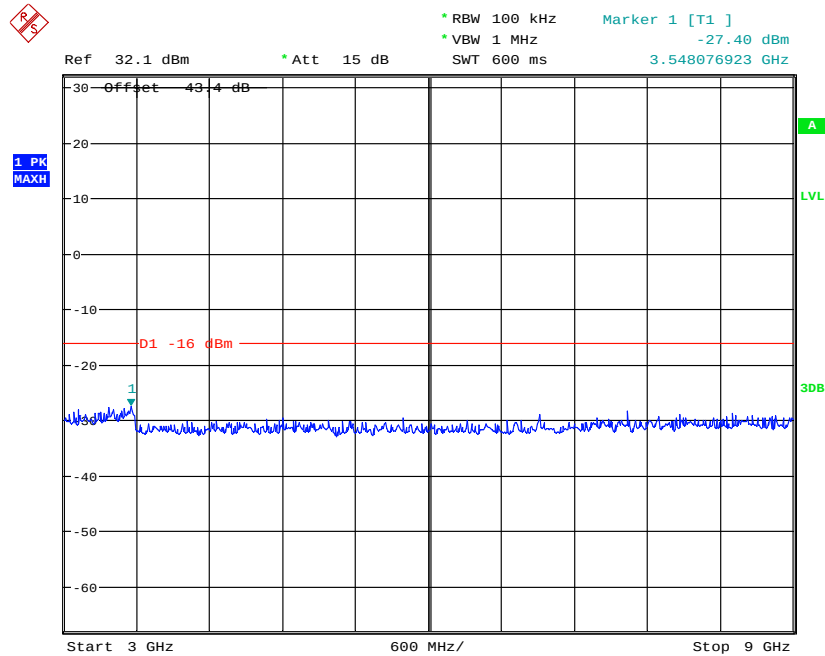
Date: 10.JUL.2014 11:27:32

Channel Position B_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 1GHz – 3GHz



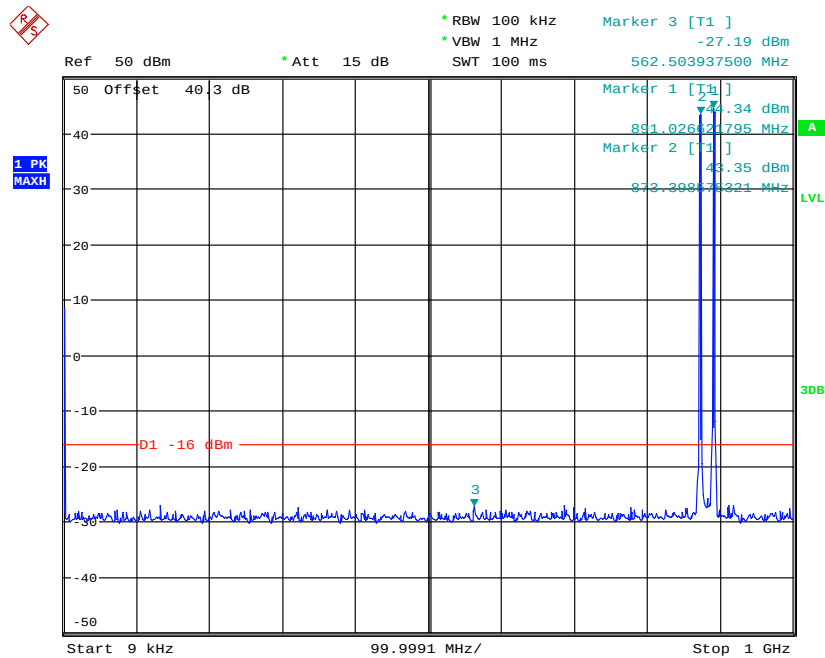
Date: 10.JUL.2014 11:30:01

Channel Position B_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 3GHz – 9GHz



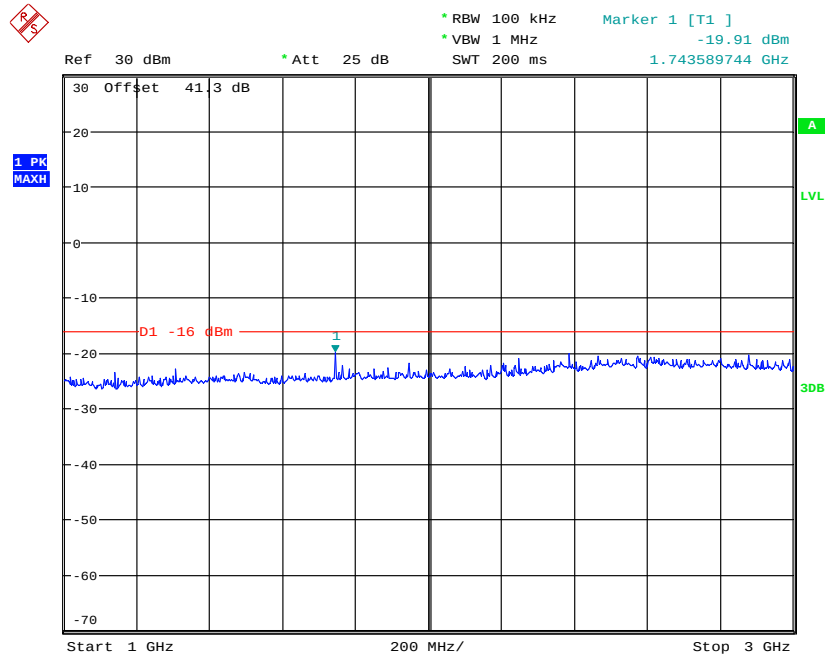
Date: 10.JUL.2014 11:31:50

Channel Position M_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 9kHz – 1GHz



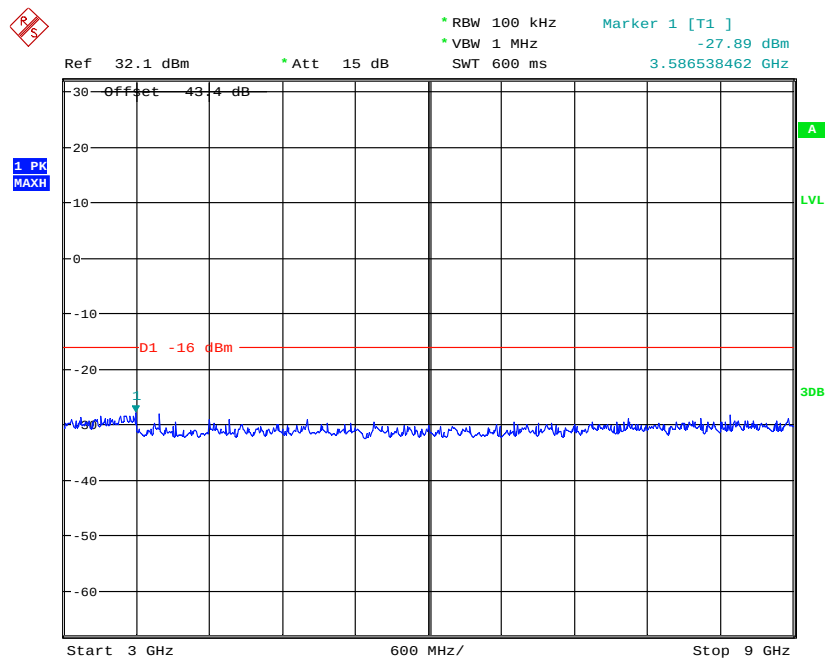
Date: 10.JUL.2014 11:03:36

Channel Position M_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 1GHz – 3GHz



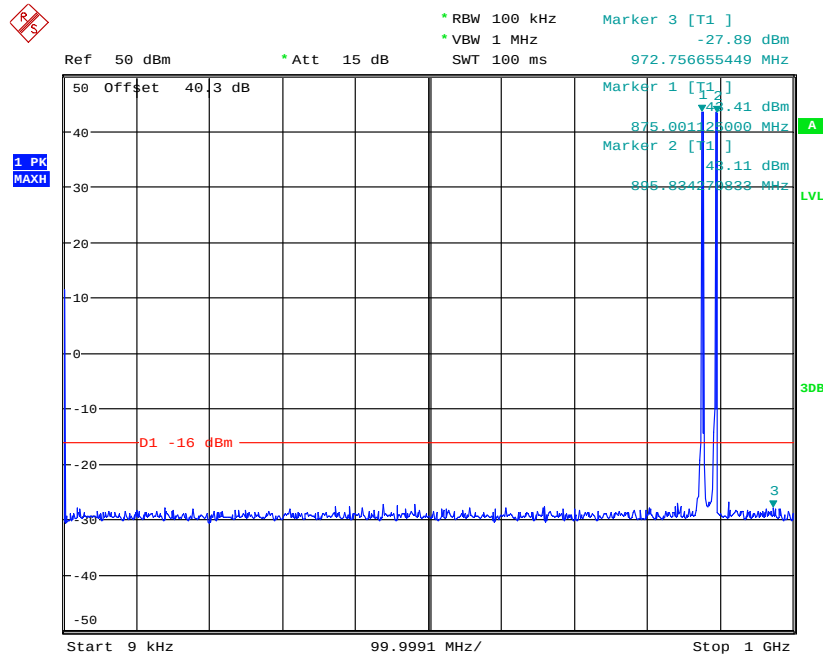
Date: 10.JUL.2014 11:05:17

Channel Position M_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 3GHz – 9GHz



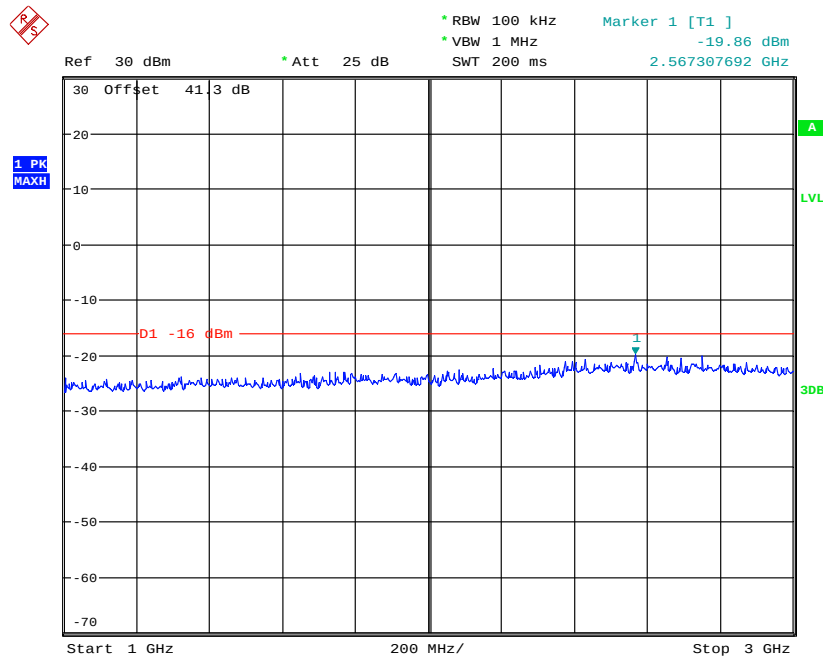
Date: 10.JUL.2014 11:06:35

Channel Position T_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 9kHz – 1GHz



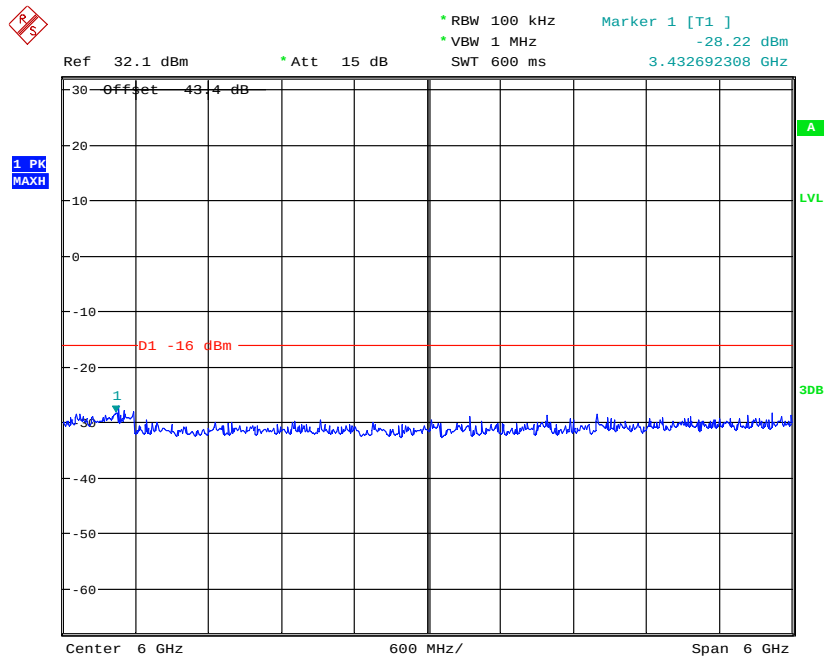
Date: 10.JUL.2014 11:36:53

Channel Position T_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 1GHz – 3GHz



Date: 10.JUL.2014 11:38:15

Channel Position T_{RFBW} - GSM GMSK / LTE QPSK: Bandwidth 1.4MHz - 3GHz - 9GHz



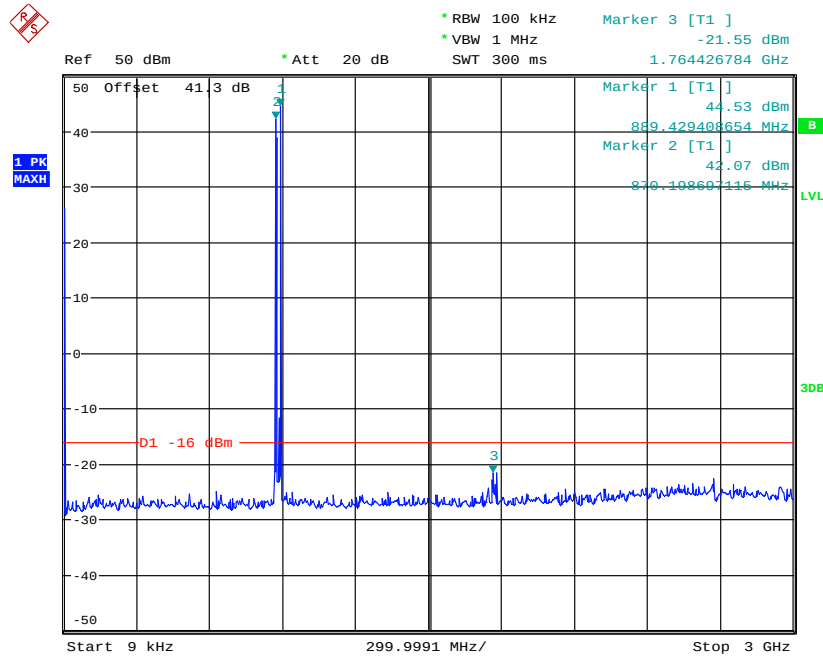
Date: 10.JUL.2014 11:39:29

Configuration W+L-MIMO-MC 1 (1W + 1L)

Maximum Output Power 46dBm per carrier, LTE Bandwidth 1.4MHz

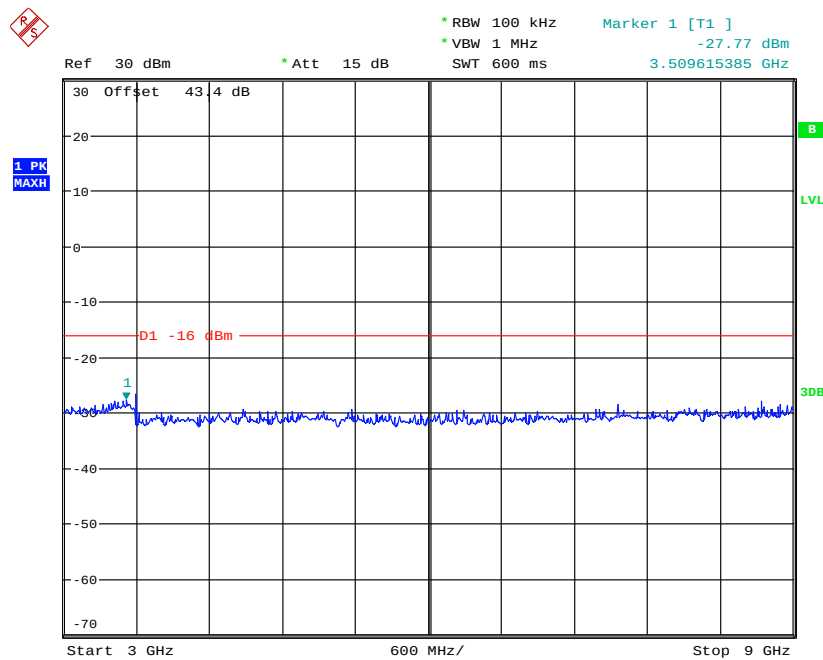
Channel Position	Channel Frequencies
Channel Position B_{RFBW}	(W) 871.4MHz +(L) 888.3MHz
Channel Position M_{RFBW}	(W) 874.0MHz +(L) 890.8MHz
Channel Position T_{RFBW}	(W) 876.4MHz +(L) 893.3MHz

Channel Position B_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 1.4MHz - 9kHz – 3GHz



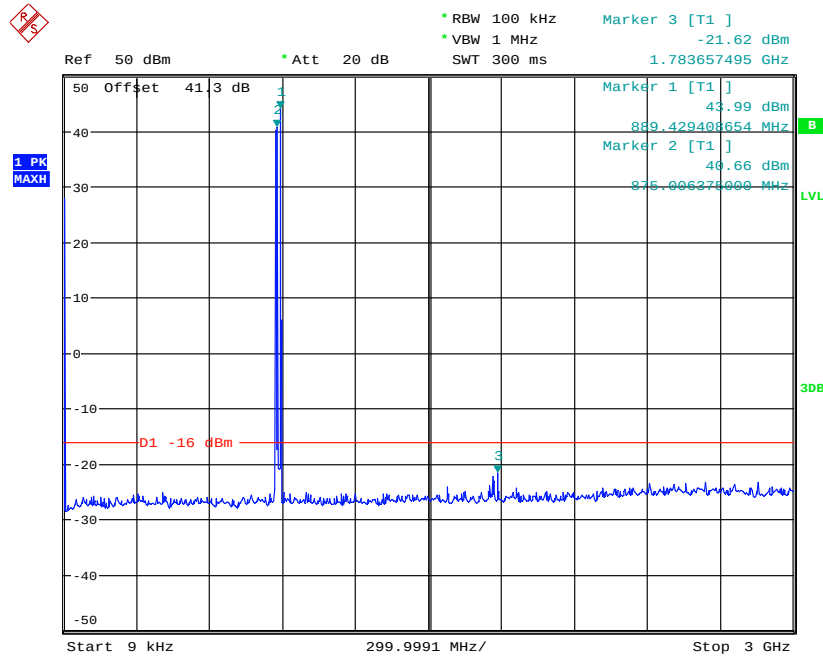
Date: 8.JUL.2014 10:15:33

Channel Position B_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 1.4MHz - 3GHz – 9GHz



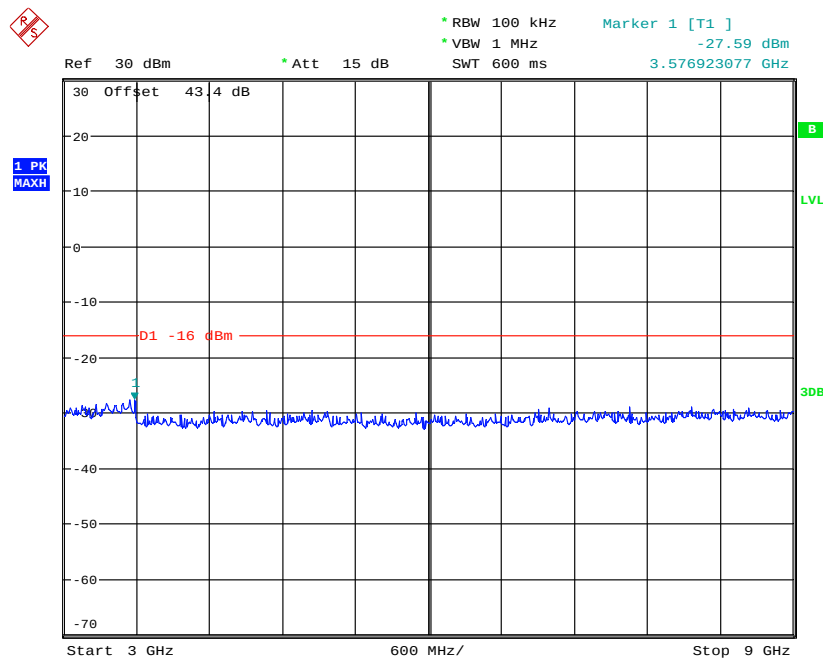
Date: 8.JUL.2014 10:16:35

Channel Position M_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 1.4MHz - 9kHz – 3GHz



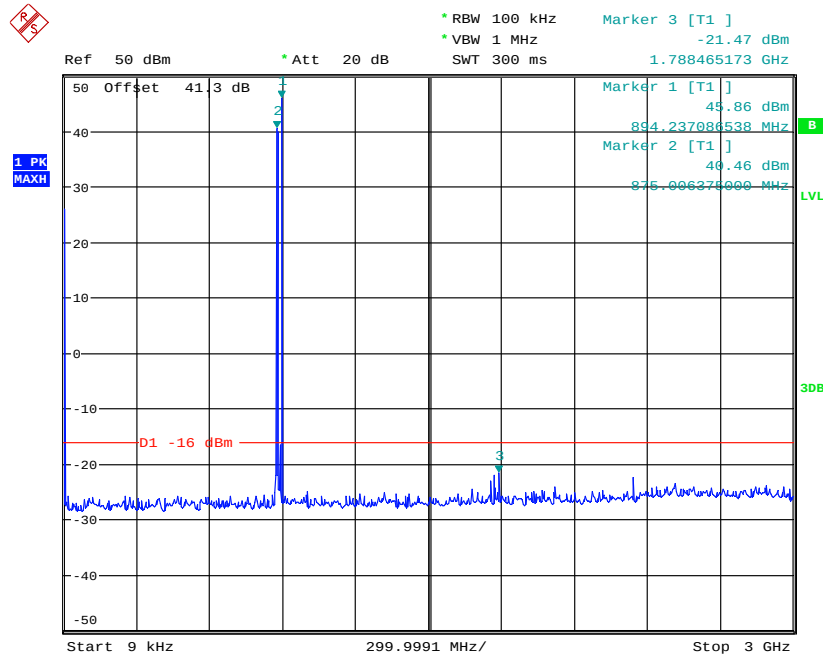
Date: 7.JUL.2014 16:33:25

Channel Position M_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 1.4MHz - 3GHz – 9GHz



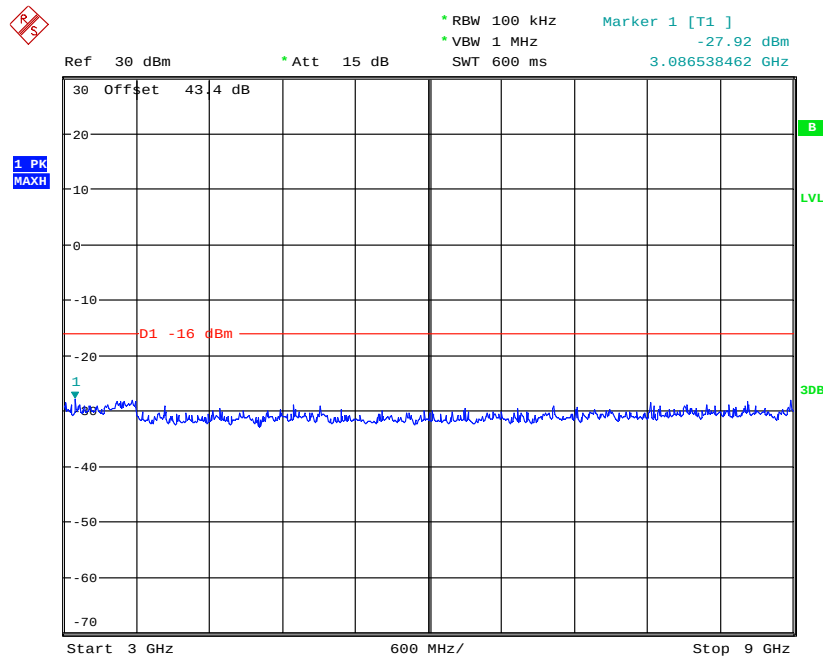
Date: 7.JUL.2014 16:34:18

Channel Position T_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 1.4MHz - 9kHz – 3GHz



Date: 8.JUL.2014 10:33:38

Channel Position T_{RFBW} - WCDMA 16QAM / LTE QPSK: Bandwidth 1.4MHz - 3GHz – 9GHz



Date: 8.JUL.2014 10:31:49

Limit	-13dBm
-------	--------

2.6 FREQUENCY STABILITY

2.6.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1055
FCC CFR 47 Part 22, Clause 22.355
Industry Canada RSS-132, Clause 5.3

2.6.2 Equipment Under Test

RRUS 01 B5, KRC 118 70/3, S/N: D168196972
RRUS 01 B5, KRC 118 70/3, S/N: D168196991

2.6.3 Date of Test and Modification State

04 and 05 August 2014 - Modification State 0

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.5 Environmental Conditions

Ambient Temperature	22.5 - 24.0°C
Relative Humidity	26.5 - 27.5%

2.6.6 Test Method

Frequency Error – Temperature Variation

The EUT was tested over the temperature range -30°C to +50°C in 10°C steps with -48 VDC Power Supply. At each temperature step, the Base Station was configured to transmit an [RAT]* at maximum power on the middle channel of the operating band. After achieving thermal balance, the averages of 200 transmission bursts were measured and the result recorded.

Frequency Error – Voltage Variation

The EUT was tested at the supplied voltages varied from 85 to 115 percent of the nominal values of both -48 VDC power supplies. At +20°C and each voltage extreme, the Base Station was configured to transmit an [RAT]* at maximum power on the middle channel of the operating band. The average of 200 transmission bursts was measured and the result recorded.

[RAT]* LTE (5.0 MHz OBW) – Single Carrier with QPSK modulation

2.6.7 Test Results

Configuration LTE-MIMO-SC (1C)

Maximum Output Power 49dBm per carrier, Channel Bandwidth 5MHz

Supply Voltage DC (V)	Temperature	Frequency Stability (Hz)
		Channel Position M (881.5MHz)
-48.0	-30°C	+4.07
	-20°C	+4.26
	-10°C	+4.06
	0°C	+3.07
	+10°C	+3.27
	+20°C	+4.02
	+30°C	+3.35
	+40°C	+4.01
	+50°C	+3.38

Configuration LTE-MIMO-SC (1C)

Maximum Output Power 37.0dBm per carrier, Channel Bandwidth 5MHz

Supply Voltage DC (V)	Temperature	Frequency Stability (Hz)
		Channel Position M (881.5MHz)
-40.8 V	+20°C	+4.45
-48.0 V		+4.02
-55.2 V		+3.68

Limit	FCC/IC: $\pm 1.5\text{ppm}$ or $\pm 1.32\text{kHz}$
-------	---

Remarks

The frequency stability of the EUT is sufficient to keep it within the authorised frequency ranges at any temperature and voltage interval across the measured range.



Product Service

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Maximum Peak Output Power and Peak to Average Ratio - Conducted					
Network Analyzer	Agilent	8720D	US36140166	12	17-Nov-2014
Power Meter	Rohde & Schwarz	NRP	101593	12	04-Aug-2014
Power Sensor	Rohde & Schwarz	NRP-Z51	102309	12	04-Aug-2014
Power Sensor	Rohde & Schwarz	NRP-Z51	102310	12	04-Aug-2014
Spectrum Analyser	Rohde & Schwarz	FSQ26	100244	12	14-Apr-2015
40dB Attenuator	Aeroflex / Weinschel	48-40-43-LIM	BR5020	-	O/P MON
Load	Shanghai Huaxiang	TFE100	09121647	-	O/P MON
Power Supply	Dahua	DH1716A-10	1000303181	-	O/P MON
Occupied Bandwidth					
Network Analyzer	Agilent	8720D	US36140166	12	17-Nov-2014
Spectrum Analyser	Rohde & Schwarz	FSQ26	100244	12	14-Apr-2015
40dB Attenuator	Aeroflex / Weinschel	48-40-43-LIM	BR5020	-	O/P MON
Load	Shanghai Huaxiang	TFE100	09121647	-	O/P MON
Power Supply	Dahua	DH1716A-10	1000303181	-	O/P MON
Band Edge					
Network Analyzer	Agilent	8720D	US36140166	12	17-Nov-2014
Spectrum Analyser	Rohde & Schwarz	FSQ26	100244	12	14-Apr-2015
40dB Attenuator	Aeroflex / Weinschel	48-40-43-LIM	BR5020	-	O/P MON
Load	Shanghai Huaxiang	TFE100	09121647	-	O/P MON
Power Supply	Dahua	DH1716A-10	1000303181	-	O/P MON
Conducted Spurious Emission					
Network Analyzer	Agilent	8720D	US36140166	12	17-Nov-2014
Spectrum Analyser	Rohde & Schwarz	FSQ26	100244	12	14-Apr-2015
40dB Attenuator	Aeroflex / Weinschel	48-40-43-LIM	BR5020	-	O/P MON
Load	Shanghai Huaxiang	TFE100	09121647	-	O/P MON
Power Supply	Dahua	DH1716A-10	1000303181	-	O/P MON
Frequency Stability					
Network Analyzer	Agilent	8720D	US36140166	12	17-Nov-2014
Spectrum Analyser	Rohde & Schwarz	FSQ26	100244	12	14-Apr-2015
40dB Attenuator	Aeroflex / Weinschel	48-40-43-LIM	BR5020	-	O/P MON
Load	Shanghai Huaxiang	TFE100	09121647	-	O/P MON
Power Supply	Dahua	DH1716A-10	1000303181	-	O/P MON
Climate Chamber	Shang Hai Zenda	ZTH100U	10070062	-	O/P MON
Digital Multimeter	FLUKE	179	91820401	12	24-Dec-2014
Thermo-hygrometer	AZ Instruments	8705	9151655	12	12-Dec-2014

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Radiated Spurious Emissions					
Load	Shanghai Huaxiang	TF100	09121648	-	O/P MON
Load	Shanghai Huaxiang	TF100	09121605	-	O/P MON
Load	Shanghai Huaxiang	TFE5-3	090323194	-	O/P MON
Load	Shanghai Huaxiang	TFE5-3	090323220	-	O/P MON
EMI Receiver	Rohde & Schwarz	ESIB26	100301	12	27-Mar-2015
BiLog Antenna	Rohde & Schwarz	HL562	100488	12	15-Feb-2015
Double Ridge Guide Horn Antenna	ETS-Lindgren	EMCO 3117	00056645	12	15-Feb-2015
Double Ridge Guide Horn Antenna	ETS-Lindgren	EMCO 3117	00056662	12	15-Feb-2015
Semi Anechoic Chamber	ETS-Lindgren	9.6m×6.72m×5.98m	-	12	18-Mar-2015
30MHz~3GHz Pre-amplifier	Rohde & Schwarz	SCU03	10005	-	O/P MON
3GHz~18GHz Pre-amplifier	Rohde & Schwarz	AFS42-00101800-25-S-42	1078388	-	O/P MON
Filters Array	Rohde & Schwarz	TS-Filt	-	-	O/P MON
Switches Array	Rohde & Schwarz	TS-RSP	100241	-	O/P MON
Multi-Device Controller	ETS-Lindgren	2090	00049393	-	O/P MON
Viedo monitoring system	ETS-Lindgren	Y21953A	2501103	-	O/P MON
Power Supply	Dahua	DH1716-5D	2008040041	-	O/P MON
Power Supply	Dahua	DH1716A-10	ETQ-123	-	O/P MON
Digital Multi-meter	FLUKE	179	91820401	12	24-Dec-2014
Thermo-hygrometer	AZ Instruments	8705	9151665	12	12-Dec-2014

N/A – Not Applicable

OP MON – Output Monitored with Calibrated Equipment

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	Frequency / Parameter	MU
Conducted Maximum Peak Output Power	30MHz to 10GHz Amplitude	0.5dB*
Conducted Emissions	30MHz to 40GHz Amplitude	3.0dB*
Frequency stability	30MHz to 2GHz	$<\pm 1 \times 10^{-7}$
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
Worst case error for both Time and Frequency measurement 12 parts in 10^6		

* In accordance with CISPR 16-4



Product Service

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT



This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA
(Not UKAS Accredited).

© 2014 TÜV SÜD Product Service