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Report On

FCC Testing of the
Ericsson RRUS 11 B26A / KRC 161 287/2

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FCC ID: TA8AKRC161287-2

Document 75920372 Report 01 Issue 1

November 2012



Product Service

TÜV SÜD Product Service, Octagon House, Concorde Way, Segensworth North,
Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuv-sud.co.uk

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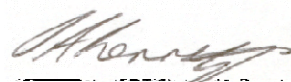
PREPARED FOR

Ericsson AB
Isafjordsgatan 10,
SE-164 80
Stockholm 16480
Sweden

PREPARED BY


Y He
Test Engineer

APPROVED BY


S Bennett
Authorised Signatory

DATED

16 November 2012

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate compliance with FCC CFR 47: Part 90. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s):


Y He


C Zhang





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SECTION 1

REPORT SUMMARY

FCC Testing of the
Ericsson RRUS 11 B26A / KRC 161 287/2



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Ericsson RRUS 11 B26A / KRC 161 287/2 to the requirements of FCC CFR 47 Part 90.

Testing was carried out in support of a C2PC application for Grant of RRUS 11 B26A / KRC 161 287/2 to include LTE/CDMA multi-standard wireless network.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Ericsson AB
Product Name	RRUS 11 B26A
Product Number	KRC 161 287/2
Serial Number(s)	C826114497
Software Version	CXP102051/18_R11ANXMU
PIS Software Version	CXP9013268%6_R48ZU
Hardware Version	R1D
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 90: 2011
Incoming Release Date	Declaration of Build Status 23 October 2012
Order Number Date	PTP 24 October 2012
Start of Test	25 October 2012
Finish of Test	30 October 2012
Name of Engineer(s)	Y He C Zhang
Related Document(s)	ANSI/TIA-603-C-2004 FCC CFR 47 Part 2: 2011



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results in accordance with FCC CFR 47 Part 2 and 90, is shown below.

Configuration 1 – Radio Equipment						
Section	Spec Clause	Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 90					
	90.635	Effective Radiated Power	864.5MHz(L5) + 868.100MHz(C)		N/A	No integral antenna.
			862.900MHz(C) + 866.5MHz(L5)		N/A	
			863.7MHz(L3) + 865.825MHz(C)		N/A	
			862.900MHz(C) + 865.5MHz(L3)		N/A	
			865.5MHz(L3) + 868.100MHz(C)		N/A	
			862.900MHz(C) + 867.3MHz(L3)		N/A	
			863.7MHz(L3) + 865.825MHz(C) + 868.100MHz(C)		N/A	
			862.900MHz(C) + 865.5MHz(L3) + 868.100MHz(C)		N/A	
			862.900MHz(C) + 865.175MHz(C) + 867.3MHz(L3)		N/A	
2.1	2.1046, 90.635	Maximum Peak Output Power - Conducted	864.5MHz(L5) + 868.100MHz(C)	0	Pass	-
			862.900MHz(C) + 866.5MHz(L5)	0	Pass	
			863.7MHz(L3) + 865.825MHz(C)	0	Pass	
			862.900MHz(C) + 865.5MHz(L3)	0	Pass	
			865.5MHz(L3) + 868.100MHz(C)	0	Pass	
			862.900MHz(C) + 867.3MHz(L3)	0	Pass	
			863.7MHz(L3) + 865.825MHz(C) + 868.100MHz(C)	0	Pass	
			862.900MHz(C) + 865.5MHz(L3) + 868.100MHz(C)	0	Pass	
			862.900MHz(C) + 865.175MHz(C) + 867.3MHz(L3)	0	Pass	
	2.1047 (d)	Modulation Characteristics	864.5MHz(L5) + 868.100MHz(C)		N/A	-
			862.900MHz(C) + 866.5MHz(L5)		N/A	
			863.7MHz(L3) + 865.825MHz(C)		N/A	
			862.900MHz(C) + 865.5MHz(L3)		N/A	
			865.5MHz(L3) + 868.100MHz(C)		N/A	
			862.900MHz(C) + 867.3MHz(L3)		N/A	
			863.7MHz(L3) + 865.825MHz(C) + 868.100MHz(C)		N/A	
			862.900MHz(C) + 865.5MHz(L3) + 868.100MHz(C)		N/A	
			862.900MHz(C) + 865.175MHz(C) + 867.3MHz(L3)		N/A	



Configuration 1 – Radio Equipment						
Section	Spec Clause	Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 90					
	2.1049	Occupied Bandwidth ¹	864.5MHz(L5) + 868.100MHz(C)		N/A	-
			862.900MHz(C) + 866.5MHz(L5)		N/A	
			863.7MHz(L3) + 865.825MHz(C)		N/A	
			862.900MHz(C) + 865.5MHz(L3)		N/A	
			865.5MHz(L3) + 868.100MHz(C)		N/A	
			862.900MHz(C) + 867.3MHz(L3)		N/A	
			863.7MHz(L3) + 865.825MHz(C) + 868.100MHz(C)		N/A	
			862.900MHz(C) + 865.5MHz(L3) + 868.100MHz(C)		N/A	
			862.900MHz(C) + 865.175MHz(C) + 867.3MHz(L3)		N/A	
2.2	2.1051, 90.210(g), 90.691	Emission Mask	864.5MHz(L5) + 868.100MHz(C)	0	Pass	-
			862.900MHz(C) + 866.5MHz(L5)	0	Pass	
			863.7MHz(L3) + 865.825MHz(C)	0	Pass	
			862.900MHz(C) + 865.5MHz(L3)	0	Pass	
			865.5MHz(L3) + 868.100MHz(C)	0	Pass	
			862.900MHz(C) + 867.3MHz(L3)	0	Pass	
			863.7MHz(L3) + 865.825MHz(C) + 868.100MHz(C)	0	Pass	
			862.900MHz(C) + 865.5MHz(L3) + 868.100MHz(C)	0	Pass	
			862.900MHz(C) + 865.175MHz(C) + 867.3MHz(L3)	0	Pass	
2.3	2.1053, 90.691	Radiated Spurious Emissions	864.5MHz(L5) + 868.100MHz(C)	0	Pass	-
			862.900MHz(C) + 866.5MHz(L5)	0	Pass	
			863.7MHz(L3) + 865.825MHz(C)	0	Pass	
			862.900MHz(C) + 865.5MHz(L3)	0	Pass	
			865.5MHz(L3) + 868.100MHz(C)	0	Pass	
			862.900MHz(C) + 867.3MHz(L3)	0	Pass	
			863.7MHz(L3) + 865.825MHz(C) + 868.100MHz(C)	0	Pass	
			862.900MHz(C) + 865.5MHz(L3) + 868.100MHz(C)	0	Pass	
			862.900MHz(C) + 865.175MHz(C) + 867.3MHz(L3)	0	Pass	



Configuration 1 – Radio Equipment						
Section	Spec Clause FCC Part 2 and 90	Test Description	Mode	Mod State	Result	Comments
2.4	2.1051, 90.691	Conducted Spurious Emissions	864.5MHz(L5) + 868.100MHz(C)	0	Pass	-
			862.900MHz(C) + 866.5MHz(L5)	0	Pass	
			863.7MHz(L3) + 865.825MHz(C)	0	Pass	
			862.900MHz(C) + 865.5MHz(L3)	0	Pass	
			865.5MHz(L3) + 868.100MHz(C)	0	Pass	
			862.900MHz(C) + 867.3MHz(L3)	0	Pass	
			863.7MHz(L3) + 865.825MHz(C) + 868.100MHz(C)	0	Pass	
			862.900MHz(C) + 865.5MHz(L3) + 868.100MHz(C)	0	Pass	
	2.1055, 90.213	Frequency Stability Under Temperature Variations	864.5MHz(L5) + 868.100MHz(C)		N/A	-
			862.900MHz(C) + 866.5MHz(L5)		N/A	
			863.7MHz(L3) + 865.825MHz(C)		N/A	
			862.900MHz(C) + 865.5MHz(L3)		N/A	
			865.5MHz(L3) + 868.100MHz(C)		N/A	
			862.900MHz(C) + 867.3MHz(L3)		N/A	
			863.7MHz(L3) + 865.825MHz(C) + 868.100MHz(C)		N/A	
			862.900MHz(C) + 865.5MHz(L3) + 868.100MHz(C)		N/A	
	2.1055, 90.213	Frequency Stability Under Voltage Variations	862.900MHz(C) + 865.175MHz(C) + 867.3MHz(L3)		N/A	-
			864.5MHz(L5) + 868.100MHz(C)		N/A	
			862.900MHz(C) + 866.5MHz(L5)		N/A	
			863.7MHz(L3) + 865.825MHz(C)		N/A	
			862.900MHz(C) + 865.5MHz(L3)		N/A	
			865.5MHz(L3) + 868.100MHz(C)		N/A	
			862.900MHz(C) + 867.3MHz(L3)		N/A	
			863.7MHz(L3) + 865.825MHz(C) + 868.100MHz(C)		N/A	
			862.900MHz(C) + 865.5MHz(L3) + 868.100MHz(C)		N/A	
			862.900MHz(C) + 865.175MHz(C) + 867.3MHz(L3)		N/A	

N/A – Not Applicable

Note1: See Sprint Nextel's Request for Waiver to permit the operation of Broadband CDMA Technology in the 817-824/862-869 MHz band.

Note2: "(L3)" means LTE network with 3MHz channel bandwidth.

"(L5)" means LTE network with 5MHz channel bandwidth.

"(C)" means CDMA network.



1.3 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	Radio Equipment
MANUFACTURER	Ericsson AB
PRODUCT NUMBER	RRUS 11 B26A
PART NUMBER	KRC 161 287/2
SERIAL NUMBER	C826114497
HARDWARE VERSION	R1D
SOFTWARE VERSION	CXP102051/18_R11ANXMU
PIS SOFTWARE VERSION	CXP9013268%6_R48ZU
TRANSMITTER OPERATING RANGE	TX: 862MHz - 869MHz RX: 817MHz - 824MHz
MODULATIONS	LTE: QPSK, 16QAM, 64QAM CDMA: QPSK, 8PSK, 16QAM
INTERMEDIATE FREQUENCIES	--
ITU DESIGNATION OF EMISSION	3M00F9W 5M00F9W 1M25F9W
CHANNEL BANDWIDTH	LTE: 3MHz and 5MHz CDMA: 1.25MHz
OUTPUT POWER (RMS) (W or dBm)	LTE/CDMA Mix Carrier (x 2): Antenna A & B: LTE (3MHz OBW) + CDMA: 2x46dBm (2x40W); or Antenna A: LTE (5MHz OBW) + CDMA: 46dBm (40W); Antenna B: LTE (5MHz OBW): 43dBm (20W);
	LTE/CDMA Mix Carrier (x3): Antenna A: LTE (3MHz OBW) + 2 x CDMA: 46dBm (40W); Antenna B: LTE (3MHz OBW): 43dBm (20W);
OUTPUT POWER TOLERANCE	± 1.0dB
NUMBER OF ANTENNA PORTS	2 TX/ RX ports
SUPPORTED CONFIGURATION	Multi-standard (LTE/CDMA) configured for Mix Carrier. Both RF chains are identical.
FCC ID	TA8AKRC161287-2
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	The equipment is the Radio Part of LTE / CDMA Base Station.

Signature

Date

05 November 2012

D of B S Serial No

75920372 /01

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



1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) RRUS 11 B26A / KRC 161 287/2 is an Ericsson Radio Equipment working in the public mobile service 800MHz band which provides communication connections to LTE&CDMA network. The RRUS 11 B26A / KRC 161 287/2 operates from a - 48V DC supply.

The Equipment Under Test (EUT) is shown in the photograph below. A full technical description can be found in the Manufacturers documentation.



Equipment Under Test



1.4.2 Test Configuration

Configuration 1: Radio Equipment

The EUT was configured in accordance with FCC CFR 47 Part 90.

The RRUS 11 B26A / KRC 161 287/2 supports Multi-standard (LTE/CDMA) configured for mix-carrier. LTE supports Test Models E-TM1.1 (QPSK), E-TM3.2 (16QAM) and E-TM3.1 (64QAM) defined in 3GPP TS 36.141 and CDMA supports QPSK, 8PSK and 16QAM modulations at 800MHz. The setting below was found to be representative for all traffic scenarios when the number of mix carriers and modulation combinations were tested to find the worst case setting. These settings were used for all measurements if not otherwise noted:

- LTE/CDMA Mix Carrier:

LTE in test models E-TM1.1, E-TM3.2 and E-TM3.1;

CDMA with QPSK Modulation

Forward Traffic Channel using Spreading Rate 1 (1X), Voice

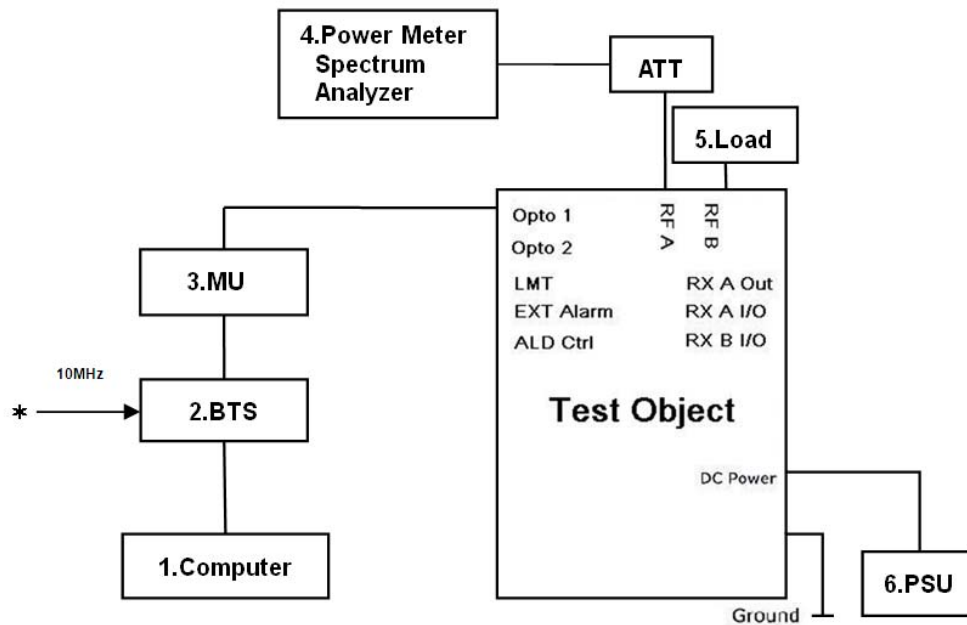
User Channels: 6

Channel rate: 9.6kbps

Channel bandwidth: 1.25MHz

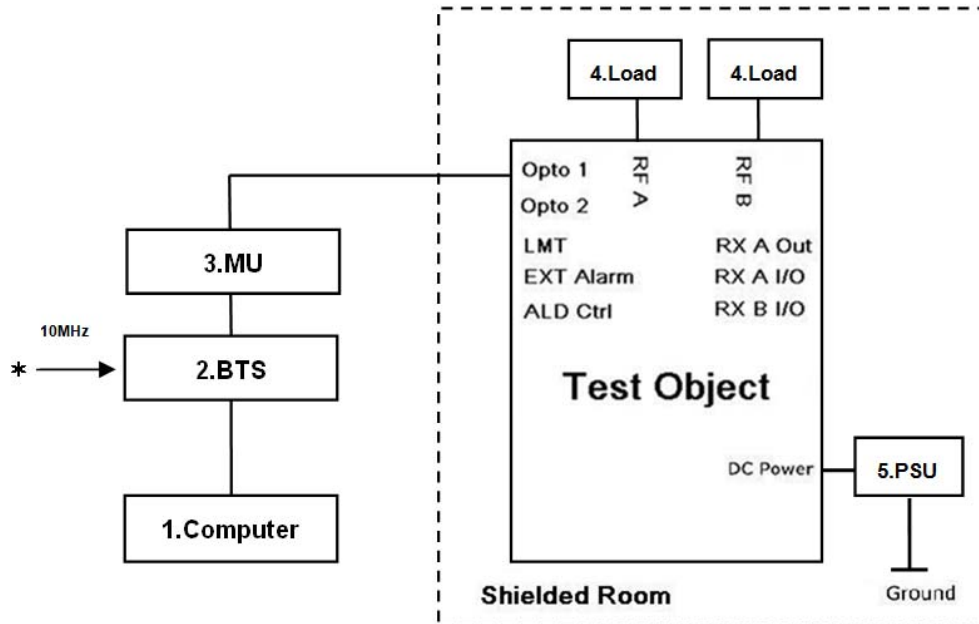
The EUT has two TX/RX ports and it can be configured to transmit with 800MHz Mix carrier at both RF output connectors. All TX measurements were performed on the combined TX/RX output connector RF A. Limited complementary TX measurements were done at connector RF B to verify identical performance for both transmitter chains. The complete testing was performed with the EUT transmitting at maximum RF power in each mode unless otherwise stated.

The EUT was powered by a -48V DC Power supply.

**Test Setup, Conducted Measurement:**

Test Object	Part Number	Version	Serial Number
Radio Part	RRUS 11 B26A / KRC 161 287/2	R1D	C826114497

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	HP DC5100SFF	--	CNG6510B8B
2	BTS 602	--	--	--
	DBU	NTLK70AA	06	NNTMPX00ME1L
	XCEM-A	NTLK86AAE5	02	NNTMPX00MHPR
	AEM1302	NTLK85GAE5	07	--
3.	DUL20 01	KDU 137 533/4	R1C	C824347539
	XMU0201	KDU137 745/1	R2A	C825499211
	SUP 6601	BFL 901 009/1	R3B	BR80908066
4	Power Meter	NRP	--	102438
	Thermal Power Sensor	NRP-Z51	--	102434
	Spectrum Analyzer	FSQ	--	201122
5	Load	TF100	--	--
6	Power Supply	DH1716-5D	--	200360033

**Test Setup, Radiated Measurement:**

Test Object	Part Number	Version	Serial Number
Radio Part	RRUS 11 B26A / KRC 161 287/2	R1D	C826114497

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	HP DC5100SFF	--	CNG6510B8B
2	BTS 602	--	--	--
	DBU	NTLK70AA	06	NNTMPX00ME1L
	XCEM-A	NTLK86AAE5	02	NNTMPX00MHPR
	AEM1302	NTLK85GAE5	07	--
3.	DUL20 01	KDU 137 533/4	R1C	C824347539
	XMU0201	KDU137 745/1	R2A	C825499211
	SUP 6601	BFL 901 009/1	R3B	BR80908066
4.	Load	TF100	--	--
	Load	TF100	--	--
5.	Power Supply	DH1716-5D	--	200360033



1.4.3 Modes of Operation

Modes of operation of each EUT during testing were as follows:

Mix Carrier (x2)

Mode 1 – 5MHz LTE B Ch & CDMA T Ch at Ant A;
5MHz LTE B Ch at Ant B

	Ant A		Ant B
	LTE (B)	CDMA (T)	LTE (B)
Bandwidth	5MHz	1.25MHz	5MHz
Output Power (W)	20	20	20
Channel No.	8745	684	8745
Frequency (MHz)	864.5	868.100	864.5

Mode 2 – CDMA B Ch & 5MHz LTE T Ch at Ant A;
5MHz LTE T ch at Ant B

	Ant A		Ant B
	CDMA (B)	LTE (T)	LTE (T)
Bandwidth	1.25MHz	5MHz	5MHz
Output Power (W)	20	20	20
Channel No.	476	8765	8765
Frequency (MHz)	862.900	866.5	866.5



Mode 3 – 3MHz LTE B Ch & CDMA M+13 Ch at Ant A;
3MHz LTE B Ch & CDMA T Ch at Ant B

	Ant A		Ant B	
	LTE (B)	CDMA (M+13)	LTE (B)	CDMA (T)
Bandwidth	3MHz	1.25MHz	3MHz	1.25MHz
Output Power (W)	20	20	20	20
Channel No.	8737	593	8737	684
Frequency (MHz)	863.7	865.825	863.7	868.100

Mode 4 – CDMA B Ch & 3MHz LTE M Ch at Ant A;
CDMA T Ch & 3MHz LTE M Ch at Ant B

	Ant A		Ant B	
	CDMA (B)	LTE (M)	LTE (M)	CDMA (T)
Bandwidth	1.25MHz	3MHz	3MHz	1.25MHz
Output Power (W)	20	20	20	20
Channel No.	476	8755	8755	684
Frequency (MHz)	862.900	865.5	865.5	868.100

Mode 5 – 3MHz LTE M Ch & CDMA T Ch at Ant A;
CDMA B Ch & 3MHz LTE M Ch at Ant B

	Ant A		Ant B	
	LTE (M)	CDMA (T)	CDMA (B)	LTE (M)
Bandwidth	3MHz	1.25MHz	1.25MHz	3MHz
Output Power (W)	20	20	20	20
Channel No.	8755	684	476	8755
Frequency (MHz)	865.5	868.100	862.900	865.5

Mode 6 – CDMA B Ch & 3MHz LTE T Ch at Ant A;
CDMA M-13 Ch & 3MHz LTE T Ch at Ant B

	Ant A		Ant B	
	CDMA (B)	LTE (T)	CDMA (M-13)	LTE (T)
Bandwidth	1.25MHz	3MHz	1.25MHz	3MHz
Output Power (W)	20	20	20	20
Channel No.	476	8773	567	8773
Frequency (MHz)	862.900	867.3	865.175	867.3

**Mix Carrier (x3)**

Mode 7 – 3MHz LTE B Ch & CDMA M+13 Ch & CDMA T Ch at Ant A;
3MHz LTE B Ch at Ant B

	Ant A			Ant B
	LTE (B)	CDMA (M+13)	CDMA (T)	LTE (B)
Bandwidth	3MHz	1.25MHz	1.25MHz	3MHz
Output Power (W)	20	10	10	20
Channel No.	8737	593	684	8737
Frequency (MHz)	863.7	865.825	868.100	863.7

Mode 8 – CDMA B Ch & 3MHz LTE M Ch & CDMA T Ch at Ant A;
3MHz LTE M Ch at Ant B

	Ant A			Ant B
	CDMA (B)	LTE (M)	CDMA (T)	LTE (M)
Bandwidth	1.25MHz	3MHz	1.25MHz	3MHz
Output Power (W)	10	20	10	20
Channel No.	476	8755	684	8755
Frequency (MHz)	826.900	865.5	868.100	865.5

Mode 9 – CDMA B Ch & CDMA M-13 Ch & 3MHz LTE T Ch at Ant A;
3MHz LTE T Ch at Ant B

	Ant A			Ant B
	CDMA (B)	CDMA (M-13)	LTE (T)	LTE (T)
Bandwidth	1.25MHz	1.25MHz	3MHz	3MHz
Output Power (W)	10	10	20	20
Channel No.	476	567	8773	8773
Frequency (MHz)	826.900	865.175	867.3	867.3

Information on the specific test modes utilised are detailed in the test procedure for each individual test.



Product Service

1.5 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 an open test area as appropriate.

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

1.6 DEVIATIONS FROM THE STANDARD

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

1.7 MODIFICATION RECORD

No modifications were made to the EUT during testing.

1.8 ALTERNATIVE TEST SITE

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

FCC Accreditation 910917:

The State Radio Monitoring Centre, No.80 Beilishi Road Xicheng District Beijing, China.



Product Service

SECTION 2

TEST DETAILS

FCC Testing of the
Ericsson RRUS 11 B26A / KRC 161 287/2



Product Service

2.1 MAXIMUM PEAK OUTPUT POWER - CONDUCTED**2.1.1 Specification Reference**

FCC CFR 47 Part 2.1046
FCC CFR 47 Part 90, Clause 90.635

2.1.2 Equipment Under Test

RRUS 11 B26A / KRC 161 287/2, S/N: C826114497

2.1.3 Date of Test and Modification State

26 October 2012 – 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 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and Part 90.

Using a power meter and attenuator(s), the output power of the EUT was measured at the antenna terminal. The carrier power was measured with all modulations.

The path loss was measured and entered as a reference level offset.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
 - Mode 2
 - Mode 3
 - Mode 4
 - Mode 5
 - Mode 6
 - Mode 7
 - Mode 8
 - Mode 9

2.1.6 Environmental Conditions

	26 October 2012
Ambient Temperature	22.0°C
Relative Humidity	42.5%



2.1.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 90 for Maximum Peak Output Power.

The test results are shown below

Configuration 1 – Mode 1, 2, 3, 4, 5, 6, 7, 8, 9

LTE (E-TM1.1) & CDMA (QPSK)

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
8745 + 684	864.5(L5) + 868.100(C)	40.4	46.44	44.06
476 + 8765	862.900(C) + 866.5(L5)	40.4	46.43	43.95
8737 + 593	863.7(L3) + 865.825(C)	40.4	46.41	43.75
476 + 8755	862.900(C) + 865.5(L3)	40.4	46.47	44.36
8755 + 684	865.5(L3) + 868.100(C)	40.4	46.40	43.65
476 + 8773	862.900(C) + 867.3(L3)	40.4	46.47	44.36
8737 + 593 + 684	863.7(L3) + 865.825(C) + 868.100(C)	40.4	46.47	44.36
476 + 8655 + 684	862.900(C) + 865.5(L3) + 868.100(C)	40.4	46.48	44.46
476 + 567 + 8773	862.900(C) + 865.175(C) + 867.3(L3)	40.4	46.48	44.46

LTE (E-TM3.2) & CDMA (QPSK)

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
8745 + 684	864.5(L5) + 868.100(C)	40.4	46.38	43.45
476 + 8765	862.900(C) + 866.5(L5)	40.4	46.36	43.25
8737 + 593	863.7(L3) + 865.825(C)	40.4	46.33	42.95
476 + 8755	862.900(C) + 865.5(L3)	40.4	46.43	43.95
8755 + 684	865.5(L3) + 868.100(C)	40.4	46.35	43.15
476 + 8773	862.900(C) + 867.3(L3)	40.4	46.40	43.65
8737 + 593 + 684	863.7(L3) + 865.825(C) + 868.100(C)	40.4	46.45	44.15
476 + 8655 + 684	862.900(C) + 865.5(L3) + 868.100(C)	40.4	46.42	43.85
476 + 567 + 8773	862.900(C) + 865.175(C) + 867.3(L3)	40.4	46.44	44.06

**LTE (E-TM3.1) & CDMA (QPSK)**

Channel No.	Frequency (MHz)	Path Loss (dB)	Result (dBm) RMS	Result (W) RMS
8745 + 684	864.5(L5) + 868.100(C)	40.4	46.42	43.85
476 + 8765	862.900(C) + 866.5(L5)	40.4	46.42	44.26
8737 + 593	863.7(L3) + 865.825(C)	40.4	46.35	43.15
476 + 8755	862.900(C) + 865.5(L3)	40.4	46.47	44.36
8755 + 684	865.5(L3) + 868.100(C)	40.4	46.39	43.55
476 + 8773	862.900(C) + 867.3(L3)	40.4	46.44	44.06
8737 + 593 + 684	863.7(L3) + 865.825(C) + 868.100(C)	40.4	46.46	44.26
476 + 8655 + 684	862.900(C) + 865.5(L3) + 868.100(C)	40.4	46.46	44.26
476 + 567 + 8773	862.900(C) + 865.175(C) + 867.3(L3)	40.4	46.48	44.48

Note: "(L3)" means LTE network with 3MHz channel bandwidth.
 "(L5)" means LTE network with 5MHz channel bandwidth.
 "(C)" means CDMA network.

Limit	≤1000W or ≤+60dBm
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Remarks

The EUT does not exceed 1000W or 60dBm at the measured frequencies.



2.2 EMISSION MASK

2.2.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 90, Clause 90.210(g)
FCC CFR 47 Part 90, Clause 90.691

2.2.2 Equipment Under Test

RRUS 11 B26A / KRC 161 287/2, S/N: C826114497

2.2.3 Date of Test and Modification State

26, 29 and 30 October 2012 – 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 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and Part 90.

Since the EUT can transmit LTE carrier on two antennas simultaneously in the same frequency range, i.e. TX Diversity, using the Measure and Add $10\log(N)$ dB technique, the limits for Spectrum Masks was adjusted with a correction of $10\log 2$.

Reference is made to FCC 12-25 where an allowance is made for equipment where the bandwidth is greater than that defined in 90.209(b)(5). As the EUT bandwidth is 1.25 MHz, 3 MHz or 5MHz wide, the emission masks defined in 90.210 and 90.691 are not applicable. Therefore, to demonstrate compliance considering the proposed rule change in FCC 12-25 to clause 90.209(b)(7), a band edge measurement has been performed. The EUT has been set to the lowest and highest channels within the 862-869 MHz band and the conducted spurious emission limit of $43+10\log(P)$ in conjunction with a reduction of 3dB to account for simultaneous transmissions from antenna port A and B. The plots shown in the test report show a tighter limit of $50+10\log(P)$ with a reduction of 3dB to account for simultaneous transmission from both antenna ports.

The EUT was tested at its maximum power level in each mode. At least 1% of the emission bandwidth was used for the resolution bandwidth. The limit -20dBm was adjusted with a correction of $10\log 2$ to -23dBm. Spectrum analyser detector was set as RMS.

The path loss measured and entered as a reference level offset.

The test results for LTE Test Model E-TM1.1 together with CDMA QPSK modulation on Antenna A were selected as representative.

The test was performed with the EUT in the following configurations and modes of operation:



Product Service

Configuration 1 - Mode 1
- Mode 2
- Mode 3
- Mode 4
- Mode 5
- Mode 6
- Mode 7
- Mode 8
- Mode 9

2.2.6 Environmental Conditions

	26 October 2012	29 October 2012	30 October 2012
Ambient Temperature	22.0°C	24.0°C	24.2°C
Relative Humidity	42.5%	44.2%	32.2%

2.2.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 90.

The test results are shown below

The EUT shall only be used on the channels and bandwidths described in the table below and those in between. Any channels outside of those described below shall not be made available to the end user.



LTE (E-TM1.1) & CDMA (QPSK)

Mix Carrier (x2)

Configuration 1 – Mode1, 2

Band Edge Frequency	Emission Mask Test with QPSK modulation Channel No./Frequencies(MHz)
Bottom 862 MHz for 5MHz LTE Top 869 MHz for CDMA	Channel: 8745 + 684 (5MHz LTE Bottom + CDMA Top) Frequency: 864.5 (L5) + 868.100 (C)
Bottom 862 MHz for CDMA Top 869 MHz for 5MHz LTE	Channel: 476 + 8765 (CDMA Bottom + 5MHz LTE Top) Frequency: 862.900 (C) + 866.5 (L5)

Note: "(L3)" means LTE network with 3MHz channel bandwidth.

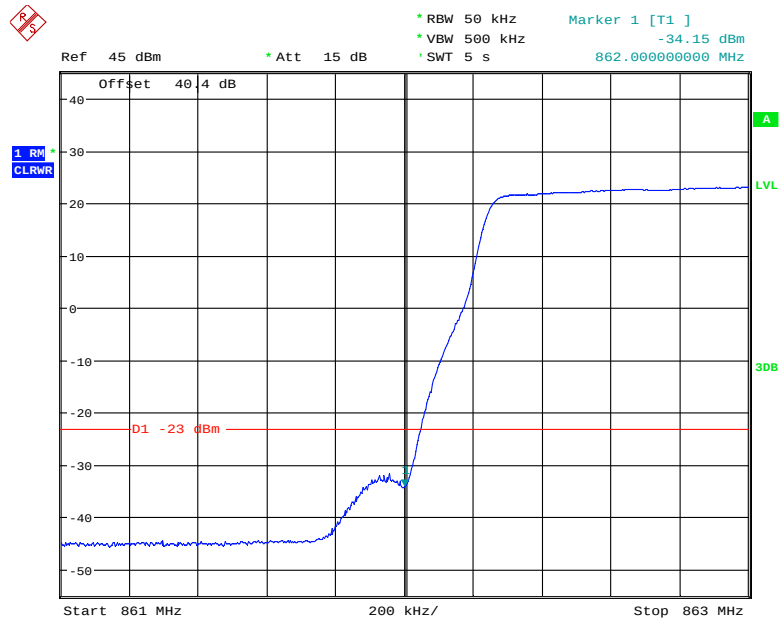
"(L5)" means LTE network with 5MHz channel bandwidth.

"(C)" means CDMA network.

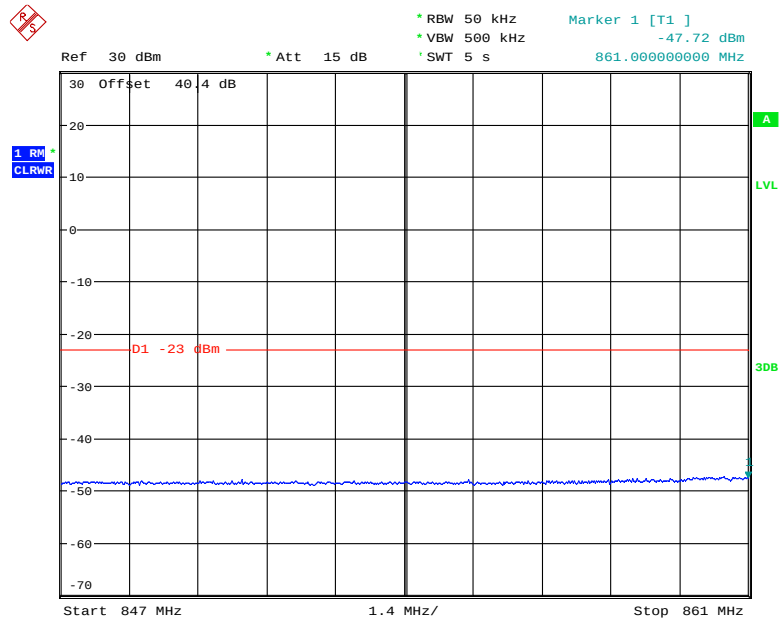


Configuration 1 - Mode 1

5MHz LTE Bottom 864.5MHz



Date: 30.OCT.2012 07:14:03

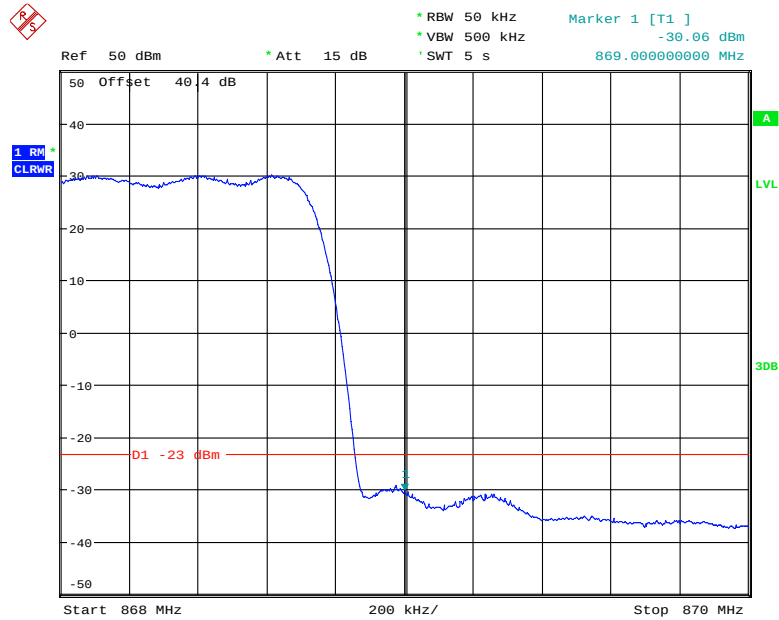


Date: 30.OCT.2012 07:15:03

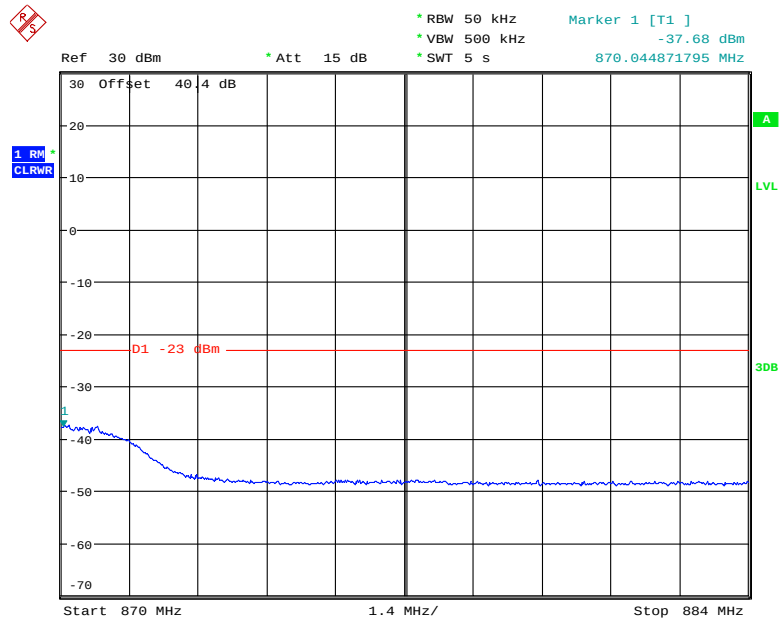


Product Service

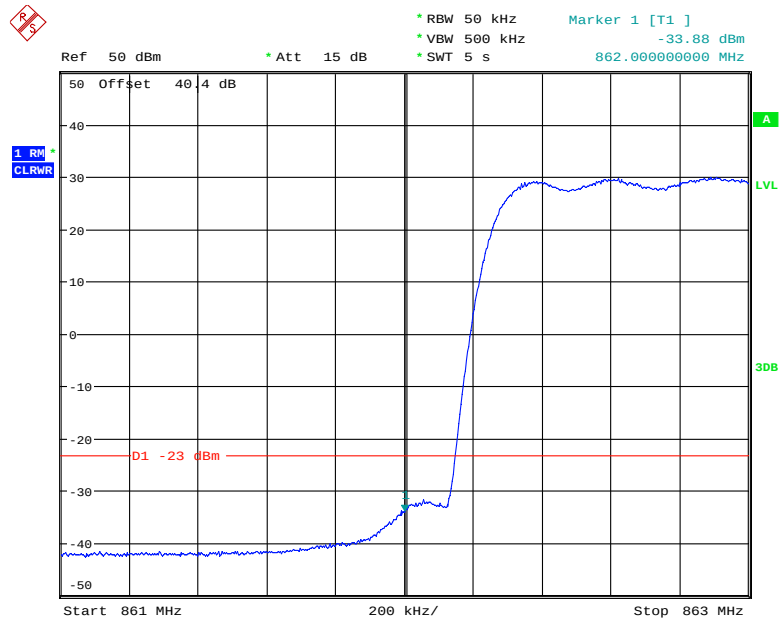
CDMA Top 868.100MHz



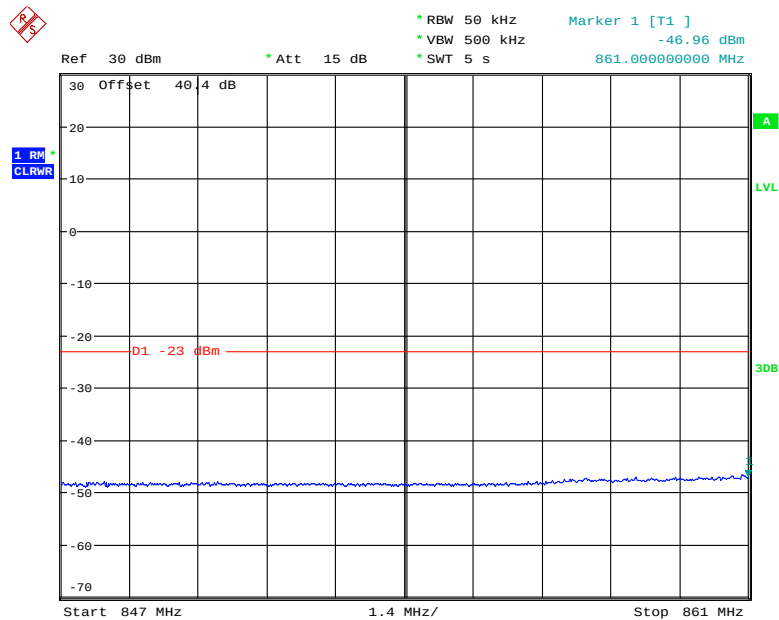
Date: 30.OCT.2012 07:16:26



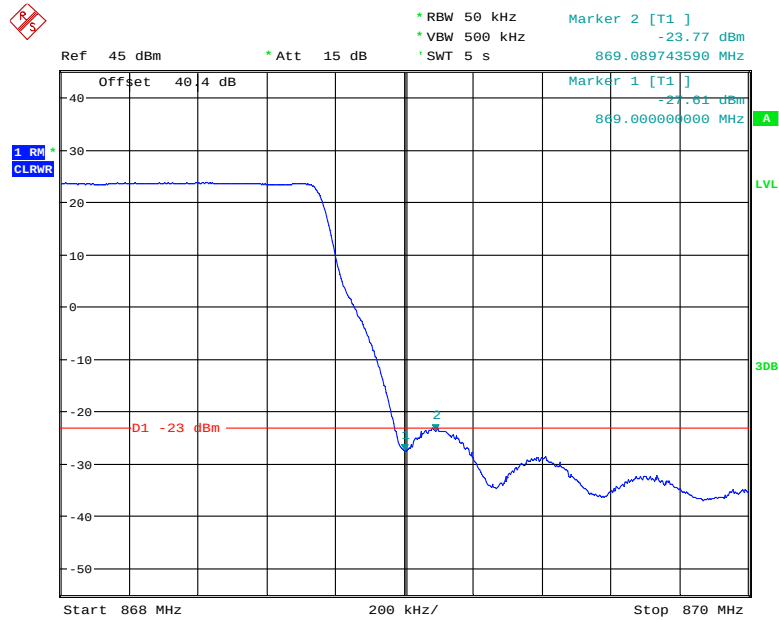
Date: 30.OCT.2012 07:16:48

Configuration 1 - Mode 2CDMA Bottom 862.900MHz

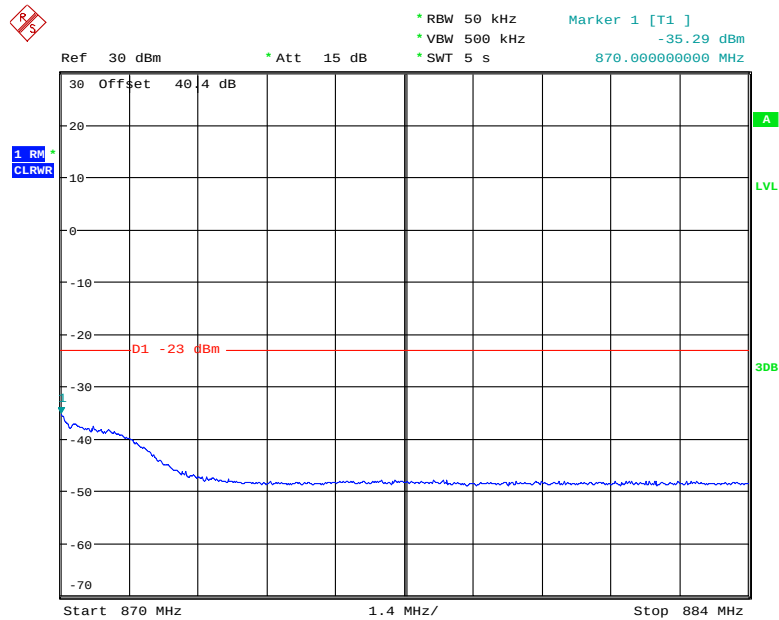
Date: 30.OCT.2012 08:05:02



Date: 30.OCT.2012 08:05:40

**5MHz LTE Top 866.5MHz**

Date: 30.OCT.2012 08:30:04



Date: 30.OCT.2012 08:30:53

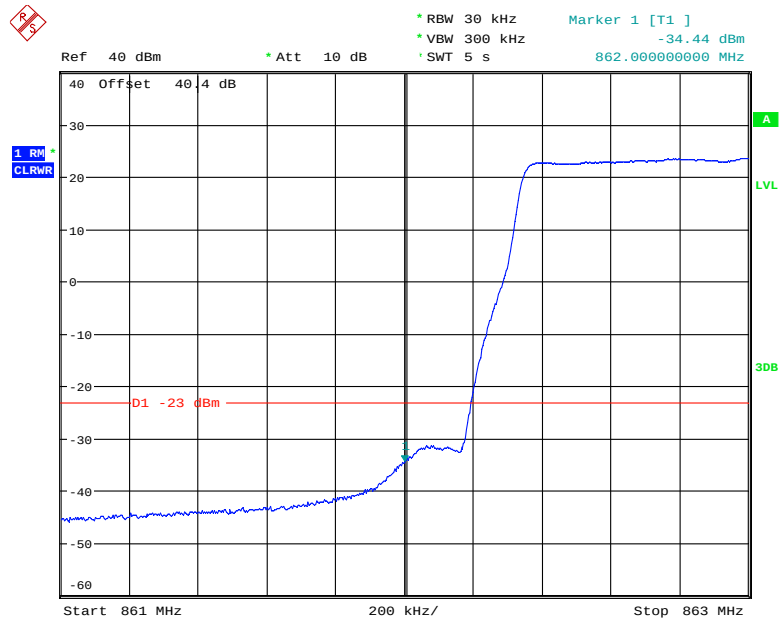
Configuration 1 – Mode 3, 6

Band Edge Frequency	Emission Mask Test with QPSK modulation Channel No./Frequencies(MHz)
Bottom 862 MHz for 3MHz LTE	Channel: 8737 + 593 Frequency: 863.7 (L3) + 865.825 (C)
Top 869 MHz for 3MHz LTE	Channel: 476 + 8773 Frequency: 862.900 (C) + 867.3 (L3)

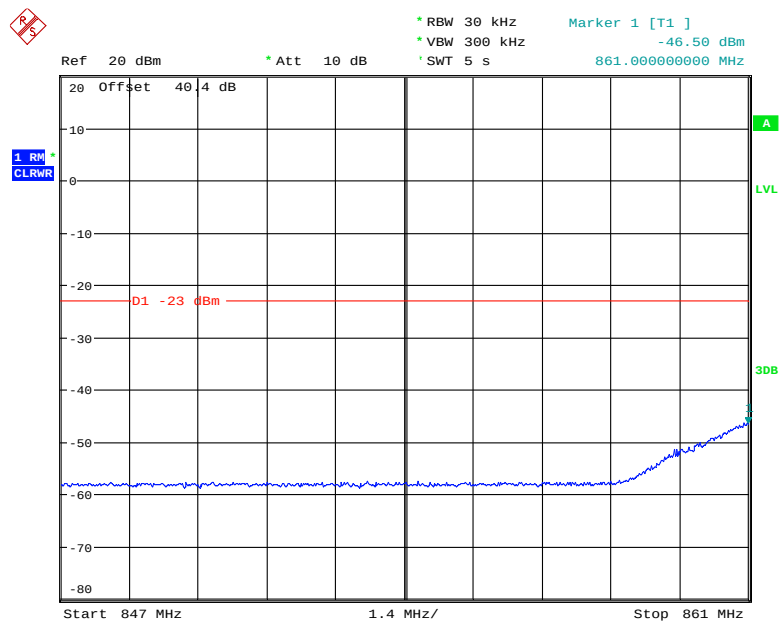
Note: "(L3)" means LTE network with 3MHz channel bandwidth.

"(L5)" means LTE network with 5MHz channel bandwidth.

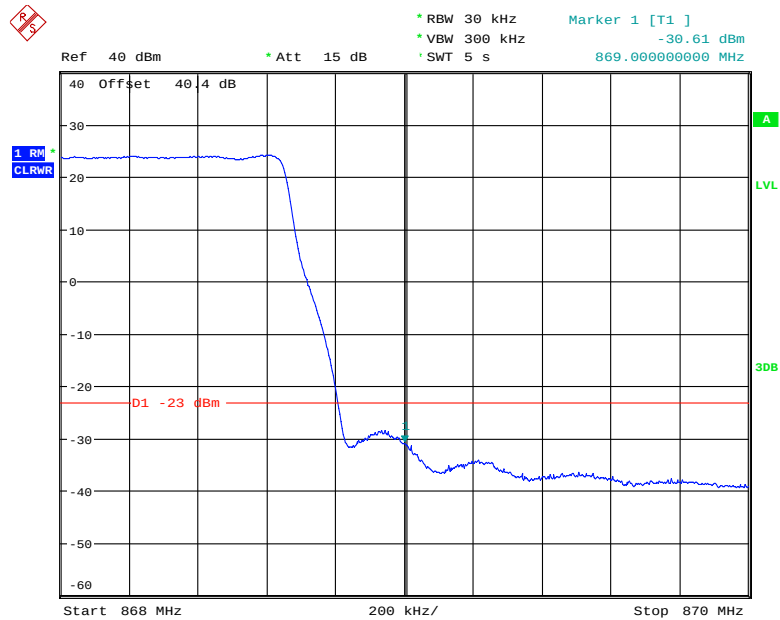
"(C)" means CDMA network.

Configuration 1 - Mode 33MHz LTE Bottom 863.7MHz

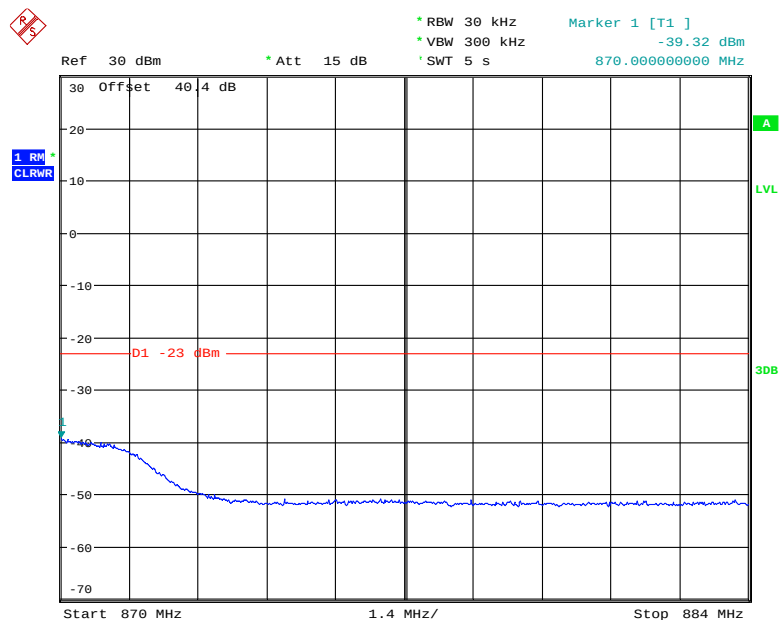
Date: 26.OCT.2012 10:33:58



Date: 26.OCT.2012 10:35:10

Configuration 1 - Mode 63MHz LTE Top 867.3MHz

Date: 30.OCT.2012 03:38:23

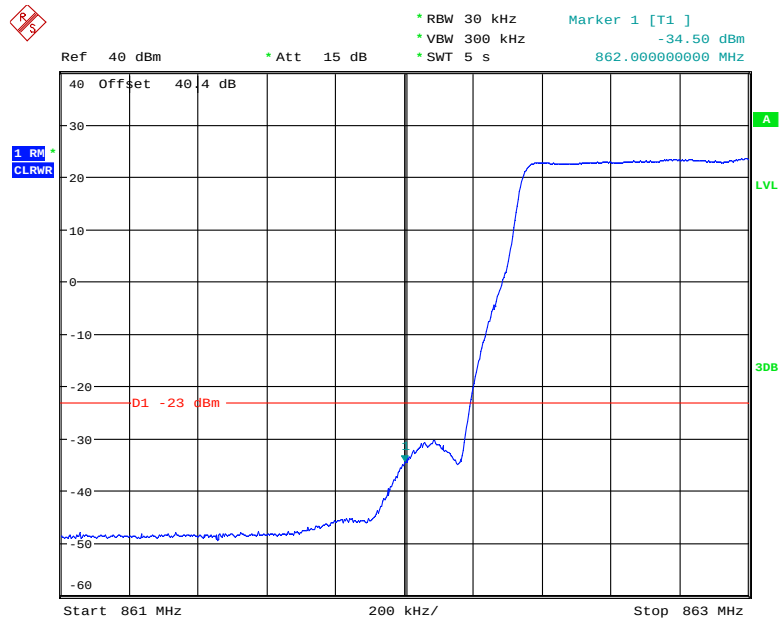


Date: 29.OCT.2012 08:37:30

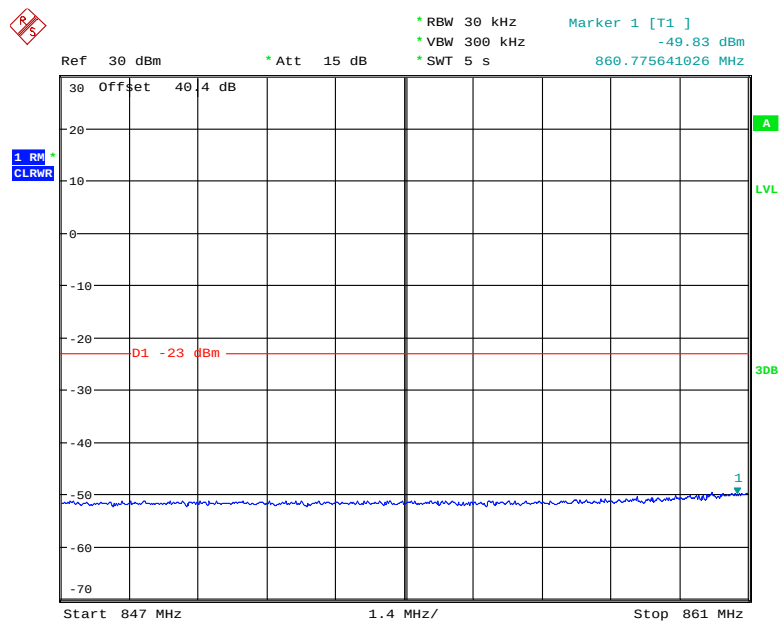
**Mix Carrier (x3)****Configuration 1 - Mode 7, 9**

Band Edge Frequency	Emission Mask Test with QPSK modulation Channel No./Frequencies(MHz)
Bottom 862 MHz for 3MHz LTE Top 869 MHz for CDMA	Channel 8737 + 593 + 684 Frequency: 863.7 (L3) + 865.825 (C) + 868.100 (C)
Bottom 862 MHz for CDMA Top 869 MHz for 3MHz LTE	Channel 476 + 567 + 8773 Frequency: 862.900 (C) + 865.175 (C) + 867.3 (L3)

Note: "(L3)" means LTE network with 3MHz channel bandwidth.
"(L5)" means LTE network with 5MHz channel bandwidth.
"(C)" means CDMA network.

Configuration 1 - Mode 7**3MHz LTE Bottom 863.7MHz**

Date: 30.OCT.2012 04:52:27

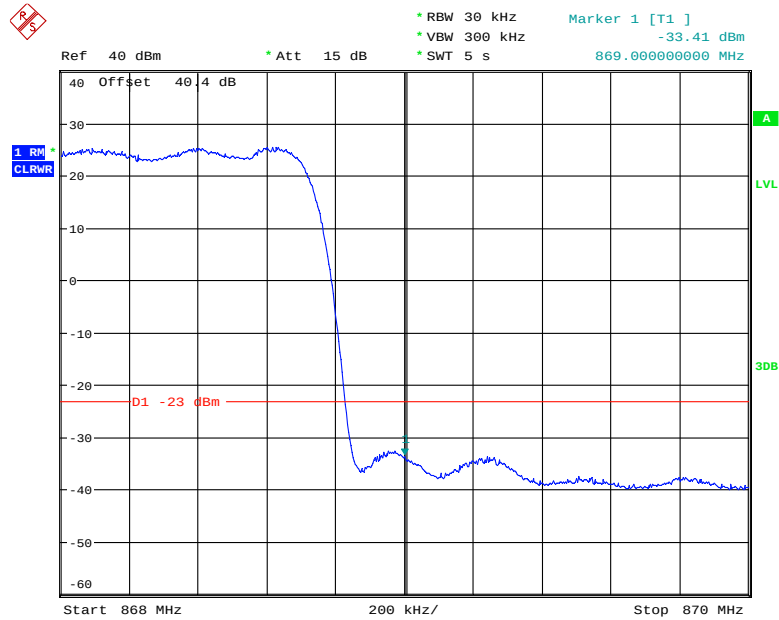


Date: 30.OCT.2012 04:52:51

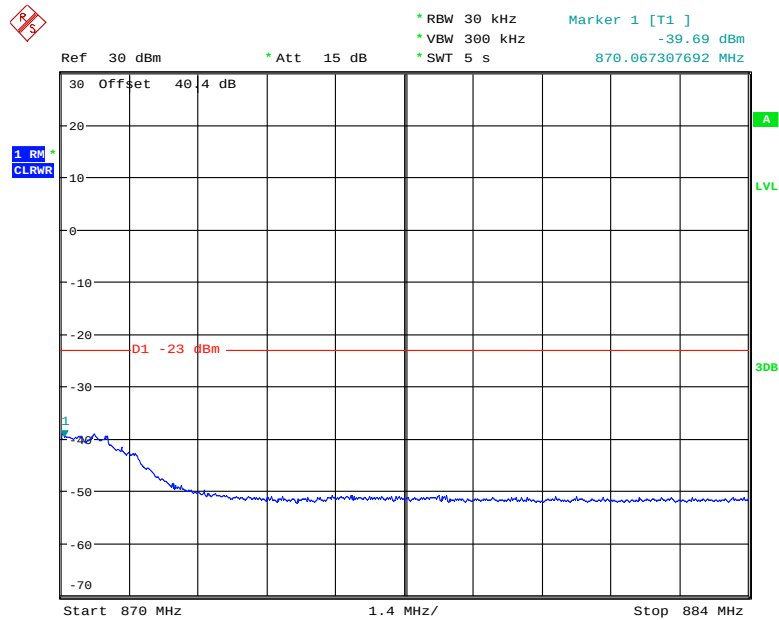


Product Service

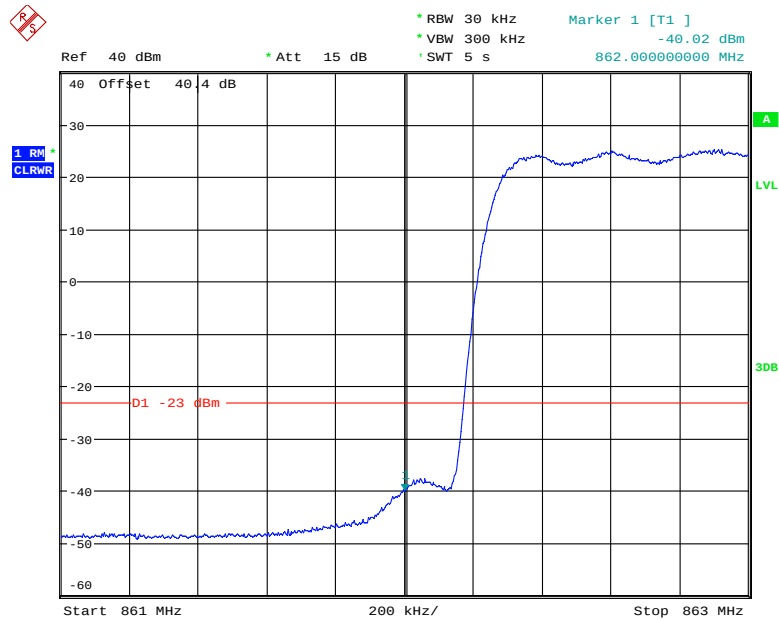
CDMA Top 868.100MHz



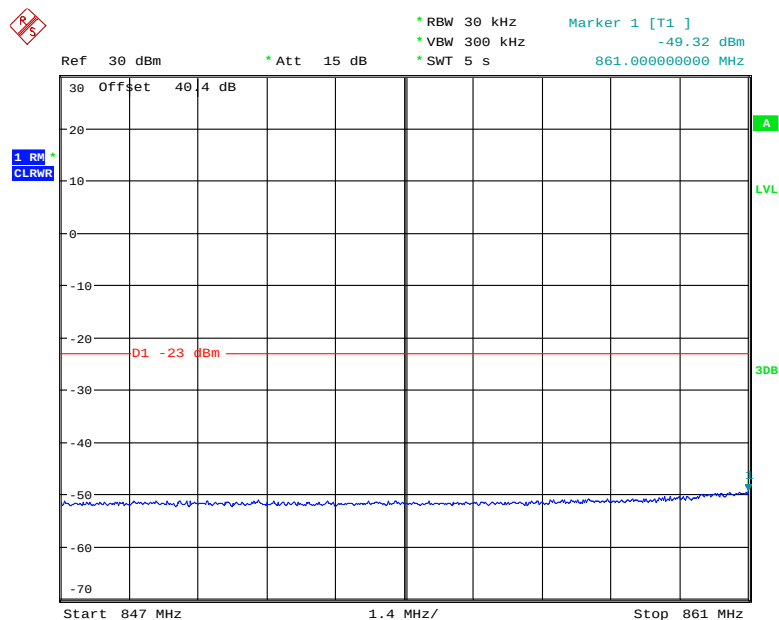
Date: 30.OCT.2012 04:53:26



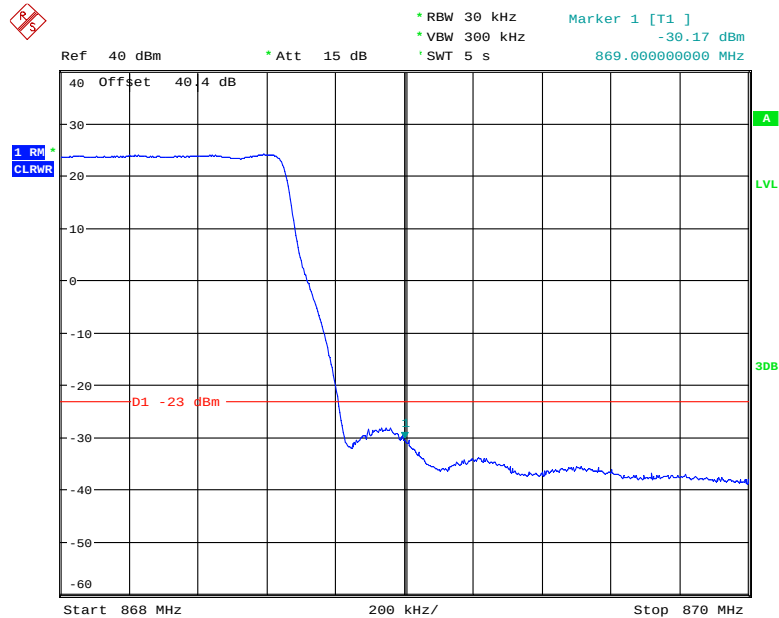
Date: 30.OCT.2012 04:54:04

Configuration 1 – Mode 9CDMA Bottom 862.900MHz

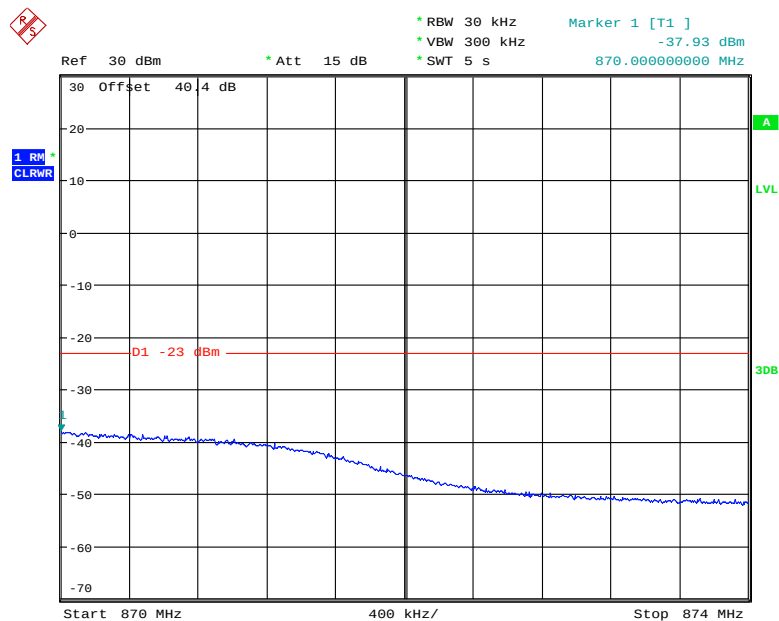
Date: 29.OCT.2012 09:38:12



Date: 29.OCT.2012 09:38:48

**3MHz LTE Top 867.3MHz**

Date: 29.OCT.2012 09:40:01



Date: 29.OCT.2012 09:40:42

Limit

The power of any emission outside the frequency band shall be attenuated below the transmitter power (P) by at least $50 + 10\log P + 10\log 2$ dB.



2.3 RADIATED SPURIOUS EMISSIONS

2.3.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1053
FCC CFR 47 Part 90, Clause 90.691

2.3.2 Equipment Under Test

RRUS 11 B26A / KRC 161 287/2, S/N: C826114497

2.3.3 Date of Test and Modification State

25 October 2012 – 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 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and Part 90.

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.

Emissions identified within the range 30MHz – 25GHz were then formally measured using a Peak detector as the worst case.

In the frequency Range 30MHz – 25GHz, the measurement was performed with a resolution bandwidth of 1MHz.

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

The limits 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 dB μ V/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:

$$E_{(v/m)} = (30 \times 1.64 \times 43.15)^{0.5} / 3 = 15.36V/m = 143.73dB\mu V/m$$

As per 90.691 the spurious emission must be attenuated by $43 + 10\log(P_o)$ dB this gives:

$$43 + 10\log(39.71) = 59.35dB$$

Therefore the limit at 3m measurement distance is:

$$143.73 - 59.35 = 84.4 \text{ dB}\mu V/m$$

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

The test was performed with the EUT in the following configurations and modes of operation as the worst cases:

- Configuration 1 - Mode 1
 - Mode 3
 - Mode 4
 - Mode 6
 - Mode 8

2.3.6 Environmental Conditions

25 October 2012

Ambient Temperature 23.5°C

Relative Humidity 38.0%



2.3.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 90 for Radiated Spurious Emissions.

The test results are shown below

Note: Only the worst case results plots have been included as all of the emissions are greater than 20dB below the limit. A set of plots have been included to show the measurement system noise floor.

LTE (E-TM1.1) & CDMA (QPSK)

Configuration 1 - Mode 1

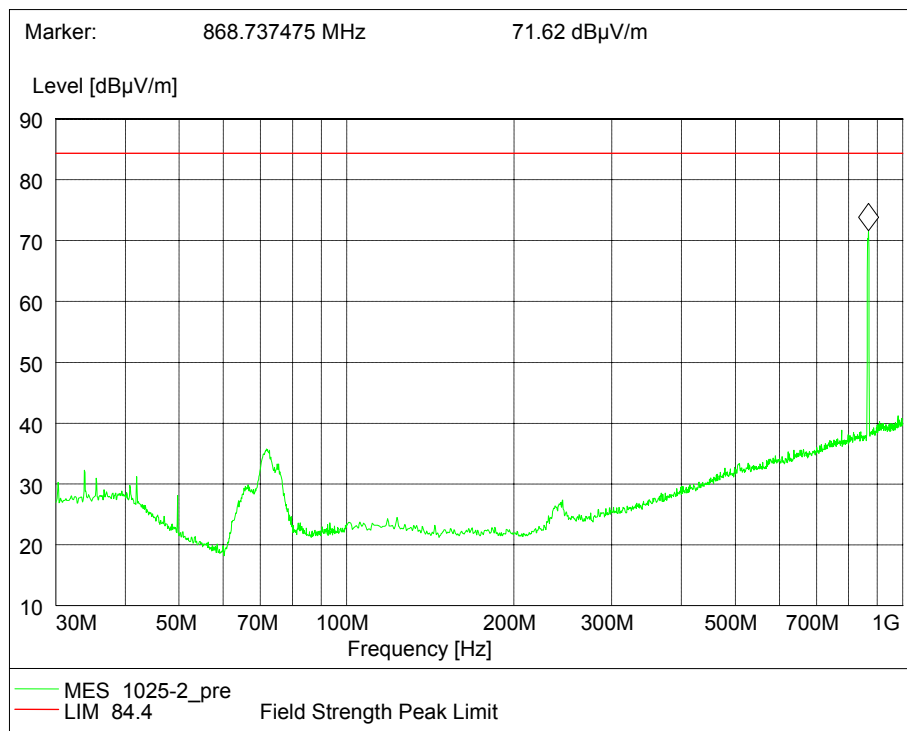
No emissions were detected within 20dB of the limit.

Configuration 1 - Mode 3

No emissions were detected within 20dB of the limit.

Configuration 1 - Mode 4

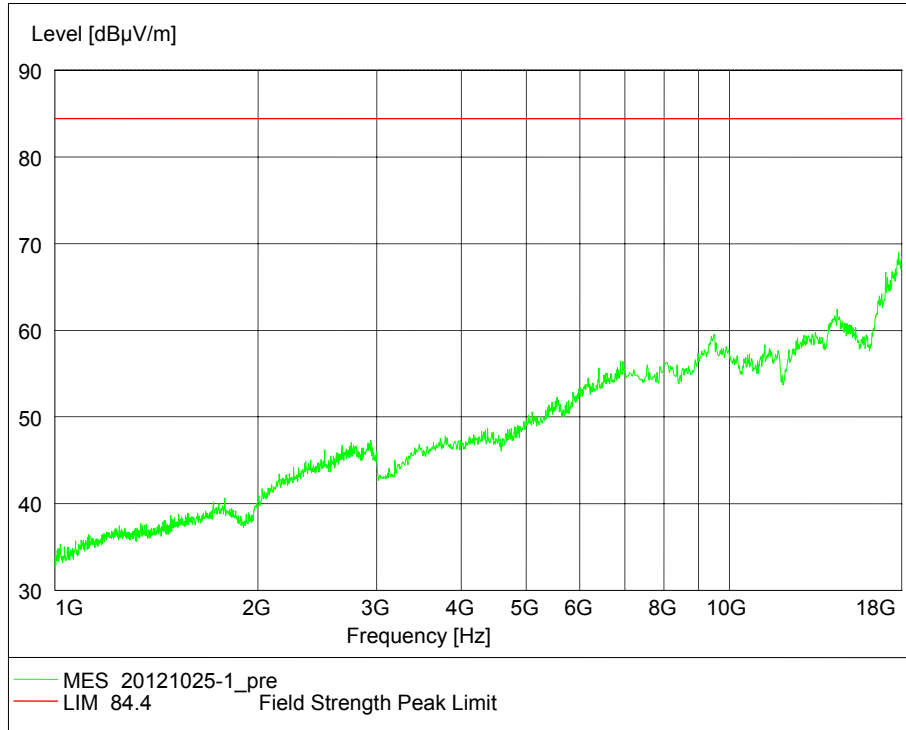
30MHz – 1GHz



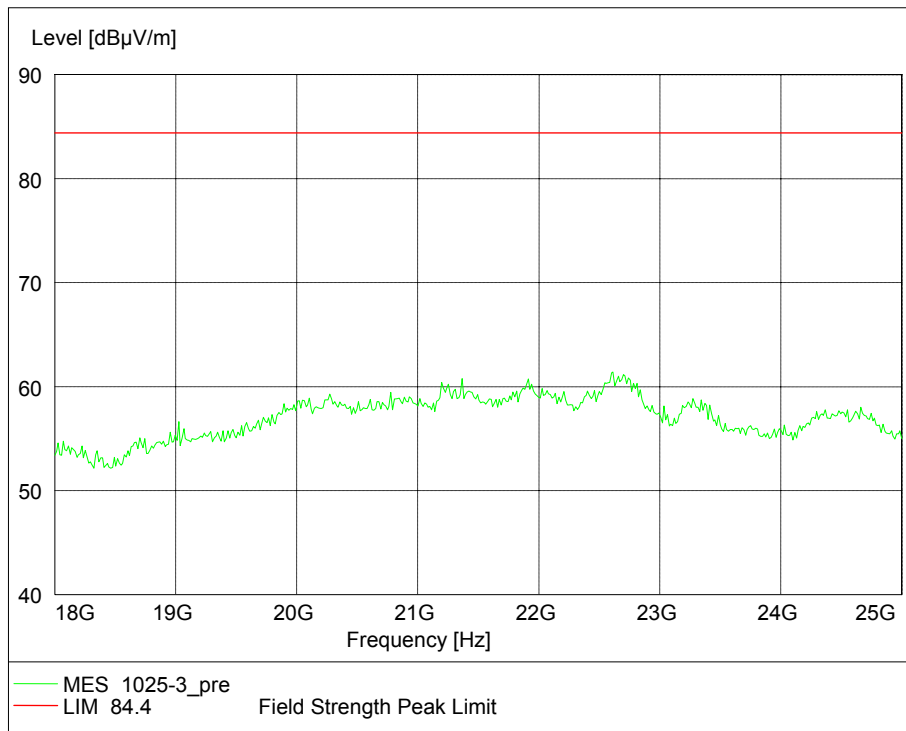
Note: The emission marked in the plot is the operating frequency.



1GHz – 18GHz



18GHz – 25GHz





Product Service

Configuration 1 - Mode 6

No emissions were detected within 20dB of the limit.

Configuration 1 - Mode 8

No emissions were detected within 20dB of the limit.

LTE (E-TM3.2) & CDMA (QPSK)Configuration 1 - Mode 4

No emissions were detected within 20dB of the limit.

LTE (E-TM3.1) & CDMA (QPSK)Configuration 1 - Mode 4

No emissions were detected within 20dB of the limit.

Limit	-13dBm / 84.4 dB μ V/m
-------	----------------------------

Remarks

The EUT does not exceed -13dBm at the measured frequencies.



2.4 CONDUCTED SPURIOUS EMISSIONS

2.4.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
FCC CFR 47 Part 90, Clause 90.691

2.4.2 Equipment Under Test

RRUS 11 B26A / KRC 161 287/2, S/N: C826114497

2.4.3 Date of Test and Modification State

26, 29 and 30 October 2012 – 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 Test Method and Operating Modes

The test was applied in accordance with the test method requirements of FCC CFR 47 Part 2 and Part 90.

In accordance with Part 2.1051 and Part 90.691, the spurious emissions from the antenna terminal were measured. The transmitter output power was attenuated using an attenuator and the frequency spectrum investigated from 9kHz to 25GHz. The EUT was set to transmit on maximum power. The resolution was set to 1MHz for 9kHz to 25GHz. The spectrum analyzer detector was set to peak and trace was kept on Max Hold.

Since the EUT transmits LTE carrier on two antennas simultaneously in the same frequency range, i.e, TX Diversity, using the Measure and Add 10Log(N) dB technique, the limit for Conducted Spurious Emission was adjusted with a correction of 10Log2 to -16dBm.

The test results for LTE Test Model E-TM1.1 together with CDMA QPSK modulation on Antenna A were selected as representative.

The maximum path loss across the measurement band was used as the reference level offset to ensure worst case.

In addition, measurements were made up to the 10th harmonic of the highest internal frequency.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
 - Mode 2
 - Mode 3
 - Mode 4
 - Mode 5
 - Mode 6
 - Mode 7
 - Mode 8
 - Mode 9



2.4.6 Environmental Conditions

	26 October 2012	29 October 2012	30 October 2012
Ambient Temperature	22.0°C	24.0°C	24.2°C
Relative Humidity	42.5%	44.2%	32.2%

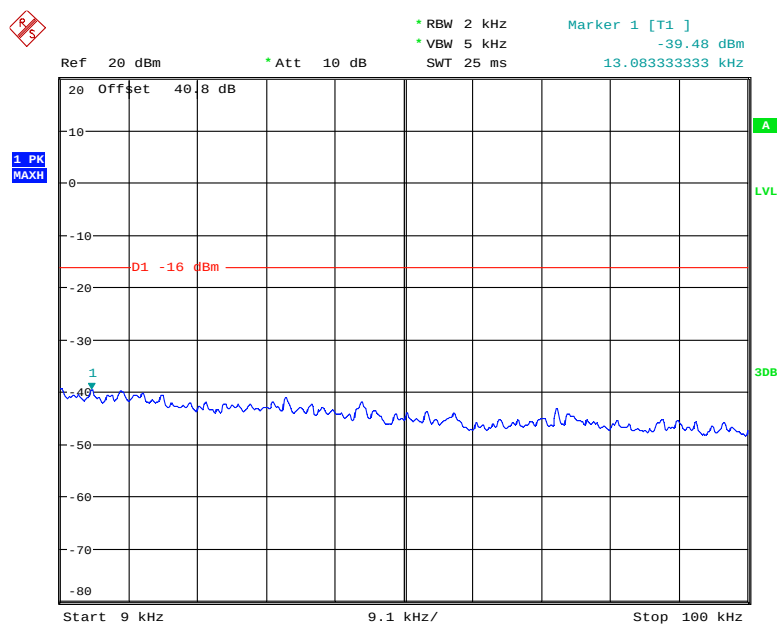
2.4.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 90 for Conducted Spurious Emissions.

The test results are shown below

Remark:

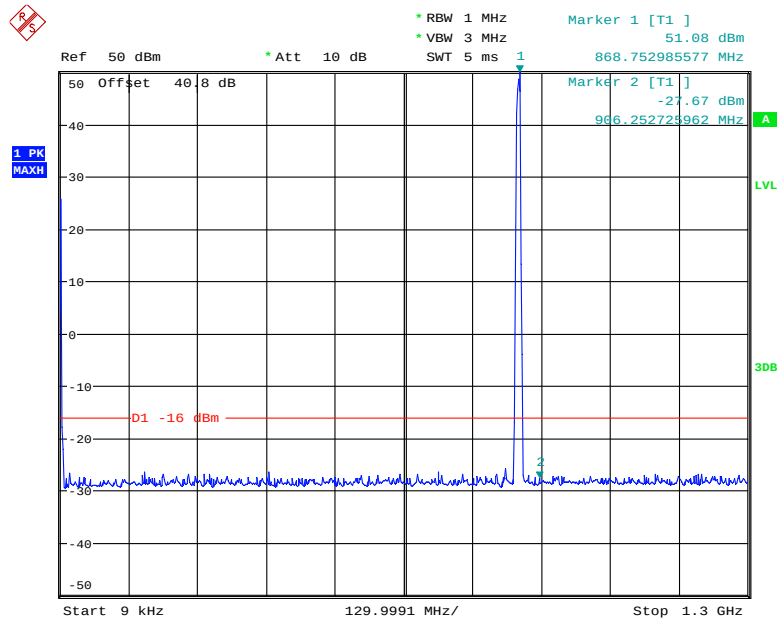
The emissions at 9kHz on the plots was not generated by the test object. A complementary measurement with a smaller Span showed that it was related to the LO feedthrough.



Date: 26.OCT.2012 08:22:07

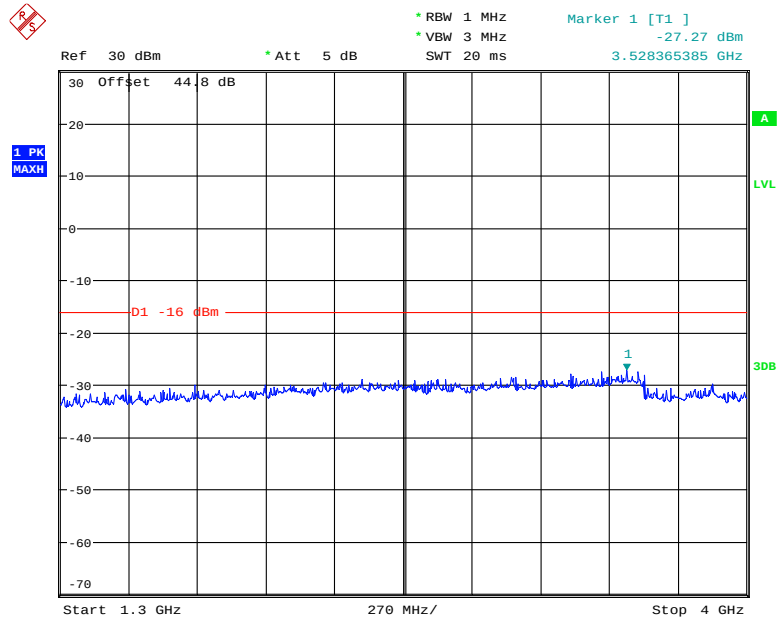


Product Service

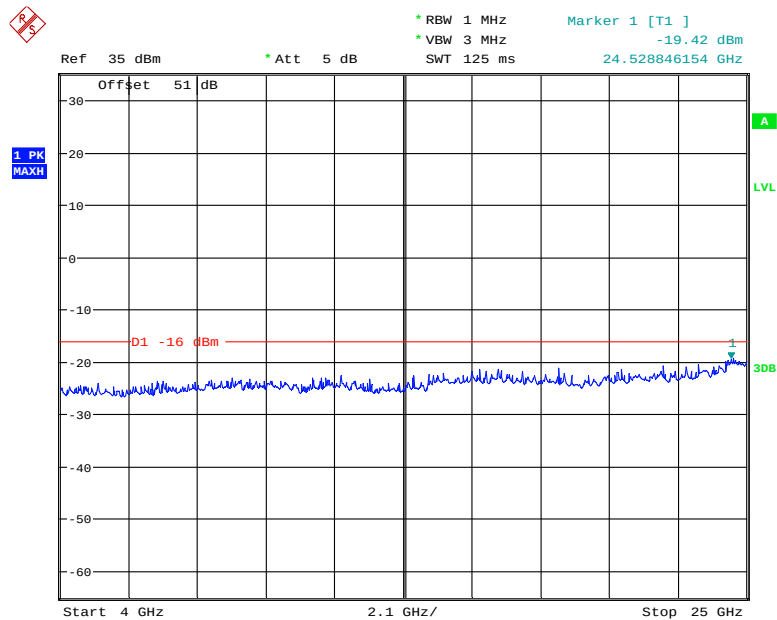
Mix Carrier (x2)**LTE (E-TM1.1) & CDMA (QPSK)****Configuration 1 – Mode1****9kHz to 1.3GHz**

Date: 30.OCT.2012 07:19:47

Note: The emissions beyond the limit are the operating frequencies.

1.3GHz to 4GHz

Date: 30.OCT.2012 07:23:12

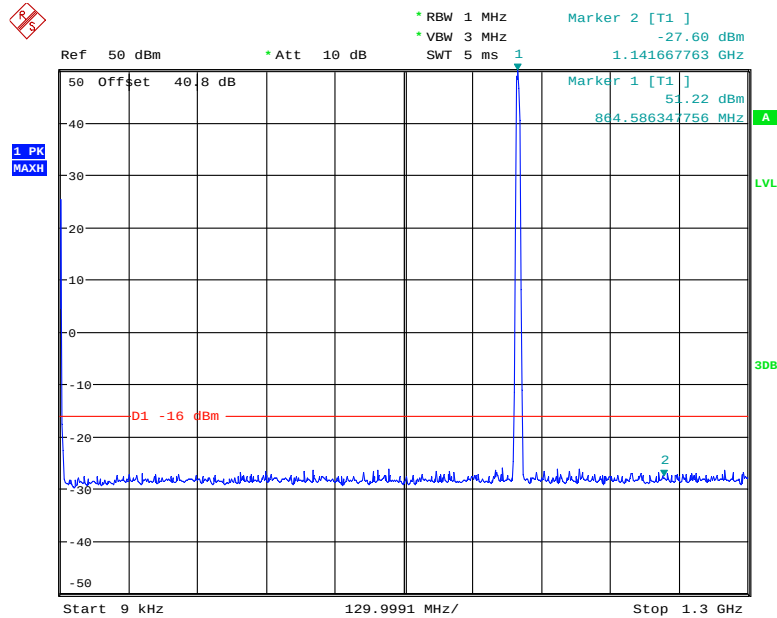
4GHz to 25GHz

Date: 30.OCT.2012 07:20:51



Configuration 1 - Mode 2

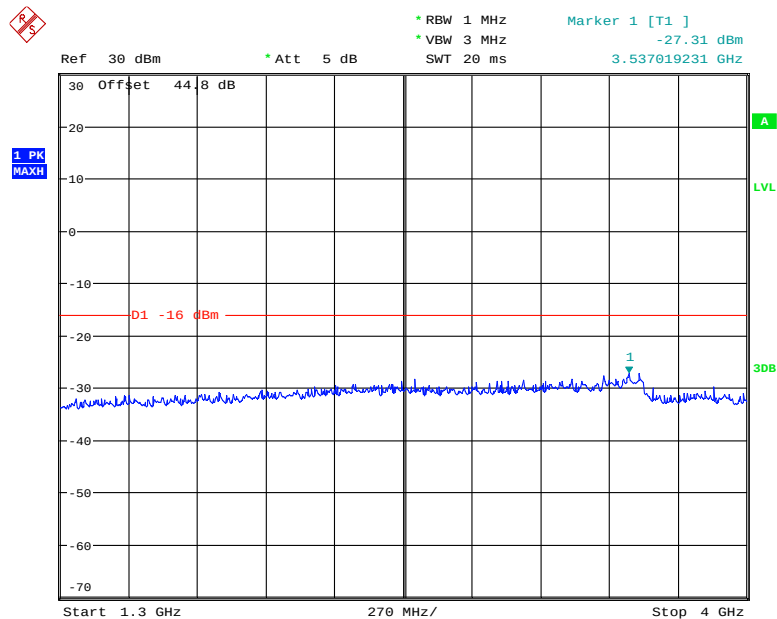
9kHz to 1.3GHz



Date: 30.OCT.2012 08:33:32

Note: The emissions beyond the limit are the operating frequencies.

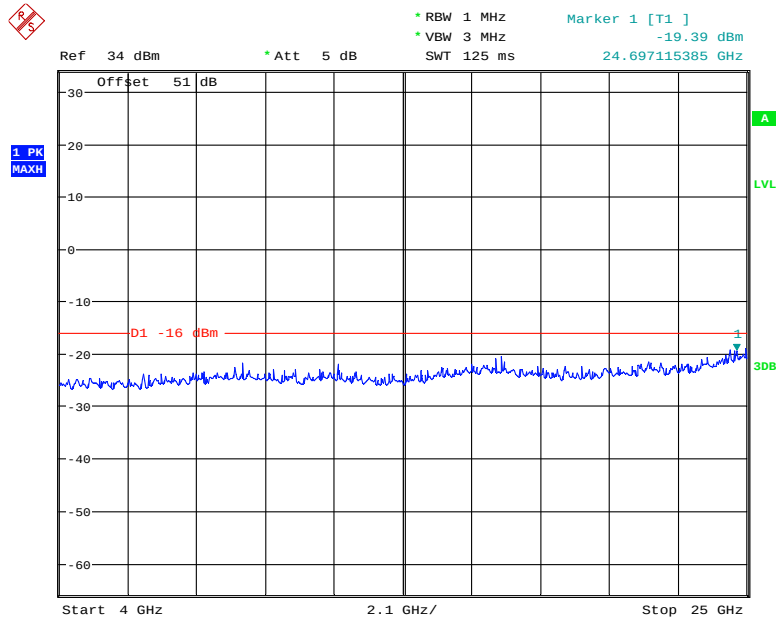
1.3GHz to 4GHz



Date: 30.OCT.2012 08:35:47



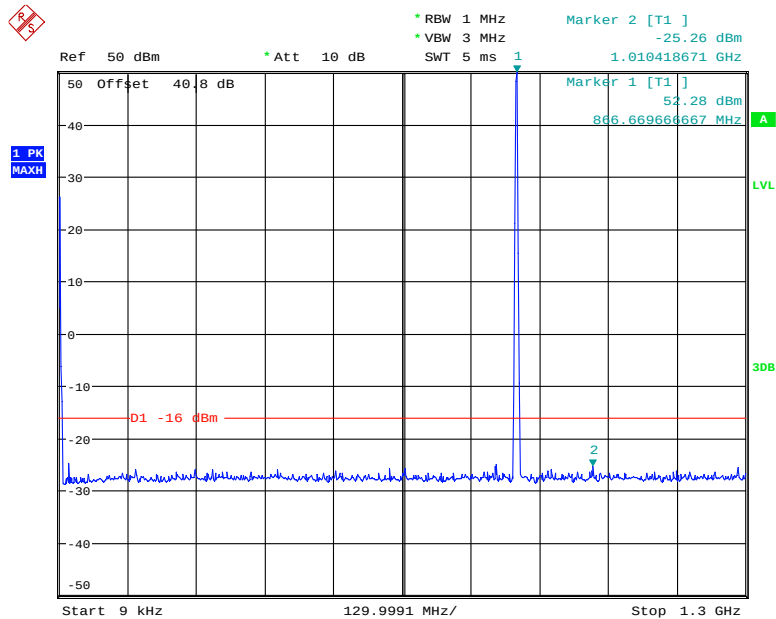
4GHz to 25GHz



Date: 30.OCT.2012 08:34:32

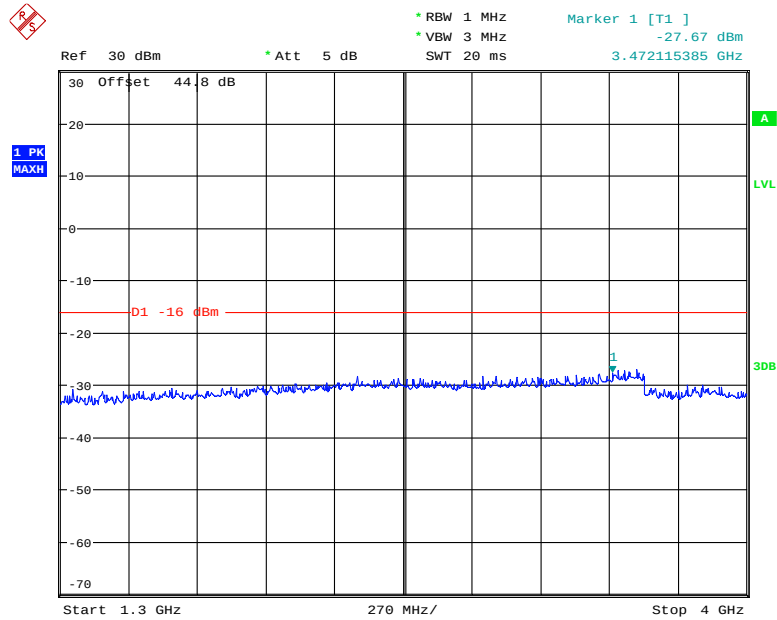
Configuration 1 – Mode 3

9kHz – 1.3GHz

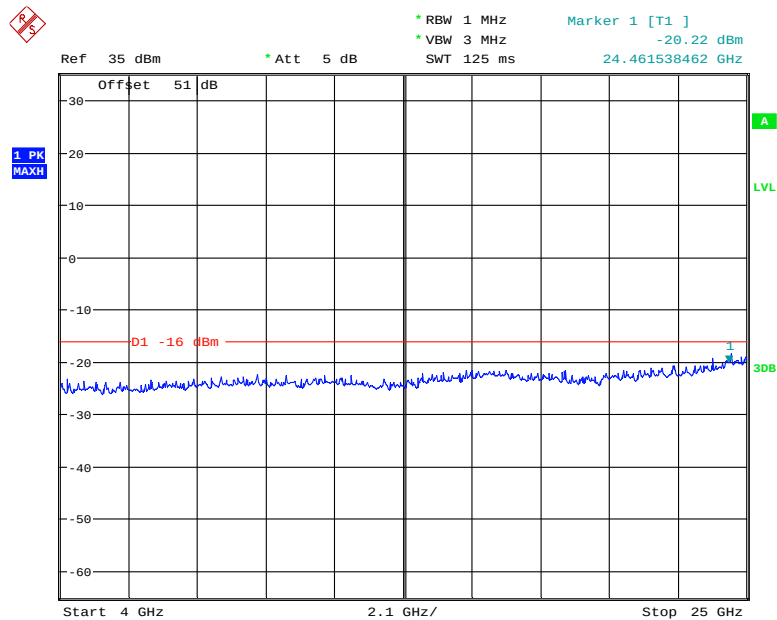


Date: 26.OCT.2012 08:21:07

Note: The emission beyond the limit is the operating frequency.

1.3GHz – 4GHz

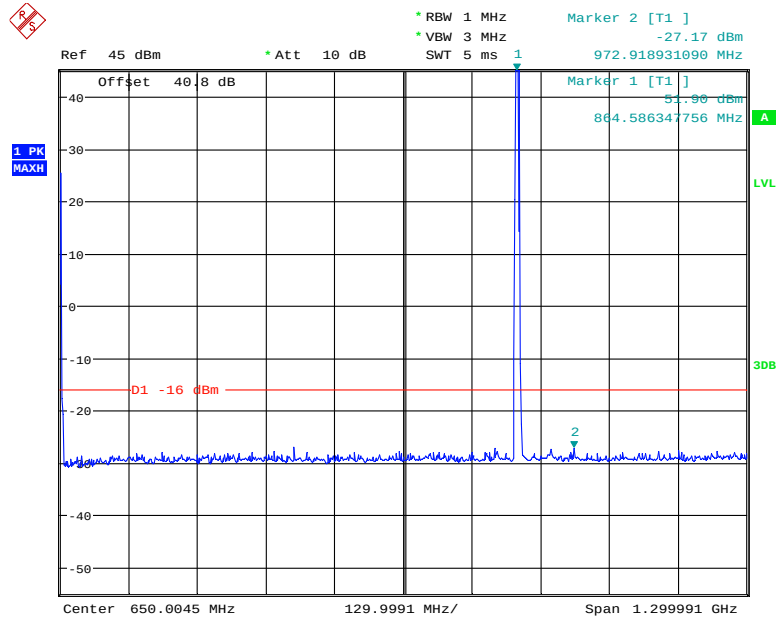
Date: 26.OCT.2012 10:27:12

4GHz – 25GHz

Date: 26.OCT.2012 10:29:34

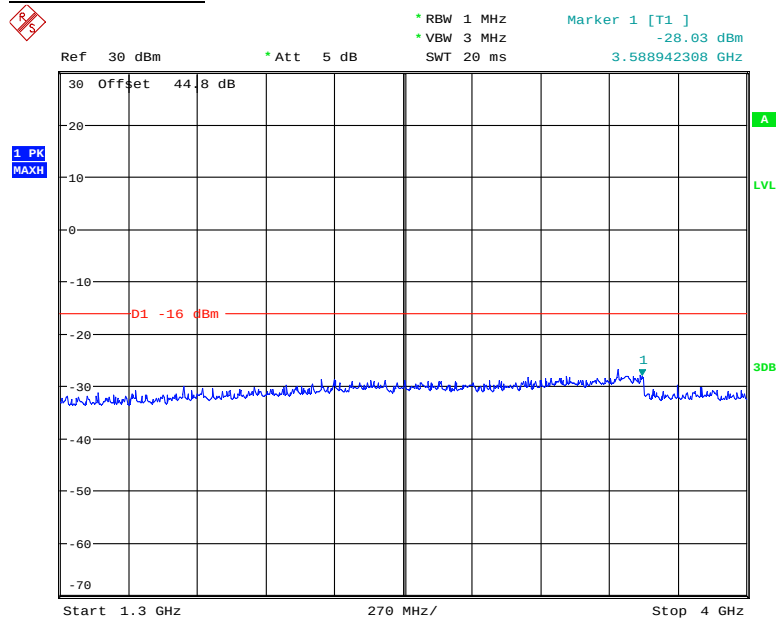


Product Service

Configuration 1 - Mode 49kHz to 1.3GHz

Date: 26.OCT.2012 11:09:54

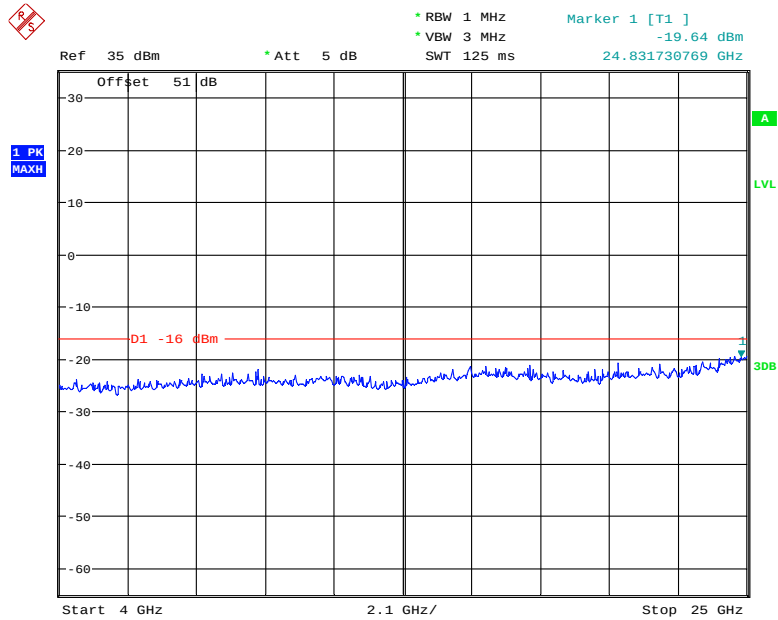
Note: The emission beyond the limit is the operating frequency.

1.3GHz to 4GHz

Date: 26.OCT.2012 11:12:34



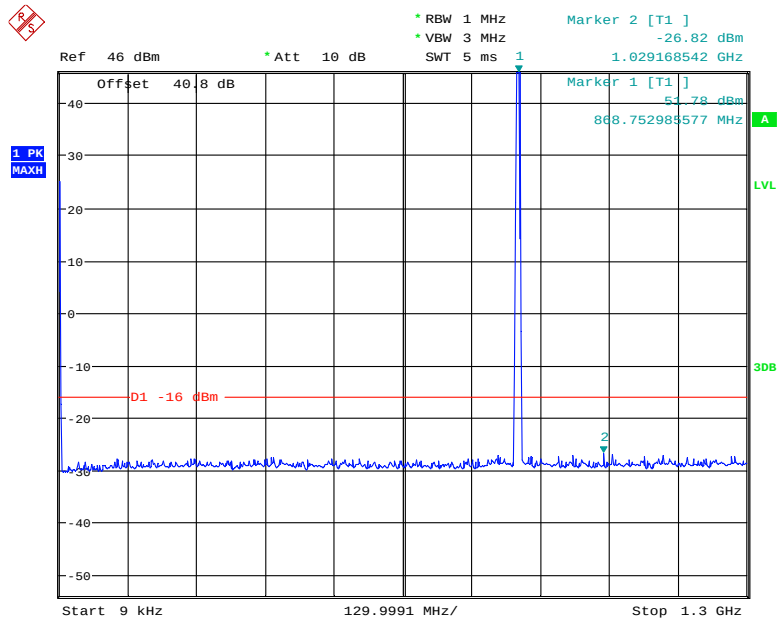
4GHz to 25GHz



Date: 26.OCT.2012 11:11:07

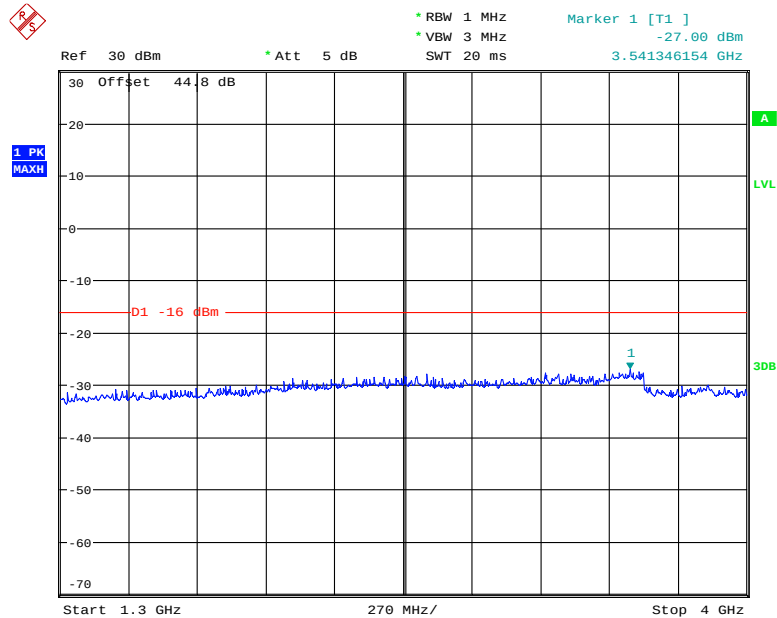
Configuration 1 - Mode 5

9kHz to 1.3GHz

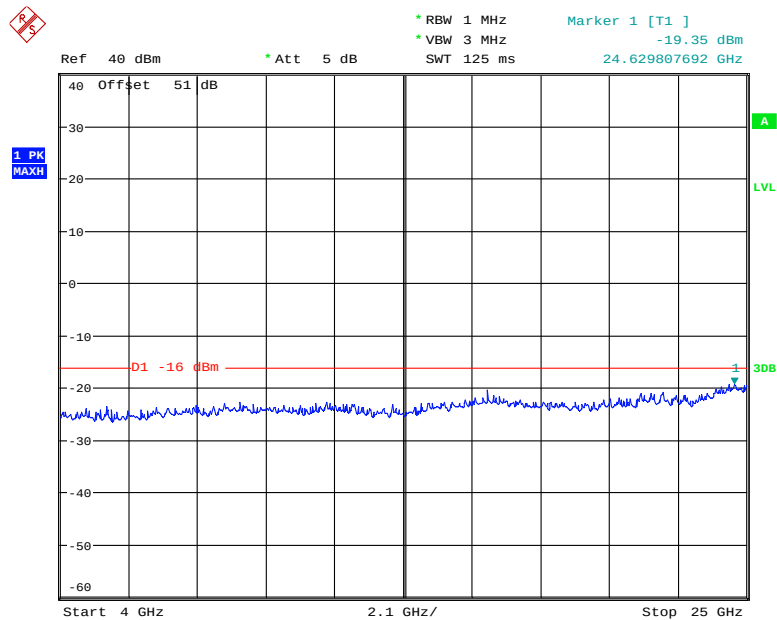


Date: 29.OCT.2012 06:26:24

Note: The emissions beyond the limit are the operating frequencies.

1.3GHz to 4GHz

Date: 29.OCT.2012 06:23:39

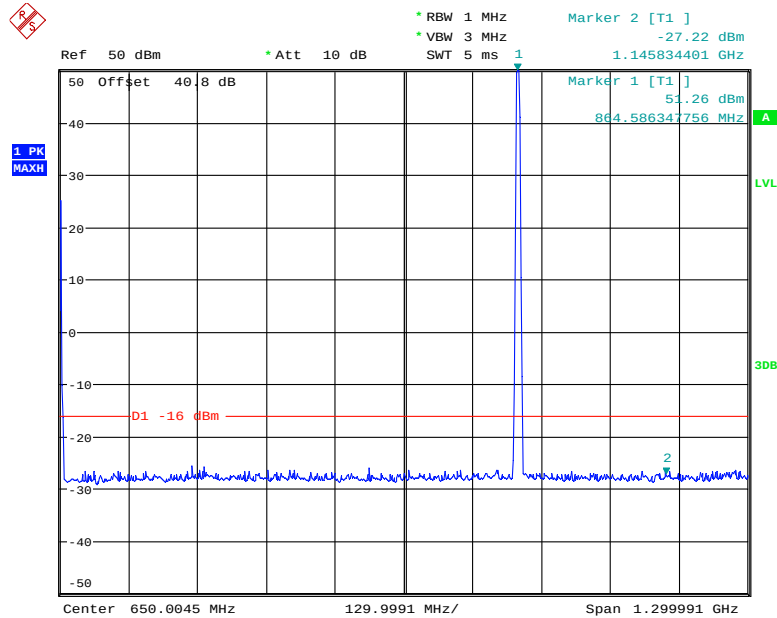
4GHz to 25GHz

Date: 29.OCT.2012 06:27:31



Configuration 1 - Mode 6

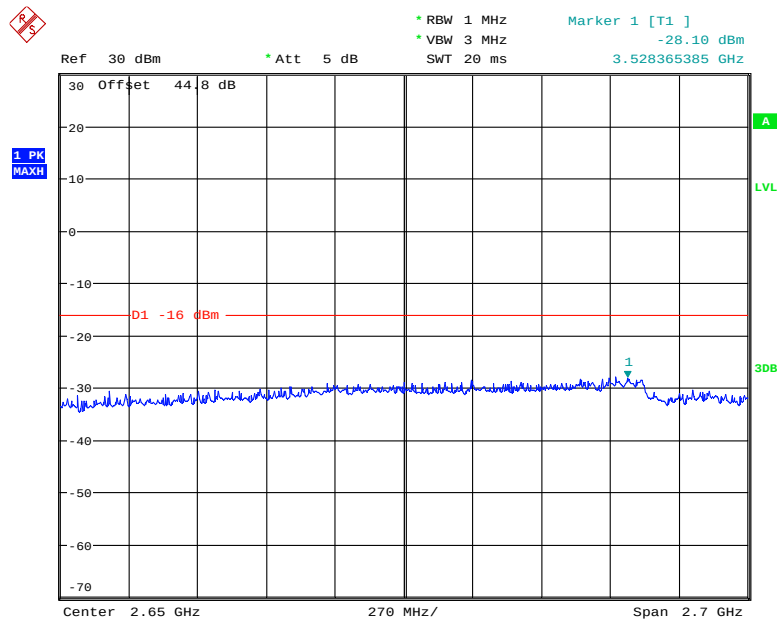
9kHz to 1.3GHz



Date: 30.OCT.2012 03:42:11

Note: The emission beyond the limit is the operating frequency.

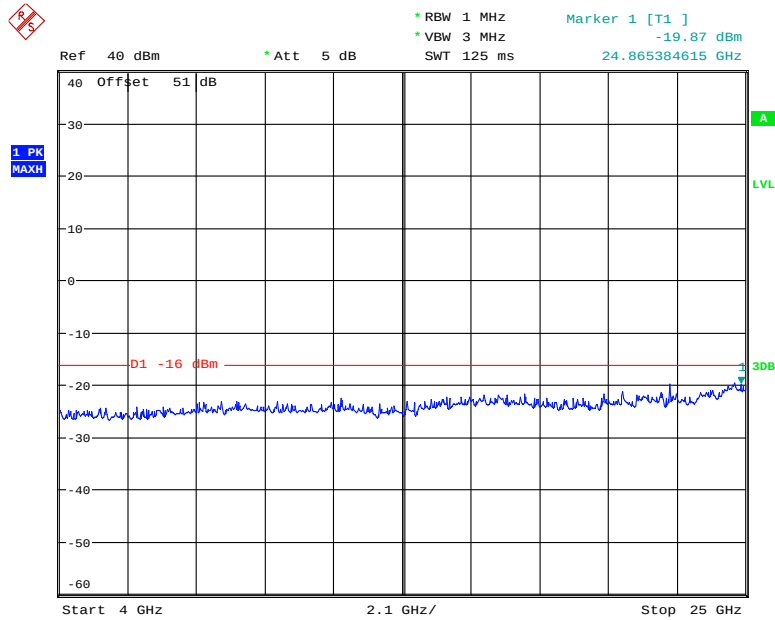
1.3GHz to 4GHz



Date: 29.OCT.2012 08:44:02



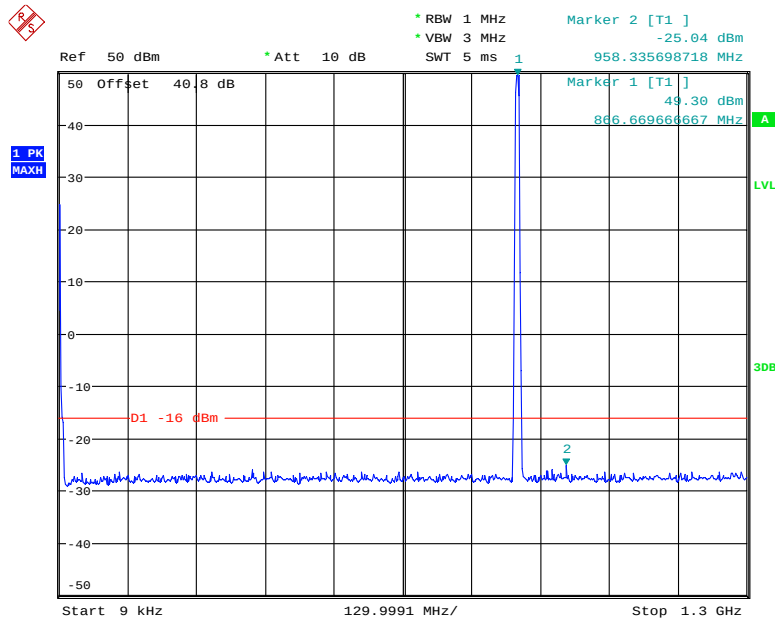
4GHz to 25GHz



Date: 29.OCT.2012 08:42:25

Configuration 1 - Mode 7

9kHz to 1.3GHz

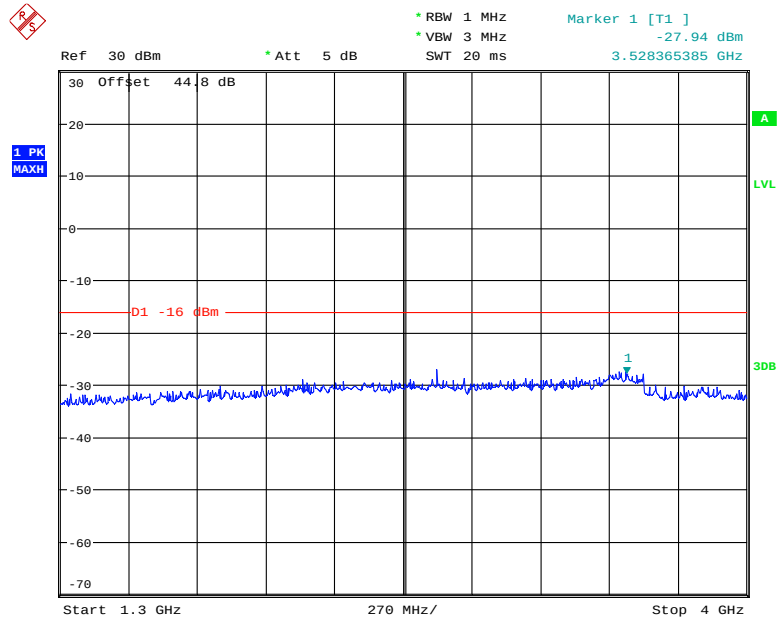


Date: 30.OCT.2012 04:56:00

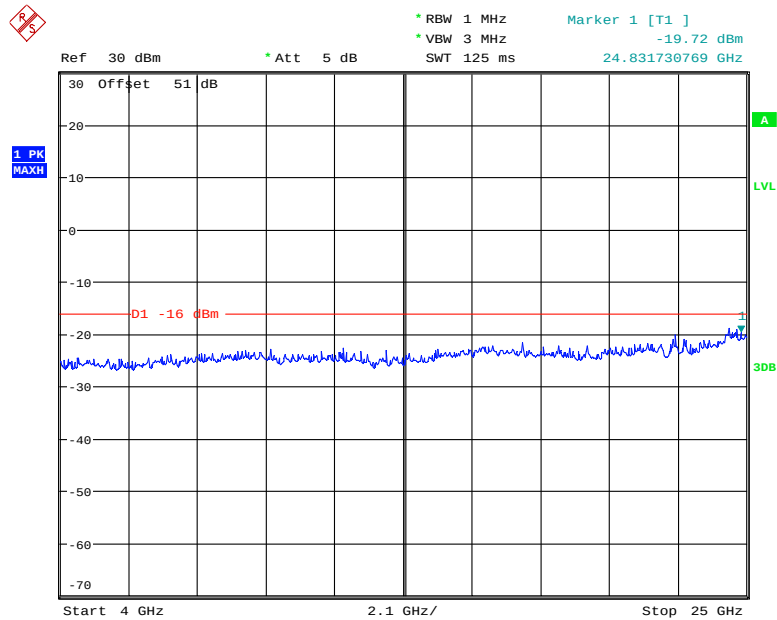
Note: The emissions beyond the limit are the operating frequencies.



Product Service

1.3GHz to 4GHz

Date: 30.OCT.2012 04:58:12

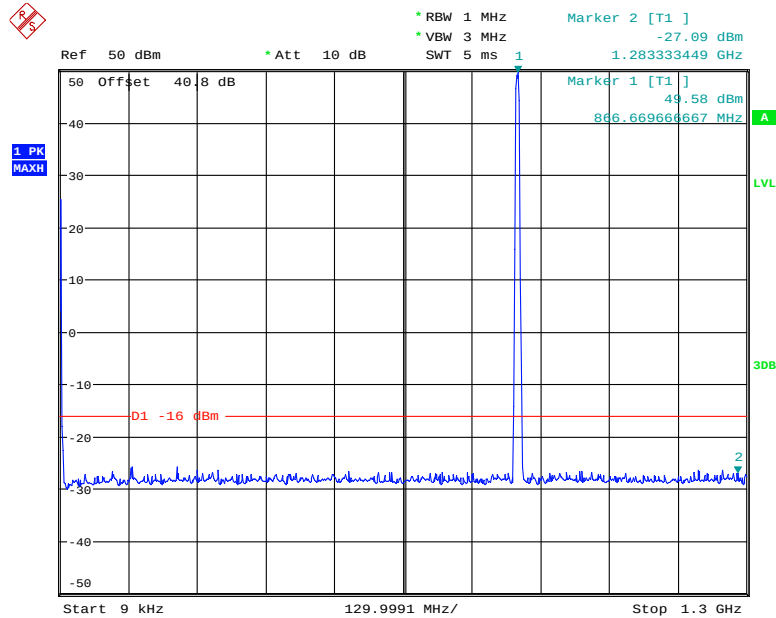
4GHz to 25GHz

Date: 30.OCT.2012 04:57:04



Configuration 1 - Mode 8

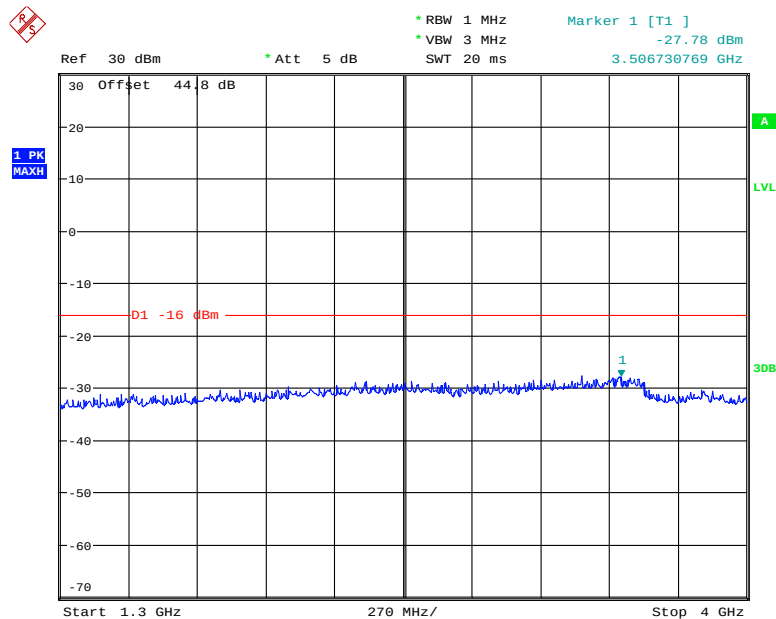
9kHz to 1.3GHz



Date: 30.OCT.2012 03:57:37

Note: The emissions beyond the limit are the operating frequencies.

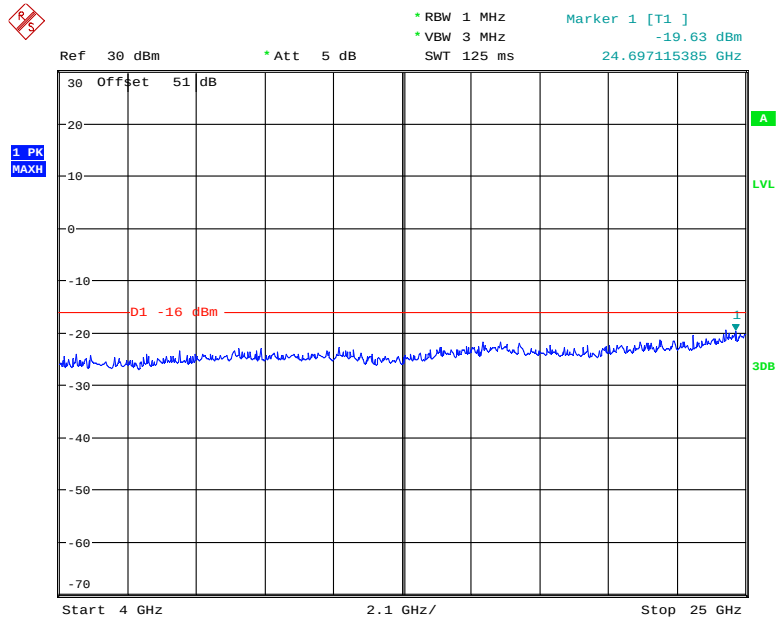
1.3GHz to 4GHz



Date: 30.OCT.2012 03:59:51



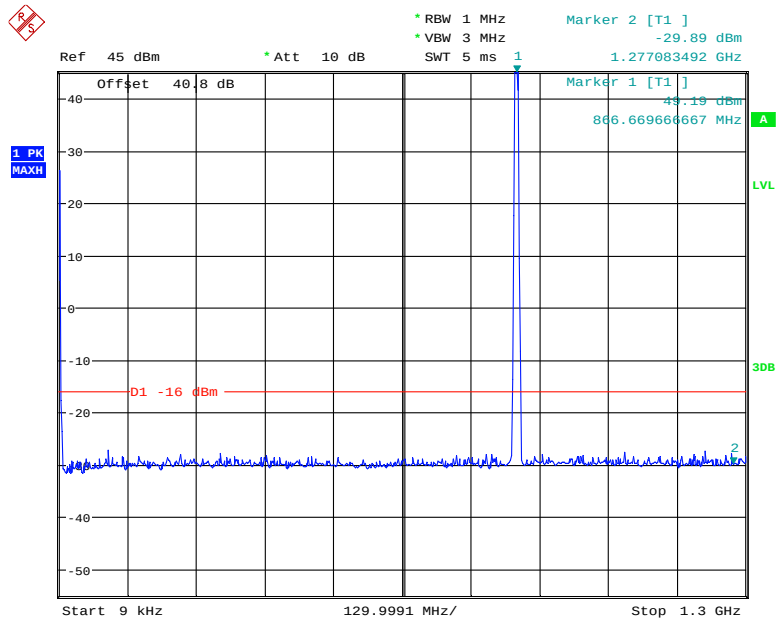
4GHz to 25GHz



Date: 30.OCT.2012 03:58:46

Configuration 1 - Mode 9

9kHz to 1.3GHz

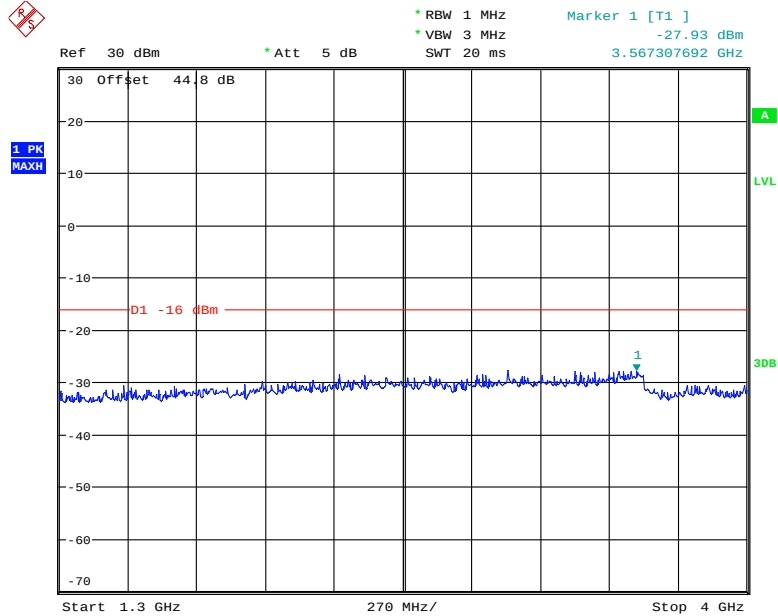


Date: 29.OCT.2012 09:36:15

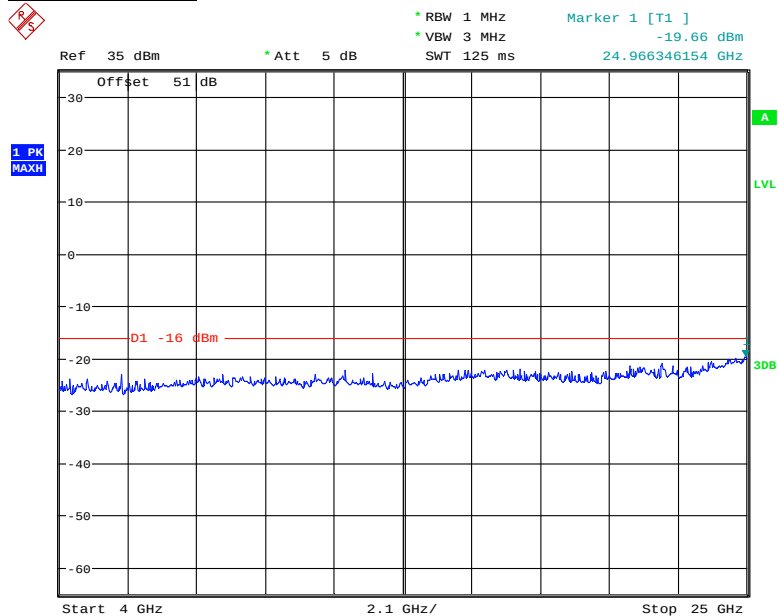
Note: The emissions beyond the limit are the operating frequencies.



Product Service

1.3GHz to 4GHz

Date: 29.OCT.2012 09:31:30

4GHz to 25GHz

Date: 29.OCT.2012 09:33:00

Limit	-16dBm
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Remarks

The EUT does not exceed -16dBm at the frequency range of 9kHz to 25GHz.



Product Service

SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

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

Instrument	Manufacturer	Type No.	Serial No.	Calibration Period (months)	Calibration Due
Section 2.1, 2.2 and 2.4 – Maximum Conducted Output Power, Emission Mask, and Conducted Spurious Emissions.					
Spectrum Analyser	Rohde & Schwarz	FSQ26	201122	12	09-Aug-2013
Power Meter	Rohde & Schwarz	NRP2	102438	12	12-Aug-2013
Thermal Power Sensor	Rohde & Schwarz	NRP-Z51	102434	12	12-Aug-2013
Network Analyzer	Agilent	8720D	US36140166	12	09-Sep-2013
40 dB Attenuator	Aeroflex / Weinschel	48-40-43-LIM	BR5020	-	O/P MON
High pass filter	K&L	WSD-00568-2	16	-	O/P MON
Load	Shanghai Huaxiang	TF 100	09121616	-	O/P MON
Power Supply	Dahua	DH1716-5D	200360033	-	O/P MON
Digital Multi-meter	FLUKE	179	91820401	12	13-Dec-2012
Thermo-hygrometer	AZ Instruments	8705	9151655	12	19-Dec-2012
Section 2.3 – Radiated Spurious Emissions					
Load	Shanghai Huaxiang	TF100	09121631	-	O/P MON
Load	Shanghai Huaxiang	TF100	09121602	-	O/P MON
EMI Receiver	Rohde & Schwarz	ESI 40	100015	12	19-Aug-2013
Ultra log test antenna	Rohde & Schwarz	HL562	100167	12	19-Aug-2013
Double-Ridged Wave-guide Horn Antenna	Rohde & Schwarz	HF 906	100029	12	19-Aug-2013
Pyramidal Horn Antenna	EMCO	3160-09	-	-	-
Antenna master	Frankonia	MA 260	-	12	19-Aug-2013
Relay Switch Unit	Rohde & Schwarz	331.1601.31	338965002	-	TU
Semi Anechoic Chamber	Frankonia	23.18m×16.88 m× 9.60m	-	12	19-Aug-2013
Power Supply	Dahua	DH1716-5D	200360033	-	O/P MON
Digital Multimeter	FLUKE	179	91820401	12	13-Dec-2012
Thermo-hygrometer	AZ Instruments	8705	9151655	12	19-Dec-2012

O/P MON Output monitored with calibration equipment
 TU Traceability Unscheduled



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 Amplitude	$<1 \times 10^{-7}$
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 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



Product Service

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).

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