Report On

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

COMMERCIAL-IN-CONFIDENCE

FCC ID: TA8AKRC161287-2

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REPORT ON

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

Document 75924256 Report 01 Issue 1

October 2013

PREPARED FOR

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APPROVED BY

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Authorised Signatory

DATED 31 October 2013

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);

G Zhao X Zhang

Product Service

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Product Service

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 for hardware update and to add Multi-Carrier in LTE wireless network. The manufacturer has declared that this hardware update does not affect the frequency stability, therefore this requirement was not tested.

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)	CF81391251
RBS Software Version	CXP102051/16 Rev R32BD
PIS Software Version	CXP9017316/1 Rev R44GS
Hardware Version	R2A
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 90: 2012
Incoming Release Date	Declaration of Build Status 17 September 2013
Order Number Date	PTP 11 September 2013
Start of Test	17 September 2013
Finish of Test	24 September 2013
Name of Engineer(s)	G Zhao X Zhang
Related Document(s)	ANSI C63.4: 2009 FCC CFR 47 Part 2: 2012

Product Service

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 – Remote Radio Equipment						
Section	Spec Clause FCC Part 2 and 90	Test Description	Mode	Mod State	Result	Comments
	90.635	Effective Radiated Power	863.7MHz (3MHz OBW) / 864.5MHz (5MHz OBW)		N/A	No integral antenna.
			865.5MHz (3MHz, 5MHz OBW)		N/A	
			867.3MHz (3MHz OBW) / 866.5MHz (5MHz OBW)		N/A	
			863.7MHz + 867.3MHz (3MHz OBW)		N/A	
2.1	2.1046, 90.635	Maximum Peak Output Power - Conducted	863.7MHz (3MHz OBW) / 864.5MHz (5MHz OBW)	0	Pass	-
			865.5MHz (3MHz, 5MHz OBW)	0	Pass	
			867.3MHz (3MHz OBW) / 866.5MHz (5MHz OBW)	0	Pass	
			863.7MHz + 867.3MHz (3MHz OBW)	0	Pass	
2.2	2.1047 (d)	Modulation Characteristics	863.7MHz (3MHz OBW)		N/A	-
			865.5MHz (3MHz OBW)	0	Pass	
			867.3MHz (3MHz OBW)		N/A	
2.3	2.1049 (h)	Occupied Bandwidth[1]	863.7MHz (3MHz OBW) / 864.5MHz (5MHz OBW)	0	Pass	-
			865.5MHz (3MHz, 5MHz OBW)	0	Pass	
			867.3MHz (3MHz OBW) / 866.5MHz (5MHz OBW)	0	Pass	
2.4	2.1051, 90.210 (g), 90.691	Emission Masks	863.7MHz (3MHz OBW) / 864.5MHz (5MHz OBW)	0	Pass	-
			865.5MHz (3MHz, 5MHz OBW)		N/A	
			867.3MHz (3MHz OBW) / 866.5MHz (5MHz OBW)	0	Pass	
			863.7MHz + 866.7MHz (3MHz OBW)	0	Pass	
			864.3MHz + 867.3MHz (3MHz OBW)	0	Pass	
2.5	2.1053, 90.691	Radiated Spurious Emissions	864.5MHz (5MHz OBW)	0	Pass	-
			865.5MHz (3MHz, 5MHz OBW)	0	Pass	
			866.5MHz (5MHz OBW)	0	Pass	
			863.7MHz + 867.3MHz (3MHz OBW)	0	Pass	
2.6	2.1051, 90.691	Conducted Spurious Emissions	863.7MHz (3MHz OBW) / 864.5MHz (5MHz OBW)	0	Pass	-
			865.5MHz (3MHz, 5MHz OBW)	0	Pass	
			867.3MHz (3MHz OBW) / 866.5MHz (5MHz OBW)	0	Pass	
			863.7MHz + 867.3MHz (3MHz OBW)	0	Pass	

Configuration 1 – Remote Radio Equipment						
Section	Spec Clause FCC Part 2 and 90	Test Description	Mode	Mod State	Result	Comments
	2.1055, 90.213	Frequency Stability Under Temperature Variations	863.7MHz (3MHz OBW) / 864.5MHz (5MHz OBW)		N/A	-
			865.5MHz (3MHz, 5MHz OBW)		N/A	
			867.3MHz (3MHz OBW) / 866.5MHz (5MHz OBW)		N/A	
			863.7MHz + 867.3MHz (3MHz OBW)		N/A	
	2.1055, 90.213	Frequency Stability Under Voltage Variations	863.7MHz (3MHz OBW) / 864.5MHz (5MHz OBW)		N/A	-
			865.5MHz (3MHz, 5MHz OBW)		N/A	
			867.3MHz (3MHz OBW) / 866.5MHz (5MHz OBW)		N/A	
			863.7MHz + 867.3MHz (3MHz OBW)		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.

Product Service

1.3 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	Remote Radio Equipment
MANUFACTURER	Ericsson AB
PRODUCT NUMBER	RRUS 11 B26A
PART NUMBER	KRC 161 287/2
SERIAL NUMBER	CF81391251
HARDWARE VERSION	R2A
RBS SOFTWARE VERSION	CXP102051/16 Rev R32BD
PIS SOFTWARE VERSION	CXP9017316/1 Rev R44GS
TRANSMITTER OPERATING RANGE	TX: 862MHz - 869MHz RX: 817MHz - 824MHz
MODULATIONS	QPSK, 16QAM, 64QAM
NUMBER OF CARRIERS	Maximum 2 carriers
ITU DESIGNATION OF EMISSION	3M00F9W 5M00F9W
OUTPUT POWER (RMS) (W or dBm)	Single Carrier: 1 x 46.0dBm per port (1 x 40W per port) Multi Carrier(x 2): 2 x 43.0dBm per port (2 x 20W per port)
OUTPTU POWER TOLERANCE	± 1.0dB
CHANNEL BANDWIDTH	Single Carrier supports 3MHz and 5MHz Multi Carrier supports 3MHz according to 3GPP TS 36.141
ANTENNA	No dedicated antenna, handled during licensing
NUMBER OF ANTENNA PORTS	2 TX/ RX ports
SUPPORTED CONFIGUATION	Dual Single Carrier or Multi 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 Base Station.

Signature 

Date 08 October 2013

D of B S Serial No 75924256/01

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

Product Service

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 operates in LTE mode. 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

Product Service

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 Test Models E-TM1.1, E-TM3.2 and E-TM3.1 at 850MHz defined in 3GPP TS 36.141. Test Model E-TM1.1 is used to represent QPSK modulation only, Test Model E-TM3.2 is used to represent 16QAM modulation, and Test Model E-TM3.1 is used to represent 64QAM modulation.

The EUT has two TX/RX ports and it can be configured to transmit in MIMO mode with both TX are active, and MIMO mode was used for measurements as the worst configuration.

For TX test cases Maximum Peak Output Power, Emission Masks and Conducted Spurious Emissions, measurements were performed on both combined TX/RX output connectors RF A and RF B of the EUT. For all other TX test cases, measurements were performed on the combined TX/RX output connector RF A.

The complete testing was performed with the EUT transmitting at maximum RF power unless otherwise stated.

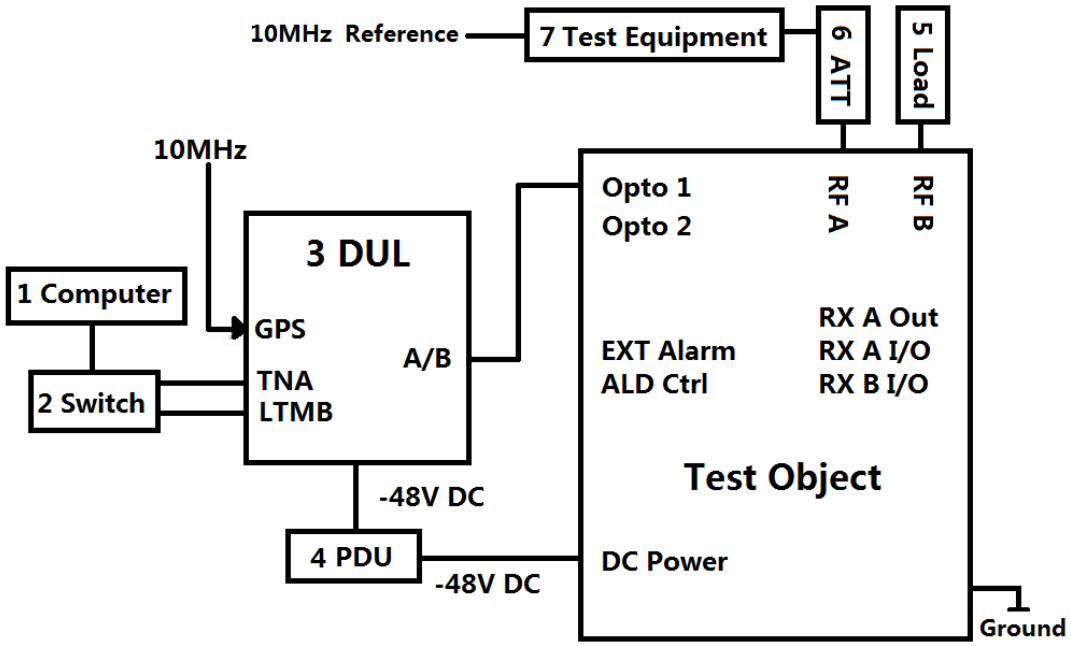
The settings below were found to be representative for all traffic scenarios when several settings with the different modulations were tested to find the worst case setting. These settings were used for all measurements if not otherwise noted:

- Single Carrier: Test Model E-TM1.1 in channel bandwidth 3MHz and 5MHz.
- Multi Carrier (x2): Test Model E-TM1.1 in channel bandwidth 3MHz.

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

Product Service

Test Setup, Conducted Measurement:

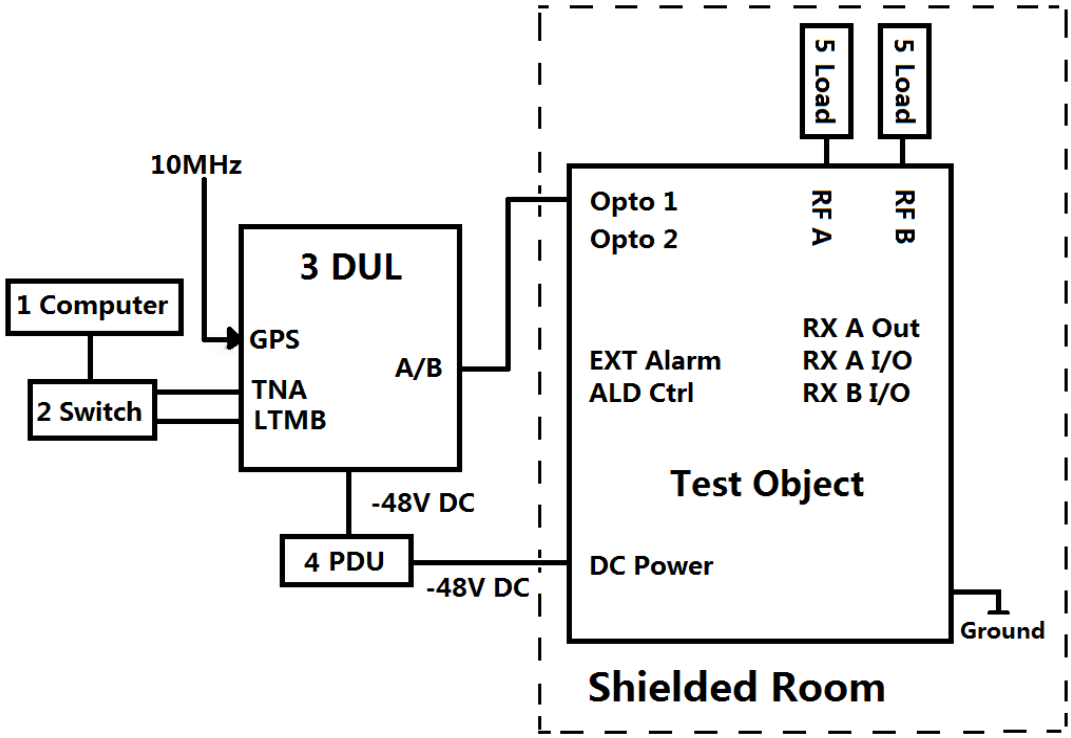


Product Name	Product Number	Version	Serial Number
RRUS 11 B26A	KRC 161 287/2	R2A	CF81391251

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	HP EliteBook 8460p	--	AP523464
2	Switch	TL-SF1008+	--	11936826484
3	RBS 6601	BFL 901 009/1	--	--
	DUL 20 01	KDU 137 533/4	R1C	CB4H365213
	SUP 6601	1/BFL 901 009/1	R3B	BR81262578
4	Power Supply	DH1716-5D	--	2008040041
	Power Supply	DH1716-5D	--	2008040050
5	Load	TF100	--	09121648
6	40dB Attenuator	48-40-43-LIM	--	BR5020
7	Power Meter	Rohde & Schwarz NRP2	--	101283
	Power Sensor	Rohde & Schwarz NRP-Z51	--	102168
	Spectrum Analyzer	FSQ26	--	100253

Product Service

Test Setup, Radiated Measurement:



Product Name	Product Number	Version	Serial Number
RRUS 11 B26A	KRC 161 287/2	R2A	CF81391251

No.	Auxiliary Equipment	Part Number / Model Type	Version	Serial Number
1	Computer	HP EliteBook 8460p	--	AP523464
2	Switch	TL-SF1008+	--	11936826484
3	RBS 6601	BFL 901 009/1	--	--
	DUL 20 01	KDU 137 533/4	R1C	CB4H365213
	SUP 6601	1/BFL 901 009/1	R3B	BR81262578
4	Power Supply	DH1716-5D	--	2008040041
	Power Supply	DH1716-5D	--	2008040050
5	Load	TF100	--	09121648
	Load	TF100	--	09121605

Product Service

1.4.3 Modes of Operation

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

Single Carrier :

Bottom Channel :

Mode 1 - 3 : EARFCN 8737 : 863.7MHz (3MHz Bandwidth)

Mode 1 - 5 : EARFCN 8745 : 864.5MHz (5MHz Bandwidth)

Middle Channel :

Mode 2 : EARFCN 8755 : 865.5MHz

Top Channel :

Mode 3 - 3 : EARFCN 8773: 867.3MHz (3MHz Bandwidth)

Mode 3 - 5 : EARFCN 8765: 866.5MHz (5MHz Bandwidth)

Multi Carrier (x2):

Mode 4 : EARFCN 8737 + 8773: 863.7MHz + 867.3MHz (3.0MHz Bandwidth)

Mode 5 : EARFCN 8737 + 8767: 863.7MHz + 866.7MHz (3.0MHz Bandwidth)

Mode 6 : EARFCN 8743 + 8773: 864.3MHz + 867.3MHz (3.0MHz Bandwidth)

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

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

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

1.8 ALTERNATIVE TEST SITE

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

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

2.1 MAXIMUM PEAK OUTPUT POWER - CONDUCTED

2.1.1 Specification Reference

FCC CFR 47 Part 2 Clause 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: CF81391251

2.1.3 Date of Test and Modification State

17 and 18 September 2013 – 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 E-TM1.1, E-TM3.2 and E-TM3.1 test models.

Since when working in MIMO mode, the EUT transmits on two antennas simultaneously in the same frequency range, using the Measure-and-Sum approach, the output power at both antennas were tested, and the total outpurt power were then summed mathematically in linear power units.

The path loss was measured and entered to the power meter as a reference level offset to get the output power value directly.

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

Configuration 1 - Mode 1 - 3, Mode 1 - 5
- Mode 2 (3MHz, 5MHz OBW)
- Mode 3 - 3, Mode 1 - 5
- Mode 4

2.1.6 Environmental Conditions

	17 September 2013	18 September 2013
Ambient Temperature	24.0°C	23.5°C
Relative Humidity	68.0%	65.0%

Product Service

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

Antenna A and B

Single Carrier

Declarative Maximum Output Power:

3MHz and 5MHz: 46.00dBm

E-TM1.1: 3MHz Bandwidth

Configuration 1 - Mode 1 - 3, Mode 2 and Mode 3 - 3

EARFCN	Frequency (MHz)	Antenna A		Antenna B		*Total (dBm) RMS	*Total (W) RMS
		Result (dBm) RMS	Result (W) RMS	Result (dBm) RMS	Result (W) RMS		
8737	863.7	45.78	37.84	45.79	37.93	48.80	75.77
8755	865.5	45.85	38.46	45.70	37.15	48.79	75.61
8773	867.3	45.90	38.90	45.88	38.73	48.90	77.63

E-TM1.1: 5MHz Bandwidth

Configuration 1 - Mode 1 - 5, Mode 2 and Mode 3 - 5

EARFCN	Frequency (MHz)	Antenna A		Antenna B		*Total (dBm) RMS	*Total (W) RMS
		Result (dBm) RMS	Result (W) RMS	Result (dBm) RMS	Result (W) RMS		
8745	864.5	45.67	36.90	45.62	36.48	48.66	73.38
8755	865.5	45.82	38.19	45.63	36.56	48.74	74.75
8765	866.5	45.89	38.82	45.79	37.93	48.85	76.75

E-TM3.2: 3MHz Bandwidth

Configuration 1 - Mode 1 - 3, Mode 2 and Mode 3 - 3

EARFCN	Frequency (MHz)	Antenna A		Antenna B		*Total (dBm) RMS	*Total (W) RMS
		Result (dBm) RMS	Result (W) RMS	Result (dBm) RMS	Result (W) RMS		
8737	863.7	45.77	37.76	45.79	37.93	48.79	75.69
8755	865.5	45.83	38.28	45.68	36.98	48.77	75.26
8773	867.3	45.87	38.64	45.85	38.46	48.87	77.10

E-TM3.2: 5MHz Bandwidth

Configuration 1 - Mode 1 - 5, Mode 2 and Mode 3 - 5

EARFCN	Frequency (MHz)	Antenna A		Antenna B		*Total (dBm) RMS	*Total (W) RMS
		Result (dBm) RMS	Result (W) RMS	Result (dBm) RMS	Result (W) RMS		
8745	864.5	45.65	36.73	45.60	36.31	48.64	73.04
8755	865.5	45.78	37.84	45.59	36.22	48.70	74.06
8765	866.5	45.81	38.11	45.75	37.58	48.79	75.69

E-TM3.1: 3MHz Bandwidth

Configuration 1 - Mode 1 - 3, Mode 2 and Mode 3 - 3

EARFCN	Frequency (MHz)	Antenna A		Antenna B		*Total (dBm) RMS	*Total (W) RMS
		Result (dBm) RMS	Result (W) RMS	Result (dBm) RMS	Result (W) RMS		
8737	863.7	45.76	37.67	45.79	37.93	48.79	75.60
8755	865.5	45.84	38.37	45.70	37.15	48.78	75.52
8773	867.3	45.89	38.82	45.87	38.64	48.89	77.46

E-TM3.1: 5MHz Bandwidth

Configuration 1 - Mode 1 - 5, Mode 2 and Mode 3 – 5

EARFCN	Frequency (MHz)	Antenna A		Antenna B		*Total (dBm) RMS	*Total (W) RMS
		Result (dBm) RMS	Result (W) RMS	Result (dBm) RMS	Result (W) RMS		
8745	864.5	45.68	36.98	45.65	36.73	48.68	73.71
8755	865.5	45.83	38.28	45.67	36.90	48.76	75.18
8765	866.5	45.85	38.46	45.81	38.11	48.84	76.57

Multi Carrier (x2)

Declarative Maximum Output Power：

3MHz: 45.50dBm

E-TM1.1, E-TM3.2 and E-TM3.1: 3MHz Bandwidth

Configuration 1 - Mode 4

EARFCN/ Frequency (MHz)	Test Model	Antenna A		Antenna B		*Total (dBm) RMS	*Total (W) RMS
		Result (dBm) RMS	Result (W) RMS	Result (dBm) RMS	Result (W) RMS		
8737+8773/ 863.7+867.3	E-TM1.1	45.17	32.89	44.98	31.48	48.09	64.37
	E-TM3.2	45.18	32.96	44.97	31.41	48.09	64.37
	E-TM3.1	45.19	33.04	44.97	31.41	48.09	64.45

Note *:

Two transmitters output power were summed up according to FCC KDB662911 D01 for MIMO mode.

This unit is tested without antenna. ERP/EIRP compliance is addressed at the time of licensing, as required by the responsible FCC/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	≤1000W or ≤+60dBm

Remarks

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

2.2 MODULATION CHARACTERISTICS

2.2.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1047 (d)

2.2.2 Equipment Under Test

RRUS 11 B26A / KRC 161 287/2, S/N: CF81391251

2.2.3 Date of Test and Modification State

18 September 2013 – Modification State 0

2.2.4 Test Method and Operating Modes

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

Connect the TX output connector RF A to a spectrum analyzer with an attenuator. The other connector RF B was connected to match load. The EUT was controlled to transmit maximum power. Measure and record the constellation of the EUT by the spectrum analyzer.

The EUT supports QPSK, 16QAM and 64QAM modulations and was tested in 3.0MHz Bandwith.

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

Configuration 1 - Mode 2 (3MHz OBW)

2.2.5 Environmental Conditions

	18 September 2013
Ambient Temperature	23.5°C
Relative Humidity	65.0%

Product Service

2.2.6 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 for Modulation Characteristics:

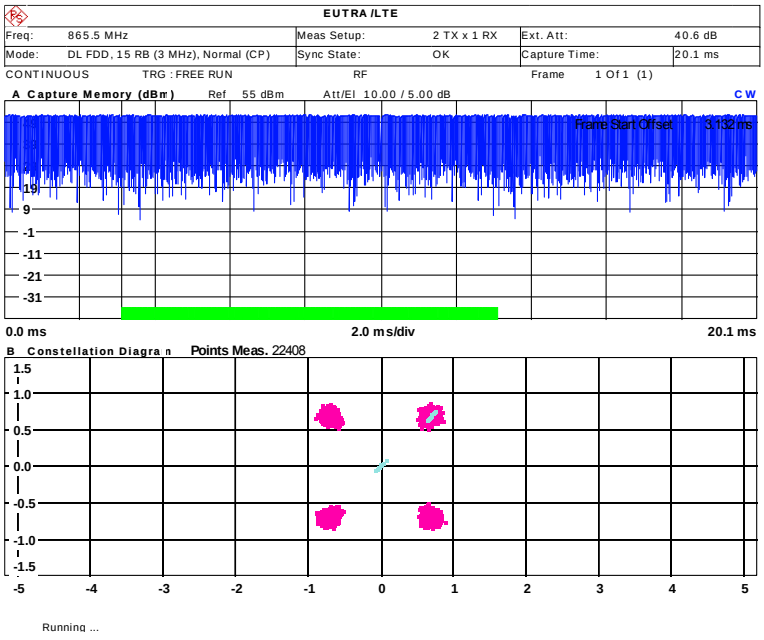
The test results are shown below

Single Carrier

Configuration 1 - Mode 2

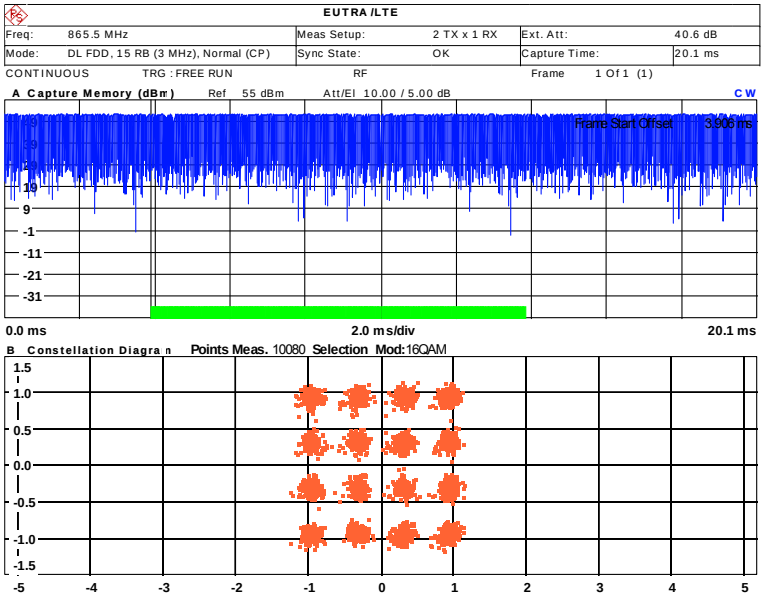
3MHz Bandwidth

E-TM1.1: EUT transmitting with QPSK modulation:



Product Service

E-TM3.2: EUT transmitting with 16QAM modulation:



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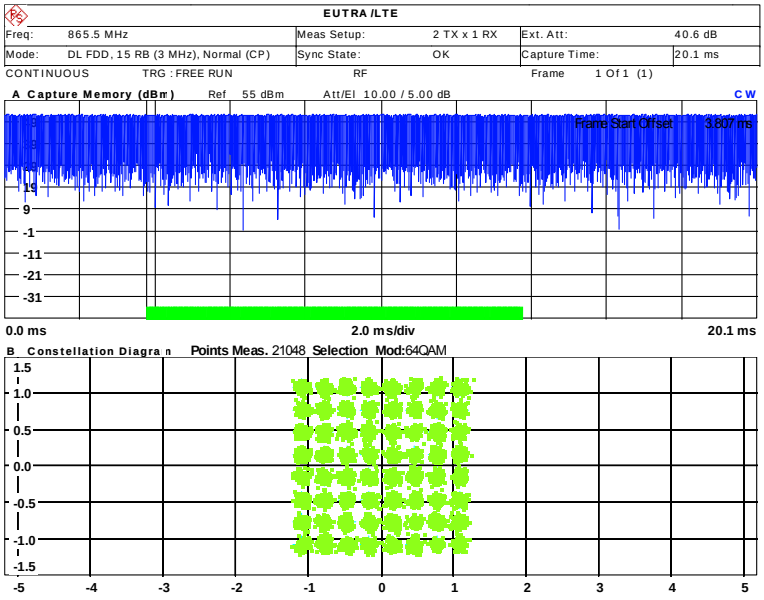
E-TM3.1: EUT transmitting with 64QAM modulation:



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2.3 OCCUPIED BANDWIDTH

2.3.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1049 (h)

2.3.2 Equipment Under Test

RRUS 11 B26A / KRC 161 287/2, S/N: CF81391251

2.3.3 Date of Test and Modification State

17 and 18 September 2013 – 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 FCC 12-25.

The EUT was transmitting at maximum power, modulated using the test models described. The EUT was tested in the supported 3MHz and 5MHz bandwidths at single carrier mode. At least 1% of the bandwidth were used for the resolution bandwidth.

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

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

Configuration 1 - Mode 1 - 3, Mode 1 - 5
- Mode 2 (3MHz, 5MHz OBW)
- Mode 3 - 3, Mode 1 - 5

2.3.6 Environmental Conditions

	17 September 2013	18 September 2013
Ambient Temperature	24.0°C	23.5°C
Relative Humidity	68.0%	65.0%

Product Service

2.3.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and FCC 12-25 for Occupied Bandwidth.

The test results are shown below

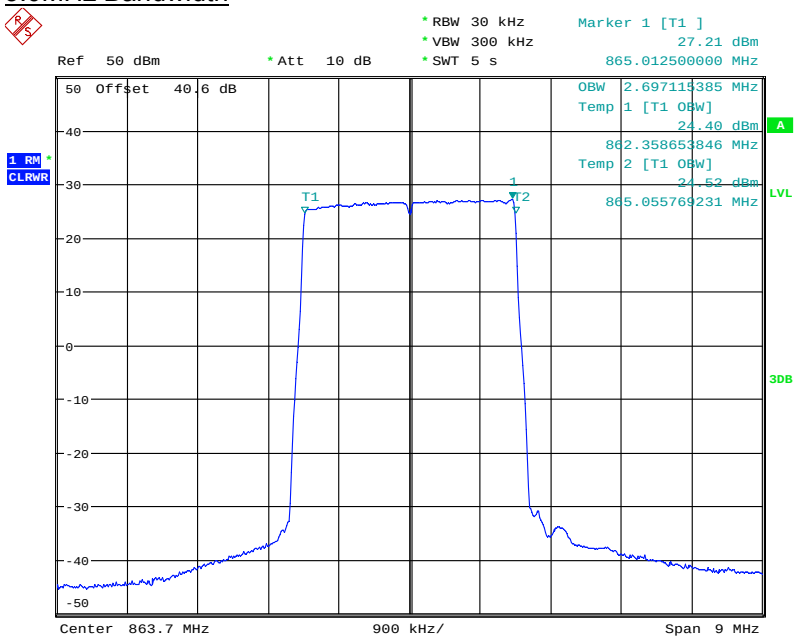
Test Model	BW configuration (MHz)	Frequency (MHz) / Channel	Occupied Bandwidth (MHz)
E-TM1.1	3.0	863.7 (Bottom)	2.70
	5.0	864.5 (Bottom)	4.47
	3.0	865.5 (Middle)	2.68
	5.0	865.5 (Middle)	4.47
	3.0	867.3 (Top)	2.68
	5.0	866.5 (Top)	4.47
E-TM3.2	3.0	865.5 (Middle)	2.70
	5.0	865.5 (Middle)	4.47
E-TM3.1	3.0	865.5 (Middle)	2.68
	5.0	865.5 (Middle)	4.47

Product Service

E-TM1.1

Configuration 1 - Mode 1 - 3

3.0MHz Bandwidth



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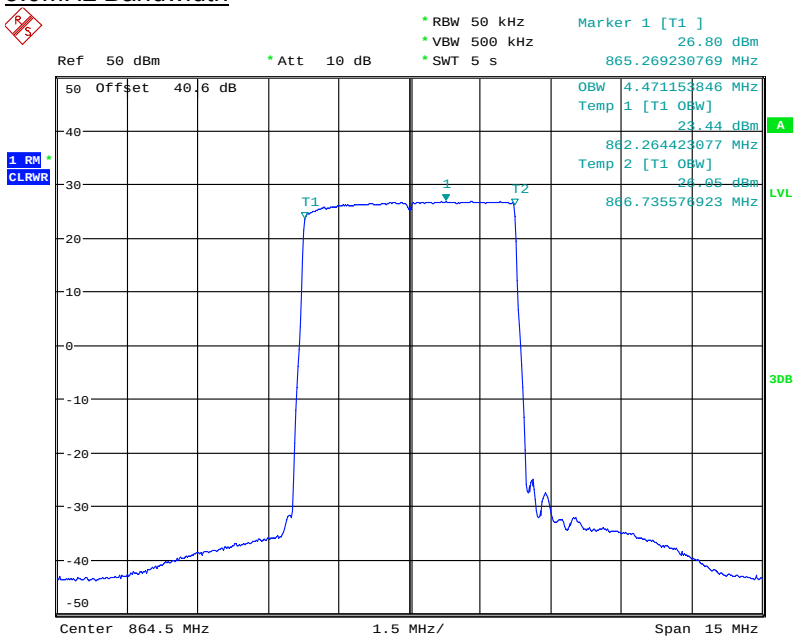
Configuration 1 - Mode 1 - 5

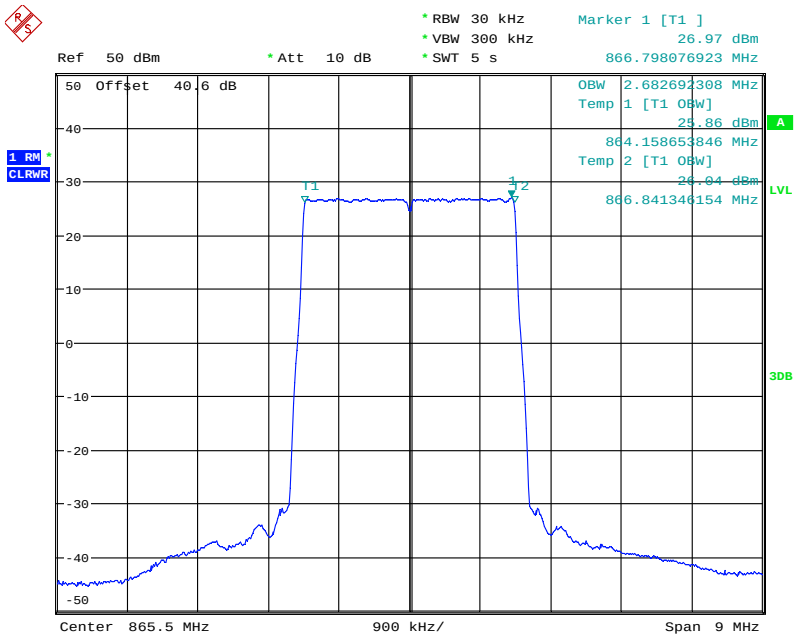
5.0MHz Bandwidth



Date: 18.SEP.2013 13:41:48

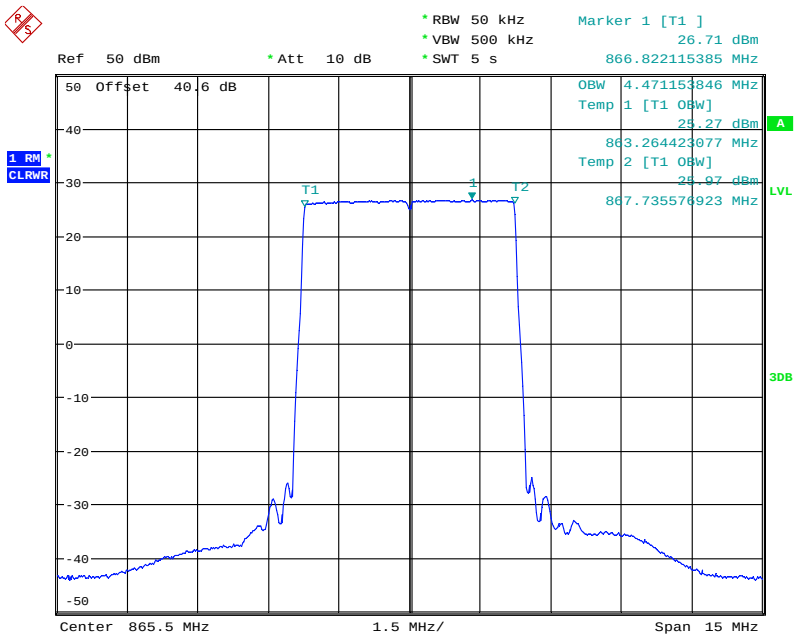
Configuration 1 - Mode 2

3.0MHz Bandwidth



Date: 18.SEP.2013 10:56:12

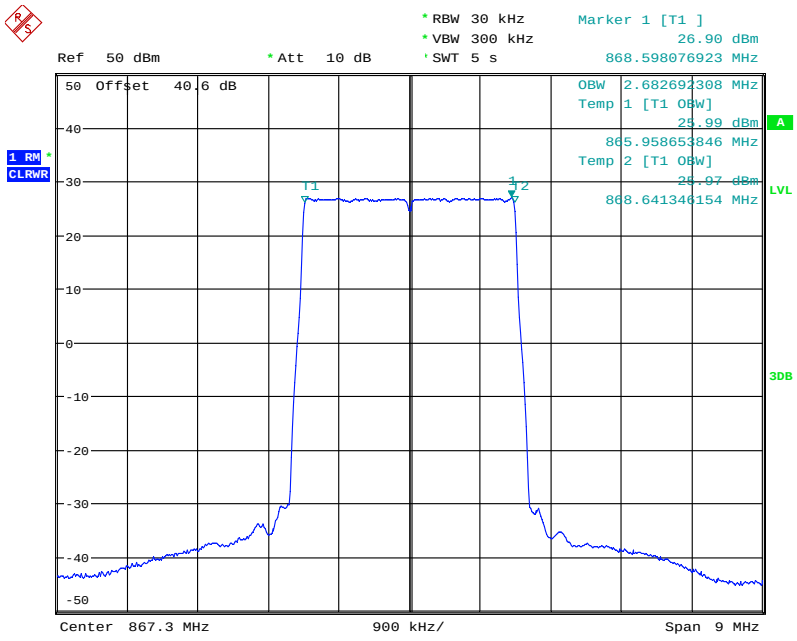
5.0MHz Bandwidth



Date: 18.SEP.2013 12:36:46

Configuration 1 - Mode 3 - 3

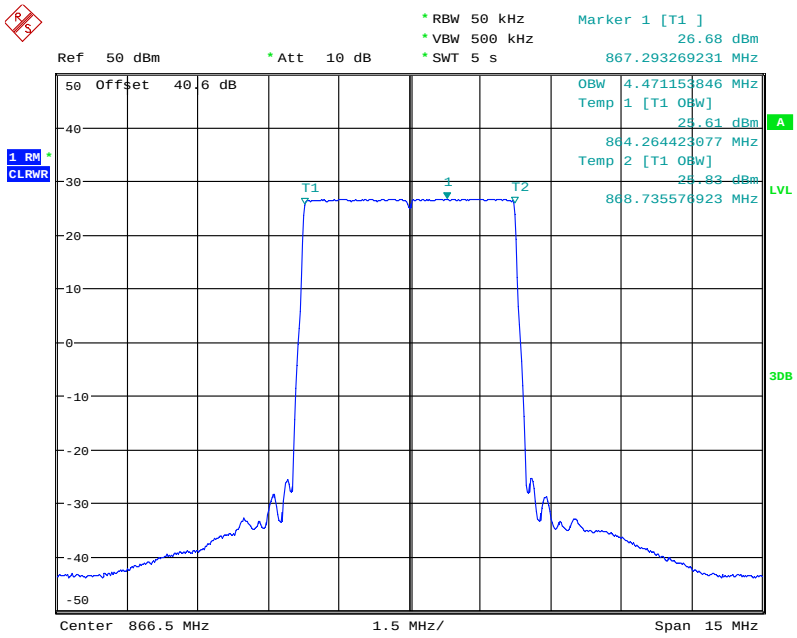
3.0MHz Bandwidth



Date: 18.SEP.2013 09:58:16

Configuration 1 - Mode 3 - 5

5.0MHz Bandwidth



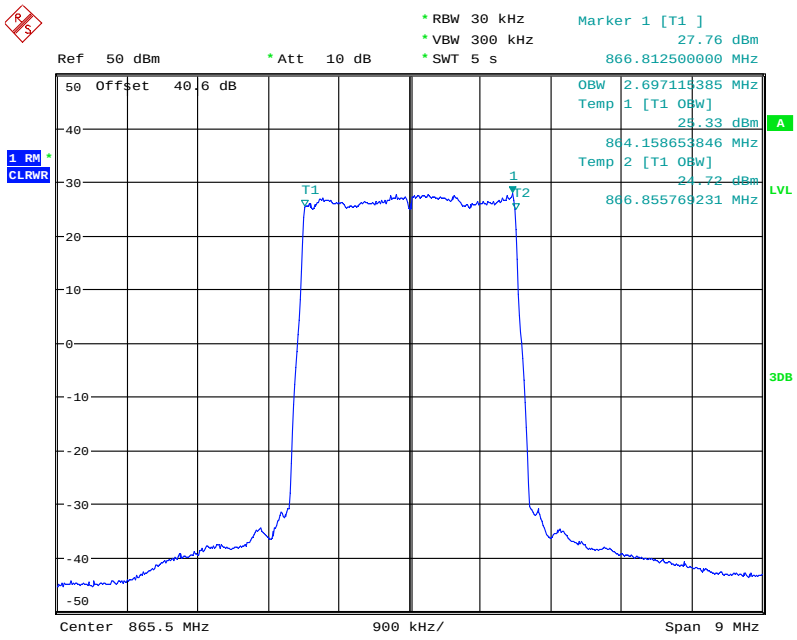
Date: 18.SEP.2013 13:29:39

Product Service

E-TM3.2

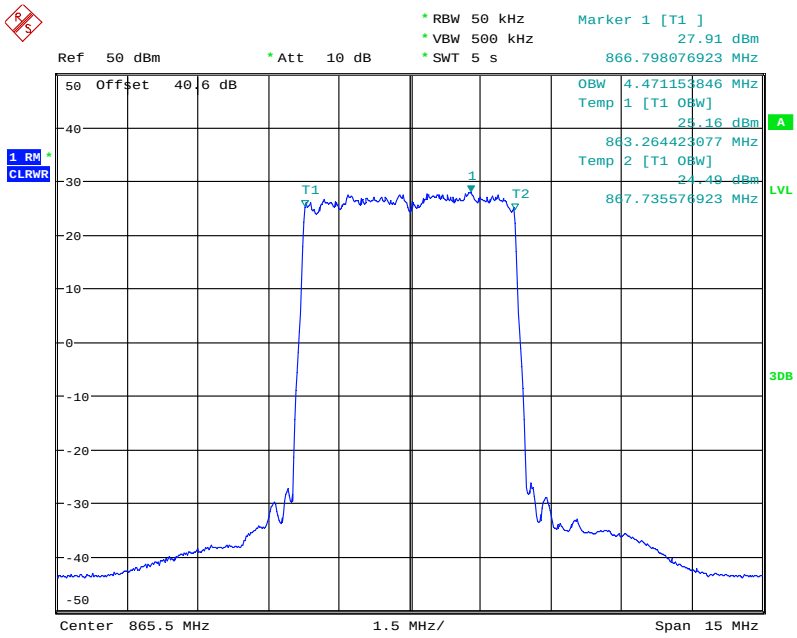
Configuration 1 - Mode 2

3.0MHz Bandwidth



Date: 18.SEP.2013 11:33:24

5.0MHz Bandwidth



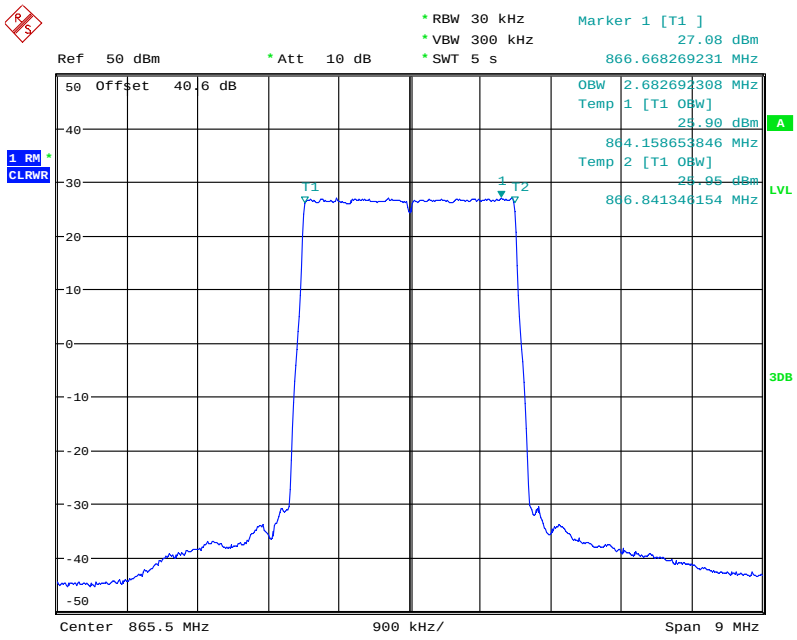
Date: 18.SEP.2013 12:47:56

Product Service

E-TM3.1

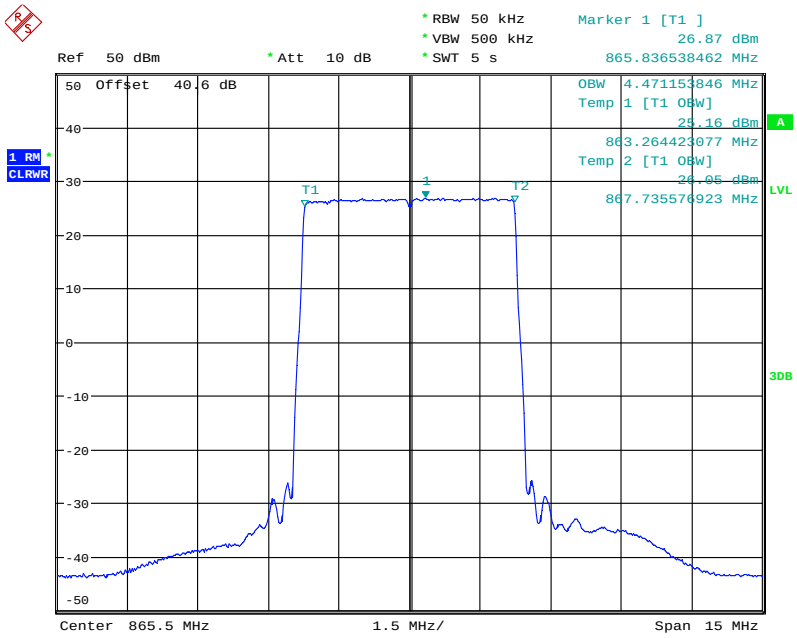
Configuration 1 - Mode 2

3.0MHz Bandwidth



Date: 18.SEP.2013 11:41:12

5.0MHz Bandwidth



Date: 18.SEP.2013 12:49:01

2.4 EMISSION MASKS

2.4.1 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

2.4.2 Equipment Under Test

RRUS 11 B26A / KRC 161 287/2, S/N: CF81391251

2.4.3 Date of Test and Modification State

17 and 18 September 2013 – 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.

Since the EUT transmits on two antennas simultaneously in the same frequency range, using the Measure and Add 10Log(N) dB technique according to FCC KDB662911 D01 accounting for simultaneous transmission from antenna ports RF A and RF B, the limits for Spectrum Masks should be adjusted with a correction of 10Log2.

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 3 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+10log(P) in conjunction with a reduction of 3 dB to account for simultaneous transmission from antenna port A and B. The plots shown in the test report show a tighter limit of 50+10log(P) with a reduction of 3 dB to account for simultaneous transmission from both antenna ports.

The EUT was tested at it's maximum power level. At least 1% of the emission bandwidth was used for the resolution bandwidth. The limit -20dBm was adjusted with a correction of 10Log2 to -23dBm. Spectrum analyser detector was set as RMS.

The path loss measured and entered to the test equipment as a reference level offset to get a more accurate testing result.

The EUT was tested at it's maximum power level. Both Antennas were tested and the tests performed on Antenna A were selected as representative.

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

Configuration 1 - Mode 1 - 3, Mode 1 - 5
- Mode 3 - 3, Mode 3 - 5
- Mode 5
- Mode 6

2.4.6 Environmental Conditions

	17 September 2013	18 September 2013
Ambient Temperature	24.0°C	23.5°C
Relative Humidity	68.0%	65.0%

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 Emission Masks.

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.

Antenna A

Single Carrier

Bandwidth: 3.0MHz

Configuration 1 - Mode 1 - 3 and Mode 3 - 3

Band Edge Frequency	Bottom 862 MHz	Top 869 MHz	RBW / VBW (Hz)	Limit (dBm)
Edge Test with 3.0MHz Bandwidth Channel No./Frequencies	Channel: 8737 Frequency: 863.7 MHz	Channel: 8773 Frequency: 867.3 MHz	30k / 300k	-23.0

Bandwidth: 5.0MHz

Configuration 1 - Mode 1 - 5 and Mode 3 - 5

Band Edge Frequency	Bottom 862 MHz	Top 869 MHz	RBW / VBW (Hz)	Limit (dBm)
Edge Test with 5.0MHz Bandwidth Channel No./Frequencies	Channel: 8745 Frequency: 864.5 MHz	Channel: 8765 Frequency: 866.5MHz	50k / 500k	-23.0

Multi Carrier (x2)

Bandwidth: 3.0MHz

Configuration 1 - Mode 5 and Mode 6

Band Edge Frequency	Bottom 862 MHz	Top 869 MHz	RBW / VBW (Hz)	Limit (dBm)
Edge Test with 3.0MHz Bandwidth Channel No./Frequencies	Channel: 8737 + 8767 Frequency: 863.7 MHz + 866.7 MHz	Channel: 8743 + 8773 Frequency: 864.3 MHz + 867.3 MHz	30k / 300k	-23.0

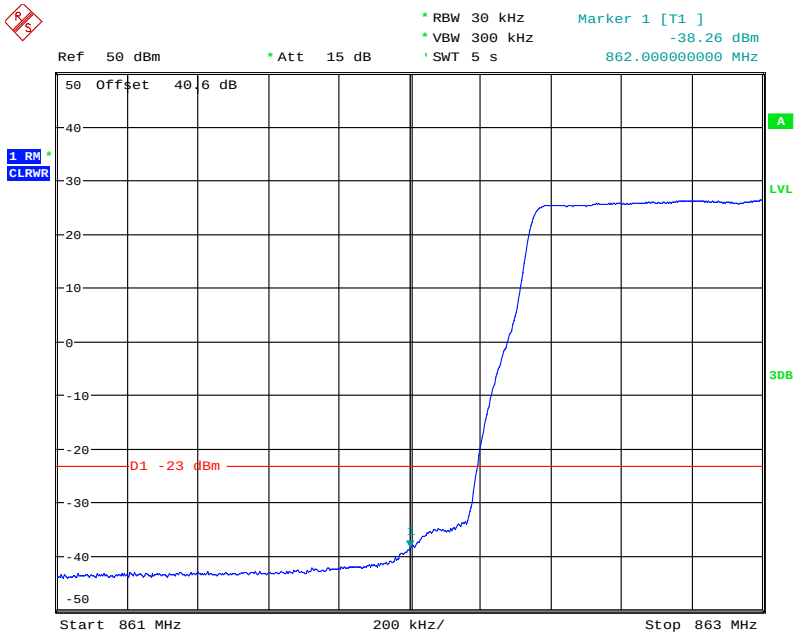
Product Service

Single Carrier

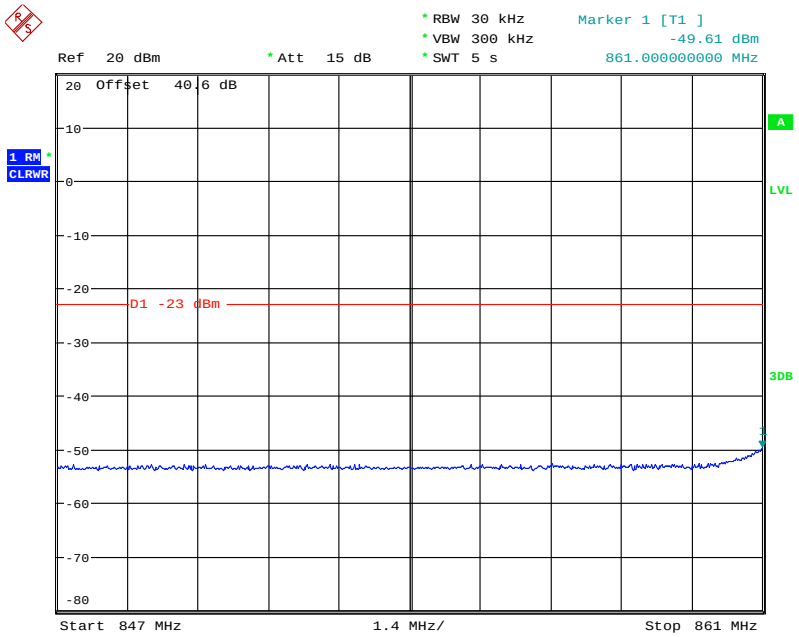
ETM1.1

3MHz Bandwidth

Configuration 1 - Mode 1 - 3



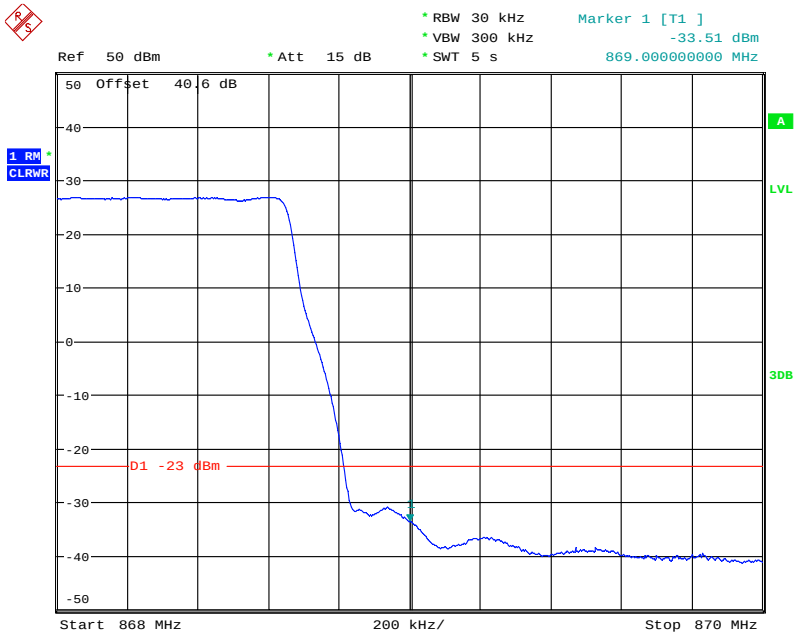
Date: 17.SEP.2013 16:25:47



Date: 17.SEP.2013 16:27:42

Product Service

Configuration 1 - Mode 3 - 3



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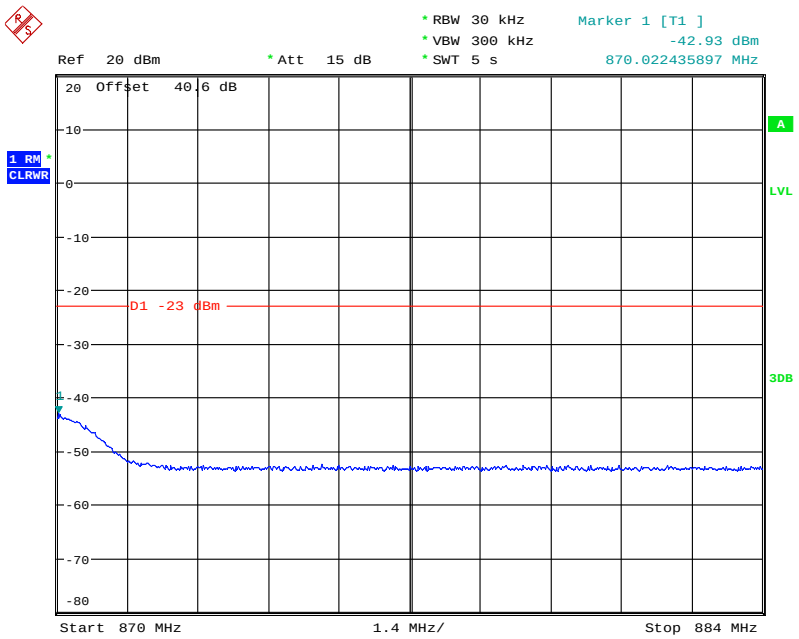
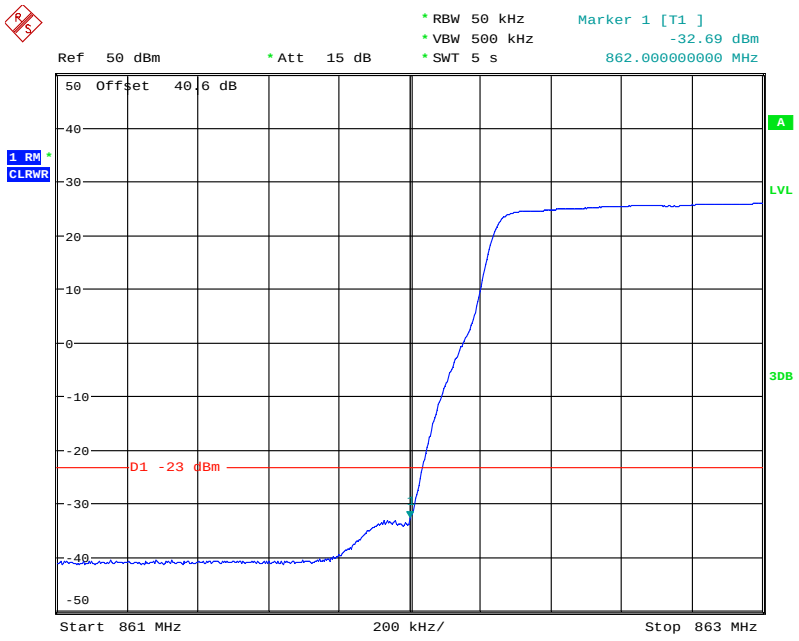


Date: 18.SEP.2013 09:43:41

Product Service

5MHz Bandwidth

Configuration 1 - Mode 1 - 5



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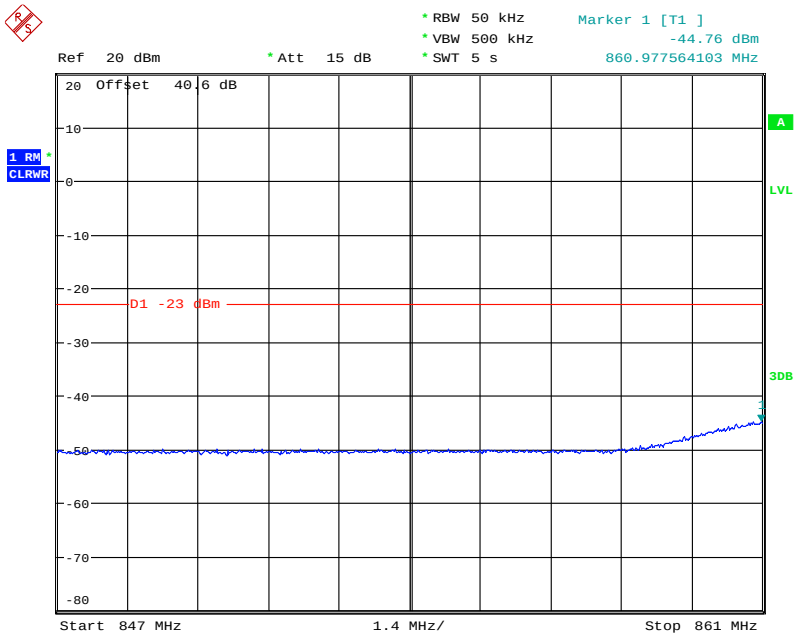
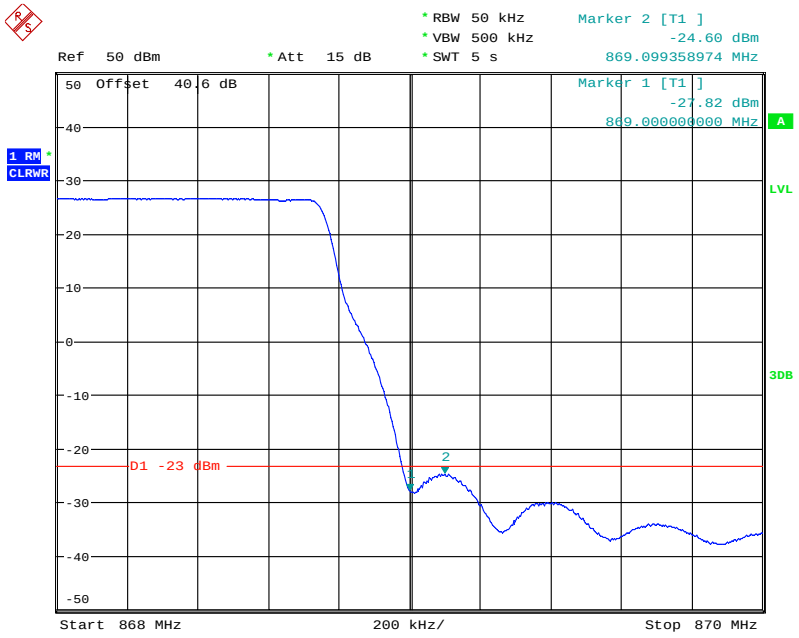


Date: 18.SEP.2013 13:39:31

Product Service

Configuration 1 - Mode 3 - 5



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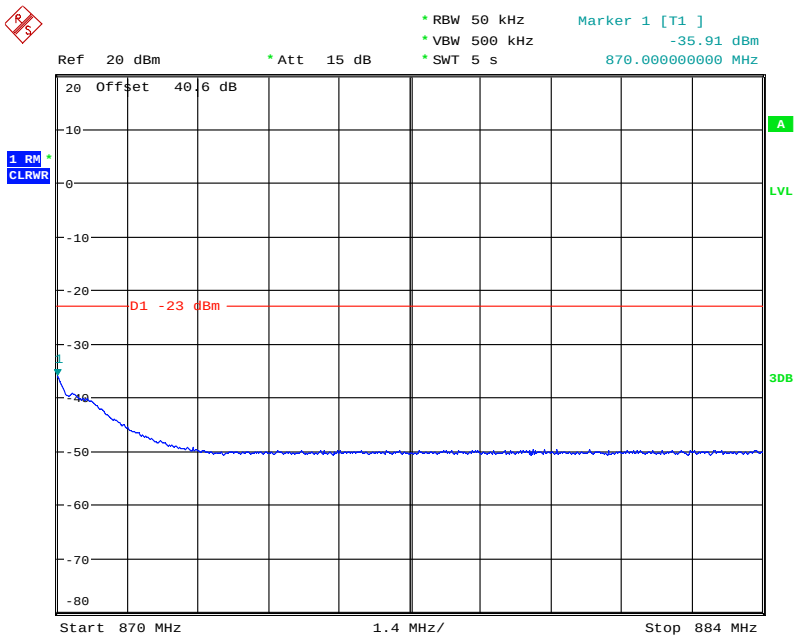


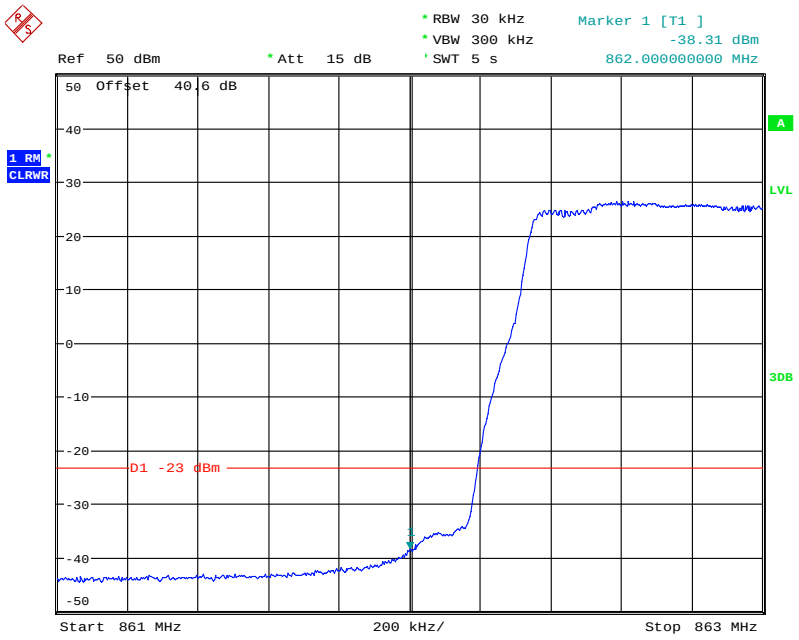
Date: 18.SEP.2013 13:31:15

Product Service

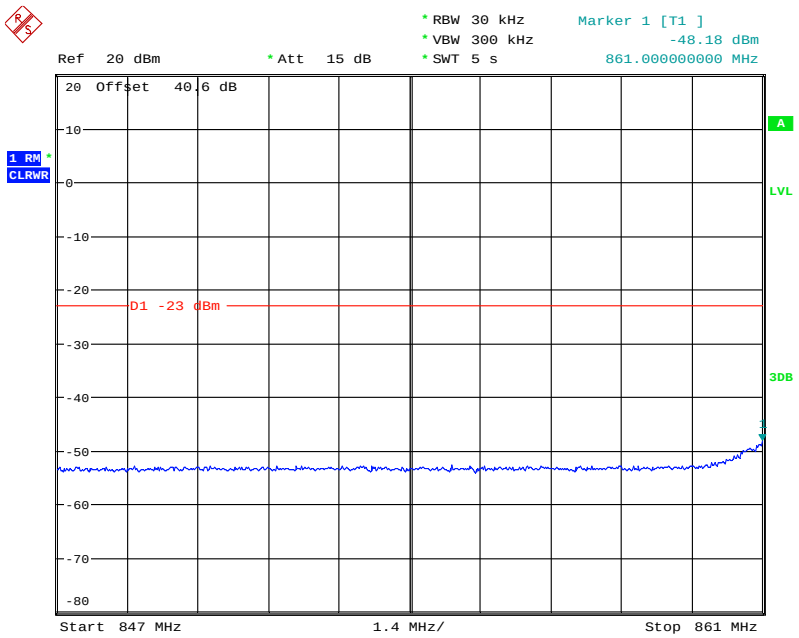
ETM3.2

3MHz Bandwidth

Configuration 1 - Mode 1 - 3



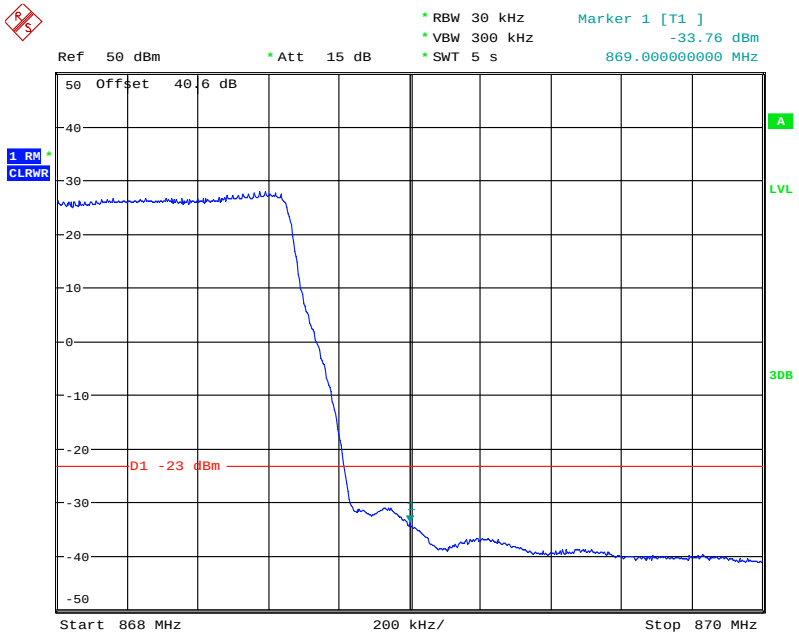
Date: 17.SEP.2013 16:55:43



Date: 17.SEP.2013 16:56:10

Product Service

Configuration 1 - Mode 3 - 3



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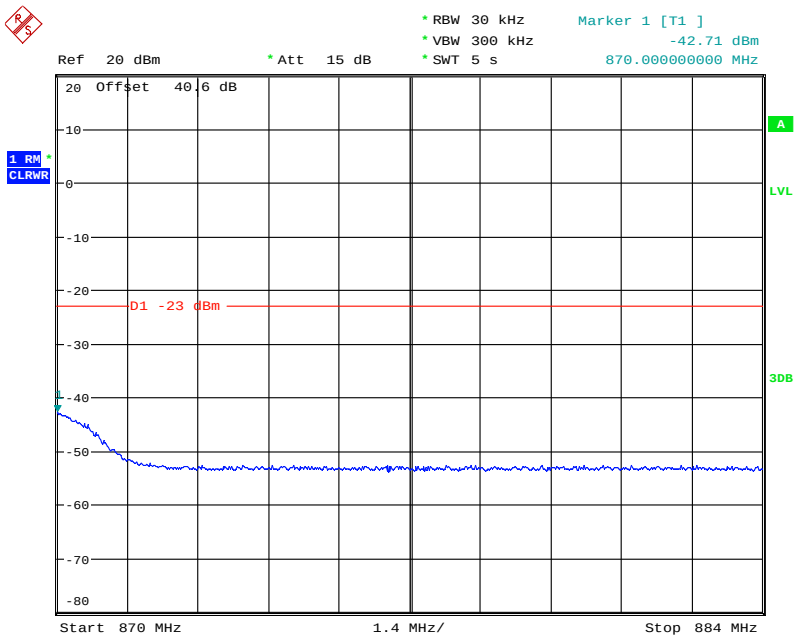
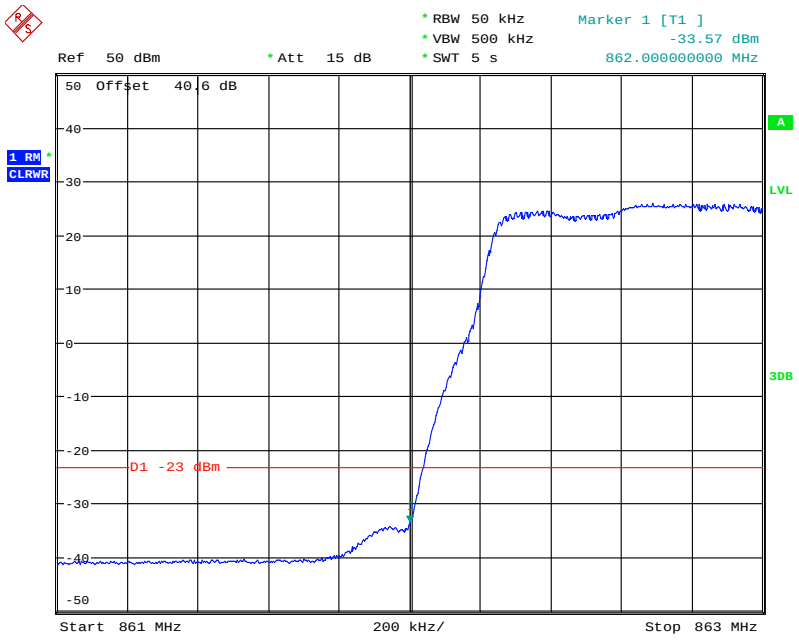


Date: 18.SEP.2013 09:48:26

Product Service

5MHz Bandwidth

Configuration 1 - Mode 1 - 5



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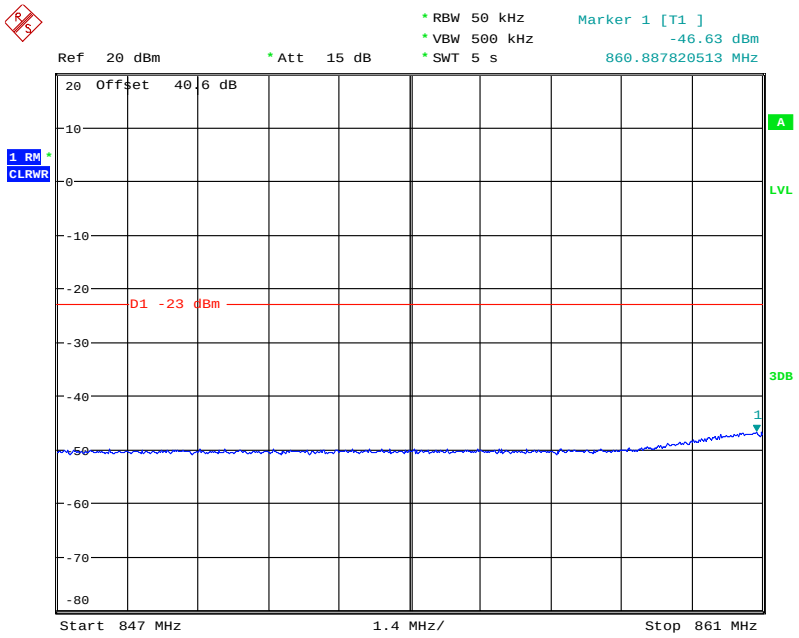
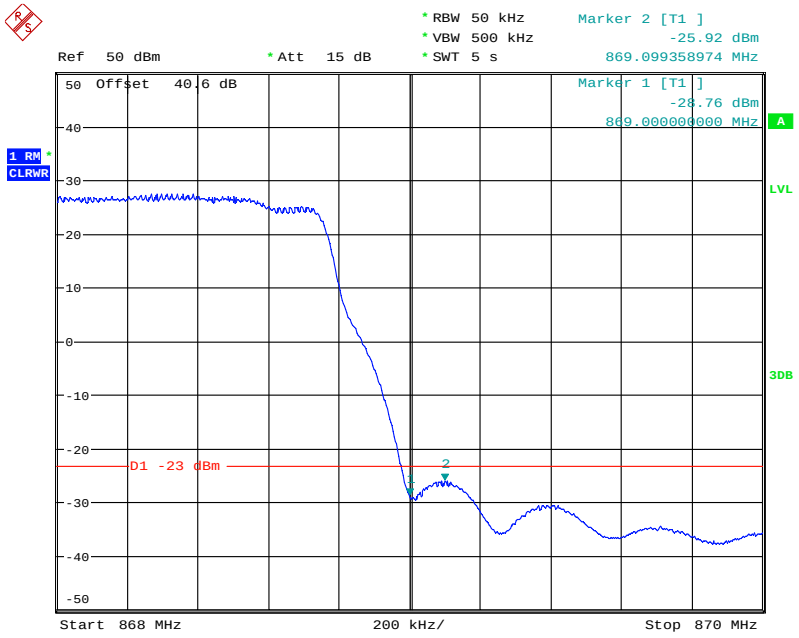


Date: 18.SEP.2013 13:48:49

Product Service

Configuration 1 - Mode 3 - 5



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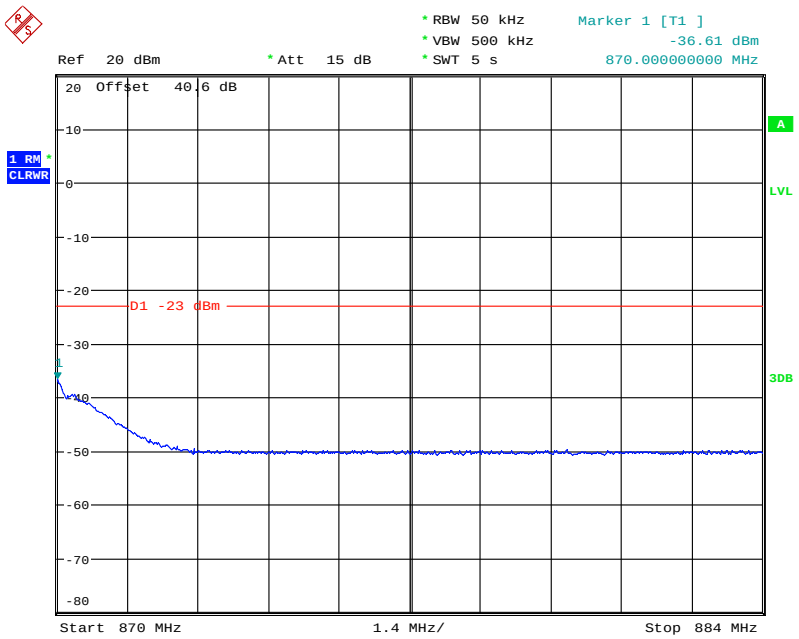


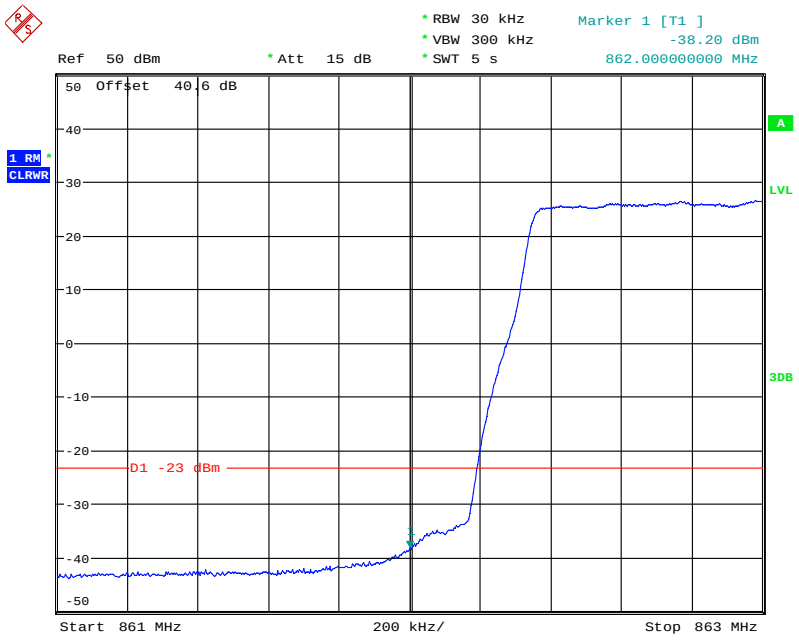
Date: 18.SEP.2013 13:26:41

Product Service

ETM3.1

3MHz Bandwidth

Configuration 1 - Mode 1 - 3



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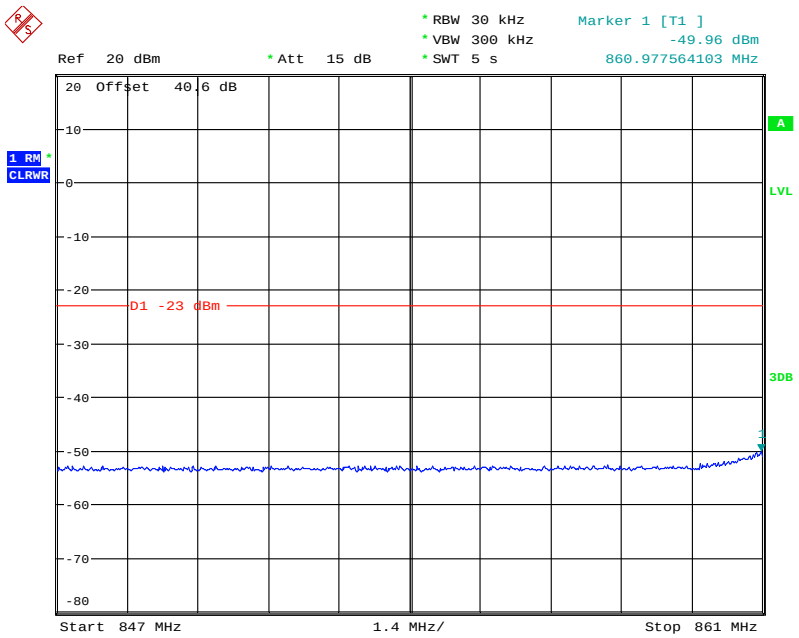
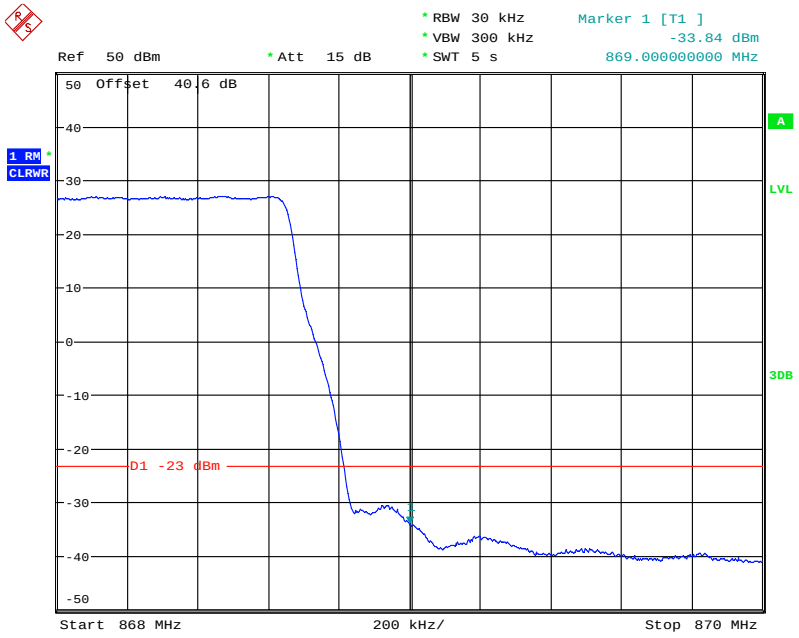


Date: 17.SEP.2013 16:57:51

Product Service

Configuration 1 - Mode 3 - 3



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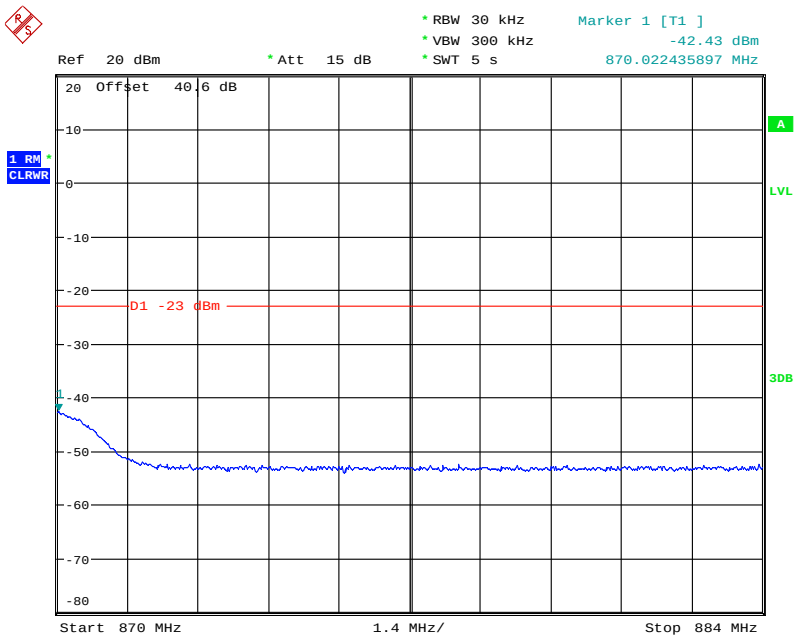

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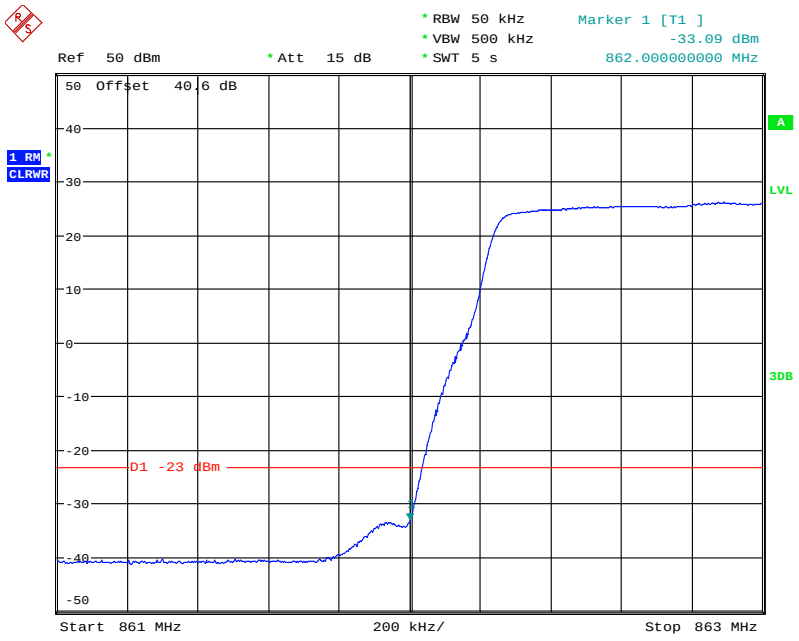
Product Service

5MHz Bandwidth

Configuration 1 - Mode 1 - 5



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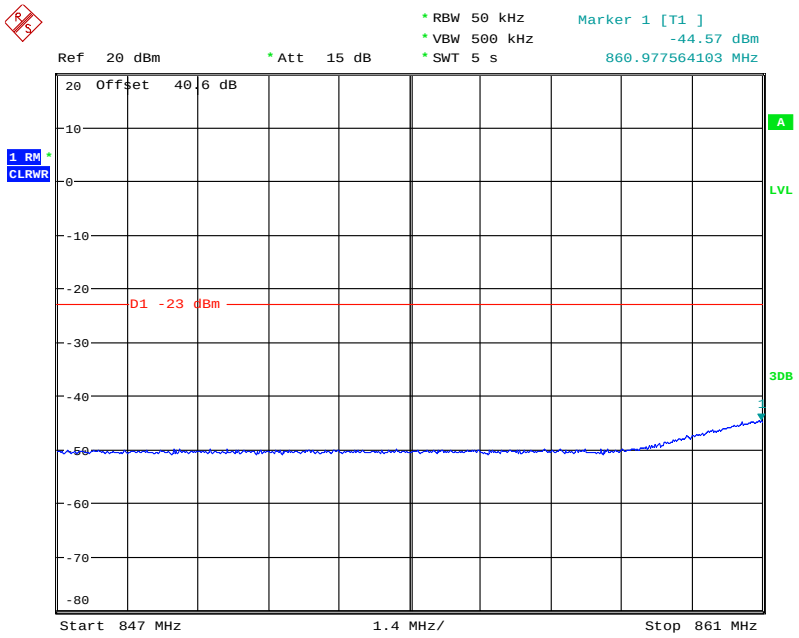

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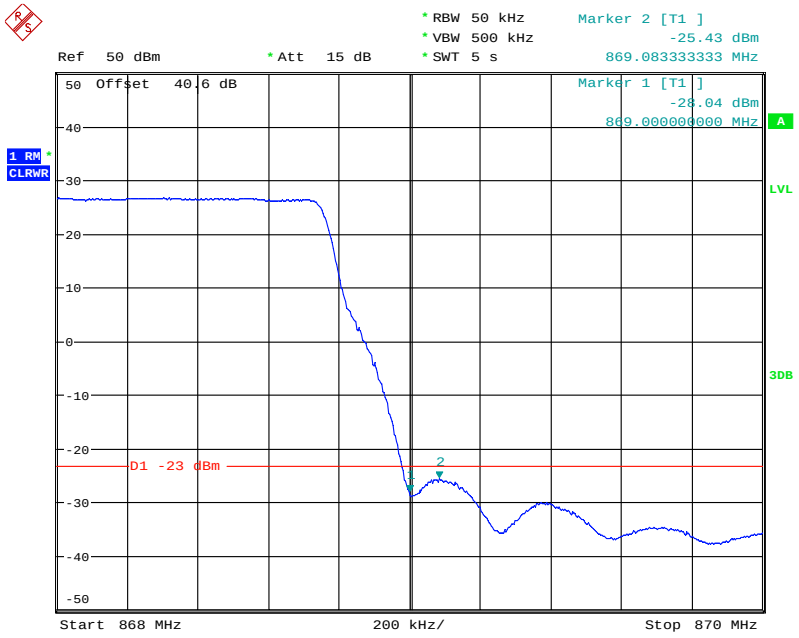
Product Service

Configuration 1 - Mode 3 - 5



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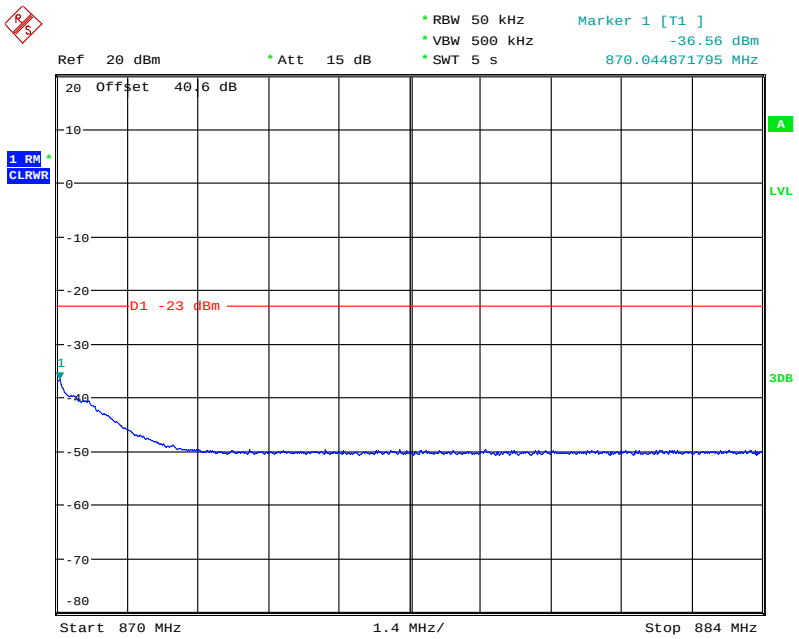


Date: 18.SEP.2013 13:25:16

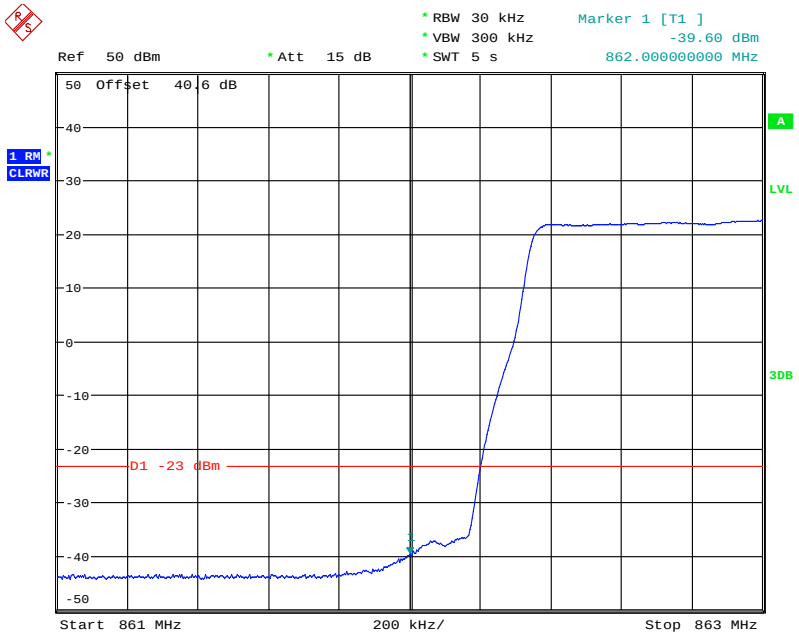
Product Service

Multi Carrier (x2)

ETM1.1

3MHz Bandwidth

Configuration 1 - Mode 5



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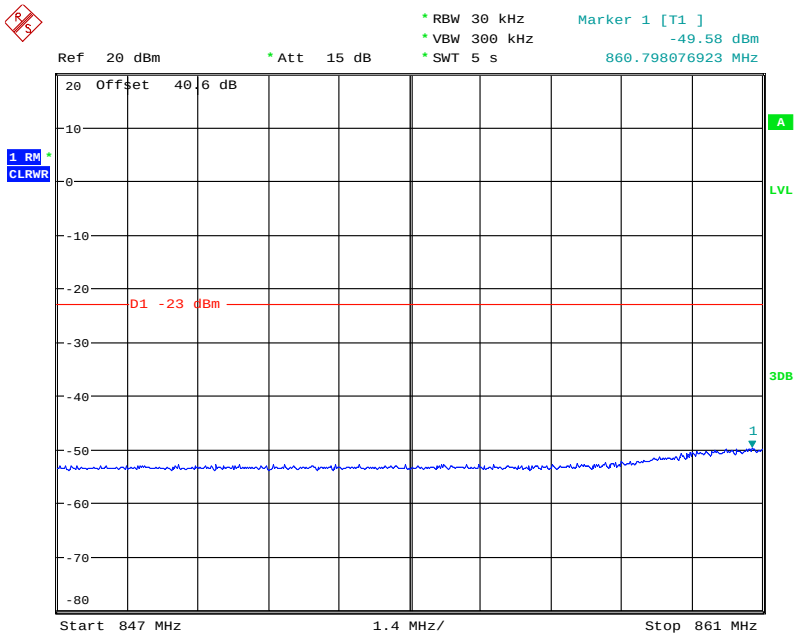

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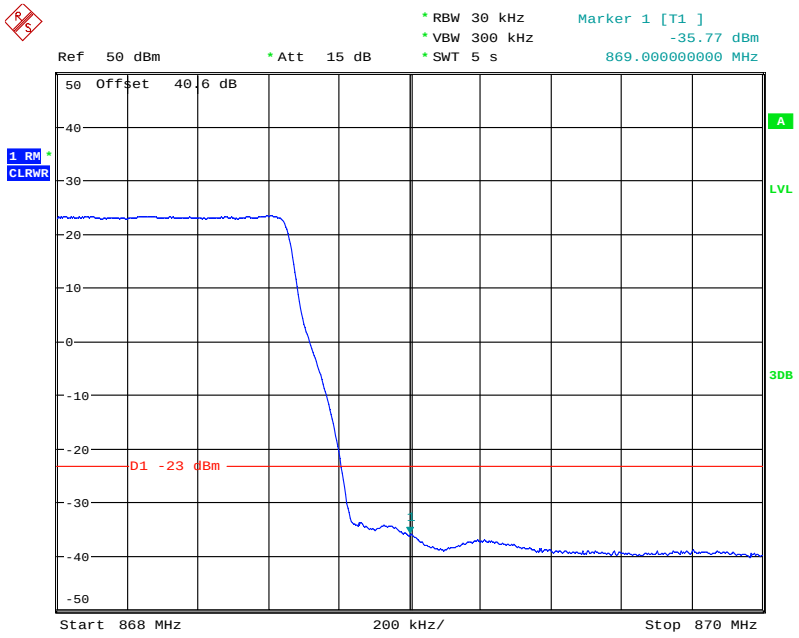
Product Service

Configuration 1 - Mode 6



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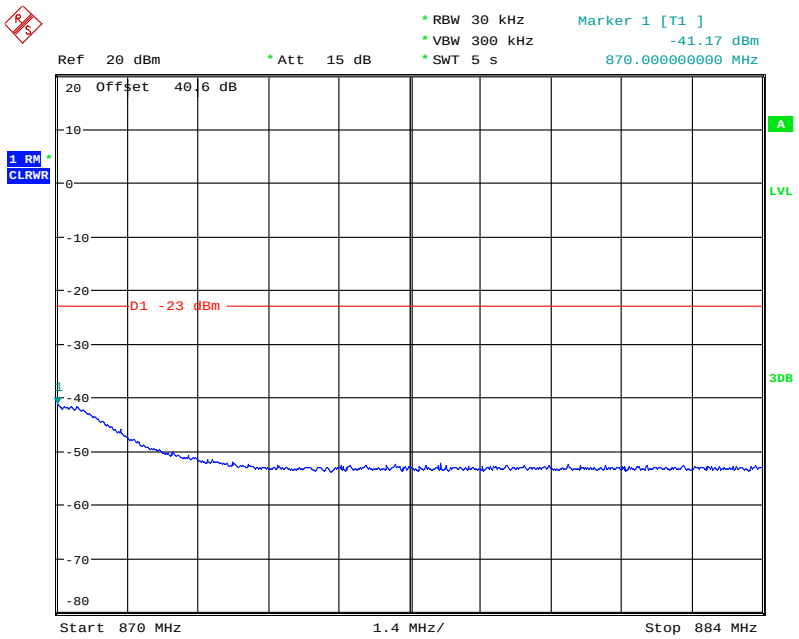


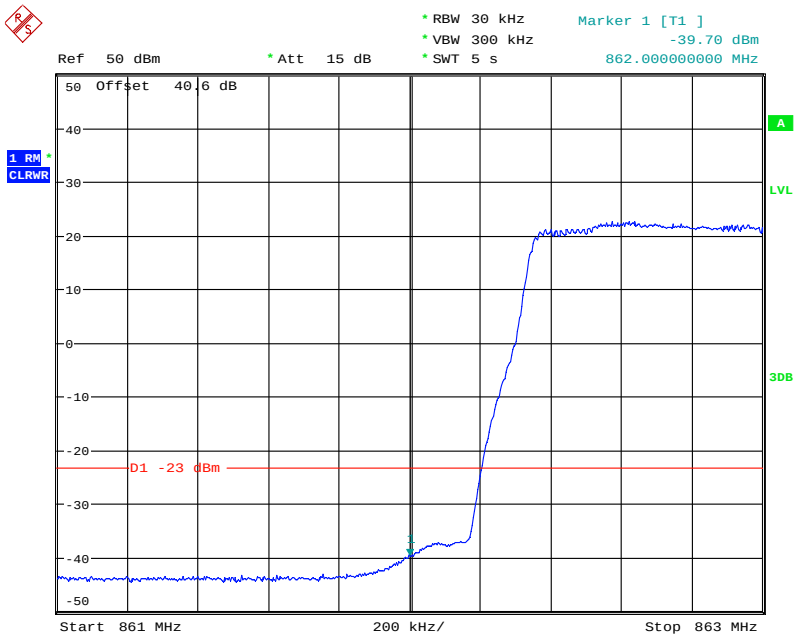
Date: 18.SEP.2013 15:08:27

Product Service

ETM3.2

3MHz Bandwidth

Configuration 1 - Mode 5



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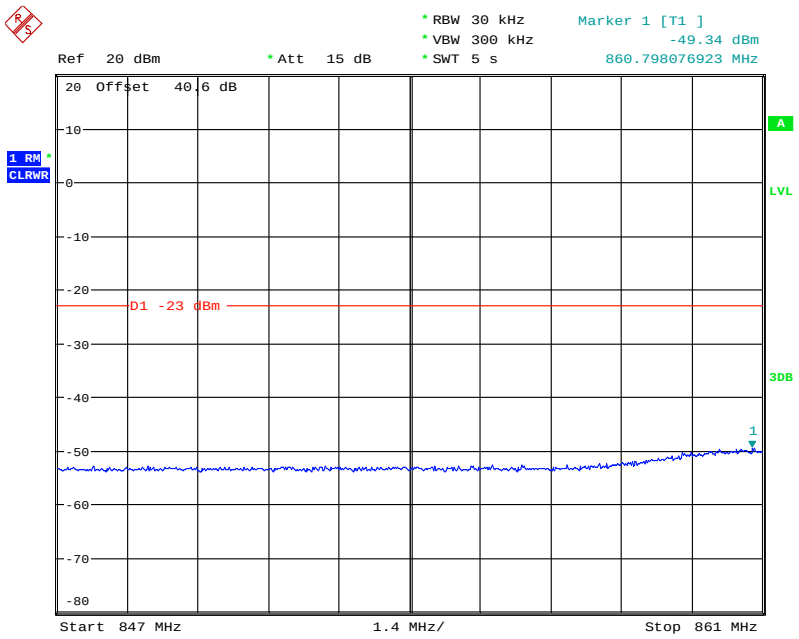

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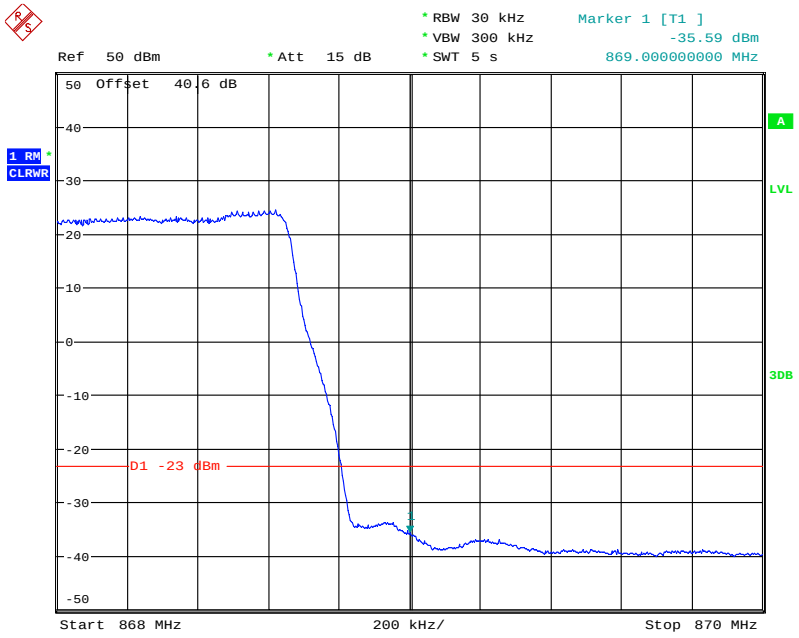
Product Service

Configuration 1 - Mode 6



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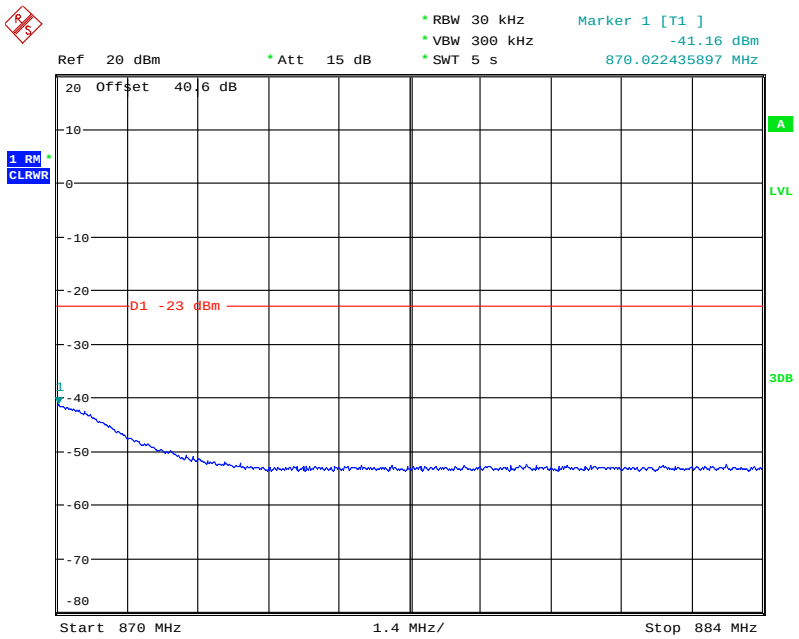


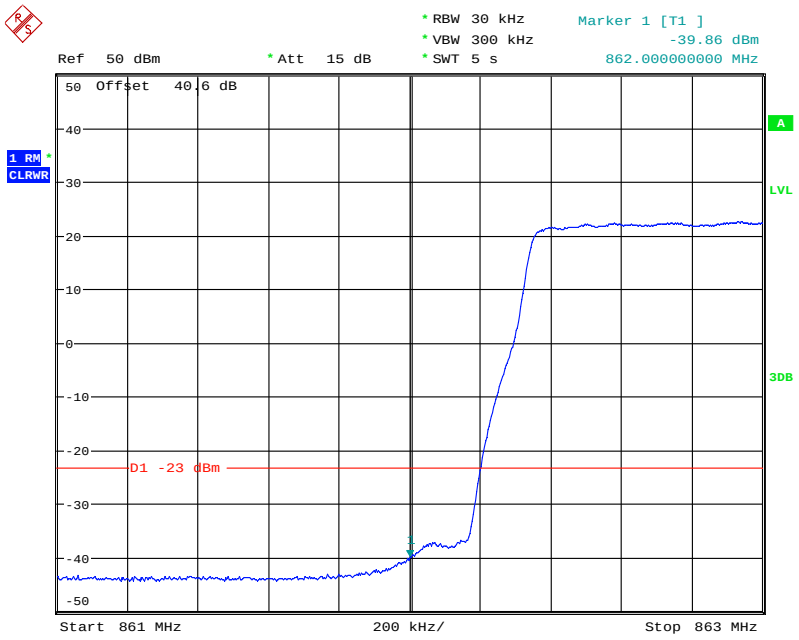
Date: 18.SEP.2013 15:11:56

Product Service

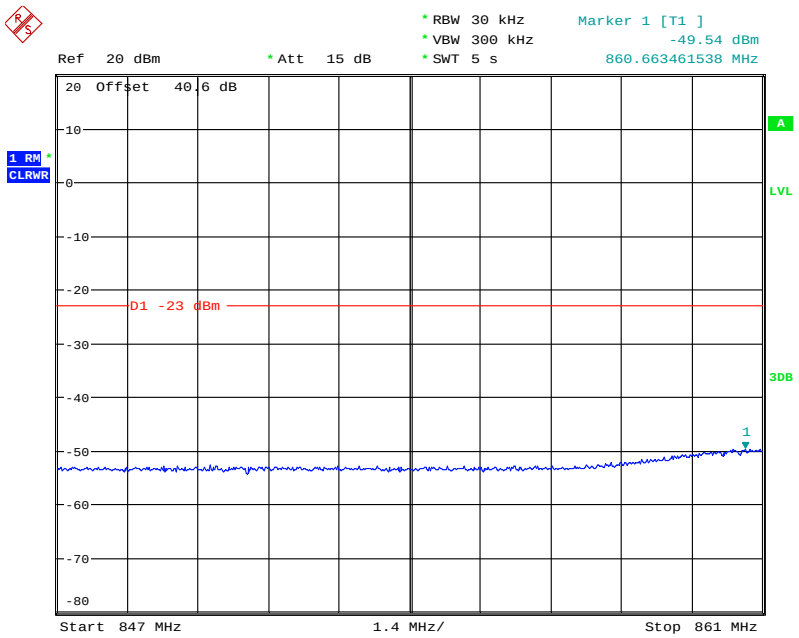
ETM3.1

3MHz Bandwidth

Configuration 1 - Mode 5



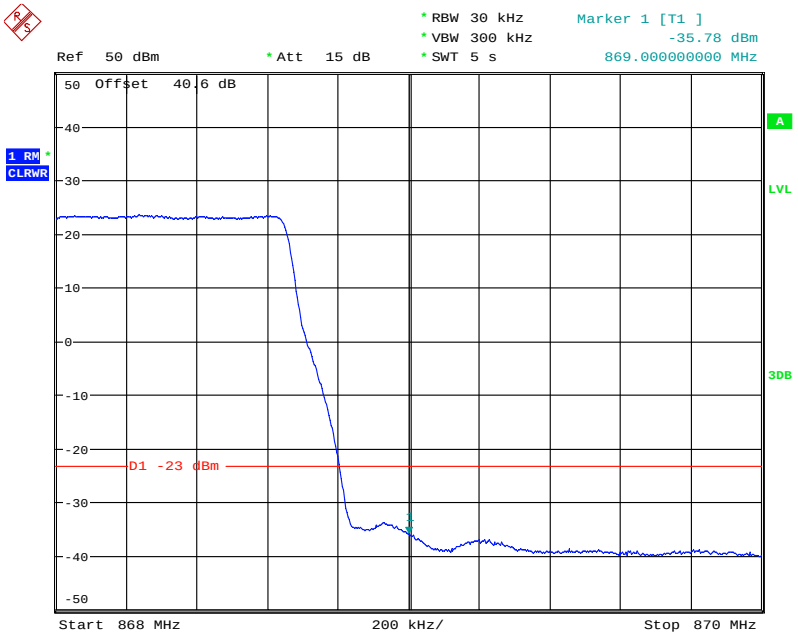
Date: 18.SEP.2013 15:00:21



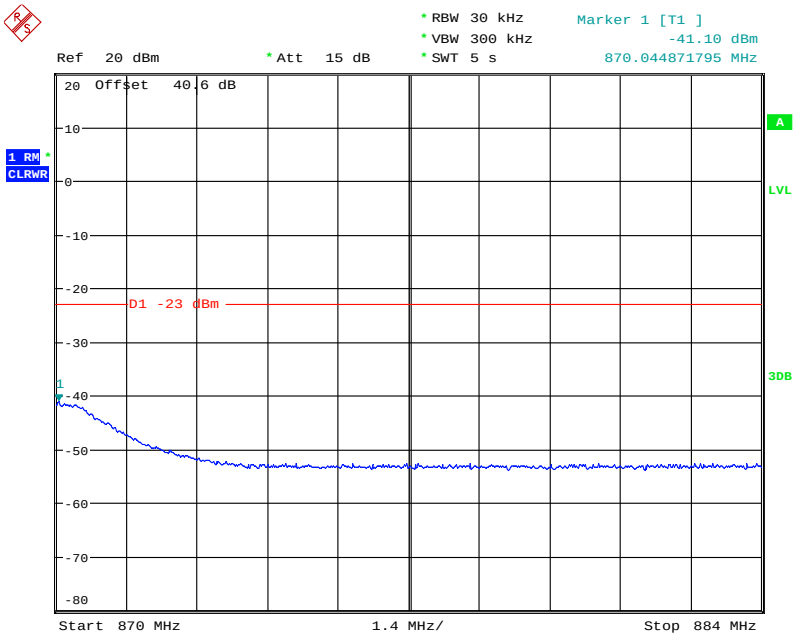
Date: 18.SEP.2013 15:01:21

Product Service

Configuration 1 - Mode 6



Date: 18.SEP.2013 15:14:00



Date: 18.SEP.2013 15:13:21

Limit

The power of any emission outside the frequency band shall be attenuated below the transmitter power (P) by at least 50 + 10LogP dB + 10Log2.

2.5 RADIATED SPURIOUS EMISSIONS

2.5.1 Specification Reference

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

2.5.2 Equipment Under Test

RRUS 11 B26A / KRC 161 287/2, S/N: CF81391251

2.5.3 Date of Test and Modification State

22 and 24 September 2013 – 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 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 – 10GHz were then formally measured using a Peak detector as the worst case.

In the frequency Range 30MHz – 10GHz, 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 + 10Log (P)) dB

Where:
Field Strength is measured in dBµV/m
P is measured Transmitter Power in Watts

Product Service

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:

$E_{(v/m)}=(30 \times 1.64 \times 64.37)^{0.5} / 3 = 18.76V/m = 145.46dB\mu V/m$

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

43 + 10Log(64.37) = 61.09dB

Therefore the limit at 3m measurement distance is:

145.46 – 61.09 = 84.4 dBµV/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 - 5
- Mode 2 (3MHz, 5MHz OBW)
- Mode 3 - 5
- Mode 4

2.5.6 Environmental Conditions

	22 September 2013	24 September 2013
Ambient Temperature	24.5°C	25.0°C
Relative Humidity	43.0%	45.0%

Product Service

2.5.7 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.

Single Carrier

E-TM1.1

3MHz Bandwidth

Configuration 1 - Mode 2

No emissions were detected within 20dB of the limit.

E-TM1.1

5MHz Bandwidth

Configuration 1 - Mode 1 - 5

No emissions were detected within 20dB of the limit.

Configuration 1 - Mode 2

No emissions were detected within 20dB of the limit.

Configuration 1 - Mode 3 - 5

No emissions were detected within 20dB of the limit.

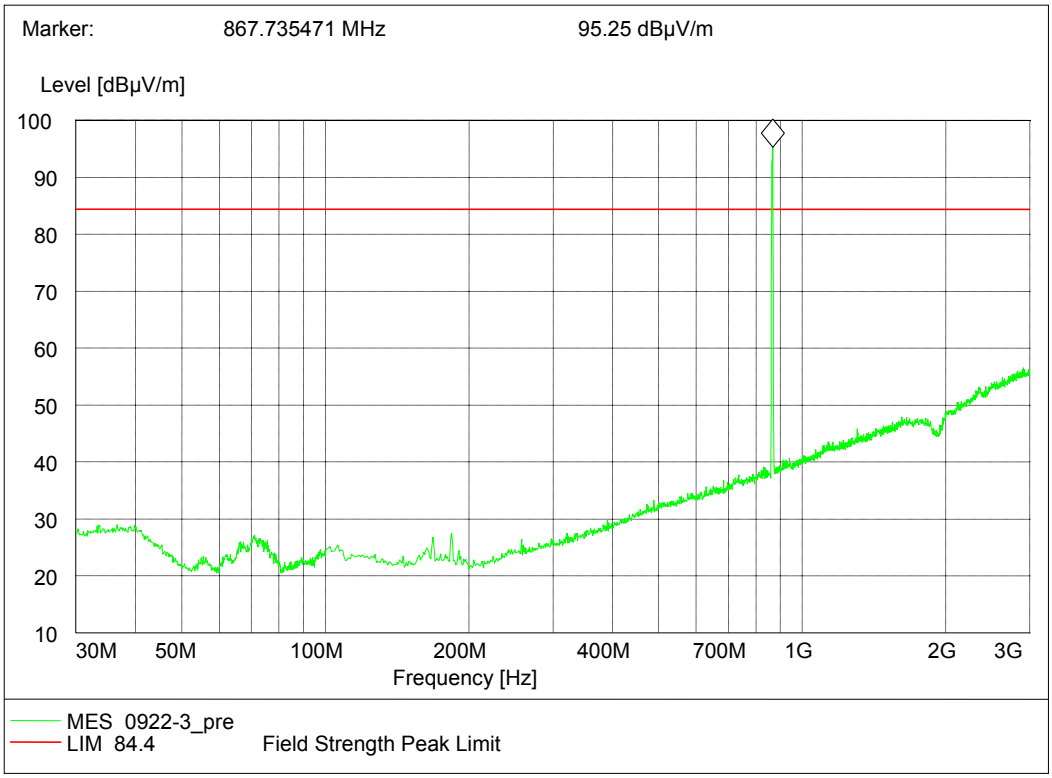
Product Service

E-TM3.2

5MHz Bandwidth

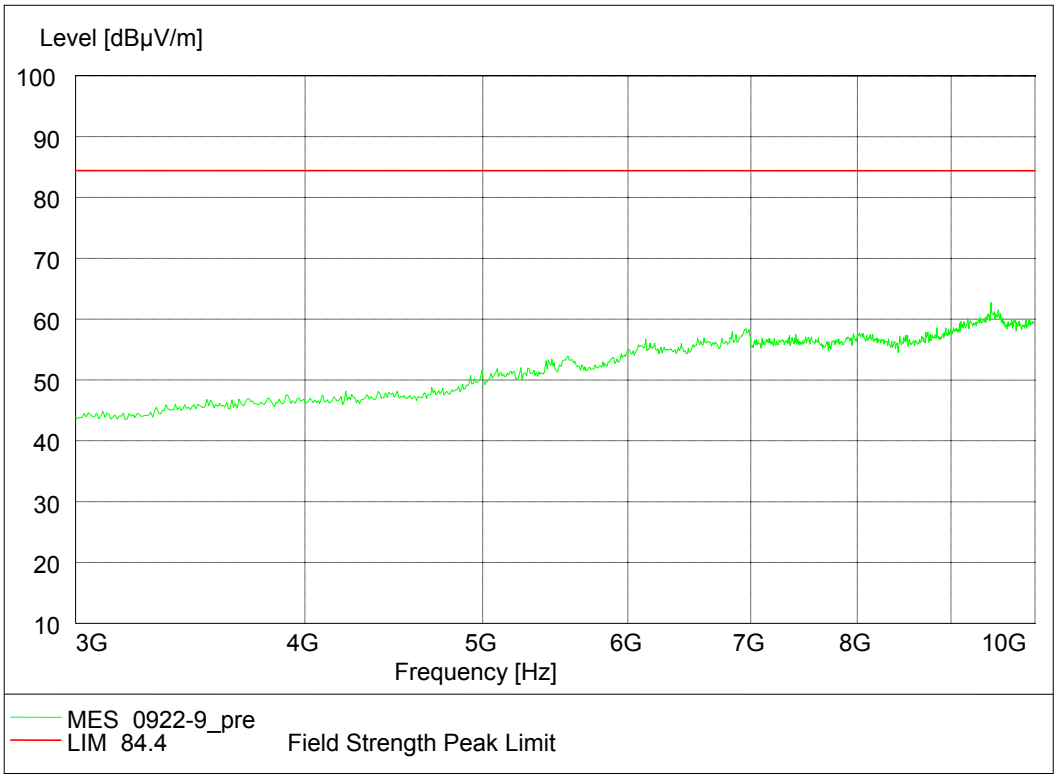
Configuration 1 - Mode 2

30MHz to 3GHz



Note: The marked emission is the operating frequency.

3GHz – 10GHz



E-TM3.1

5MHz Bandwidth

Configuration 1 - Mode 2

No emissions were detected within 20dB of the limit.

Multi Carrier (x2)

E-TM3.2

3MHz Bandwidth

Configuration 1 - Mode 4

No emissions were detected within 20dB of the limit.

Limit	-13dBm / 84.4 dBµV/m

Remarks

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

2.6 CONDUCTED SPURIOUS EMISSIONS

2.6.1 Specification Reference

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

2.6.2 Equipment Under Test

RRUS 11 B26A / KRC 161 287/2, S/N: CF81391251

2.6.3 Date of Test and Modification State

17 and 18 September 2013 – 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 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, the spurious emissions from the antenna terminal were measured. The measurements were performed on the output connector RF A. Limited complementary measurement were done at output connector RF B to verify identical performance for both transmitter chains. The EUT was set to transmit on maximum power. The transmitter output power was attenuated using an attenuator and the frequency spectrum investigated from 9kHz to 10GHz. The EUT was tested on Bottom, Middle and Top channels for E-TM1.1 test models in 3MHz and 5MHz bandwidths for single carrier and all the test models in 3MHz bandwidth for multi carrier. The tests performed on Antenna A were selected as representative.

The resolution was set to 1MHz for 9kHz to 10GHz. The spectrum analyzer detector was set to peak and trace was kept on Max Hold as worst case.

The limit was adjusted with a correction of -3dB [10Log(2)] to -16dBm by using the Measure and Add 10Log(N) dB technique according to FCC KDB662911 D01 accounting for simultaneous transmission from antenna ports RF A and RF B.

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

Measurements were made up to the 10^{th} harmonic of the highest carrier frequency at least.

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

Configuration 1 - Mode 1 - 3, Mode 1 - 5
- Mode 2 (3MHz, 5MHz)
- Mode 3 - 3, Mode 3 - 5
- Mode 4

Product Service

2.6.6 Environmental Conditions

	17 September 2013	18 September 2013
Ambient Temperature	24.0°C	23.5°C
Relative Humidity	68.0%	65.0%

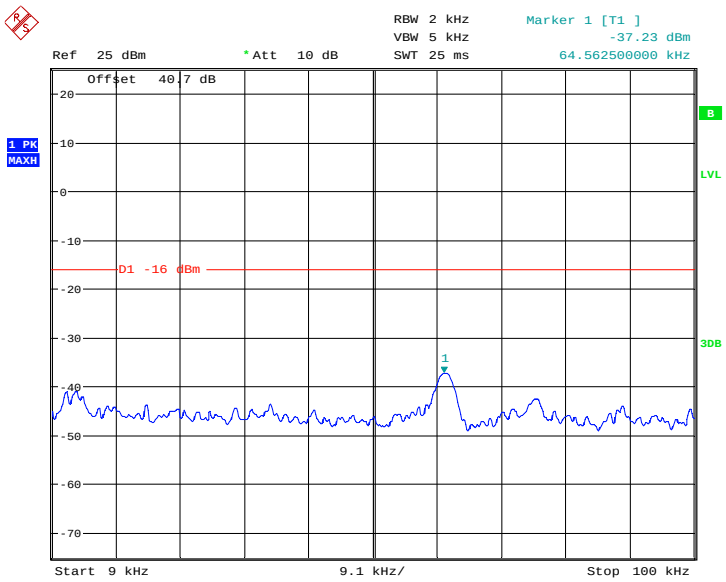
2.6.7 Test Results

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 measruement with a smaller Span showed that it was related to the LO feedthrough.



Date: 18.SEP.2013 11:40:35

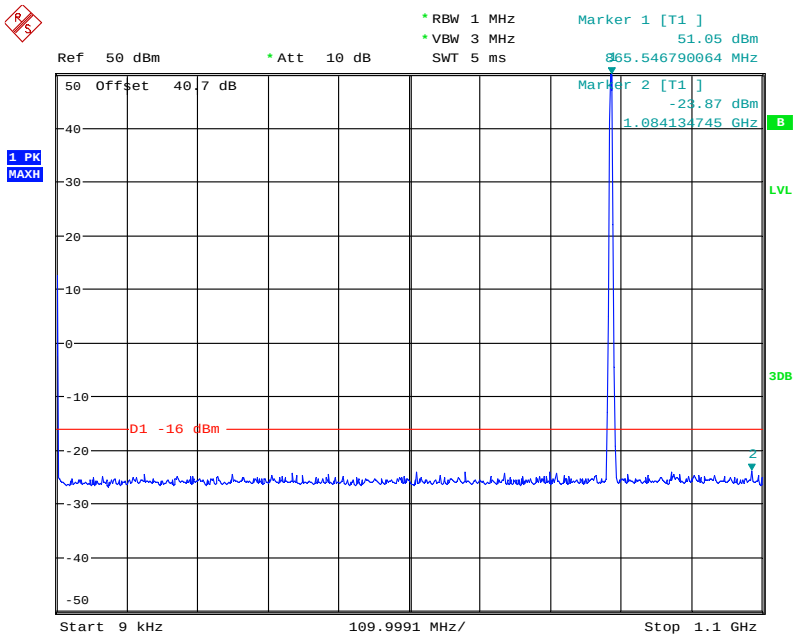
Antenna A

E-TM1.1

3MHz Bandwidth

Configuration 1 - Mode 1 - 3

9kHz to 1.1GHz

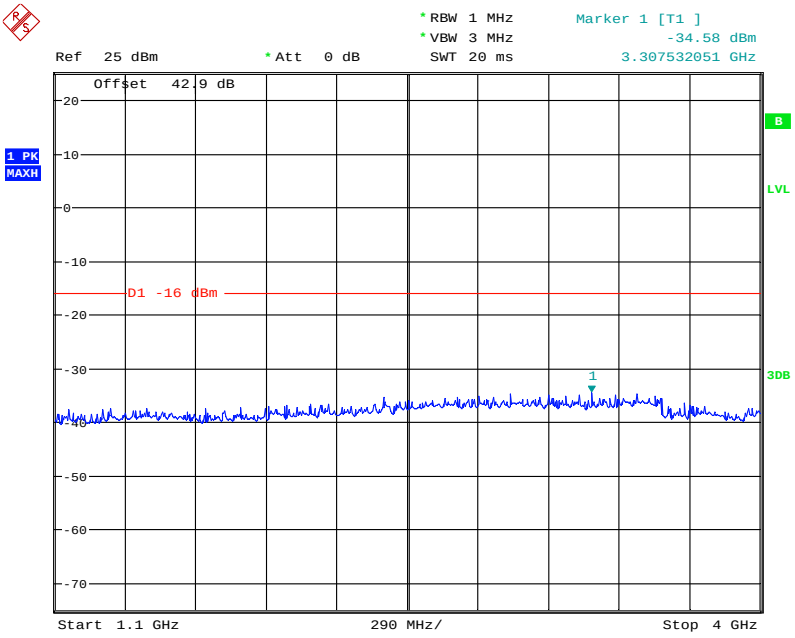


Date: 17.SEP.2013 16:32:35

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

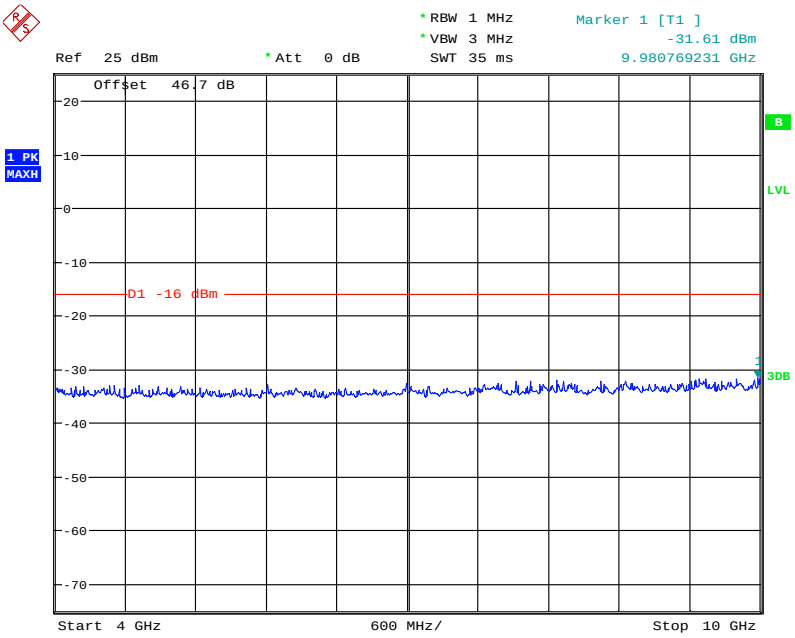
Product Service

1.1GHz to 4GHz



Date: 17.SEP.2013 16:36:34

4GHz to 10GHz

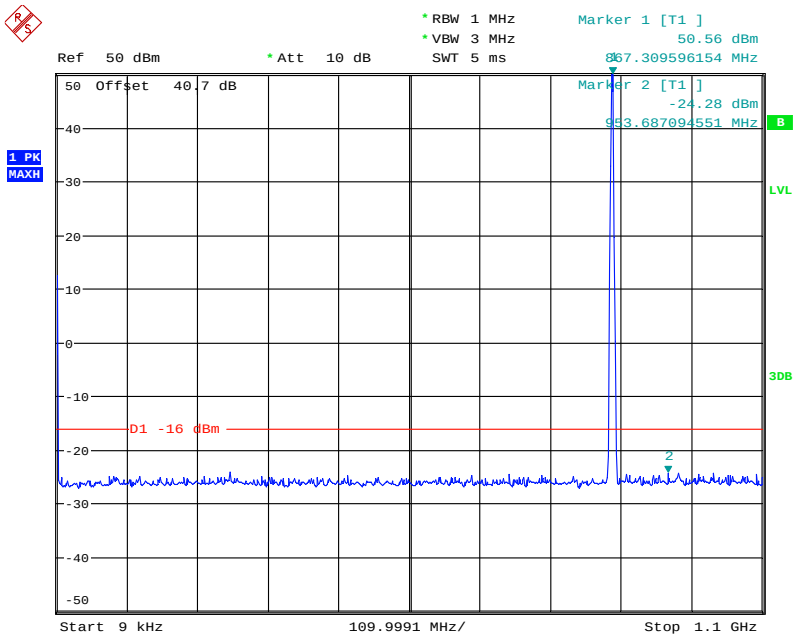


Date: 17.SEP.2013 16:33:56

Product Service

Configuration 1 - Mode 2

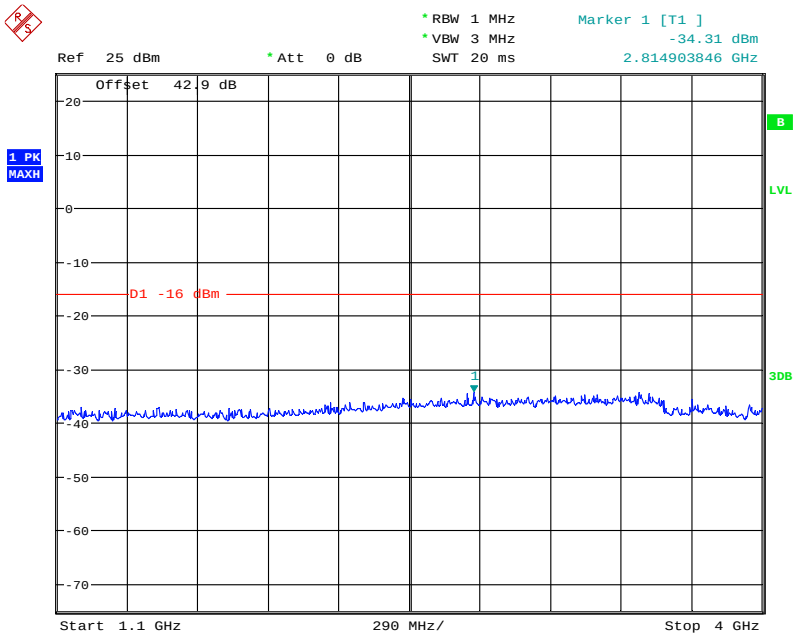
9kHz to 1.1GHz



Date: 18.SEP.2013 10:57:53

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

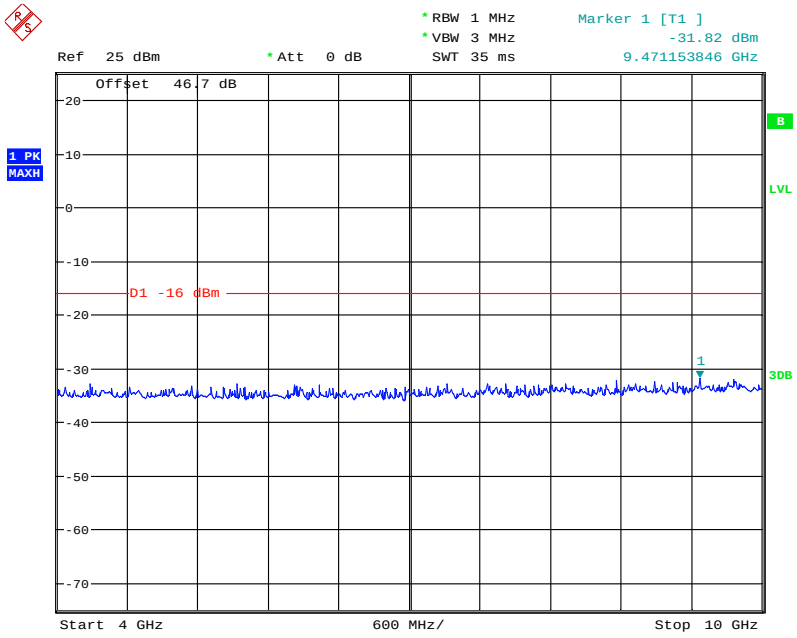
1.1GHz to 4GHz



Date: 18.SEP.2013 11:00:06

Product Service

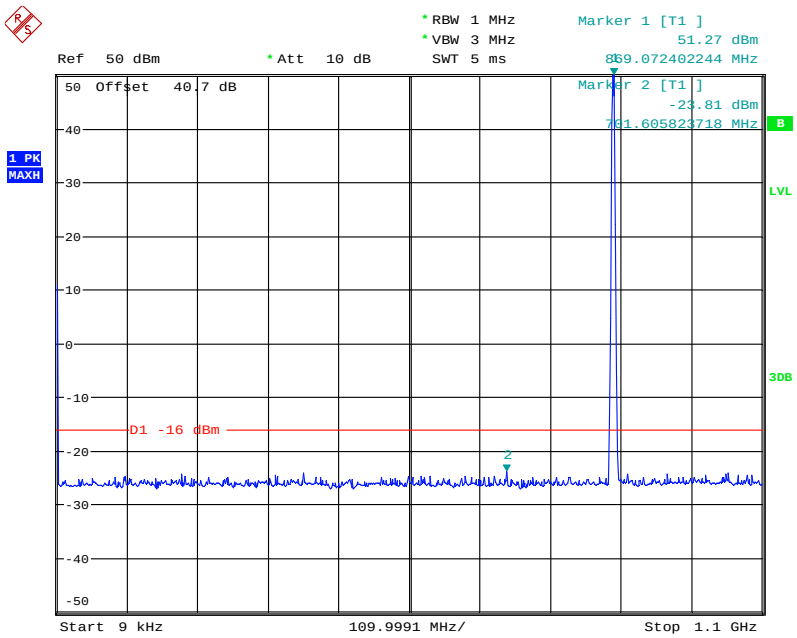
4GHz to 10GHz



Date: 18.SEP.2013 10:58:54

Configuration 1 – Mode 3 - 3

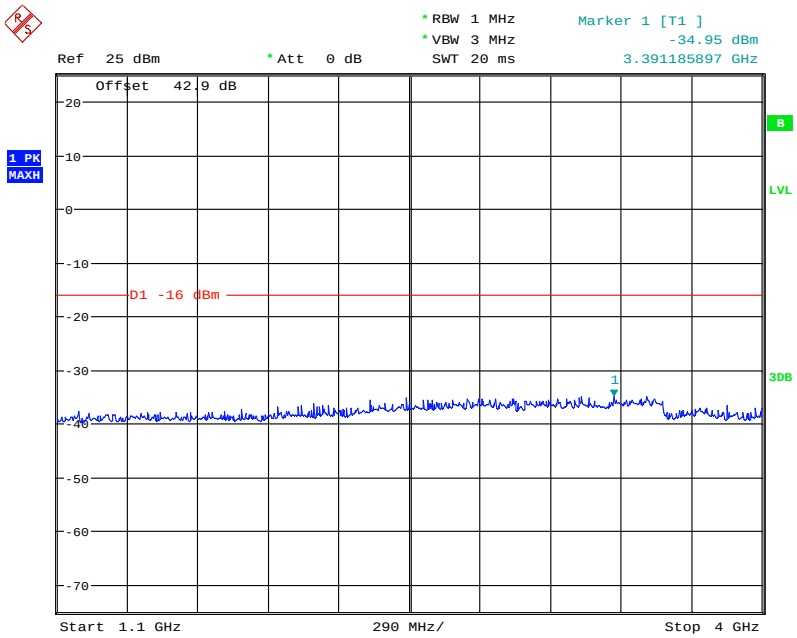
9kHz to 1.1GHz



Date: 18.SEP.2013 09:46:20

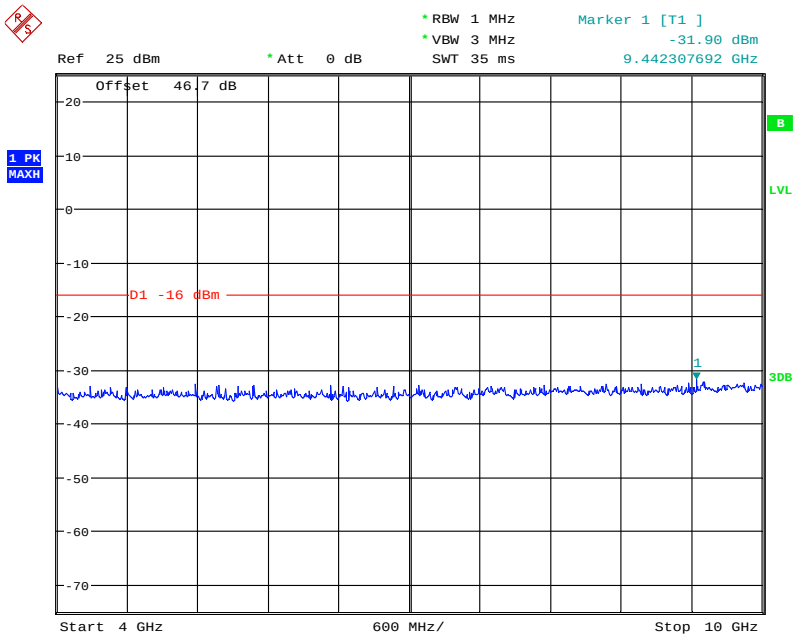
Note: The emission beyond the limit is the operating frequency.

1.1GHz to 4GHz



Date: 18.SEP.2013 10:18:17

4GHz to 10GHz



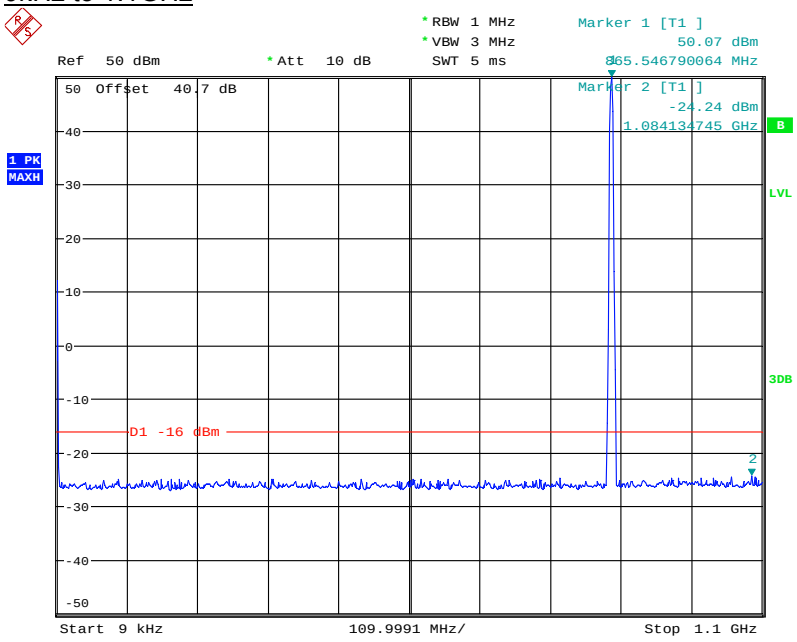
Date: 18.SEP.2013 09:45:12

Product Service

5MHz Bandwidth

Configuration 1 - Mode 1 - 5

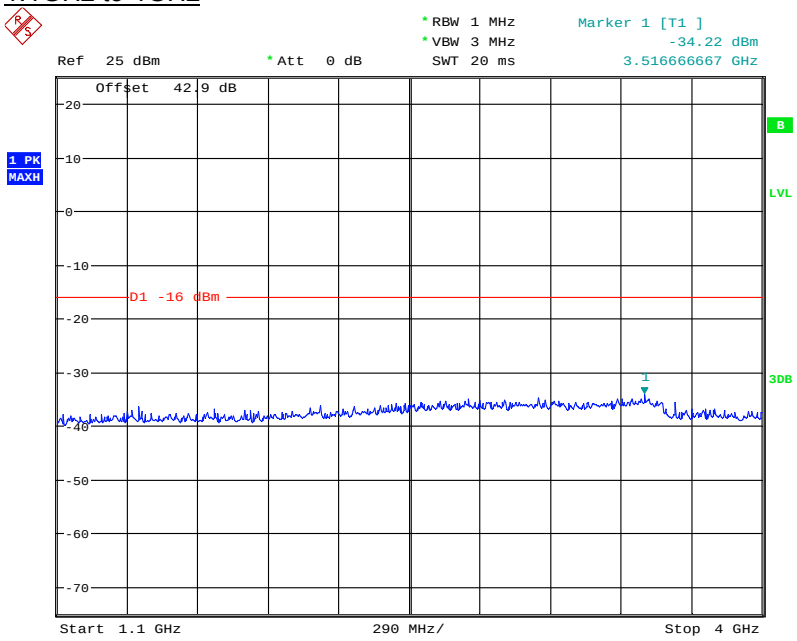
9kHz to 1.1GHz



Date: 18.SEP.2013 13:38:27

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

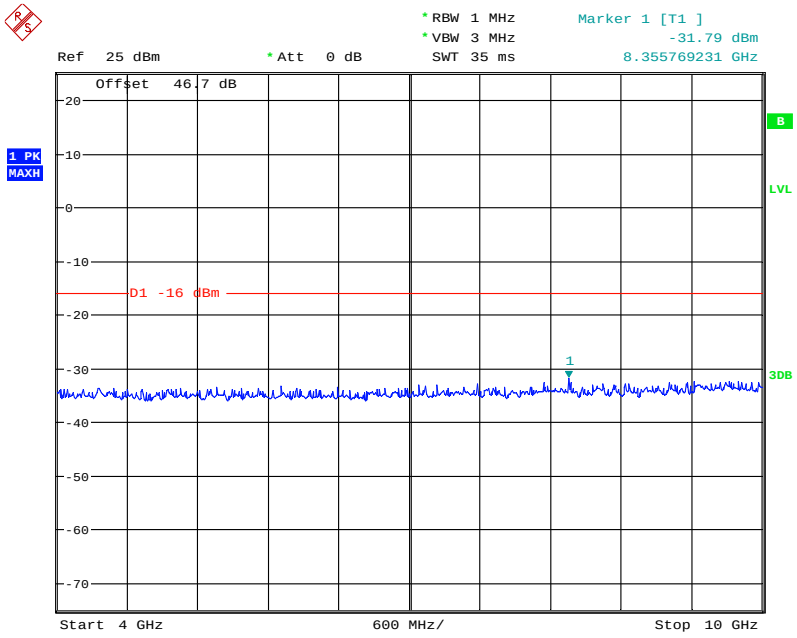
1.1GHz to 4GHz



Date: 18.SEP.2013 13:35:37

Product Service

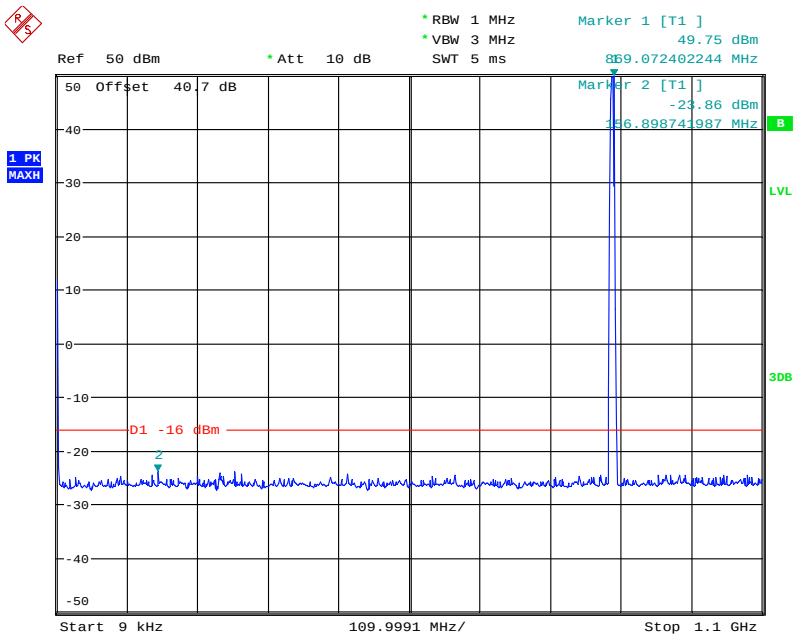
4GHz to 10GHz



Date: 18.SEP.2013 13:37:12

Configuration 1 - Mode 2

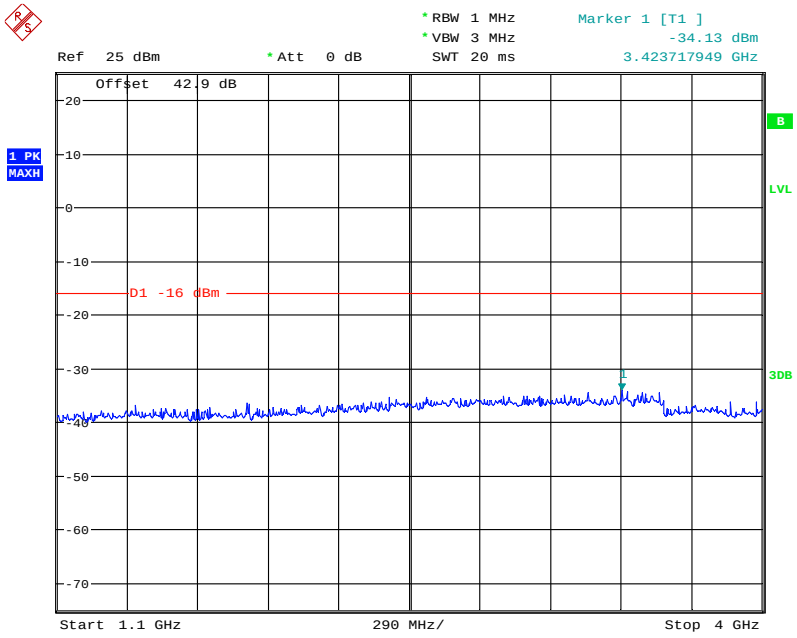
9kHz to 1.1GHz



Date: 18.SEP.2013 12:38:07

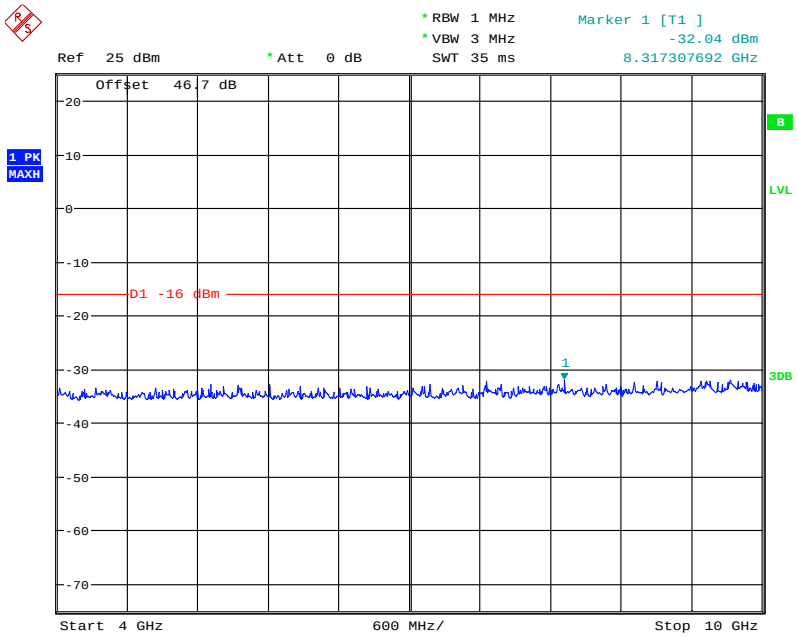
Note: The emission beyond the limit is the operating frequency.

1.1GHz to 4GHz



Date: 18.SEP.2013 12:41:35

4GHz to 10GHz

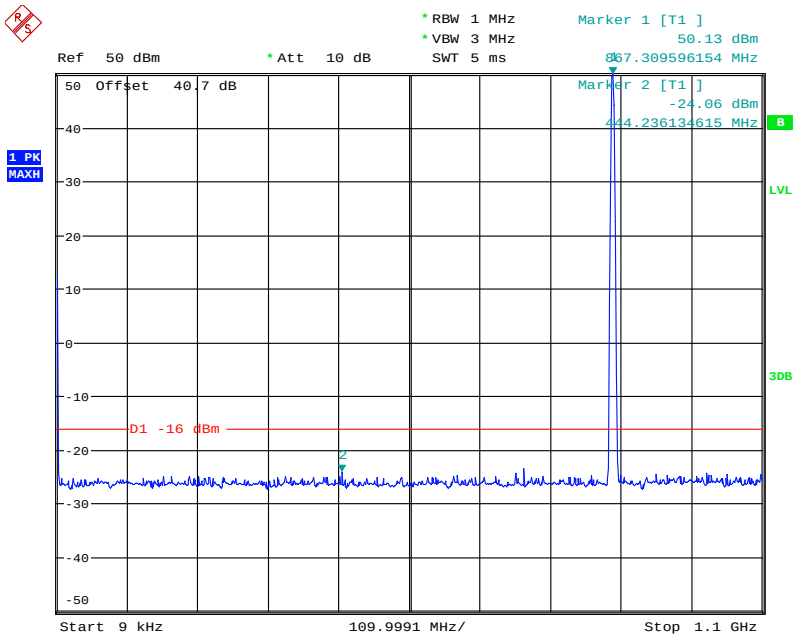


Date: 18.SEP.2013 12:39:00

Product Service

Configuration 1 - Mode 3 - 5

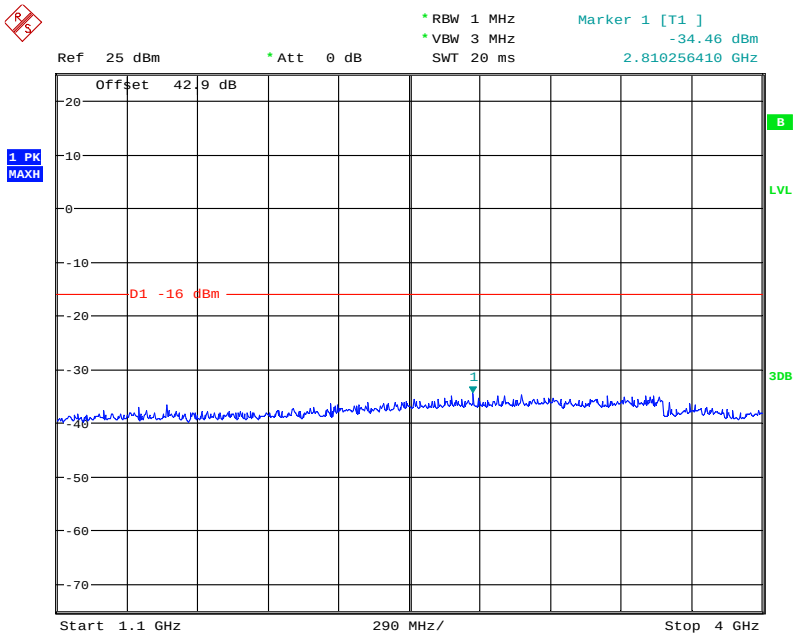
9kHz to 1.1GHz



Date: 18.SEP.2013 13:33:51

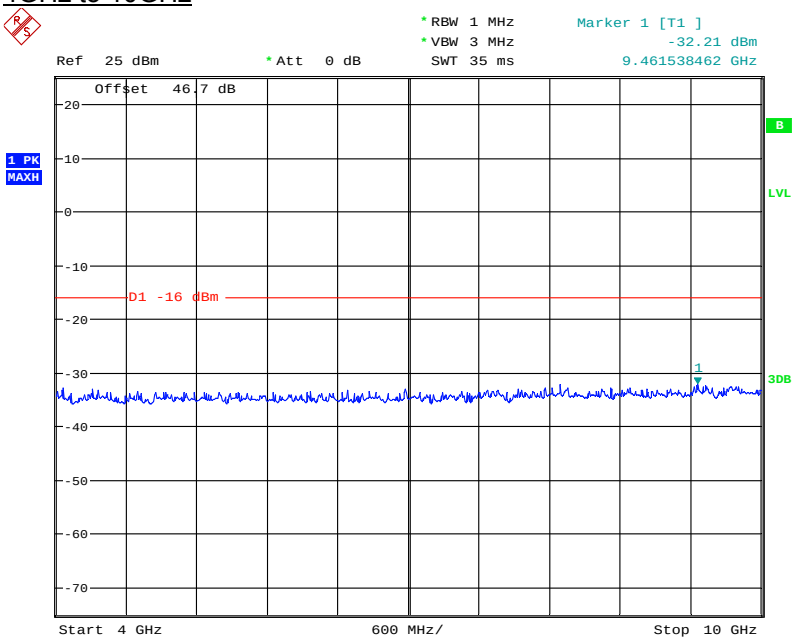
Note: The emission beyond the limit is the operating frequency.

1.1GHz to 4GHz



Date: 18.SEP.2013 13:34:41

4GHz to 10GHz



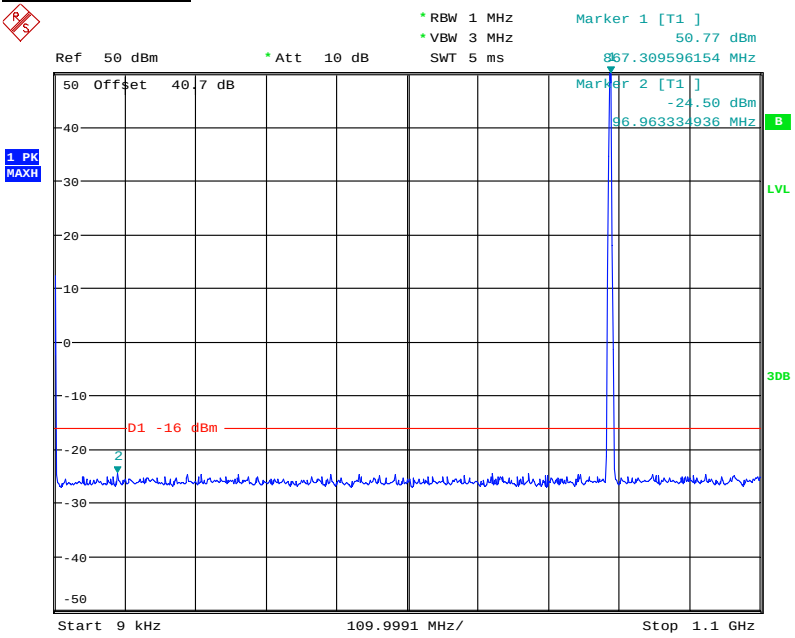
Date: 18.SEP.2013 13:32:39

E-TM3.2

3MHz Bandwidth

Configuration 1 - Mode 2

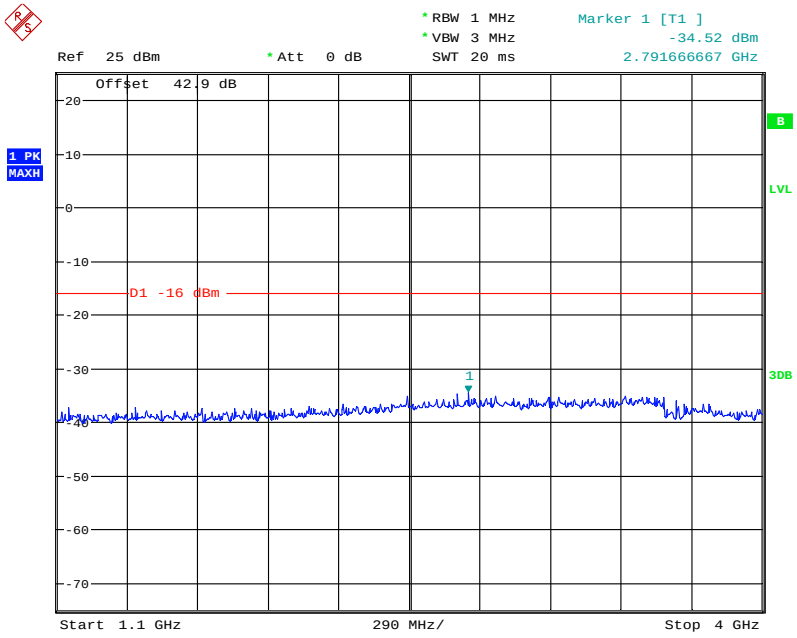
9kHz to 1.1GHz



Date: 18.SEP.2013 11:35:29

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

1.1GHz to 4GHz



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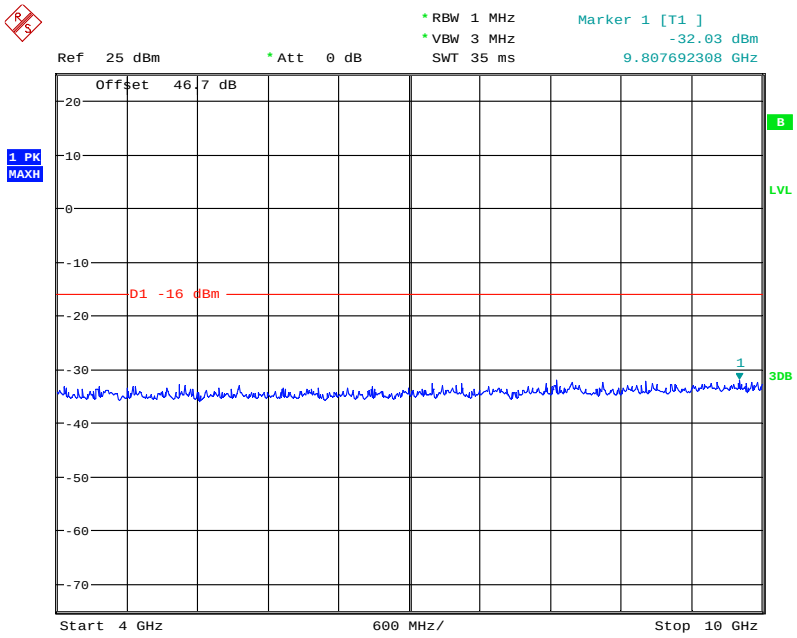
4GHz to 10GHz



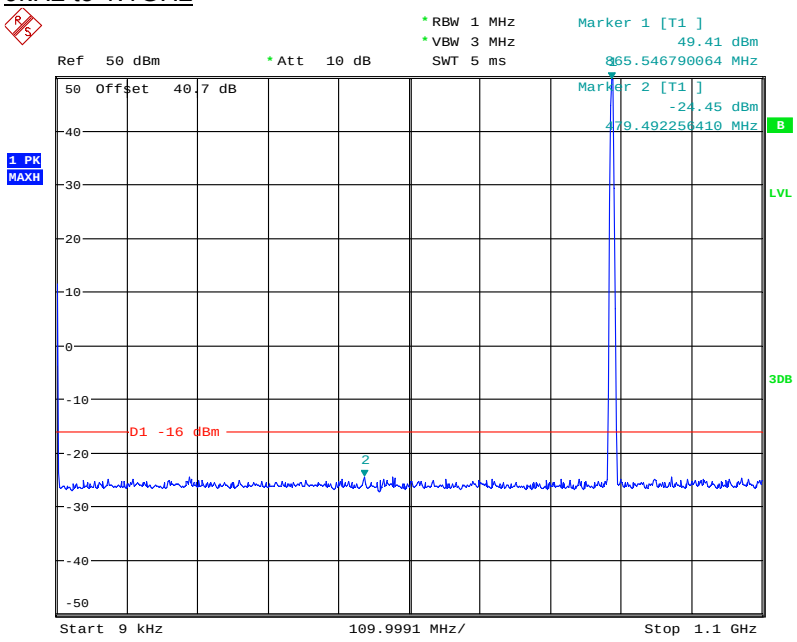
Date: 18.SEP.2013 11:36:14

Product Service

5MHz Bandwidth

Configuration 1 - Mode 2

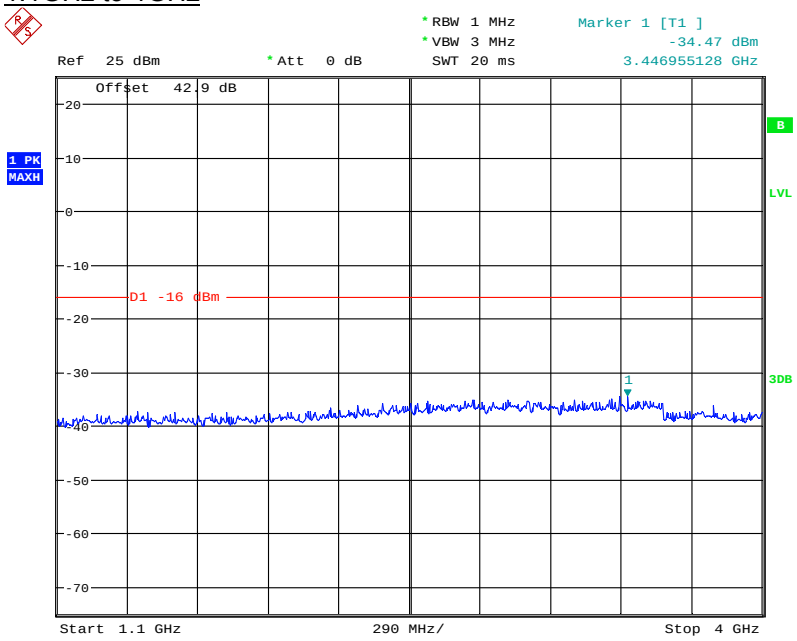
9kHz to 1.1GHz



Date: 18.SEP.2013 12:46:15

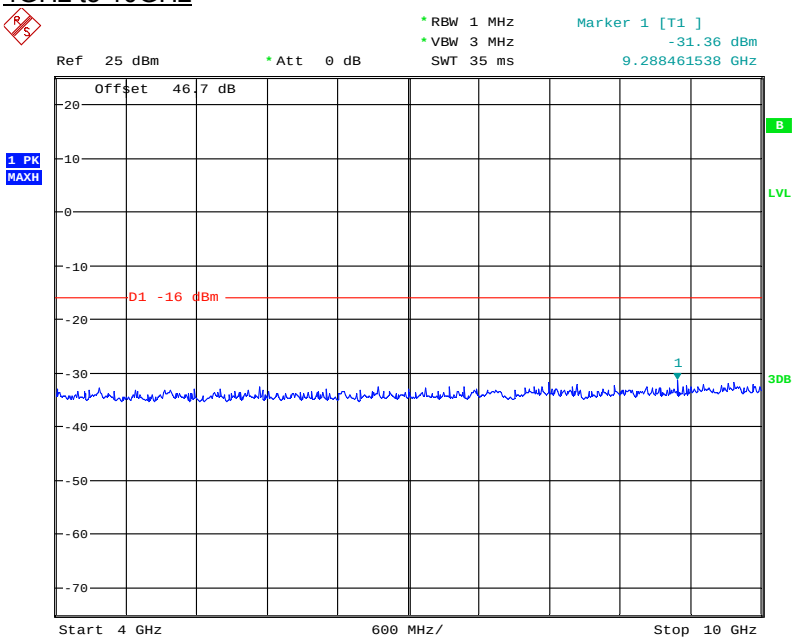
Note: The emission beyond the limit is the operating frequency.

1.1GHz to 4GHz



Date: 18.SEP.2013 12:41:58

4GHz to 10GHz



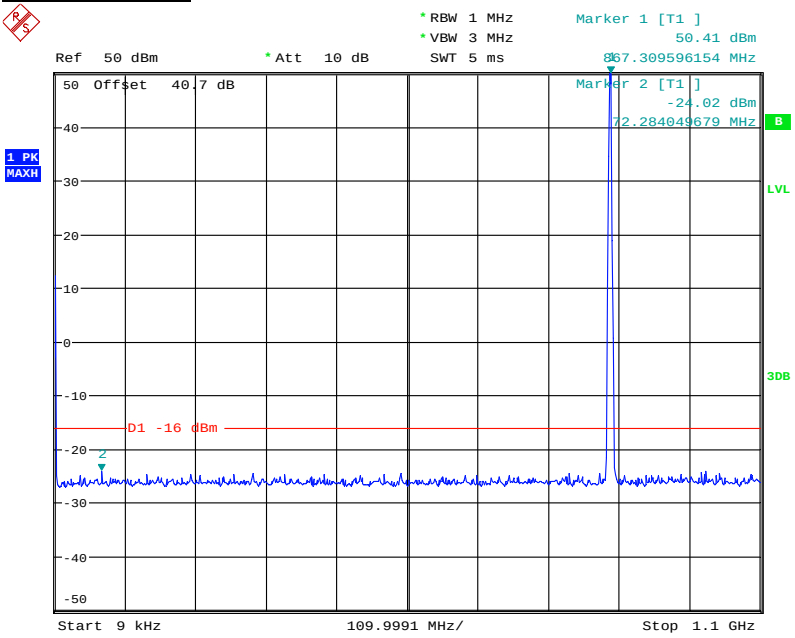
Date: 18.SEP.2013 12:47:12

E-TM3.1

3MHz Bandwidth

Configuration 1 - Mode 2

9kHz to 1.1GHz

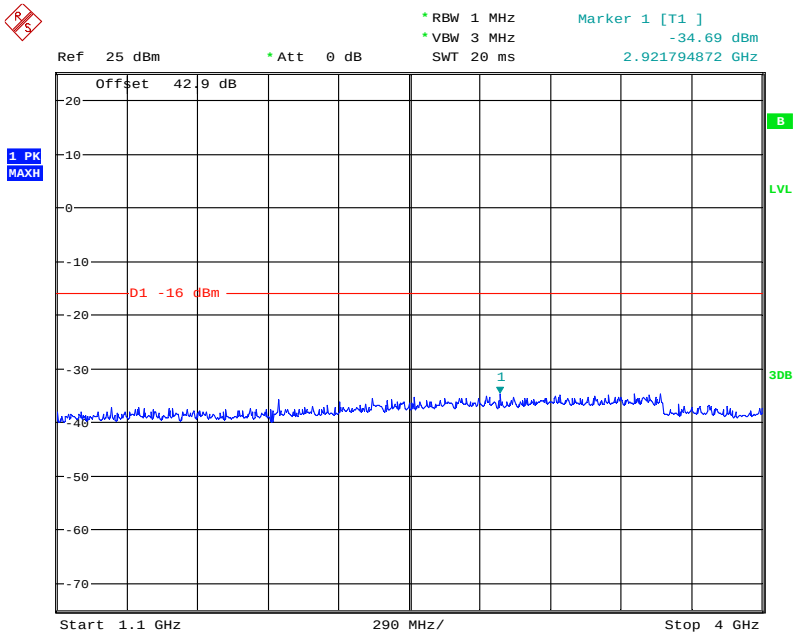


Date: 18.SEP.2013 11:39:47

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

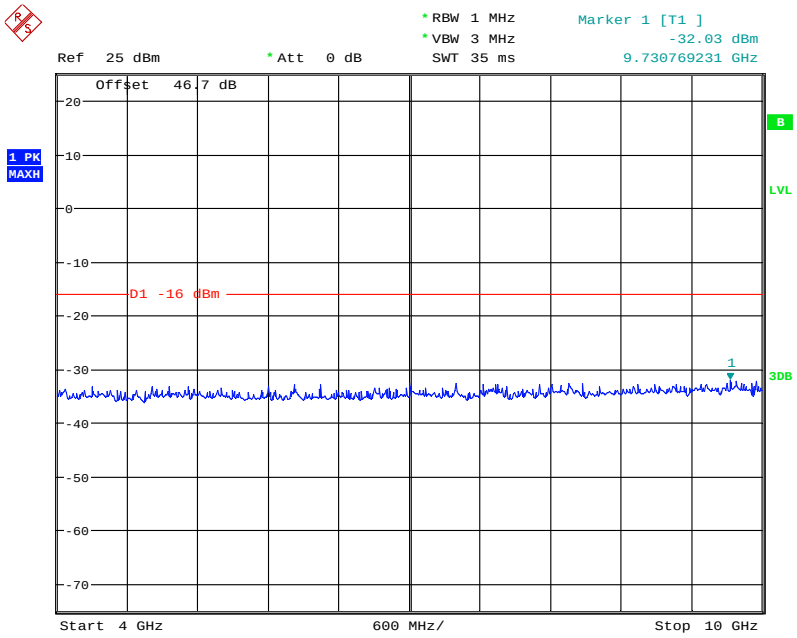
Product Service

1.1GHz to 4GHz



Date: 18.SEP.2013 11:02:07

4GHz to 10GHz



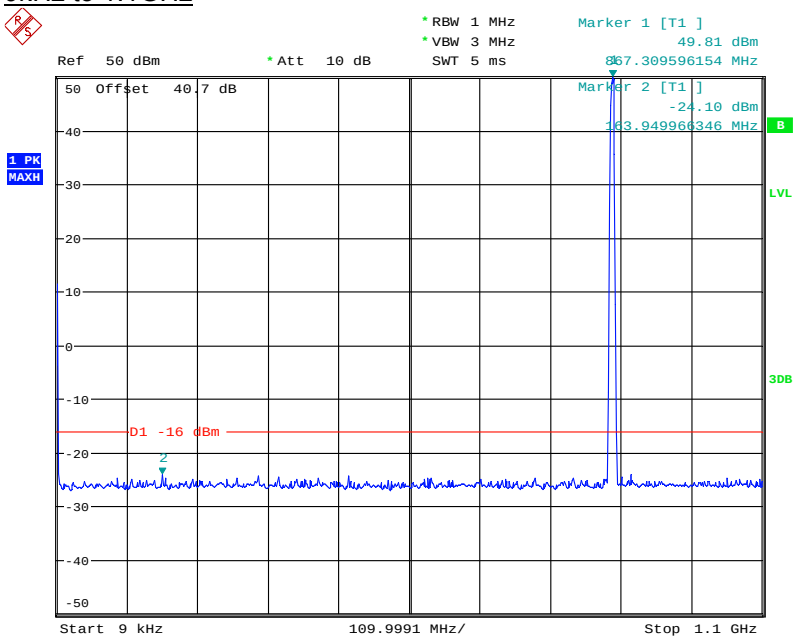
Date: 18.SEP.2013 11:37:51

Product Service

5MHz Bandwidth

Configuration 1 - Mode 2

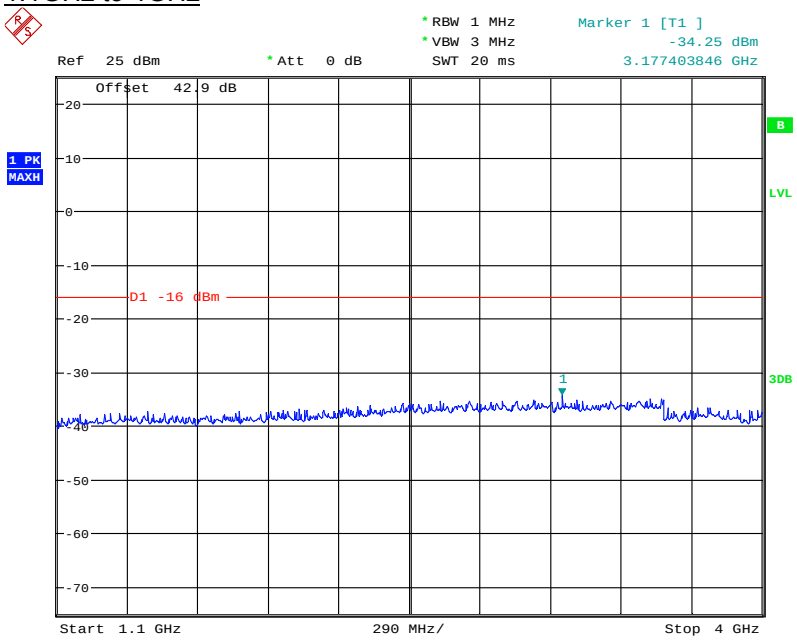
9kHz to 1.1GHz



Date: 18.SEP.2013 12:51:42

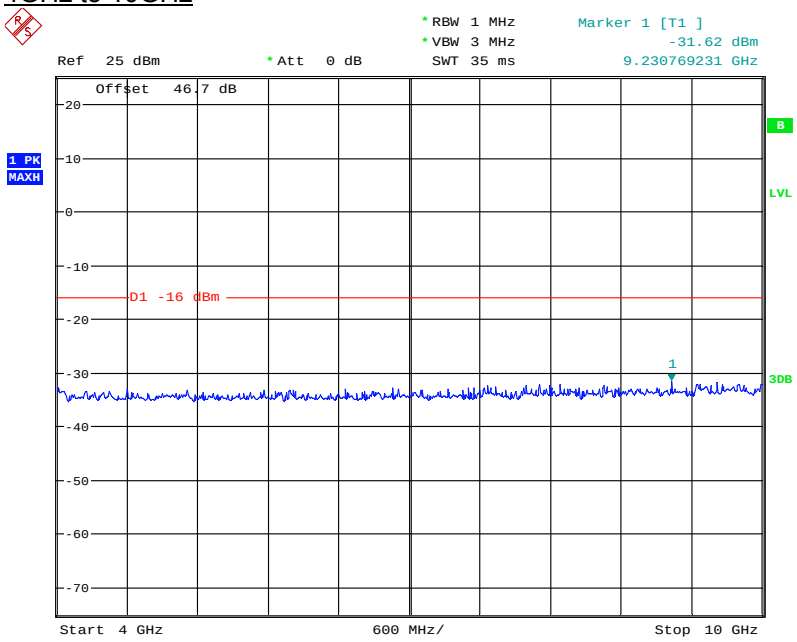
Note: The emission beyond the limit is the operating frequency.

1.1GHz to 4GHz



Date: 18.SEP.2013 12:42:29

4GHz to 10GHz



Date: 18.SEP.2013 12:50:17

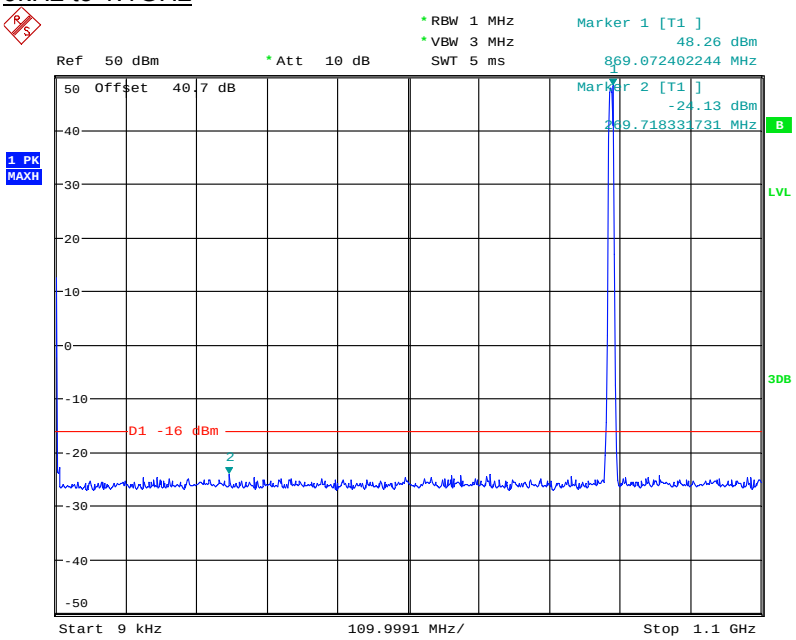
Multi Carrier (x2)

3MHz Bandwidth

E-TM1.1

Configuration 1 - Mode 4

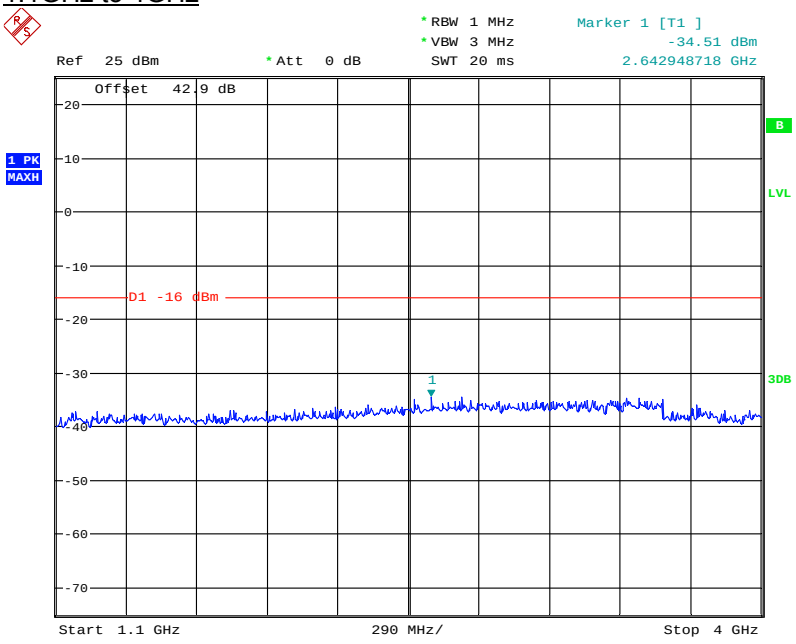
9kHz to 1.1GHz



Date: 18.SEP.2013 14:42:15

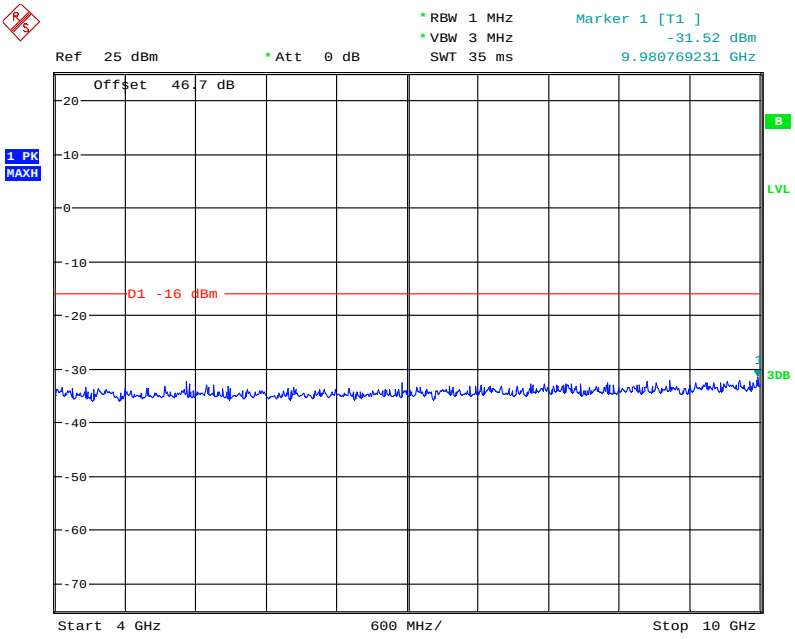
Note: The emission beyond the limit is the operating frequency.

1.1GHz to 4GHz



Date: 18.SEP.2013 14:37:32

4GHz to 10GHz



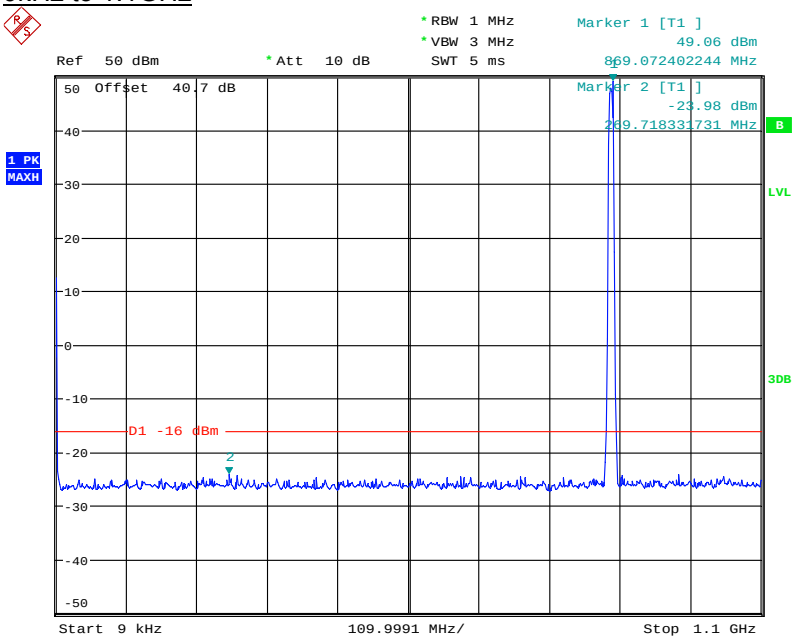
Date: 18.SEP.2013 14:40:36

Product Service

E-TM3.2

Configuration 1 - Mode 4

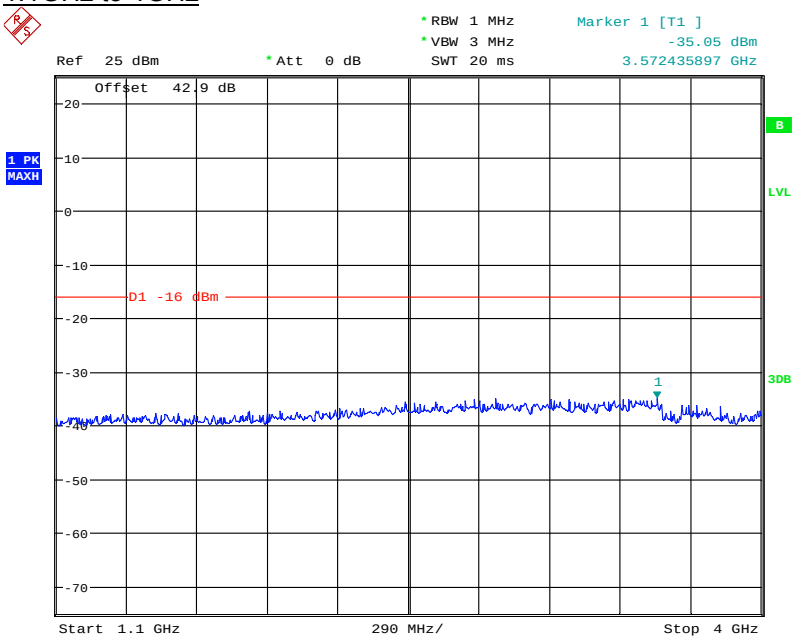
9kHz to 1.1GHz



Date: 18.SEP.2013 14:45:47

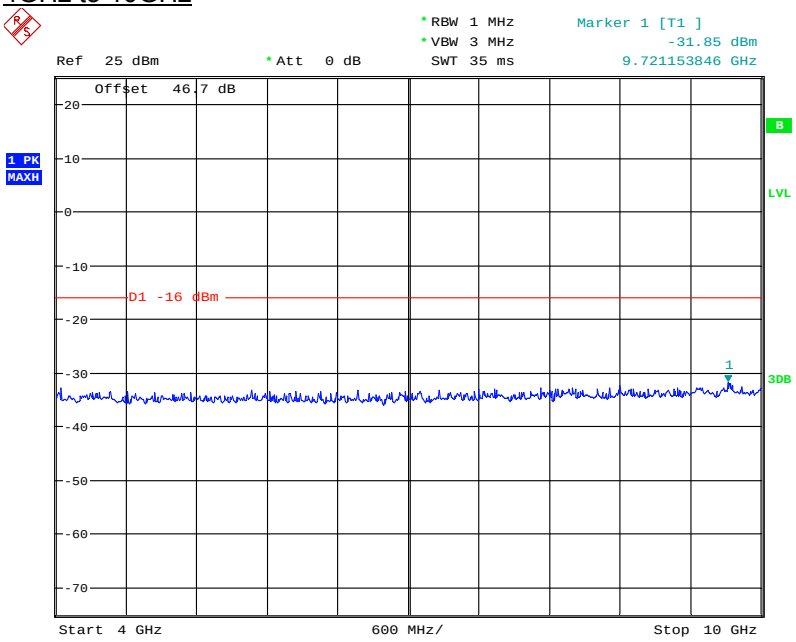
Note: The emission beyond the limit is the operating frequency.

1.1GHz to 4GHz



Date: 18.SEP.2013 14:38:20

4GHz to 10GHz

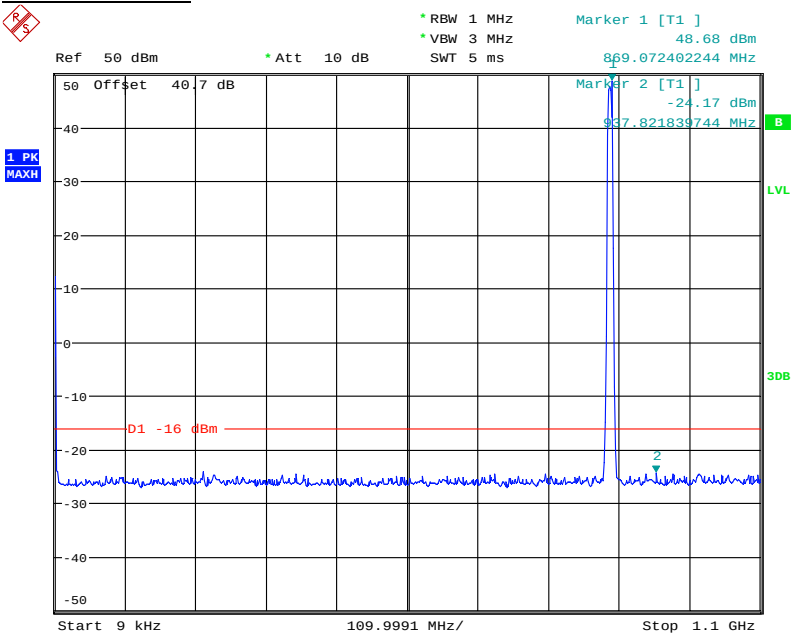


Date: 18.SEP.2013 14:47:06

E-TM3.1

Configuration 1 - Mode 4

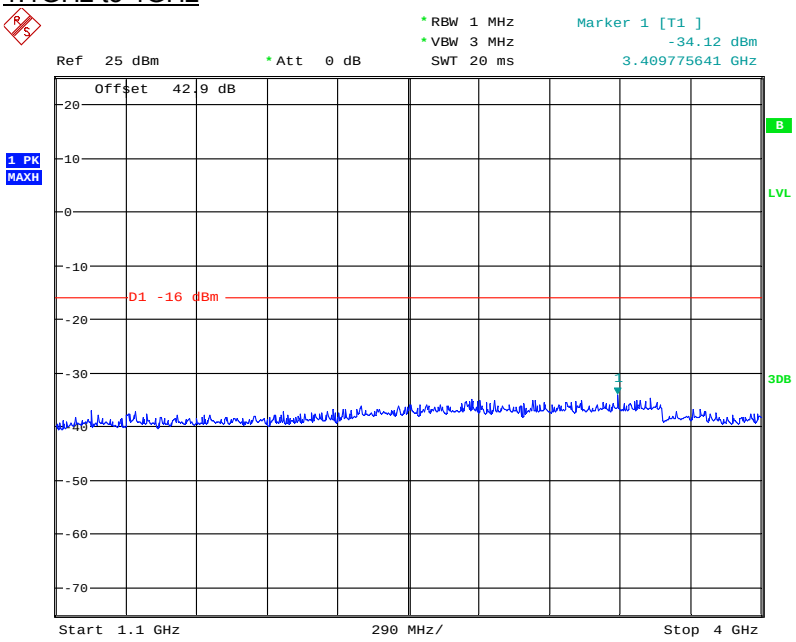
9kHz to 1.1GHz



Date: 18.SEP.2013 14:51:02

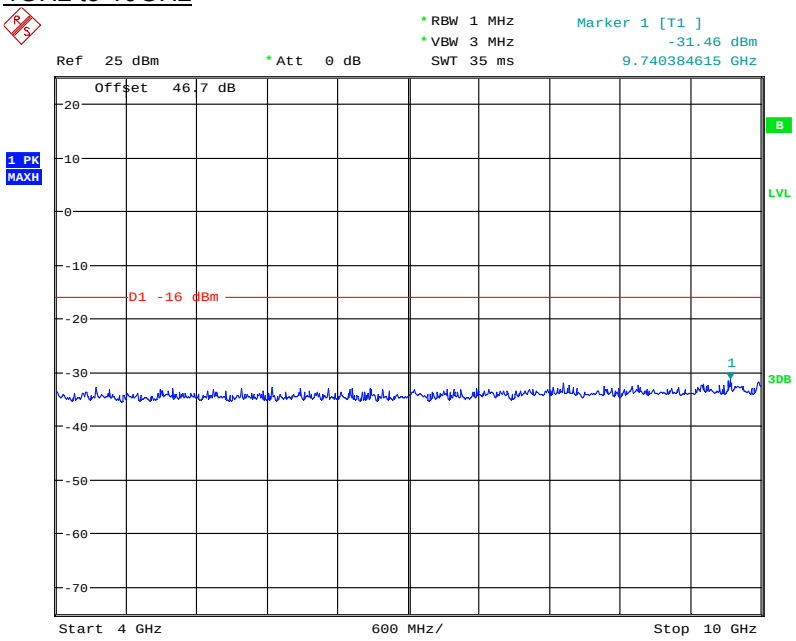
Note: The emission beyond the limit is the operating frequency.

1.1GHz to 4GHz



Date: 18.SEP.2013 14:38:47

4GHz to 10GHz



Date: 18.SEP.2013 14:49:40

Limit	-16dBm

Remarks

The EUT does not exceed -16dBm at the frequency range of 9kHz to 10GHz.

Product Service

SECTION 3

TEST EQUIPMENT USED

Product Service

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, 2.3, 2.4 and 2.6 – Maximum Conducted Output Power, Modulation Characteristics, Occupied Bandwidth, Emission Masks and Conducted Spurious Emissions.					
Spectrum Analyser	Rohde & Schwarz	FSQ26	100253	12	04-Aug-2014
Power Meter	Rohde & Schwarz	NRP2	101283	12	04-Aug-2014
Power Sensor	Rohde & Schwarz	NRP-Z51	102168	12	07-Apr-2014
Network Analyzer	Agilent	8720D	US36140166	12	09-Sep-2014
40 dB Attenuator	Aeroflex / Weinschel	48-40-43-LIM	BR5020	-	O/P MON
Pass Filter	K&L	ULK 904 098/2	16	-	O/P MON
Load	Shanghai Huaxiang	TF100	09121648	-	O/P MON
Power Supply	Dahua	DH1716-5D	2008040041	-	O/P MON
Power Supply	Dahua	DH1716-5D	2008040050	-	O/P MON
Digital Multi-meter	FLUKE	179	91820401	12	13-Dec-2013
Thermo-hygrometer	AZ Instruments	8705	9151655	12	19-Dec-2013
Section 2.5 – Radiated Spurious Emissions					
Load	Shanghai Huaxiang	TF100	09121648	-	O/P MON
Load	Shanghai Huaxiang	TF100	09121605	-	O/P MON
EMI Receiver	Rohde & Schwarz	ESI 40	100015	12	19-Aug-2014
Ultra log test antenna	Rohde & Schwarz	HL562	100167	12	19-Aug-2014
Double-Ridged Wave-guide Horn Antenna	Rohde & Schwarz	HF 906	100029	12	19-Aug-2014
Pyramidal Horn Antenna	EMCO	3160-09	-	-	-
Antenna master	Frankonia	MA 260	-	12	19-Aug-2014
Relay Switch Unit	Rohde & Schwarz	331.1601.31	338965002	-	TU
Semi Anechoic Chamber	Frankonia	23.18m×16.88 m×9.60m	-	12	19-Aug-2014
Power Supply	Dahua	DH1716-5D	2008040041	-	O/P MON
Power Supply	Dahua	DH1716-5D	2008040050	-	O/P MON
Digital Multimeter	FLUKE	179	91820401	12	13-Dec-2013
Thermo-hygrometer	AZ Instruments	8705	9151655	12	16-Dec-2013

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*
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

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).