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Report On

FCC and Industry Canada Testing of the
Ericsson RRUS 11 B4 / KRC 161 254/2

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FCC ID: TA8BKRC161254-2

IC ID: 287AB-BS1612542

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February 2014



Product Service

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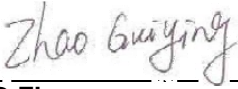
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PREPARED FOR

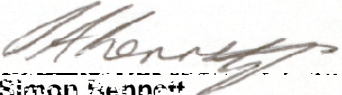
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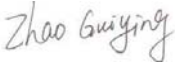
DATED

21 February 2014

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 27 and Industry Canada RSS-139. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);



G Zhao



X Zhang





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SECTION 1

REPORT SUMMARY

FCC and Industry Canada Testing of the
Ericsson RRUS 11 B4 / KRC 161 254/2



Product Service

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Ericsson RRUS 11 B4 / KRC 161 254/2 to the requirements of FCC CFR 47 Part 27 and Industry Canada RSS-139.

Testing was carried out in support of an application for Grant of RRUS 11 B4 / KRC 161 254/2 in CDMA and LTE Multi Standard Radio mode.

Objective	To perform FCC and Industry Canada 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 B4
Product Number	KRC 161 254/2
IC Model Number	BS1612542
Serial Number(s)	CF81442849
RBS Software Version	CXP102051/16 Rev R32BD
PIS Software Version	CXP9017316/1 Rev R39UL
Hardware Version	R2B
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 27: 2013 Industry Canada RSS-139 issue 2: 2009
Incoming Release Date	Declaration of Build Status 21 October 2013
Order Number Date	PTP 19 October 2013
Start of Test	11 November 2013
Finish of Test	13 February 2014
Name of Engineer(s)	G Zhao X Zhang
Related Document(s)	ANSI C63.4: 2009 FCC CFR 47 Part 2: 2013 Industry Canada RSS-GEN Issue 3: 2010 Industry Canada SRSP513 Issue 2: 2009



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results in accordance with FCC CFR 47 Part 27 and Industry Canada RSS-139, is shown below.

Configuration 1 – Remote Radio Equipment							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 27	RSS-139 and RSS-GEN					
	27.50 (d)	6.4	Effective Radiated Power	2132.5MHz(L1.4)+2133.85MHz(C)		N/A	No integral antenna.
				2132.5MHz(L3)+2134.65MHz(C)		N/A	
				2132.5MHz(L5)+2135.65MHz(C)		N/A	
				2132.5MHz(L10)+2138.15MHz(C)		N/A	
				2132.5MHz(L15)+2140.65MHz(C)		N/A	
2.1	2.1046, 27.50 (d)	6.4	RF Output Power - Conducted	2110.7MHz(L1.4)+2112.05MHz(C)	0	Pass	
				2132.5MHz(L1.4)+2133.85MHz(C)	0	Pass	
				2152.95MHz(C)+2154.3MHz(L1.4)	0	Pass	
				2111.5MHz(L3)+2113.65MHz(C)	0	Pass	
				2132.5MHz(L3)+2134.65MHz(C)	0	Pass	
				2151.35MHz(C)+2153.5MHz(L3)	0	Pass	
				2112.5MHz(L5)+2115.65MHz(C)	0	Pass	
				2132.5MHz(L5)+2135.65MHz(C)	0	Pass	
				2149.35MHz(C)+2152.5MHz(L5)	0	Pass	
				2115.0MHz(L10)+2120.65MHz(C)	0	Pass	
				2132.5MHz(L10)+2138.15MHz(C)	0	Pass	
				2144.35MHz(C)+2150.0MHz(L10)	0	Pass	
				2117.5MHz(L15)+2125.65MHz(C)	0	Pass	
				2132.5MHz(L15)+2140.65MHz(C)	0	Pass	
				2139.35MHz(C)+2147.5MHz(L15)	0	Pass	
				2131.15MHz(C)+2132.5MHz(L1.4)+2133.85MHz(C)	0	Pass	
				2130.35MHz(C)+2132.5MHz(L3)+2134.65MHz(C)	0	Pass	
				2129.35MHz(C)+2132.5MHz(L5)+2135.65MHz(C)	0	Pass	
				2126.85MHz(C)+2132.5MHz(L10)+2138.15MHz(C)	0	Pass	
				2131.15MHz(C)+2132.5MHz(L1.4)+2133.85MHz(C)+2135.10MHz(C)	0	Pass	
2130.35MHz(C)+2132.5MHz(L3)+2134.65MHz(C)+2135.90MHz(C)	0	Pass					
2129.35MHz(C)+2132.5MHz(L5)+2135.65MHz(C)+2136.90MHz(C)	0	Pass					



Configuration 1 – Remote Radio Equipment							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 27	RSS-139 and RSS-GEN					
2.2	27.50 (i)	-	Peak – Average Ratio	2110.7MHz(L1.4)+2112.05MHz(C)	0	Pass	-
				2132.5MHz(L1.4)+2133.85MHz(C)	0	Pass	
				2152.95MHz(C)+2154.3MHz(L1.4)	0	Pass	
				2111.5MHz(L3)+2113.65MHz(C)	0	Pass	
				2132.5MHz(L3)+2134.65MHz(C)	0	Pass	
				2151.35MHz(C)+2153.5MHz(L3)	0	Pass	
				2112.5MHz(L5)+2115.65MHz(C)	0	Pass	
				2132.5MHz(L5)+2135.65MHz(C)	0	Pass	
				2149.35MHz(C)+2152.5MHz(L5)	0	Pass	
				2115.0MHz(L10)+2120.65MHz(C)	0	Pass	
				2132.5MHz(L10)+2138.15MHz(C)	0	Pass	
				2144.35MHz(C)+2150.0MHz(L10)	0	Pass	
				2117.5MHz(L15)+2125.65MHz(C)	0	Pass	
				2132.5MHz(L15)+2140.65MHz(C)	0	Pass	
				2139.35MHz(C)+2147.5MHz(L15)	0	Pass	
				2131.15MHz(C)+2132.5MHz(L1.4)+2133.85MHz(C)	0	Pass	
				2130.35MHz(C)+2132.5MHz(L3)+2134.65MHz(C)	0	Pass	
				2129.35MHz(C)+2132.5MHz(L5)+2135.65MHz(C)	0	Pass	
2126.85MHz(C)+2132.5MHz(L10)+2138.15MHz(C)	0	Pass					
2131.15MHz(C)+2132.5MHz(L1.4)+2133.85MHz(C)+2135.10MHz(C)	0	Pass					
2130.35MHz(C)+2132.5MHz(L3)+2134.65MHz(C)+2135.90MHz(C)	0	Pass					
2129.35MHz(C)+2132.5MHz(L5)+2135.65MHz(C)+2136.90MHz(C)	0	Pass					
	2.1047 (d)	6.2	Modulation Characteristics	2132.5MHz(L1.4)+2133.85MHz(C)		N/A	-
				2132.5MHz(L3)+2134.65MHz(C)		N/A	
				2132.5MHz(L5)+2135.65MHz(C)		N/A	
				2132.5MHz(L10)+2138.15MHz(C)		N/A	
				2132.5MHz(L15)+2140.65MHz(C)		N/A	
	2.1049, 27.53 (h)	RSS-Gen 4.6.1	Occupied Bandwidth	2132.5MHz(L1.4)+2133.85MHz(C)		N/A	-
				2132.5MHz(L3)+2134.65MHz(C)		N/A	
				2132.5MHz(L5)+2135.65MHz(C)		N/A	
				2132.5MHz(L10)+2138.15MHz(C)		N/A	
				2132.5MHz(L15)+2140.65MHz(C)		N/A	



Configuration 1 – Remote Radio Equipment							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 27	RSS-139 and RSS-GEN					
2.3	2.1051, 27.53 (h)	6.5	Spurious Emissions at Antenna Terminals (±1MHz)	2110.7MHz(L1.4)+2112.05MHz(C)	0	Pass	-
				2152.95MHz(C)+2154.3MHz(L1.4)	0	Pass	
				2111.5MHz(L3)+2113.65MHz(C)	0	Pass	
				2151.35MHz(C)+2153.5MHz(L3)	0	Pass	
				2112.5MHz(L5)+2115.65MHz(C)	0	Pass	
				2149.35MHz(C)+2152.5MHz(L5)	0	Pass	
				2115.0MHz(L10)+2120.65MHz(C)	0	Pass	
				2144.35MHz(C)+2150.0MHz(L10)	0	Pass	
				2117.5MHz(L15)+2125.65MHz(C)	0	Pass	
				2139.35MHz(C)+2147.5MHz(L15)	0	Pass	
2.4	2.1053, 27.53 (h)	6.5	Radiated Spurious Emissions	2110.7MHz(L1.4)+2112.05MHz(C)	0	Pass	-
				2132.5MHz(L1.4)+2133.85MHz(C)	0	Pass	
				2152.95MHz(C)+2154.3MHz(L1.4)	0	Pass	
				2132.5MHz(L3)+2134.65MHz(C)	0	Pass	
				2132.5MHz(L5)+2135.65MHz(C)	0	Pass	
				2132.5MHz(L10)+2138.15MHz(C)	0	Pass	
				2132.5MHz(L15)+2140.65MHz(C)	0	Pass	
				2131.15MHz(C)+2132.5MHz(L1.4)+2133.85MHz(C)	0	Pass	
2131.15MHz(C)+2132.5MHz(L1.4)+2133.85MHz(C)+2135.10MHz(C)	0	Pass					
2.5	2.1051, 27.53 (h)	6.5	Conducted Spurious Emissions	2110.7MHz(L1.4)+2129.35MHz(C)	0	Pass	-
				2123.2MHz(L1.4)+2141.85MHz(C)	0	Pass	
				2135.65MHz(C)+2154.3MHz(L1.4)	0	Pass	
				2124.0MHz(L3)+2141.85MHz(C)	0	Pass	
				2125.0MHz(L5)+2141.85MHz(C)	0	Pass	
				2127.5MHz(L10)+2141.85MHz(C)	0	Pass	
				2130.0MHz(L15)+2141.85MHz(C)	0	Pass	
				2123.2MHz(L1.4)+2140.60MHz(C)+2141.85MHz(C)	0	Pass	
2123.2MHz(L1.4)+2139.35MHz(C)+2140.60MHz(C)+2141.85MHz(C)	0	Pass					



Configuration 1 – Remote Radio Equipment							
Section	Spec Clause		Test Description	Mode	Mod State	Result	Comments
	FCC Part 2 and 27	RSS-139 and RSS-GEN					
	2.1055, 27.54	6.3	Frequency Stability Under Temperature Variations	2132.5MHz(L1.4)+2133.85MHz(C)		N/A	-
				2132.5MHz(L3)+2134.65MHz(C)		N/A	
				2132.5MHz(L5)+2135.65MHz(C)		N/A	
				2132.5MHz(L10)+2138.15MHz(C)		N/A	
				2132.5MHz(L15)+2140.65MHz(C)		N/A	
				2131.15MHz(C)+2132.5MHz(L1.4)+2133.85MHz(C)		N/A	
				2131.15MHz(C)+2132.5MHz(L1.4)+2133.85MHz(C)+2135.10MHz(C)		N/A	
	2.1055, 27.54	6.3	Frequency Stability Under Voltage Variations	2132.5MHz(L1.4)+2133.85MHz(C)		N/A	-
				2132.5MHz(L3)+2134.65MHz(C)		N/A	
				2132.5MHz(L5)+2135.65MHz(C)		N/A	
				2132.5MHz(L10)+2138.15MHz(C)		N/A	
				2132.5MHz(L15)+2140.65MHz(C)		N/A	
				2131.15MHz(C)+2132.5MHz(L1.4)+2133.85MHz(C)		N/A	
				2131.15MHz(C)+2132.5MHz(L1.4)+2133.85MHz(C)+2135.10MHz(C)		N/A	

N/A – Not Applicable

Note: “(L1.4)” denotes LTE network with 1.4MHz channel bandwidth.

“(L3)” denotes LTE network with 3MHz channel bandwidth.

“(L5)” denotes LTE network with 5MHz channel bandwidth.

“(L10)” denotes LTE network with 10MHz channel bandwidth.

“(L15)” denotes LTE network with 15MHz channel bandwidth.

“(C)” denotes CDMA network.



1.3 DECLARATION OF BUILD STATUS

MAIN EUT	
MANUFACTURING DESCRIPTION	Remote Radio Equipment
MANUFACTURER	Ericsson AB
PRODUCT NAME	RRUS 11 B4
PRODUCT NUMBER	KRC 161 254/2
IC Model Number	BS1612542
SERIAL NUMBER(s)	CF81442849
HARDWARE VERSION	R2B
RBS SOFTWARE VERSION	CXP102051/16 Rev R32BD
PIS SOFTWARE VERSION	CXP9017316/1 Rev R39UL
TRANSMITTER OPERATING RANGE	TX: 2110MHz - 2155MHz RX: 1710MHz - 1755MHz
MODULATIONS	LTE: QPSK, 16QAM, 64QAM CDMA: QPSK, 8PSK, 16QAM
ITU DESIGNATION OF EMISSION	CDMA: 1M25F9W LTE: 1M40F9W, 3M00F9W, 5M00F9W, 10M0F9W, 15M0F9W
SUPPORTED CHANNEL BANDWIDTH CONFIGURATION	CDMA: 1.25MHz LTE: 1.4MHz, 3MHz, 5MHz, 10MHz and 15MHz according to 3GPP TS 36.141
OUTPUT POWER (RMS) (W or dBm)	LTE/CDMA Mix Carrier (x 2): Antenna A: LTE + CDMA: 46dBm (40W) Antenna B: LTE + CDMA: 46dBm (40W)
	LTE/CDMA Mix Carrier (x3): Antenna A: LTE + 2 x CDMA: 46dBm (40W) Antenna B: LTE + CDMA: 44.8dBm (30W)
	LTE/CDMA Mix Carrier (x4): Antenna A: LTE + 3 x CDMA: 46dBm (40W) Antenna B: LTE: 40.0dBm (10W)
OUTPUT POWER TOLERANCE	± 2.0dB
INSTANTANEOUS BANDWIDTH	20MHz
ANTENNA	No dedicated antenna, handled during licensing
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	TA8BKRC161254-2
IC ID	287AB-BS1612542
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	The equipment is the Radio Part of LTE, CDMA Base Station.

Signature

Date

15 November 2013

D of B S Serial No

75924767/05

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 B4 / KRC 161 254/2 is an Ericsson Radio Equipment working in the public mobile service 2100MHz band which provides communication connections to LTE and CDMA network. The RRUS 11 B4 / KRC 161 254/2 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: Remote Radio Equipment

The EUT was configured in accordance with FCC CFR 47 Part 27 and Industry Canada RSS-139.

The RRUS 11 B4 / KRC 161 254/2 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 2100MHz.

The setting below were found to be representative for all traffic scenarios when several settings, with the different modulations, number of carriers and the output power combinations were tested to find the worst case settings. After the measured results were compared, the following settings were used for all measurements unless otherwise noted:

- LTE/CDMA Mix Carrier:

The Output Power settings as below:

Mix Carriers	The Output Power Settings		Bandwidth for LTE
	Port A	Port B	
x2	20W(L) & 20W(C)	20W(L) & 20W(C)	1.4MHz, 3MHz, 5MHz, 10MHz
	20W(L) & 20W(C)	20W(L)	15MHz
x3	20W(L) & 10W(C) & 10W(C)	20W(L) & 10W(C)	1.4MHz, 3MHz, 5MHz
	20W(L) & 10W(C) & 10W(C)	20W(L)	10MHz
x4	10W(L) & 10W(C) & 10W(C) & 10W(C)	10W(L)	1.4MHz, 3MHz, 5MHz

LTE works in TX MIMO mode with 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

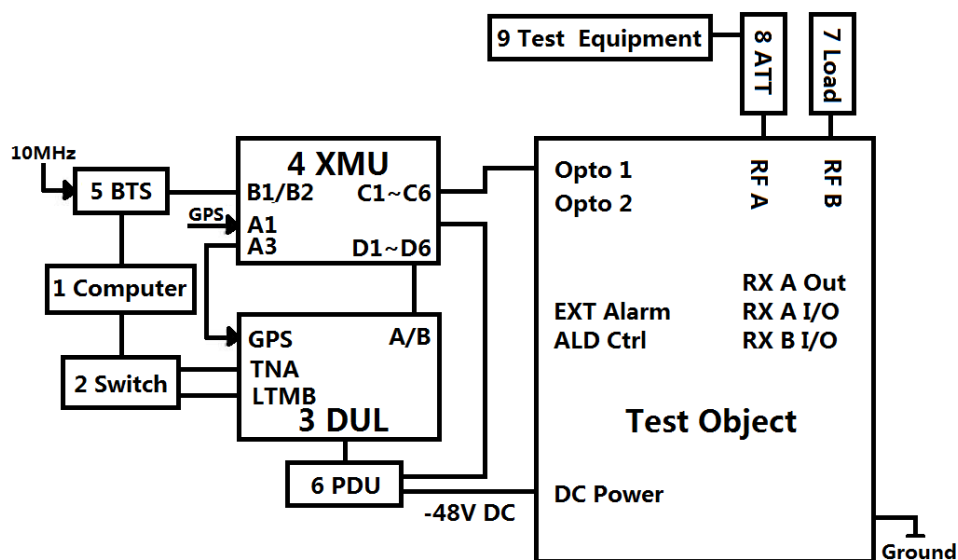
The EUT has two TX/RX ports and it can be configured to transmit with 2100MHz multi carrier at both RF output connectors. All TX measurements were performed on the combined TX/RX output connector RF A. Limited complementary TX measurements were done at connector RF B to verify identical performance for both transmitter chains. The complete testing was performed with the EUT transmitting at maximum RF power unless otherwise stated.

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



Product Service

Test Setup, Conducted Measurement:

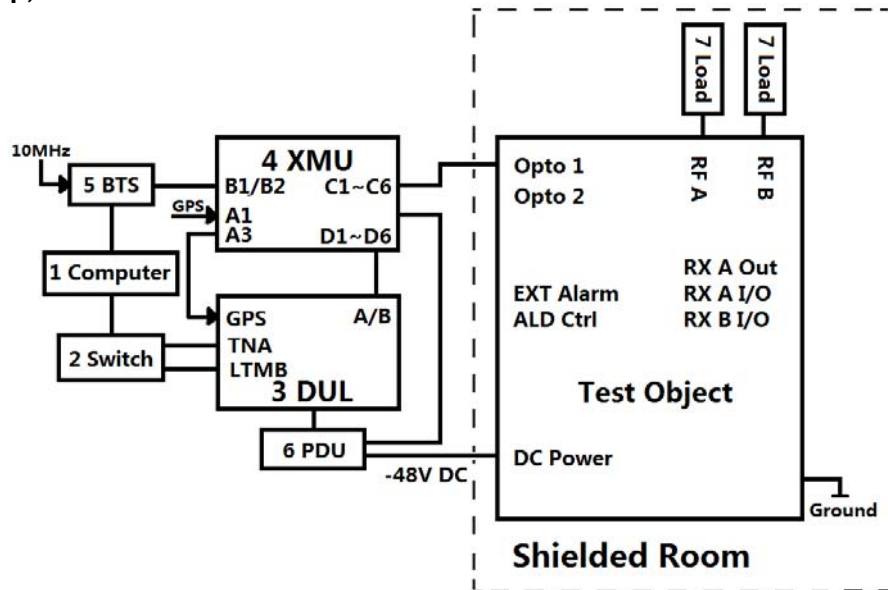


Product Name	Product Number	Version	Serial Number
RRUS 11 B4	KRC 161 254/2	R2B	CF81442849

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	BR80993658
4	RBS 6601	BFL 901 009/1	--	--
	XMU 02 01	KDU137 745/1	R2A	C825513800
	SUP 6601	1/BFL 901 009/1	R3B	BR81262578
5	DBA	NTLK90AAE5	09	NNTMPX00VD94
	XCEM-A	NTLK79AAE5	01	NNTMPX00JCKF
	AEM1302	NTLK85GAE5	07	NNTMPX00VRY4
	AEM1302	NTLK85GAE5	07	NNTMPX00RV3M
6	Power Supply	DH1716-5D	--	2008040041
	Power Supply	DH1716-5D	--	2008040050
7	Load	TF100	--	09121648
8	40dB Attenuator	48-40-43-LIM	--	BR5020
9	Power Meter	Rohde & Schwarz NRP2	--	101593
	Power Sensor	Rohde & Schwarz NRP-Z51	--	102123
	Spectrum Analyzer	FSQ26	--	100253



Test Setup, Radiated Measurement:



Product Name	Product Number	Version	Serial Number
RRUS 11 B4	KRC 161 254/2	R2B	CF81442849

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	BR80993658
4	RBS 6601	BFL 901 009/1	--	--
4	XMU 02 01	KDU137 745/1	R2A	C825513800
	SUP 6601	1/BFL 901 009/1	R3B	BR81262578
5	DBA	NTLK90AAE5	09	NNTMPX00VD94
	XCEM-A	NTLK79AAE5	01	NNTMPX00JCKF
	AEM1302	NTLK85GAE5	07	NNTMPX00VRY4
	AEM1302	NTLK85GAE5	07	NNTMPX00RV3M
6	Power Supply	DH1716-5D	--	2008040041
	Power Supply	DH1716-5D	--	2008040050
7	Load	TF100	--	09121648
	Load	TF100	--	09121605



1.4.3 Modes of Operation

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

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

- L1.4 denotes LTE network with 1.4MHz channel bandwidth.
- L3 denotes LTE network with 3MHz channel bandwidth.
- L5 denotes LTE network with 5MHz channel bandwidth.
- L10 denotes LTE network with 10MHz channel bandwidth.
- L15 denotes LTE network with 15MHz channel bandwidth.
- C denotes CDMA network.

Mix Carrier (x2)

Mode 1 - L1.4&C, L3&C, L5&C, L10&C, L15&C

MSR	Channel No.	Frequencies (MHz)
L1.4(B)&C	1957 & 41	2110.7+2112.05
L3(B)&C	1965 & 73	2111.5+2113.65
L5(B)&C	1975 & 113	2112.5+2115.65
L10(B)&C	2000 & 213	2115.0+2120.65
L15(B)&C	2025 & 313	2117.5+2125.65

Mode 1' - L1.4&C

MSR	Channel No.	Frequencies (MHz)
L1.4(B)&C	1957 & 387	2110.7+2129.35

Mode 2 - L1.4&C, L3&C, L5&C, L10&C, L15&C

MSR	Channel No.	Frequencies (MHz)
L1.4(M)&C	2175 & 477	2132.5+2133.85
L3(M)&C	2175 & 493	2132.5+2134.65
L5(M)&C	2175 & 513	2132.5+2135.65
L10(M)&C	2175 & 563	2132.5+2138.15
L15(M)&C	2175 & 613	2132.5+2140.65



Mode 2' - L1.4&C, L3&C, L5&C, L10&C, L15&C

MSR	Channel No.	Frequencies (MHz)
L1.4&C	2082 & 637	2123.2+2141.85
L3&C	2090 & 637	2124.0+2141.85
L5&C	2100 & 637	2125.0+2141.85
L10&C	2125 & 637	2127.5+2141.85
L15&C	2150 & 637	2130.0+2141.85

Mode 3 - C&L1.4, C&L3, C&L5, C&L10, C&L15

MSR	Channel No.	Frequencies (MHz)
C&L1.4(T)	859 & 2393	2152.95+2154.3
C&L3(T)	827 & 2385	2151.35+2153.5
C&L5(T)	787 & 2375	2149.35+2152.5
C&L10(T)	687 & 2350	2144.35+2150.0
C&L15(T)	587 & 2325	2139.35+2147.5

Mode 3' - C&L1.4

MSR	Channel No.	Frequencies (MHz)
C&L1.4(T)	513 & 2393	2135.65+2154.3

Mix Carrier (x3)

Mode 4 - C&L1.4&C, C&L3&C, C&L5&C, C&L10&C

MSR	Channel No.	Frequencies (MHz)
C&L1.4(M)&C	423 & 2175 & 477	2131.15+2132.5+2133.85
C&L3(M)&C	407 & 2175 & 493	2130.35+2132.5+2134.65
C&L5(M)&C	387 & 2175 & 513	2129.35+2132.5+2135.65
C&L10(M)&C	337 & 2175 & 563	2126.85+2132.5+2138.15

Mode 4' - L1.4&C&C

MSR	Channel No.	Frequencies (MHz)
L1.4&C&C	2082 & 612 & 637	2123.2+2140.60+2141.85

**Mix Carrier (x4)**

Mode 5 - C&L1.4&C&C, C&L3&C&C, C&L5&C&C

MSR	Channel No.	Frequencies (MHz)
C&L1.4(M)&C&C	423 & 2175 & 477 & 502	2131.15+2132.5+2133.85+2135.10
C&L3(M)&C&C	407 & 2175 & 493 & 518	2130.35+2132.5+2134.65+2135.90
C&L5(M)&C&C	387 & 2175 & 513 & 538	2129.35+2132.5+2135.65+2136.90

Mode 5' - L1.4&C&C&C

MSR	Channel No.	Frequencies (MHz)
L1.4&C&C&C	2082 & 587 & 612 & 637	2123.2+2139.35+2140.60+2141.85

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

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

- RF Output Power – Conducted
- Peak - Average Ratio
- Spurious Emissions at Antenna Terminals (± 1 MHz)
- Conducted Spurious Emissions

Only Radiated Spurious Emission 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.

Industry Canada Accreditation 7308A-1:

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



Product Service

SECTION 2

TEST DETAILS

FCC and Industry Canada Testing of the
Ericsson RRUS 11 B4 / KRC 161 254/2



Product Service

2.1 RF OUTPUT POWER - CONDUCTED

2.1.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1046
 FCC CFR 47 Part 27, Clause 27.50 (d)
 Industry Canada RSS-139, Clause 6.4

2.1.2 Equipment Under Test

RRUS 11 B4 / KRC 161 254/2, S/N: CF81442849

2.1.3 Date of Test and Modification State

11, 12 and 14 November 2013 – Modification State 0

2.1.4 Test Equipment Used

The major items of test equipment used for the below 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 27 and Industry Canada RSS-139.

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

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 - L1.4&C, L3&C, L5&C, L10&C, L15&C
 - Mode 2 - L1.4&C, L3&C, L5&C, L10&C, L15&C
 - Mode 3 - C&L1.4, C&L3, C&L5, C&L10, C&L15
 - Mode 4 - C&L1.4&C, C&L3&C, C&L5&C, C&L10&C
 - Mode 5 - C&L1.4&C&C, C&L3&C&C, C&L5&C&C

2.1.6 Environmental Conditions

	11 November 2013	12 November 2013	14 November 2013
Ambient Temperature	23.5°C	23.5°C	23.0°C
Relative Humidity	43.0%	45.0%	39.0%



2.1.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 27 and Industry Canada RSS-139 for RF Output Power.

The test results are shown below

Mix Carrier (x2)

Declarative Maximum Output power:

L1.4&C, L3&C, L5&C: 46.00dBm

L10&C: 45.60dBm

L15&C: 45.70dBm

Configuration 1 - Mode 1 - L1.4&C, L3&C, L5&C, L10&C, L15&C

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

MSR	Channel No.	Frequencies (MHz)	Result (dBm)RMS	Result (W)RMS
L1.4&C	1957 & 41	2110.7+2112.05	45.43	34.91
L3&C	1965 & 73	2111.5+2113.65	45.49	35.40
L5&C	1975 & 113	2112.5+2115.65	45.51	35.56
L10&C	2000 & 213	2115.0+2120.65	45.16	32.81
L15&C	2025 & 313	2117.5+2125.65	45.25	33.50

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

MSR	Channel No.	Frequencies (MHz)	Result (dBm)RMS	Result (W)RMS
L1.4&C	1957 & 41	2110.7+2112.05	45.41	34.75
L3&C	1965 & 73	2111.5+2113.65	45.48	35.32
L5&C	1975 & 113	2112.5+2115.65	45.48	35.32
L10&C	2000 & 213	2115.0+2120.65	45.17	32.89
L15&C	2025 & 313	2117.5+2125.65	45.23	33.34

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

MSR	Channel No.	Frequencies (MHz)	Result (dBm)RMS	Result (W)RMS
L1.4&C	1957 & 41	2110.7+2112.05	45.40	34.67
L3&C	1965 & 73	2111.5+2113.65	45.49	35.40
L5&C	1975 & 113	2112.5+2115.65	45.51	35.56
L10&C	2000 & 213	2115.0+2120.65	45.18	32.96
L15&C	2025 & 313	2117.5+2125.65	45.21	33.19

**Configuration 1 - Mode 2 - L1.4&C, L3&C, L5&C, L10&C, L15&C****LTE (E-TM1.1) & CDMA (QPSK)**

MSR	Channel No.	Frequencies (MHz)	Result (dBm)RMS	Result (W)RMS
L1.4&C	2175 & 477	2132.5+2133.85	45.88	38.73
L3&C	2175 & 493	2132.5+2134.65	45.85	38.46
L5&C	2175 & 513	2132.5+2135.65	45.91	38.99
L10&C	2175 & 563	2132.5+2138.15	45.50	35.48
L15&C	2175 & 613	2132.5+2140.65	45.54	35.81

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

MSR	Channel No.	Frequencies (MHz)	Result (dBm)RMS	Result (W)RMS
L1.4&C	2175 & 477	2132.5+2133.85	45.87	38.64
L3&C	2175 & 493	2132.5+2134.65	45.84	38.37
L5&C	2175 & 513	2132.5+2135.65	45.88	38.73
L10&C	2175 & 563	2132.5+2138.15	45.45	35.08
L15&C	2175 & 613	2132.5+2140.65	45.53	35.73

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

MSR	Channel No.	Frequencies (MHz)	Result (dBm)RMS	Result (W)RMS
L1.4&C	2175 & 477	2132.5+2133.85	45.85	38.46
L3&C	2175 & 493	2132.5+2134.65	45.85	38.46
L5&C	2175 & 513	2132.5+2135.65	45.90	38.90
L10&C	2175 & 563	2132.5+2138.15	45.47	35.24
L15&C	2175 & 613	2132.5+2140.65	45.53	35.73

Configuration 1 - Mode 3 - C&L1.4, C&L3, C&L5, C&L10, C&L15**LTE (E-TM1.1) & CDMA (QPSK)**

MSR	Channel No.	Frequencies (MHz)	Result (dBm)RMS	Result (W)RMS
C&L1.4	859 & 2393	2152.95+2154.3	45.82	38.19
C&L3	827 & 2385	2151.35+2153.5	45.86	38.55
C&L5	787 & 2375	2149.35+2152.5	45.83	38.28
C&L10	687 & 2350	2144.35+2150.0	45.54	35.81
C&L15	587 & 2325	2139.35+2147.5	45.64	36.64

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

MSR	Channel No.	Frequencies (MHz)	Result (dBm)RMS	Result (W) RMS
C&L1.4	859 & 2393	2152.95+2154.3	45.80	38.02
C&L3	827 & 2385	2151.35+2153.5	45.83	38.28
C&L5	787 & 2375	2149.35+2152.5	45.81	38.11
C&10	687 & 2350	2144.35+2150.0	45.53	35.73
C&L15	587 & 2325	2139.35+2147.5	45.64	36.64

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

MSR	Channel No.	Frequencies (MHz)	Result (dBm)RMS	Result (W)RMS
C&L1.4	859 & 2393	2152.95+2154.3	45.78	37.84
C&L3	827 & 2385	2151.35+2153.5	45.85	38.46
C&L5	787 & 2375	2149.35+2152.5	45.83	38.28
C&10	687 & 2350	2144.35+2150.0	45.55	35.89
C&L15	587 & 2325	2139.35+2147.5	45.65	36.73

Mix Carrier (x3)**Declarative Maximum Output power:**

L3&C: 46.00dBm

L1.4&C, L5&C, L10&C: 44.40dBm

Configuration 1 - Mode 4 – C&L1.4&C, C&L3&C, C&L5&C, C&L10&C**LTE (E-TM1.1) & CDMA (QPSK)**

MSR	Channel No.	Frequencies (MHz)	Result (dBm)RMS	Result (W)RMS
C&L1.4&C	423 & 2175 & 477	2131.15+2132.5+2133.85	44.27	26.73
C&L3&C	407 & 2175 & 493	2130.35+2132.5+2134.65	45.88	38.73
C&L5&C	387 & 2175 & 513	2129.35+2132.5+2135.65	44.32	27.04
C&L10&C	337 & 2175 & 563	2126.85+2132.5+2138.15	44.31	26.98

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

MSR	Channel No.	Frequencies (MHz)	Result (dBm)RMS	Result (W)RMS
C&L1.4&C	423 & 2175 & 477	2131.15+2132.5+2133.85	44.27	26.73
C&L3&C	407 & 2175 & 493	2130.35+2132.5+2134.65	45.86	38.55
C&L5&C	387 & 2175 & 513	2129.35+2132.5+2135.65	44.29	26.85
C&L10&C	337 & 2175 & 563	2126.85+2132.5+2138.15	44.29	26.85

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

MSR	Channel No.	Frequencies (MHz)	Result (dBm)RMS	Result (W)RMS
C&L1.4&C	423 & 2175 & 477	2131.15+2132.5+2133.85	44.26	26.67
C&L3&C	407 & 2175 & 493	2130.35+2132.5+2134.65	45.87	38.64
C&L5&C	387 & 2175 & 513	2129.35+2132.5+2135.65	44.30	26.92
C&L10&C	337 & 2175 & 563	2126.85+2132.5+2138.15	44.30	26.92

Mix Carrier (x4)**Declarative Maximum Output power:****L3&C: 46.00dBm****L1.4&C, L5&C: 44.40dBm****Configuration 1 - Mode 5 – C&L1.4&C&C, C&L3&C&C, C&L5&C&C****LTE (E-TM1.1) & CDMA (QPSK)**

MSR	Channel No.	Frequencies (MHz)	Result (dBm)RMS	Result (W)RMS
C&L1.4&C&C	423 & 2175 & 477 & 502	2131.15+2132.5+2133.85+2135.10	44.40	27.54
C&L3&C&C	407 & 2175 & 493 & 518	2130.35+2132.5+2134.65+2135.90	45.86	38.55
C&L5&C&C	387 & 2175 & 513 & 538	2129.35+2132.5+2135.65+2136.90	44.40	27.54

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

MSR	Channel No.	Frequencies (MHz)	Result (dBm)RMS	Result (W)RMS
C&L1.4&C&C	423 & 2175 & 477 & 502	2131.15+2132.5+2133.85+2135.10	44.39	27.48
C&L3&C&C	407 & 2175 & 493 & 518	2130.35+2132.5+2134.65+2135.90	45.86	38.55
C&L5&C&C	387 & 2175 & 513 & 538	2129.35+2132.5+2135.65+2136.90	44.38	27.42

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

MSR	Channel No.	Frequencies (MHz)	Result (dBm)RMS	Result (W)RMS
C&L1.4&C&C	423 & 2175 & 477 & 502	2131.15+2132.5+2133.85+2135.10	44.38	27.42
C&L3&C&C	407 & 2175 & 493 & 518	2130.35+2132.5+2134.65+2135.90	45.88	38.73
C&L5&C&C	387 & 2175 & 513 & 538	2129.35+2132.5+2135.65+2136.90	44.40	27.54

This unit is tested without an antenna. ERP/EIRP compliance is addressed at the time of licensing, as required by the responsible FCC/IC Bureau(s). Licensee's are the 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	$\leq 1640\text{W/MHz}$ or $\leq +62.1\text{dBm/MHz}$
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Remarks

The EUT does not exceed 1640W/MHz or 62.1dBm/MHz at the measured frequencies.



2.2 PEAK – AVERAGE RATIO

2.2.1 Specification Reference

FCC CFR 47 Part 27, Clause 27.50 (d)(5)
Industry Canada RSS-139, Clause 6.4

2.2.2 Equipment Under Test

RRUS 11 B4 / KRC 161 254/2, S/N: CF81442849

2.2.3 Date of Test and Modification State

14, 18 and 21 November 2013 – Modification State 0

2.2.4 Test Equipment Used

The major items of test equipment used for the below 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 27 and Industry Canada RSS-139.

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

The path loss 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 - L1.4&C, L3&C, L5&C, L10&C, L15&C
 - Mode 2 - L1.4&C, L3&C, L5&C, L10&C, L15&C
 - Mode 3 - C&L1.4, C&L3, C&L5, C&L10, C&L15
 - Mode 4 - C&L1.4&C, C&L3&C, C&L5&C, C&L10&C
 - Mode 5 - C&L1.4&C&C, C&L3&C&C, C&L5&C&C

2.2.6 Environmental Conditions

	14 November 2013	18 November 2013	21 November 2013
Ambient Temperature	23.0°C	23.8°C	23.5°C
Relative Humidity	39.0%	38.0%	41.0%



2.2.7 Test Results

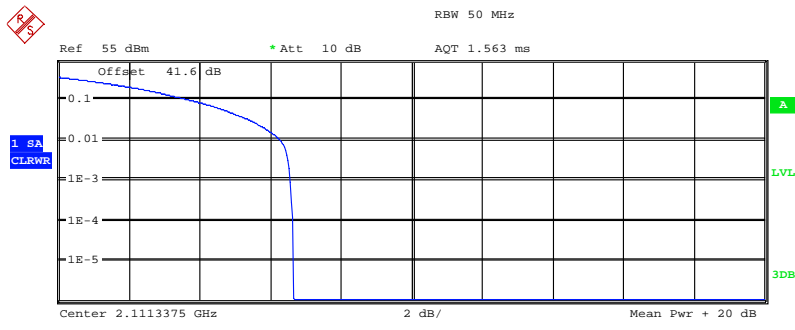
For the period of test the EUT met the requirements of FCC CFR 47 Part 27 for Peak – Average Ratio.

The test results are shown below.

Mix Carrier (x2)

Configuration 1 - Mode 1 - L1.4&C

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



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 37.9MHz

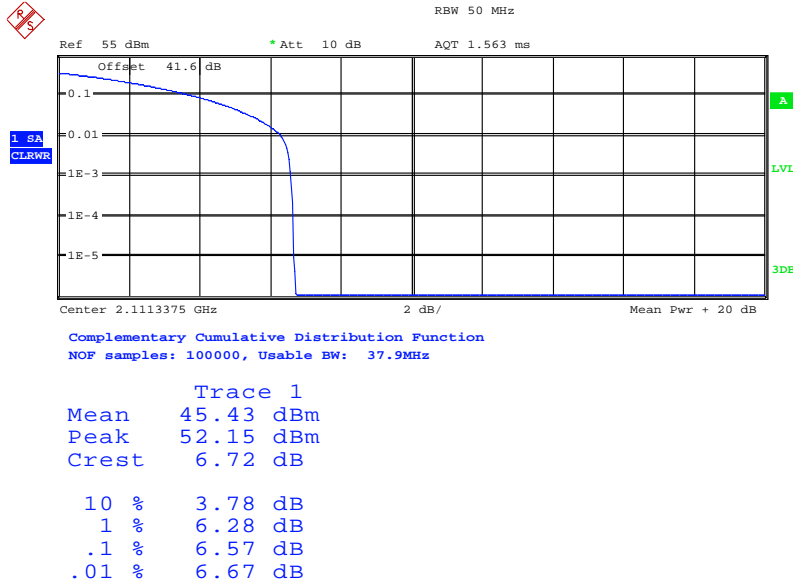
Trace 1	
Mean	45.43 dBm
Peak	52.08 dBm
Crest	6.65 dB
10 %	3.75 dB
1 %	6.28 dB
.1 %	6.57 dB
.01 %	6.63 dB

Date: 18.NOV.2013 11:56:56



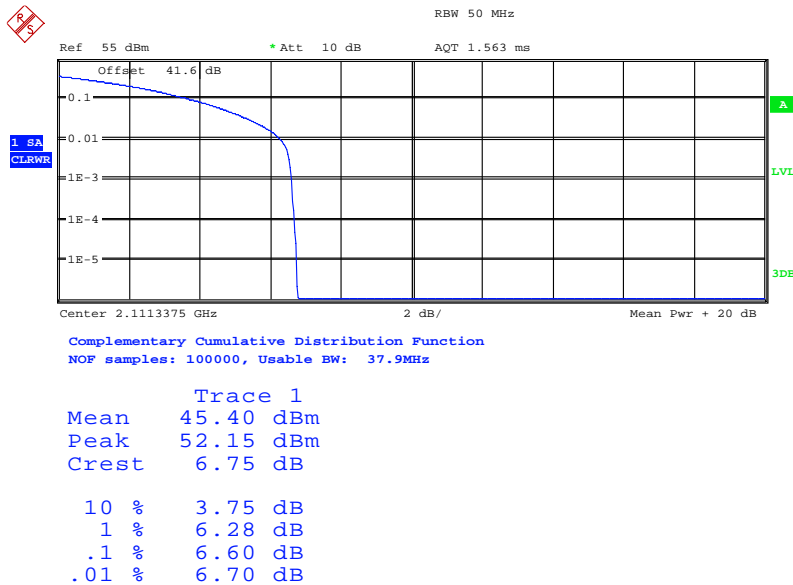
Product Service

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



Date: 18.NOV.2013 11:56:28

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

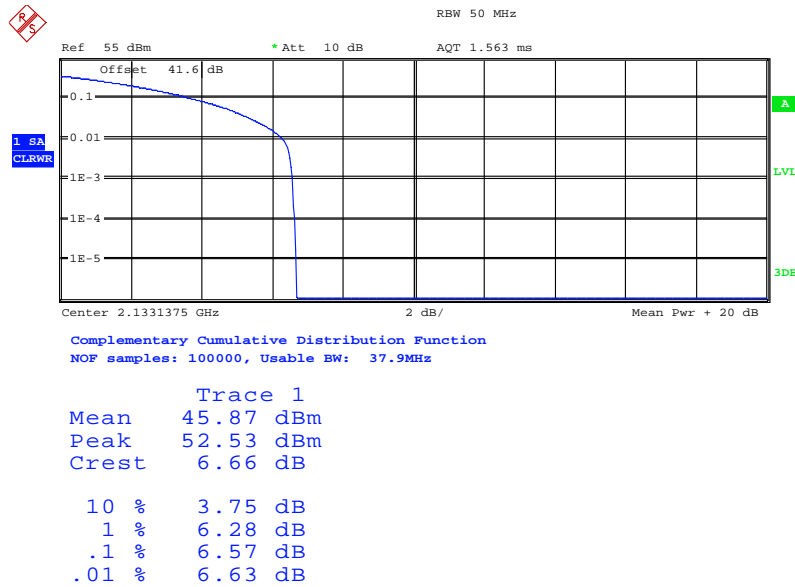


Date: 18.NOV.2013 11:49:11



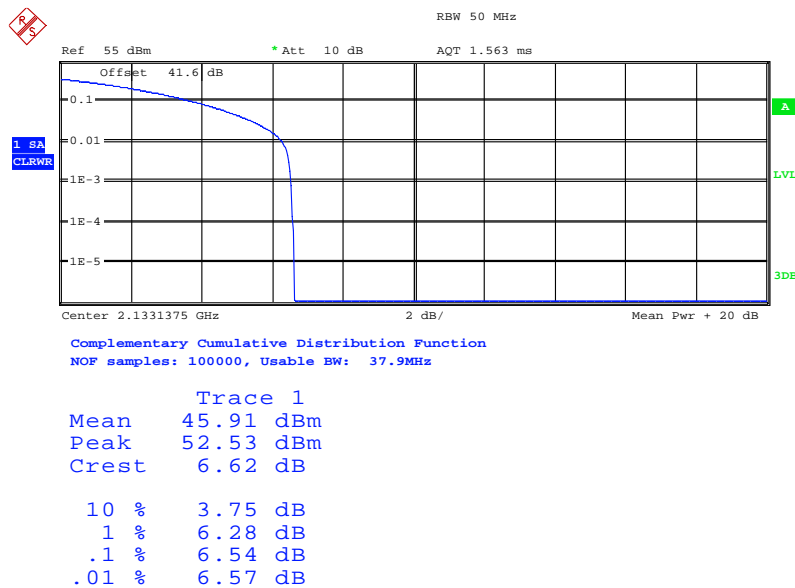
Configuration 1 - Mode 2 - L1.4&C

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



Date: 18.NOV.2013 11:07:45

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

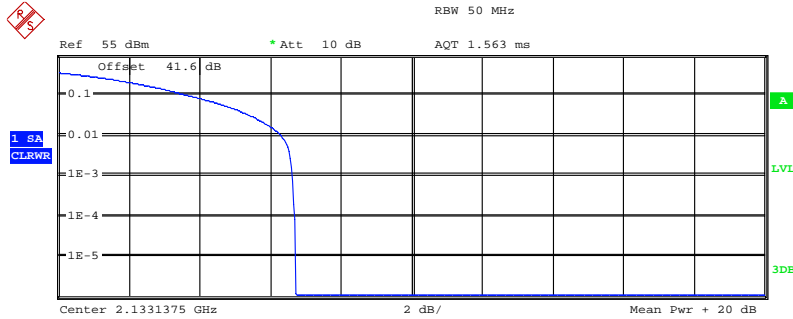


Date: 18.NOV.2013 11:16:07



Product Service

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



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 37.9MHz

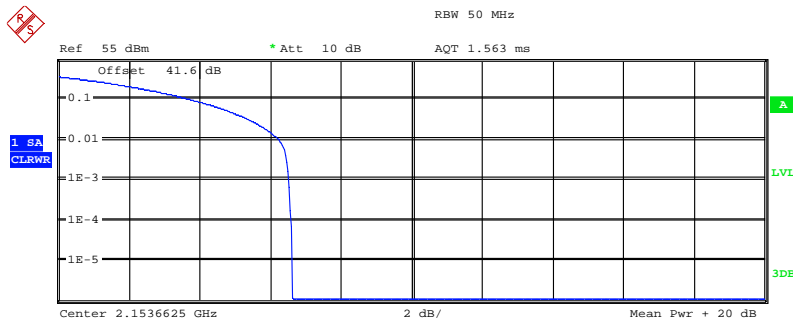
Trace 1

Mean	45.82 dBm
Peak	52.53 dBm
Crest	6.71 dB
10 %	3.72 dB
1 %	6.28 dB
.1 %	6.63 dB
.01 %	6.70 dB

Date: 18.NOV.2013 11:16:39

Configuration 1 - Mode 3 - C&L1.4

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



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 37.9MHz

Trace 1

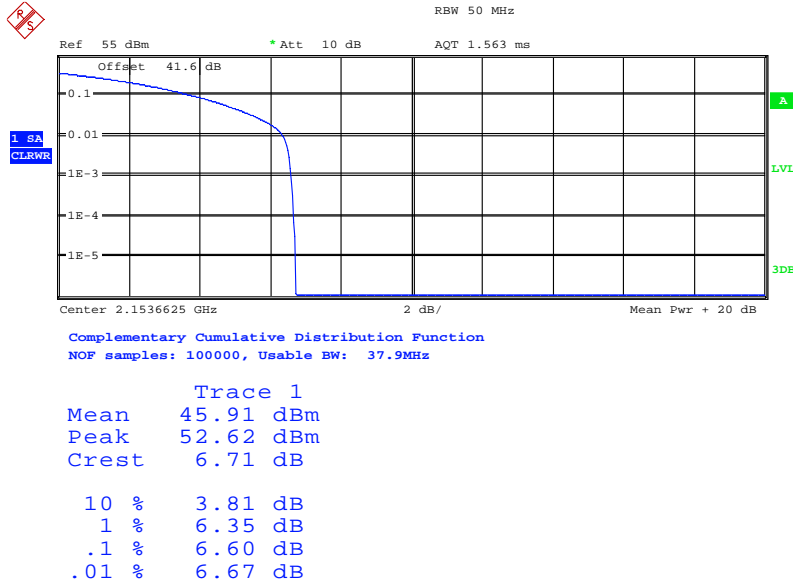
Mean	45.94 dBm
Peak	52.55 dBm
Crest	6.61 dB
10 %	3.75 dB
1 %	6.22 dB
.1 %	6.54 dB
.01 %	6.60 dB

Date: 18.NOV.2013 12:24:04



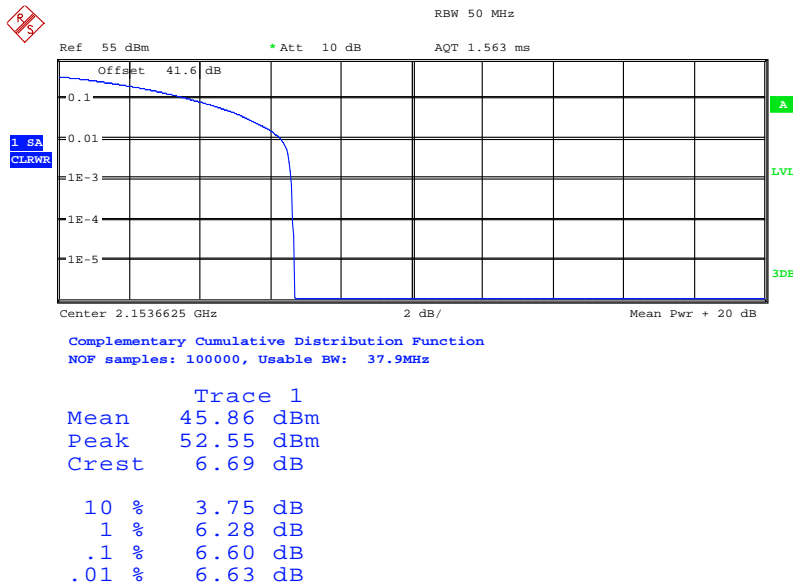
Product Service

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



Date: 18.NOV.2013 12:24:33

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



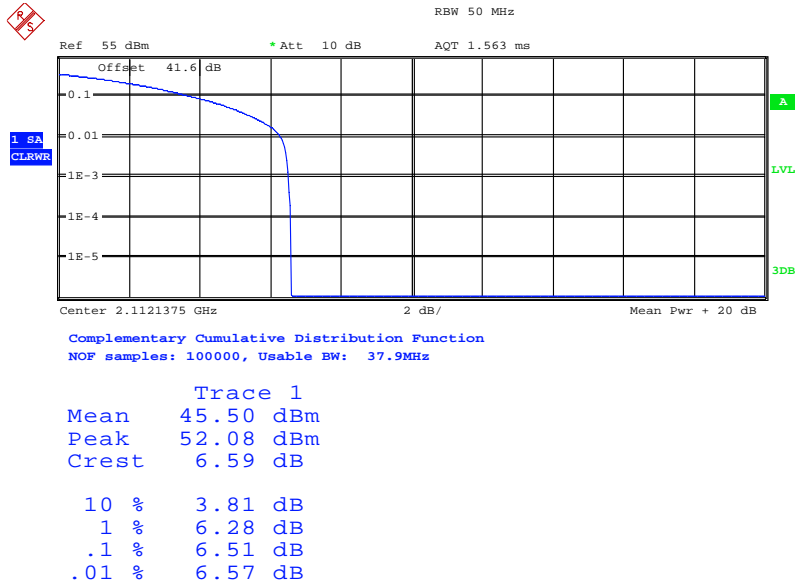
Date: 18.NOV.2013 12:35:58



Product Service

Configuration 1 - Mode 1- L3&C

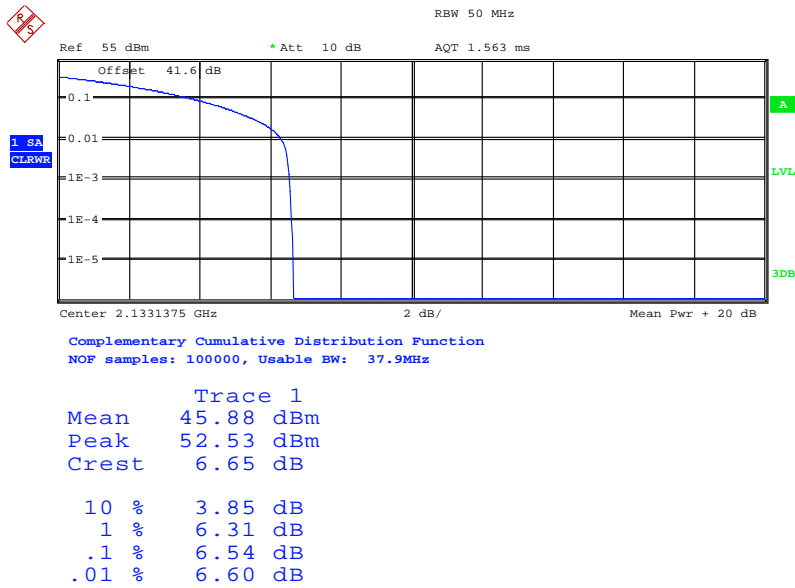
LTE (E-TM1.1) & CDMA (QPSK)



Date: 21.NOV.2013 09:44:21

Configuration 1 - Mode 2 - L3&C

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



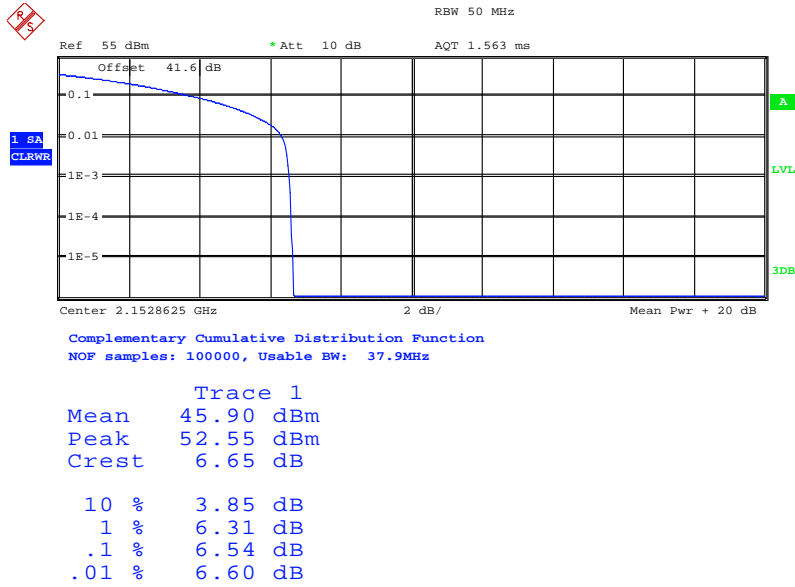
Date: 21.NOV.2013 10:52:31



Product Service

Configuration 1 - Mode 3 - C&L3

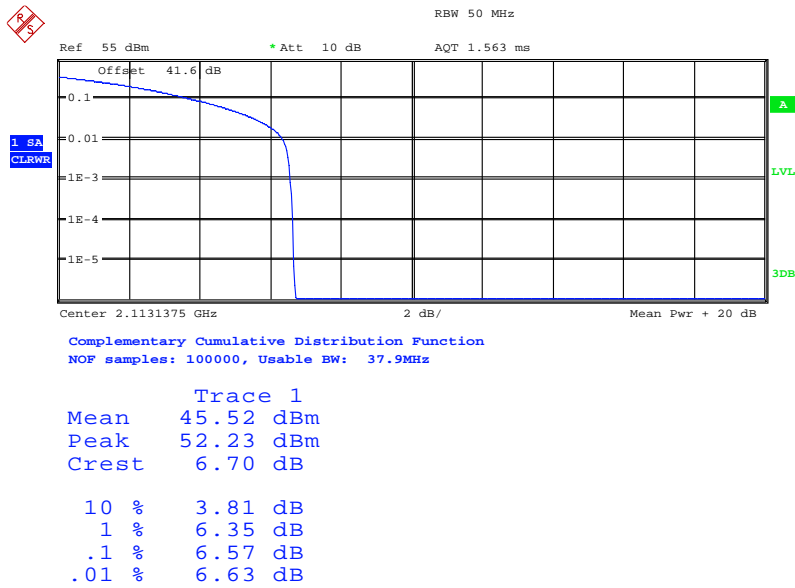
LTE (E-TM1.1) & CDMA (QPSK)



Date: 21.NOV.2013 11:04:44

Configuration 1 - Mode 1 - L5&C

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

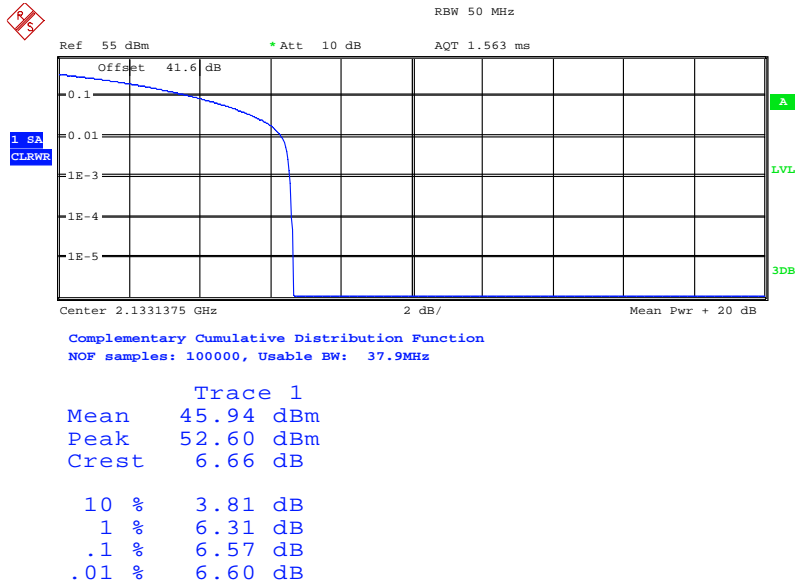


Date: 21.NOV.2013 11:51:08



Configuration 1 - Mode 2 - L5&C

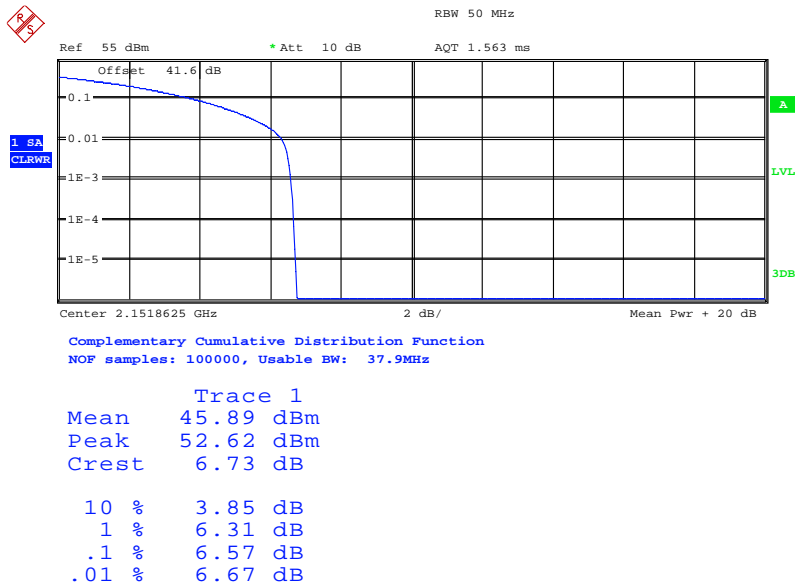
LTE (E-TM1.1) & CDMA (QPSK)



Date: 21.NOV.2013 12:32:39

Configuration 1 - Mode 3 - C&L5

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

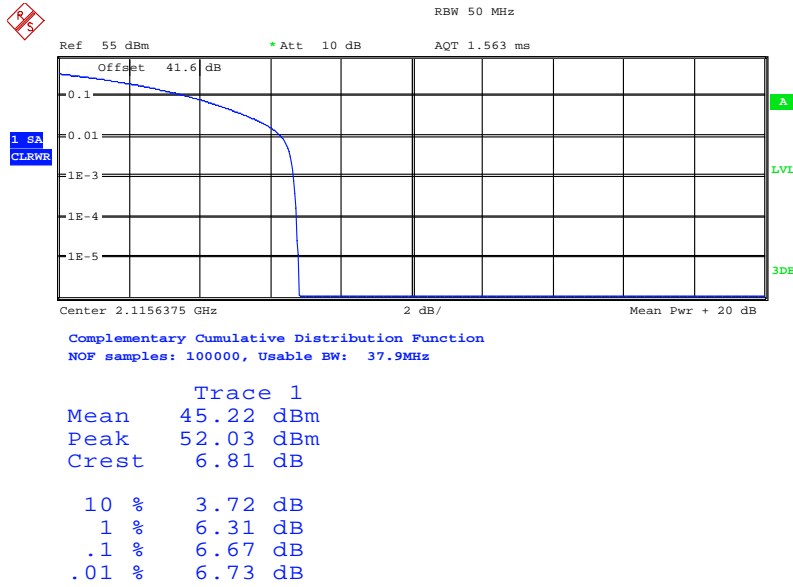


Date: 21.NOV.2013 12:58:53



Configuration 1 - Mode 1 - L10&C

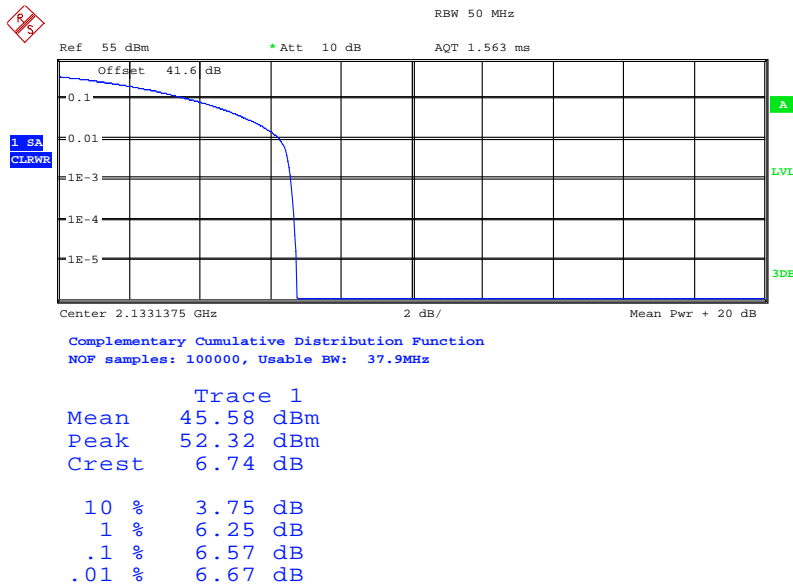
LTE (E-TM1.1) & CDMA (QPSK)



Date: 14.NOV.2013 11:23:11

Configuration 1 - Mode 2 - L10&C

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



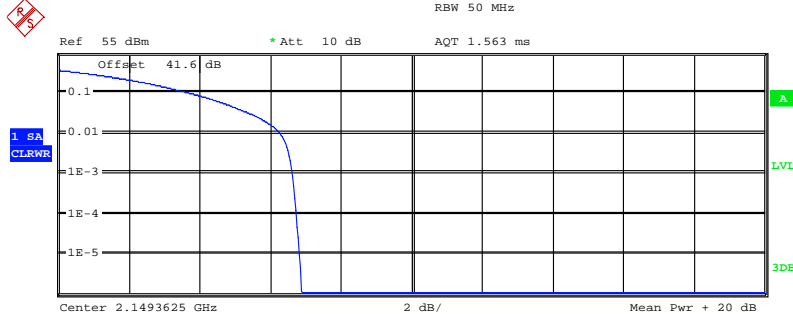
Date: 14.NOV.2013 12:47:28



Product Service

Configuration 1 - Mode 3 - C&L10

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



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 37.9MHz

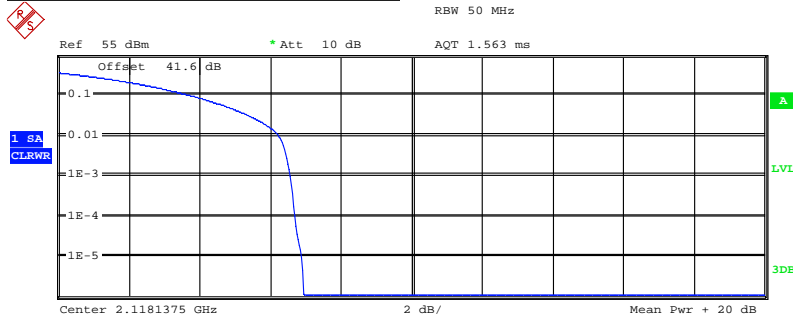
Trace 1

Mean	45.52 dBm
Peak	52.40 dBm
Crest	6.88 dB
10 %	3.75 dB
1 %	6.25 dB
.1 %	6.63 dB
.01 %	6.73 dB

Date: 14.NOV.2013 12:20:52

Configuration 1 - Mode 1 - L15&C

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



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 37.9MHz

Trace 1

Mean	45.38 dBm
Peak	52.32 dBm
Crest	6.94 dB
10 %	3.75 dB
1 %	6.22 dB
.1 %	6.57 dB
.01 %	6.70 dB

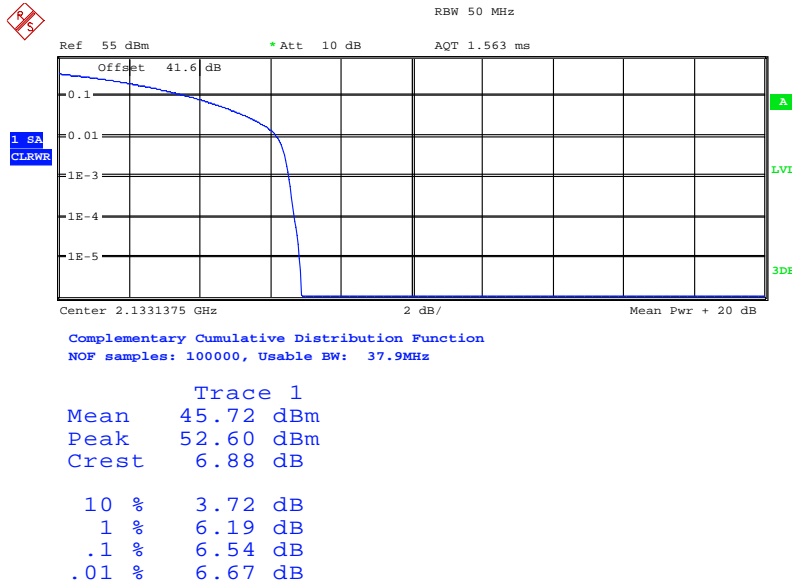
Date: 14.NOV.2013 14:36:34



Product Service

Configuration 1 - Mode 2 - L15&C

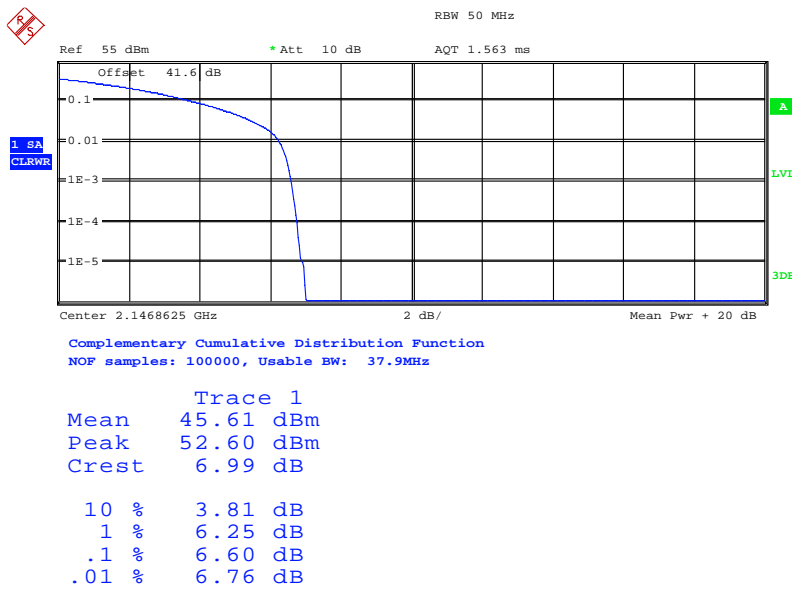
LTE (E-TM1.1) & CDMA (QPSK)



Date: 14.NOV.2013 14:12:17

Configuration 1 - Mode 3 - C&L15

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



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

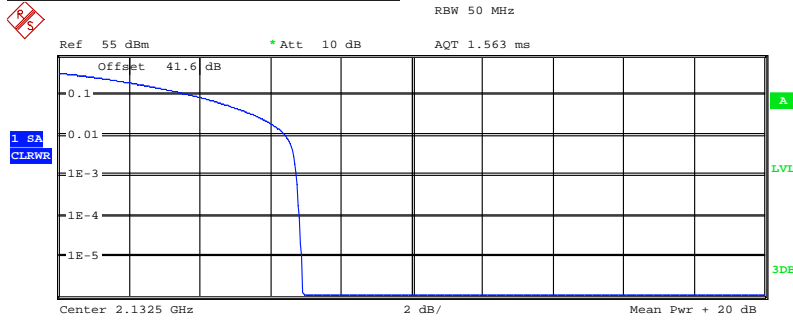


Product Service

Mix Carrier (x3)

Configuration 1 - Mode 4 - C&L1.4&C

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



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 37.9MHz

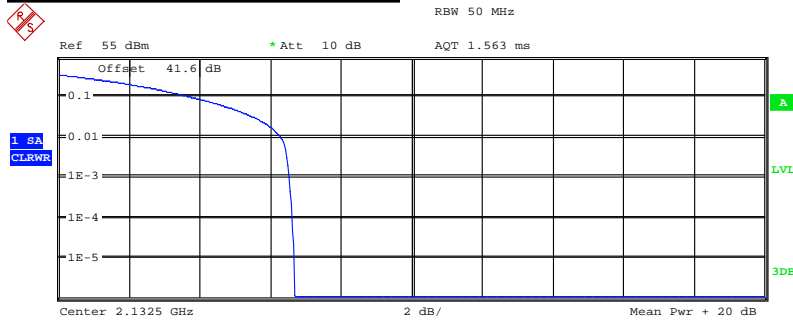
Trace 1

Mean	44.27 dBm
Peak	51.19 dBm
Crest	6.92 dB
10 %	3.81 dB
1 %	6.41 dB
.1 %	6.73 dB
.01 %	6.83 dB

Date: 18.NOV.2013 13:04:51

Configuration 1 - Mode 4 - C&L3&C

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



Complementary Cumulative Distribution Function
NOF samples: 100000, Usable BW: 37.9MHz

Trace 1

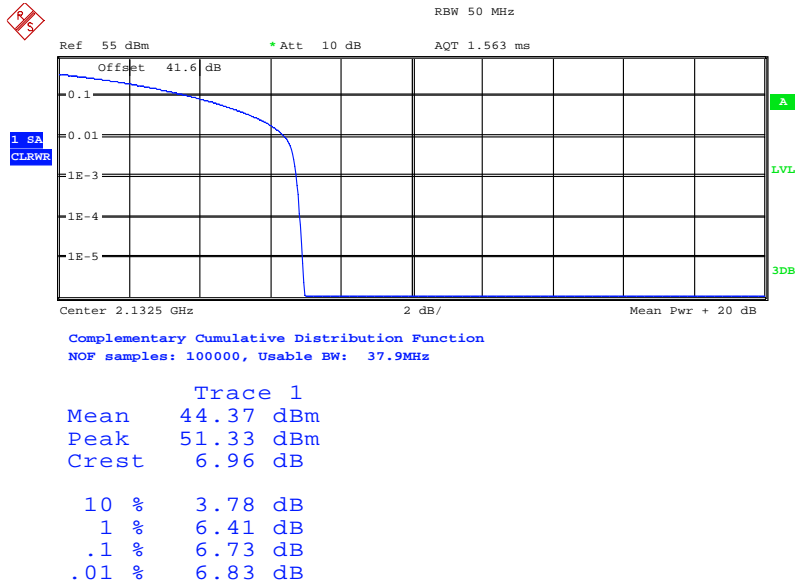
Mean	45.91 dBm
Peak	52.60 dBm
Crest	6.69 dB
10 %	3.81 dB
1 %	6.28 dB
.1 %	6.54 dB
.01 %	6.63 dB

Date: 18.NOV.2013 15:53:15



Configuration 1 - Mode 4 - C&L5&C

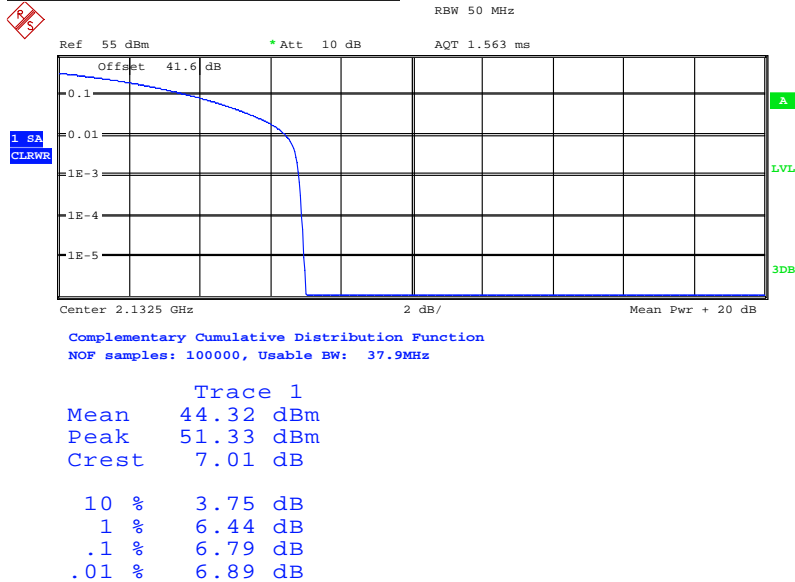
LTE (E-TM1.1) & CDMA (QPSK)



Date: 21.NOV.2013 13:38:27

Configuration 1 - Mode 4 - C&L10&C

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



Date: 14.NOV.2013 13:50:58

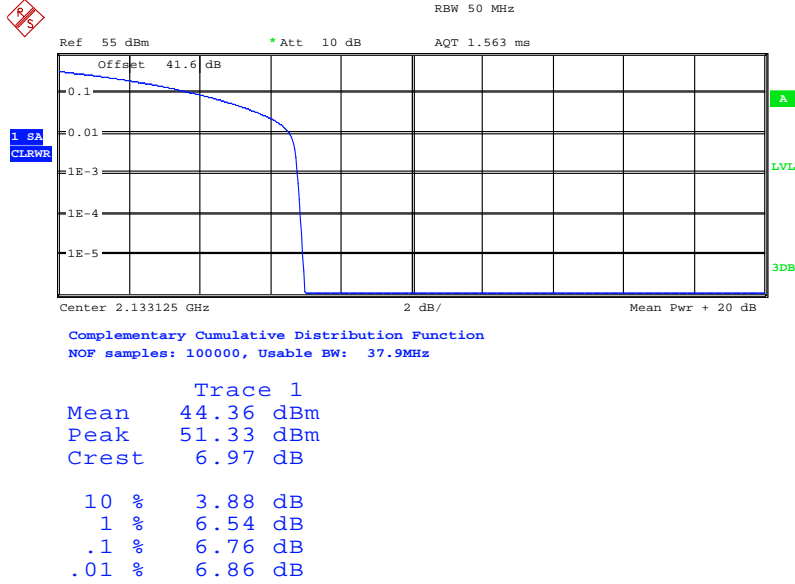


Product Service

Mix Carrier (x4)

Configuration 1 - Mode 5 - C&L1.4&C&C

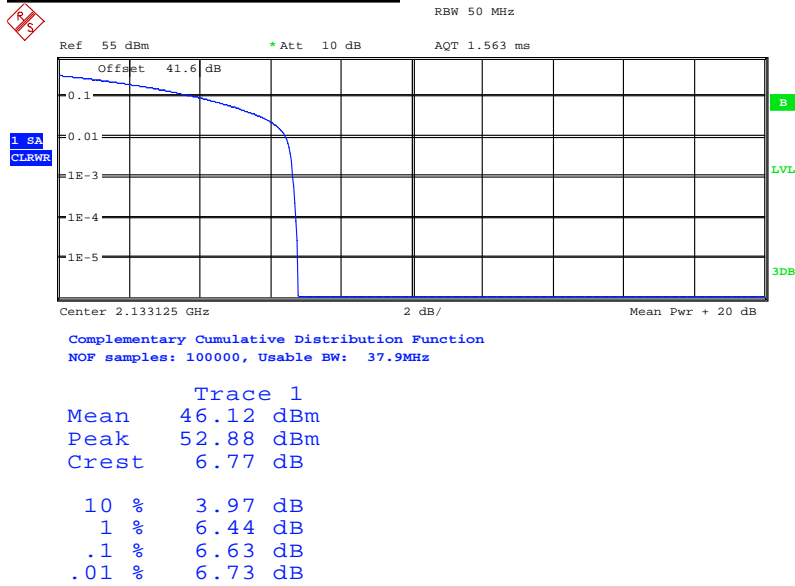
LTE (E-TM1.1) & CDMA (QPSK)



Date: 18.NOV.2013 14:35:54

Configuration 1 - Mode 5 - C&L3&C&C

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



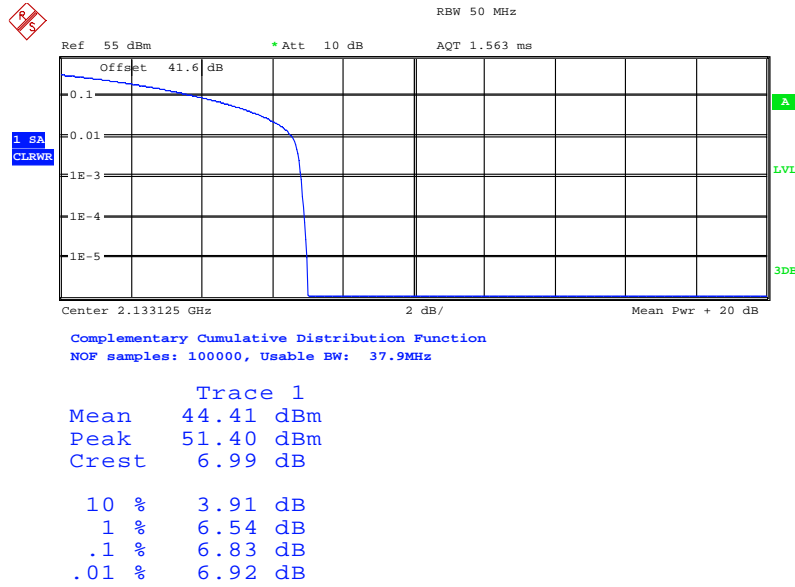
Date: 21.NOV.2013 12:47:36



Product Service

Configuration 1 - Mode 5 - C&L5&C&C

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



Date: 21.NOV.2013 14:12:08

Limit	13dB
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Remarks

The Peak – Average ratio does not exceed 13dB at the measured frequencies.



2.3 SPURIOUS EMISSIONS AT ANTENNA TERMINALS (± 1 MHz)

2.3.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
 FCC CFR 47 Part 27, Clause 27.53 (h)
 Industry Canada RSS-139, Clause 6.5

2.3.2 Equipment Under Test

RRUS 11 B4 / KRC 161 254/2, S/N: CF81442849

2.3.3 Date of Test and Modification State

14, 18 and 21 November 2013 – Modification State 0

2.3.4 Test Equipment Used

The major items of test equipment used for the below 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 27 and Industry Canada RSS-139.

In accordance with FCC Part 27.53(h), at least 1% of the emission bandwidth shall be used as resolution bandwidth for the frequencies offset up to 1MHz away from the block edge and a RBW of 1MHz for measurements of emissions > 1MHz away from the band edges. The power of any emission outside the frequency band shall be attenuated below the transmitter power (P) by at least $43 + 10\log P$ dB. After calculation, the limit is -13dBm. A resolution bandwidth of 100kHz was used for the tests of emissions > 1MHz away from the band edges, so the limit was adjusted with -13dBm to -23dBm to compensated for the reduce measurement bandwidth. As the EUT can operate in LTE TX-MIMO mode, according to FCC KDB662911 D01 Multiple Transmitter Output v02r01, the limit should be adjusted with a correction of -3dB [10Log(2)].

For CDMA/LTE mix carrier(x2),with LTE signal at the edge, which is selected as the worst case The LTE emission bandwidth of the EUT support are 1.4MHz, 3MHz, 5MHz, 10MHz and 15MHz, the CDMA emission bandwidth is 1.25MHz. Then, 20kHz RBW was used for frequencies offset up to 1MHz away from the band edges when the mix carrier of LTE bandwidth is 1.4MHz, 30kHz RBW for the mix carriers of LTE bandwidth with 3MHz, 50kHz RBW for the mix carriers of LTE bandwidth with 5MHz, 100kHz RBW for the Mix carriers of LTE bandwidth with 10MHz and 200kHz RBW for the Mix carriers of LTE bandwidth with 15MHz. Due to LTE transmit in TX-MIMO in Mix carrier mode and the EUT has Two transmit ports, the limit was adjusted to -16dBm. A resolution bandwidth of 100kHz was used between 1MHz to 5MHz away from the band edge and -26dBm was used as the limit line. Spectrum analyser detector was set as RMS.

The EUT was tested at it's maximum power level. The path loss 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 - L1.4&C, L3&C, L5&C, L10&C, L15&C
 - Mode 3 - C&L1.4, C&L3, C&L5, C&L10, C&L15

2.3.6 Environmental Conditions

	14 November 2013	18 November 2013	21 November 2013
Ambient Temperature	23.0°C	23.8°C	23.5°C
Relative Humidity	39.0%	38.0%	41.0%

2.3.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 27 and Industry Canada RSS-139 for Spurious Emissions Antenna Terminals (± 1 MHz).

Below are the Frequencies the EUT was tested against along with the tested channels.

Mix Carrier (x2)

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

Configuration 1 - Mode 1 - L1.4&C, Mode 3 - C&L1.4

Band Edge Frequency	Edge Test with LTE at the Bottom and Top Channel	RBW / VBW (Hz)
Bottom 2110MHz	Channel No. 1957 & 41 Frequencies 2110.7MHz(L1.4)+2112.05MHz(C)	20k / 200k
Top 2155MHz	Channel No. 859 & 2393 Frequencies 2152.95MHz(C)+2154.3MHz(L1.4)	

Configuration 1 - Mode 1 - L3&C, Mode 3 - C&L3

Band Edge Frequency	Edge Test with LTE at the Bottom and Top Channel	RBW / VBW (Hz)
Bottom 2110MHz	Channel No. 1965 & 73 Frequencies 2111.5MHz(L3)+2113.65MHz(C)	30k / 300k
Top 2155MHz	Channel No. 827 & 2385 Frequencies 2151.35MHz(C)+2153.5MHz(L3)	

Configuration 1 - Mode 1 - L5&C, Mode 3 - C&L5

Band Edge Frequency	Edge Test with LTE at the Bottom and Top Channel	RBW / VBW (Hz)
Bottom 2110MHz	Channel No. 1975 & 113 Frequencies 2112.5MHz(L5)+2115.65MHz(C)	50k / 500k
Top 2155MHz	Channel No. 787 & 2375 Frequencies 2149.35MHz(C)+2152.5MHz(L5)	

Configuration 1 - Mode 1 - L10&C, Mode 3 - C&L10

Band Edge Frequency	Edge Test with LTE at the Bottom and Top Channel	RBW / VBW (Hz)
Bottom 2110MHz	Channel No. 2000 & 213 Frequencies 2150.0MHz(L10)+2120.65MHz(C)	100k / 1000k
Top 2155MHz	Channel No. 687 & 2350 Frequencies 2144.35MHz(C)+2150.0MHz(L10)	



Product Service

Configuration 1 - Mode 1 – L15&C, Mode 3 - C&L15

Band Edge Frequency	Edge Test with LTE at the Bottom and Top Channel	RBW / VBW (Hz)
Bottom 2110MHz	Channel No. 2025 & 313 Frequencies 2117.5MHz(L15)+2125.65MHz(C)	200k /2000k
Top 2155MHz	Channel No. 587 & 2325 Frequencies 2139.35MHz(C)+2147.5MHz(L15)	

The channels shown in the table above are the minimum and maximum channels that can be used in the authorised frequency ranges to maintain compliance. Channels used outside of those stated and power levels used beyond those stated in the table exceed the specification limits, thus they cannot be used.

The channels outside of those shown in the table above were not tested at lower power levels to determine a level at which compliance would be achieved. Therefore, to maintain compliance, only the channels shown in the table above shall be used.

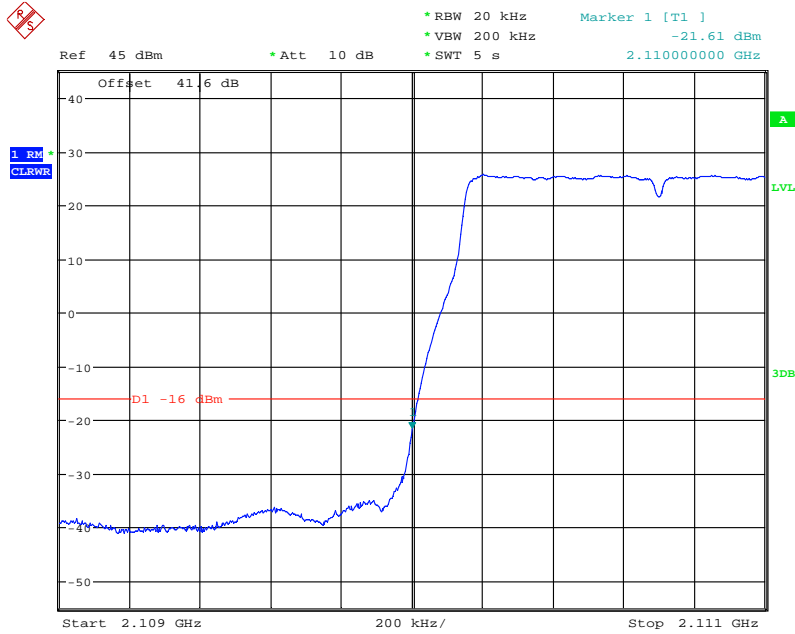


The test results are shown below

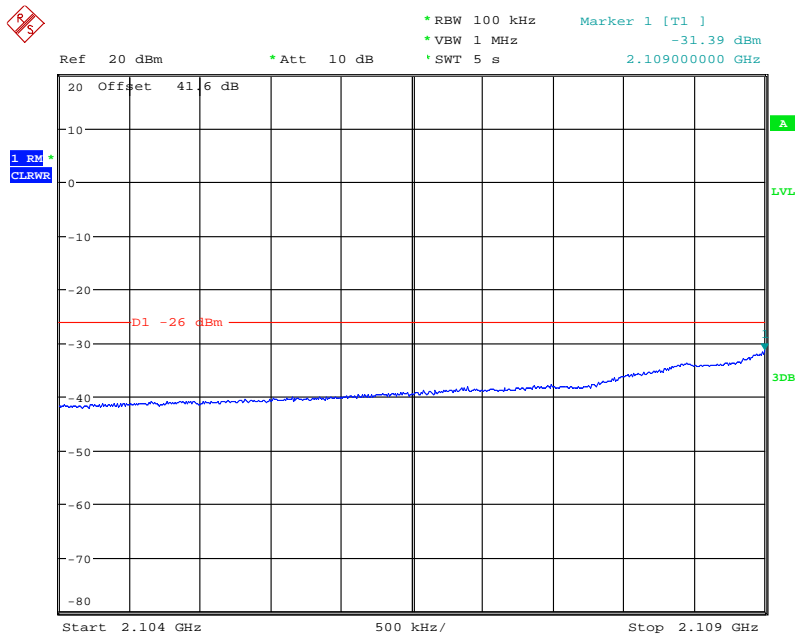
Mix Carrier (x2)

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

Configuration 1 - Mode 1 - L1.4&C



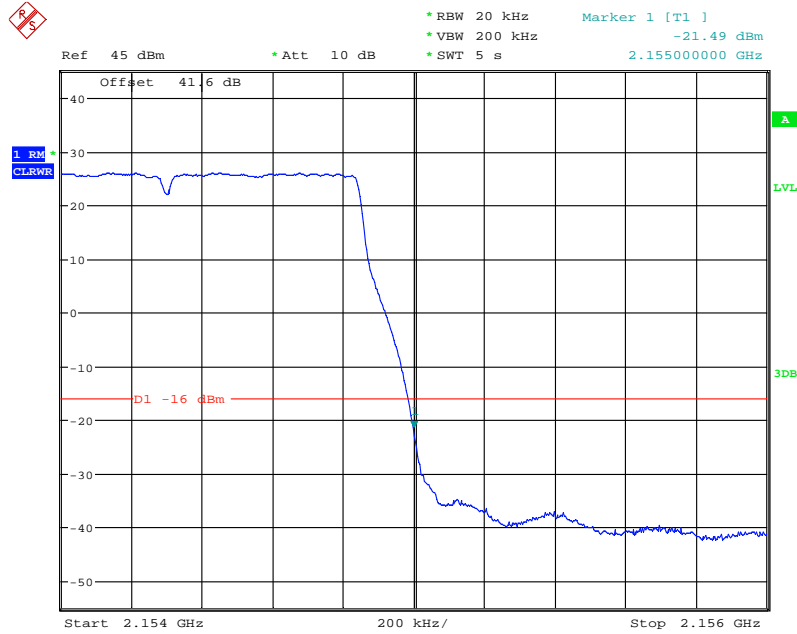
Date: 18.NOV.2013 11:57:34



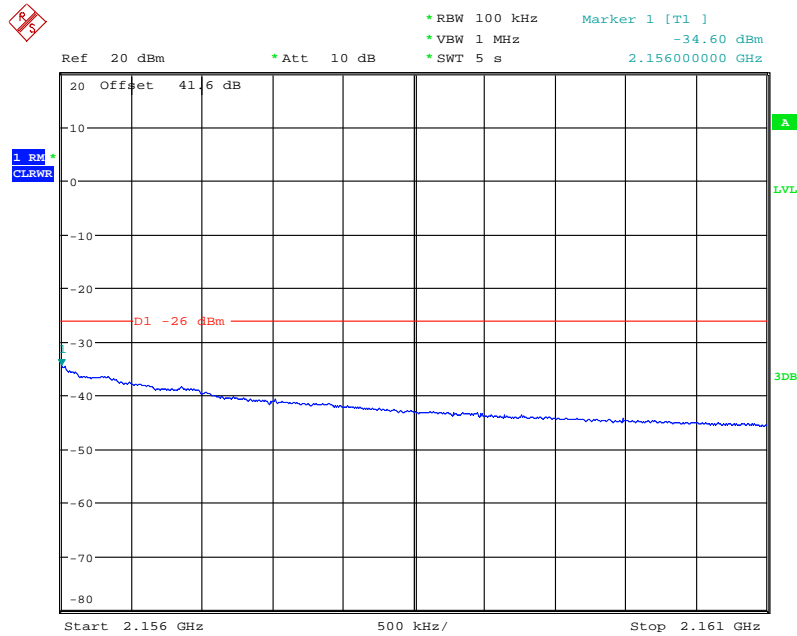
Date: 18.NOV.2013 11:59:34



Configuration 1 - Mode 3 - C&L1.4



Date: 18.NOV.2013 12:21:54

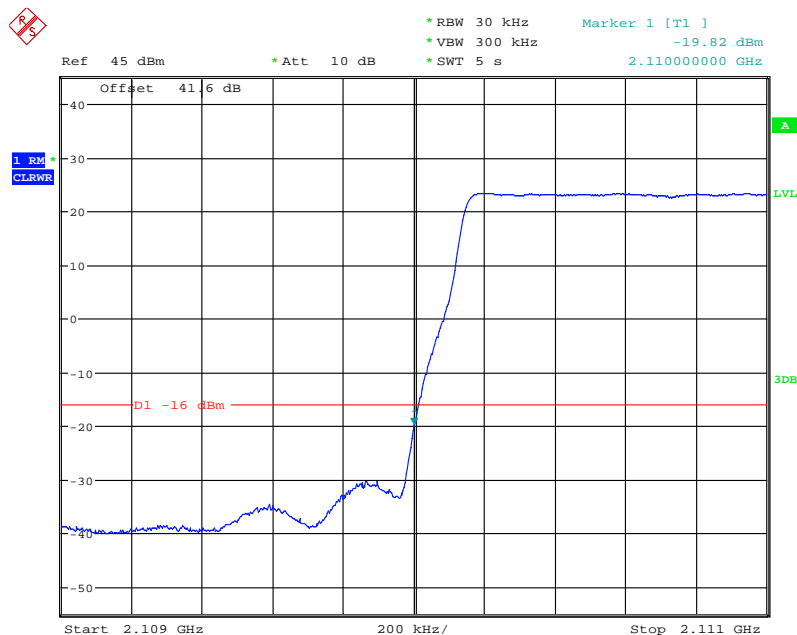


Date: 18.NOV.2013 12:20:39

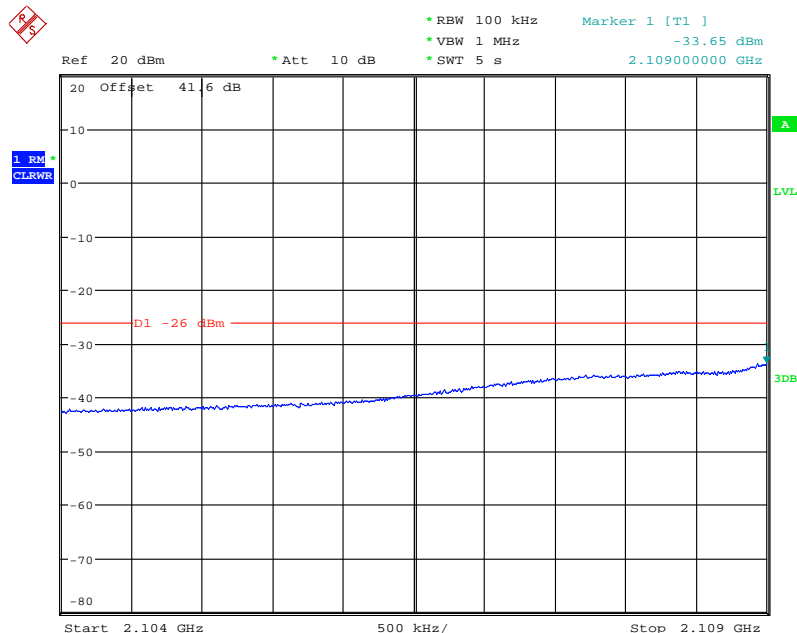


Product Service

Configuration 1 - Mode 1 - L3&C



Date: 21.NOV.2013 09:47:17

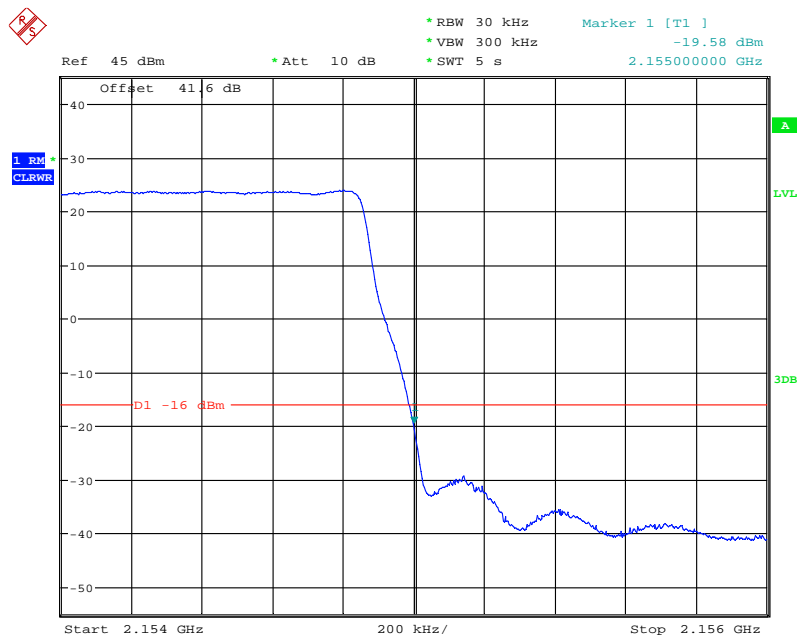


Date: 21.NOV.2013 09:45:40

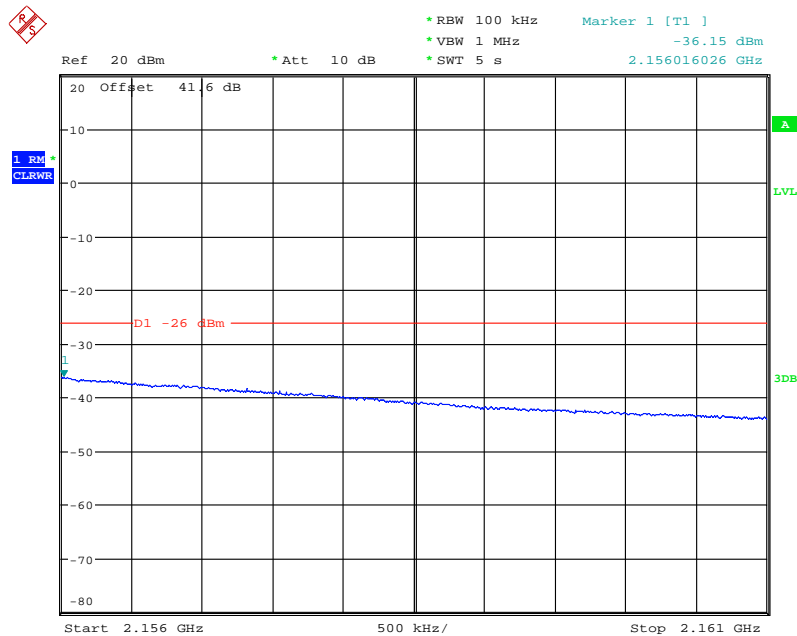


Product Service

Configuration 1 - Mode 3 - C&L3



Date: 21.NOV.2013 11:05:41

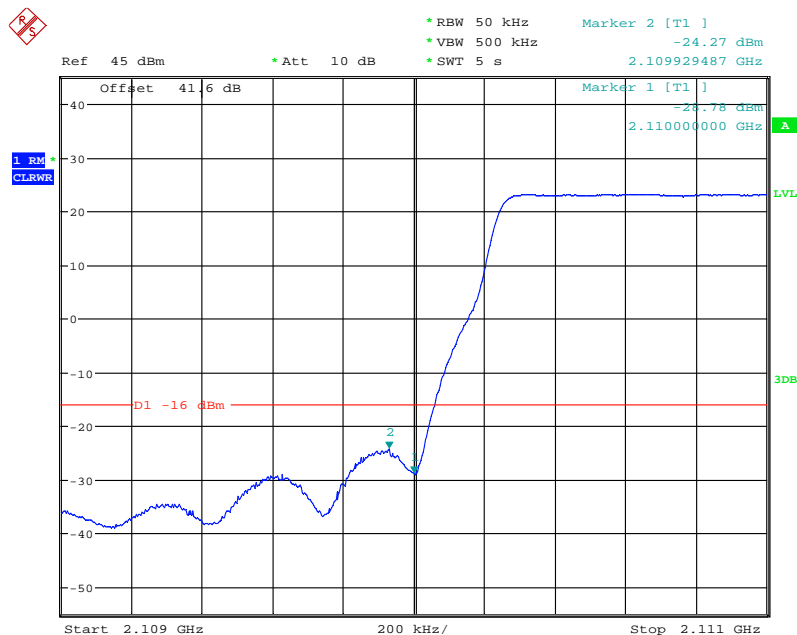


Date: 21.NOV.2013 11:07:47

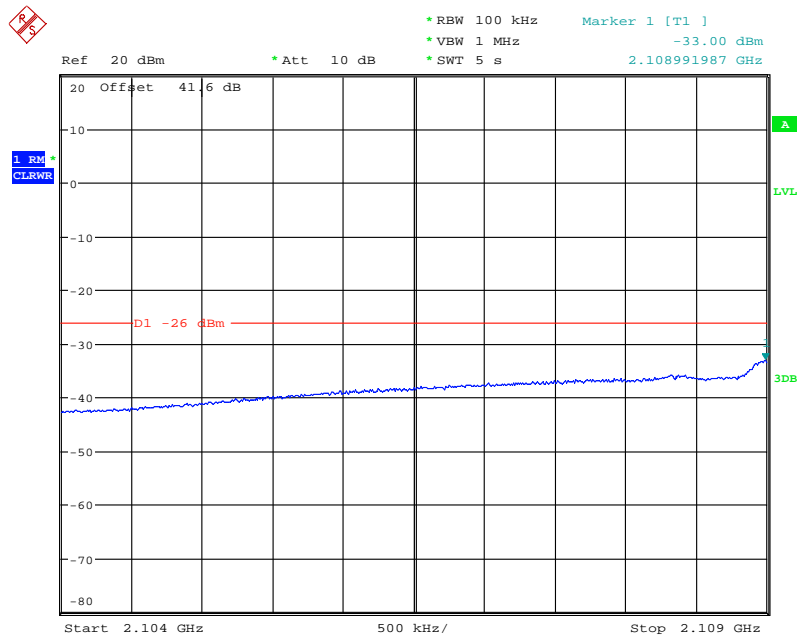


Product Service

Configuration 1 - Mode 1 - L5&C



Date: 21.NOV.2013 11:52:41

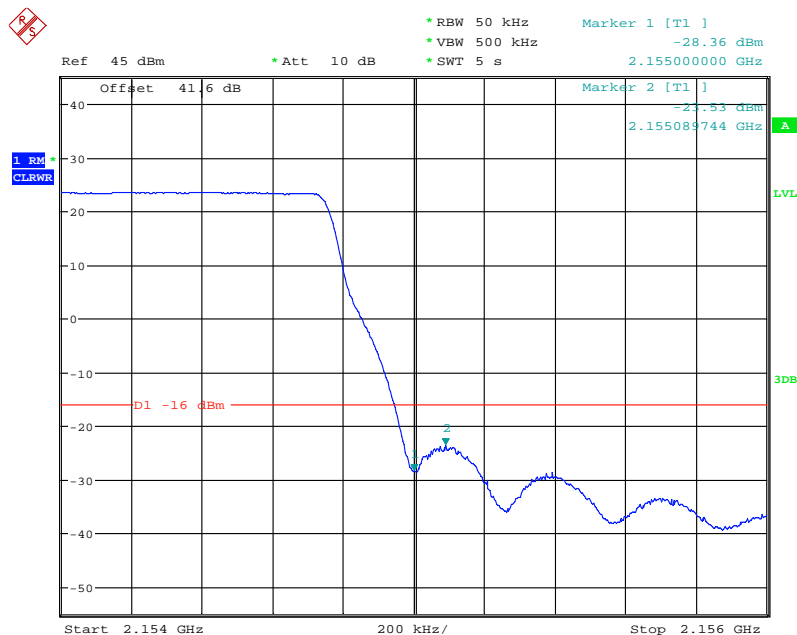


Date: 21.NOV.2013 11:55:31

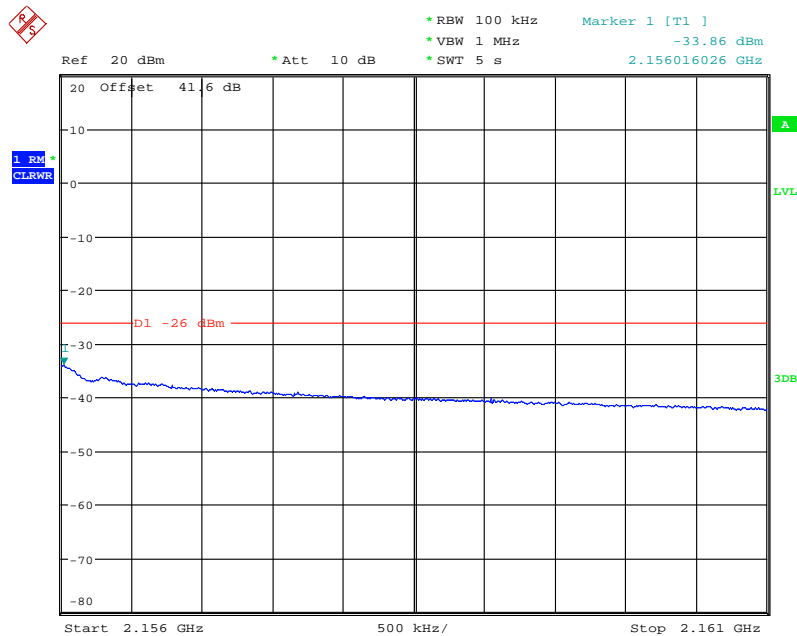


Product Service

Configuration 1 - Mode 3 - C&L5



Date: 21.NOV.2013 13:05:02

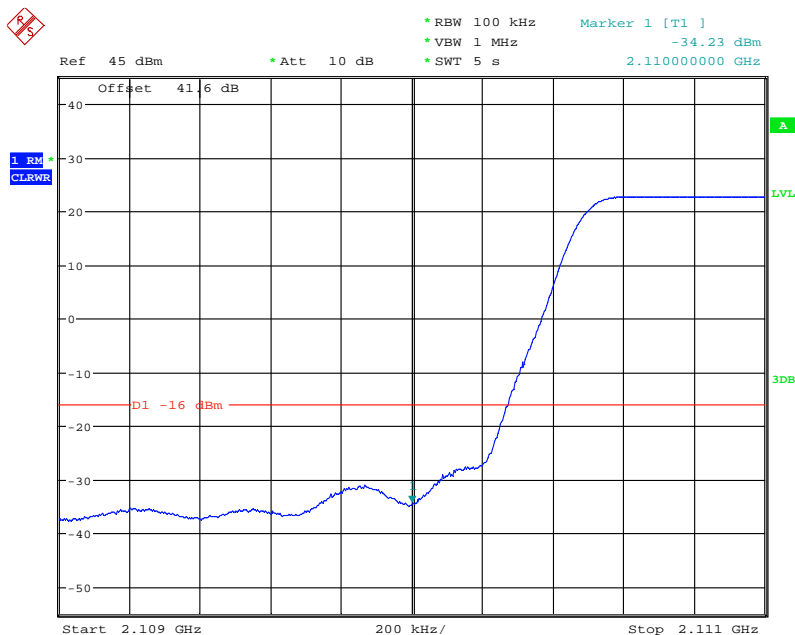


Date: 21.NOV.2013 13:00:10

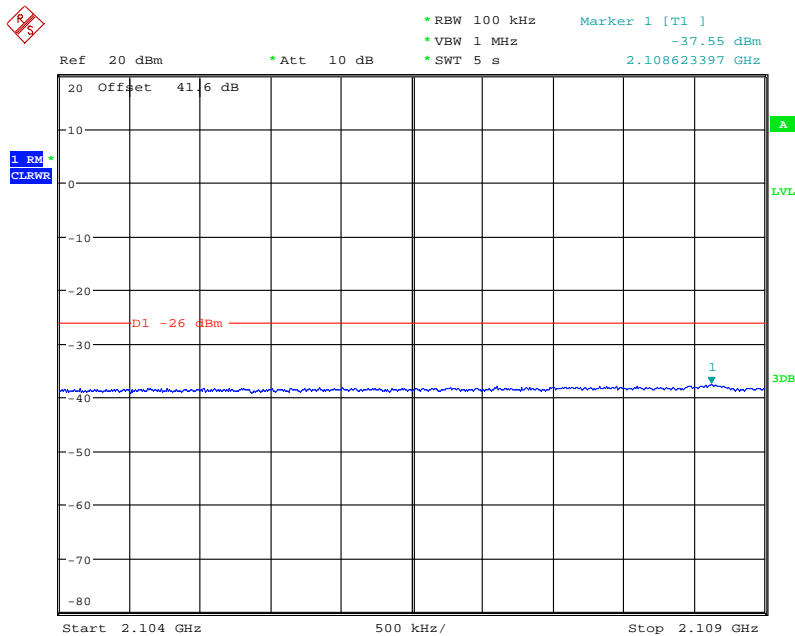


Product Service

Configuration 1 - Mode 1 - L10&C



Date: 14.NOV.2013 11:25:07

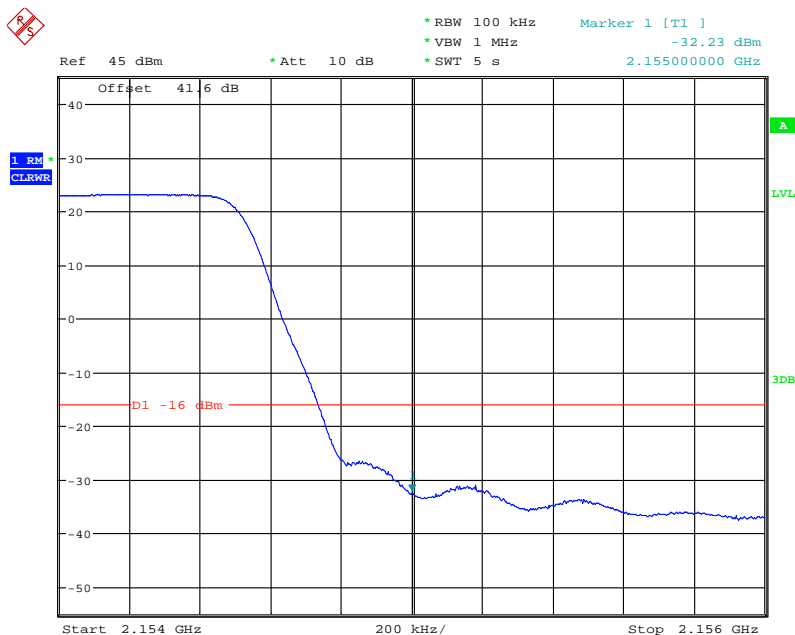


Date: 14.NOV.2013 11:26:23

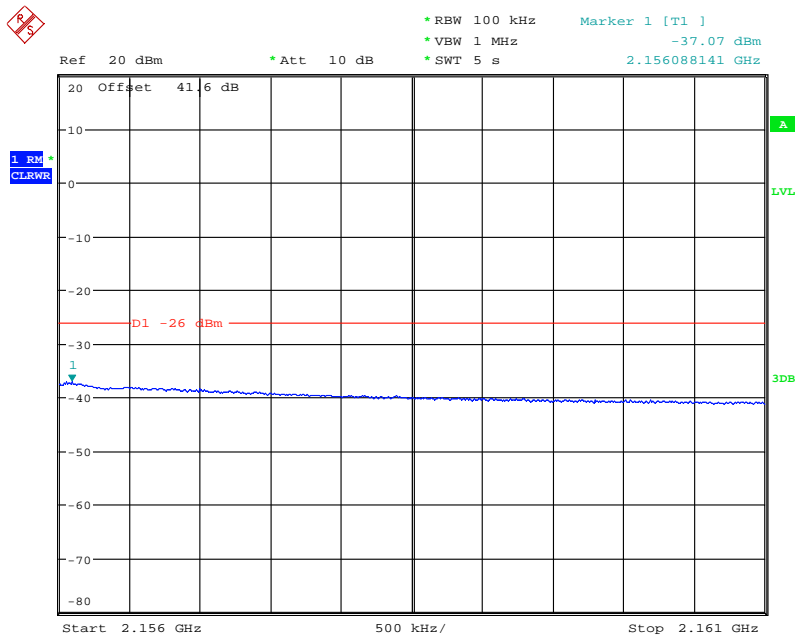


Product Service

Configuration 1 - Mode 3 - C&L10



Date: 14.NOV.2013 12:21:29

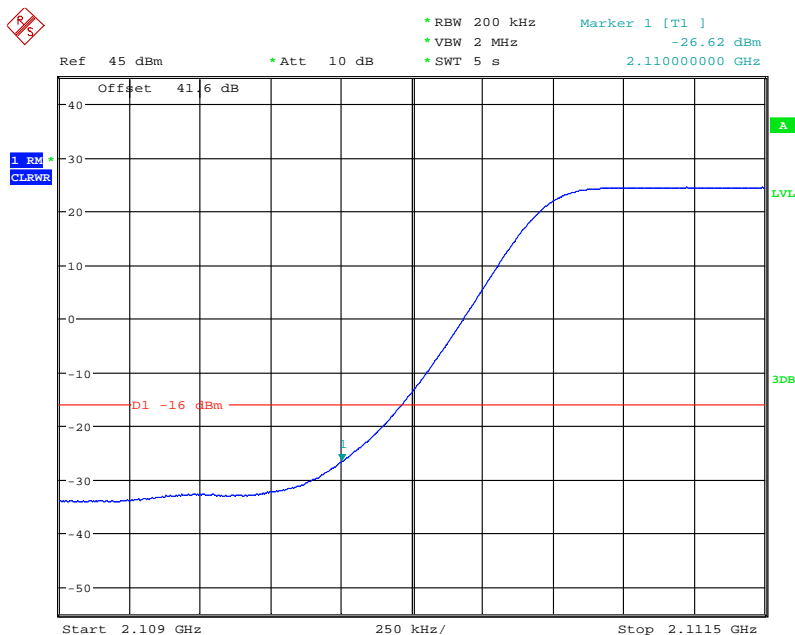


Date: 14.NOV.2013 12:22:09

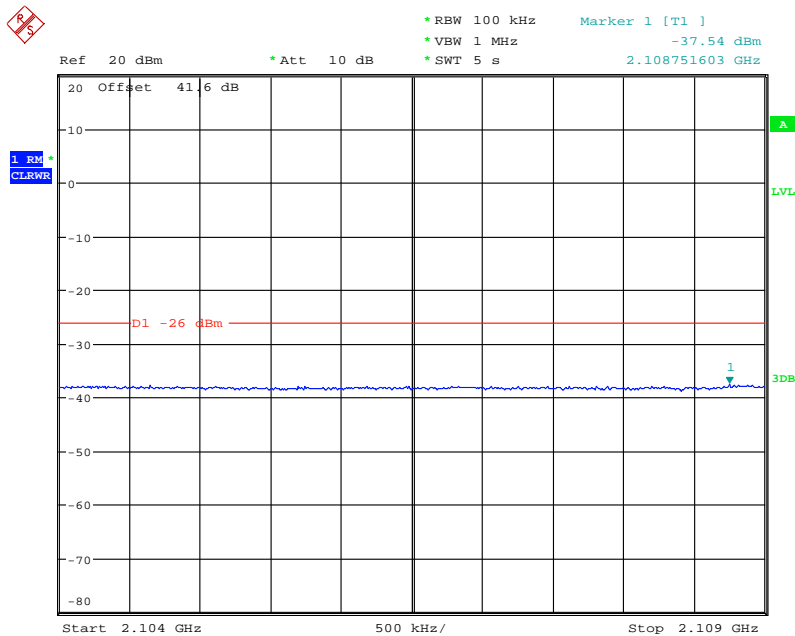


Product Service

Configuration 1 - Mode 1 - L15&C



Date: 14.NOV.2013 14:38:36

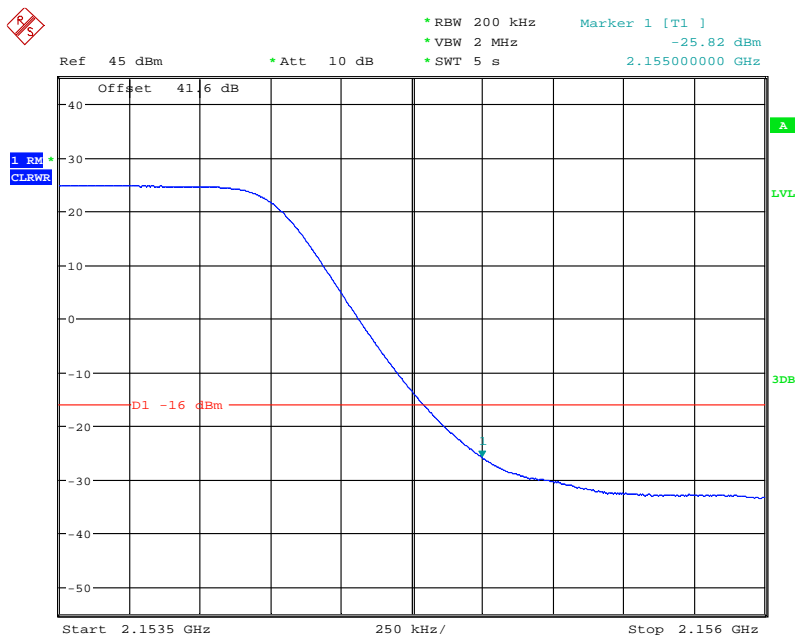


Date: 14.NOV.2013 14:39:12

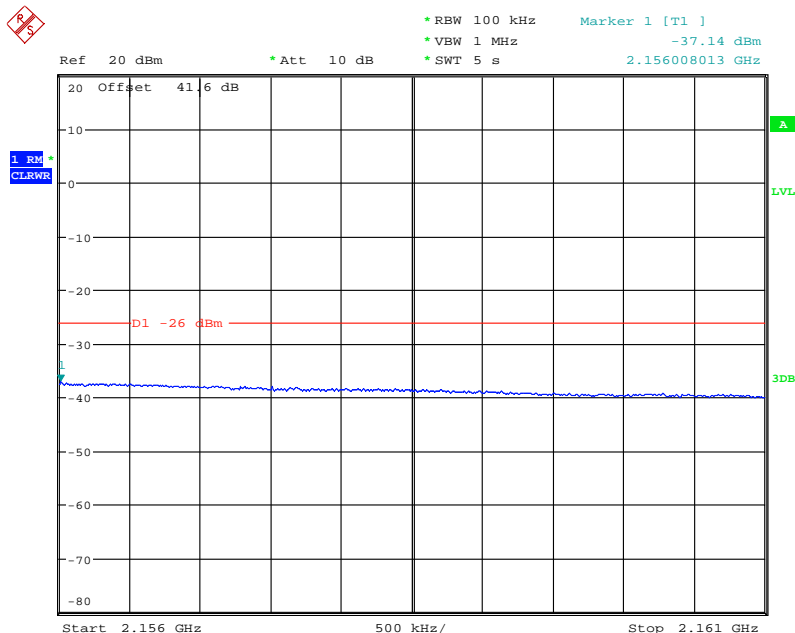


Product Service

Configuration 1 - Mode 3 - C&L15



Date: 18.NOV.2013 15:32:11



Date: 18.NOV.2013 15:33:12

Limit

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



2.4 RADIATED SPURIOUS EMISSIONS

2.4.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1053
FCC CFR 47 Part 27, Clause 27.53 (h)
Industry Canada RSS-139, Clause 6.5

2.4.2 Equipment Under Test

RRUS 11 B4 / KRC 161 254/2, S/N: CF81442849

2.4.3 Date of Test and Modification State

26 and 27 November 2013 – Modification State 0

2.4.4 Test Equipment Used

The major items of test equipment used for the below 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 27 and Industry Canada RSS-139.

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 - $(43 + 10\text{Log}(P))$ 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 dipole 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 meters.

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

$$E_{(v/m)} = (30 \times 1.64 \times 26.67)^{0.5} / 3 = 12.07V/m = 141.64dB\mu V/m$$

As per 27.53 (h) the spurious emission must be attenuated by $43 + 10\log(P_o)$ dB this gives:

$$43 + 10\log(26.67) = 57.26dB$$

Therefore the limit at 3m measurement distance is:

$$141.64 - 57.26 = 84.4 \text{ dB}\mu V/m$$

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

The test was performed with the EUT operating on all modes in section 1.4.3 and record the result of the following configurations and modes of operation for worst case:

- Configuration 1
- Mode 1 - L1.4&C
 - Mode 2 - L1.4&C, L3&C, L5&C, L10&C, L15&C
 - Mode 3 - C&L1.4
 - Mode 4 - C&L1.4&C
 - Mode 5 - C&L1.4&C&C

2.4.6 Environmental Conditions

	26 November 2013	27 November 2013
Ambient Temperature	23.0°C	23.5°C
Relative Humidity	35.0%	35.0%



Product Service

2.4.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 & Part 27 and Industry Canada RSS-139 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

Mix Carrier (x2)

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

Configuration 1 - Mode 2 - L1.4&C

Note: The emission marked is the operating frequency.

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

Configuration 1 - Mode 2 - L1.4&C

Note: The emission marked is the operating frequency.

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

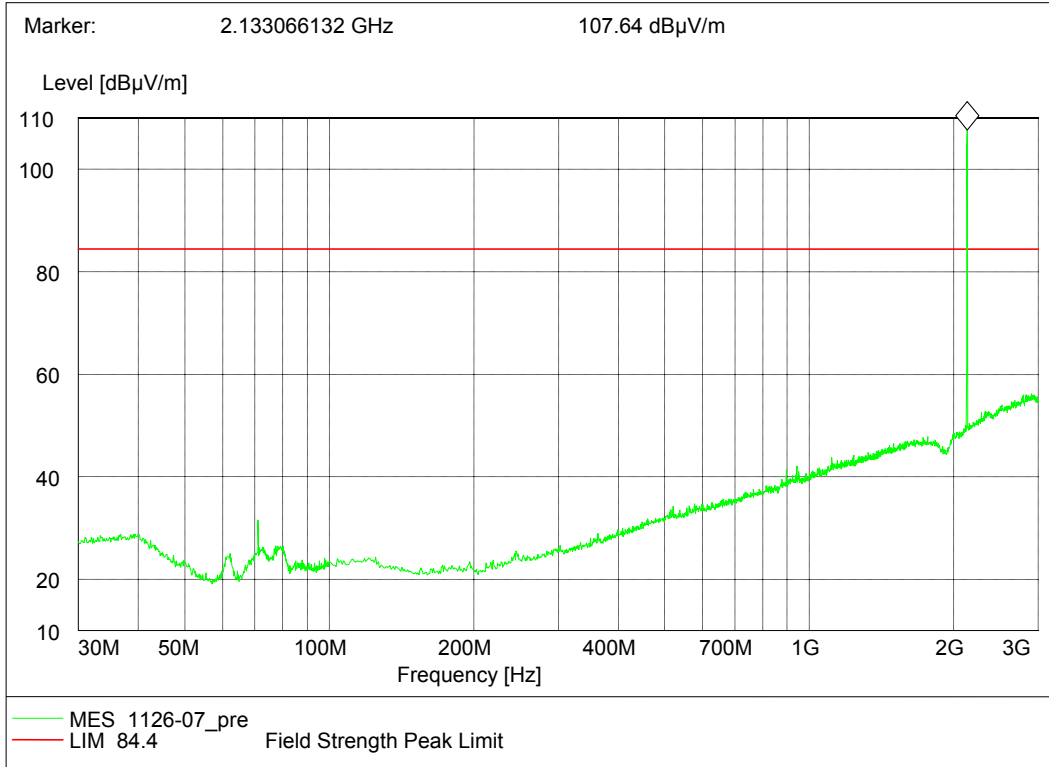
Configuration 1 - Mode 1 - L1.4&C

No emissions were detected within 20dB of the limit.



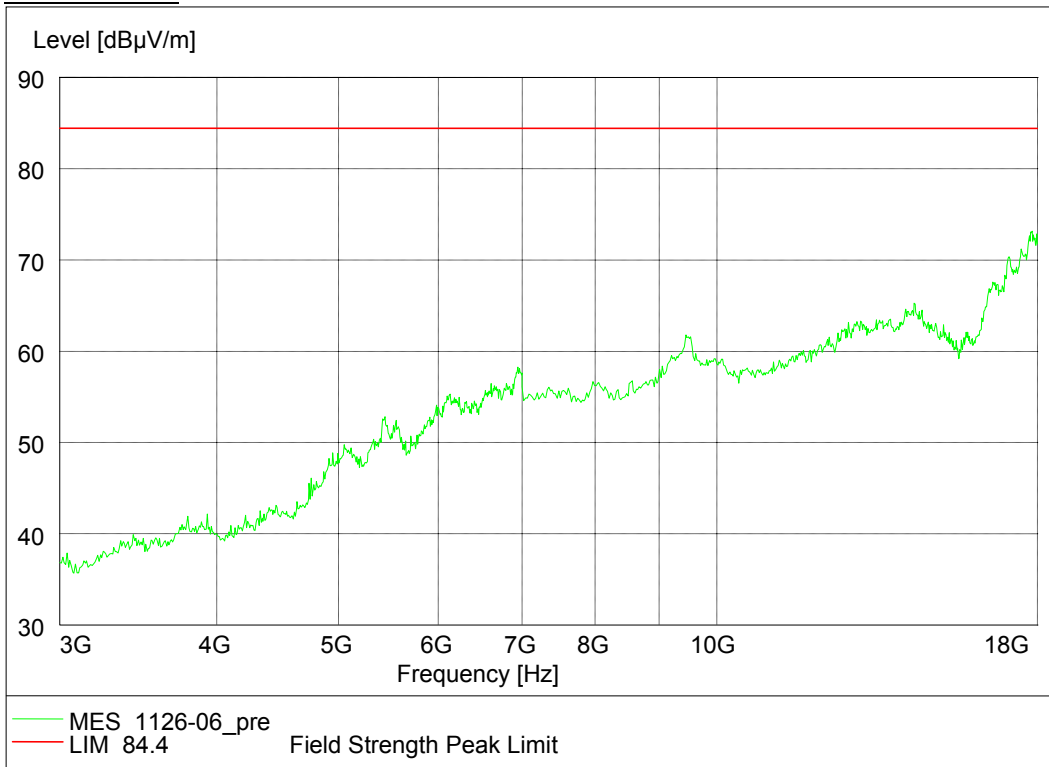
Configuration 1 - Mode 2 - L1.4&C

30MHz - 3GHz



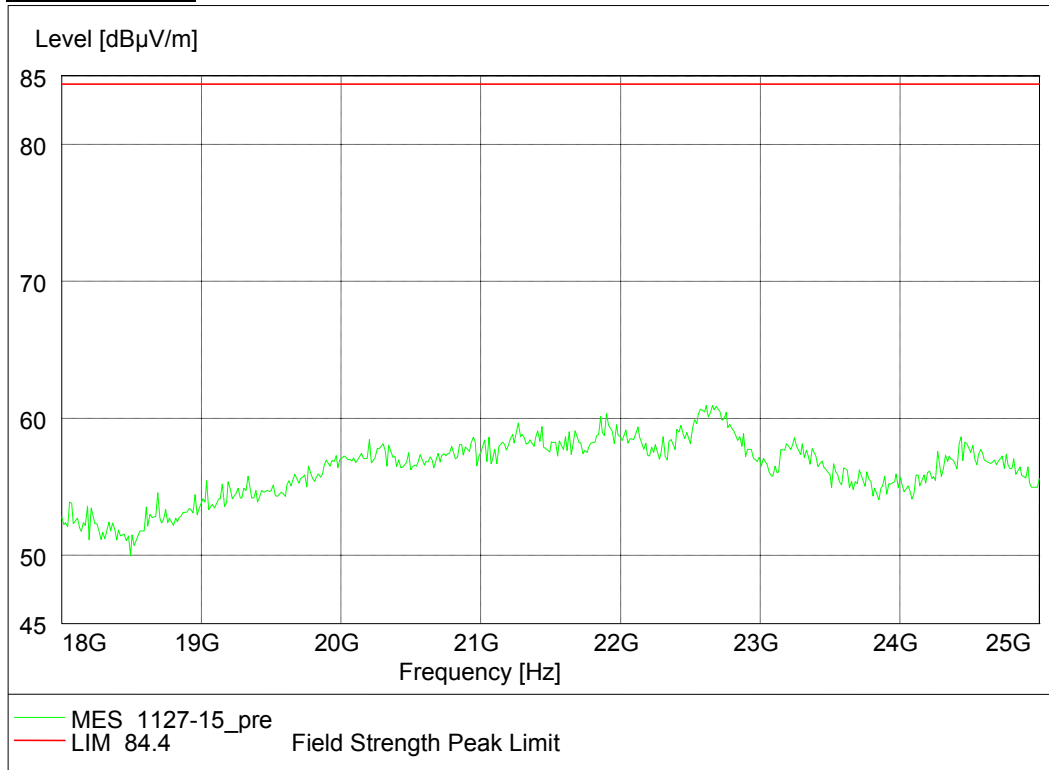
Note: The emission beyond the limit is the operating frequency

3GHz - 18GHz





18GHz - 25GHz



Configuration 1 - Mode 3 - C&L1.4

No emissions were detected within 20dB of the limit

Configuration 1 - Mode 2 - L3&C

Note: The emission marked is the operating frequency.

Configuration 1 - Mode 2 - L5&C

No emissions were detected within 20dB of the limit.

Configuration 1 - Mode 2 - L10&C

No emissions were detected within 20dB of the limit.

Configuration 1 - Mode 2 - L15&C

No emissions were detected within 20dB of the limit.

Mix Carrier (x3)

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

Configuration 1 - Mode 4 - C&L1.4&C

No emissions were detected within 20dB of the limit.



Product Service

MixCarrier (x4)**LTE (E-TM3.1) & CDMA (QPSK)****Configuration 1 - Mode 5 - C&L1.4&C&C**

No emissions were detected within 20dB of the limit.

Limit	-13dBm / 84.4dB μ V/m
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Remarks

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



2.5 CONDUCTED SPURIOUS EMISSIONS

2.5.1 Specification Reference

FCC CFR 47 Part 2, Clause 2.1051
 FCC CFR 47 Part 27, Clause 27.53 (h)
 Industry Canada RSS-139, Clause 6.5

2.5.2 Equipment Under Test

RRUS 11 B4 / KRC 161 254/2, S/N: CF81442849

2.5.3 Date of Test and Modification State

13 February 2014 – Modification State 0

2.5.4 Test Equipment Used

The major items of test equipment used for the below 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 27 and Industry Canada RSS-139.

In accordance with FCC Part 2.1051, the spurious emissions from the antenna terminal were measured. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. After calculation, the limit is -13dBm. As the EUT can operate in LTE TX-MIMO mode, according to FCC KDB662911 D01 Multiple Transmitter Output v02r01, the limit should be adjusted to: $P(\text{dBm}) - (43 + 10\log P(\text{W})) - 10\log(N_{\text{ANT}})$

The transmitter output power was attenuated using an attenuator and the frequency spectrum investigated from 9kHz to 22GHz. The EUT was set to transmit on maximum power. The EUT was tested on Bottom, Middle and Top channels. The resolution was set to 1MHz for 9kHz to 22GHz thus meeting the requirements of Industry Canada RSS-139 Clause 6.5. The spectrum analyser detector was set to peak and trace was kept on Max Hold. As LTE transmit in TX-MIMO and the EUT has Two transmit ports, the limit was adjusted with a correction of -3dB [$10\log(2)$] by using the Measure and Add $10\log(N)$ dB technique according to FCC KDB662911 D01 Multiple Transmitter Output v02r01. The limit was adjusted from -13dBm to -16dBm.

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 10th 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' - L1.4&C
- Mode 2' - L1.4&C, L3&C, L5&C, L10&C, L15&C
- Mode 3' - C&L1.4
- Mode 4' - L1.4&C&C
- Mode 5' - L1.4&C&C&C



Product Service

2.5.6 Environmental Conditions

13 February 2014

Ambient Temperature 22.5°C

Relative Humidity 38.0%

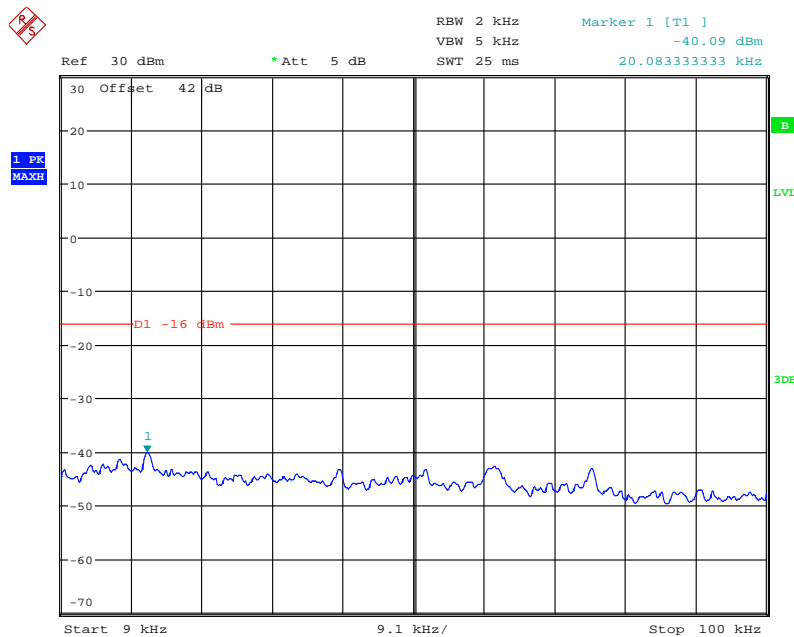
2.5.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 2 and Part 27 and Industry Canada RSS-139 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: 14.NOV.2013 11:29:35



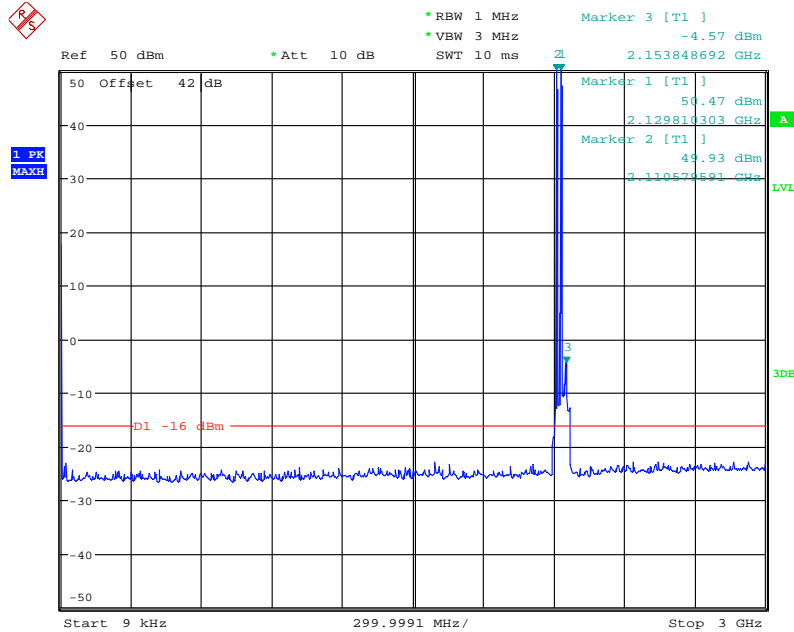
Product Service

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

Mix Carrier (x2)

Configuration 1 - Mode 1' - L1.4&C

9kHz to 3GHz

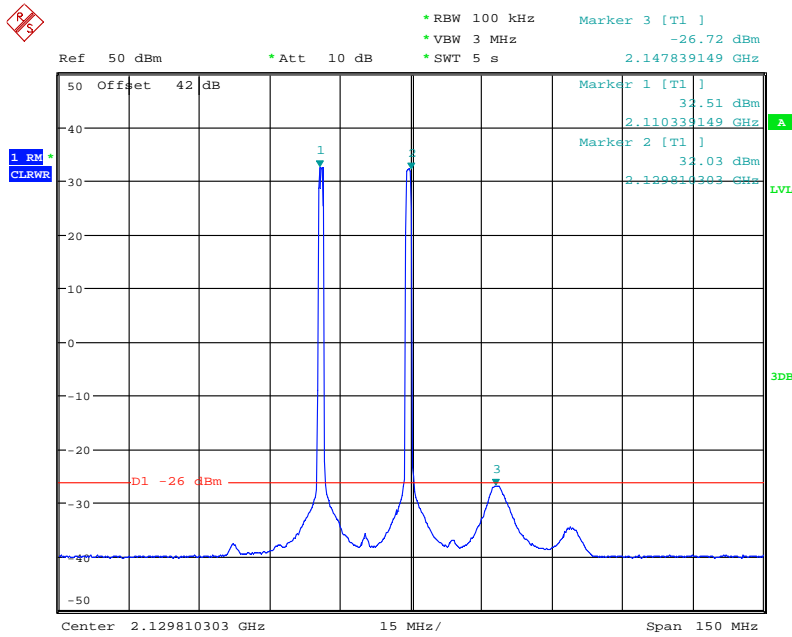


Date: 13.FEB.2014 13:49:17

Note: The emissions above the limit are measured in a smaller bandwidth and using a RMS detector, see the plot on page 63 of 82.



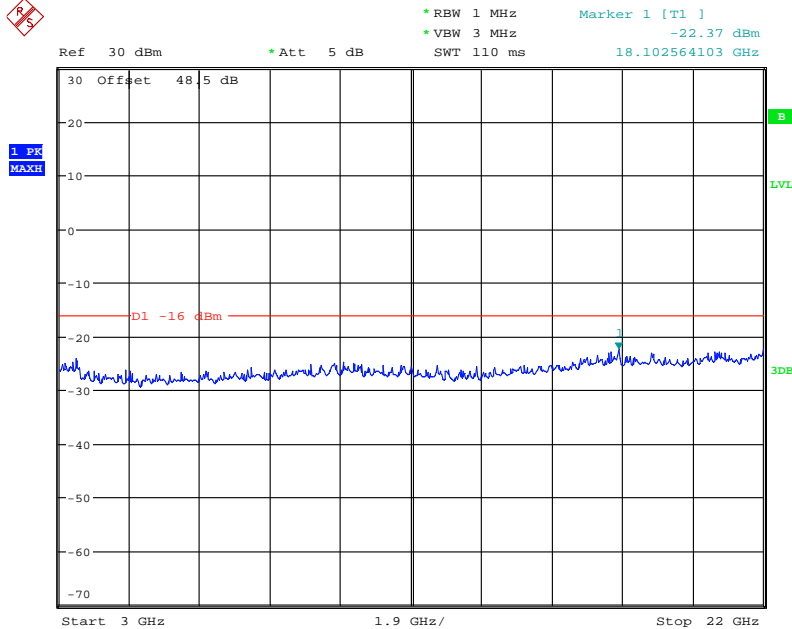
Product Service



Date: 13.FEB.2014 13:53:12

Note: The limit has been reduced by 10dB to account for the reduction in measurement bandwidth.

3GHz to 22GHz

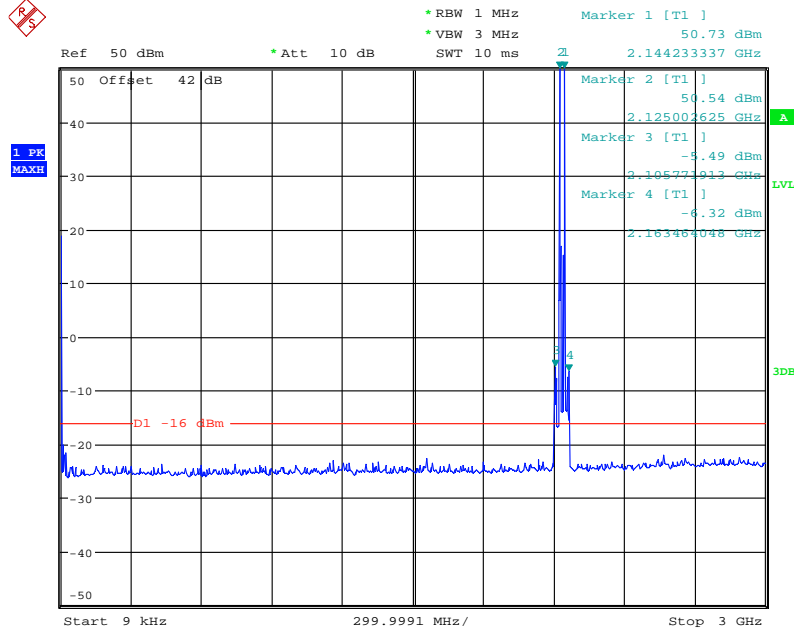


Date: 13.FEB.2014 13:54:13



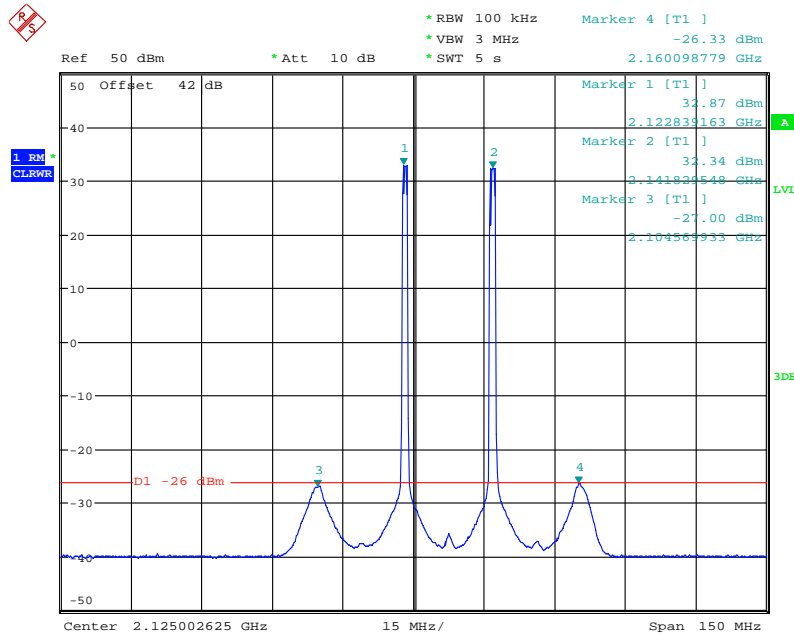
Configuration 1 - Mode 2' - L1.4&C

9kHz to 3GHz



Date: 13.FEB.2014 15:05:28

Note: The emissions above the limit are measured in a smaller bandwidth and using a RMS detector, see the plot below.



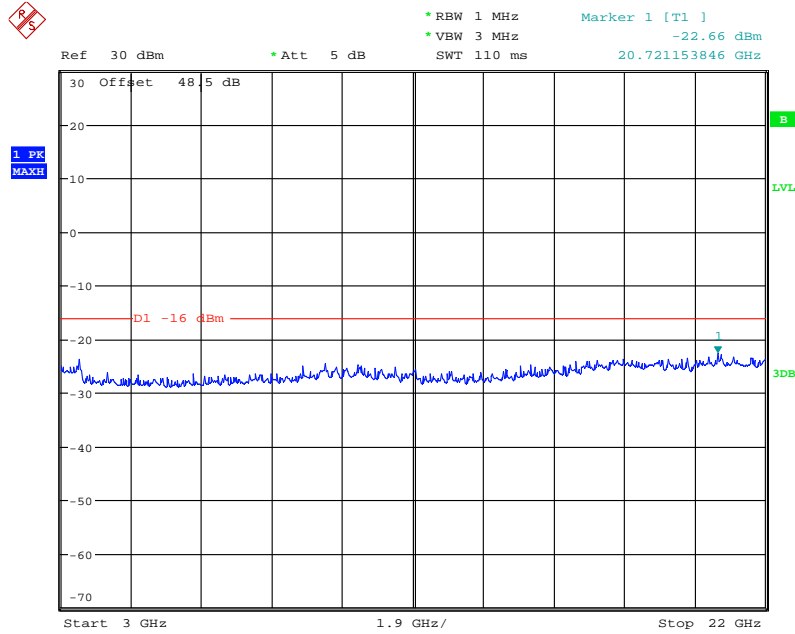
Date: 13.FEB.2014 15:08:25

Note: The limit has been reduced by 10dB to account for the reduction in measurement bandwidth.



Product Service

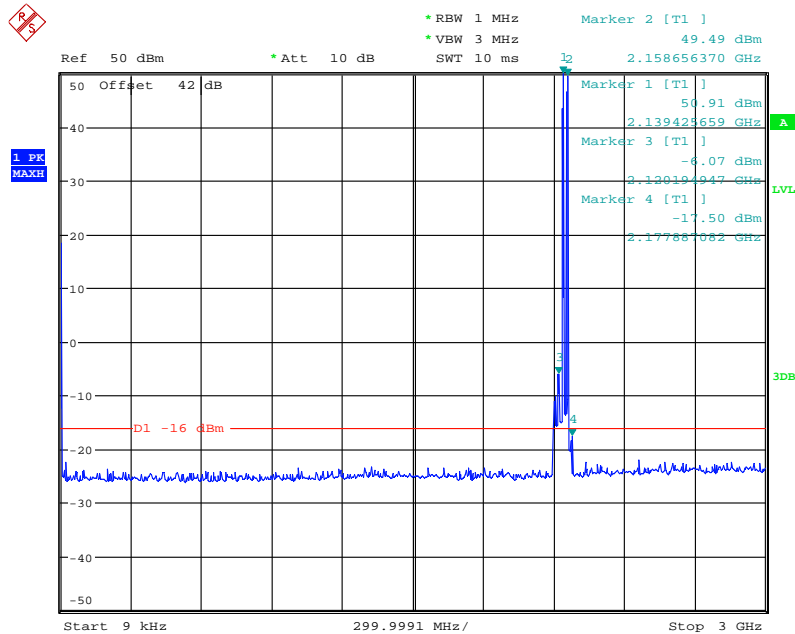
3GHz to 22GHz



Date: 13.FEB.2014 15:08:43

Configuration 1 - Mode 3' - C&L1.4

9kHz to 3GHz

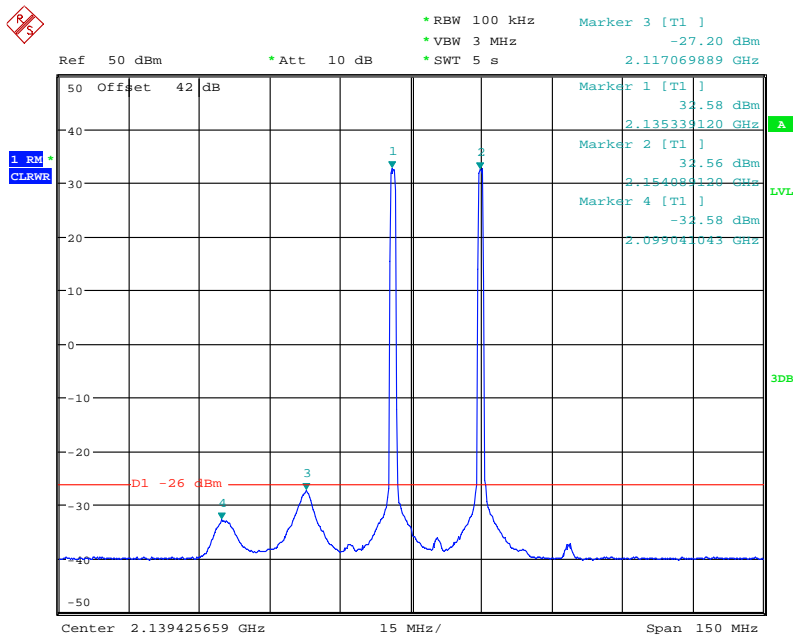


Date: 13.FEB.2014 14:09:09

Note: The emissions above the limit are measured in a smaller bandwidth and using a RMS detector, see the plot on page 66 of 82.



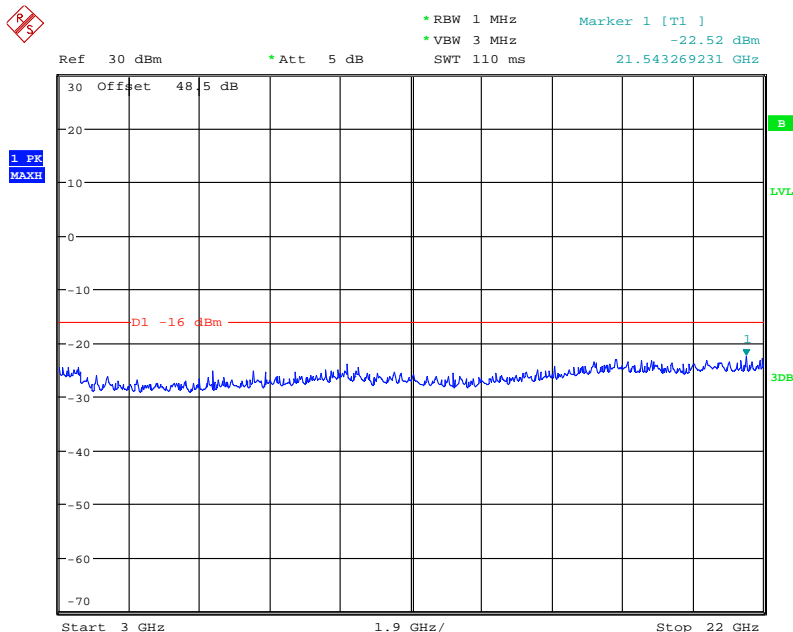
Product Service



Date: 13.FEB.2014 14:10:22

Note: The limit has been reduced by 10dB to account for the reduction in measurement bandwidth.

3GHz to 22GHz



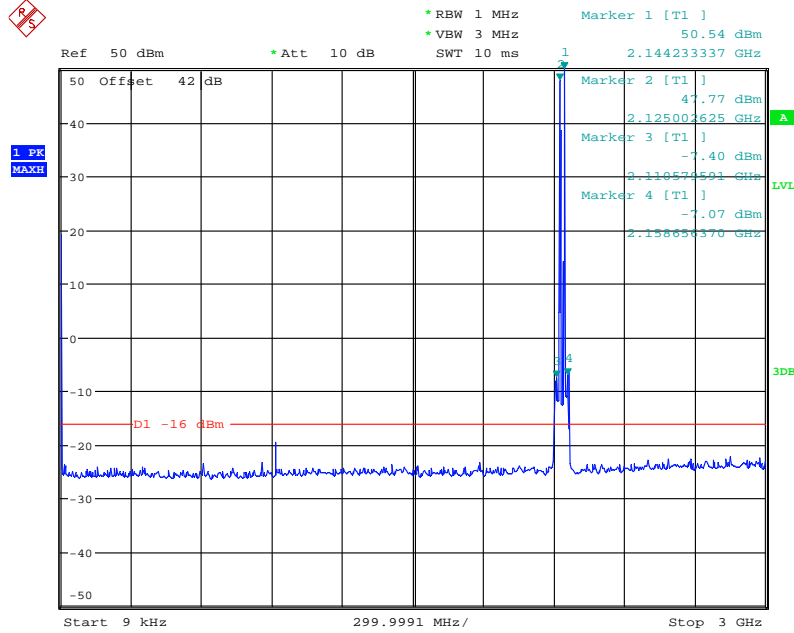
Date: 13.FEB.2014 14:12:16



Product Service

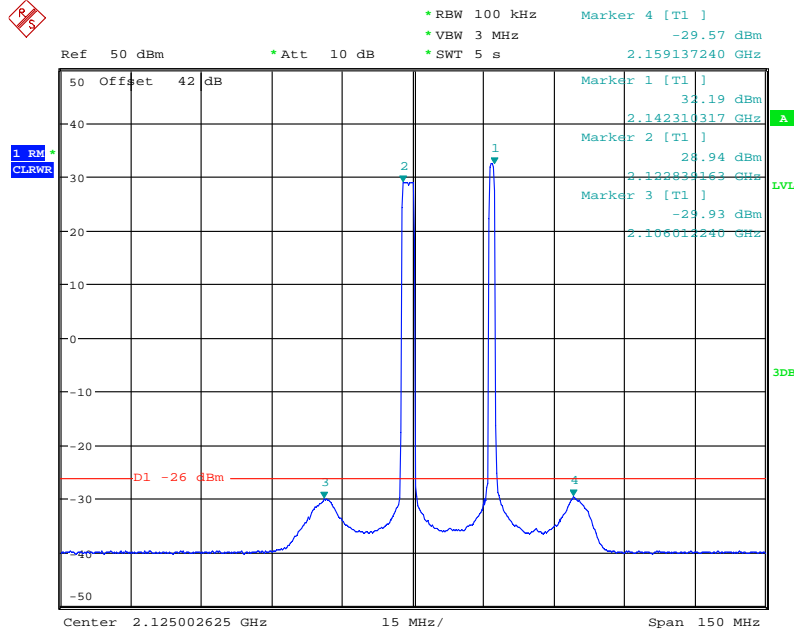
Configuration 1 - Mode 2' - L3&C

9kHz to 3GHz



Date: 13.FEB.2014 15:14:36

Note: The emissions above the limit are measured in a smaller bandwidth and using a RMS detector, see the plot below.

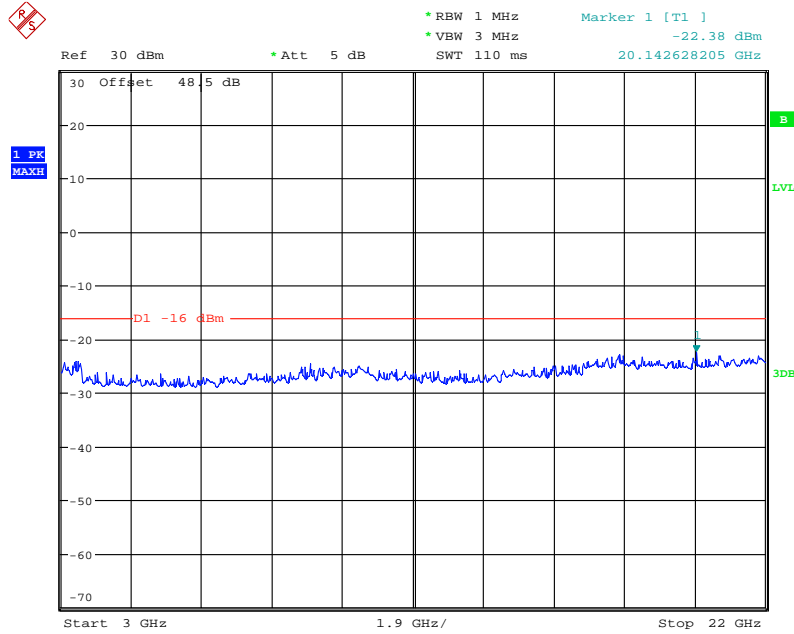


Date: 13.FEB.2014 15:15:49

Note: The limit has been reduced by 10dB to account for the reduction in measurement bandwidth.



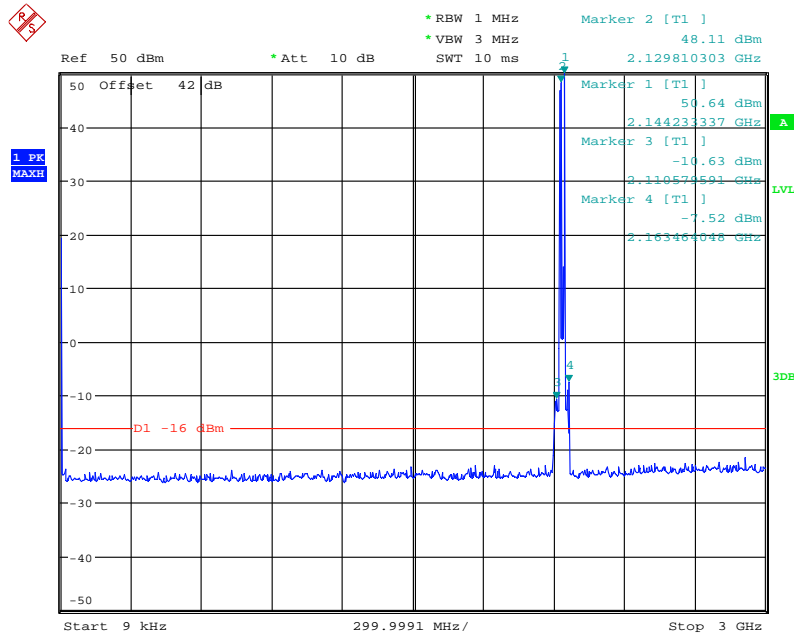
3GHz to 22GHz



Date: 13.FEB.2014 15:16:20

Configuration 1 - Mode 2' - L5&C

9kHz to 3GHz

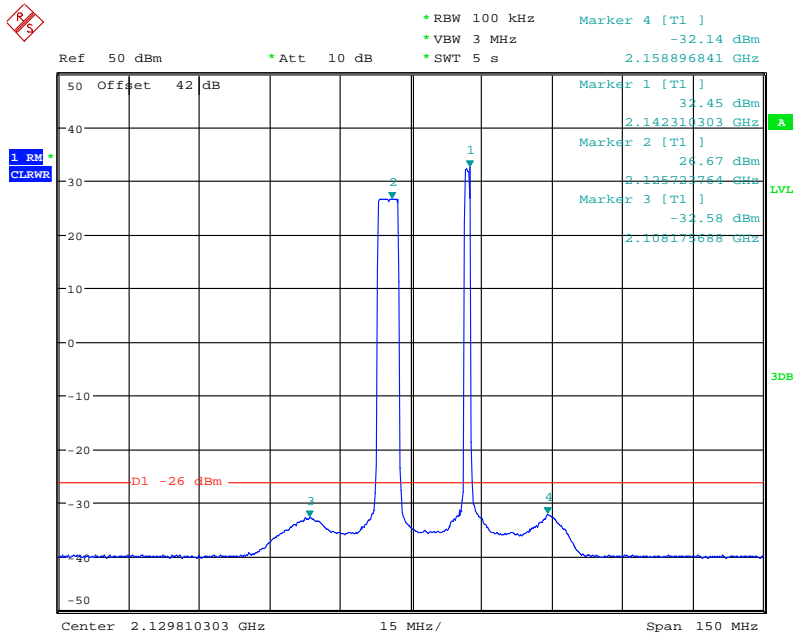


Date: 13.FEB.2014 15:19:42

Note: The emissions above the limit are measured in a smaller bandwidth and using a RMS detector, see the plot on page 69 of 82.



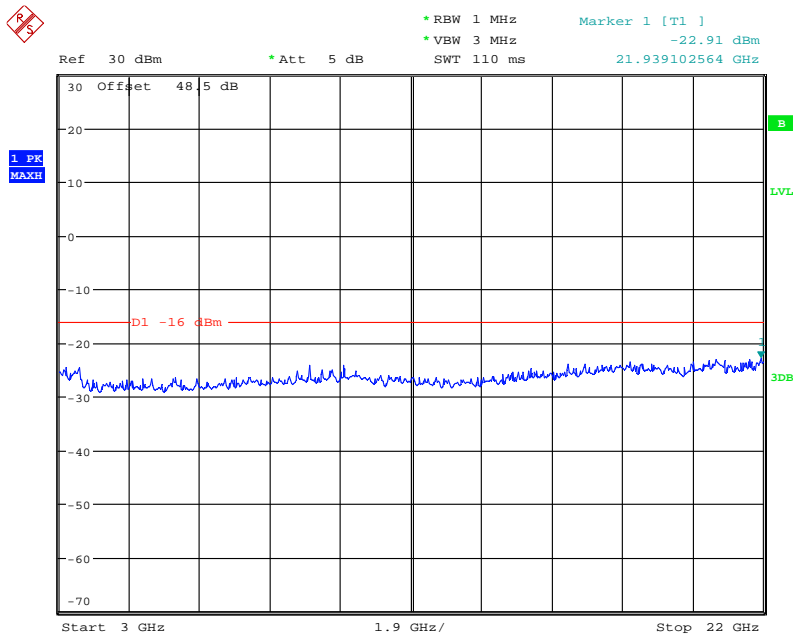
Product Service



Date: 13.FEB.2014 15:20:30

Note: The limit has been reduced by 10dB to account for the reduction in measurement bandwidth.

3GHz to 22GHz



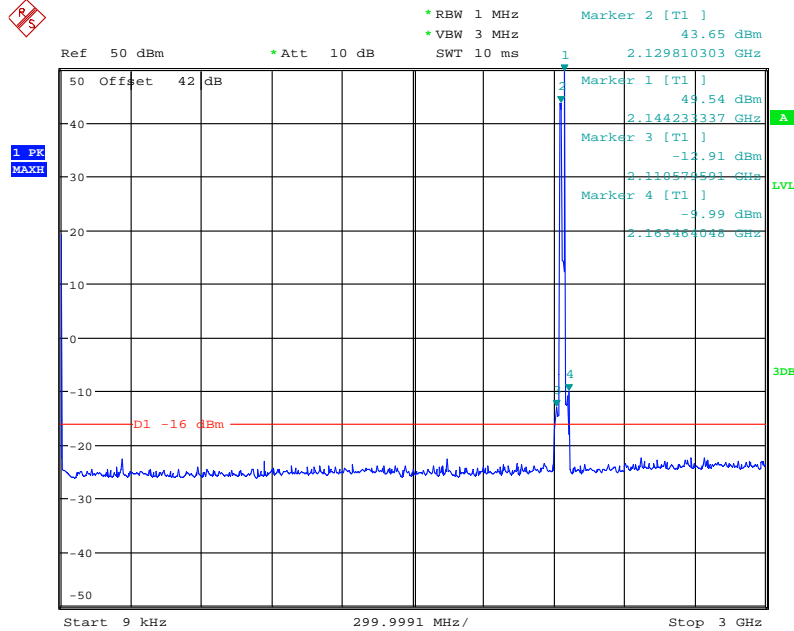
Date: 13.FEB.2014 15:18:43



Product Service

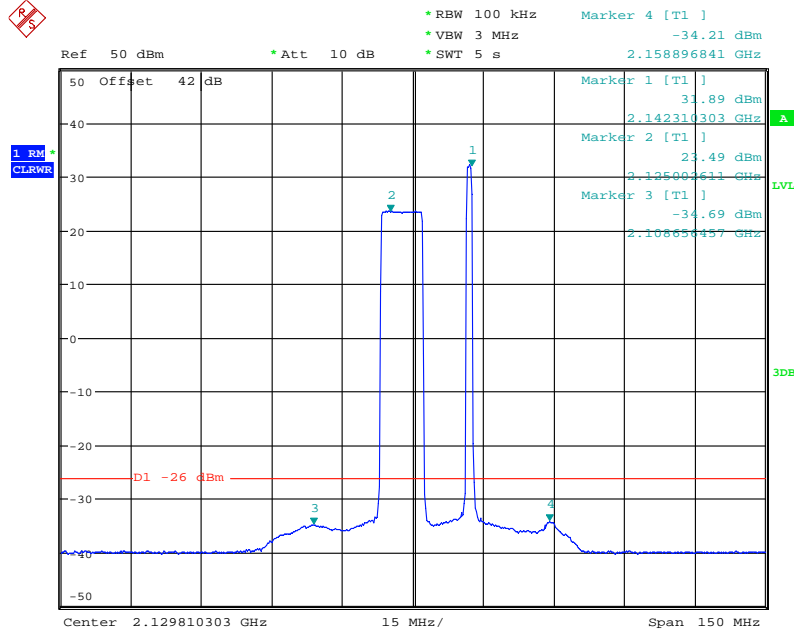
Configuration 1 - Mode 2' - L10&C

9kHz to 3GHz



Date: 13.FEB.2014 15:23:27

Note: The emissions above the limit are measured in a smaller bandwidth and using a RMS detector, see the plot below.



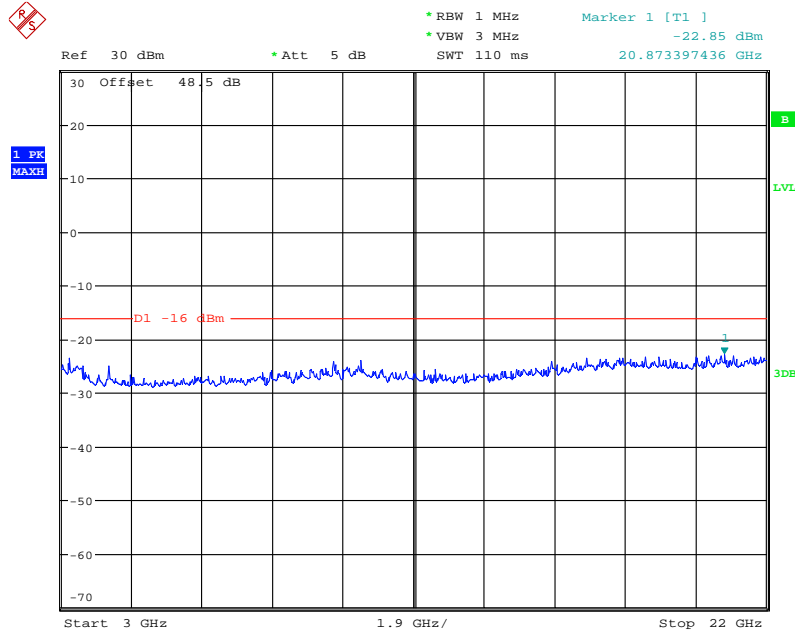
Date: 13.FEB.2014 15:24:07

Note: The limit has been reduced by 10dB to account for the reduction in measurement bandwidth.



Product Service

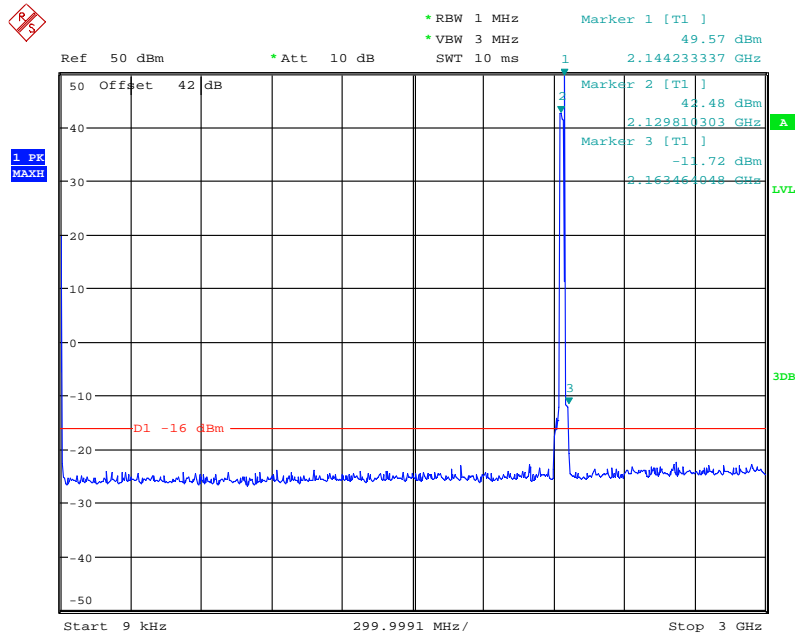
3GHz to 22GHz



Date: 13.FEB.2014 15:25:12

Configuration 1 - Mode 2' - L15&C

9kHz to 3GHz

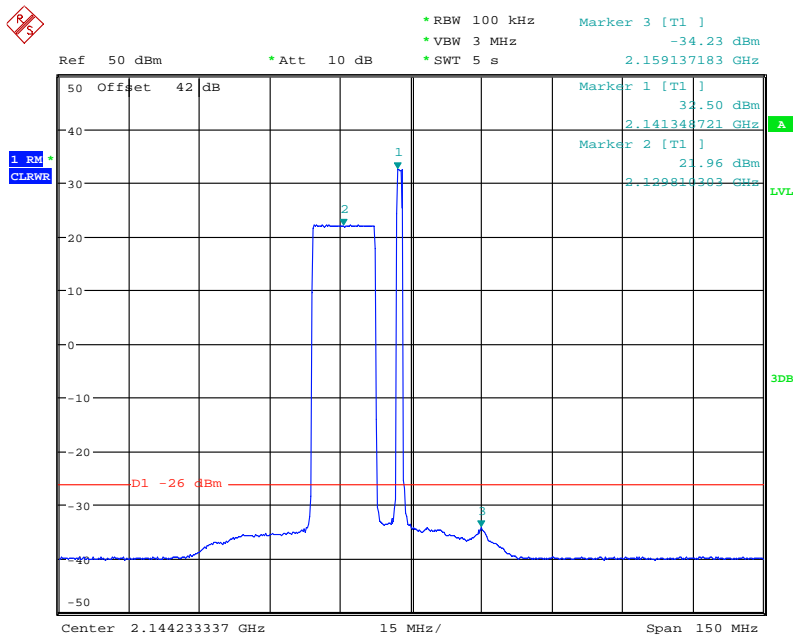


Date: 13.FEB.2014 15:28:34

Note: The emissions above the limit are measured in a smaller bandwidth and using a RMS detector, see the plot on page 72 of 82.



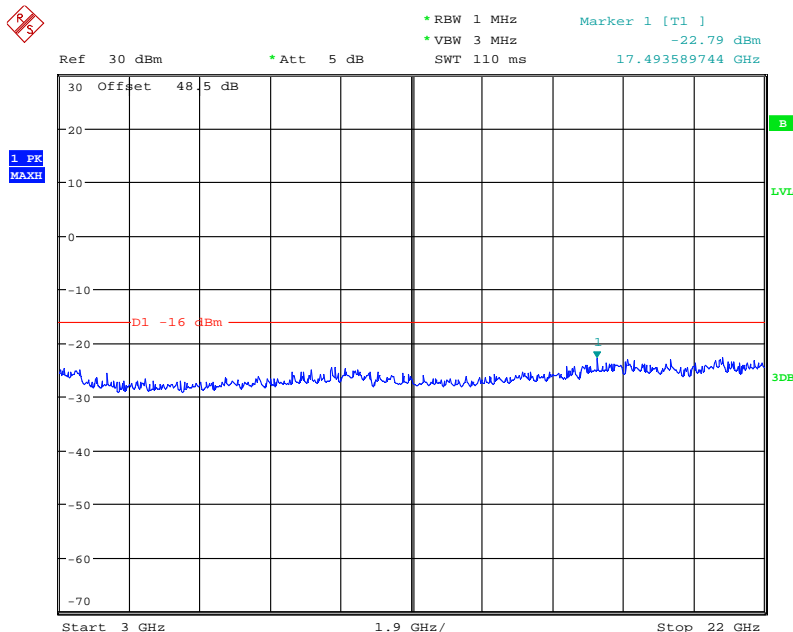
Product Service



Date: 13.FEB.2014 15:29:08

Note: The limit has been reduced by 10dB to account for the reduction in measurement bandwidth.

3GHz to 22GHz



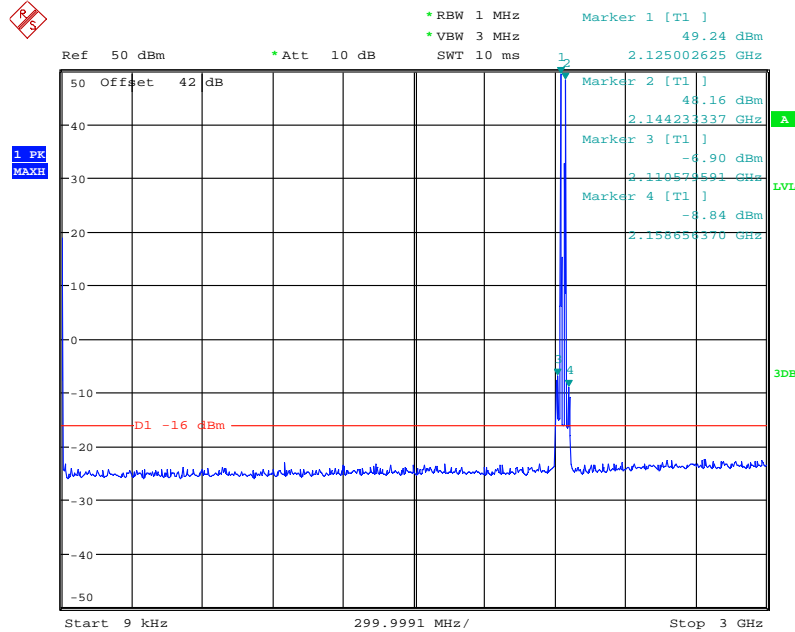
Date: 13.FEB.2014 15:29:41



Mix Carrier (x3)

Configuration 1 - Mode 4' - L1.4&C&C

9kHz to 3GHz

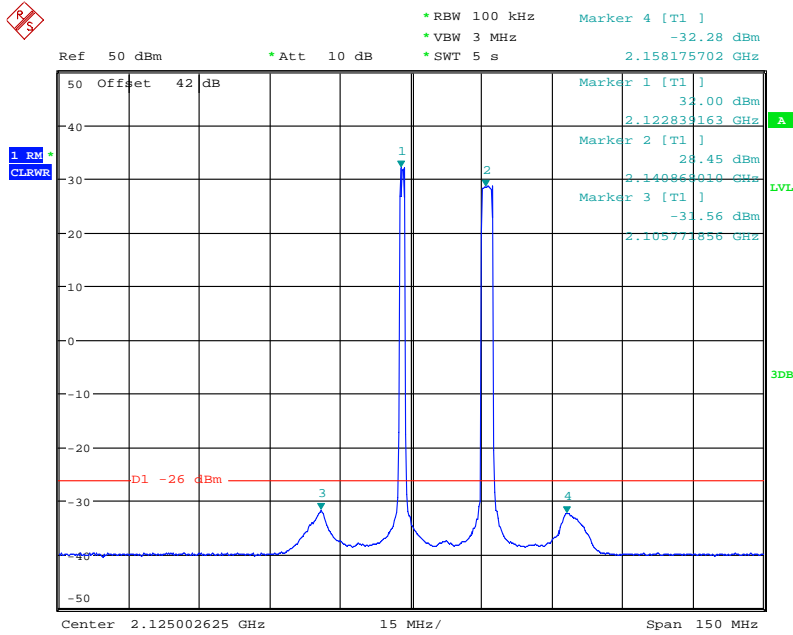


Date: 13.FEB.2014 15:56:13

Note: The emissions above the limit are measured in a smaller bandwidth and using a RMS detector, see the plot on page 73 of 82.



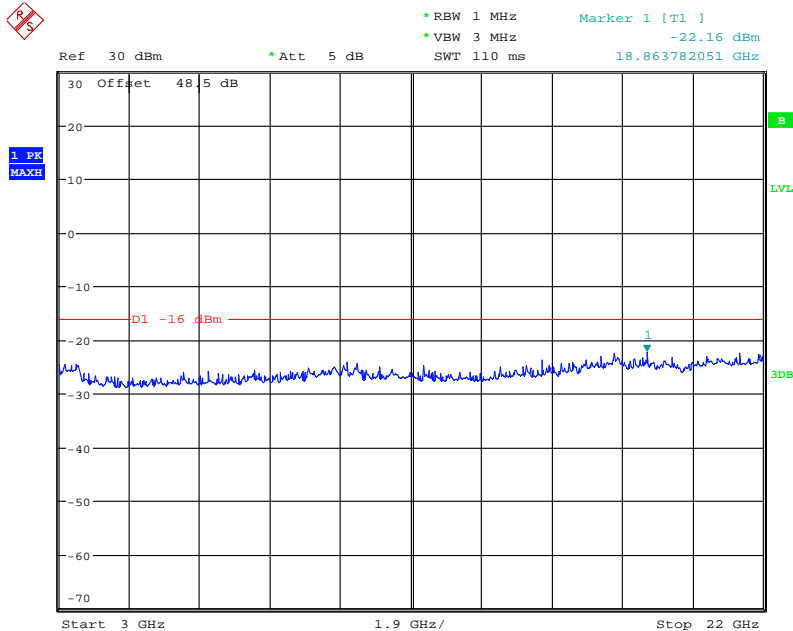
Product Service



Date: 13.FEB.2014 16:00:38

Note: The limit has been reduced by 10dB to account for the reduction in measurement bandwidth.

3GHz to 22GHz



Date: 13.FEB.2014 16:01:10

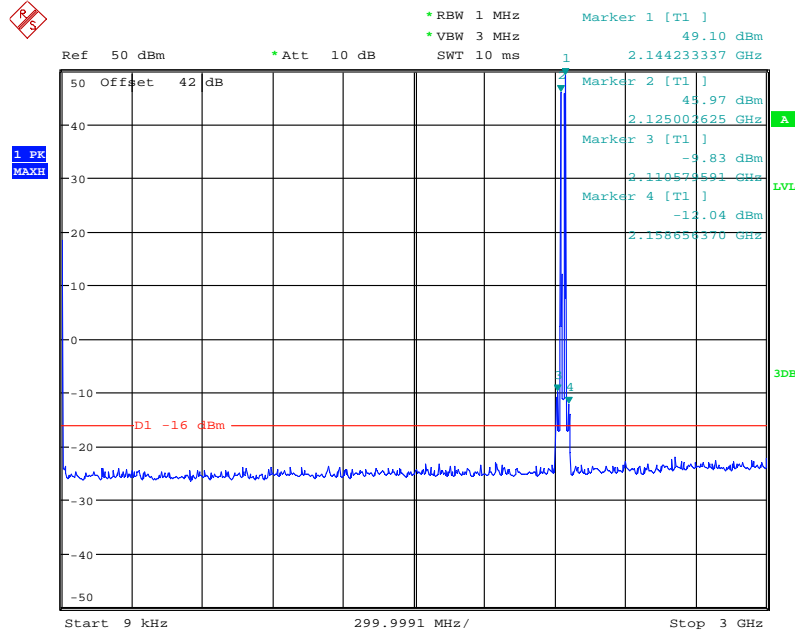


Product Service

Mix Carrier (x4)

Configuration 1 - Mode 5' - L1.4&C&C&C

9kHz to 3GHz

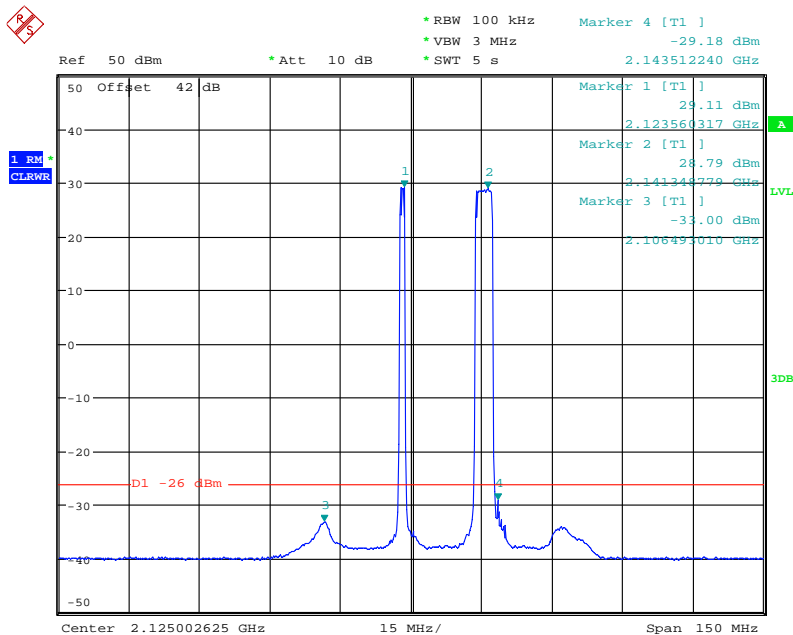


Date: 13.FEB.2014 16:06:45

Note: The emissions above the limit are measured in a smaller bandwidth and using a RMS detector, see the plot on page 75 of 82.



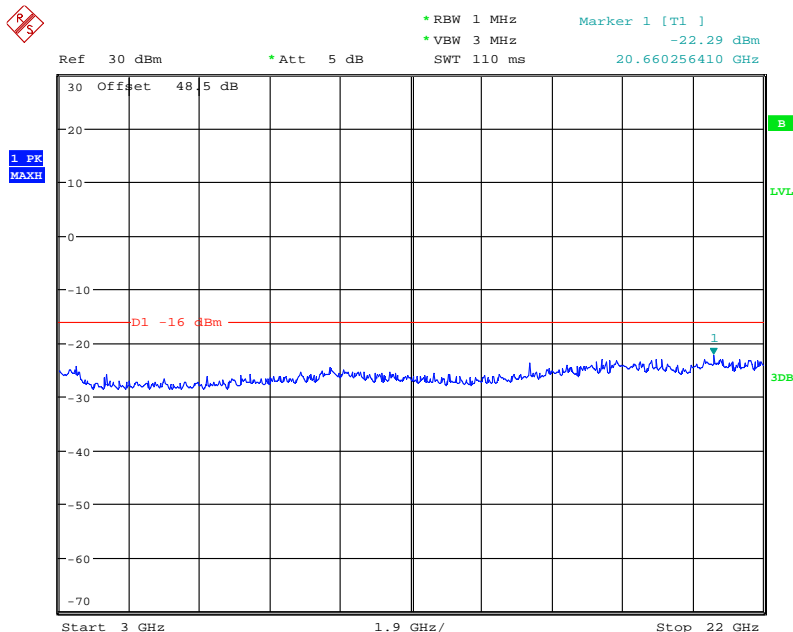
Product Service



Date: 13.FEB.2014 16:08:23

Note: The limit has been reduced by 10dB to account for the reduction in measurement bandwidth.

3GHz to 22GHz



Date: 13.FEB.2014 16:04:36



Product Service

Limit	-16dBm
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Remarks

The EUT does not exceed -16dBm at the frequency range of 9kHz to 22GHz.



Product Service

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

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

Instrument	Manufacturer	Type No.	Serial No.	Calibration Period (months)	Calibration Due
Section 2.1, 2.2, 2.3, 2.5, 2.6 – Maximum Conducted Output Power, Peak – Average Ratio, Spurious Emissions at Antenna Terminals (± 1MHz), Conducted Spurious Emissions and Receiver Spurious Emissions.					
Spectrum Analyser	Rohde & Schwarz	FSQ26	100253	12	04-Aug-2014
Power Meter	Rohde & Schwarz	NRP2	101593	12	04-Aug-2014
Power Sensor	Rohde & Schwarz	NRP-Z51	102123	12	04-Aug-2014
Network Analyzer	Agilent	8720D	US36140166	12	26-Sep-2014
40dB 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	24-Dec-2014
Thermo-hygrometer	AZ Instruments	8705	9151665	12	12-Dec-2014
Section 2.4 – 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 Waveguide 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	24-Dec-2014
Thermo-hygrometer	AZ Instruments	8705	9151665	12	12-Dec-2014

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



Product Service

3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	Frequency / Parameter	MU
Conducted RF 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).

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