

Radio test report — NGR Radio 2217 B2

308335-1TRFWL-R1

Date of issue: June 6, 2016

Applicant:

Ericsson Canada

Product:

NGR Radio 2217

Model:

Radio 2217 Band 2

Part number:

KRC 161 563/1

FCC ID:

TA8AKRC161563-1

IC Registration number:

287AB-AS1615631

Specifications/Summary:

Standard	Environmental Phenomenon	Compliance
FCC 47 CFR Part 24 – Personal communications services	Part §24.238(a) Out of band emissions (Radiated)	Yes
RSS-133 – 2 GHz Personal Communications Services	Clause 6.5.1 (ii) Transmitter Unwanted Emissions (Radiated)	Yes

Tested by	Predrag Golic, EMC Specialist; Shawn He, Senior EMC Specialist
Reviewed by	Andrey Adelberg, Senior Wireless/EMC Specialist
Review date	June 6, 2016
Reviewer signature	

Test location

Company name	Nemko Canada Inc.
Address	303 River Road
City	Ottawa
Province	Ontario
Postal code	K1V 1H2
Country	Canada
Telephone	+1 613 737 9680
Facsimile	+1 613 737 9691
Toll free	+1 800 563 6336
Website	www.nemko.com
Site number	FCC test site registration number: 176392, IC: 2040A-4 (3 m semi anechoic chamber)

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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Section 1. Report summary

1.1 Applicant and manufacturer

Company name	Ericsson Canada Inc.
Address	349 Terry Fox Drive, Ottawa, ON, Canada, K2K 2V6

1.2 Test specifications

FCC 47 CFR Part 24	Personal communications services (Subpart E – Broadband PCS)
FCC 47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; general rules and regulations
RSS-133 (Issue 6)	2 GHz Personal Communications Services
RSS-GEN (Issue 4)	General Requirements for Compliance of Radio Apparatus

1.3 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was performed against all relevant requirements of the test standard except as noted in section 1.4 below. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See “Summary of test results” for full details.

1.4 Exclusions

As per client request the EUT was only assessed for FCC Clause §24.238(a) “out of band emission” and RSS Clause 6.5.1 (ii) “Transmitter Unwanted Emissions”. All other sections of FCC Part 24 and RSS-133 were omitted.

1.5 Test report revision history

Table 1.5-1: Test report revision history

Revision #	Details of changes made to test report
TRF	Original report issued

Notes: None



Section 2. Summary of test results

2.1 FCC Part 24 Subpart E test results

Table 2.1-1: FCC Part 24 – Radio Results

Part	Test description	Verdict
§24.238(a)	Out of band emissions (Radiated)	Pass

Notes: None

2.2 RSS-133 test results

Table 2.2-1: RSS-133 – Radio Results

Clause	Test description	Verdict
6.5.1 (ii)	Transmitter Unwanted Emissions (Radiated)	Pass

Notes: None

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	May 3, 2016
Nemko sample ID number	133-002480

3.2 EUT information

Product name	NGR Radio 2217
Model	Radio 2217 B2
Part number	KRC 161 563/1
Revision	R1A
Serial number	C82A451965
Antenna ports	2 TX/RX Ports
IBW	LTE 1/4/3MHzTx: 20 MHz LTE 5/10/15/20MHz Tx: 40 MHz WCDMA Tx: 40 MHz Rx: 60 MHz
FDD	80 MHz
Frequency	TX (DL): 1930–1990 MHz RX (UL): 1850–1910 MHz
Nominal O/P per antenna port Up to 20MHz Carrier BW	Single Carrier: 1 × 40 W (46 dBm) Except LTE 1.4/3 MHz: 1 × 20 (43 dBm) Multi-Carrier: 2 × 20 W (43 dBm), 3 × 13.3 W (41.25 dBm), 4 × 10 W (40 dBm), 5 × 8 W (39 dBm), 6 × 6.67 W (38.24 dBm), 7 × 5.71 W (37.57 dBm), 8 × 5 W (37 dBm)
Accuracy (nominal)	±0.1 ppm
Nominal voltage	–48 VDC @ 10 A
RAT	LTE: SC, MC
Modulation	LTE: QPSK, 16 QAM, 64 QAM, 256QAM WCDMA: QPSK, 16QAM, 64QAM
Channel bandwidth	LTE: 1.4, 3, 5, 10, 15, 20 MHz
Maximum combined OBW per port	Tx: 40 MHz, Rx: 60 MHz
CPRI	10 Gbps
Channel raster	100 kHz for LTE, 200 kHz for WCDMA
Regulatory requirements	Radio: CFR 47 Part 2, 24 RSS-GEN, RSS-133 EMC: CFR 47 Part 15 ICES-003
Multi-carrier	Single Antenna, TX Diversity, MIMO
Regulatory ID:	FCC: TA8AKRC161563-1 IC: 287AB-AS1615631 IC Model: AS1615631
Operating temperature	–40 °C to +55 °C
Total Power based on IBW	2 × 40 W
WCDMA Supported carrier configurations	WCDMA= (1-8) / port
Supported carrier configurations	LTE BW=1.4, 3, 5, 10MHz (1-3), 15, 20 MHz (1-2), WCDMA= (1-8)

3.2 EUT information, continued

Description/theory of operation	The Radio 2217 B2 (KRC 161 563/1) is a multi-standard remote radio forming part of the Ericsson RBS (Radio Base Station) equipment. The Radio 2217 provides radio access for mobile and fixed devices and is designed for the outdoor environment. The radio unit deployment is intended for pole, wall or mast mounted options for co-location near the antenna. A fiber optic interface provides the RRU/RBS control and digital interface between the radio and the RBS. The Radio 2217 B2 product is convection cooled and shall be mounted vertically. Horizontal mounting is supported with forced air cooling with an optional fan tray BKV 106 137/1. Output RF Power is rated at 2 x 40W. Altitude during operation: Below 3000m																				
Operational frequencies	<table border="1"> <thead> <tr> <th colspan="2">Clocks / Oscillators</th></tr> </thead> <tbody> <tr> <td>RX LO</td><td>1699.2 MHz</td></tr> <tr> <td>CPRI Clock</td><td>122.8 MHz</td></tr> <tr> <td>TOR Clock</td><td>2083.2–2142.72 MHz</td></tr> <tr> <td>RX IF</td><td>153.3–208.3 MHz</td></tr> <tr> <td>GSYNC</td><td>7.68 MHz</td></tr> </tbody> </table>	Clocks / Oscillators		RX LO	1699.2 MHz	CPRI Clock	122.8 MHz	TOR Clock	2083.2–2142.72 MHz	RX IF	153.3–208.3 MHz	GSYNC	7.68 MHz								
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Software details	CXP9017316%9_R62FB																				

3.3 EUT configuration and performance monitors

Down link	RAT	Modulation	Performance Requirement		Test Model / Configuration
	LTE	QPSK	TX: Throughput		E-TM1.1
	WCDMA	16-QAM	TX: Throughput TX BLER		TM11
Up link	RAT	Modulation	Performance Requirement	Input Signal	Test Model / Configuration
	LTE	QPSK	RX: Throughput	-75dBm	E-UTRA-UL
	WCDMA	16-QAM	RX: Throughput	-75dBm	UTRA-UL

3.4 EMC test parameter details/readings

Test frequencies:

LTE Single Carrier						
Bandwidth	Transmit /DL (MHz)					
MHz	EARFCN	B	EARFCN	M	EARFCN	T
1.4	607	1930.7	900	1960	1193	1989.3
3	615	1931.5	900	1960	1185	1988.5
5	625	1932.5	900	1960	1175	1987.5
10	650	1935.0	900	1960	1150	1985.0
20	700	1940.0	900	1960	1100	1980.0

LTE Single Carrier						
Bandwidth	Receive /UL (MHz)					
MHz	EARFCN	B	EARFCN	M	EARFCN	T
1.4	18607	1850.7	18900	1880.0	19193	1909.3
3	18615	1851.5	18900	1880.0	19185	1908.5
5	18625	1852.5	18900	1880.0	19175	1907.5
10	18650	1855.0	18900	1880.0	19150	1905.0
20	18700	1860.0	18900	1880.0	19100	1900.0

LTE Multi-Carrier (Spurious Emissions)																		
BW	Transmit/DL (MHz)																	
MHz	EARFCN	B1	EARFCN	B2	EARFCN	B3	EARFCN	M1	EARFCN	M2	EARFCN	M3	EARFCN	T1	EARFCN	T2	EARFCN	T3
1.4	607	1930.7	779	1947.9	793	1949.3	807	1950.7	979	1967.9	993	1969.3	1007	1970.7	1179	1987.9	1193	1989.3
3	615	1931.5	755	1945.5	785	1948.5	715	1941.5	955	1965.5	985	1968.5	1015	1971.5	1155	1985.5	1185	1988.5
5	625	1932.5	925	1962.5	975	1967.5	725	1942.5	1025	1972.5	1075	1977.5	825	1962.5	1125	1982.5	1175	1987.5
10	650	1935.0	850	1955.0	950	1965.0	750	1945.0	950	1965.0	1050	1975.0	850	1955.0	1050	1975.0	1150	1985.0
15	675	1937.5	-	-	925	1962.5	775	1947.5	875	1957.5	1025	1972.5	875	1957.5	-	-	1125	1982.5
20	700	1940.0	-	-	900	1960.0	800	1950.0	800	1950.0	1000	1970.0	900	1960.0	-	-	1100	1980.0

WCDMA Single Carrier													
Bandwidth (MHz)	Transmit / DL (MHz)						Receive / UL (MHz)						
	B		M		T		B		M		T		
	ARFCN	Freq.	ARFCN	Freq.	ARFCN	Freq.	ARFCN	Freq.	ARFCN	Freq.	ARFCN	Freq.	ARFCN
5	9662	1932.4	9800	1960	9938	1987.6	9262	1852.4	9400	1880.0	9538	1907.6	

WCDMA Multi-Carrier (Spurious Emissions)												
Bandwidth (MHz)	Transmit/DL (MHz)											
B1	B2	M7	M5	M3	M1	M2	M4	M6	M8	T1	T2	B1
1.4	1932.4	1937.4	1942.4	1947.4	1952.4	1957.4	1962.6	1967.6	1972.6	1977.6	1982.6	1987.6
ARFCN	9662	9687	9712	9737	9762	9787	9813	9838	9863	9888	9913	9938

3.5 EUT setup details

Table 3.5-1: EUT interface ports

Description	Qty.
Power	1
Data1	1
Data2	1
MMI	1
ANT A	1
ANT B	1
RET	1
Alarm	1
GND	1

Table 3.5-2: Inter-connection cables

Cable description	From	To	Length (m)
CPRI fiber cable	METS-LITE	EUT Data-1	20
Ground	Lab Ground	EUT Ground	2

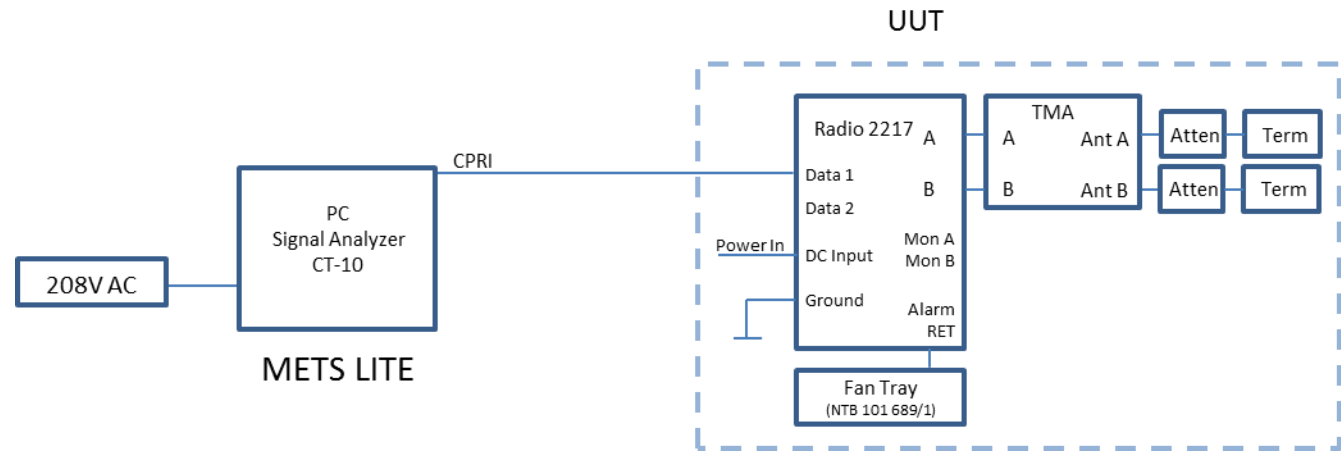


Figure 3.5-1: Emissions setup diagram

Support equipment	METS Lite Test System - Anritsu MS 2691 VSA/Sig Gen - HP Laptop - CT10 LTE, WCDMA, and GSM Test and Verification Platform
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Section 4. Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5. Test conditions

5.1 Atmospheric conditions

Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	860–1060 mbar

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages $\pm 5\%$, for which the equipment was designed.



Section 6. Measurement uncertainty

6.1 Uncertainty of measurement

Measurement uncertainty budgets for the tests are detailed below. Measurement uncertainty calculations assume a coverage factor of $K = 2$ with 95% certainty.

Test name	Measurement uncertainty, dB
Radiated spurious emissions	3.78

Section 7. Test equipment

7.1 Test equipment list

Table 7.1-1: Equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 m EMI test chamber	TDK	SAC-3	FA002047	1 year	Dec. 01/16
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 26	FA002043	1 year	Jan. 07/17
Biconical antenna (30–300 MHz)	Sunol	BC2	FA002078	1 year	Mar. 04/17
Log periodic antenna (200–5000 MHz)	Sunol	LP5	FA002077	1 year	Mar. 14/17
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 26	FA002043	1 year	Jan. 07/17
Spectrum analyzer	Rohde & Schwarz	FSU	FA001877	1 year	Apr. 15/17
Horn antenna (1–18 GHz)	EMCO	3115	FA000649	1 year	Aug. 31/16
Horn antenna (18–40 GHz)	EMCO	3116	FA002487	2 year	July 9/16
Pre-amplifier (1–18 GHz)	JCA	JCA118-503	FA002091	1 year	April 26/17
Pre-amplifier (18–26 GHz)	Narda	BBS-1826N612	FA001550	—	VOU

Notes: VOU - verify on use

Table 7.1-2: Test software details

Test description	Manufacturer of Software	Details
Radiated emissions	Rhode & Schwarz	EMC32, Software for EMC Measurements, Version 8.53.0

Notes: None

Section 8. Testing data

8.1 FCC Part 24 Clause 24.238(a) Out of band emissions and RSS-133 Clause 6.5.1 (ii) Transmitter Unwanted Emissions (Radiated)

8.1.1 Definitions and limits

PART 24—PERSONAL COMMUNICATIONS SERVICES

Subpart E—Broadband PCS

§24.238 Emission limitations for Broadband PCS equipment.

(a) Out of band emissions. 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.

RSS-133 — 2 GHz Personal Communications Services

6.5 Transmitter Unwanted Emissions

ii. After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least $43 + 10 \log_{10}(P)$ (watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

8.1.2 Test summary

Verdict	Pass				
Test date	May 3, 2016	Test engineer	Predrag Golic; Shawn He		
Temperature	24 °C	Relative humidity	31%	Air pressure	998 mbar

Section 8*Testing data***Test name***FCC Part 24 Clause 24.238(a) Out of band emissions and RSS-133 Clause 6.5.1 (ii) Transmitter Unwanted Emissions (Radiated)***Specification***FCC Part 24E and RSS-133***8.1.3 Observations, settings and special notes**

- The following test cases were verified as per client test plan see Table 8.1–1 below
- The spectral plots are a summation of a vertical and horizontal scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Table 8.1-1: Test cases

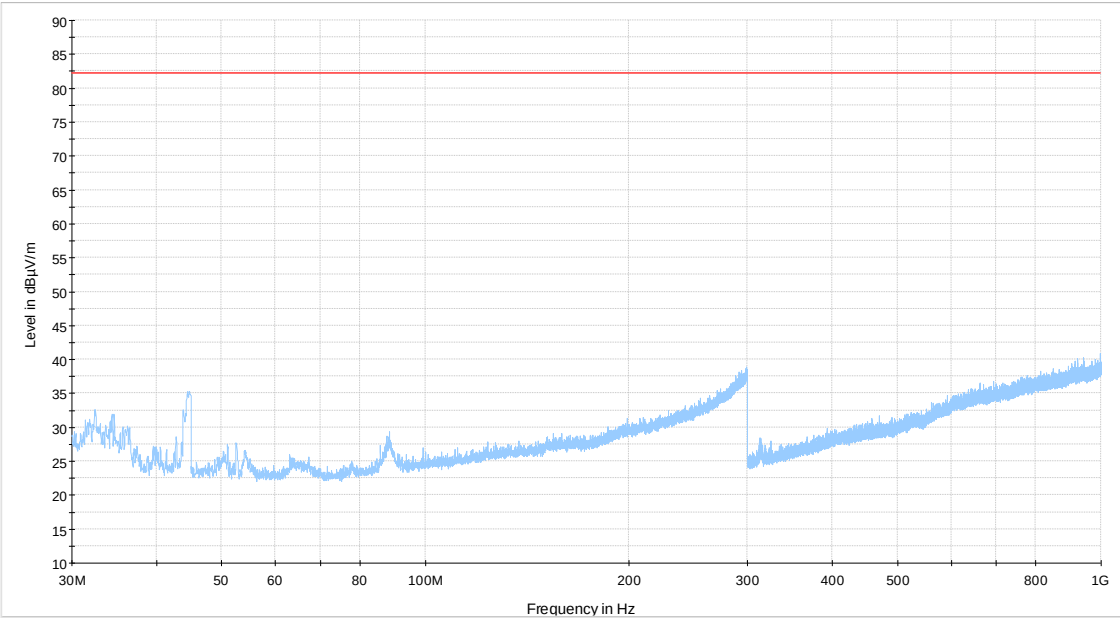
Test Case	Description
LTE, BW=1.4M, Middle channel	LTE Single Carrier with 1.4MHz Bandwidth, Middle Channel, QPSK Modulation
LTE, BW=1.4M, Bottom channel	LTE Single Carrier with 1.4MHz Bandwidth, Bottom Channel, QPSK Modulation
LTE, BW=1.4M, Top channel	LTE Single Carrier with 1.4MHz Bandwidth, Top Channel, QPSK Modulation
LTE, 2 Carriers, BW=1.4M, Middle channel	LTE 2 Carriers with 1.4MHz Bandwidth, Middle Channel (M1+M2), QPSK Modulation
WCDMA, 1 Carrier, Middle Channel	WCDMA Single Carrier, Middle Channel, 16QAM Modulation
LTE+WCDMA Multi RAT, 1W+1L, Middle Channel	Multi RAT (LTE QPSK+WCDMA 16QAM), 2 Carriers, LTE 1.4MHz Bandwidth, Middle Channel

Notes:

Spectrum analyzer settings

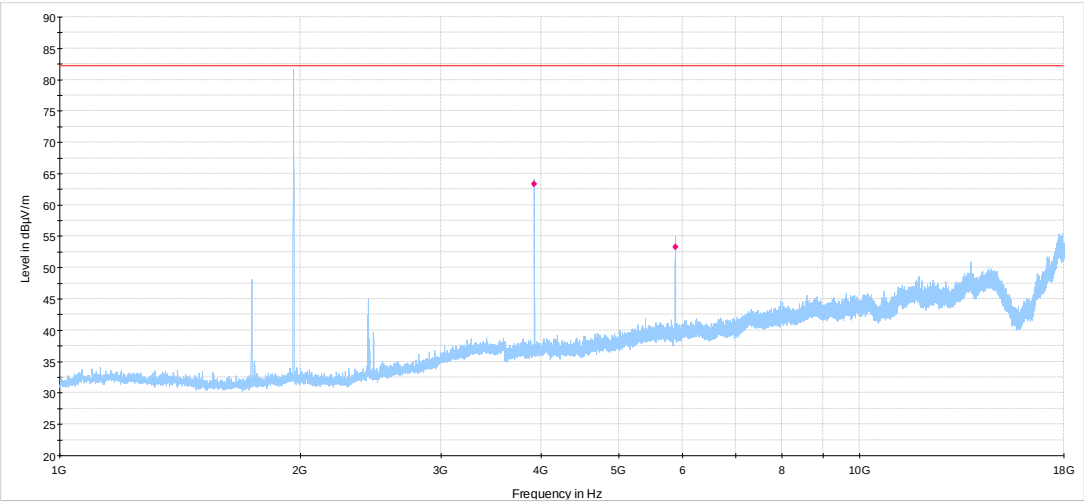
Frequency range	30 MHz to 10 th harmonic
Detector mode	Peak
Resolution bandwidth	100 kHz (below 1 GHz), 1000 kHz (above 1 GHz)
Video bandwidth	>RBW
Trace mode	Max Hold

8.1.4 Test data



LTE SC; BW - 1.4MHz [middle channel]
Limit (82.23 dBuV/m = -13 dBm)
Preview Result 1-PK+

Figure 8.1-1: 30 to 1000 MHz – LTE, BW=1.4M, Middle channel



LTE SC; BW - 1.4MHz [middle channel]
Limit (82.23 dBuV/m = -13 dBm)
Preview Result 1-PK+
Final Result 1-PK+

Figure 8.1-2: 1 to 18 GHz – LTE, BW=1.4M, Middle channel

Section 8

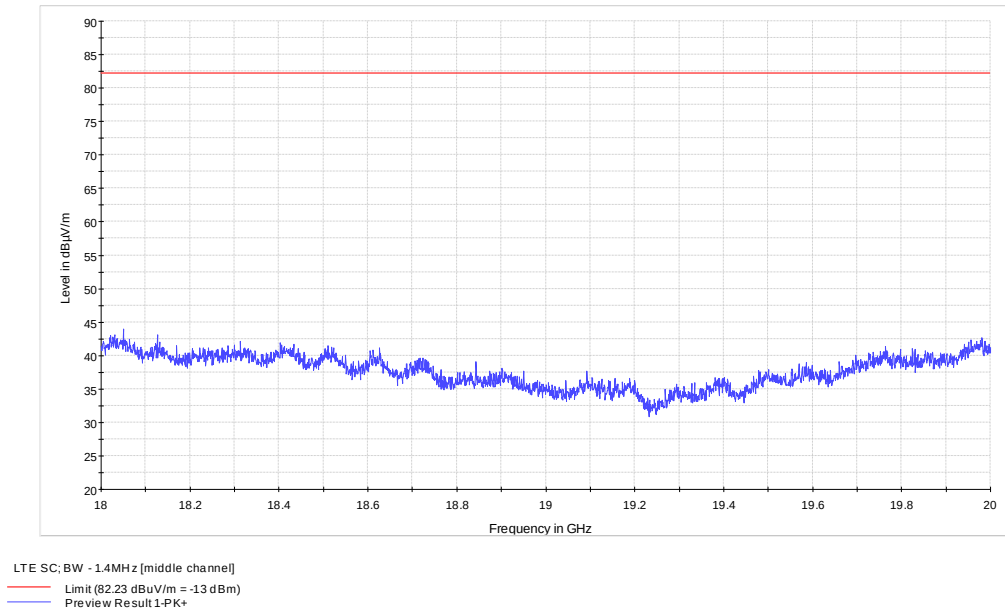
Test name

Specification

Testing data
FCC Part 24 Clause 24.238(a) Out of band emissions and RSS-133 Clause 6.5.1 (ii) Transmitter
Unwanted Emissions (Radiated)
FCC Part 24E and RSS-133



8.1.4 Test data, continued



Note: (Limit = 82.23 dBuV = -13 dBm)

Figure 8.1-3: 18 to 20 GHz – LTE, BW=1.4M, Middle channel

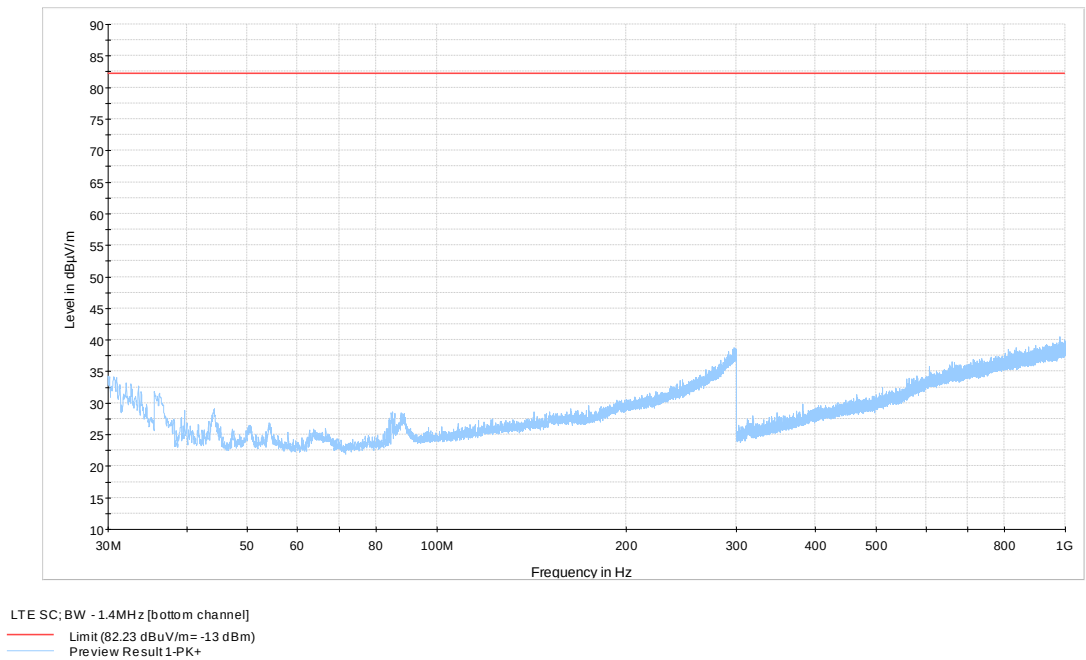


Figure 8.1-4: 30 to 1000 MHz – LTE, BW=1.4M, Bottom channel

8.1.4 Test data, continued

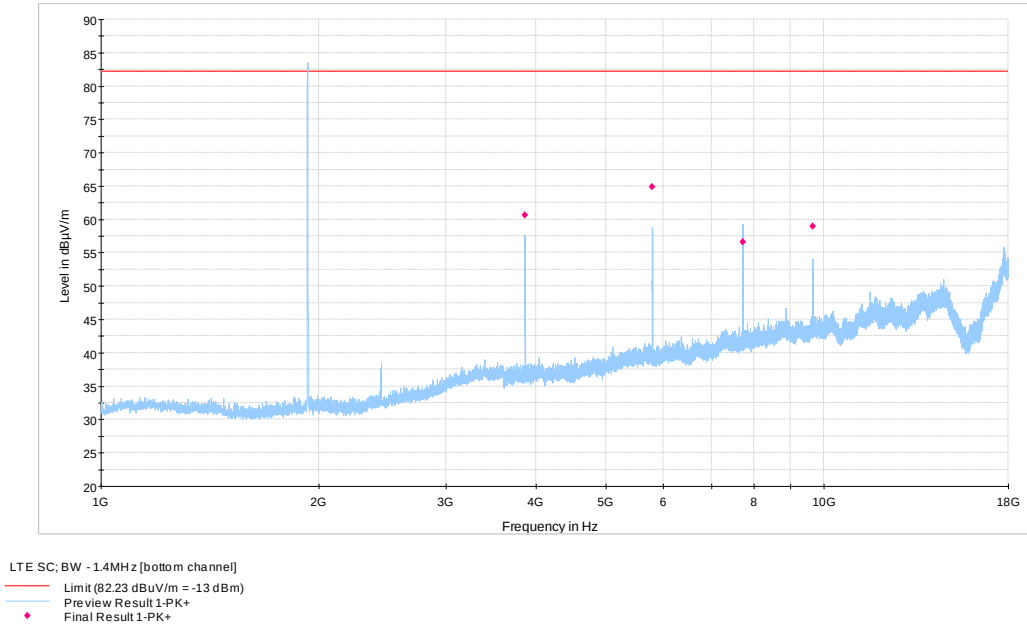
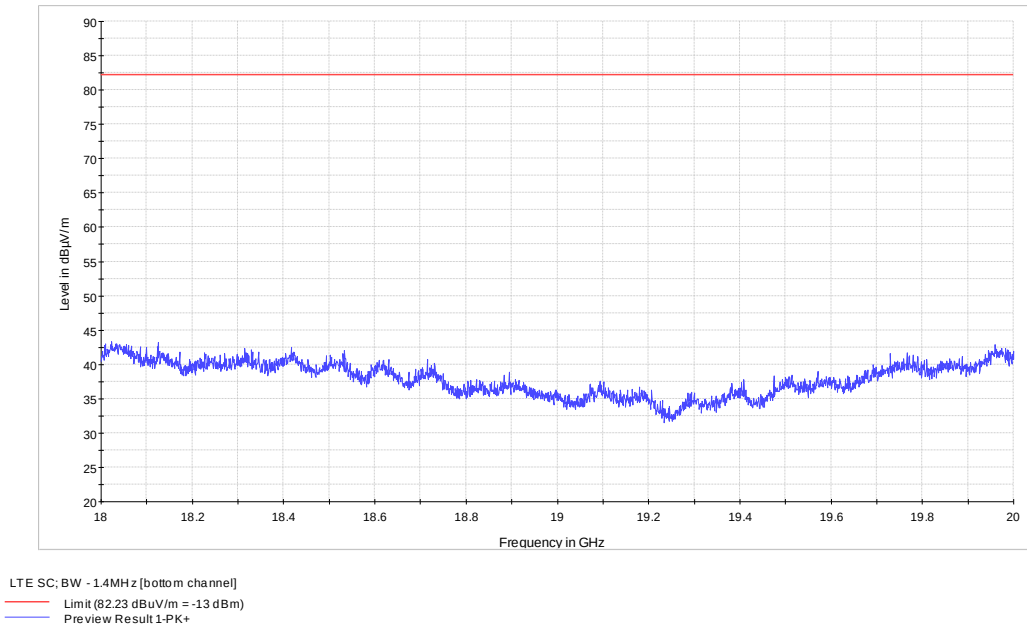


Figure 8.1-5: 1 to 18 GHz – LTE, BW=1.4M, Bottom channel



Note: (Limit = 82.23 dBuV = -13 dBm)

Figure 8.1-6: 18 to 20 GHz – LTE, BW=1.4M, Bottom channel

8.1.4

Test data, continued

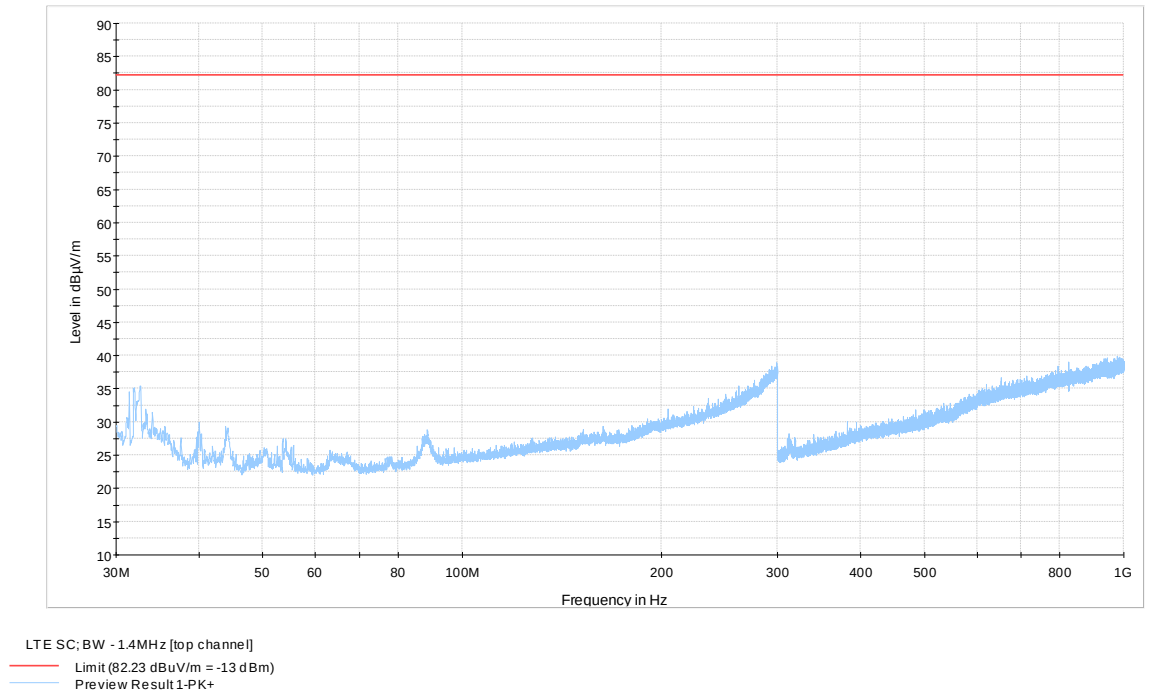


Figure 8.1-7: 30 to 1000 MHz – LTE, BW=1.4M, Top channel

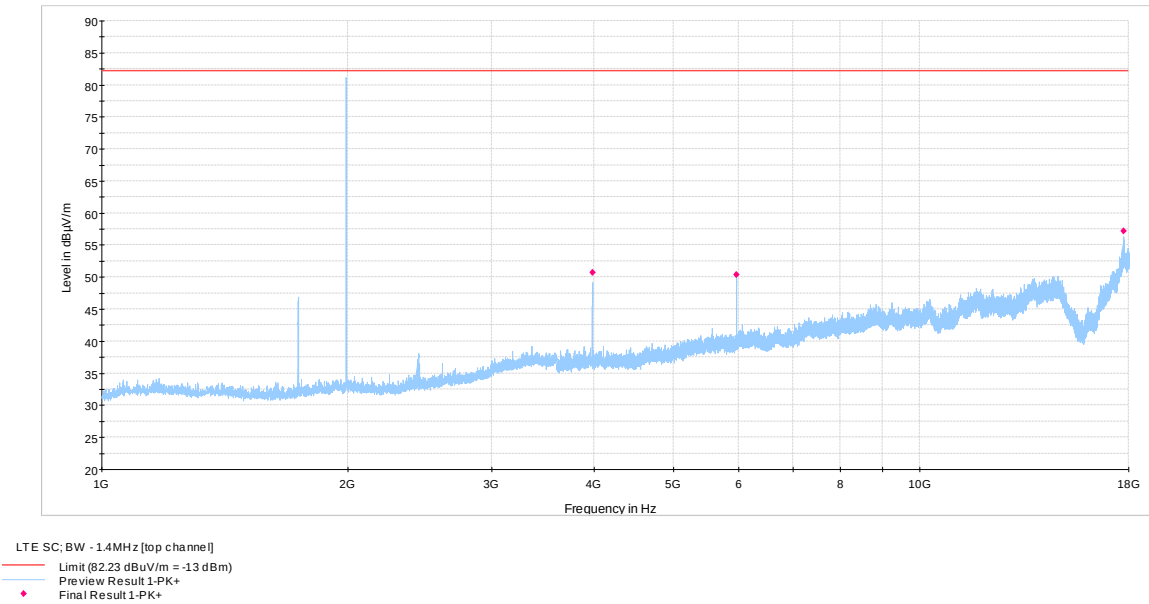


Figure 8.1-8: 1 to 18 GHz – LTE, BW=1.4M, Top channel

Section 8

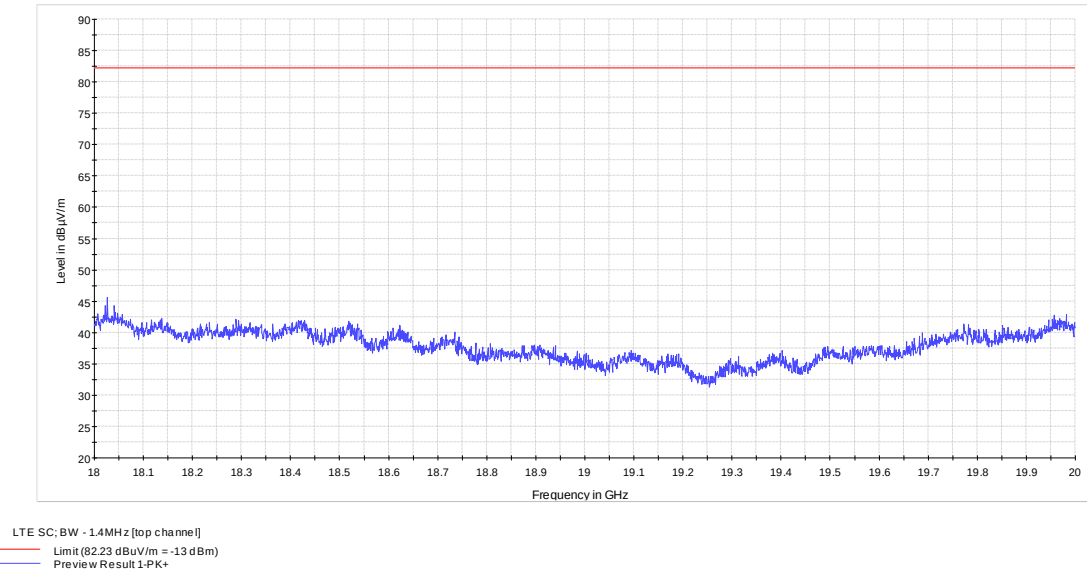
Test name

Specification

Testing data
FCC Part 24 Clause 24.238(a) Out of band emissions and RSS-133 Clause 6.5.1 (ii) Transmitter
Unwanted Emissions (Radiated)
FCC Part 24E and RSS-133



8.1.4 Test data, continued



Note: (Limit = 82.23 dBuV = -13 dBm)

Figure 8.1-9: 18 to 20 GHz – LTE, BW=1.4M, Top channel

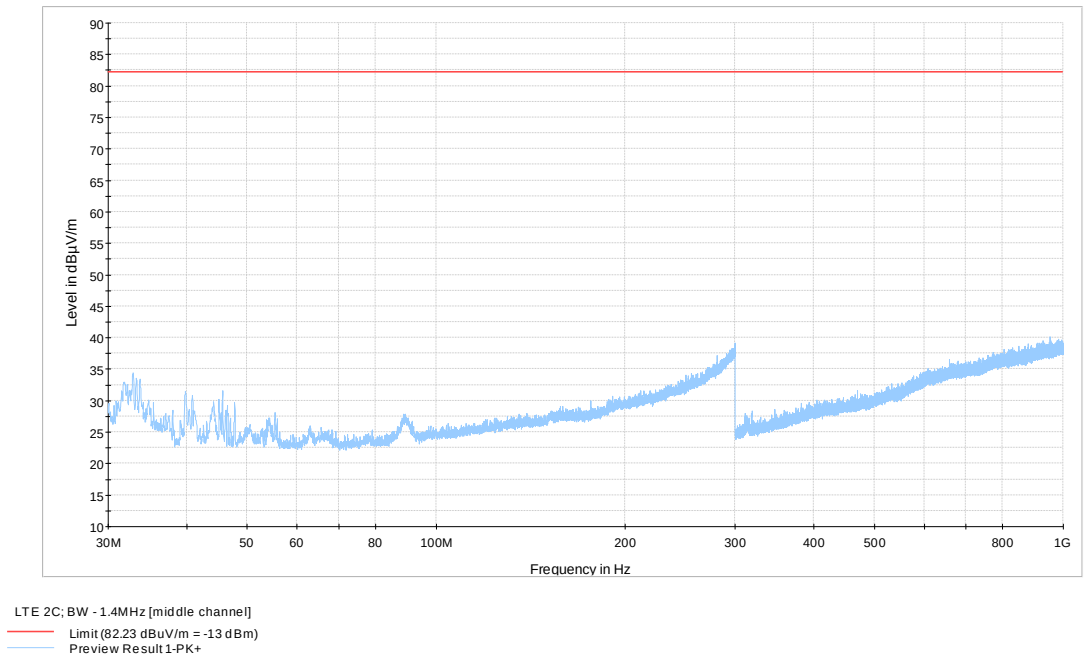


Figure 8.1-10: 30 to 1000 MHz – LTE, 2 Carriers, BW=1.4M, Middle channel

8.1.4 Test data, continued

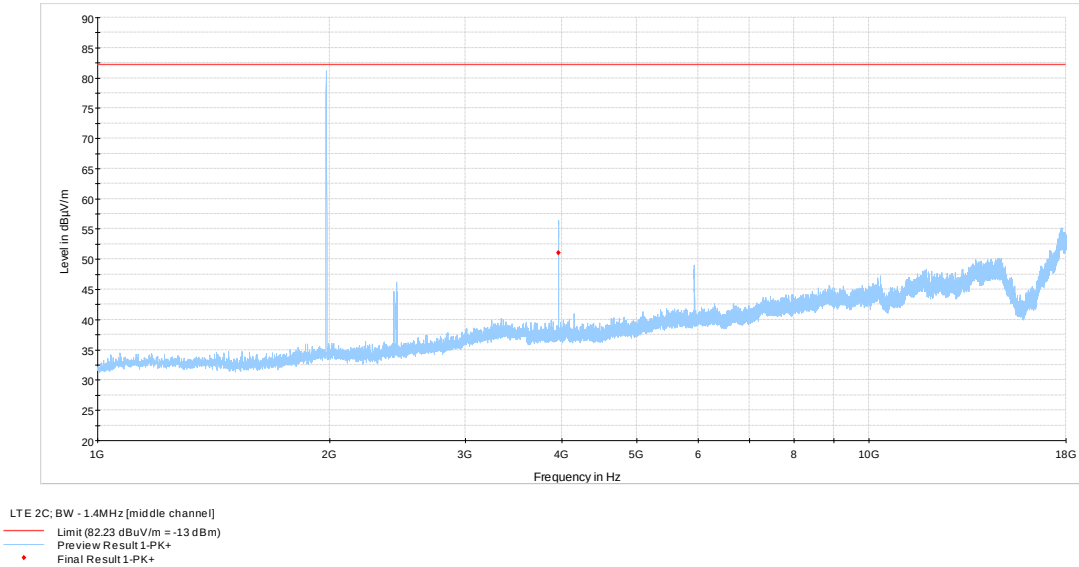
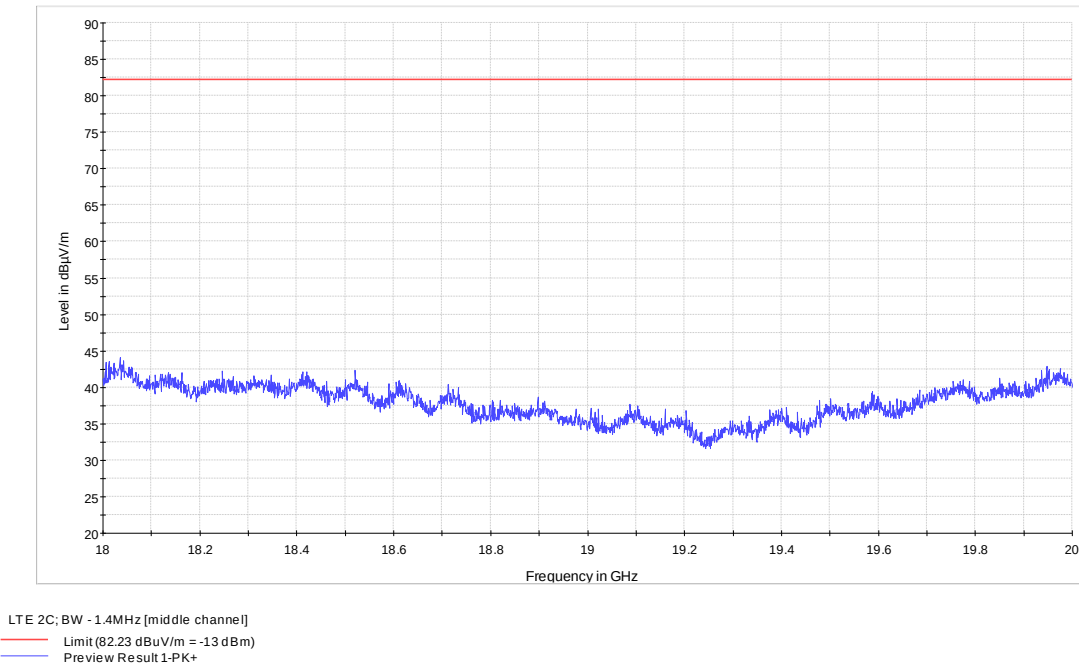


Figure 8.1-11: 1 to 18 GHz – LTE, 2 Carriers, BW=1.4M, Middle channel



Note: (Limit = 82.23 dBμV = -13 dBm)

Figure 8.1-12: 18 to 20 GHz – LTE, 2 Carriers, BW=1.4M, Middle channel

8.1.4 Test data, continued

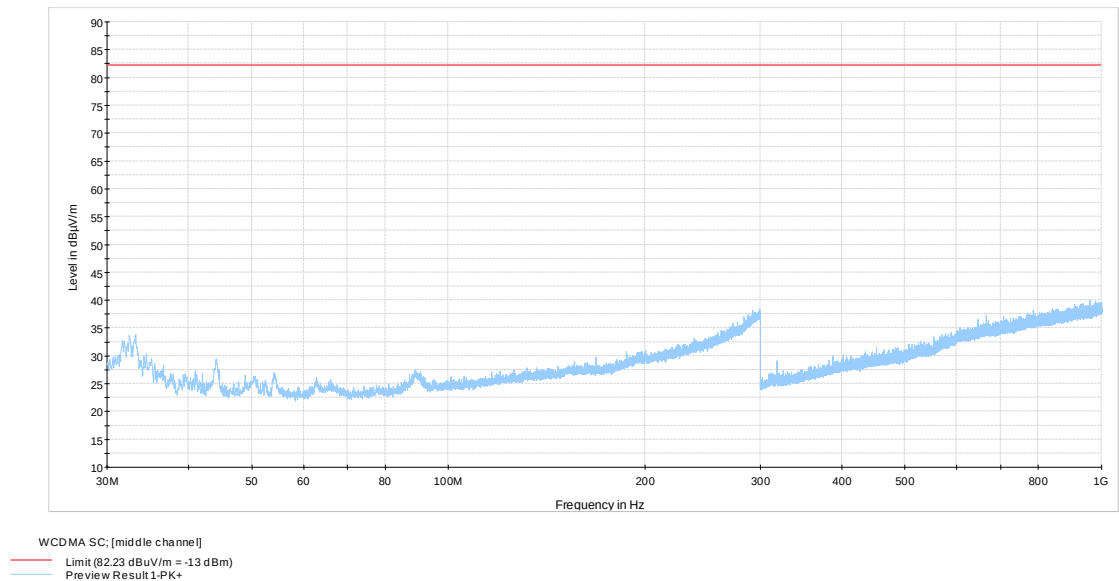


Figure 8.1-13: 30 to 1000 MHz – WCDMA, 1 Carrier, Middle Channel

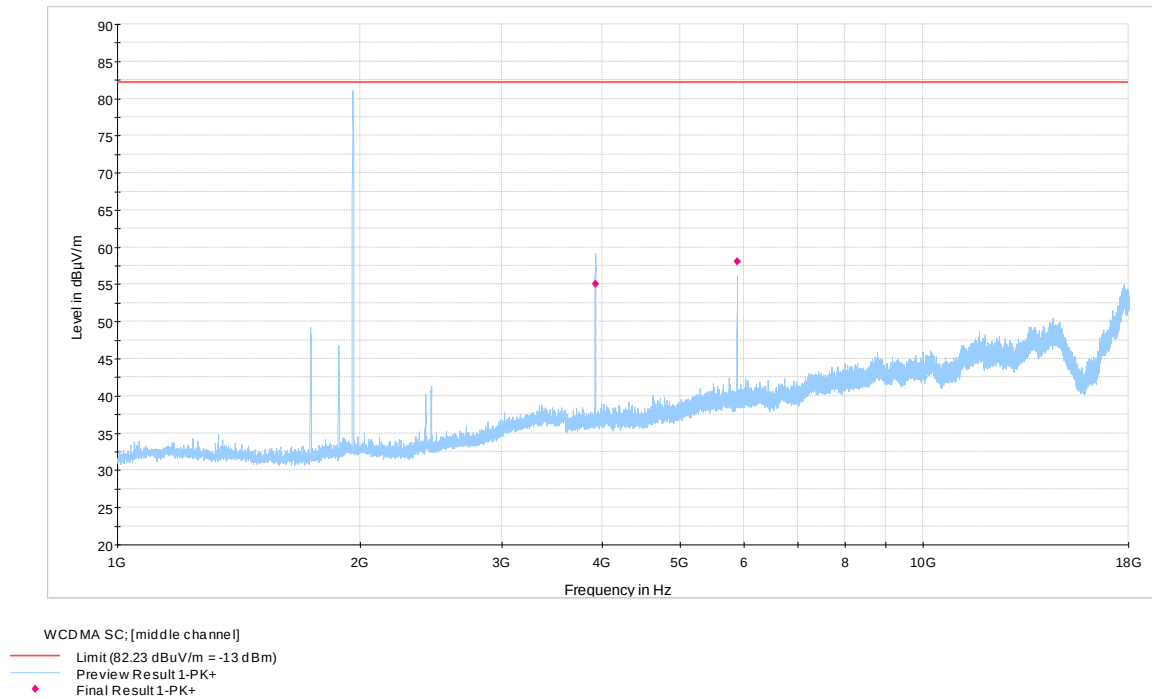


Figure 8.1-14: 1 to 18 GHz – WCDMA, 1 Carrier, Middle Channel

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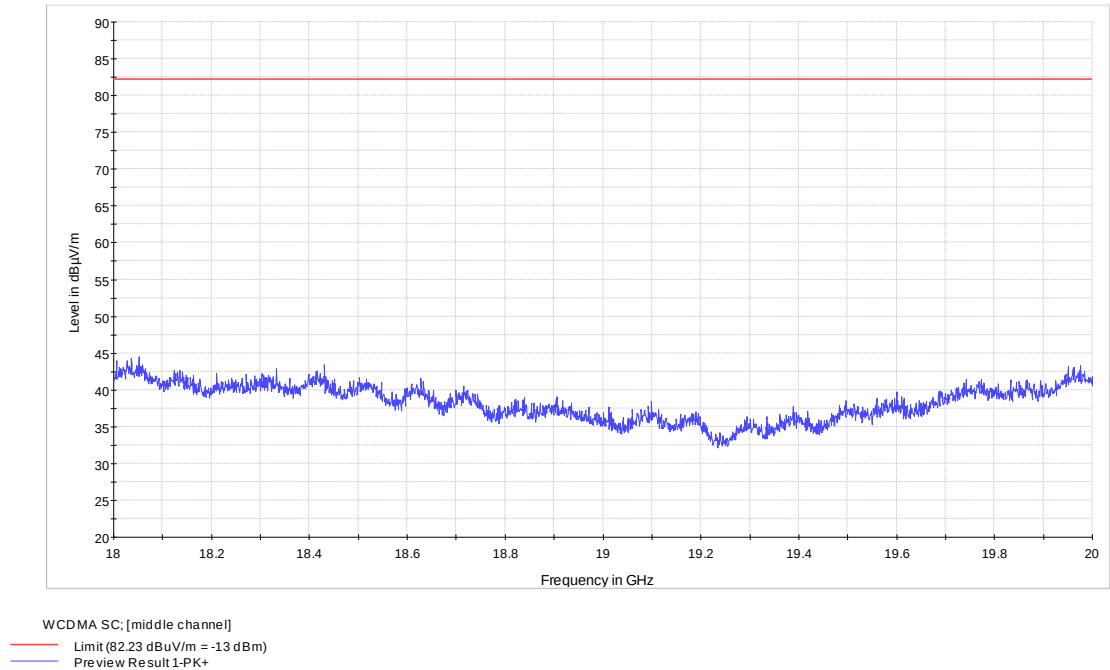
Test name

Specification

Testing data
FCC Part 24 Clause 24.238(a) Out of band emissions and RSS-133 Clause 6.5.1 (ii) Transmitter
Unwanted Emissions (Radiated)
FCC Part 24E and RSS-133



8.1.4 Test data, continued



Note: (Limit = 82.23 dBμV = -13 dBm)

Figure 8.1-15: 18 to 20 GHz – WCDMA, 1 Carrier, Middle Channel

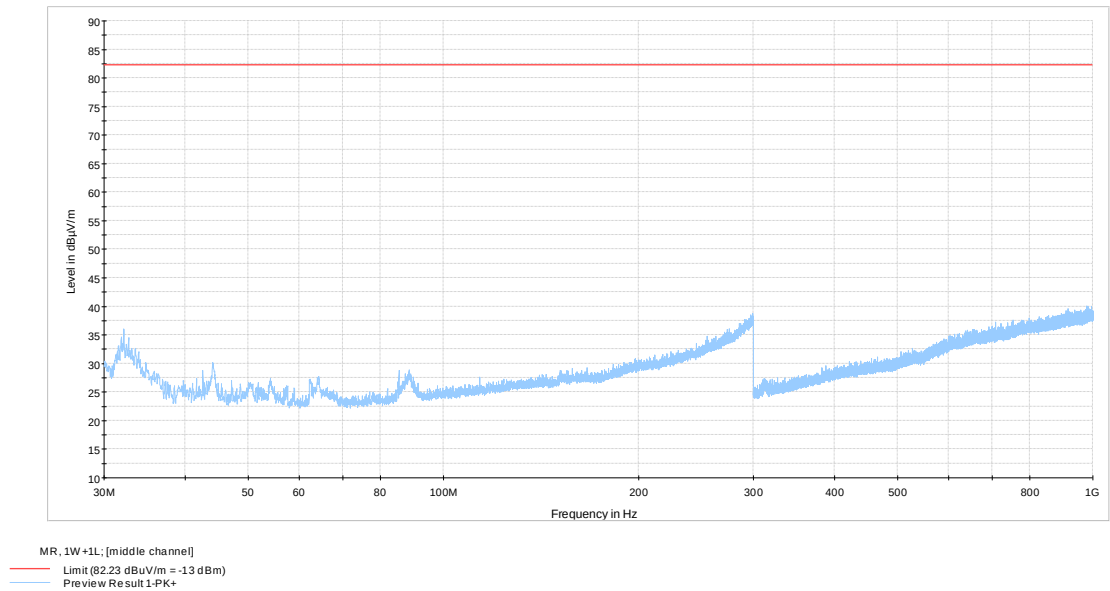


Figure 8.1-16: 30 to 1000 MHz – LTE+WCDMA Multi RAT, 1W+1L, Middle Channel

8.1.4

Test data, continued

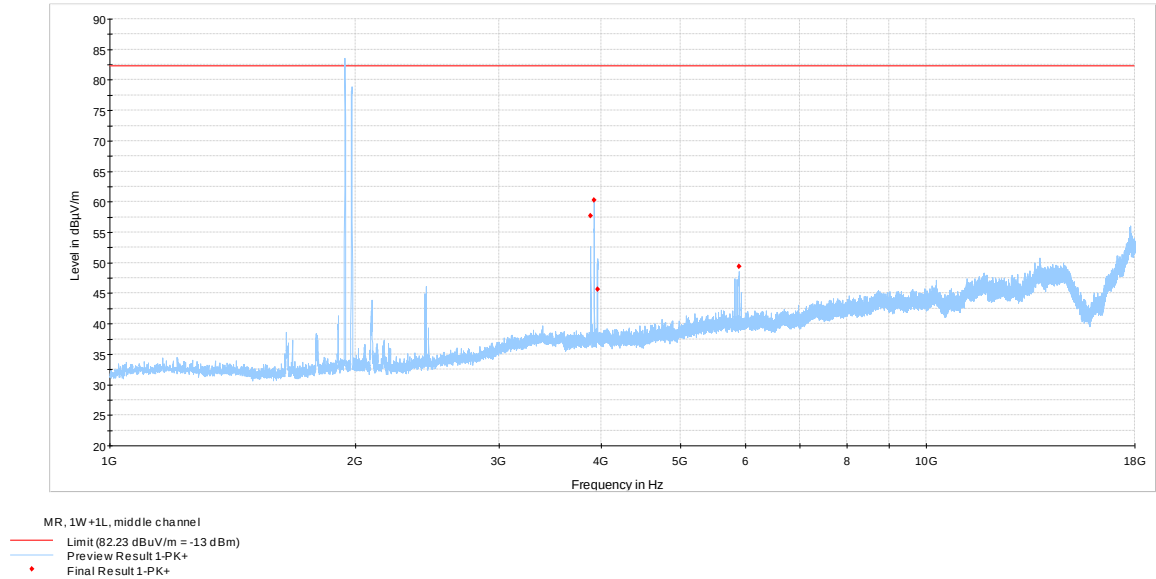
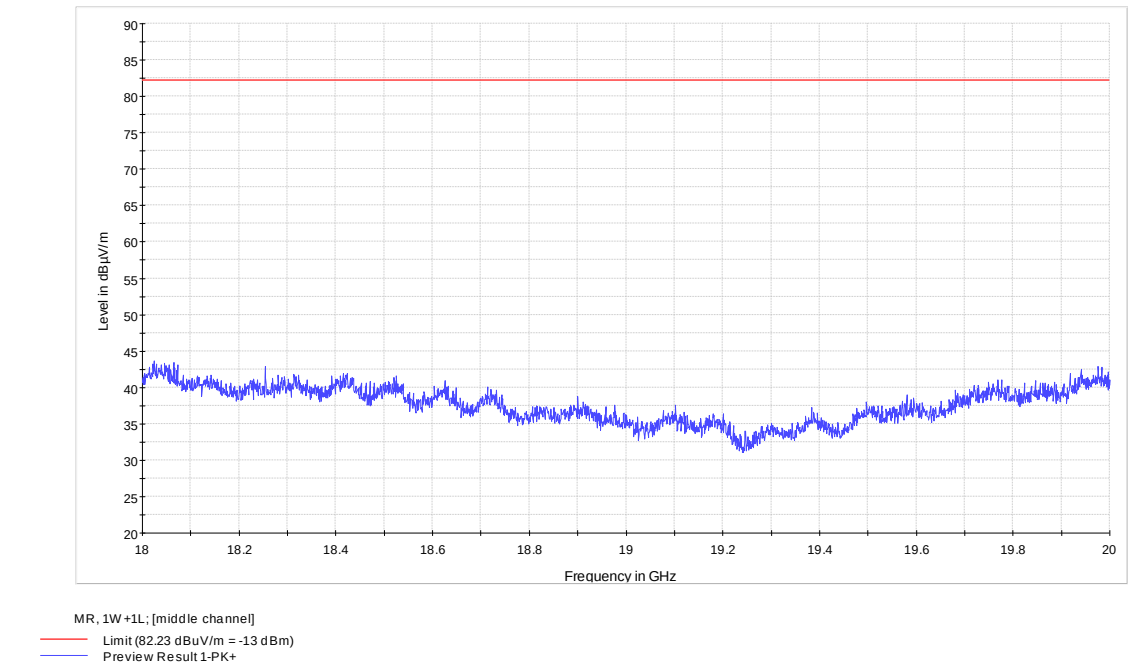


Figure 8.1-17: 1 to 18 GHz – LTE+WCDMA Multi RAT, 1W+1L, Middle Channel



Note: (Limit = 82.23 dBuV= -13 dBm)

Figure 8.1-18: 18 to 20 GHz – LTE+WCDMA Multi RAT, 1W+1L, Middle Channel

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Testing data

Test name

FCC Part 24 Clause 24.238(a) Out of band emissions and RSS-133 Clause 6.5.1 (ii) Transmitter
Unwanted Emissions (Radiated)

Specification

FCC Part 24E and RSS-133



8.1.5 Setup photos, continued

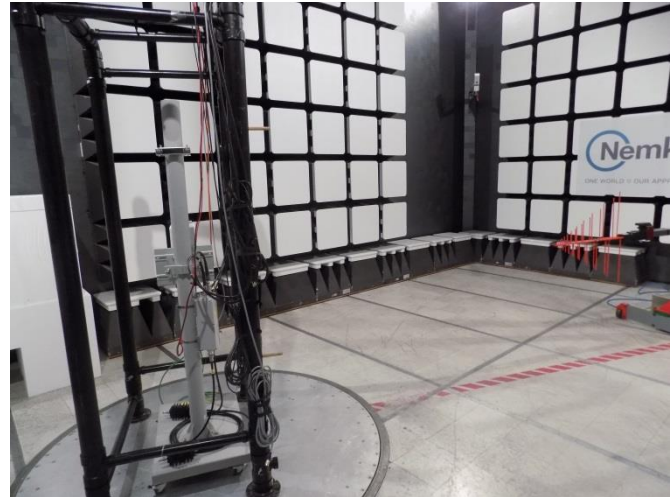


Figure 8.1-19: Setup photo – below 1 GHz

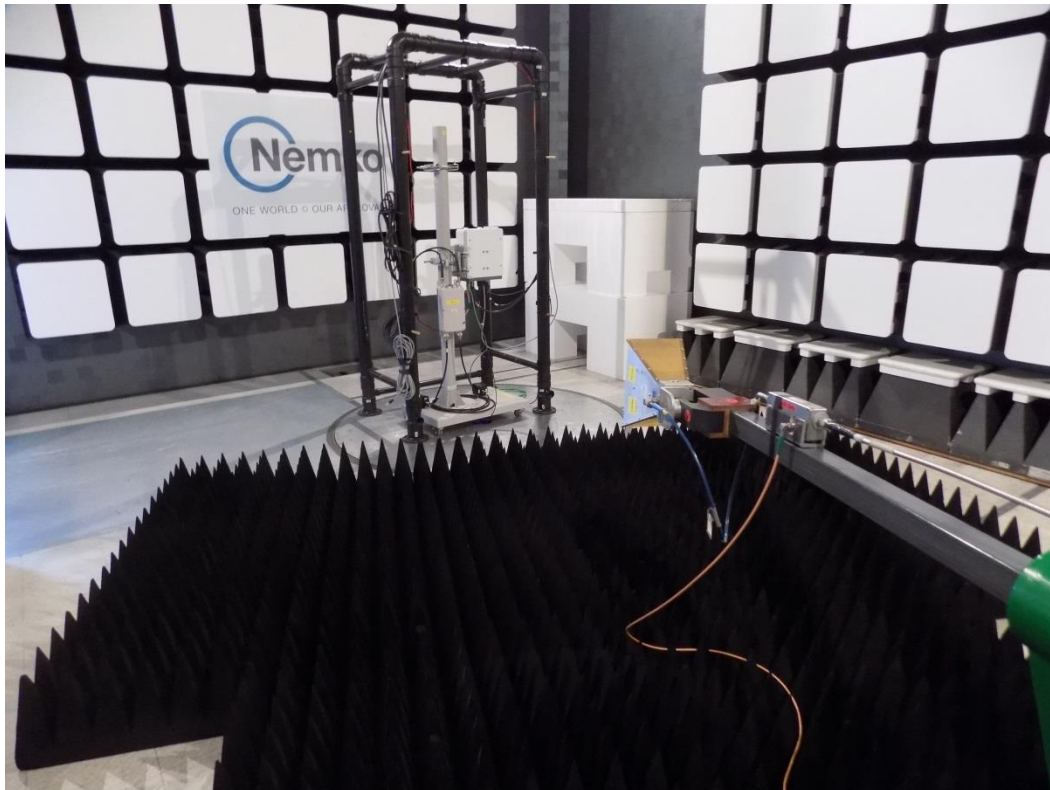
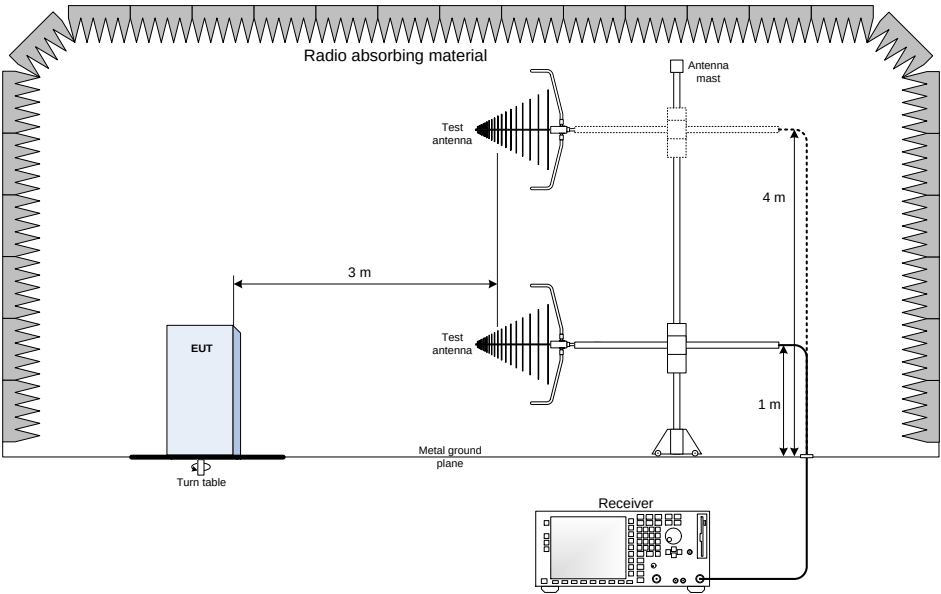


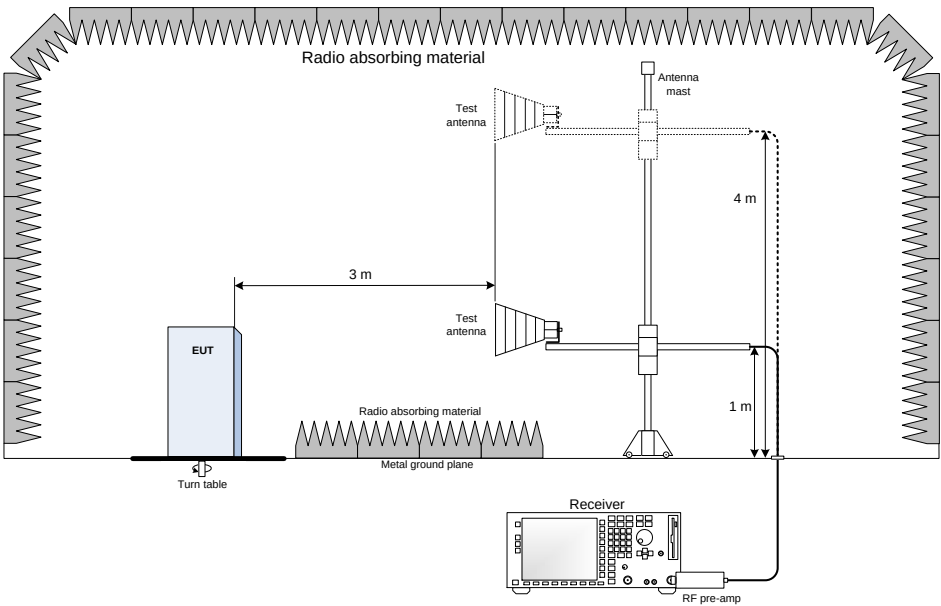
Figure 8.1-20: Setup photo – above 1 GHz

Section 9. Block diagrams of test set-ups

9.1 Radiated emissions set-up 30 to 1000 MHz



9.2 Radiated emissions set-up above 1 GHz



Section 10. EUT photos

10.1 External photos



Figure 10.1-1: Front view



Figure 10.1-2: Rear view



Figure 10.1-3: Side views



Figure 10.1-4: Bottom view