

Report number: **Equipment Under Test:** TRE7S8SC8A9S19AWAS **TEKO Telecom Srl** Applicant: Via Meucci, 24/a I-40024 Castel S. Pietro Terme (BO) FCC ID: XM2-EP6B Test specification: Title 47-Telecommunication Chapter I – Federal Communications Commission Subchapter A – General Part 22 - Public Mobile Services Subpart H – Cellular Radiotelephone Service 2014/03/27___ Reviewed by: Signature Date P. Barbieri, Wireless/EMC Specialist 2014/03/27 Reviewed by:

Signature

G. Curioni, Wireless/EMC Specialist

253922-3TRFWL

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Specification: FCC 22 Subpart H

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Section 1: Report summary

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Section 1: Report summary

This report contains an assessment of apparatus against specifications based upon tests carried out on samples submitted at Nemko Italy SpA.

Test specification:

FCC Part 22 Subpart H, Cellular Radiotelephone Service

Compliance status:	Complies
Exclusions:	None
Non-compliances:	None
Report release history:	Original release
Test location:	Nemko Italy S.p.A. Via del Carroccio 4, 20046, Biassono, Italy.
Registration number:	481407 (10 m Semi anechoic chamber)

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 Italy's ISO/IEC 17025 accreditation.

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FCC ID:

Date of receipt:

Section 2: Equipment under test

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Section 2: Equipment under test

2.1 Identification of equipment under test (EUT) The following information identifies the EUT under test: Type of equipment: Product marketing name: Teko Telecom Srl Model number: TRE7S8SC8A9S19AWAS Serial number: 132059001 Nemko sample number: -----

2.2 Accessories and support equipment

XM2-EP6B

2014-03-03

The following information identifies accessories used to exercise the EUT during testing:

Only setup See 3.4 test equipment and photo

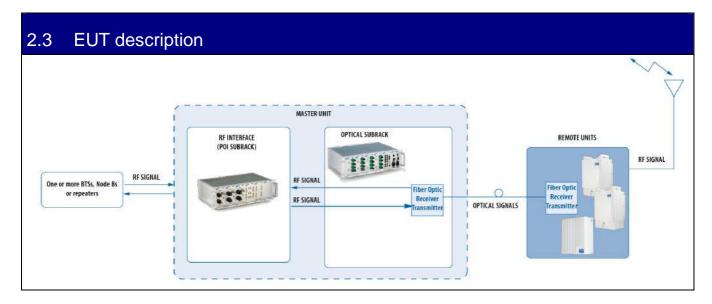


Section 2: Equipment under test

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Section 2: Equipment under test, continued



2.4 Technical specifications of the EUT

Operating band:	Down Link 869-894 MHz; Up Link 824-849 MHz				
Operating frequencies:	Wideband				
Modulation type:	GSM, EDGE, CDMA, WCDMA, LTE (QAM and QPSK)				
Occupied bandwidth:	GSM and EDGE: 200 kHz;				
	CDMA: 1,25 MHz,				
	WCDMA: 5 MHz				
	LTE: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz				
Channel spacing:	Standard				
Emission designator:	GSM and EDGE: GXW;				
	CDMA, WCDMA: F9W,				
	LTE: D7W				
RF Output	Down Link: 31dBm (1,25W)				
	Up Link: N.A. (The EUT does not transmit over the air in the up-link				
	direction)				
Gain	Down Link: 36dB				
	Up Link: N.A. (The EUT does not transmit over the air in the up-link				
	direction)				
Antenna data:	No antenna provided				
Antenna type: No antenna provided					
	External Antenna				
	(Equipment that has an external 50 Ω RF connector)				
Power source	100-240 Vac				

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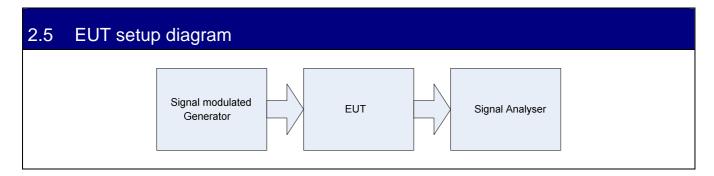


Section 2: Equipment under test

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Section 2: Equipment under test, continued



2.6 Operation of the EUT during testing

In down-link direction, normal working at max gain with max RF power output

2.7 Modifications incorporated in the EUT

None/Comments (Performed by: Client or Nemko)

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



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Section 3: Test conditions

3.1 Deviations from laboratory tests procedures

No deviations were made from laboratory test procedures.

3.2 Test conditions, power source and ambient temperatures					
Normal temperature, humidity and air pressure test conditions	Temperature: 15–30 °C Relative humidity: 30–60 % Air pressure: 860–1060 hPa				
	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.				
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 ±5 %, for which the equipment was designed.				



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Section 3: Test conditions, continued

3.3 Measurement uncertainty

Nemko S.p.A. measurement uncertainty has been calculated using the standard CISPR 16-4-2 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modeling – Uncertainty in EMC measurements". All calculations have been performed to provide a confidence level of 95 % and can be found in Nemko S.p.A. document WML1002.



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3.4 Test equipment

Client's property:

Identification number	Description	Manufacturer model	s/n	Cal. Due	
1a	Vector Signal Generator	Agilent N5182A MXG	MY48180714	May 2015	
1b	Vector Signal Generator	Agilent E4438C ESG	MY45094485	Ago 2016	
2a	Spectrum Analyzer	Agilent E4440A	US40420470	May 2015	
2b	Spectrum Analyzer	Agilent E9020A MXA	MY48011812	Ago 2015	
3	Network Analyzer	Agilent E5071B	MY42301133	Ago 2016	
4	Climatic chamber	Angelantoni Hygros 600	7237	Nov 2014	

Property of Nemko Italy:

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle months	Next cal.	
Trilog Broad Band Antenna 25-2000 MHz	Schwarzbeck	VULB 9168	VULB 9168- 242	36	02/2015	
Trilog Broad Band Antenna 25-8000 MHz	Schwarzbeck	VULB 9162	VULB 9162- 25	36	05/2015	
Antenna 1-18 GHz	Schwarzbeck	STLP 9148	STPL 9148- 123	36	02/2015	
Double ridge waveguide horn	RFspin	DRH40	061106A40		08/2016	
Preamplifier 18-40 GHz	Miteq	JS44	1648665		09/2014	
Broadband preamplifier 1-18 GHz	Schwarzbeck	BBV 9718	9718-137	36	09/2014	
EMI receiver 20 Hz ÷ 8 GHz	R&S	ESU8	100202	12	02/2015	
EMI receiver 20 Hz ÷ 3 GHz	R&S	ESCI	100888	12	08/2014	
Hydraulic revolving platform	Nemko	RTPL 01	4.233		NCR	
Turning-table	R&S	HCT	835 803/03		NCR	
Antenna mast	R&S	HCM	836 529/05		NCR	
Controller	R&S	HCC	836 620/7		NCR	
Spectrum Analyzer 9kHz ÷ 40GHz	R&S	FSEK	848255/005		08/2014	
Semi-anechoic chamber	amber Nemko 10m semi-anechoic 530 chamber			08/2014		
Shielded room	Siemens	10m control room	1947		NCR	
Semi-anechoic chamber	Nemko	10m semi-anechoic chamber	70		NCR	
Shielded Room	Siemens	3m semi-anechoic chamber	3		NCR	
Motor controller	Emco	1051-25	9012-1559		NCR	
Motor controller	Emco	1061-1.521	9012-1508		NCR	
Antenna Tower	Emco	2071-2	9601-1940		NCR	
Controller pole/table	Emco	2090	9511-1099		NCR	
V-Network	Rohde & Schwarz	ESH2-Z5	872 460/041	12	09/2014	

Note: N/A = Not applicable, NCR = No cal required, COU = Cal on use



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Section 4: Result summary

4.1 Test results

The apparatus was assessed against the following specifications:

FCC Part 2 Subpart J, Equipment Authorization Procedures

FCC Part 22 Subpart H Cellular Radiotelephone Service

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N	No : not applicable / not relevant.
Υ	Yes: Mandatory i.e. the apparatus shall conform to these tests.
N/T	Not Tested, mandatory but not assessed. (See report summary)

Part	Test description	Required	Result
§22.913(a)	Effective radiated power limits (500 W erp)	Υ	Pass
§2.1049	Occupied bandwidth (Input/Output)	Υ	Pass
§22.917	Out of band emissions (antenna terminals)	Υ	Pass
§22.917	Field Strength of Spurious Emissions	Υ	Pass
§22.355	Frequency tolerance	N	N/A a)
	Filter Frequency Response	Υ	Pass

Notes:

a) NOT APPLICABLE: Modulation/frequency conversion circuitry not in use. No frequency change in EUT (input and output have same frequency)



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Appendix A: Test results

Clause 22.913(a) Effective radiated power limits

The effective radiated power (ERP) of transmitters in the Cellular Radiotelephone Service must not exceed the limits in this section.

- (a) Maximum ERP. In general, the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts (57 dBm). However, for those systems operating in areas more than 72 km (45 miles) from international borders that:
 - Are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census; or,
 - (2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in §22.949, the ERP of base transmitters and cellular repeaters of such systems must not exceed 1000 Watts (60 dBm). The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts (38.45 dBm).

Test date: 2014-03-05

Test results: Pass

Special notes

Conducted measurement were performed:

The power was measured using spectrum analyzer with RMS detector / average power meter.

In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13dB

Only conducted measurement at antenna connector was possible, no antenna provided by manufacturer



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Clause 22.913(a) RF power output, continued

Test data

Conducted measurement

Test data					
Direction	Modulation	Frequency (MHz)	RF output Power (dBm)	RF output channel Power (W)	PAR (dB)
Down-link	GSM (200 kHz)	881.5	31.13	1.30	0.07
Down-link	EDGE (200 kHz)	881.5	31.10	1.29	3.43
Down-link	CDMA (1,25MHz)	881.5	31.08	1.28	9.20
Down-link	WCDMA (5MHz)	881.5	31.17	1.31	10.90
Down-link	LTE (QAM, 1,4MHz)	881.5	31.06	1.28	10.15
Down-link	LTE (QPSK, 1,4MHz)	881.5	31.14	1.30	9.70
Down-link	LTE (QAM, 3MHz)	881.5	31.13	1.30	10.35
Down-link	LTE (QPSK, 3MHz)	881.5	31.07	1.28	10.59
Down-link	LTE (QAM, 5MHz)	881.5	31.18	1.31	10.84
Down-link	LTE (QPSK, 5MHz)	881.5	31.11	1.29	10.32
Down-link	LTE (QAM, 10MHz)	881.5	31.18	1.31	10.88
Down-link	LTE (QPSK, 10MHz)	881.5	31.19	1.31	10.74



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Test data

Mod. GSM

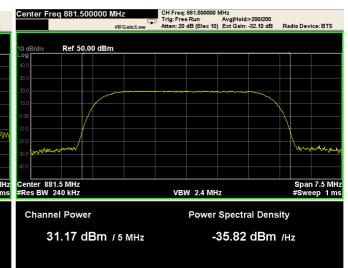
Ref Offset 32.1 dB Ref 50.00 dBm Ref Solve dBm Re

Mod. EDGE



Mod. CDMA

Mod. WCDMA

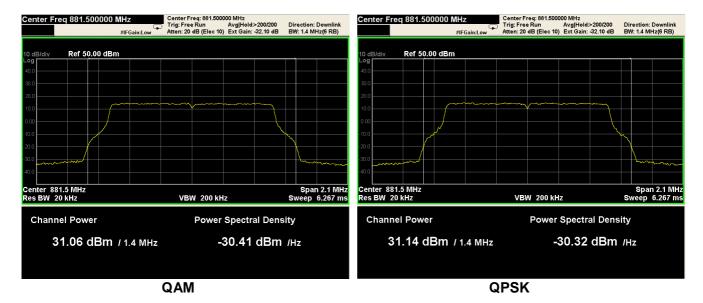




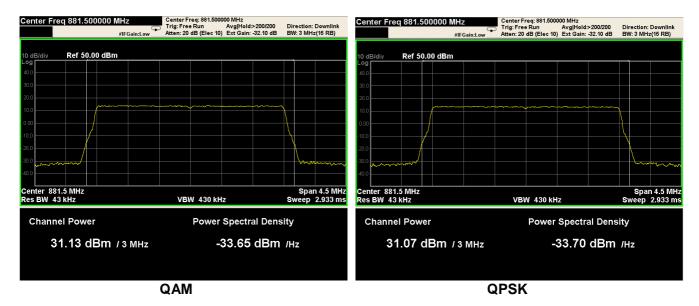
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Mod. LTE 1,4MHz (Down-link)



Mod. LTE 3MHz (Down-link)

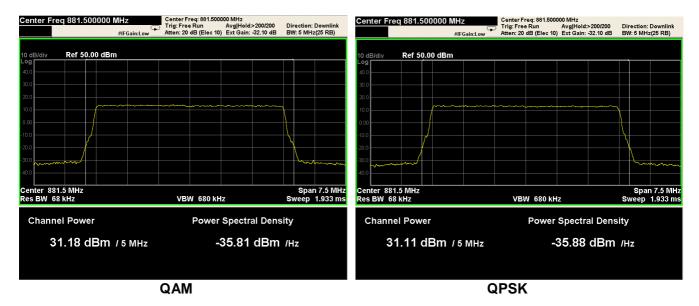




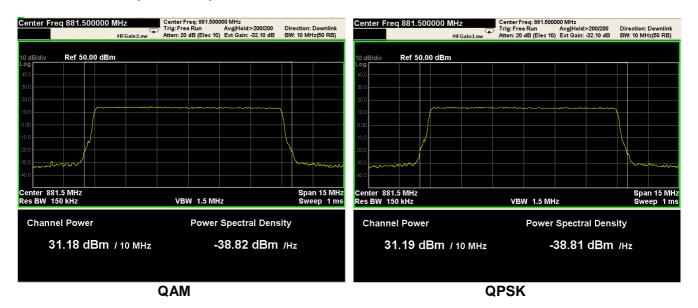
Report number: 253922-3TRFWL

Specification: FCC 22 Subpart H

Mod. LTE 5MHz (Down-link)



Mod. LTE 10MHz (Down-link)





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Clause 2.1049 Occupied bandwidth (input/output)

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

Test date: 2014-03-05
Test results: Pass

Special notes

Resolution bandwidth was set wider or equal than occupied bandwidth.



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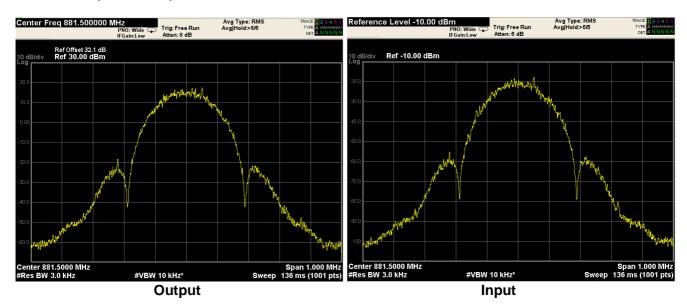
Specification: FCC 22 Subpart H

Clause Occupied bandwidth (input/output), continued

Mod. GSM (Down-link)



Mod. EDGE (Down-link)

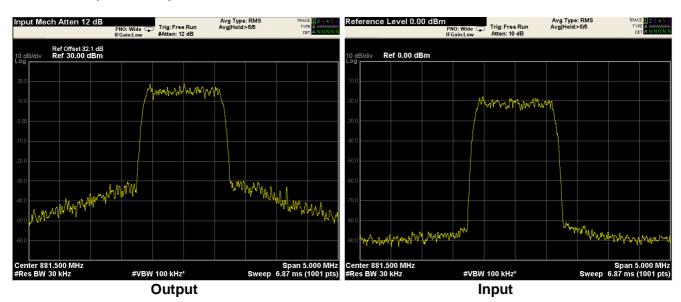




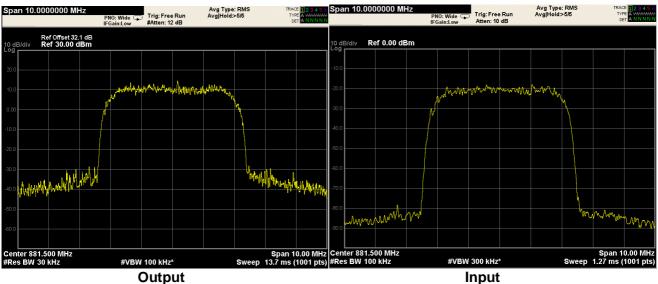
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Mod. CDMA (Down-link)



Mod. WCDMA (Down-link)



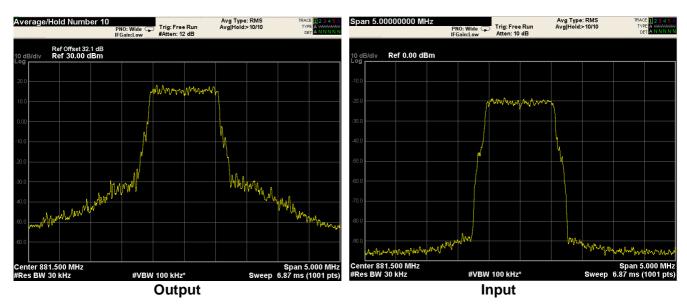
Input



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Mod. LTE 1.4MHz (QAM) (Down-link)



Mod. LTE 1.4MHz (QPSK) (Down-link)

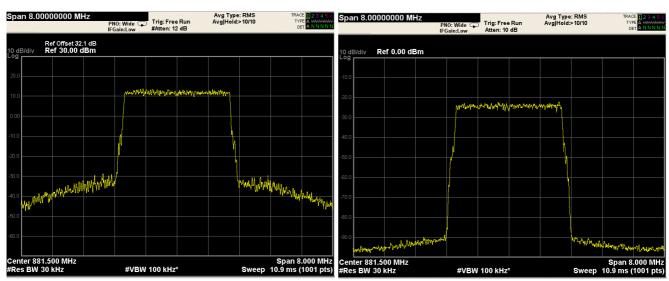




Report number: 253922-3TRFWL

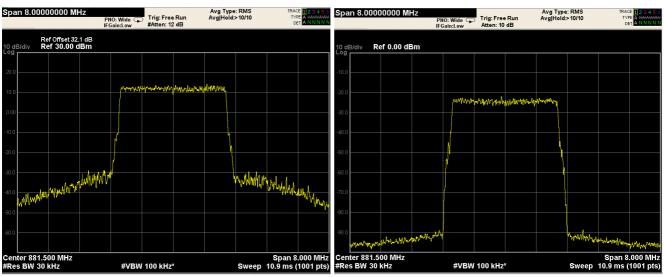
Specification: FCC 22 Subpart H

Mod. LTE 3MHz (QAM) (Down-link)



Output Input

Mod. LTE 3MHz (QPSK) (Down-link)



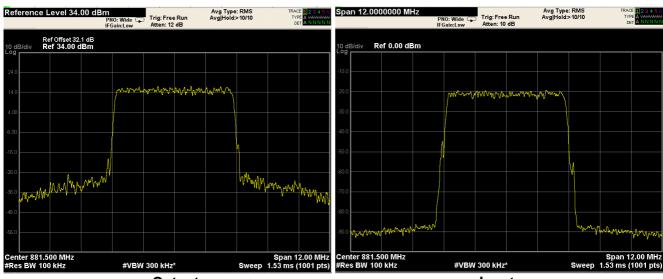
Output Input



Report number: 253922-3TRFWL

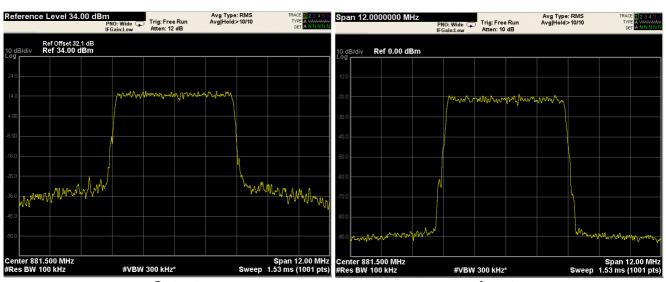
Specification: FCC 22 Subpart H

Mod. LTE 5MHz (QAM) (Down-link)



Output Input

Mod. LTE 5MHz (QPSK) (Down-link)



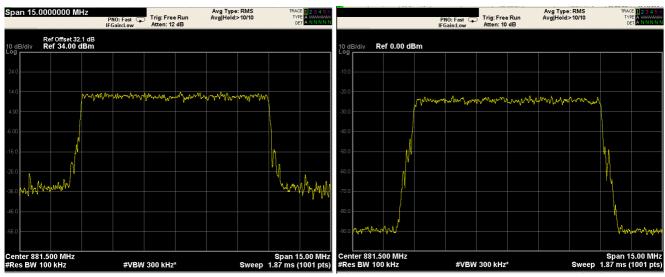
Output Input



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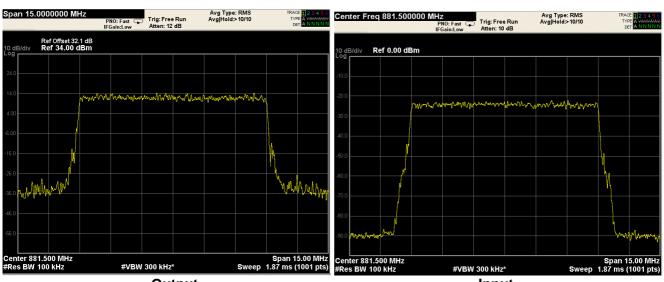
Specification: FCC 22 Subpart H

Mod. LTE 10MHz (QAM) (Down-link)



Output Input

Mod. LTE 10MHz (QPSK) (Down-link)



Output Input



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Clause 22.917 Out of band emissions at antenna terminal

- (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.
- (b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified).

Test date: 2014-03-05

Test results: Pass

Special notes

The spectrum was searched from 30 MHz up to 10th harmonic

Only the worst data presented in the test report.

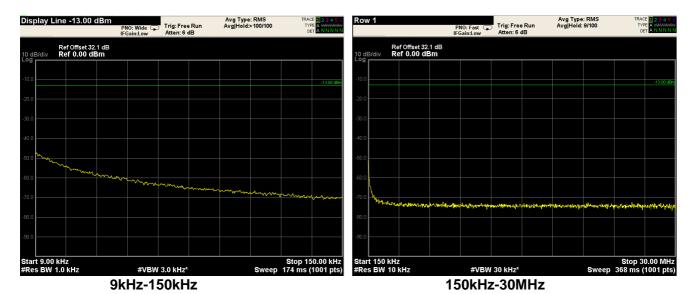


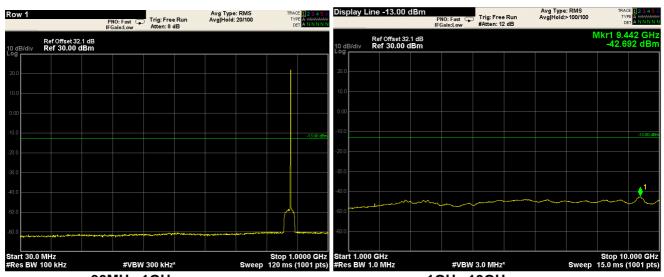
Report number: 253922-3TRFWL

Specification: FCC 22 Subpart H

Clause 22.917(a) Out of band spurious emissions at antenna terminal

Mod. GSM (Down-link)





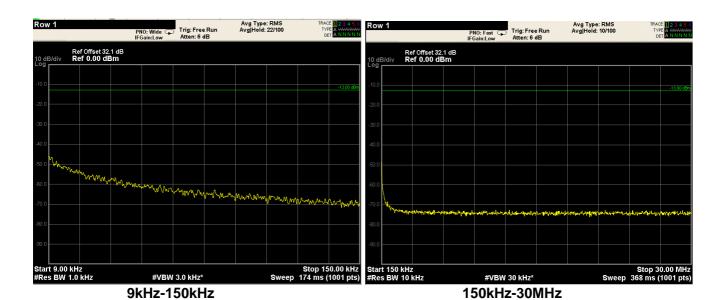
30MHz-1GHz 1GHz-10GHz



Report number: 253922-3TRFWL

Specification: FCC 22 Subpart H

Mod. EDGE (Down-link)



Marker 1 507.240000000 MHz
Pito: Fast | Pito

30MHz-1GHz 1GHz-10GHz

#VBW 3.0 MHz*

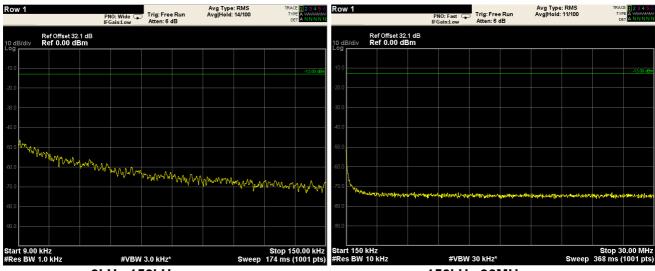
#VBW 300 kHz*



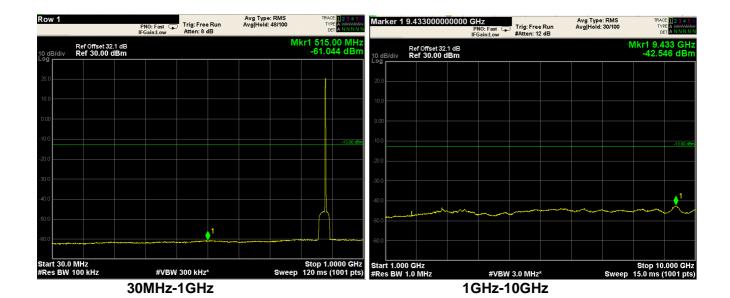
Report number: 253922-3TRFWL

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Mod. CDMA (Down-link)



9kHz-150kHz 150kHz-30MHz

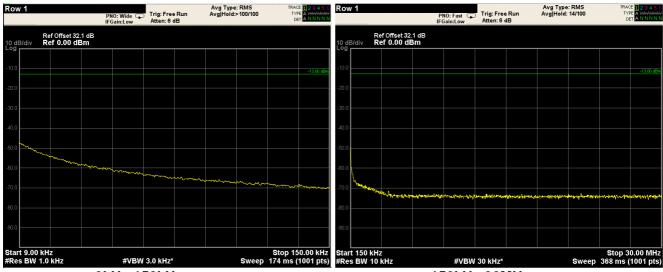




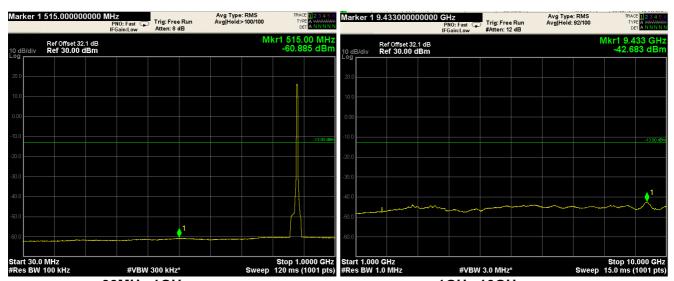
Report number: 253922-3TRFWL

Specification: FCC 22 Subpart H

Mod. WCDMA (Down-link)



9kHz-150kHz 150kHz-30MHz



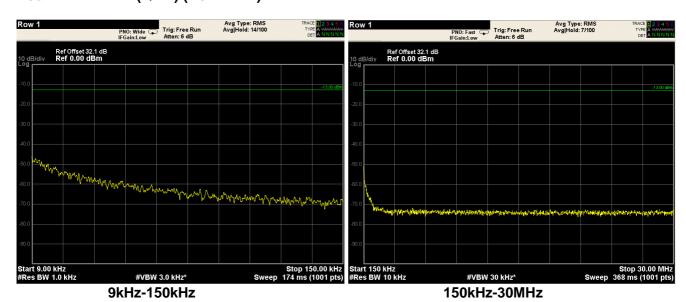
30MHz-1GHz 1GHz-10GHz



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Mod. LTE 1.4MHz (QAM) (Down-link)





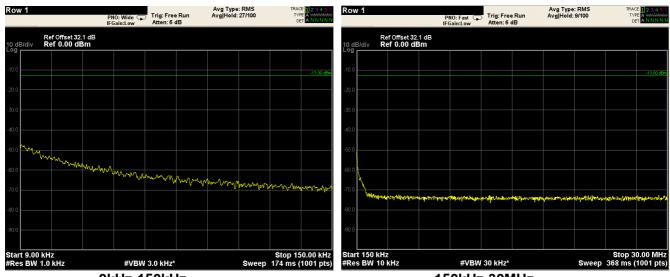
1GHz-10GHz



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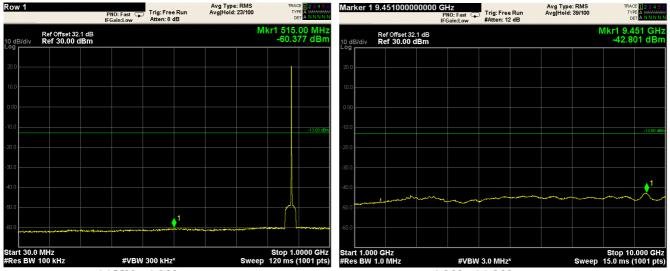
Specification: FCC 22 Subpart H

Mod. LTE 1.4MHz (QPSK) (Down-link)



9kHz-150kHz

150kHz-30MHz



30MHz-1GHz

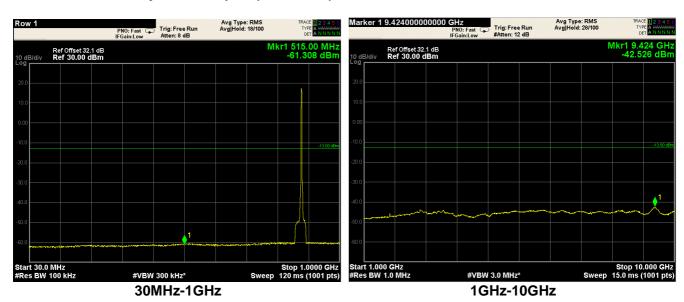
1GHz-20GHz



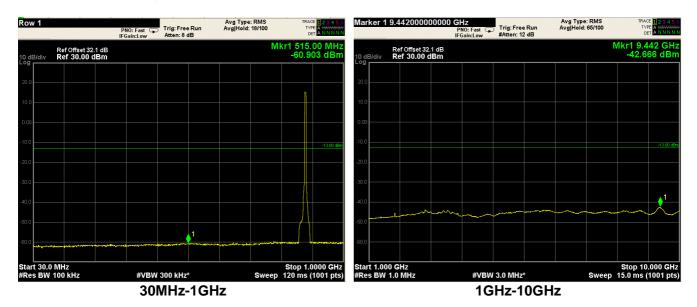
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Mod. LTE 3MHz, only 30M-10G plot (Down-link)



Mod. LTE 5MHz, only 30M-10G plot (Down-link)

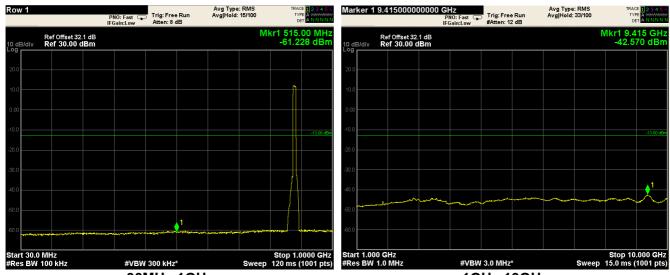




Report number: 253922-3TRFWL

Specification: FCC 22 Subpart H

Mod. LTE 10MHz, only 30M-10G plot (Down-link)





Report number: 253922-3TRFWL

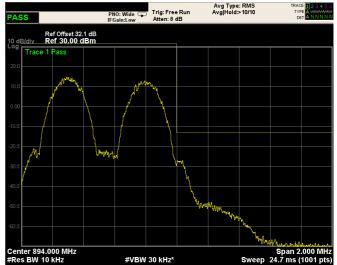
Specification: FCC 22 Subpart H

Clause 22.917(a) Out of band emissions at antenna terminal, continued

Test data, continued band edges Inter modulation:

Mod. GSM (Down-link)





Low Band Edge

High Band Edge

Mod. EDGE (Down-link)





Low Band Edge

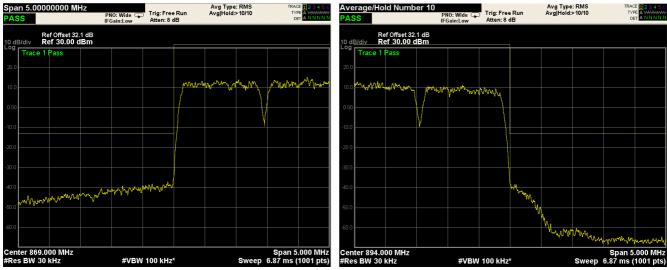
High Band Edge



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Mod. CDMA (Down-link)



Low Band Edge

High Band Edge



Low Band Edge

High Band Edge



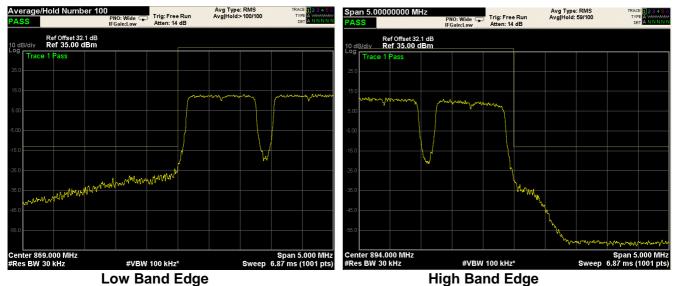
Report number: 253922-3TRFWL

Specification: FCC 22 Subpart H

Mod. LTE 1.4MHz (QAM) (Down-link)



Mod. LTE 1.4MHz (QPSK) (Down-link)



High Band Edge



Report number: 253922-3TRFWL

Specification: FCC 22 Subpart H

Mod. LTE 3MHz (QAM) (Down-link)



Low Band Edge

High Band Edge

Mod. LTE 3MHz (QPSK) (Down-link)



Low Band Edge

High Band Edge



Report number: 253922-3TRFWL

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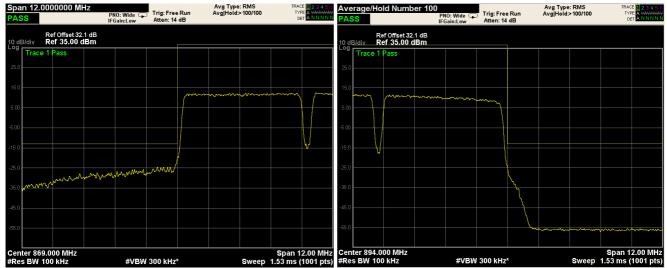
Mod. LTE 5MHz (QAM) (Down-link)



Low Band Edge

High Band Edge

Mod. LTE 5MHz (QPSK) (Down-link)



Low Band Edge

High Band Edge



Report number: 253922-3TRFWL

Specification: FCC 22 Subpart H

Mod. LTE 10MHz (QAM) (Down-link)



Mod. LTE 10MHz (QPSK) (Down-link)

Avg Type: RMS PRO: Fast | Trig: Free Run | Avg Type: RMS | Avg Hold: Trig: Free Run | Avg Type: RMS | Trig: Free Run | Avg Type: RMS | Avg Hold: Trig: Free Run | Avg Type: RMS | Avg Hold: Trig: Free Run | Avg Type: RMS | Avg Hold: Trig: Free Run | Avg Type: RMS | Avg Hold: Trig: Free Run | Avg Type: RMS | Avg Hold: Trig: Free Run | Avg Type: RMS | Avg Hold: Trig: Free Run | Avg Type: RMS | Avg Hold: Trig: Free Run | Avg Type: RMS | Avg Hold: Trig: Free Run | Avg Type: RMS | Avg Hold: Trig: Free Run | Avg Type: RMS | Avg Hold: Trig: Free Run | Avg Type: RMS | Avg Hold: Trig: Free Run | Avg Type: RMS | Avg Hold: Trig: Free Run | Avg Type: RMS | Avg Hold: Trig: Free Run | Avg Type: RMS | Avg Hold: Trig: Free Run | Avg Type: RMS | Avg Hold: Trig: Free Run | Avg Type: RMS | Avg Hold: Trig: Free Run | Avg Type: RMS | Avg Hold: Trig: Free Run | Avg Type: RMS | Avg Hold: Trig: Free Run

Low Band Edge High Band Edge



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Clause 22.917 Field strength of emissions

- (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.
- (b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified).

Test date: 2014-03-05.

Test results: Pass

Special notes

The spectrum was searched from 30 MHz up to 10th harmonic

- The EUT was measured on three orthogonal axis.
- All measurements were performed at a distance of 3 m.
- Only the worst data presented in the test report.
- The EUT's antenna port was terminated with 50 Ω termination.

Test Data

The D.U.T. was positioned according to the radiated emissions set-up

The D.U.T. antenna connector was terminated by a 50 Ω shielded dummy load.

The spectrum was searched from 30 MHz to 1 GHz (RBW 100 kHz) & 1 GHz (RBW 1 MHz) to the tenth harmonic of the carrier.

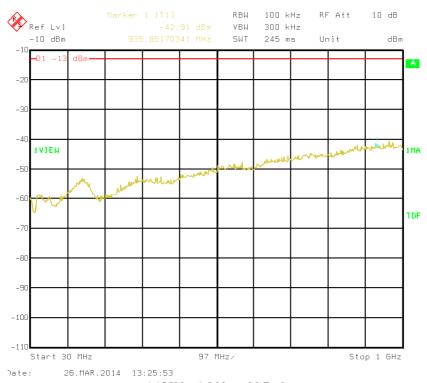
There were no emissions detected above the noise floor which was at least 20 dB below the specification limit.

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30MHz-1GHz - H Pol



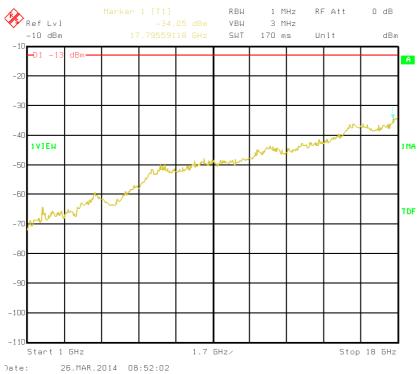
30MHz-1GHz - V Pol

Report number: 253922-3TRFWL

Specification: FCC 22 Subpart H



1GHz-18GHz - H Pol



1GHz-18GHz - V Pol



Report number: 253922-3TRFWL

Specification: FCC 22 Subpart H

Clause 22.355 Frequency tolerance

Except as otherwise provided in this part, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances as follows:

Base fixed station	Mobile station		
(ppm)	(ppm)		
1.5	2.5		

Test date:

Test results:

NOT APPLICABLE: Modulation/frequency conversion circuitry not in use. No frequency change in EUT (input and output have same frequency)

Special notes

The resolution bandwidth was set to 10 kHz, video bandwidth was set to 100 Hz

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Specification: FCC 22 Subpart H

Clause 22.355 Frequency tolerance, continued

Test data

Down-link

Conditions	Frequency (Hz)	Offset (ppm)	Limit (ppm)	Margin (ppm)
+50 °C, Nominal power				
+40 °C, Nominal power				
+30 °C, Nominal power				
+20 °C, +10% power				
+20 °C, Nominal power				
+20 °C, -10% power				
+10 °C, Nominal power				
0 °C, Nominal power				
-10 °C, Nominal power				
−20 °C, Nominal power				

• Note: Offset calculation: $\frac{F_{\textit{Measured}} - F_{\textit{reference}}}{F_{\textit{reference}}} \times 1.10^6$

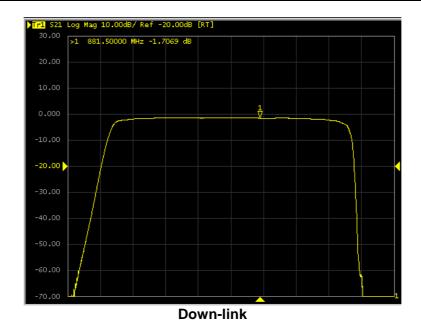
• Maximum frequency drift is kHz

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Filter Frequency Response

Test date: 2014-03-05.
Test results: Pass



Report number: 253922-3TRFWL

Specification: FCC 22 Subpart H

Photo Set up



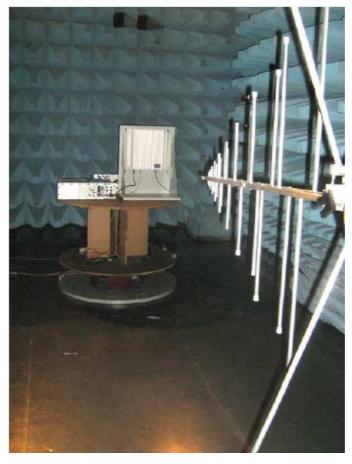




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Photo EUT







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Appendix B: Block diagrams

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Specification: FCC 22 Subpart H

Appendix B: Block diagrams of test set-ups

