Company: Rockwell Collins

Test of: SSR-7610

To: FCC Part 22 & IC RSS 132

Report No.: ROCK25-U9 Rev B

TEST REPORT

COMBINED TEST REPORT

FROM

Test of: SSR-7610

To: FCC CFR 47 Part 22 & IC RSS-132

Test Report Serial No.: ROCK25-U9 RevB

This report supersedes: ROCK25-U9 Rev A

Applicant:	Rockwell Collins 400 Collins Road NE Cedar Rapids, IA 52498 USA
Product Function:	Secure Server Router
Issue Date:	15th March 2017

This Test Report is Issued Under the Authority of:

MiCOM Labs, Inc.
575 Boulder Court
Pleasanton California 94566
USA
Phone: +1 (925) 462-0304
Fax: +1 (925) 462-0306
www.micomlabs.com

ACCREDITED
TESTING CERT #2381.01

MiCOM Labs is an ISO 17025 Accredited Testing Laboratory

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1. ACCREDITATION, LISTINGS & RECOGNITION

1.1. TESTING ACCREDITATION

MiCOM Labs, Inc. is an accredited Electrical testing laboratory per the international standard ISO/IEC 17025:2005. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.01. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-01.pdf

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Accredited Laboratory

A2LA has accredited

MICOM LABS

Pleasanton, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 4th day of February 2016.

President and CEO
For the Accreditation Council
Certificate Number 2381.01
Valid to March 31, 2018
Revised February 28, 2018

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

1.2. RECOGNITION

MiCOM Labs, Inc has widely recognized wireless testing capabilities. Our international recognition includes Conformity Assessment Body designation by APEC MRA countries. MiCOM Labs test reports are accepted globally.

Country	Recognition Body	Status	Phase	Identification No.
USA	Federal Communications Commission (FCC)	TCB	-	US0159 Listing #: 102167
Canada	Industry Canada (IC)	FCB	APEC MRA 2	US0159 Listing #: 4143A-2 4143A-3
Japan	MIC (Ministry of Internal Affairs and Communication)	CAB	APEC MRA 2	RCB 210
	VCCI	--	--	A-0012
Europe	European Commission	NB	EU MRA	NB 2280
Australia	Australian Communications and Media Authority (ACMA)	CAB	APEC MRA 1	US0159
Hong Kong	Office of the Telecommunication Authority (OFTA)	CAB	APEC MRA 1	
Korea	Ministry of Information and Communication Radio Research Laboratory (RRL)	CAB	APEC MRA 1	
Singapore	Infocomm Development Authority (IDA)	CAB	APEC MRA 1	
Taiwan	National Communications Commission (NCC) Bureau of Standards, Metrology and Inspection (BSMI)	CAB	APEC MRA 1	
Vietnam	Ministry of Communication (MIC)	CAB	APEC MRA 1	

EU MRA – European Union Mutual Recognition Agreement.
NB – Notified Body
APEC MRA – Asia Pacific Economic Community Mutual Recognition Agreement. Recognition agreement under which test lab is accredited to regulatory standards of the APEC member countries.

Phase I - recognition for product testing
Phase II – recognition for both product testing and certification

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1.3. PRODUCT CERTIFICATION

MiCOM Labs, Inc. is an accredited Product Certification Body per the international standard ISO/IEC 17065:2012. The company is accredited by the American Association for Laboratory Accreditation (A2LA) www.a2la.org test laboratory number 2381.02. MiCOM Labs test schedule is available at the following URL; http://www.a2la.org/scopepdf/2381-02.pdf

Accredited Product Certification Body

A2LA has accredited

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Pleasanton, CA

This product certification body is accredited in accordance with the recognized International Standard ISO/IEC 17065:2012 *Requirements for bodies certifying products, processes and services*. This product certification body also meets the *A2LA R322 – Specific Requirements – Notified Body Accreditation Requirements* and *A2LA R308 - Specific Requirements - ISO-IEC 17065 - Telecommunication Certification Body Accreditation Program*. This accreditation demonstrates technical competence for a defined scope and the operation of a management system.

Presented this 4th day of February 2016.

President and CEO
For the Accreditation Council
Certificate Number 2381.02
Valid to March 31, 2018
Revised February 28, 2018

For the product certification schemes to which this accreditation applies, please refer to the organization's Product Certification Scope of Accreditation.

United States of America – Telecommunication Certification Body (TCB)
Industry Canada – Certification Body, CAB Identifier – US0159
Europe – Notified Body (NB), NB Identifier - 2280
Japan – Recognized Certification Body (RCB), RCB Identifier - 210

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2. DOCUMENT HISTORY

Document History		
Revision	Date	Comments
Draft	9th March 2018	Draft Report for client review
Rev A	13th March 2018	Initial Release
Rev B	16th March 2018	Updated reference documents & sections

In the above table the latest report revision will replace all earlier versions.

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3. TEST RESULT CERTIFICATE

Manufacturer: Rockwell Collins Inc. 400 Collins Road NE Cedar Rapids, IA 52498 USA	**Tested By:** MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Model: SSR-7610	**Telephone:** +1 925 462 0304 **Fax:** +1 925 462 0306
Equipment Type: Secure Server Router	
S/N's: 4CY592	
Test Date(s): 13th -27th February 2018	**Website:** www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC CFR 47 Part 22 IC RSS-132	EQUIPMENT COMPLIES

MiCOM Labs, Inc. tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

Notes:

1. This document reports conditions under which testing was conducted and the results of testing performed.

2. Details of test methods used have been recorded and kept on file by the laboratory.

3. Test results apply only to the item(s) tested.

A2LA ACCREDITED
TESTING CERT #2381.01

Approved & Released for MiCOM Labs, Inc. by:

Graeme Grieve
Quality Manager MiCOM Labs, Inc.

Gordon Hurst
President & CEO MiCOM Labs, Inc.

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4. REFERENCES AND MEASUREMENT UNCERTAINTY

4.1. Normative References

REF.	PUBLICATION	YEAR	TITLE
I	KDB 971168 D01	October 27, 2017	Power Measurements License Digital Systems v03
II	KDB 971168 D02	November 3, 2018	Miscellaneous OOBE License Digital Systems v02r01
III	KDB 981606	March 5, 2008	Alternative out-of-band emission limits, Parts 22 and 24
IV	A2LA	August 2017	R105 - Requirement's When Making Reference to A2LA Accreditation Status
V	ANSI C63.26	2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
VI	ETSI TR 100 028	2001-12	Parts 1 and 2 Electromagnetic compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics
VII	FCC 47 CFR Part 22	2016	Personal Communications Services; Subpart H –Cellular Radiotelephone Service
VIII	RSS-132	Issue 3 Jan. 2013	Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894 MHz
IX	RSS-GEN	Issue 4 Nov. 2014	General Requirements for Compliance of Radio Apparatus
X	M 3003	Edition 3 Nov.2012	Expression of Uncertainty and Confidence in Measurements
XI	TIA-603	Rev. E 2016	Land Mobile FM or PM Communications Equipment Measurement and Performance
XII	DO-160G	2014	Environmental Conditions and Test Procedures for Airborne Equipment
XIII	TIA-603-D -2010	2010	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

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4.2. Test and Uncertainty Procedure

Conducted and radiated emission measurements were conducted in accordance with American National Standards Institute ANSI C63.26 listed in the Normative References section of this report.

Internal testing was performed by Rockwell Collins in accordance with DO-160G, Environmental Conditions and Test Procedures for Airborne Equipment. See Test report numbers 201723075 (EMI Report) and 201724077 (ENV Report).

Measurement uncertainty figures are calculated in accordance with ETSI TR 100 028 Parts 1 and 2.

Measurement uncertainties stated are based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95 % in accordance with UKAS document M 3003 listed in the Normative References section of this report.

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5. PRODUCT DETAILS AND TEST CONFIGURATIONS

5.1. Technical Details

Details	Description
Purpose:	Test of the Rockwell Collins SSR-7610 to FCC CFR 47 Part 22 Subpart H
Applicant:	Rockwell Collins Inc. 400 Collins Road NE Cedar Rapids, IA 52498 USA
Manufacturer:	As applicant
Laboratory performing the tests:	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Test report reference number:	ROCK25-U9 Rev B
Date EUT received:	5th February, 2018
Standard(s) applied:	to FCC CFR 47 Part 22 Subpart H
Dates of test (from - to):	13th -27th February 2018
No of Units Tested:	1
Product Family Name:	Rockwell Collins SSR-7610
Model(s):	SSR-7610
Location for use:	Indoors/ Vehicle
Declared Frequency Range(s):	WCDMA Band 5: UL: 824-849 MHz, DL: 869-894 MHz
Type of Modulation:	WCDMA
EUT Modes of Operation:	Bandwidth 5 MHz*
Declared Nominal Output Power (dBm):	+30
Transmit/Receive Operation:	Transceiver
Rated Input Voltage and Current:	115 Vac 400Hz
Operating Temperature Range:	-40ºC to +70ºC
ITU Emission Designator:	See Table in Section 5.7
Equipment Dimensions:	15.22in x 2.43in x 7.64in
Weight:	7.8 lbs
Hardware Rev:	822-3543-100 Revision
Software Rev:	Bootloader: 072-2836-002B Factory ETS: 072-2838-001

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5.2. Scope Of Test Program

Rockwell Collins SSR-7610 to FCC CFR 47 Part 22 Subpart H

The scope of the test program was to test the Rockwell Collins SSR-7610 configurations in the frequency ranges 824-849 MHz, 869-894 MHz for compliance against the following specification:

FCC CFR 47 Part 22 Subpart H
Compliance Measurement Procedures for Cellular Radiotelephone Service.

ISED RSS-132
Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894 MHz

Rockwell Collins SSR-7610, Top

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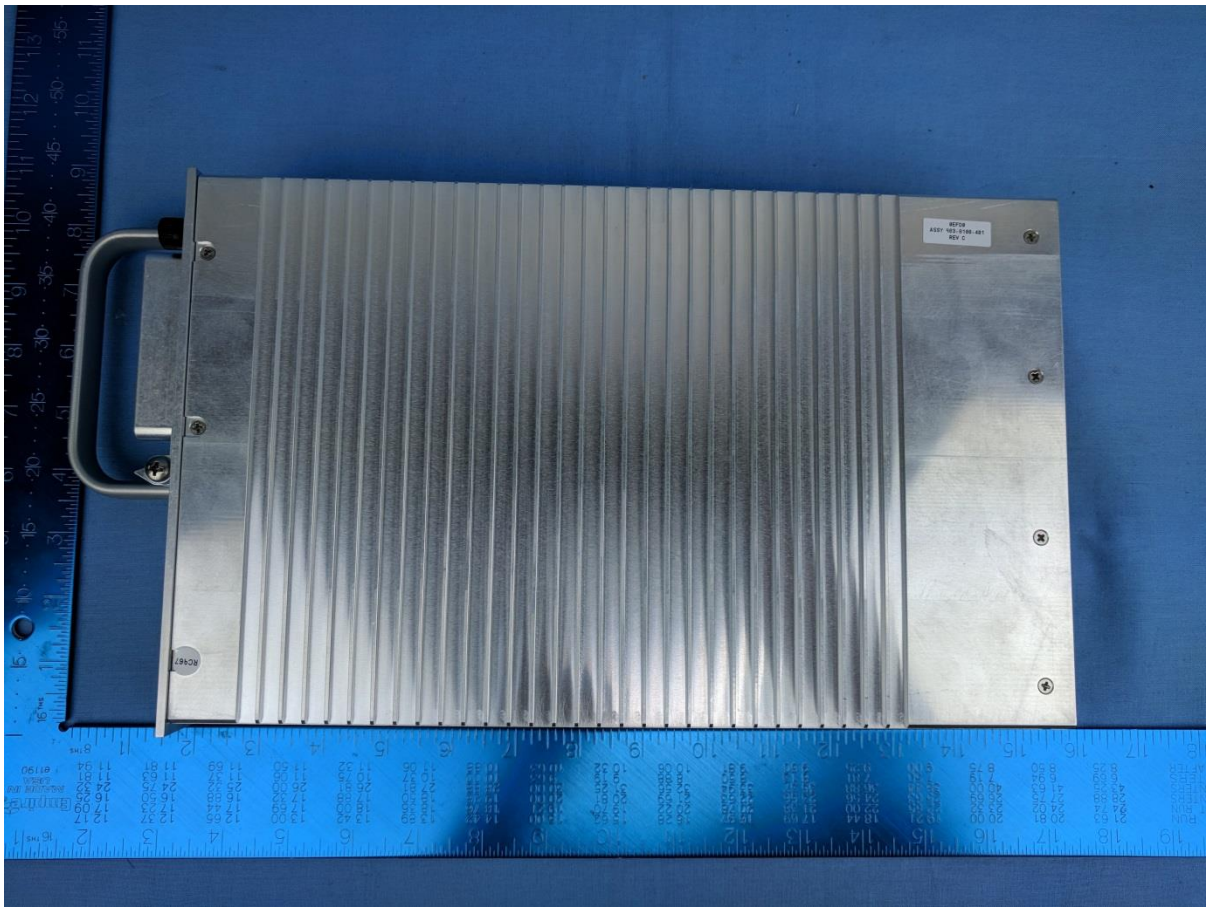
Rockwell Collins SSR-7610, Bottom



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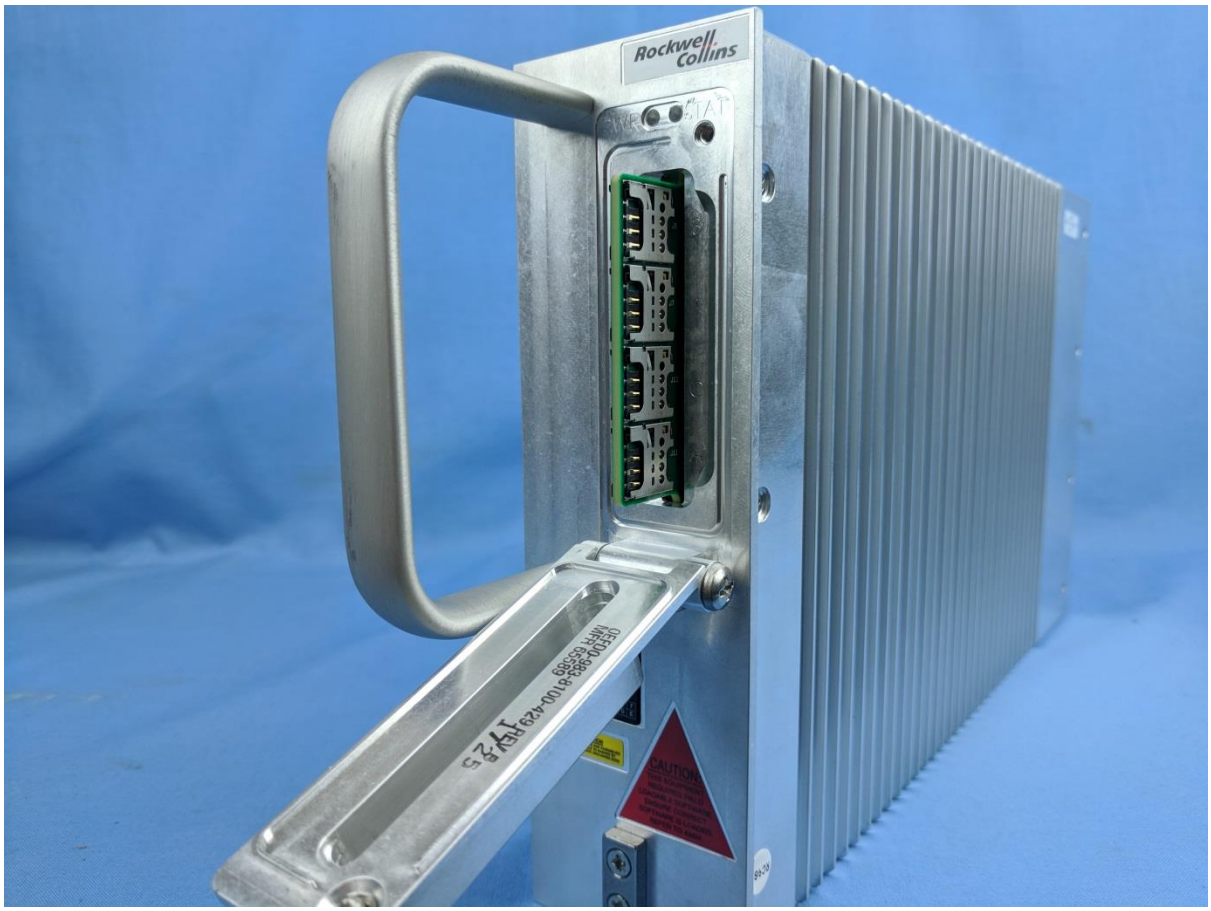
Rockwell Collins SSR-7610, Front



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5.3. Equipment Model(s) and Serial Number(s)

The following is a description of supporting equipment used during the test program.

Type (EUT/ Support)	Equipment Description (Including Brand Name)	Executable RCPN & Revision
EUT	Rockwell Collins	SSR-7610
Support	Rockwell Collins SSR-7610 Unit Qualification Software (GUI)	072-1178-001
Support	Test PC (Linux OS) Dell Optiplex 2010	N/A
Support	Rockwell Collins Test PC (SSR-76100) Software GUI	072-1313-001
Support	Ethernet Isolation Card	PN: 1012002003R
Support	A429/A717/RS422/Discrete EMI Test Card (Main Load Card)	828-2248-003 Rev A
Support	Ballard A717/USB Converter UA1401	UA1401
Support	RS232 EMI Test Card	PROJ-0004253
Support	Bulkhead, Aircraft Bulkhead Simulator	983-9994-009 Rev B
Support	WLAN Antenna, Quantity 2	822-3357-001 Rev -
Support	Gatelink Antenna, Quantity 2	822-1531-001 Rev C
Support	RF Combiner	PD2120 “INSTOCK WIRELESS”
Support	RF Attenuator	Aeroflex Model 3054
Support	Power Supply	Elgar
Support	RF Interface Card	828-4826-001 Rev A
Support	Netgear 5 Port Gigabit Switch	GS105
Support	TP-Link Gigabit Switch	TLSG1008D
Support	Wi-Fi Range Extender	Amped- Wireless Model SR300
Support	Power Cable Extender	983-9994-017

5.4. Antenna Details

Type	Manufacturer	Model	Family	Gain (dBi)	BF Gain	Dir BW	X-Pol	Frequency Band (MHz)
External	Rockwell Collins	AT2400-36R	Stub	0	-	-	-	700 - 2700

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5.5. Cabling and I/O Ports

The following is a description of the cable and input, output ports available on the EUT;
Number and type of I/O ports;

Port Type	Port Description	Qty.	Screened (Yes/ No)	Length
Ethernet	Ethernet	9	Yes	> 3m
Gatelink Wi-Fi	RF	1	Yes	> 3m
Gatelink 1 Cellular	RF	1	Yes	> 3m
Gatelink 2 Cellular	RF	1	Yes	> 3m
Discrete I/O	I/O	19	Yes	> 3m
ARINC 717 Receivers	I/O	8	Yes	> 3m
ARINC 429 Receivers	I/O	16	Yes	> 3m
ARINC 429 Transmitters	I/O	1	Yes	> 3m
RS422	I/O	2	Yes	> 3m
SIM cards	SIM	4	Yes	N/A
RS232	RS232	2	No	N/A

5.6. Test Configurations

Results for the following configurations are provided in this report:

Modulation Scheme	Channel Bandwidth(s)	Channel Frequency (MHz)		
		Low	Mid	High
WCDMA	5 MHz	826.5	836.4	846.6

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5.7. ITU Emissions Designators

LTE Band 5 - WCDMA		
Bandwidth (MHz)	**Frequency Range (MHz)**	**Emissions Designator**
5	824-849	4M75W7D

5.8. Equipment Modifications

The following modifications were required to bring the equipment into compliance:
1. NONE

5.9. Deviations from the Test Standard

The following deviations from the test standard were required in order to complete the test program:
1. NONE

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6. TEST SUMMARY

List of Measurements

Test Header	Result	Data Link
26 dB & 99% Bandwidth	Complies	View Data
Frequency Stability	Complies	View Data
Peak Transmit Power	Complies	View Data
Spurious Emissions	Complies	View Data
Radiated Spurious Emissions	Complies	View Data
Conducted Spurious Emissions	--	--
Band-Edge Emissions	Complies	View Data
Peak to Average Ratio	Complies	View Data

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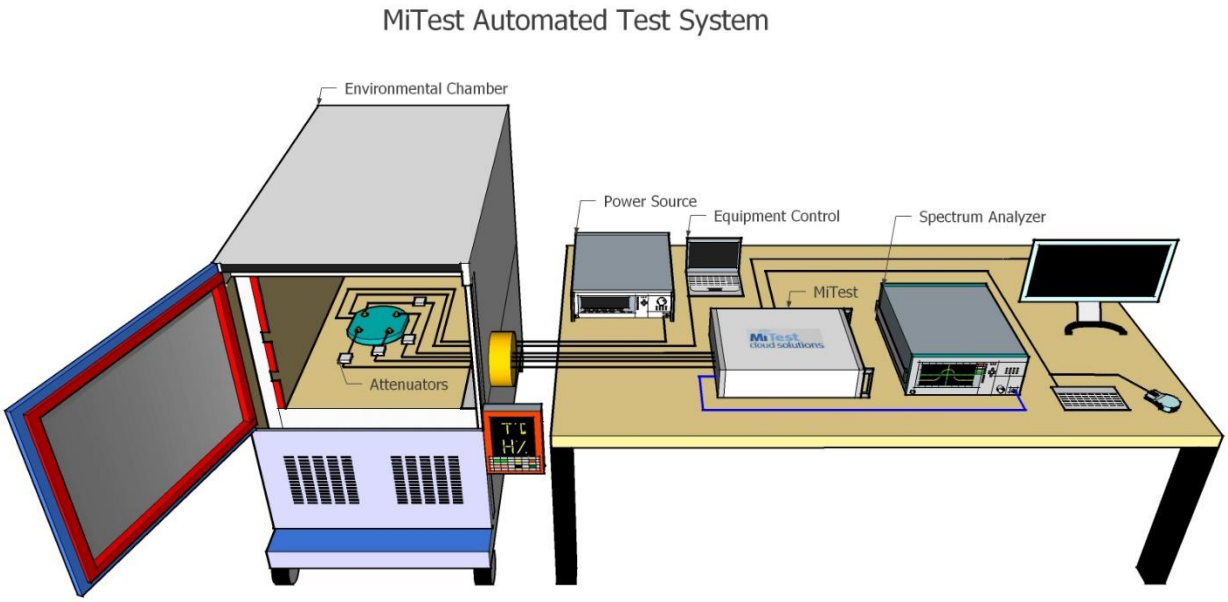
7. TEST EQUIPMENT CONFIGURATION(S)

7.1. Conducted



A full system calibration was performed on the test station and any resulting system losses (or gains) were taken into account in the production of all final measurement data.

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Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
#3 SA	MiTest Box to SA	Fairview Microwave	SCA1814-0101-72	#3 SA	8 May 2018
#3P1	EUT to MiTest box port 1	Fairview Microwave	SCA1814-0101-72	#3P1	8 May 2018
#3P2	EUT to MiTest box port 2	Fairview Microwave	SCA1814-0101-72	#3P2	8 May 2018
#3P3	EUT to MiTest box port 3	Fairview Microwave	SCA1814-0101-72	#3P3	8 May 2018
#3P4	EUT to MiTest box port 4	Fairview Microwave	SCA1812-0101-72	#3P4	8 May 2018
249	Resistance Thermometer	Thermotronics	GR2105-02	9340 #2	30 Oct 2018
287	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100201	2 May 2018
361	Desktop for RF#1, Labview Software installed	Dell	Vostro 220	WS RF#1	Not Required
390	USB Power Head 50MHz - 24GHz -60 to +20dBm	Agilent	U2002A	MY50000103	17 Dec 2018
398	MiTest RF Conducted Test Software	MiCOM	MiTest ATS	Version 4.1	Not Required
405	DC Power Supply 0-60V	Agilent	6654A	MY4001826	Cal when used
408	USB to GPIB interface	National Instruments	GPIB-USB HS	14C0DE9	Not Required
436	USB Wideband Power Sensor	Boonton	55006	8731	14 Sep 2018
441	USB Wideband Power Sensor	Boonton	55006	9179	20 Sep 2018
443	4x4 RF Switch Box	MiCOM Labs	MiTest 4X4 RF Switch Box	MIC003	8 May 2018
445	PoE Injector	D-Link	DPE-101GL	QTAH1E2000625	Not Required
461	Spectrum Analyzer	Agilent	E4440A	MY46185537	20 Sep 2018
510	Barometer/Thermometer	Control Company	68000-49	170871375	11 Dec 2018
75	Environmental Chamber	Thermatron	SE-300-2-2	27946	24 Dec 2018

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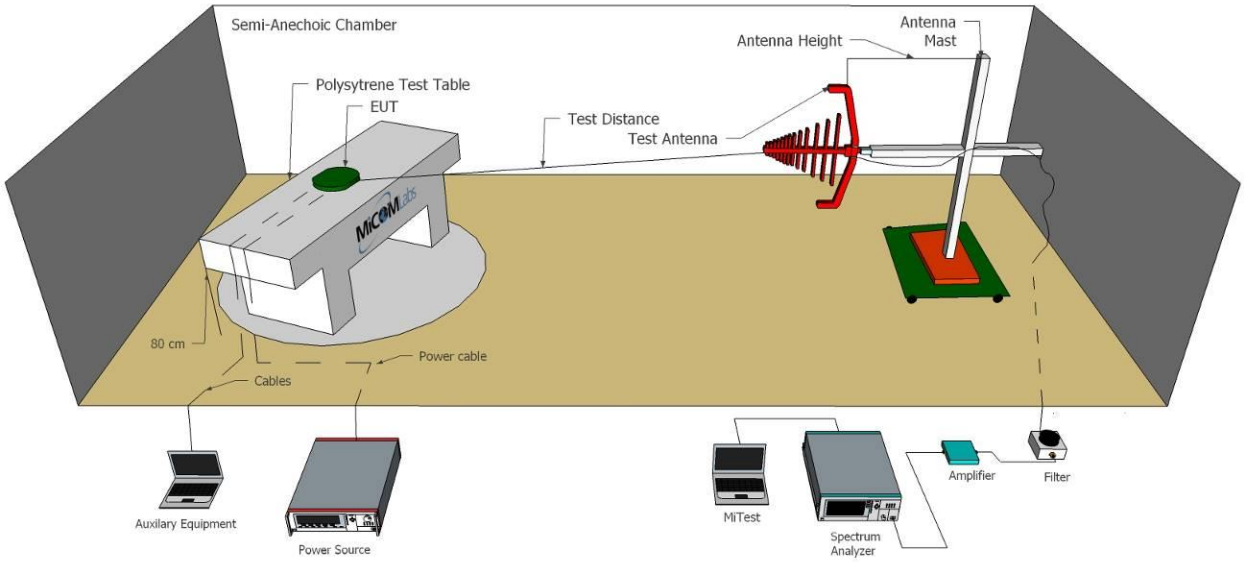
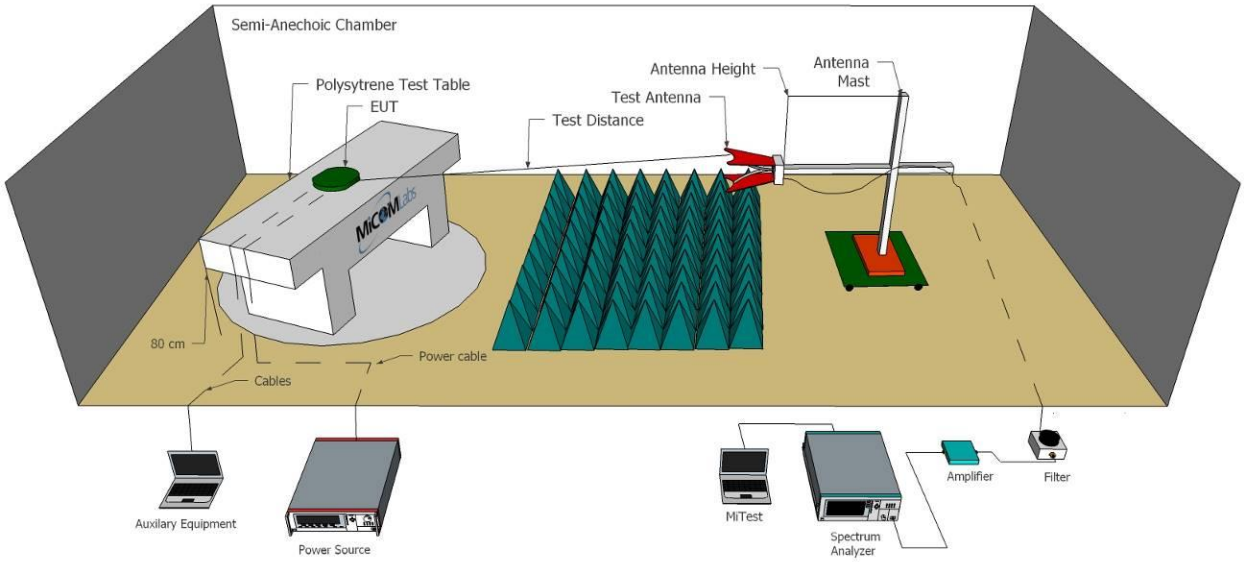
7.2. Radiated Emissions - 3m Chamber

Radiated Emissions Below 1GHz Test Setup



Radiated Emissions Above 1GHz Test Setup



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Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
170	Video System Controller for Semi Anechoic Chamber	Panasonic	WV-CU101	04R08507	Not Required
287	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100201	2 May 2018
298	3M Radiated Emissions Chamber Maintenance Check	MiCOM	3M Chamber	298	28 Mar 2018
338	Sunol 30 to 3000 MHz Antenna	Sunol	JB3	A052907	5 Oct 2018
342	2.4 GHz Notch Filter	EWT	EWT-14-0203	H1	6 Oct 2018
397	Amp 10 - 2500MHz	MiCOM Labs	Amp 10 - 2500 MHz	NA	12 Oct 2018
399	ETS 1-18 GHz Horn Antenna	ETS	3117	00154575	12 Oct 2018
406	Amplifier for Radiated Emissions	MiCOM Labs	40dB 1 to 18GHz Amp	0406	12 Oct 2018
410	Desktop Computer	Dell	Inspiron 620	WS38	Not Required
411	Mast/Turntable Controller	Sunol Sciences	SC98V	060199-1D	Not Required
412	USB to GPIB Interface	National Instruments	GPIB-USB HS	11B8DC2	Not Required
413	Mast Controller	Sunol Science	TWR95-4	030801-3	Not Required
415	Turntable Controller	Sunol Sciences	Turntable Controller	None	Not Required
447	MiTest Rad Emissions Test Software	MiCOM	Rad Emissions Test Software Version 1.0	447	Not Required
462	Schwarzbeck cable from Antenna to Amplifier.	Schwarzbeck	AK 9513	462	4 Oct 2018
463	Schwarzbeck cable from Amplifier to Bulkhead.	Schwarzbeck	AK 9513	463	4 Oct 2018
464	Schwarzbeck cable from Bulkhead to Receiver	Schwarzbeck	AK 9513	464	4 Oct 2018
465	Low Pass Filter DC-1000 MHz	Mini-Circuits	NLP-1200+	VUU01901402	6 Oct 2018
466	Low Pass Filter DC-1500 MHz	Mini-Circuits	NLP-1750+	VUU10401438	6 Oct 2018
480	Cable - Bulkhead to Amp	SRC Haverhill	157-3050360	480	6 Oct 2018
481	Cable - Bulkhead to Receiver	SRC Haverhill	151-3050787	481	6 Oct 2018
482	Cable - Amp to Antenna	SRC Haverhill	157-3051574	482	6 Oct 2018
510	Barometer/Thermometer	Control Company	68000-49	170871375	11 Dec 2018
CC05	Confidence Check	MiCOM	CC05	None	19 Jul 2018
VLF-1700	Low pass filter DC-1700 MHz	Mini Circuits	VLF-1700	None	6 Oct 2018

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8. MEASUREMENT AND PRESENTATION OF TEST DATA

The measurement and graphical data presented in this test report was generated automatically using state-of-the-art technology creating an easy to read report structure. Numerical measurement data is separated from supporting graphical data (plots) through hyperlinks. Numerical measurement data can be reviewed without scrolling through numerous graphical pages to arrive at the next data matrix.

Plots have been relegated into the Appendix 'Graphical Data'.

Test and report automation was performed by MiTest. MiTest is an automated test system developed by MiCOM Labs. MiTest is the first cloud based modular test system enabling end-to-end automation of regulatory compliance testing for conducted RF testing.

The MiCOM Labs "MiTest" Automated Test System" (Patent Pending)

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9. TEST RESULTS

9.1. 26 dB & 99% Bandwidth

Conducted Test Conditions for 26 dB and 99% Bandwidth			
Rules and Sections:	FCC CFR 47:2.1049 FCC CFR 47:22.917 RSS-Gen: 6.6 RSS-199: 4.2	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	26 dB and 99 % Bandwidth	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	ANSI C63.26:2016:5.4.3 & 5.4.4	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for 26 dB and 99% Bandwidth Measurement

The bandwidth at 26 dB and 99 % was measured with a spectrum analyzer connected to the antenna terminal, while the EUT is operating in transmission mode at the appropriate frequency.

Testing was performed under ambient conditions at nominal voltage. Where the device operated with multiple antenna ports i.e. MIMO device, each port was measured and reported.

Test configuration and setup used for the measurement was per the Conducted Test Set-up specified in this document.

5.4.3 Occupied bandwidth—Relative measurement procedure

The OBW is measured as the width of the spectral envelope of the modulated signal, at an amplitude level reduced from a reference value by a specified ratio (or in decibels, a specified number of dB down from the reference value). The typical ratio for transmitters is −26 dB, corresponding to the 26 dB BW; however, other ratios can be specified. In this sub clause, the ratio is designated by "−X dB."

NOTE—This parameter, when expressed in relative terms, is often referred to in regulations as the EBW.

The reference level is either the amplitude of the unmodulated carrier, or the highest amplitude of the spectral envelope of the modulated signal, as stated by the applicable requirement. Some requirements can specify a particular maximum or minimum value for the "−X dB" bandwidth; other requirements can specify that the "−X dB" bandwidth be entirely contained within the authorized or designated frequency band.

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.

b) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.

NOTE—Step a), step b), and step c) may require iteration to adjust within the specified tolerances.

d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target "−X dB" requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.

e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold. f) Determine the reference value by either of the following:

1) Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the

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highest level of the displayed trace (this is the reference value).

2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.

g) Determine the "−X dB amplitude" as equal to (Reference Value − X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.

h) If the reference value was determined using an unmodulated carrier, turn the EUT modulation on, then either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise the trace from step f) shall be used for step i).

i) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the "−X dB amplitude" determined in step f). If a marker is below this "−X dB amplitude" value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers. The spectral envelope can cross the "−X dB amplitude" at multiple points. The lowest or highest frequency shall be selected as the frequencies that are the farthest away from the center frequency at which the spectral envelope crosses the "−X dB amplitude."

j) The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

5.4.4 Occupied bandwidth—Power bandwidth (99%) measurement procedure[30]

The OBW is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring (99%) power bandwidth:31

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of 1.5 × OBW is sufficient).

b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.

NOTE—Step a), step b), and step c) may require iteration to adjust within the specified tolerances.

d) Set the detection mode to peak, and the trace mode to max-hold.

e) If the instrument does not have a 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.

f) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

Limits for 26 dB and 99% Bandwidth

Measurements were performed for reporting purposes only.

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WCDMA 26 dB and 99% Bandwidth

Equipment Configuration for 26 dB & 99% Occupied Bandwidth			
Variant:	5 MHz Bandwidth	**Duty Cycle (%):**	100
Data Rate:	-	**Antenna Gain (dBi):**	0
Modulation:	WCDMA	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	SB
Engineering Test Notes:			

Test Frequency	Measured 26 dB Bandwidth (MHz)				26 dB Bandwidth (MHz)			
MHz	**A**	**B**	**C**	**D**	**Highest**	**Lowest**		
826.4	4.749	-	-	-	4.749	4.749		
836.4	4.719	-	-	-	4.719	4.719		
846.6	4.709	-	-	-	4.709	4.709		

Test Frequency	Measured 99% Bandwidth (MHz)				99% Bandwidth (MHz)			
MHz	**A**	**B**	**C**	**D**	**Highest**	**Lowest**		
826.4	4.168	-	-	-	4.168	4.168		
836.4	4.148	-	-	-	4.148	4.148		
846.6	4.188	-	-	-	4.188	4.188		

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-03 MEASURING RF SPECTRUM MASK
Measurement Uncertainty:	±2.81 dB

Note: click the links in the above matrix to view the graphical image (plot).

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9.2. Frequency Stability

Conducted Test Conditions for Frequency Stability			
Rules and Sections:	FCC CFR 47:2.1055 RSS-132:5.3 RSS-199: 4.3	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Frequency Stability	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	ANSI C63.26-2015:5.6.3	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Frequency Stability Measurement

Frequency Stability was measured with a spectrum analyzer connected to the antenna terminal, while the EUT is operating in transmission mode at the appropriate frequency.

5.6.3 Procedure for frequency stability testing

Frequency stability is a measure of the frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at +20 °C and rated supply voltage. The operating carrier frequency shall be set up in accordance with the manufacturer's published operation and instruction manual prior to the commencement of these tests. No adjustment of any frequency determining circuit element shall be made subsequent to this initial set-up. Frequency stability is tested:

a) At 10 °C intervals of temperatures between −30 °C and +50 °C at the manufacturer's rated supply voltage, and

b) At +20 °C temperature and ±15% supply voltage variations. If a product is specified to operate over a range of input voltage then the −15% variation is applied to the lowermost voltage and the +15% is applied to the uppermost voltage.

During the test all necessary settings, adjustments and control of the EUT have to be performed without disturbing the test environment, i.e., without opening the environmental chamber. The frequency stabilities can be maintained to a lesser temperature range provided that the transmitter is automatically inhibited from operating outside the lesser temperature range. For handheld equipment that is only capable of operating from internal batteries and the supply voltage cannot be varied, the frequency stability tests shall be performed at the nominal battery voltage and the battery end point voltage specified by the manufacturer. An external supply voltage can be used and set at the internal battery nominal voltage, and again at the battery operating end point voltage which shall be specified by the equipment manufacturer. If an unmodulated carrier is not available, the mean frequency of a modulated carrier can be obtained by using a frequency counter with gating time set to an appropriately large multiple of bit periods (gating time depending on the required accuracy). Full details on the choice of values shall be included in the test report.

Limits for Frequency Stability

Part 22: < 2.5ppm

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9.2.1. WCDMA Frequency Stability

Test frequency	836.5 MHz	Measured Frequency	Frequency Error	Frequency Error	Limit	Margin
Temperature	Voltage	Hz	kHz	ppm	ppm	ppm
20 °C	230	836499485.00	-0.52	-6.16E-01	± 2.5	-1.88433
20 °C	110	836499485.00	-0.52	-6.16E-01	± 2.5	-1.88433
70 °C	120	836500005.00	0.01	5.98E-03	± 2.5	-2.49402
60 °C	120	836499979.96	-0.02	-2.40E-02	± 2.5	-2.47604
50 °C	120	836499979.96	-0.02	-2.40E-02	± 2.5	-2.47604
40 °C	120	836500030.00	0.03	3.59E-02	± 2.5	-2.46414
30 °C	120	836500015.00	0.01	1.79E-02	± 2.5	-2.48207
20 °C	120	836499500.00	-0.50	-5.98E-01	± 2.5	-1.90227
10 °C	120	836500010.00	0.01	1.19E-02	± 2.5	-2.48805
0 °C	120	836500100.00	0.10	1.20E-01	± 2.5	-2.38046
-10 °C	120	836500150.00	0.15	1.79E-01	± 2.5	-2.32069
-20 °C	120	836499950.00	-0.05	-5.98E-02	± 2.5	-2.44022
-30 °C	120	836500100.00	0.10	1.20E-01	± 2.5	-2.38046
-40 °C	120	836500055.00	0.05	6.57E-02	± 2.5	-2.43426
20 °C	230	836499485.00	-0.52	-6.16E-01	± 2.5	-1.88433

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9.3. Peak Transmit Power

Conducted Test Conditions for Maximum Conducted Output Power			
Standard:	FCC CFR 47:2.1046 FCC CFR 47:22.913 RSS-132: 5.4 RSS-199: 4.4	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	RF power output	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	ANSI C63.26:2015:5.2.3.2	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

5.2.3.2 Measurement of peak power with a peak power meter

The total peak output power may best be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the EUT OBW, and utilize a fast responding diode detector. See item r) of 4.1 for more information regarding power meter functional requirements and limitations and consult the instrumentation-specific application literature for proper setup and use.

Limits for Maximum Conducted Output Power

Shall not exceed 7 W (38.45dBm)

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9.3.1. WCDMA Peak Output Power

Equipment Configuration for Average Output Power			
Variant:	5 MHz Bandwidth	**Duty Cycle (%):**	100
Data Rate:	-	**Antenna Gain (dBi):**	0
Modulation:	WCDMA	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	SB
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Output Power (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dB	
826.4	20.33	-	-	-	20.33	38.45	-18.12	Max
836.4	20.35	-	-	-	20.35	38.45	-18.10	Max
846.6	20.21	-	-	-	20.21	38.45	-18.24	Max

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Measurement Uncertainty:	1.33 dB

The above measurements are true pulse readings and therefore a Duty Cycling correction factor is not required.

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9.4. Peak to Average Power Ratio

Conducted Test Conditions for Peak to Average Power Ratio			
Rules and Sections:	RSS-132: 5.4 RSS-199: 4.4	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Transmitter Output Power	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	ANSI C63.26 Section 5.2.6	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Peak to Average Power Ratio

Test configuration and setup used for the measurement was per the Conducted Test Set-up specified in this document.

The CCDF function of the spectrum analyzer was used to calculate the peak-to-average ratio using the following formula:

PAPR (dB) = P_{Pk} (dBm) − P_{Avg} (dBm)

Where:

PAPR peak-to-average power ratio, in dB
P_{Pk} measured peak power or peak PSD level, in dBm
P_{Avg} measured average power or average PSD level, in dBm

Limits for Maximum Peak to Average Power Ratio

Shall not exceed 13 dB

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Equipment Configuration for Peak to Average Power Ratio

Variant:	5 MHz Bandwidth	**Duty Cycle (%):**	100
Data Rate:	-	**Antenna Gain (dBi):**	0
Modulation:	WCDMA	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	SB
Engineering Test Notes:			

Test Measurement Results

Test Frequency	1 Resource Block*			Full Resource Blocks		
MHz	**Peak to Average Ratio (dB)**	**Limit**	**Margin**	**Peak to Average Ratio (dB)**	**Limit**	**Margin**
826.5	-	13.0	-	6.31	13.0	-6.69
836.5	-	13.0	-	6.15	13.0	-6.85
846.5	-	13.0	-	6.32	13.0	-6.68

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-01 MEASURING RF OUTPUT POWER
Measurement Uncertainty:	1.33 dB

*Measurements using Full Resource Blocks were shown to be worst case.

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9.5. Conducted Spurious Emissions and Band-Edge

Test Conditions for Conducted Spurious and Band-Edge Emissions			
Rules and Sections:	FCC CFR 47:2.1051 FCC CFR 47: 22.917 RSS-132: 5.5 RSS-199: 4.5	**Ambient Temp. (ºC):**	20.0 - 24.5
Test Heading:	Conducted Spurious and Band-Edge Emissions	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	ANSI C63.26: 5.7.4 & 5.7.3	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Conducted Spurious and Band-Edge Emissions

Conducted Spurious Emissions and Band-edge were measured with a spectrum analyzer connected to the antenna terminal, while the EUT is operating in transmission mode at the appropriate frequency.

Test configuration and setup used for the measurement was per the Conducted Test Set-up specified in this document.

From ANSI C63.26: 5.7.4 Spurious unwanted emission measurements:
a) Set the spectrum analyzer start frequency to the lowest frequency generated by the EUT, without going below 9 kHz, and the stop frequency to the lower frequency covered by the measurements previously performed in 5.7.3. As an alternative, the stop frequency can be set to the value specified in 5.1.1, depending on the EUT operating range, if the resulting plot can clearly demonstrate compliance for all frequencies not addressed by the out-of-band emissions measurements performed as per 5.7.3.

b) When using an average power (rms) detector, ensure that the number of points in the sweep ≥ 2 × (span / RBW). This may require that the measurement range defined by the start and stop frequencies be subdivided, depending on the spectrum analyzer capabilities. This requirement does not apply to peak-detected power measurements. When average power is specified by the applicable regulation, a peak-detector can be utilized for preliminary measurements to accommodate wider frequency spans. Any emissions found in the preliminary measurement to exceed the applicable limit(s) shall be further examined using a power averaging (rms) detector with the minimum number of measurement points as defined above.

c) The sweep time should be set to auto-couple for performing peak-detector measurements. For measurements that use a power averaging (rms) detector, the sweep time shall be set as described for out-of-band emissions measurements in item d) of 5.7.3.

d) Identify and measure the highest spurious emission levels in each frequency range. It is not necessary to re-measure the out-of-band emissions as a part of this test. Record the frequencies and amplitudes corresponding to the measured emissions and capture the data plots.

e) Repeat step b) through step d) for the upper spurious emission frequency range if not already captured by a wide span measurement performed as per the alternative provided in step a). The upper frequency for this measurement is defined in 5.1.1 as a function of the EUT operating range.

f) Compare the results with the corresponding limit in the applicable regulation. g) The test report shall include the data plots of the measuring instrument display and the measured data.

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

Limits for Conducted Spurious Emissions
WCDMA Band 5: §22.917: < 43+10log10(P[Watts])

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From ANSI C63.26: 5.7.3: Out-of-band unwanted emissions measurements
a) Set the spectrum analyzer center frequency to the block, band, or channel edge frequency.

b) Set the span wide enough to capture the fundamental emission closest to the authorized block or band edge, and to include all modulation products that spill into the immediately adjacent frequency band. In some cases, it may be possible to set the center frequency and span so as to encompass the fundamental emission and the unwanted out-of-band (band-edge) emissions on either side of the authorized block, band, or channel. This can be accomplished with a single (slow) sweep, if adequate overload protection and sufficient dynamic range can be maintained.

c) Set the number of points in sweep ≥ 2 × span / RBW.

d) Sweep time should be auto for peak detection. For rms detection the sweep time should be set as follows:
1) If the device can be configured to transmit continuously (duty cycle ≥ 98%), set the (sweep time) > (number of points in sweep) × (symbol period) (e.g., by a factor of 10 × symbol period × number of points). Increasing the sweep time (i.e., slowing the sweep speed) will allow for averaging over multiple symbols

2) If the device cannot transmit continuously (duty cycle < 98%), a gated sweep shall be used when possible (i.e., gate triggered such that the analyzer only sweeps when the device is transmitting at full power), set the sweep time > (number of points in sweep) × (symbol period) but the sweep time shall always be maintained at a value that is less than or equal to the minimum transmission time.

3) If the device cannot be configured to transmit continuously (duty cycle < 98%) and a freerunning sweep must be used, set the sweep time so that the averaging is performed over multiple on/off cycles by setting the sweep time > (number of points in sweep) × (transmitter period) (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by [10 log (1/duty cycle)]. This assumes that the transmission period and duty cycle is relatively constant (duty cycle variation ≤ ±2%).

4) If the device cannot be configured to transmit continuously and a free-running sweep must be used, and if the transmissions exhibit a non-constant duty cycle (duty cycle variations > ±2%), set the sweep time so that the averaging is performed over the on-period by setting the sweep time > (symbol period) × (number of points), while also maintaining the sweep time < (transmitter on-time). The trace mode shall be set to max hold, since not every display point will be averaged only over just the on-time. Thus, multiple sweeps (e.g., 100) in maximum hold are necessary to ensure that the maximum power is measured.

e) The test report shall include the plots of the measuring instrument display and the measured data.

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9.5.1. WCDMA Conducted Spurious Emissions

Equipment Configuration for Transmitter Unwanted Emissions in the Spurious Domain			
Variant:	5 MHz Bandwidth	**Duty Cycle (%):**	100
Data Rate:	-	**Antenna Gain (dBi):**	0
Modulation:	WCDMA	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	SB
Engineering Test Notes:			

Test Measurement Results

CHAIN A					
Temperature	**20.0 °C**	**Maximum Observed Spurious Emission**		**Limit**	**Margin**
Voltage	**120.00 Vdc**	**Amplitude**	**Emission Frequency**		
Test Frequency	**Frequency Range**	**dBm**	**MHz**	**dBm**	**dB**
826.4 MHz	**30 - 10000 MHz**	-37.339	6963.046	-13	-24.33

CHAIN A					
Temperature	**20 °C**	**Maximum Observed Spurious Emission**		**Limit**	**Margin**
Voltage	**120 Vdc**	**Amplitude**	**Emission Frequency**		
Test Frequency	**Frequency Range**	**dBm**	**MHz**	**dBm**	**dB**
836.40 MHz	**30 - 10000 MHz**	-37.266	6523.487	-13	-24.266

CHAIN A					
Temperature	**20 °C**	**Maximum Observed Spurious Emission**		**Limit**	**Margin**
Voltage	**120 Vdc**	**Amplitude**	**Emission Frequency**		
Test Frequency	**Frequency Range**	**dBm**	**MHz**	**dBm**	**dB**
847.5 MHz	**30 - 10000 MHz**	-36.719	6583.427	-13	-23.719

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-05 MEASUREMENT OF SPURIOUS EMISSIONS
Measurement Uncertainty:	<=40 GHz ±2.37 dB, > 40 GHz ±4.6 dB

Note: click the links in the above matrix to view the graphical image (plot).

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9.5.2. WCDMA Conducted Band Edge Emissions

Equipment Configuration for Conducted Band-Edge Emissions

Variant:	5 MHz Bandwidth	**Duty Cycle (%):**	100
Data Rate:	-	**Antenna Gain (dBi):**	0
Modulation:	WCDMA	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	SB
Engineering Test Notes:			

Test Measurement Results

Band-Edge Frequency:	824.0 MHz & 849.0 MHz					
Channel Frequency	**Band-Edge Markers and Limit**			**Revised Limit**		**Margin**
	Amplitude (dBm)	**Plot Limit (dBm)**	**Frequency (MHz)**	**Amplitude (dBm)**	**M2A Frequency (MHz)**	**(MHz)**
826.4 (Full RB)	-22.028	-13.00	824.0	--	--	-9.03
846.6 (Full RB)	-16.16	-13.00	849.0	--	--	-3.16

Traceability to Industry Recognized Test Methodologies	
Work Instruction:	WI-05 MEASUREMENT OF SPURIOUS EMISSIONS
Measurement Uncertainty:	<=40 GHz 2.37 dB, > 40 GHz 4.6 dB

Note: click the links in the above matrix to view the graphical image (plot).
Note: RB = Resource Blocks

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9.6. Radiated Spurious Emissions

Radiated Test Conditions for Radiated Spurious			
Rules and Sections:	FCC CFR 47:2.1053, FCC CFR 47:22.917, RSS-132: 5.5 RSS-Gen: 6:13	**Ambient Temp. (ºC):**	20.0 - 24.5
Test Heading:	Radiated Spurious	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	ANSI/TIA-603	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Radiated Spurious Emissions

ANSI/TIA-603

Measurements were performed in accordance with TIA/EIA 603.

Measurements were made while EUT was operating in modulated mode of operation at the appropriate center frequency. The antenna port was attenuated with a 50 Ω termination.

The measurement equipment was set to measure in peak hold mode. The emissions were measured in the anechoic chamber at a 3-meter distance on every azimuth in both horizontal and vertical polarities. The emissions are recorded and maximized as a function of azimuth by rotation through 360° with a spectrum analyzer in peak hold mode.

The highest emissions relative to the limit are listed for each frequency band measured.

Limits for Maximum Spurious Emissions
Band 5: < 43+10log10(P[Watts])Band 7: < 55+10log10(P[Watts])
Band 41: < 55+10log10(P[Watts])

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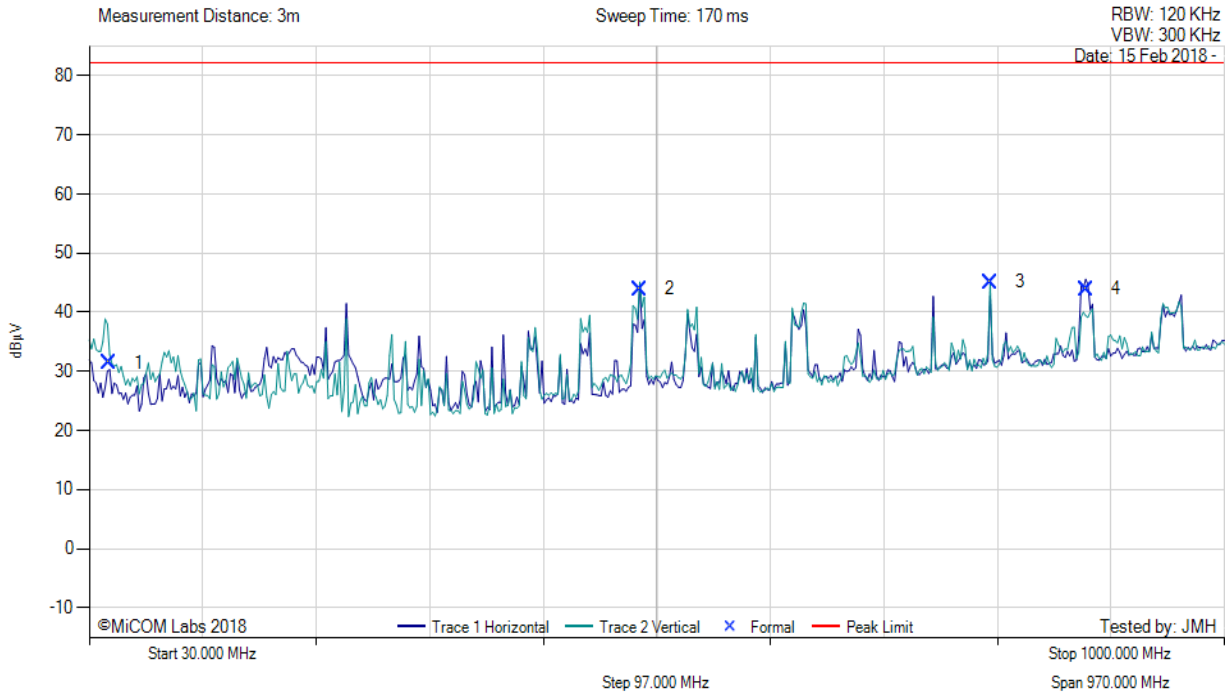
9.6.1. WCDMA Radiated Spurious Emissions

30-1000 MHz:

Equipment Configuration for Radiated Digital Emissions			
Antenna:	Terminated in Callbox	**Variant:**	WCDMA
Antenna Gain (dBi):	Not Applicable	**Modulation:**	16QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	-
Channel Frequency (MHz):	836.4	**Data Rate:**	-
Power Setting:	MAX	**Tested By:**	JMH

Test Measurement Results

Variant: , Test Freq: 836.4 MHz, Power Setting: MAX



30.00 - 1000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	46.73	49.52	3.52	-21.61	31.43	MaxQP	Vertical	99	104	82.2	-50.8	Pass
2	500.04	52.04	5.18	-13.27	43.95	MaxQP	Vertical	117	10	82.2	-38.3	Pass
3	799.81	48.15	5.98	-9.02	45.11	MaxQP	Vertical	135	188	82.2	-37.1	Pass
4	881.81	45.82	6.20	-8.09	43.93	MaxQP	Horizontal	101	68	82.2	-38.3	Pass

Test Notes: EUT powered by 115V 400 Hz. Cell active on LTE Band 5 836.5 , WiFi 2.4GHz active. TX Spur limit is 82.23

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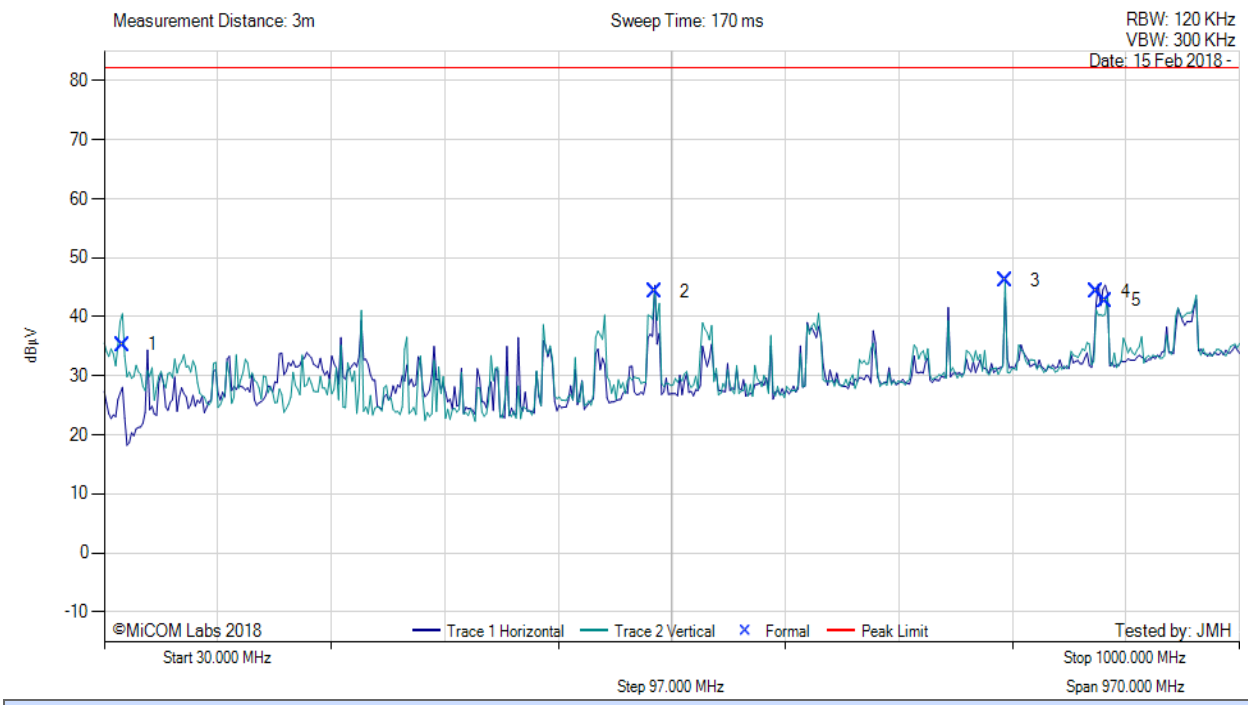
30-1000 MHz: LTE Band 5 & WCDMA Colocation Emissions 836.5, 844 MHz,

Equipment Configuration for Transmitter Spurious

Antenna:	Terminated in Callbox	**Variant:**	LTE Band 5, WCDMA
Antenna Gain (dBi):	Not Applicable	**Modulation:**	QPSK, 16QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	
Channel Frequency (MHz):	836.4, 844	**Data Rate:**	
Power Setting:	MAX	**Tested By:**	JMH

Test Measurement Results

Test Freq: 836.5, 844 MHz, Power Setting: MAX



30.00 - 1000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	45.62	52.75	3.52	-21.00	35.27	MaxQP	Vertical	98	269	82.2	-46.5	Pass
2	500.02	52.43	5.18	-13.27	44.34	MaxQP	Horizontal	107	12	82.2	-37.9	Pass
3	799.80	49.13	5.98	-9.02	46.09	MaxQP	Vertical	102	188	82.2	-36.1	Pass
4	877.47	46.09	6.18	-7.99	44.28	MaxQP	Horizontal	101	331	82.2	-38.0	Pass
5	885.68	44.54	6.19	-8.00	42.73	MaxQP	Horizontal	100	326	82.2	-39.5	Pass

Test Notes: EUT powered by 115V 400 Hz. Cell active on LTE Band 5 836.5, WDCMA 844 MHz , WiFi 2.4GHz active. TX Spur limit is 82.23

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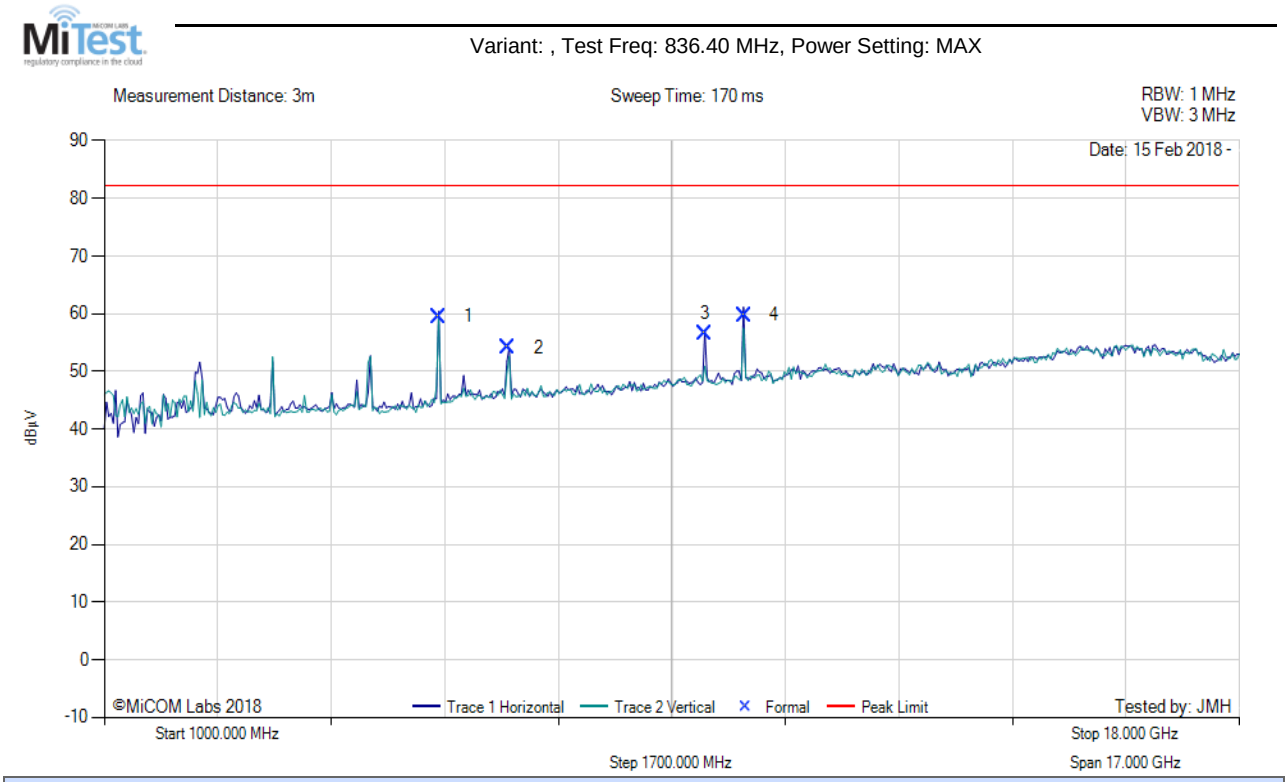
1-18 GHz TX Spurious and Colocation:

Equipment Configuration for Radiated Digital Emissions (Class A)			
Antenna:	Terminated in Callbox	**Variant:**	WCDMA
Antenna Gain (dBi):	Not Applicable	**Modulation:**	16QAM
Beam Forming Gain (Y):	Not Applicable	**Duty Cycle (%):**	-
Channel Frequency (MHz):	836.4	**Data Rate:**	-
Power Setting:	MAX	**Tested By:**	JMH

Test Measurement Results



1000.00 - 18000.00 MHz												
Num	**Frequency MHz**	**Raw dBµV**	**Cable Loss dB**	**AF dB**	**Level dBµV/m**	**Measurement Type**	**Pol**	**Hgt cm**	**Azt Deg**	**Limit dBµV/m**	**Margin dB**	**Pass /Fail**
1	6000.02	66.43	3.26	-10.14	59.55	Max Avg	Horizontal	114	330	82.2	-22.7	Pass
2	7052.02	58.25	3.29	-7.44	54.10	Max Avg	Horizontal	144	108	82.2	-28.1	Pass
3	10000.17	59.27	4.53	-7.24	56.56	Max Avg	Horizontal	101	42	82.2	-45.6	Pass
4	10577.99	60.90	4.54	-5.66	59.78	Max Avg	Horizontal	98	3	82.2	-22.4	Pass

Test Notes: EUT powered by 115V 400 Hz. Cell active on LTE Band 5 836.5, WDCMA 844 MHz , WiFi 2.4GHz active. TX Spur limit is 82.23

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A. APPENDIX - GRAPHICAL IMAGES

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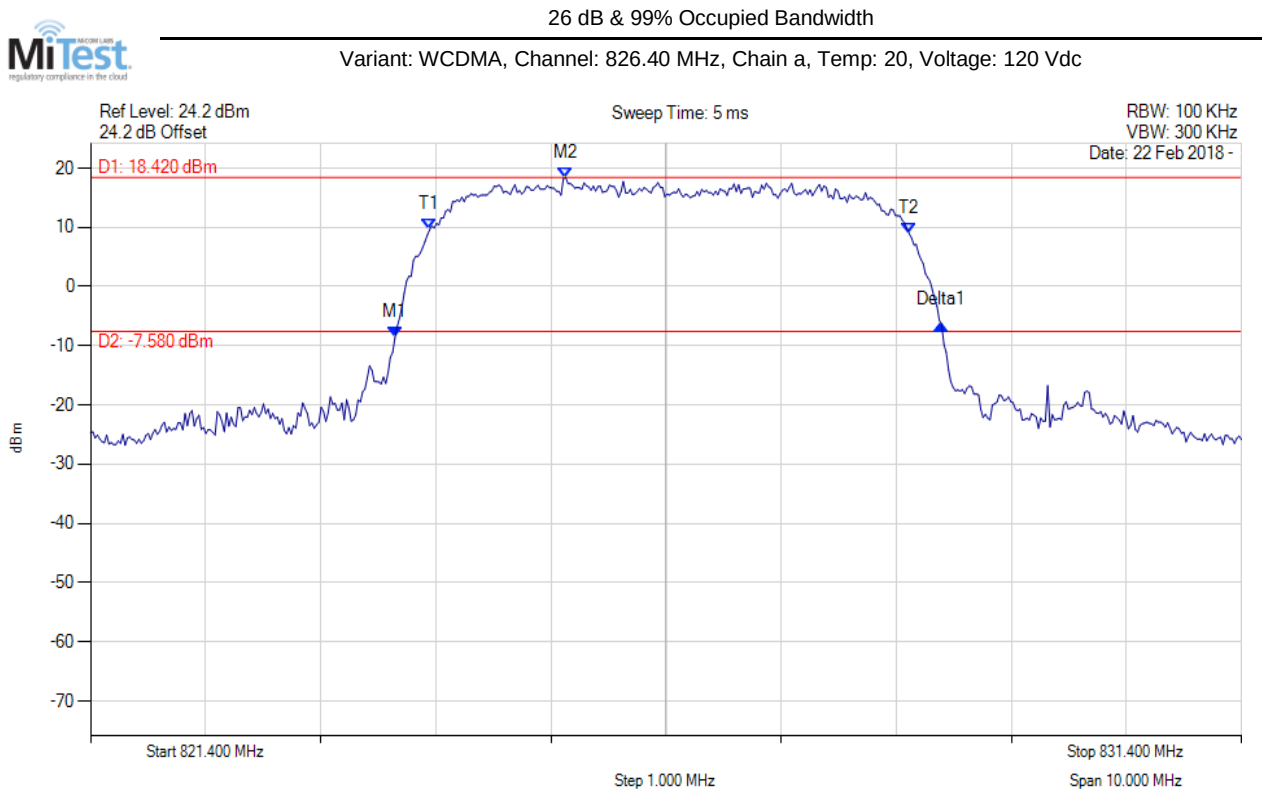
A.1. 26 dB & 99% Bandwidth

A.1.1 WCDMA: 26 dB & 99% Bandwidth



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 10 Trace Mode = VIEW	M1 : 824.045 MHz : -8.647 dBm M2 : 825.528 MHz : 18.424 dBm Delta1 : 4.749 MHz : 2.300 dB T1 : 824.346 MHz : 9.592 dBm T2 : 828.514 MHz : 8.898 dBm OBW : 4.168 MHz	Channel Frequency: 826.40 MHz

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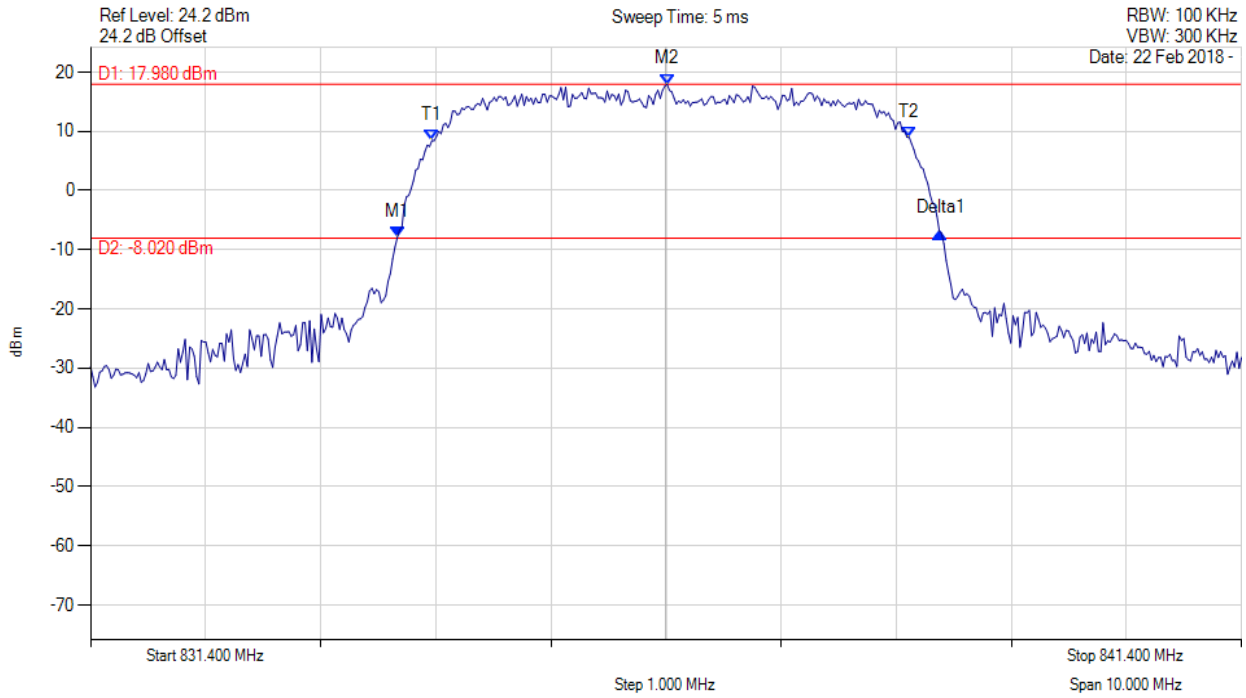
26 dB & 99% Occupied Bandwidth

Variant: WCDMA, Channel: 836.40 MHz, Chain a, Temp: 20, Voltage: 120 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 10 Trace Mode = VIEW	M1 : 834.065 MHz : -7.907 dBm M2 : 836.410 MHz : 17.977 dBm Delta1 : 4.719 MHz : 0.712 dB T1 : 834.366 MHz : 8.428 dBm T2 : 838.514 MHz : 8.977 dBm OBW : 4.148 MHz	Channel Frequency: 836.40 MHz

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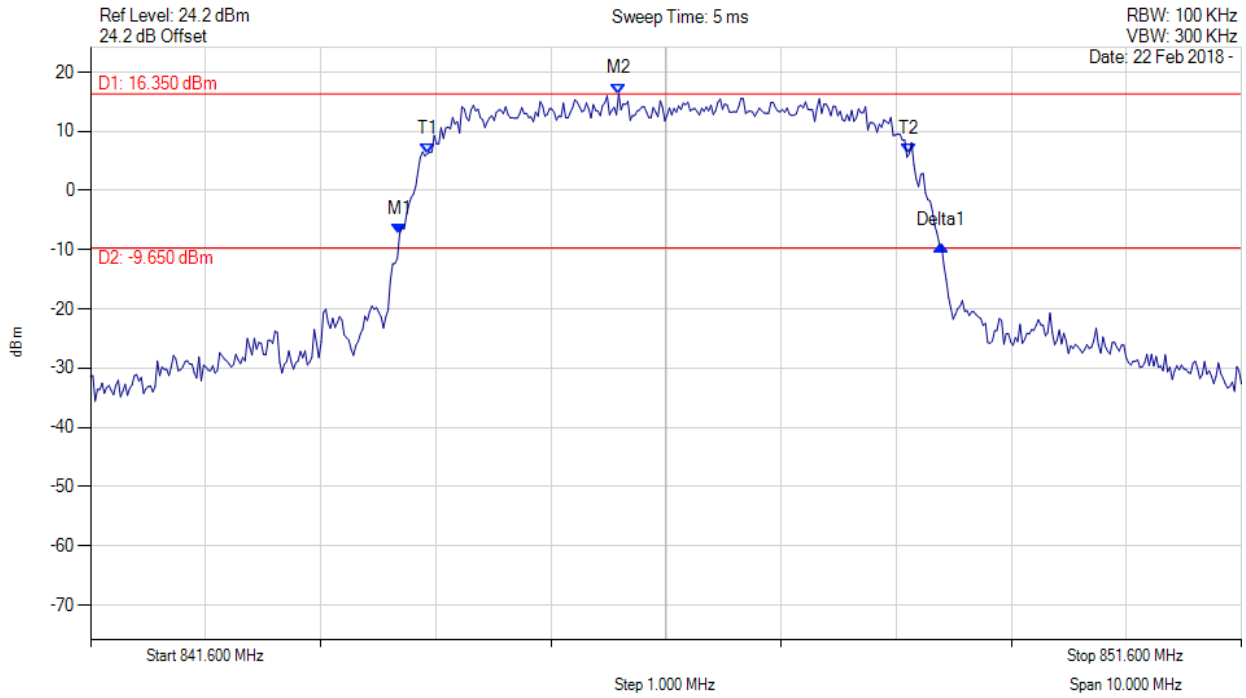
26 dB & 99% Occupied Bandwidth

Variant: WCDMA, Channel: 846.60 MHz, Chain a, Temp: 20, Voltage: 120 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 10 Trace Mode = VIEW	M1 : 844.285 MHz : -7.431 dBm M2 : 846.189 MHz : 16.346 dBm Delta1 : 4.709 MHz : -1.828 dB T1 : 844.526 MHz : 6.230 dBm T2 : 848.714 MHz : 6.252 dBm OBW : 4.188 MHz	Channel Frequency: 846.60 MHz

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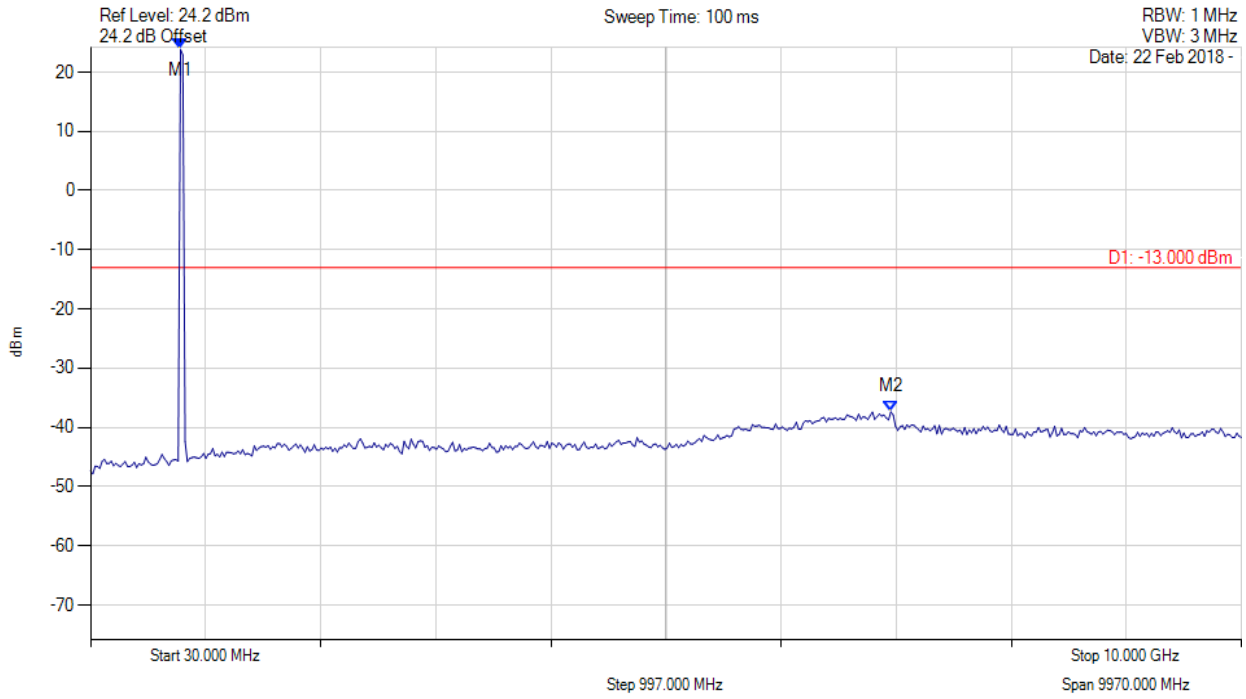
A.2. Conducted Spurious Emissions

A.2.1. WCDMA: Conducted Spurious Emissions

Transmitter Unwanted Emissions in the Spurious Domain

Variant: WCDMA, Channel: 826.40 MHz, Chain a, Temp: 20, Voltage: 120 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 10 Trace Mode = MAX HOLD	M1 : 809.218 MHz : 23.856 dBm M2 : 6963.046 MHz : -37.339 dBm	Channel Frequency: 826.40 MHz

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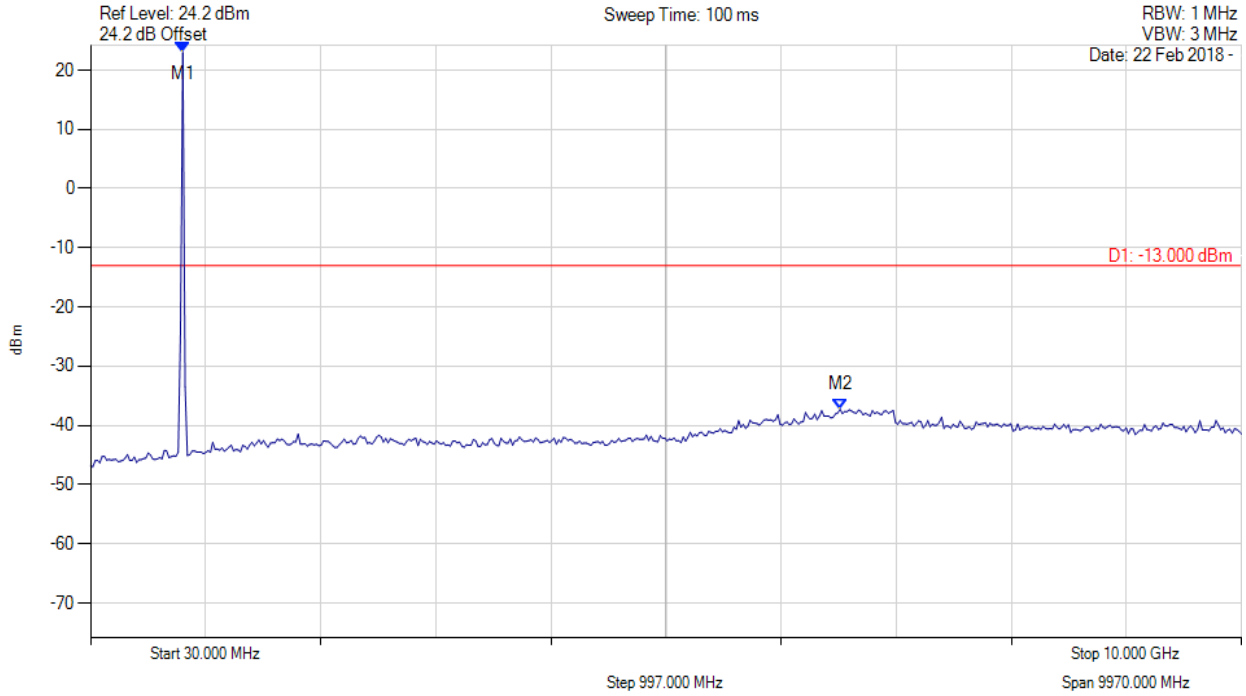
Transmitter Unwanted Emissions in the Spurious Domain

Variant: WCDMA, Channel: 836.40 MHz, Chain a, Temp: 20, Voltage: 120 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 10 Trace Mode = MAX HOLD	M1 : 829.198 MHz : 23.002 dBm M2 : 6523.487 MHz : -37.266 dBm	Channel Frequency: 836.40 MHz

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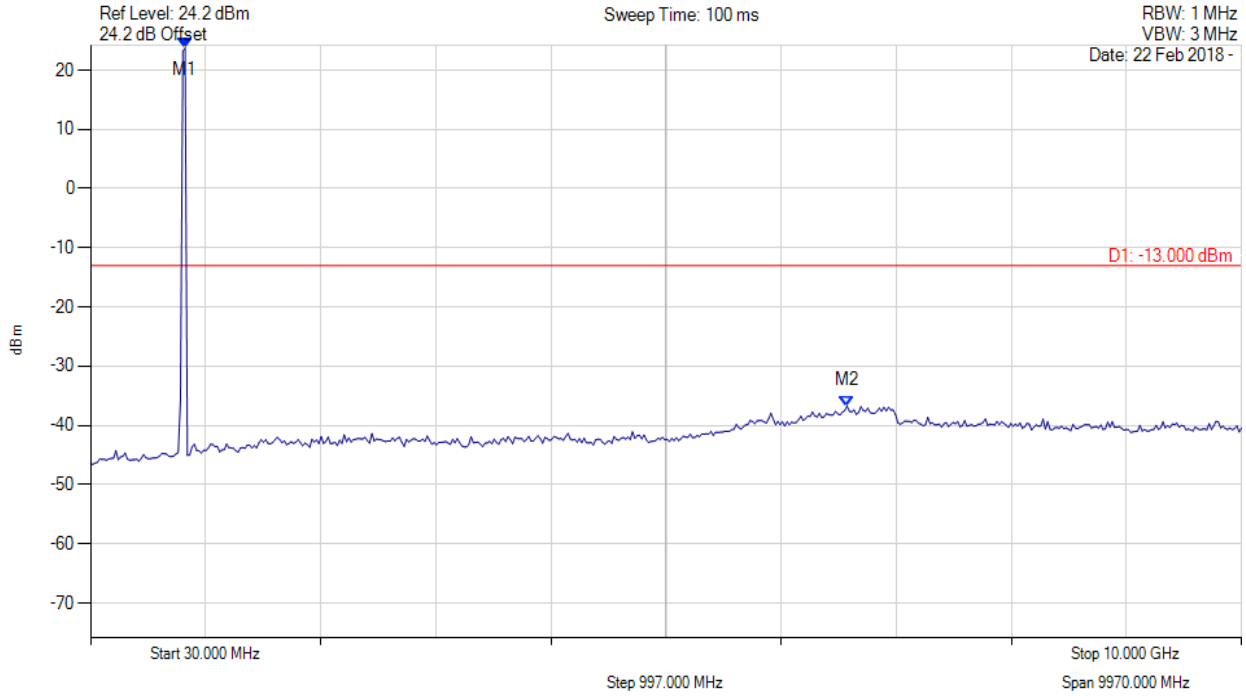
Transmitter Unwanted Emissions in the Spurious Domain

Variant: WCDMA, Channel: 846.60 MHz, Chain a, Temp: 20, Voltage: 120 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 10 Trace Mode = VIEW	M1 : 849.178 MHz : 23.710 dBm M2 : 6583.427 MHz : -36.719 dBm	Channel Frequency: 846.60 MHz

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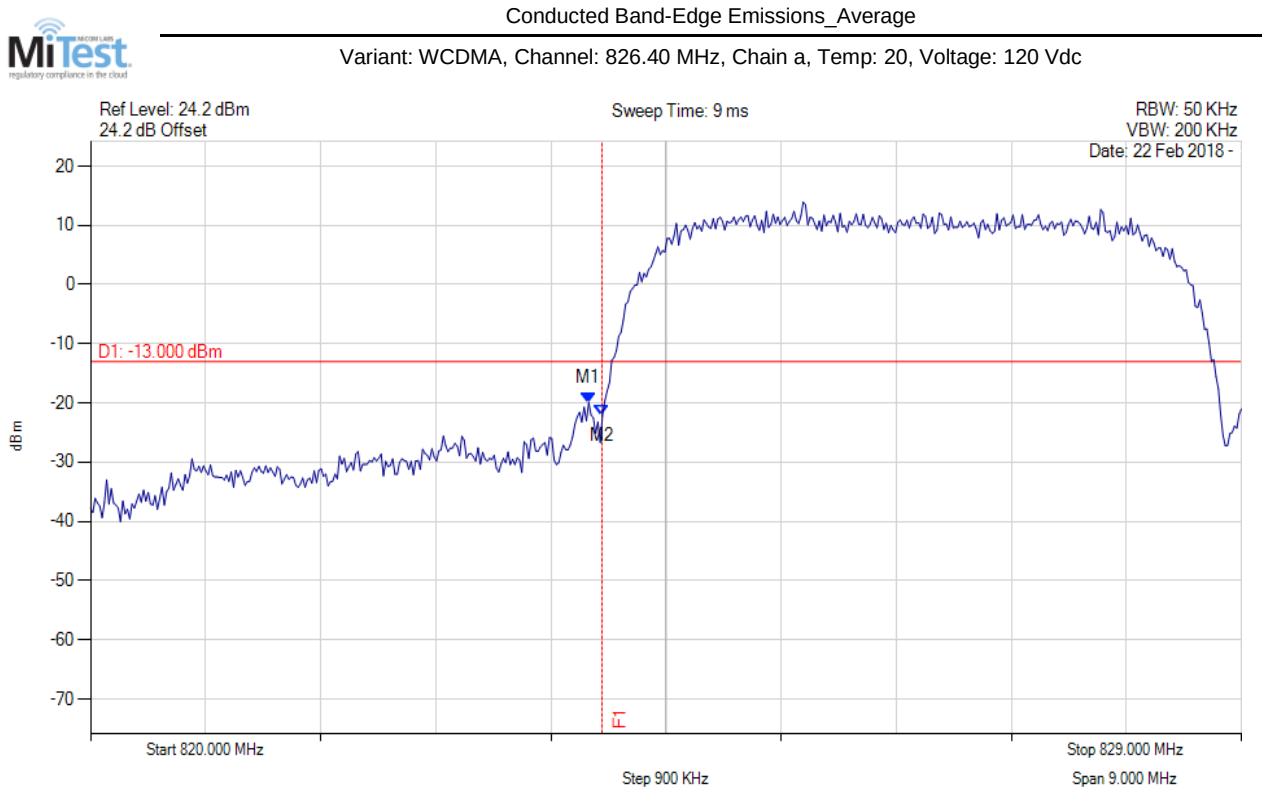
A.2.4 WCDMA: Conducted Band Edge Emissions



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = RMS Sweep Count = 0 RF Atten (dB) = 10 Trace Mode = VIEW	M1 : 823.892 MHz : -19.954 dBm M2 : 824.000 MHz : -22.028 dBm	Channel Frequency: 826.40 MHz

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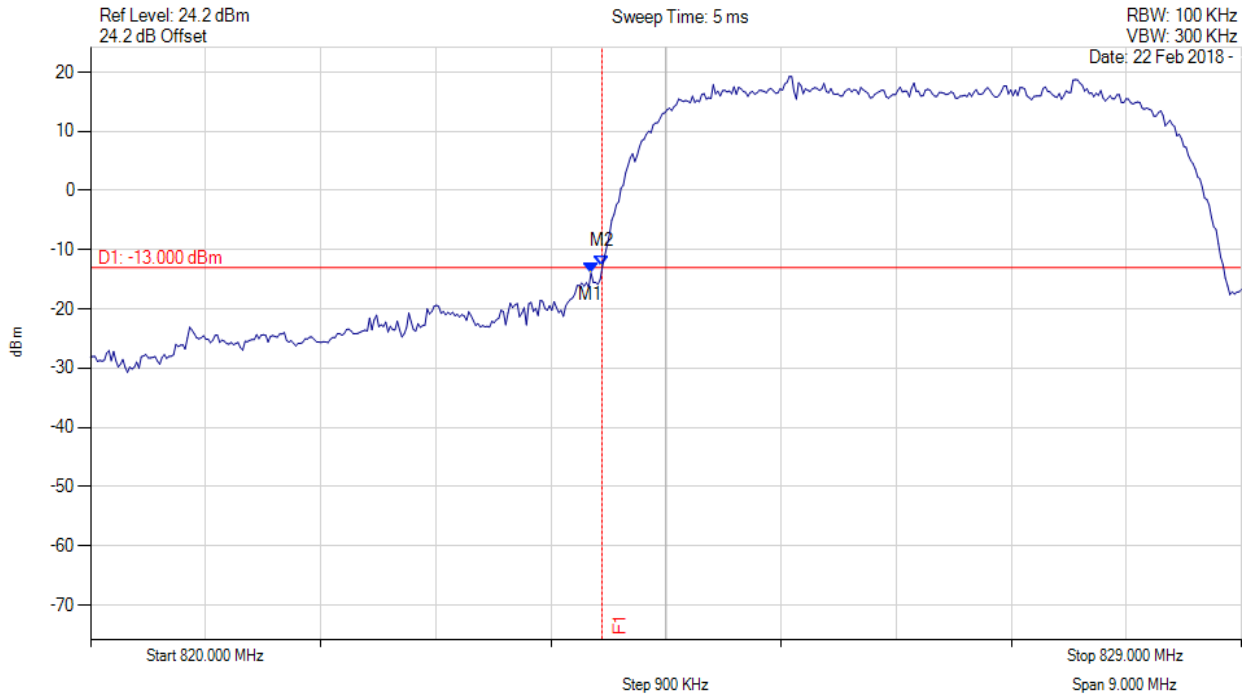
Conducted Band-Edge Emissions_Peak

Variant: WCDMA, Channel: 826.40 MHz, Chain a, Temp: 20, Voltage: 120 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 10 Trace Mode = MAX HOLD	M1 : 823.914 MHz : -13.927 dBm M2 : 824.000 MHz : -12.698 dBm	Channel Frequency: 826.40 MHz

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Note: For improvement of accuracy, Section 5.7.2 of ANSI C63.26 allows for a narrower RBW to be used near band edges. See average plot for a higher resolution measurement.

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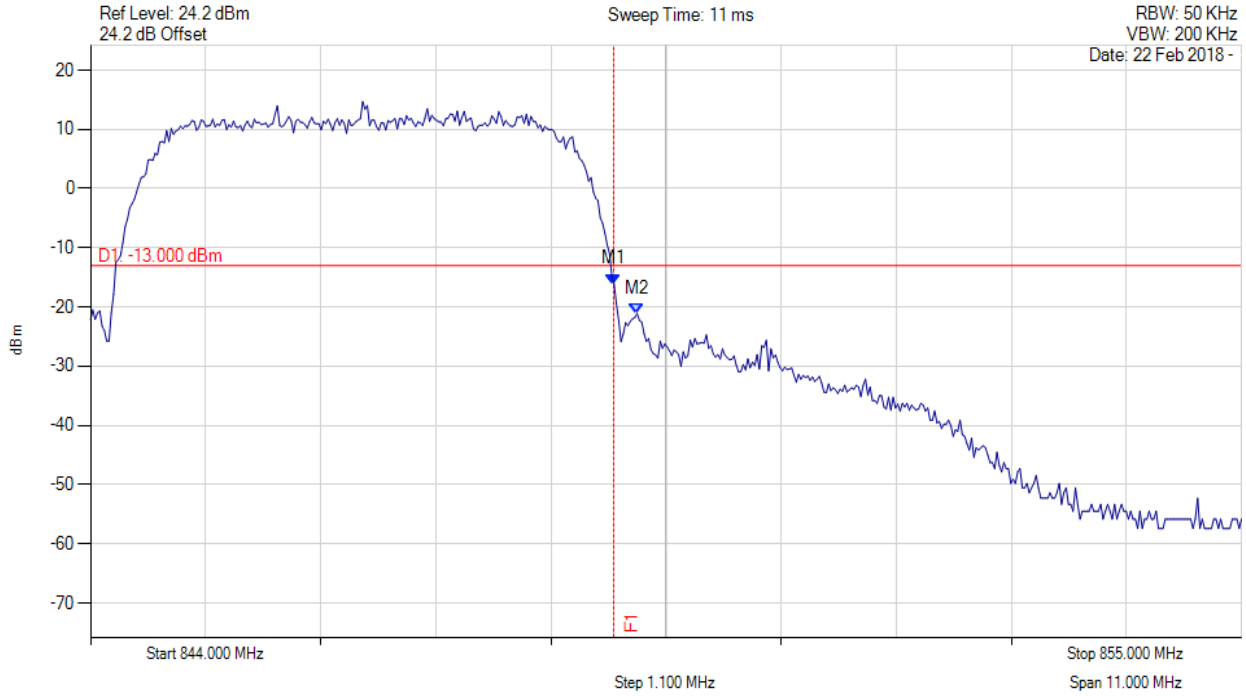
Conducted Band-Edge Emissions_Average

Variant: WCDMA, Channel: 846.60 MHz, Chain a, Temp: 20, Voltage: 120 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = RMS Sweep Count = 0 RF Atten (dB) = 10 Trace Mode = VIEW	M1 : 849.000 MHz : -16.157 dBm M2 : 849.220 MHz : -21.128 dBm	Channel Frequency: 846.60 MHz

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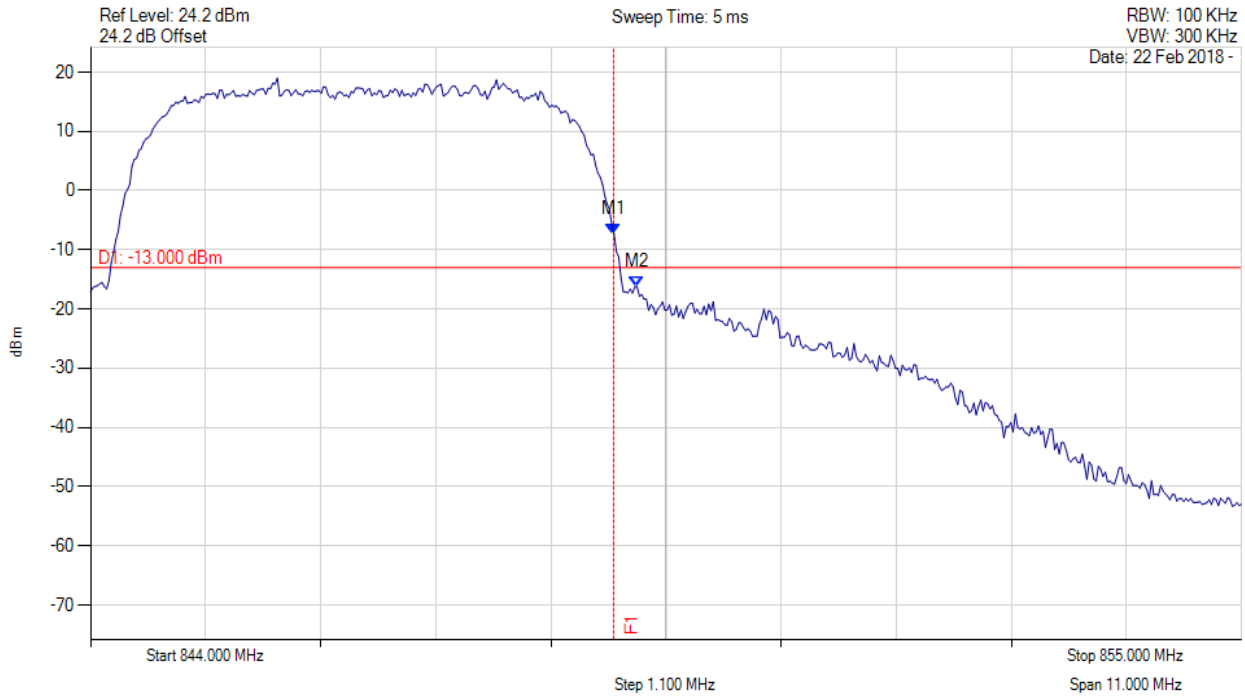
Conducted Band-Edge Emissions_Peak

Variant: WCDMA, Channel: 846.60 MHz, Chain a, Temp: 20, Voltage: 120 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 10 Trace Mode = VIEW	M1 : 849.000 MHz : -7.368 dBm M2 : 849.220 MHz : -16.296 dBm	Channel Frequency: 846.60 MHz

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Note: For improvement of accuracy, Section 5.7.2 of ANSI C63.26 allows for a narrower RBW to be used near band edges. See average plot for a higher resolution measurement.

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