Company: Silver Spring Networks

Test of: NIC 541-0302
To: FCC CFR 47 Part 15 Subpart C 15.247 (DTS) &
IC RSS-247 902-928 MHz operation

Report No.: SSNT108–U3 Rev A

CONDUCTED, RADIATED TEST REPORT

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FROM

MiCOM Labs
opening wireless markets

Test of: Silver Spring Networks NIC 541-0302
to

To: FCC CFR 47 Part 15 Subpart C 15.247 (DTS) &
IC RSS-247 902-928 MHz operation.

Test Report Serial No.: SSNT108–U3 Rev A

This report supersedes: NONE

Applicant:	Silver Spring Networks 555 Broadway Street Redwood City, California 94063 USA
Product Function:	Plug-in radio device, will communicate over 900 MHz and 2.4 GHz mesh network
Issue Date:	11th December 2015

This Test Report is Issued Under the Authority of:

MiCOM Labs, Inc.
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A2LA 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*).

American Association for Laboratory Accreditation Corporate Seal 1978 District of Columbia A2LA

Presented this 28th day of February 2014.

President & CEO
For the Accreditation Council
Certificate Number 2381.01
Valid to December 31, 2015
Revised November 18, 2015

For the tests or types of 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

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

MICOM LABS

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 accreditation demonstrates technical competence for a defined scope and the operation of a management system.

Presented this 28th day of February 2014.

President & CEO
For the Accreditation Council
Certificate Number 2381.02
Valid to December 31, 2015
Revised November 18, 2015

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

2. DOCUMENT HISTORY

Document History		
Revision	Date	Comments
Draft		
Rev A	11th December 2015	Initial release.
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In the above table the latest report revision will replace all earlier versions.

3. TEST RESULT CERTIFICATE

Manufacturer:	Silver Spring Networks 555 Broadway Street Redwood City California 94063 USA	**Tested By:**	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Model:	NIC 541-0302 902-928 MHz operation.	**Telephone:**	+1 925 462 0304
		Fax:	+1 925 462 0306
Type Of Equipment:	Plug-in radio device, will communicate over 900 MHz and 2.4 GHz mesh network		
S/N's:	00:13:50:FF:FE:40:00:1E		
Test Date(s):	10 – 19th November 2015	**Website:**	www.micomlabs.com

STANDARD(S)	TEST RESULTS
FCC CFR 47 Part 15 Subpart C 15.247 (DTS)	**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.

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.

4. REFERENCES AND MEASUREMENT UNCERTAINTY

4.1. Normative References

REF.	PUBLICATION	YEAR	TITLE
I	KDB 662911	Oct 31 2013	Guidance for measurement of output emission of devices that employ single transmitter with multiple outputs or systems with multiple transmitters operating simultaneously in the same frequency band
II	KDB 558074 D01 v03r03	9th June 2015	Guidance for performing compliance measurements on Digital Transmission Systems (DTS) operating under section 15.247.
III	A2LA	June 2015	R105 - Requirement's When Making Reference to A2LA Accreditation Status
IV	ANSI C63.10	2013	American National Standard for Testing Unlicensed Wireless Devices
V	ANSI C63.4	2009	American National Standards for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
VI	CISPR 22	2008	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement
VII	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
VIII	FCC 47 CFR Part 15.247	2014	Radio Frequency Devices; Subpart C – Intentional Radiators
IX	ICES-003	Issue 5 2012	Spectrum Management and Telecommunications; Interference-Causing Equipment Standard. Information Technology Equipment (ITE) – Limits and methods of measurement.
X	M 3003	Edition 3 Nov. 2012	Expression of Uncertainty and Confidence in Measurements
XI	RSS-247 Issue 1	May 2015	Digital Transmission Systems (DTSs), Frequency Hopping System (FHSs) and Licence-Exempt Local Area Network (LE-LEN) Devices
XII	RSS-Gen Issue 4	November 2014	General Requirements and Information for the Certification of Radiocommunication Equipment
XIII	KDB 644545 D03 v01	August 14th 2014	Guidance for IEEE 802.11ac New Rules
XIV	FCC 47 CFR Part 2.1033	2014	FCC requirements and rules regarding photographs and test setup diagrams.

4.2. Test and Uncertainty Procedure

Conducted and radiated emission measurements were conducted in accordance with American National Standards Institute ANSI C63.4, listed in the Normative References section of this 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.

5. PRODUCT DETAILS AND TEST CONFIGURATIONS

5.1. Technical Details

Details	Description
Purpose:	Test of the Silver Spring Networks NIC 541-0302 to FCC CFR 47 Part 15 Subpart C 15.247 (DTS) and Industry Canada RSS-247. Radio Frequency Devices; Subpart C – Intentional Radiators
Applicant:	Silver Spring Networks 555 Broadway Street Redwood City California 94063 USA
Manufacturer:	As Applicant
Laboratory performing the tests:	MiCOM Labs, Inc. 575 Boulder Court Pleasanton California 94566 USA
Test report reference number:	SSNT108-U3 Rev A
Date EUT received:	9th November 2015
Standard(s) applied:	FCC CFR 47 Part 15 Subpart C 15.247 (DTS)
Dates of test (from - to):	10 - 19 November 2015
No of Units Tested:	1
Type of Equipment:	Network Interface Card (NIC)
Product Family Name:	NIC540
Model(s):	NIC 541-0302
Location for use:	Indoor/Outdoor
Declared Frequency Range(s):	902 - 928 MHz; 2400 - 2483.5 MHz;
Primary function of equipment:	Plug-in radio device, will communicate over 900 MHz and 2.4 GHz mesh network
Secondary function of equipment:	None Provided
Type of Modulation:	FHSS, DTS
EUT Modes of Operation:	902 - 928 MHz: FSK; GFSK ; 2FSK; OQPSK; OFDM
Declared Nominal Output Power (Ave):	902 - 928 MHz: FSK: 30 dBm; GFSK: 30 dBm; 2FSK: 30 dBm; OFDM: 30dBm; OQPSK: 30 dBm
Transmit/Receive Operation:	Transceiver - Half Duplex
Rated Input Voltage and Current:	DC only (Battery operated / external supply) 4Vdc
Operating Temperature Range:	Declared Range -40°C to 85°C
ITU Emission Designator:	FHSS: FSK 105KF1D FSK 164KF1D 2FSK 87KF1D GFSK 164KF1D GFSK 220KF1D GFSK 332KF1D OQPSK 117KF1D OFDM 300KF1D --

	DTS: 1M22G1D
Equipment Dimensions:	114.5mm x 101.6mm x 19mm
Weight:	140 grams
Hardware Rev:	173-0656-00; 173-0724-00
Software Rev:	3.10

5.2. Scope Of Test Program

Silver Spring Networks NIC 541-0302

The scope of the test program was to test the Silver Spring Networks NIC 541-0302, Network Interface Card (NIC) configurations in the frequency ranges 902 - 928 MHz for compliance against the following specification:

> **FCC CFR 47 Part 15 Subpart C 15.247 (DTS) & Industry Canada RSS-247**
> Radio Frequency Devices; Subpart C – Intentional Radiators and Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

The EUT has 20 modulation modes available for the US. 9 modes were tested. Modes not tested were the multi-rate modes which do not represent a change in RF performance, including OBW and power.

Test plan includes all modes in use.

Testing of; Number of channels; Channel Spacing; Dwell time and Channel Occupancy was limited to testing 3 modes that were declared by the manufacturer as representing all modes of operation for these parameters.

> Modes tested; 300 kHz FSK 100 kbps; 400 kHz OFDM 600 kbps; 200 kHz OQPSK 6.25 kbps.

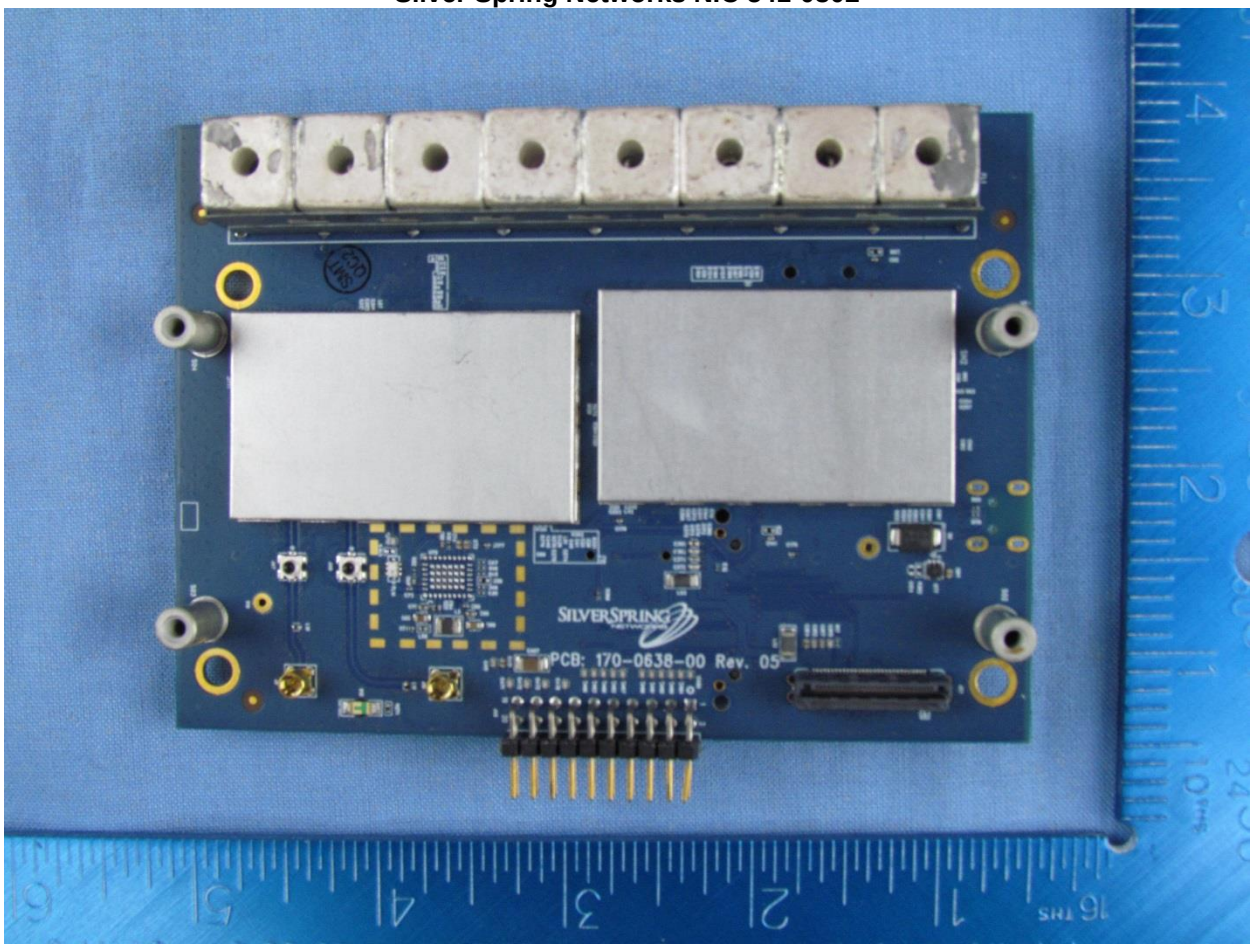
Product Description

The following product description was provided by the manufacturer.

NIC 540

The Silver Spring Networks (SSN) Network Interface Card, or NIC 541-0302, is based on SSN's 5th Generation radio platform. NIC 541-0302 is a Network Relay Point (NRP) NIC to be used in Access Points, Relays, Bridges, and other DA radio applications to be used in SSN Smart Energy Networks (SEN). The NIC 541-0302 incorporates a 902-928 MHz frequency hopping mesh radio, a 902-928 MHz DSSS radio, a 2.4 GHz ISM band frequency hopping mesh radio, and a 2.4 GHz DSSS radio.

Silver Spring Networks NIC 541-0302



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

Type	Description	Manufacturer	Model	Serial no.	Delivery Date
EUT	Network Interface Card (NIC)	Silver Spring Networks	NIC 541-0302	00:13:50:FF:FE:40:00:1E	9th November 2015

5.4. Antenna Details

Type	Manufacturer	Model	Family	Gain (dBi)	BF Gain	Dir BW	X-Pol	Frequency Band (MHz)
external	L-COM	HGV-906U	OMNI	6.0	-	360	-	902 - 928
external	Tessco	MHO24006NM	OMNI	6.0	-	360	-	2400 - 2483.5

BF Gain - Beamforming Gain
Dir BW - Directional BeamWidth
X-Pol - Cross Polarization

5.5. Cabling and I/O Ports

*None

5.6. Test Configurations

Results for the following configurations are provided in this report:

Channel Spacing (kHz)	Operational Mode(s) (FHSS)	Data Rate with Highest Power (Kbps)	Channel Frequency (MHz)		
			Low	Mid	High
902.00 – 928.00 MHz					
300	FSK	100.00	902.30	915.20	926.90
400	FSK	150.00	902.40	915.20	927.60
300	GFSK	150.00	902.30	915.20	926.90
300	GFSK	200.00	902.30	915.20	926.90
400	GFSK	300.00	902.40	915.20	927.60
200	2FSK	50.00	902.20	915.00	927.80
400	OFDM	600.00	902.40	915.20	927.60
200	OQPSK	6.25	902.20	915.00	927.80

Channel Spacing (kHz)	Operational Mode(s)	Data Rate with Highest Power (Kbps)	Channel Frequency (MHz)		
			Low	Mid	High
902.00 – 928.00 MHz					
1200	OFDM	2400.00	903.20	914.00	926.00

5.7. Equipment Modifications

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

5.8. Deviations from the Test Standard

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

6. TEST SUMMARY

List of Measurements

Test Header	Result	Data Link
Conducted Test Results		
15.247(a)(2) 20 dB & 99% Bandwidth	Complies	View Data
15.247(a)(2) 6 dB & 99% Bandwidth	Complies	View Data
15.247(a)(2) Number of Channels; Channel Spacing; Dwell Time & Channel Occupancy	Complies Note 1	View Data
15.247(b), 15.31(e) Conducted Output Power	Complies	View Data
15.247(d) Emissions	-	-
(1) Conducted Emissions	-	-
(i) Conducted Spurious Emissions	Complies	View Data
(ii) Conducted Band-Edge Emissions	Complies	View Data
15.247(e) Power Spectral Density	Complies	View Data
Radiated Emissions		
(i) 15.205 Spurious Emissions	Complies	View Data
ac Wireline Emissions		
(3) 15.209 Digital Emissions (0.03 - 1 GHz)	Complies	View Data

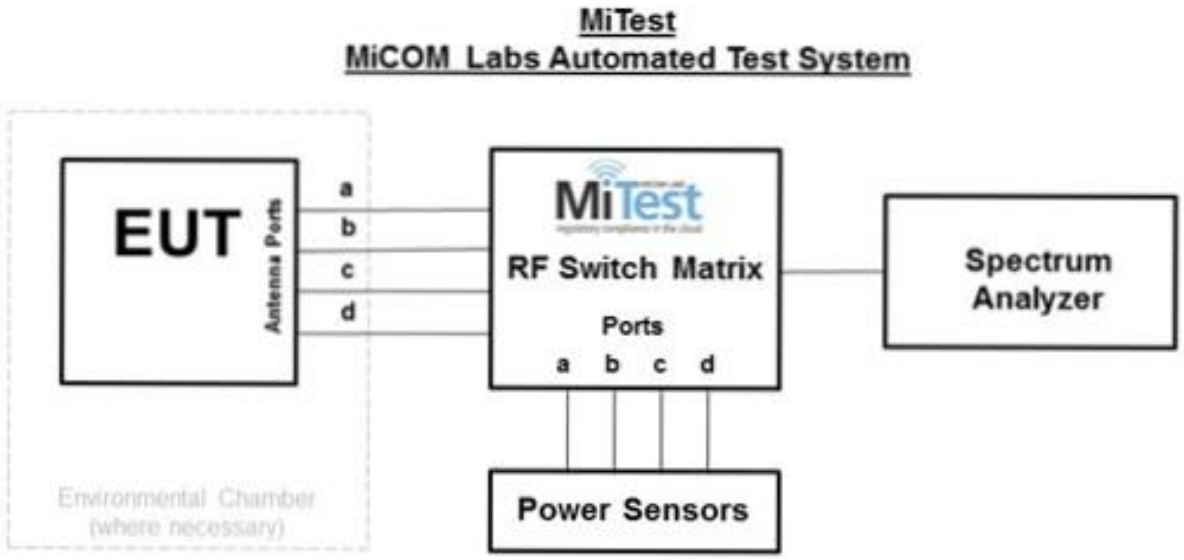
Note
Testing of; Number of channels; Channel Spacing; Dwell time and Channel Occupancy was limited to testing 3 modes that were declared by the manufacturer as representing all modes of operation for these parameters.

Modes tested; 300 kHz FSK 100 kbps; 400 kHz OFDM 600 kbps; 200 kHz OQPSK 6.25 kbps.

7. TEST EQUIPMENT CONFIGURATION(S)

7.1. Conducted

Conducted RF Emission Test Set-up(s)
The following tests were performed using the conducted test set-up shown in the diagram below.
1. 20 dB & 99% Bandwidth
2. 6 dB & 99% Bandwidth
3. Number of Channels
4. Channel Spacing
5. Dwell time & Channel Occupancy
6. Conducted Output Power
7. Conducted Spurious Emissions
8. Conducted Spurious Band-Edge Emissions
9. Power Spectral Density



Conducted Test Measurement Setup

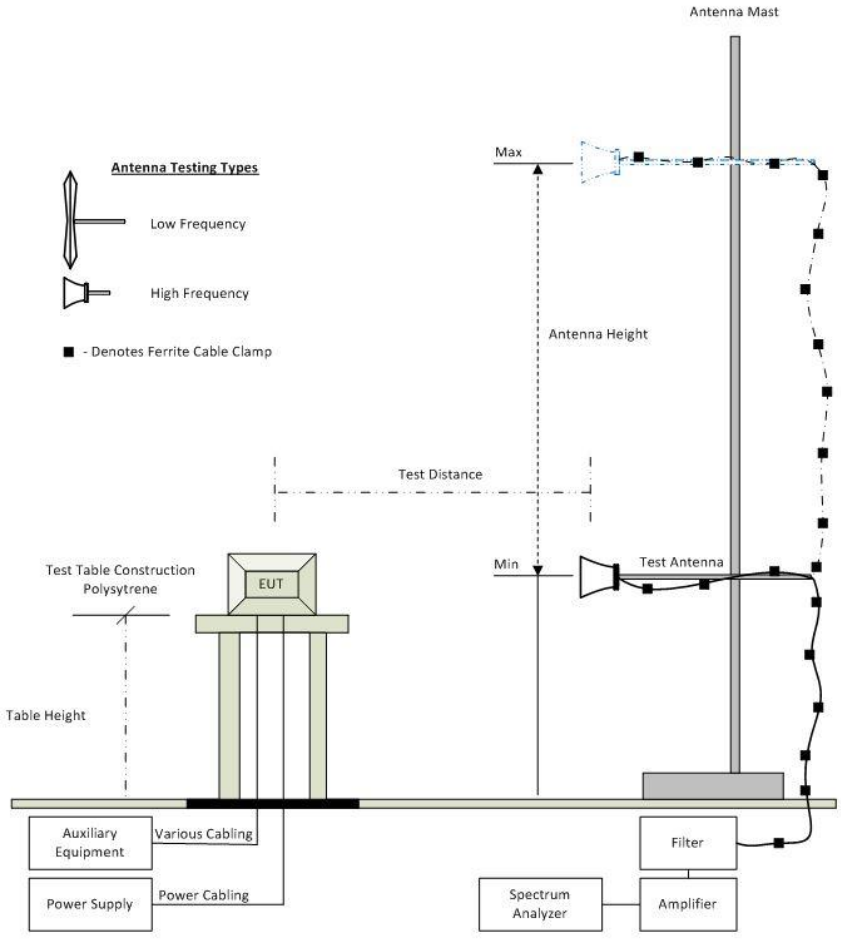
A full system calibration was performed on the test station and any resulting system losses (or gains) were taken into account in the production of all final measurement data.

Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
127	Power Supply	HP	6674A	US36370530	Cal when used
158	Barometer/Thermometer	Control Company	4196	E2846	01 Dec 2016
193	Receiver 20 Hz to 7 GHz	Rhode & Schwarz	ESI 7	838496/007	14 Jan 2016
248	Resistance Thermometer	Thermotronics	GR2105-02	9340 #1	21 Oct 2016
287	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100201	27 Aug 2016
376	USB 10MHz - 18GHz Average Power Sensor	Agilent	U2000A	MY51440005	23 Oct 2016
378	Rohde & Schwarz 40 GHz Receiver with Generator	Rhode & Schwarz	ESIB40	100107/040	04 Aug 2016
381	4x4 RF Switch Box	MiCOM Labs	MiTest RF Switch Box	MIC002	20 Dec 2015
419	Laptop with Labview Software	Lenova	W520	TS02	Not Required
420	USB to GPIB Interface	National Instruments	GPIB-USB HS	1346738	Not Required
435	USB Wideband Power Sensor	Boonton	55006	8730	31 Jul 2016
440	USB Wideband Power Sensor	Boonton	55006	9178	25 Sep 2016
441	USB Wideband Power Sensor	Boonton	55006	9179	25 Sep 2016
442	USB Wideband Power Sensor	Boonton	55006	9181	25 Sep 2016
445	PoE Injector	D-Link	DPE-101GL	QTAH1E2000625	Not Required
460	Dell Computer	Dell	Optiplex330	BC944G1	Not Required
74	Environmental Chamber 3	Tenney	TTC	12808-1	30 Sep 2016
RF#2 GPIB#1	GPIB cable to Power Supply	HP	GPIB	None	Not Required
RF#2 SMA#1	EUT to Mitest box port 1	Flexco	SMA Cable port1	None	20 Dec 2015
RF#2 SMA#2	EUT to Mitest box port 2	Flexco	SMA Cable port2	None	20 Dec 2015
RF#2 SMA#3	EUT to Mitest box port 3	Flexco	SMA Cable port3	None	20 Dec 2015
RF#2 SMA#4	EUT to Mitest box port 4	Flexco	SMA Cable port4	None	20 Dec 2015
RF#2 SMA#SA	Mitest box to SA	Flexco	SMA Cable SA	None	20 Dec 2015
RF#2 USB#1	USB Cable to Mitest Box	Dynex	USB Cable	None	Not Required

7.2. Radiated Emissions

The following tests were performed using the conducted test set-up shown in the diagram below.

1. Section 9.4.1 Spurious Emissions
2. Section 9.4.2 Restricted Band-Edge Emissions
3. Section 9.5 Radiated Digital Emissions



Radiated Emission Test Setup

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.

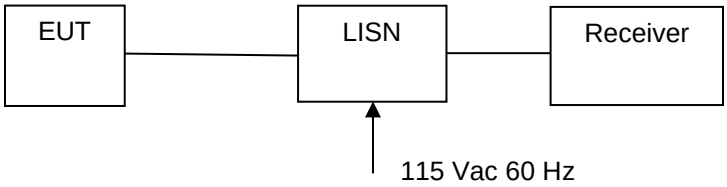
Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
158	Barometer/Thermometer	Control Company	4196	E2846	01 Dec 2016
170	Video System Controller for Semi Anechoic Chamber	Panasonic	WV-CY101	04R08507	Not Required
287	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100201	27 Aug 2016
338	Sunol 30 to 3000 MHz Antenna	Sunol	JB3	A052907	15 Aug 2016
341	900MHz Notch Filter	EWT	EWT-14-0199	H1	18 Aug 2016
342	2.4 GHz Notch Filter	EWT	EWT-14-0203	H1	18 Aug 2016
396	2.4 GHz Notch Filter	Microtronics	BRM50701	001	18 Aug 2016
397	Amp 10 - 2500MHz	MiCOM Labs	Amp 10 - 2500 MHz	NA	24 Feb 2016
399	ETS 1-18 GHz Horn Antenna	ETS	3117	00154575	10 Oct 2016
406	Amplifier for Radiated Emissions	MiCOM Labs	40dB 1 to 18GHz Amp	0406	28 May 2016
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
414	DC Power Supply 0-60V	HP	6274	1029A01285	Cal when used
415	Turntable Controller	Sunol Sciences	Turntable Controller	None	Not Required
447	Rad Emissions Test Software	MiCOM	Rad Emissions Test Software Version 1.0.73	447	Not Required
462	Schwarzbeck cable from Antenna to Amplifier.	Schwarzbeck	AK 9513	462	25 Feb 2016
463	Schwarzbeck cable from Amplifier to Bulkhead.	Schwarzbeck	AK 9513	463	25 Feb 2016
464	Schwarzbeck cable from Bulkhead to Receiver	Schwarzbeck	AK 9513	464	25 Feb 2016
465	Low Pass Filter DC-1000 MHz	Mini-Circuits	NLP-1200+	VUU01901402	18 Aug 2016
480	Cable - Bulkhead to Amp	SRC Haverhill	157-157-3050360	480	11 Aug 2016
481	Cable - Bulkhead to Receiver	SRC Haverhill	151-151-3050787	481	11 Aug 2016
482	Cable - Amp to Antenna	SRC Haverhill	157-157-3051574	482	11 Aug 2016

7.3. ac Wireline Emission

The following tests were performed using the conducted test set-up shown in the diagram below.

1. Section 9.6 ac Wireline Conducted Emissions

Test Measurement Set up



Measurement set up for AC Wireline Conducted Emissions Test

Traceability of Test Equipment Utilized for ac Wireline Emission Testing

Asset#	Description	Manufacturer	Model#	Serial#	Calibration Due Date
158	Barometer/Thermometer	Control Company	4196	E2846	04 Dec 2015
184	Pulse Limiter	Rhode & Schwarz	ESH3Z2	357.8810.52	07 Jan 2016
190	LISN (two-line V-network)	Rhode & Schwarz	ESH3Z5	836679/006	29 Oct 2016
193	Receiver 20 Hz to 7 GHz	Rhode & Schwarz	ESI 7	838496/007	14 Jan 2016
287	Rohde & Schwarz 40 GHz Receiver	Rhode & Schwarz	ESIB40	100201	27 Aug 2016
307	BNC-CABLE	Megaphase	1689 1GVT4	15F50B002	07 Jan 2016
316	Dell desktop computer workstation with Vasona	Dell	Desktop	WS04	Not Required
372	AC Variable PS	California Instruments	1251P	L06951	Cal when used
378	Rohde & Schwarz 40 GHz Receiver with Generator	Rhode & Schwarz	ESIB40	100107/040	04 Aug 2016
388	LISN (3 Phase) 9kHz - 30MHz	Rohde & Schwarz	ESH2-Z5	892107/022	30 Oct 2016
ADAPT SMA#1	SMA Cable	Megaphase	SMA Cable #1	None	Cal when used

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)

9. TEST RESULTS

9.1. 20 dB & 99% Bandwidth

Conducted Test Conditions for 20 dB and 99% Bandwidth			
Standard:	FCC CFR 47:15.247	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	20 dB and 99 % Bandwidth	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.247 (a)(2)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for 20 dB and 99% Bandwidth Measurement
The bandwidth at 20 dB and 99 % was measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center 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.

Limits for 20 dB and 99% Bandwidth

(a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Modulation (FHSS)

Equipment Configuration for 20 dB & 99% Bandwidth			
Variant:	300 FSK	**Duty Cycle (%):**	99.00
Data Rate:	100.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 20 dB Bandwidth (MHz) Port(s)				20 dB Bandwidth (MHz)		Limit	Lowest Margin
MHz	a	b	c	d	Highest	Lowest	KHz	KHz
902.3	0.115	--	--	--	0.115	0.115	≤500.0	-385.00
915.2	0.114	--	--	--	0.114	0.114	≤500.0	-386.00
926.9	0.117	--	--	--	0.117	0.117	≤500.0	-383.00

Test Frequency	Measured 99% Bandwidth (MHz) Port(s)				Maximum 99% Bandwidth (MHz)		
MHz	a	b	c	d			
902.3	0.105	--	--	--	0.105		
915.2	0.105	--	--	--	0.105		
926.9	0.105	--	--	--	0.105		

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).

Equipment Configuration for 20 dB & 99% Bandwidth			
Variant:	300 GFSK	**Duty Cycle (%):**	99.00
Data Rate:	150.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 20 dB Bandwidth (MHz) Port(s)				20 dB Bandwidth (MHz)		Limit	Lowest Margin
MHz	a	b	c	d	Highest	Lowest	KHz	KHz
902.3	0.184	--	--	--	0.184	0.184	≤500.0	-316.0
915.2	0.182	--	--	--	0.182	0.182	≤500.0	-318.0
926.9	0.182	--	--	--	0.182	0.182	≤500.0	-318.0

Test Frequency	Measured 99% Bandwidth (MHz) Port(s)				Maximum 99% Bandwidth (MHz)		
MHz	a	b	c	d			
902.3	0.164	--	--	--	0.164		
915.2	0.162	--	--	--	0.162		
926.9	0.162	--	--	--	0.162		

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).

Equipment Configuration for 20 dB & 99% Bandwidth			
Variant:	300 GFSK	**Duty Cycle (%):**	99.00
Data Rate:	200.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 20 dB Bandwidth (MHz) Port(s)				20 dB Bandwidth (MHz)		Limit	Lowest Margin
MHz	a	b	c	d	Highest	Lowest	KHz	KHz
902.3	0.233	--	--	--	0.233	0.233	≤500.0	-267.0
915.2	0.231	--	--	--	0.231	0.231	≤500.0	-269.0
926.9	0.236	--	--	--	0.236	0.236	≤500.0	-264.0

Test Frequency	Measured 99% Bandwidth (MHz) Port(s)				Maximum 99% Bandwidth (MHz)		
MHz	a	b	c	d			
902.3	0.220	--	--	--	0.220		
915.2	0.220	--	--	--	0.220		
926.9	0.219	--	--	--	0.219		

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).

Equipment Configuration for 20 dB & 99% Bandwidth			
Variant:	400 FSK	**Duty Cycle (%):**	99.00
Data Rate:	150.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 20 dB Bandwidth (MHz) Port(s)				20 dB Bandwidth (MHz)		Limit	Lowest Margin
MHz	a	b	c	d	Highest	Lowest	KHz	KHz
902.4	0.176	--	--	--	0.176	0.176	≤500.0	-324.0
915.2	0.178	--	--	--	0.178	0.178	≤500.0	-322.0
927.6	0.176	--	--	--	0.176	0.176	≤500.0	-324.0

Test Frequency	Measured 99% Bandwidth (MHz) Port(s)				Maximum 99% Bandwidth (MHz)		
MHz	a	b	c	d			
902.4	0.164	--	--	--	0.164		
915.2	0.162	--	--	--	0.162		
927.6	0.162	--	--	--	0.162		

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).

Equipment Configuration for 20 dB & 99% Bandwidth			
Variant:	400 GFSK	**Duty Cycle (%):**	99.00
Data Rate:	300.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 20 dB Bandwidth (MHz) Port(s)				20 dB Bandwidth (MHz)		Limit	Lowest Margin
MHz	a	b	c	d	Highest	Lowest	KHz	KHz
902.4	0.353	--	--	--	0.353	0.353	≤500.0	-147.0
915.2	0.353	--	--	--	0.353	0.353	≤500.0	-147.0
927.6	0.345	--	--	--	0.345	0.345	≤500.0	-155.0

Test Frequency	Measured 99% Bandwidth (MHz) Port(s)				Maximum 99% Bandwidth (MHz)		
MHz	a	b	c	d			
902.4	0.332	--	--	--	0.332		
915.2	0.330	--	--	--	0.330		
927.6	0.330	--	--	--	0.330		

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).

Equipment Configuration for 20 dB & 99% Bandwidth			
Variant:	200 2FSK	**Duty Cycle (%):**	99.00
Data Rate:	50.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 20 dB Bandwidth (MHz) Port(s)				20 dB Bandwidth (MHz)		Limit	Lowest Margin
MHz	a	b	c	d	Highest	Lowest	KHz	KHz
902.2	0.083	--	--	--	0.083	0.083	≤500.0	-417.0
915.0	0.085	--	--	--	0.085	0.085	≤500.0	-415.0
927.8	0.083	--	--	--	0.083	0.083	≤500.0	-417.0

Test Frequency	Measured 99% Bandwidth (MHz) Port(s)				Maximum 99% Bandwidth (MHz)		
MHz	a	b	c	d			
902.2	0.084	--	--	--	0.084		
915.0	0.087	--	--	--	0.087		
927.8	0.085	--	--	--	0.085		

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).

Equipment Configuration for 20 dB & 99% Bandwidth			
Variant:	200 OQPSK	**Duty Cycle (%):**	99.00
Data Rate:	6.25 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 20 dB Bandwidth (MHz) Port(s)				20 dB Bandwidth (MHz)		Limit	Lowest Margin
MHz	a	b	c	d	Highest	Lowest	KHz	KHz
902.2	0.129	--	--	--	0.129	0.129	≤500.0	-371.0
915.0	0.127	--	--	--	0.127	0.127	≤500.0	-373.0
927.8	0.123	--	--	--	0.123	0.123	≤500.0	-377.0

Test Frequency	Measured 99% Bandwidth (MHz) Port(s)				Maximum 99% Bandwidth (MHz)		
MHz	a	b	c	d			
902.2	0.115	--	--	--	0.115		
915.0	0.117	--	--	--	0.117		
927.8	0.114	--	--	--	0.114		

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).

Equipment Configuration for 20 dB & 99% Bandwidth			
Variant:	400 OFDM	**Duty Cycle (%):**	99.00
Data Rate:	600 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 20 dB Bandwidth (MHz) Port(s)				20 dB Bandwidth (MHz)		Limit	Lowest Margin
MHz	a	b	c	d	Highest	Lowest	KHz	KHz
902.4	0.348	--	--	--	0.348	0.348	≤500.0	-152.0
915.2	0.377	--	--	--	0.377	0.377	≤500.0	-123.0
927.6	0.383	--	--	--	0.383	0.383	≤500.0	-117.0

Test Frequency	Measured 99% Bandwidth (MHz) Port(s)				Maximum 99% Bandwidth (MHz)		
MHz	a	b	c	d			
902.4	0.298	--	--	--	0.298		
915.2	0.300	--	--	--	0.300		
927.6	0.298	--	--	--	0.298		

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).

9.2. 6 dB & 99% Bandwidth

Conducted Test Conditions for 6 dB and 99% Bandwidth			
Standard:	FCC CFR 47:15.247	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	6 dB and 99 % Bandwidth	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.247 (a)(2)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for 6 dB and 99% Bandwidth Measurement
The bandwidth at 6 dB and 99 % was measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center 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.

Limits for 6 dB and 99% Bandwidth

(a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

(2) Systems using digital modulation techniques may operate in the 902-928 MHz and 2400-2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Modulation (DTS)

Equipment Configuration for 6 dB & 99% Bandwidth

Variant:	1200 OFDM	**Duty Cycle (%):**	99.00
Data Rate:	2400.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	DTS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured 6 dB Bandwidth (MHz) Port(s)				6 dB Bandwidth (MHz)		Limit	Lowest Margin
MHz	a	b	c	d	Highest	Lowest	KHz	MHz
903.2	1.063	--	--	--	1.063	1.063	≥500.0	-0.56
914.0	1.082	--	--	--	1.082	1.082	≥500.0	-0.58
926.0	1.073	--	--	--	1.073	1.073	≥500.0	-0.57

Test Frequency	Measured 99% Bandwidth (MHz) Port(s)				Maximum 99% Bandwidth (MHz)		
MHz	a	b	c	d			
903.2	1.222	--	--	--	1.222		
914.0	1.217	--	--	--	1.217		
926.0	1.207	--	--	--	1.207		

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).

9.3. Number Of Channels

Conducted Test Conditions for Number Of Channels			
Standard:	FCC CFR 47:15.247	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Number of Channels	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.247 (a)(2)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure
The number of channels and channel occupancy is measured with a spectrum analyzer connected to the antenna terminal, while the EUT is operating in transmission mode at the appropriate center frequency and modulation.

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.

Limit
For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies.

Equipment Configuration for Hopping Sequence			
Variant:	Not Applicable	**Duty Cycle (%):**	Not Applicable
Data Rate:	Not Applicable	**Antenna Gain (dBi):**	Not Applicable
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Variant	Frequency Range (MHz)	Number of Hopping Channels	Limit	Total Number of Hops	Results
			No of Hopping Channels		
200 kHz OQPSK	900.00 – 914.00	60.0	≥ 50	129.0	Pass
200 kHz OQPSK	914.00 – 928.00	69.0	≥ 50	129.0	Pass
200 kHz OQPSK	902.00 – 928.00	**Total No. of Hopping Channels:**		129.0	Pass
400 kHz FSK	900.00 – 914.00	40.0	≥ 50	83.0	Pass
400 kHz FSK	914.00 – 928.00	43.0	≥ 50	83.0	Pass
400 kHz FSK	902.00 – 928.00	**Total No. of Hopping Channels:**		83.0	Pass
400 kHz OFDM	900.00 – 914.00	30.0	≥ 25	63.0	Pass
400 kHz OFDM	914.00 – 928.00	33.0	≥ 25	63.0	Pass
400 kHz OFDM	902.00 – 928.00	**Total No. of Hopping Channels:**		63.0	Pass

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).

9.4. Channel Spacing

Conducted Test Conditions for 6 dB and 99% Bandwidth			
Standard:	FCC CFR 47:15.247	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Channel Spacing	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.247 (a)(2)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure
The number of channels and channel occupancy is measured with a spectrum analyzer connected to the antenna terminal, while the EUT is operating in transmission mode at the appropriate center frequency and modulation.

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.

Limit

(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

Equipment Configuration for Channel Separation			
Variant:	Not Applicable	**Duty Cycle (%):**	Not Applicable
Data Rate:	Not Applicable	**Antenna Gain (dBi):**	Not Applicable
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Center Frequency	Variant Type	Chan Separation	Limit (20 dB Occ. BW)	Result
MHz		MHz	MHz	
915.00	200 kHz OQPSK	0.200	≥ 0.129	Pass
915.20	300 kHz FSK	0.302	≥ 0.117	Pass
915.20	400 kHz OFDM	0.400	≥ 0.383	Pass
Traceability to Industry Recognized Test Methodologies				
Measurement Uncertainty:	±2.81 dB (Spectrum/Amplitude), ±0.86 ppm (Frequency)			

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

9.5. Dwell Time & Channel Occupancy

Conducted Test Conditions for Channel Occupancy			
Standard:	FCC CFR 47:15.247	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Dwell Time & Channel Occupancy	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.247 (a)(2)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure
The number of channels and channel occupancy is measured with a spectrum analyzer connected to the antenna terminal, while the EUT is operating in transmission mode at the appropriate center frequency and modulation.

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.

Limit
(i) For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period.

Equipment Configuration for Dwell Time & Channel Occupancy			
Variant:	Not Applicable	**Duty Cycle (%):**	Not Applicable
Data Rate:	Not Applicable	**Antenna Gain (dBi):**	Not Applicable
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

		Test Measurement Results			
Center Frequency	**Variant Type**	**Dwell Time (Single Channel)**	**Channel Occupancy**	**Channel Occupancy Limit**	**Result**
MHz		**mS**	**ms**	**ms**	
915.00	200 kHz OQPSK	139.00	298.00	400.00	Pass
915.20	300 kHz FSK	81.00	243.00	400.00	Pass
915.20	400 kHz OFDM	3.00	27.00	400.00	Pass

Traceability to Industry Recognized Test Methodologies	
Measurement Uncertainty:	±2.81 dB (Spectrum/Amplitude), ±0.86 ppm (Frequency)

Note: click the links in the above matrix

9.6. Conducted Output Power

Conducted Test Conditions for Fundamental Emission Output Power			
Standard:	FCC CFR 47:15.247	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Output Power	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.247 (b) & (c)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Fundamental Emission Output Power Measurement
In the case of average power measurements an average power sensor was utilized.

For peak power measurements the spectrum analyzer built-in power function was used to integrate peak power over the 20 dB bandwidth.

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

Test configuration and setup used for the measurement was per the Conducted Test Set-up specified in this document.
Supporting Information
Calculated Power = A + G + Y+ 10 log (1/x) dBm

A = Total Power [10*Log10 ($10^{a/10}$ + $10^{b/10}$ + $10^{c/10}$ + $10^{d/10}$)]
G = Antenna Gain
Y = Beamforming Gain
x = Duty Cycle (average power measurements only)

Limits for Fundamental Emission Output Power
(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following for non-frequency hopping systems:

(3) For systems using digital modulation in the 902-928 MHz and 2400-2483.5 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(c) Operation with directional antenna gains greater than 6 dBi.
(1) Fixed point-to-point operation:
(i) Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

(iii) Fixed, point-to-point operation, as used in paragraphs (c)(1)(i) and (c)(1)(ii) of this section, excludes the use of point-to-multipoint systems, omnidirectional applications, and multiple co-located intentional radiators transmitting the same information. The operator of the spread spectrum or digitally modulated intentional radiator or, if the equipment is professionally installed, the installer is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations. The instruction manual furnished with the intentional radiator shall contain language in the installation

instructions informing the operator and the installer of this responsibility.

(2) In addition to the provisions in paragraphs (b)(3), (b)(4) and (c)(1)(i) of this section, transmitters operating in the 2400-2483.5 MHz band that emit multiple directional beams, simultaneously or sequentially, for the purpose of directing signals to individual receivers or to groups of receivers provided the emissions comply with the following:

(i) Different information must be transmitted to each receiver.

(ii) If the transmitter employs an antenna system that emits multiple directional beams but does not do emit multiple directional beams simultaneously, the total output power conducted to the array or arrays that comprise the device, i.e., the sum of the power supplied to all antennas, antenna elements, staves, etc. and summed across all carriers or frequency channels, shall not exceed the limit specified in paragraph (b)(1) or (b)(3) of this section, as applicable. However, the total conducted output power shall be reduced by 1 dB below the specified limits for each 3 dB that the directional gain of the antenna/antenna array exceeds 6 dBi. The directional antenna gain shall be computed as follows:

(A) The directional gain shall be calculated as the sum of 10 log (number of array elements or staves) plus the directional gain of the element or stave having the highest gain.

(B) A lower value for the directional gain than that calculated in paragraph (c)(2)(ii)(A) of this section will be accepted if sufficient evidence is presented, e.g., due to shading of the array or coherence loss in the beamforming.

(iii) If a transmitter employs an antenna that operates simultaneously on multiple directional beams using the same or different frequency channels, the power supplied to each emission beam is subject to the power limit specified in paragraph (c)(2)(ii) of this section. If transmitted beams overlap, the power shall be reduced to ensure that their aggregate power does not exceed the limit specified in paragraph (c)(2)(ii) of this section. In addition, the aggregate power transmitted simultaneously on all beams shall not exceed the limit specified in paragraph (c)(2)(ii) of this section by more than 8 dB.

(iv) Transmitters that emit a single directional beam shall operate under the provisions of paragraph (c)(1) of this section.

9.6.1. Modulation (FHSS)

Equipment Configuration for Peak Output Power

Variant:	300 FSK	**Duty Cycle (%):**	99.00
Data Rate:	100.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Output Power + DCCF (+0.04 dB) (dBm)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
	Port(s)							
MHz	a	b	c	d	dBm	dBm	dB	
902.3	29.54	--	--	--	29.54	30.00	-0.46	30.00
915.2	29.50	--	--	--	29.50	30.00	-0.50	30.00
926.9	29.41	--	--	--	29.41	30.00	-0.59	30.00

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

DCCF - Duty Cycle Correction Factor

Equipment Configuration for Peak Output Power			
Variant:	300 GFSK	**Duty Cycle (%):**	99.00
Data Rate:	150.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Output Power + DCCF (+0.04 dB) (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dB	
902.3	29.74	--	--	--	29.74	30.00	-0.26	30.00
915.2	29.44	--	--	--	29.44	30.00	-0.56	30.00
926.9	29.35	--	--	--	29.35	30.00	-0.65	30.00

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

DCCF - Duty Cycle Correction Factor

Equipment Configuration for Peak Output Power			
Variant:	300 GFSK	**Duty Cycle (%):**	99.00
Data Rate:	200 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Output Power + DCCF (+0.04 dB) (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dB	
902.3	29.69	--	--	--	29.69	30.00	-0.31	30.00
915.2	29.43	--	--	--	29.43	30.00	-0.57	30.00
926.9	29.35	--	--	--	29.35	30.00	-0.65	30.00

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

DCCF - Duty Cycle Correction Factor

Equipment Configuration for Peak Output Power			
Variant:	400 FSK	**Duty Cycle (%):**	99.00
Data Rate:	150.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Output Power + DCCF (+0.04 dB) (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dB	
902.4	29.53	--	--	--	29.53	30.00	-0.47	30.00
915.2	29.33	--	--	--	29.33	30.00	-0.67	30.00
927.6	29.22	--	--	--	29.22	30.00	-0.78	30.00

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

DCCF - Duty Cycle Correction Factor

Equipment Configuration for Peak Output Power			
Variant:	400 GFSK	**Duty Cycle (%):**	99.00
Data Rate:	300.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Output Power + DCCF (+0.04 dB) (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dB	
902.4	29.47	--	--	--	29.47	30.00	-0.53	30.00
915.2	29.40	--	--	--	29.40	30.00	-0.60	30.00
927.6	29.26	--	--	--	29.26	30.00	-0.74	30.00

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

DCCF - Duty Cycle Correction Factor

Equipment Configuration for Peak Output Power			
Variant:	200 2FSK	**Duty Cycle (%):**	99.00
Data Rate:	50.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Output Power + DCCF (+0.04 dB) (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dB	
902.2	29.56	--	--	--	29.56	30.00	-0.44	30.00
915.0	29.41	--	--	--	29.41	30.00	-0.59	30.00
927.8	29.39	--	--	--	29.39	30.00	-0.61	30.00

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

DCCF - Duty Cycle Correction Factor

Equipment Configuration for Peak Output Power			
Variant:	200 OQPSK	**Duty Cycle (%):**	99.00
Data Rate:	6.25 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Output Power + DCCF (+0.04 dB) (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dB	
902.2	29.64	--	--	--	29.64	30.00	-0.36	30.00
915.0	29.43	--	--	--	29.43	30.00	-0.57	30.00
927.8	29.32	--	--	--	29.32	30.00	-0.68	30.00

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

DCCF - Duty Cycle Correction Factor

Equipment Configuration for Peak Output Power			
Variant:	400 OFDM	**Duty Cycle (%):**	99.00
Data Rate:	600.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Output Power + DCCF (+0.04 dB) (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dB	
902.4	25.99	--	--	--	25.99	30.00	-4.01	30.00
915.2	29.89	--	--	--	29.89	30.00	-0.11	30.00
927.6	30.00	--	--	--	30.00	30.00	0.00	30.00

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

DCCF - Duty Cycle Correction Factor

9.6.2. Modulation (DTS)

Equipment Configuration for Peak Output Power

Variant:	1200 OFDM	**Duty Cycle (%):**	99.00
Data Rate:	2400.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	DTS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Output Power + DCCF (+0.04 dB) (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dB	
903.2	30.00	--	--	--	30.00	30.00	0.00	30.00
914.0	29.92	--	--	--	29.92	30.00	-0.08	30.00
926.0	29.92	--	--	--	29.92	30.00	-0.08	30.00

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

DCCF - Duty Cycle Correction Factor

9.7. Emissions

9.7.1. Conducted Emissions

9.7.1.1. Conducted Spurious Emissions

Conducted Test Conditions for Transmitter Conducted Spurious and Band-Edge Emissions			
Standard:	FCC CFR 47:15.247	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Max Unwanted Emission Levels	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.247 (d)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Transmitter Conducted Spurious and Band-Edge Emissions Measurement
Transmitter Conducted Spurious and Band-Edge emissions were measured at a limit of 30 dBc (average detector) or 20 dBc (peak detector) below the highest in-band spectral density measured with a spectrum analyzer connected to the antenna terminal. Measurements were made while EUT was operating in transmit mode of operation at the appropriate centre frequency closest to the band-edge. Emissions were maximized during the measurement and limits derived from the peak spectral power and drawn on each plot.

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

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

Limits Transmitter Conducted Spurious and Band-Edge Emissions
(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

9.7.1.1.1. Modulation (FHSS)

Equipment Configuration for Transmitter Conducted Spurious Emissions

Variant:	300 FSK	**Duty Cycle (%):**	99.00
Data Rate:	100.00 Kbps	**Antenna Gain (dBi):**	Not Applicable
Modulation:	FHSS	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Frequency Range	Transmitter Conducted Spurious Emissions (dBm)							
		Port a		Port b		Port c		Port d	
MHz	MHz	SE	Limit	SE	Limit	SE	Limit	SE	Limit
902.3	30.0 - 26000.0	-25.109	9.00	--	--	--	--	--	--
915.2	30.0 - 26000.0	-25.309	9.00	--	--	--	--	--	--
926.9	30.0 - 26000.0	-25.526	9.00	--	--	--	--	--	--

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).

Equipment Configuration for Transmitter Conducted Spurious Emissions			
Variant:	300 GFSK	**Duty Cycle (%):**	99.00
Data Rate:	150.00 Kbps	**Antenna Gain (dBi):**	Not Applicable
Modulation:	FHSS	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Frequency Range	Transmitter Conducted Spurious Emissions (dBm)							
		Port a		Port b		Port c		Port d	
MHz	MHz	SE	Limit	SE	Limit	SE	Limit	SE	Limit
902.3	30.0 - 26000.0	-25.817	9.00	--	--	--	--	--	--
915.2	30.0 - 26000.0	-25.126	9.00	--	--	--	--	--	--
926.9	30.0 - 26000.0	-25.073	9.00	--	--	--	--	--	--

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).

Equipment Configuration for Transmitter Conducted Spurious Emissions			
Variant:	300 GFSK	**Duty Cycle (%):**	99.00
Data Rate:	200.00 Kbps	**Antenna Gain (dBi):**	Not Applicable
Modulation:	FHSS	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Frequency Range	Transmitter Conducted Spurious Emissions (dBm)							
		Port a		Port b		Port c		Port d	
MHz	MHz	SE	Limit	SE	Limit	SE	Limit	SE	Limit
902.3	30.0 - 26000.0	-25.465	9.00	--	--	--	--	--	--
915.2	30.0 - 26000.0	-25.433	9.00	--	--	--	--	--	--
926.9	30.0 - 26000.0	-24.882	8.00	--	--	--	--	--	--

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).

Equipment Configuration for Transmitter Conducted Spurious Emissions			
Variant:	400 FSK	**Duty Cycle (%):**	99.00
Data Rate:	150.00 Kbps	**Antenna Gain (dBi):**	Not Applicable
Modulation:	FHSS	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Frequency Range	Transmitter Conducted Spurious Emissions (dBm)							
		Port a		Port b		Port c		Port d	
MHz	MHz	SE	Limit	SE	Limit	SE	Limit	SE	Limit
902.4	30.0 - 26000.0	-24.304	8.00	--	--	--	--	--	--
915.2	30.0 - 26000.0	-25.026	8.00	--	--	--	--	--	--
927.6	30.0 - 26000.0	-25.337	8.00	--	--	--	--	--	--

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).

Equipment Configuration for Transmitter Conducted Spurious Emissions			
Variant:	400 GFSK	**Duty Cycle (%):**	99.00
Data Rate:	300.00 Kbps	**Antenna Gain (dBi):**	Not Applicable
Modulation:	FHSS	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Frequency Range	Transmitter Conducted Spurious Emissions (dBm)							
		Port a		Port b		Port c		Port d	
MHz	MHz	SE	Limit	SE	Limit	SE	Limit	SE	Limit
902.4	30.0 - 26000.0	-25.296	9.00	--	--	--	--	--	--
915.2	30.0 - 26000.0	-25.701	9.00	--	--	--	--	--	--
927.6	30.0 - 26000.0	-25.351	8.00	--	--	--	--	--	--

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).

Equipment Configuration for Transmitter Conducted Spurious Emissions			
Variant:	200 2FSK	**Duty Cycle (%):**	99.00
Data Rate:	50.00 Kbps	**Antenna Gain (dBi):**	Not Applicable
Modulation:	FHSS	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Frequency Range	Transmitter Conducted Spurious Emissions (dBm)							
		Port a		Port b		Port c		Port d	
MHz	MHz	SE	Limit	SE	Limit	SE	Limit	SE	Limit
902.2	30.0 - 26000.0	-35.580	11.09	--	--	--	--	--	--
915.0	30.0 - 26000.0	-25.478	9.00	--	--	--	--	--	--
927.8	30.0 - 26000.0	-35.640	10.81	--	--	--	--	--	--

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).

Equipment Configuration for Transmitter Conducted Spurious Emissions			
Variant:	200 OQPSK	**Duty Cycle (%):**	99.00
Data Rate:	6.25 Kbps	**Antenna Gain (dBi):**	Not Applicable
Modulation:	FHSS	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Frequency Range	Transmitter Conducted Spurious Emissions (dBm)							
		Port a		Port b		Port c		Port d	
MHz	MHz	SE	Limit	SE	Limit	SE	Limit	SE	Limit
902.2	30.0 - 26000.0	-37.680	11.22	--	--	--	--	--	--
915.0	30.0 - 26000.0	-25.016	9.00	--	--	--	--	--	--
927.8	30.0 - 26000.0	-35.370	10.98	--	--	--	--	--	--

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).

Equipment Configuration for Transmitter Conducted Spurious Emissions			
Variant:	400 OFDM	**Duty Cycle (%):**	99.00
Data Rate:	600 Kbps	**Antenna Gain (dBi):**	Not Applicable
Modulation:	FHSS	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Frequency Range	Transmitter Conducted Spurious Emissions (dBm)							
		Port a		Port b		Port c		Port d	
MHz	MHz	SE	Limit	SE	Limit	SE	Limit	SE	Limit
902.4	30.0 - 26000.0	-25.183	5.00	--	--	--	--	--	--
915.2	30.0 - 26000.0	-23.364	4.00	--	--	--	--	--	--
927.6	30.0 - 26000.0	-25.557	4.00	--	--	--	--	--	--

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).

9.7.1.1.2. Modulation (DTS)

Equipment Configuration for Transmitter Conducted Spurious Emissions			
Variant:	1200 OFDM	**Duty Cycle (%):**	99.00
Data Rate:	2400.00 Kbps	**Antenna Gain (dBi):**	Not Applicable
Modulation:	DTS	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Frequency Range	Transmitter Conducted Spurious Emissions (dBm)							
		Port a		Port b		Port c		Port d	
MHz	MHz	SE	Limit	SE	Limit	SE	Limit	SE	Limit
903.2	30.0 - 26000.0	-25.345	1.00	--	--	--	--	--	--
914.0	30.0 - 26000.0	-19.633	0.00	--	--	--	--	--	--
926.0	30.0 - 26000.0	-24.719	0.00	--	--	--	--	--	--

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).

9.7.1.2. Conducted Band-Edge Emissions

9.7.1.2.1. Conducted Low Band-Edge Emissions

9.7.1.2.1.1. Modulation (FHSS)

Equipment Configuration for Conducted Low Band-Edge Emissions - Peak			
Variant:	300 FSK	**Duty Cycle (%):**	99.00
Data Rate:	100.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Channel Frequency:	902.3 MHz					
Band-Edge Frequency:	902.0 MHz					
Test Frequency Range:	880.0 - 904.0 MHz					
Port(s)	**Band-Edge Markers and Limit**			**Revised Limit**		**Margin**
	M1 Amplitude (dBm)	**Plot Limit (dBm)**	**M2 Frequency (MHz)**	**Amplitude (dBm)**	**M2A Frequency (MHz)**	**(MHz)**
a	-9.08	9.00	902.10	--	--	-0.100

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).

Equipment Configuration for Conducted Low Band-Edge Emissions - Peak			
Variant:	300 GFSK	**Duty Cycle (%):**	99.00
Data Rate:	150.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Channel Frequency:	902.3 MHz					
Band-Edge Frequency:	902.0 MHz					
Test Frequency Range:	880.0 - 904.0 MHz					
Port(s)	**Band-Edge Markers and Limit**			**Revised Limit**		**Margin**
	M1 Amplitude (dBm)	**Plot Limit (dBm)**	**M2 Frequency (MHz)**	**Amplitude (dBm)**	**M2A Frequency (MHz)**	**(MHz)**
a	-6.18	9.00	902.10	--	--	-0.100

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).

Equipment Configuration for Conducted Low Band-Edge Emissions - Peak			
Variant:	300 GFSK	**Duty Cycle (%):**	99.00
Data Rate:	200.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Channel Frequency:	902.3 MHz					
Band-Edge Frequency:	902.0 MHz					
Test Frequency Range:	880.0 - 904.0 MHz					
Port(s)	**Band-Edge Markers and Limit**			**Revised Limit**		**Margin**
	M1 Amplitude (dBm)	**Plot Limit (dBm)**	**M2 Frequency (MHz)**	**Amplitude (dBm)**	**M2A Frequency (MHz)**	**(MHz)**
a	-3.41	9.00	902.00	--	--	-0.028

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).

Equipment Configuration for Conducted Low Band-Edge Emissions - Peak			
Variant:	400 FSK	**Duty Cycle (%):**	99.00
Data Rate:	150.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Channel Frequency:	902.4 MHz					
Band-Edge Frequency:	902.0 MHz					
Test Frequency Range:	880.0 - 904.0 MHz					
Port(s)	**Band-Edge Markers and Limit**			**Revised Limit**		**Margin**
	M1 Amplitude (dBm)	**Plot Limit (dBm)**	**M2 Frequency (MHz)**	**Amplitude (dBm)**	**M2A Frequency (MHz)**	**(MHz)**
a	-16.61	9.00	902.20	--	--	-0.200

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).

Equipment Configuration for Conducted Low Band-Edge Emissions - Peak			
Variant:	400 GFSK	**Duty Cycle (%):**	99.00
Data Rate:	300.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Channel Frequency:	902.4 MHz					
Band-Edge Frequency:	902.0 MHz					
Test Frequency Range:	880.0 - 904.0 MHz					
Port(s)	**Band-Edge Markers and Limit**			**Revised Limit**		**Margin**
	M1 Amplitude (dBm)	**Plot Limit (dBm)**	**M2 Frequency (MHz)**	**Amplitude (dBm)**	**M2A Frequency (MHz)**	**(MHz)**
a	-8.64	9.00	902.10	--	--	-0.100

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).

Equipment Configuration for Conducted Low Band-Edge Emissions - Peak			
Variant:	200 2FSK	**Duty Cycle (%):**	99.00
Data Rate:	50.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Channel Frequency:	902.2 MHz					
Band-Edge Frequency:	902.0 MHz					
Test Frequency Range:	880.0 - 905.0 MHz					
Port(s)	**Band-Edge Markers and Limit**			**Revised Limit**		**Margin**
	M1 Amplitude (dBm)	**Plot Limit (dBm)**	**M2 Frequency (MHz)**	**Amplitude (dBm)**	**M2A Frequency (MHz)**	**(MHz)**
a	-7.83	11.52	902.045	--	--	-0.045

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).

Equipment Configuration for Conducted Low Band-Edge Emissions - Peak			
Variant:	200 OQPSK	**Duty Cycle (%):**	99.00
Data Rate:	6.25 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Channel Frequency:	902.2 MHz					
Band-Edge Frequency:	902.0 MHz					
Test Frequency Range:	880.0 - 905.0 MHz					
Port(s)	**Band-Edge Markers and Limit**			**Revised Limit**		**Margin**
	M1 Amplitude (dBm)	**Plot Limit (dBm)**	**M2 Frequency (MHz)**	**Amplitude (dBm)**	**M2A Frequency (MHz)**	**(MHz)**
a	-7.26	11.19	902.045	--	--	-0.045

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).

Equipment Configuration for Conducted Low Band-Edge Emissions - Peak			
Variant:	400 OFDM	**Duty Cycle (%):**	99.00
Data Rate:	600 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Channel Frequency:	902.4 MHz					
Band-Edge Frequency:	902.0 MHz					
Test Frequency Range:	880.0 - 905.0 MHz					
Port(s)	**Band-Edge Markers and Limit**			**Revised Limit**		**Margin**
	M1 Amplitude (dBm)	**Plot Limit (dBm)**	**M2 Frequency (MHz)**	**Amplitude (dBm)**	**M2A Frequency (MHz)**	**(MHz)**
a	-4.21	7.00	902.10	--	--	-0.100

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).

9.7.1.2.1.2. Modulation (DTS)

Equipment Configuration for Conducted Low Band-Edge Emissions - Peak			
Variant:	1200 OFDM	**Duty Cycle (%):**	99.0
Data Rate:	2400.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	DTS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Channel Frequency:	903.2 MHz					
Band-Edge Frequency:	902.0 MHz					
Test Frequency Range:	880.0 - 905.0 MHz					
Port(s)	**Band-Edge Markers and Limit**			**Revised Limit**		**Margin**
	M1 Amplitude (dBm)	**Plot Limit (dBm)**	**M2 Frequency (MHz)**	**Amplitude (dBm)**	**M2A Frequency (MHz)**	**(MHz)**
a	-10.74	3.00	902.50	--	--	-0.500

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).

9.7.1.2.2. Conducted High Band-Edge Emissions

9.7.1.2.2.1. Modulation (FHSS)

Equipment Configuration for Conducted High Band-Edge Emissions - Peak			
Variant:	300 FSK	**Duty Cycle (%):**	99.00
Data Rate:	100.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Channel Frequency:	926.9 MHz					
Band-Edge Frequency:	928.0 MHz					
Test Frequency Range:	925.0 - 935.0 MHz					
Port(s)	**Band-Edge Markers and Limit**			**Revised Limit**		**Margin**
	M3 Amplitude (dBm)	**Plot Limit (dBm)**	**M2 Frequency (MHz)**	**Amplitude (dBm)**	**M2A Frequency (MHz)**	**(MHz)**
a	-28.23	9.00	927.10	--	--	-0.900

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).

Equipment Configuration for Conducted High Band-Edge Emissions - Peak			
Variant:	300 GFSK	**Duty Cycle (%):**	99.00
Data Rate:	150.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Channel Frequency:	926.9 MHz					
Band-Edge Frequency:	928.0 MHz					
Test Frequency Range:	925.0 - 935.0 MHz					
Port(s)	**Band-Edge Markers and Limit**			**Revised Limit**		**Margin**
	M3 Amplitude (dBm)	**Plot Limit (dBm)**	**M2 Frequency (MHz)**	**Amplitude (dBm)**	**M2A Frequency (MHz)**	**(MHz)**
a	-28.12	9.00	927.10	--	--	-0.900

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).

Equipment Configuration for Conducted High Band-Edge Emissions - Peak			
Variant:	300 GFSK	**Duty Cycle (%):**	99.00
Data Rate:	200.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Channel Frequency:	926.9 MHz					
Band-Edge Frequency:	928.0 MHz					
Test Frequency Range:	925.0 - 935.0 MHz					
Port(s)	**Band-Edge Markers and Limit**			**Revised Limit**		**Margin**
	M3 Amplitude (dBm)	**Plot Limit (dBm)**	**M2 Frequency (MHz)**	**Amplitude (dBm)**	**M2A Frequency (MHz)**	**(MHz)**
a	-28.14	9.00	927.10	--	--	-0.900

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).

Equipment Configuration for Conducted High Band-Edge Emissions - Peak			
Variant:	400 FSK	**Duty Cycle (%):**	99.00
Data Rate:	150.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Channel Frequency:	927.6 MHz					
Band-Edge Frequency:	928.0 MHz					
Test Frequency Range:	925.0 - 935.0 MHz					
Port(s)	**Band-Edge Markers and Limit**			**Revised Limit**		**Margin**
	M3 Amplitude (dBm)	**Plot Limit (dBm)**	**M2 Frequency (MHz)**	**Amplitude (dBm)**	**M2A Frequency (MHz)**	**(MHz)**
a	-12.45	9.00	927.80	--	--	-0.200

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).

Equipment Configuration for Conducted High Band-Edge Emissions - Peak			
Variant:	400 GFSK	**Duty Cycle (%):**	99.00
Data Rate:	300.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Channel Frequency:	927.6 MHz					
Band-Edge Frequency:	928.0 MHz					
Test Frequency Range:	925.0 - 935.0 MHz					
Port(s)	**Band-Edge Markers and Limit**			**Revised Limit**		**Margin**
	M3 Amplitude (dBm)	**Plot Limit (dBm)**	**M2 Frequency (MHz)**	**Amplitude (dBm)**	**M2A Frequency (MHz)**	**(MHz)**
a	-3.50	9.00	927.90	--	--	-0.100

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).

Equipment Configuration for Conducted High Band-Edge Emissions - Peak			
Variant:	200 2FSK	**Duty Cycle (%):**	99.00
Data Rate:	50.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Channel Frequency:	927.8 MHz					
Band-Edge Frequency:	928.0 MHz					
Test Frequency Range:	925.0 - 935.0 MHz					
Port(s)	**Band-Edge Markers and Limit**			**Revised Limit**		**Margin**
	M3 Amplitude (dBm)	**Plot Limit (dBm)**	**M2 Frequency (MHz)**	**Amplitude (dBm)**	**M2A Frequency (MHz)**	**(MHz)**
a	-8.59	10.86	927.950	--	--	-0.050

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).

Equipment Configuration for Conducted High Band-Edge Emissions - Peak			
Variant:	200 OQPSK	**Duty Cycle (%):**	99.00
Data Rate:	6.25 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Channel Frequency:	927.8 MHz					
Band-Edge Frequency:	928.0 MHz					
Test Frequency Range:	925.0 - 935.0 MHz					
Port(s)	**Band-Edge Markers and Limit**			**Revised Limit**		**Margin**
	M3 Amplitude (dBm)	**Plot Limit (dBm)**	**M2 Frequency (MHz)**	**Amplitude (dBm)**	**M2A Frequency (MHz)**	**(MHz)**
a	-8.98	11.05	927.951	--	--	-0.049

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).

Equipment Configuration for Conducted High Band-Edge Emissions - Peak			
Variant:	400 OFDM	**Duty Cycle (%):**	99.00
Data Rate:	600 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	FHSS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Channel Frequency:	927.6 MHz					
Band-Edge Frequency:	928.0 MHz					
Test Frequency Range:	925.0 - 935.0 MHz					
Port(s)	**Band-Edge Markers and Limit**			**Revised Limit**		**Margin**
	M3 Amplitude (dBm)	**Plot Limit (dBm)**	**M2 Frequency (MHz)**	**Amplitude (dBm)**	**M2A Frequency (MHz)**	**(MHz)**
a	-2.06	7.00	927.90	--	--	-0.100

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).

9.7.1.2.2.2. Modulation (DTS)

Equipment Configuration for Conducted High Band-Edge Emissions - Peak

Variant:	1200 OFDM	**Duty Cycle (%):**	99.00
Data Rate:	2400.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	DTS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Channel Frequency:	926.0 MHz					
Band-Edge Frequency:	928.0 MHz					
Test Frequency Range:	925.0 - 935.0 MHz					
Port(s)	**Band-Edge Markers and Limit**			**Revised Limit**		**Margin**
	M3 Amplitude (dBm)	**Plot Limit (dBm)**	**M2 Frequency (MHz)**	**Amplitude (dBm)**	**M2A Frequency (MHz)**	**(MHz)**
a	-18.71	3.00	926.70	--	--	-1.300

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).

9.7.2. Radiated Emissions

Transmitter Radiated Spurious Emissions (above 1 GHz); Peak Field Strength Measurements; and Radiated Band Edge Measurements – Restricted Bands

FCC, Part 15 Subpart C §15.247(d) 15.205; 15.209
Industry Canada RSS-247 §A5.5

Test Procedure
Radiated emissions above 1 GHz are 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. Depending on the frequency band spanned a notch filter and waveguide filter was used to remove the fundamental frequency. The highest emissions relative to the limit are listed for each frequency spanned.

All measurements on any frequency or frequencies over 1 MHz are based on the use of measurement instrumentation employing an average detector function. All measurements above 1 GHz were performed using a minimum resolution bandwidth of 1 MHz.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.

FS = R + AF + CORR - FO

where: FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor
NFL = Notch Filter Loss or Waveguide Loss

For example:
Given receiver input reading of 51.5 dBμV; Antenna Factor of 8.5 dB; Cable Loss of 1.3 dB; Falloff Factor of 0 dB, an Amplifier Gain of 26 dB and Notch Filter Loss of 1 dB. The Field Strength of the measured emission is:

FS = 51.5 + 8.5 + 1.3 - 26.0 +1 = 36.3 dBμV/m

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

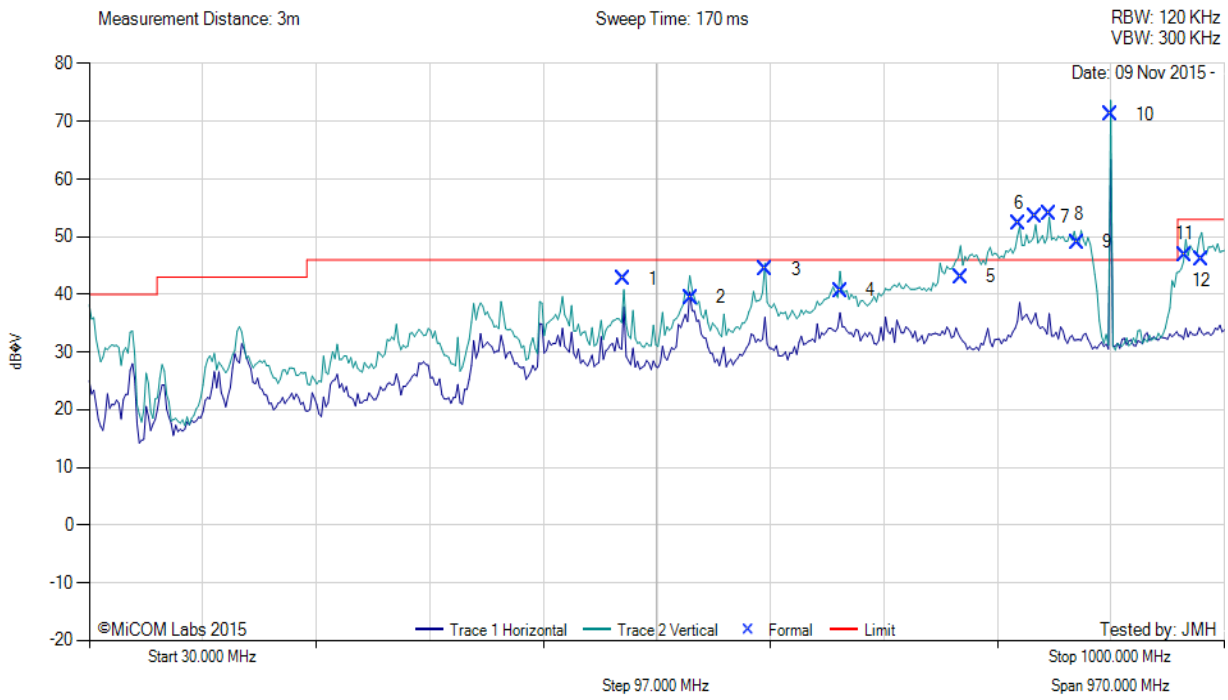
Level (dBμV/m) = 20 * Log (level (μV/m))

40 dBμV/m = 100 μV/m
48 dBμV/m = 250 μV/m

NOTE: KDB 662911 was implemented for Out-of-Band measurements. Where necessary Option (2) Measure and add 10 log (N) dB was implemented

Radiated emissions testing was limited to testing the mode with worst case emissions; FSK mode with the narrowest bandwidth i.e. 300 kHz FSK (Refer to the table in Section 5.6 of this report).

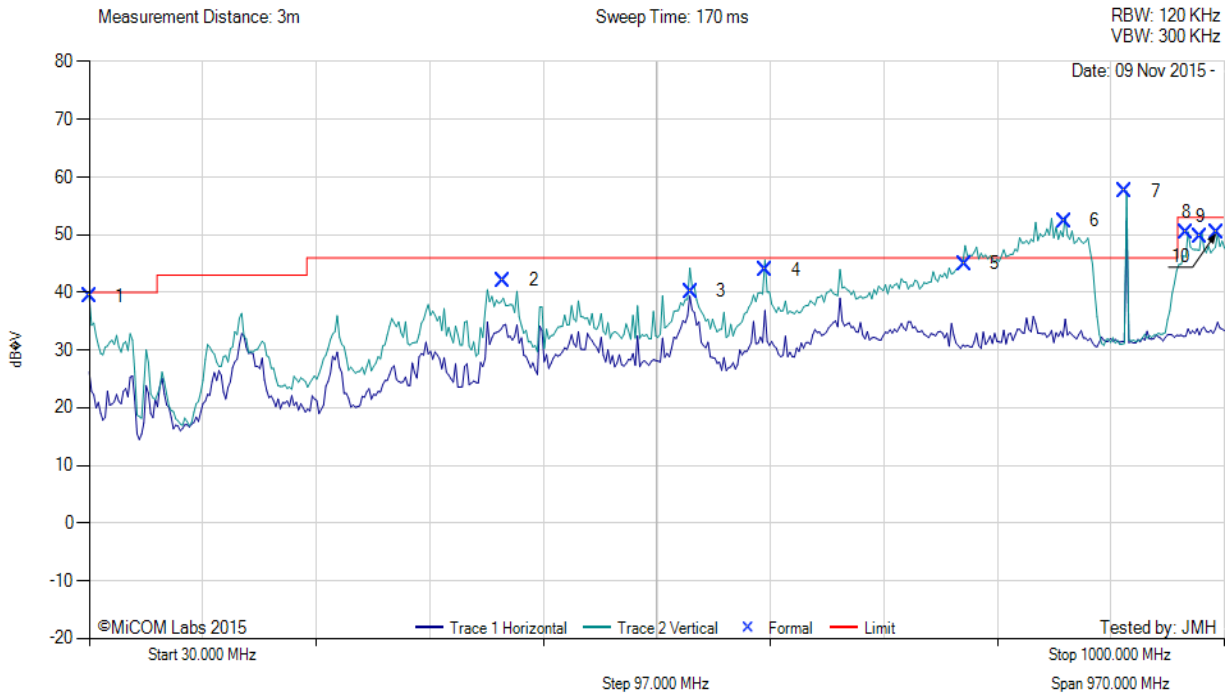
Variant: FSK, Test Freq: 902.30 MHz, Antenna: External, Power Setting: 30 dbm, Duty Cycle (%): 100



Num	Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	486.26	50.22	5.31	-12.80	42.73	Peak (NRB)	Vertical	100	101	--	--	Pass
2	543.97	46.23	5.45	-12.21	39.47	Peak (NRB)	Vertical	100	0	--	--	Pass
3	608.00	50.27	5.62	-11.48	44.41	MaxQP	Vertical	286	188	46.0	-1.6	Pass
4	672.00	45.47	5.79	-10.58	40.68	Peak (NRB)	Vertical	301	0	--	--	Pass
5	774.36	46.16	6.05	-9.20	43.01	Peak (NRB)	Vertical	198	0	--	--	Pass
6	824.29	54.49	6.17	-8.35	52.31	Peak (NRB)	Vertical	198	0	--	--	Pass
7	838.40	55.76	6.20	-8.49	53.47	Peak (NRB)	Vertical	198	0	--	--	Pass
8	850.32	55.96	6.26	-8.29	53.93	Peak (NRB)	Vertical	198	0	--	--	Pass
9	874.21	50.89	6.27	-8.12	49.04	Peak (NRB)	Vertical	198	0	--	--	Pass
10	902.26	72.59	6.34	-7.79	71.14	Fundamental	Vertical	198	0	--	--	
11	966.35	47.43	6.49	-7.03	46.89	MaxQP	Vertical	160	117	53.0	-6.1	Pass
12	980.38	46.48	6.53	-6.93	46.08	MaxQP	Vertical	141	145	53.0	-6.9	Pass

Test Notes: EUT on table powered by DC 4V

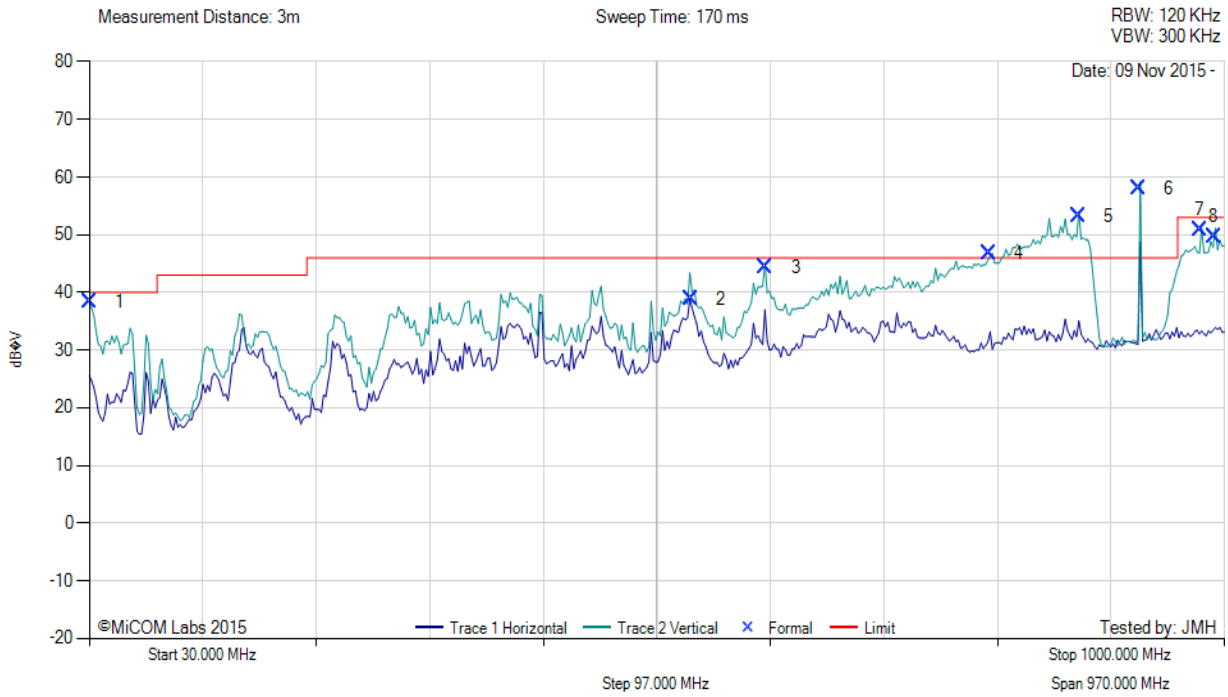
Variant: FSK, Test Freq: 915.20 MHz, Antenna: External, Power Setting: 30 dbm, Duty Cycle (%): 100



Num	Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	30.64	46.52	3.43	-10.61	39.34	Peak (NRB)	Vertical	100	1	--	--	Pass
2	384.01	52.35	4.97	-15.26	42.06	Peak (NRB)	Vertical	222	360	--	--	Pass
3	543.98	46.93	5.45	-12.21	40.17	Peak (NRB)	Vertical	222	360	--	--	Pass
4	608.01	49.67	5.62	-11.48	43.81	MaxQP	Vertical	214	12	46.0	-2.2	Pass
5	778.40	48.05	6.06	-9.12	44.99	Peak (NRB)	Vertical	222	360	--	--	Pass
6	863.17	54.35	6.25	-8.19	52.41	Peak (NRB)	Vertical	222	360	--	--	Pass
7	915.18	58.91	6.39	-7.75	57.55	Fundamental	Vertical	100	360	--	--	
8	967.20	50.80	6.50	-7.01	50.29	MaxQP	Vertical	181	137	53.0	-2.7	Pass
9	979.20	50.10	6.54	-6.93	49.71	MaxQP	Vertical	148	157	53.0	-3.3	Pass
10	993.20	50.32	6.57	-6.55	50.34	MaxQP	Vertical	146	196	53.0	-2.7	Pass

Test Notes: EUT on table powered by DC 4V

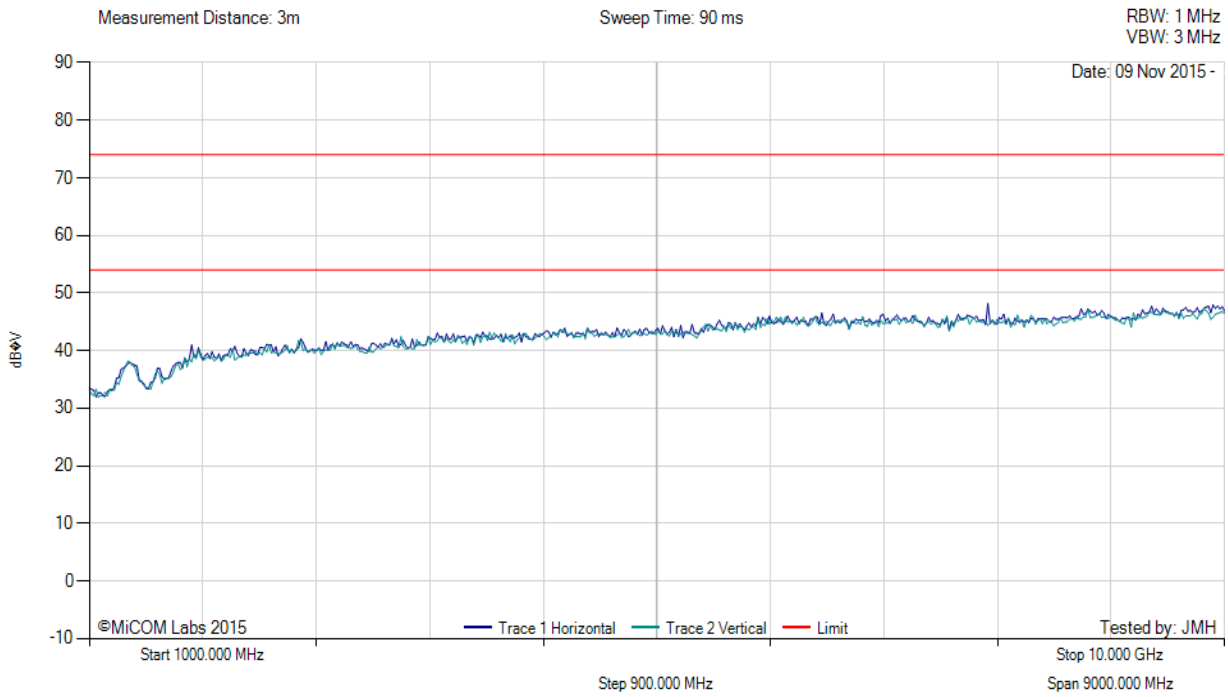
Variant: FSK, Test Freq: 926.90 MHz, Antenna: External, Power Setting: 30 dbm, Duty Cycle (%): 100



Num	Frequency MHz	Raw dBµV	Cable Loss	AF dB	Level dBµV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBµV/m	Margin dB	Pass /Fail
1	30.16	44.62	3.42	-9.72	38.32	Peak (NRB)	Vertical	100	1	--	--	Pass
2	543.96	45.56	5.45	-12.21	38.80	Peak (NRB)	Vertical	100	1	--	--	Pass
3	608.11	50.25	5.62	-11.48	44.39	MaxQP	Vertical	208	37	46.0	-1.6	Pass
4	798.88	49.53	6.08	-8.91	46.70	Peak (NRB)	Vertical	201	1	--	--	Pass
5	874.88	55.00	6.27	-8.09	53.18	Peak (NRB)	Vertical	201	1	--	--	Pass
6	926.91	59.06	6.43	-7.51	57.98	Fundamental	Vertical	201	1	--	--	
7	978.90	51.15	6.54	-6.93	50.76	MaxQP	Vertical	185	98	53.0	-2.2	Pass
8	990.87	49.62	6.55	-6.59	49.58	MaxQP	Vertical	218	97	53.0	-3.4	Pass

Test Notes: EUT on table powered by DC 4V

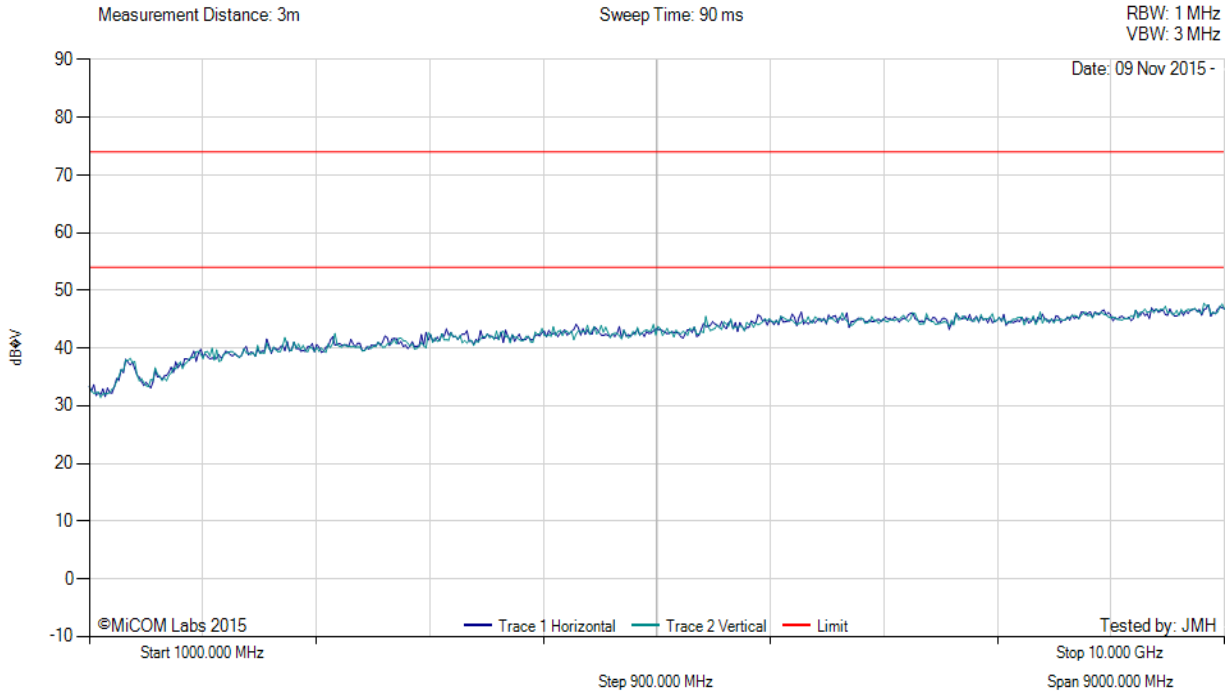
Variant: FHSS, Test Freq: 902.30 MHz, Antenna: External, Power Setting: 30 dbm, Duty Cycle (%): 100



There are no emissions found within 6dB of the limit line.

Test Notes: EUT on table at 150cm powered by AC/DC PS 4V

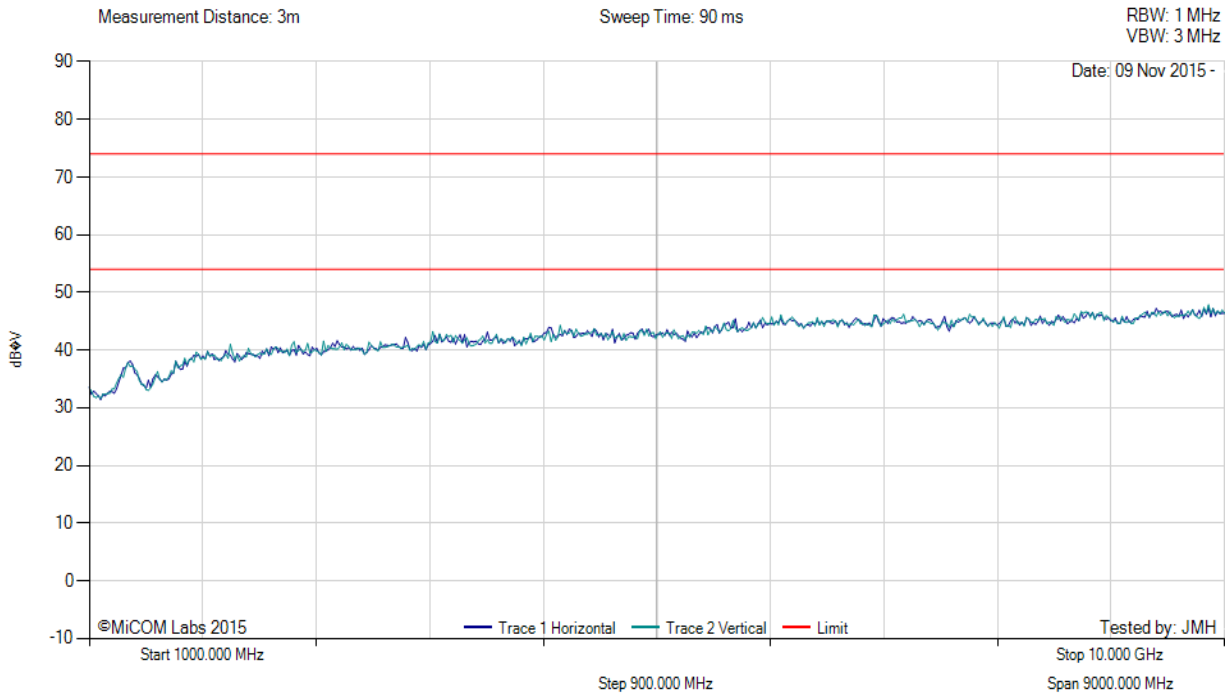
Variant: FHSS, Test Freq: 915.20 MHz, Antenna: External, Power Setting: 30 dbm, Duty Cycle (%): 100



There are no emissions found within 6dB of the limit line.

Test Notes: EUT on table at 150cm powered by AC/DC PS 4V

Variant: FHSS, Test Freq: 926.90 MHz, Antenna: External, Power Setting: 30 dbm, Duty Cycle (%): 100



There are no emissions found within 6dB of the limit line.

Test Notes: EUT on table at 150cm powered by AC/DC PS 4V

9.7.3. Digital Emissions (0.03 - 1 GHz)

FCC, Part 15 Subpart C §15.205/ §15.209
Industry Canada RSS-Gen §8.9

Test Procedure

Testing 30M-1 GHz was performed in a 3-meter anechoic chamber using a CISPR compliant receiver. Preliminary radiated emissions were measured on every azimuth and with the receiving antenna in both horizontal and vertical polarizations. To further maximize emissions the receive antenna was varied between 1 and 4 meters. The emissions are recorded with receiver in peak hold mode. Emissions closest to the limits are measured in the quasi-peak mode with the tuned receiver using a bandwidth of 120 kHz. Only the highest emissions relative to the limit are listed. The anechoic chamber test set-up is identified in Section 6 Test Set-Up Photographs.

The EUT had two methods of powering on ac/dc converter and Power over Ethernet (POE). Both modes were tested for emissions below 1GHz.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. In this test facility, the Antenna Factor, Cable Loss, and Amplifier Gains are loaded into the Rohde & Schwarz Receiver and the corrected field strength can be read directly on the receiver.

$$FS = R + AF + CORR$$

where:

FS = Field Strength
R = Measured Receiver Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL – AG + NFL
CL = Cable Loss
AG = Amplifier Gain

For example:
Given a Receiver input reading of 51.5dBμV; Antenna Factor of 8.5dB; Cable Loss of 1.3dB; Falloff Factor of 0dB, an Amplifier Gain of 26dB and Notch Filter Loss of 1dB. The Field Strength of the measured emission is:

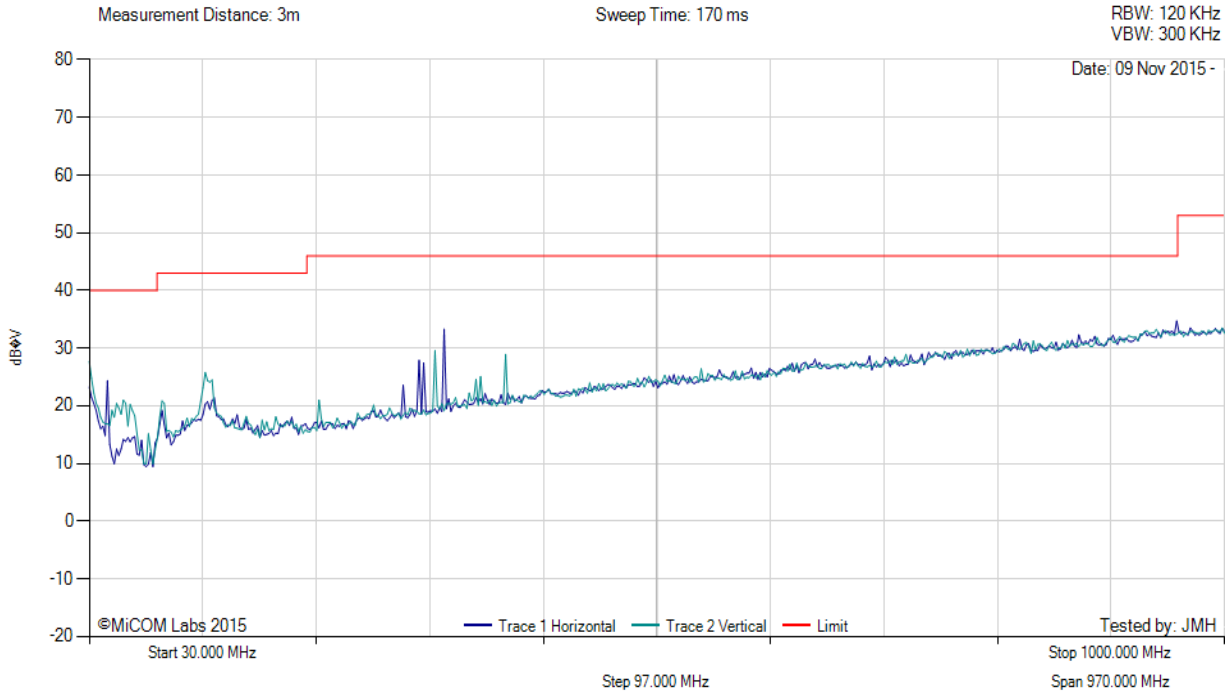
$$FS = 51.5 + 8.5 + 1.3 - 26.0 + 1 = 36.3 dB\mu V/m$$

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

$$Level (dB\mu V/m) = 20 * Log (level (\mu V/m))$$

40 dBμV/m = 100μV/m
48 dBμV/m = 250μV/m

Variant: OFDM, Test Freq: 0.00 MHz, Antenna: External, Power Setting: NA, Duty Cycle (%): NA



There are no emissions found within 6dB of the limit line.

Test Notes: EUT in RCV mode powered by DC 4V

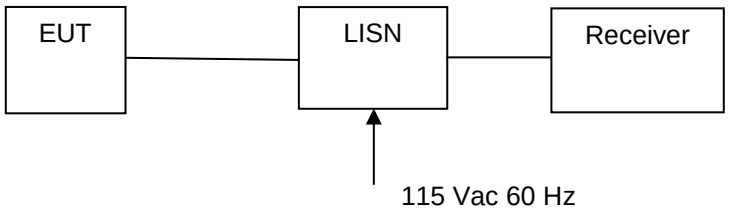
9.8. AC Wireline Conducted Emissions (150 kHz – 30 MHz)

NOTE: Test not applicable EUT is dc powered

FCC, Part 15 Subpart C §15.207
Industry Canada RSS-Gen §8.8

Test Procedure
The EUT is configured in accordance with ANSI C63.4. The conducted emissions are measured in a shielded room with a spectrum analyzer in peak hold in the first instance. Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation. The highest emissions relative to the limit are listed.

Test Measurement Set up



Measurement Results for AC Wireline Conducted Emissions (150 kHz – 30 MHz)

Specification

Limit

§15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μΩ line impedance stabilization network (LISN), see §15.207 (a) matrix below. Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

RSS-Gen §8.8
A radio apparatus that is designed to be connected to the public utility (AC) power line shall ensure that the radio frequency voltage, which is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz-30 MHz, shall not exceed the limits in Table 3.

§15.207 (a) and **RSS-Gen §8.8** Limit Matrix
The lower limit applies at the boundary between frequency ranges

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency

Laboratory Measurement Uncertainty for Conducted Emissions

Measurement uncertainty	±2.64 dB

9.9. Power Spectral Density

Conducted Test Conditions for Power Spectral Density			
Standard:	FCC CFR 47:15.247	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Power Spectral Density	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.247 (e)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References		

Test Procedure for Power Spectral Density
The transmitter output was connected to a spectrum analyzer and the measured made in a 3 kHz resolution bandwidth using the analyzer auto-coupled sweep-time. A peak value was found over the full emission bandwidth and the spectrum downloaded for post processing purposes.

Where the device operated with multiple antenna ports i.e. MIMO device, each port was measured separately. The Peak Power Spectral Density is the highest level found across the emission bandwidth. With multiple antenna port measurements the numerical analyzer data from each port is summed (å) and a link to this additional graphic is provided.

Testing was performed under ambient conditions at nominal voltage only.

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

Measure and sum the spectra across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The individual spectra are then summed mathematically in linear power units. Unlike in-band power measurements, in which the sum involves a single measured value (output power) from each output, measurements for compliance with PSD limits involve summing entire spectra across corresponding frequency bins on the various outputs. Consistency is maintained for any device with multiple transmitter outputs to be certain the individual outputs are all aligned with the same span and same number of points. In this instance, the linear power spectrum value within the first spectral bin of output 0 is summed with that in the first spectral bin of output 1, and the first spectral bin of output 2, and so on up to the Nth output to obtain the true value for the first frequency bin of the summed spectrum. The summed spectrum value for each frequency bin is computed in this fashion. These summed spectral values were post processed and the resulting numerical and graphical data presented.

NOTE:
It may be observed that the spectrum in some antenna port plots break the limit line however this in itself does NOT constitute a failure. In all cases a spectrum summation plot is provided in order to prove compliance. A failure occurs only after the summation of all spectrum plots have been summed and are found to be greater than the limit line.

Supporting Information
Calculated Power = A + 10 log (1/x) dBm
A = Total Power Spectral Density [10 Log10 ($10^{a/10}$ + $10^{b/10}$ + $10^{c/10}$ + $10^{d/10}$)]
x = Duty Cycle

Limits Power Spectral Density
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than +8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

9.9.1. Modulation (DTS)

Equipment Configuration for Power Spectral Density - Peak			
Variant:	1200 OFDM	**Duty Cycle (%):**	99.00
Data Rate:	2400.00 Kbps	**Antenna Gain (dBi):**	6.00
Modulation:	DTS	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:			

Test Measurement Results

Test Frequency	Measured Power Spectral Density Port(s) (dBm/3KHz)				Amplitude Summation	Limit	Margin
MHz	a	b	c	d	dBm/3KHz	dBm/3KHz	dB
903.2	5.516	--	--	--	5.516	8.0	-2.5
914.0	5.621	--	--	--	5.621	8.0	-2.4
926.0	5.091	--	--	--	5.091	8.0	-2.9

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

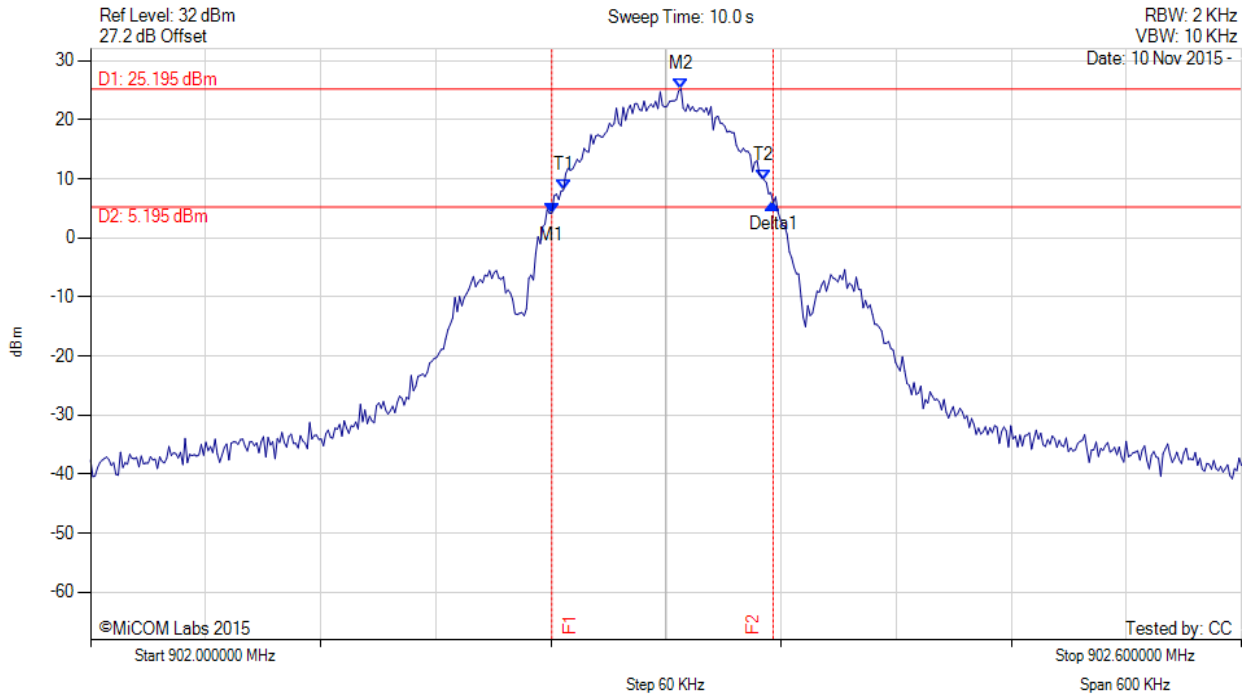
Note: click the links in the above matrix to view the graphical image (plot).

A. APPENDIX - GRAPHICAL IMAGES

A.1. 20 dB & 99% Bandwidth

20 dB & 99% BANDWIDTH

Variant: 300 FSK, Channel: 902.30 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

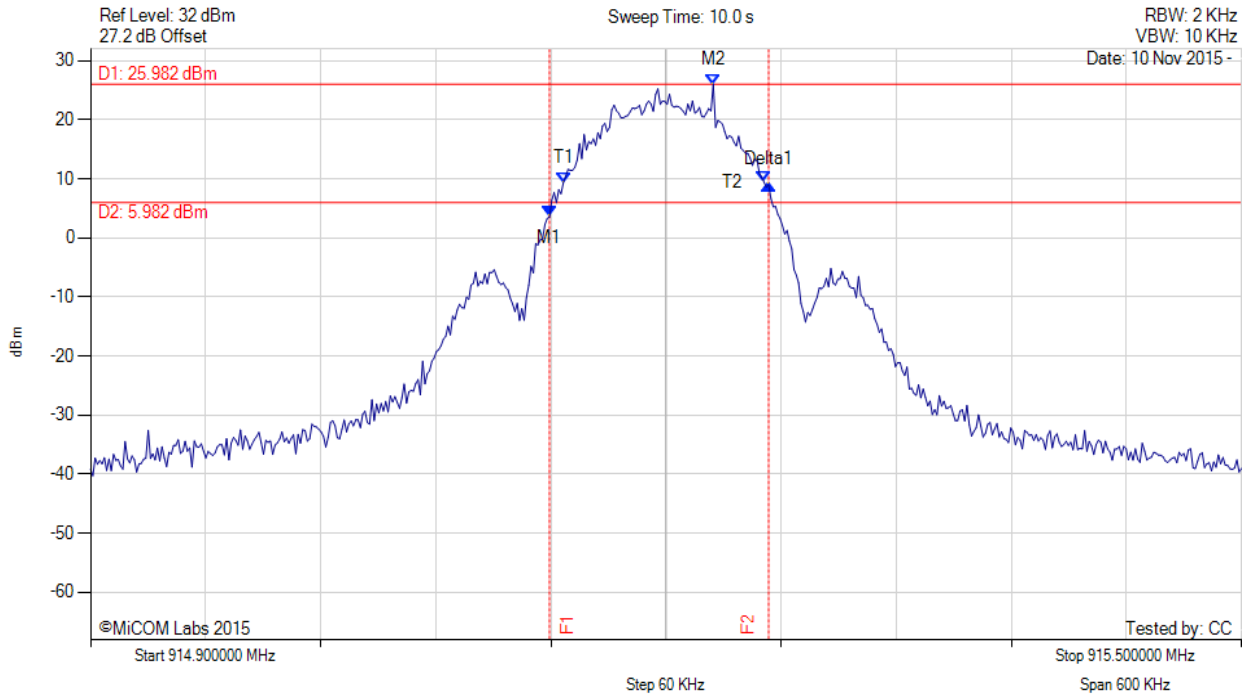


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 902.240 MHz : 4.136 dBm M2 : 902.308 MHz : 25.195 dBm Delta1 : 115 KHz : 1.745 dB T1 : 902.246 MHz : 8.049 dBm T2 : 902.351 MHz : 9.804 dBm OBW : 105 KHz	

back to matrix

20 dB & 99% BANDWIDTH

Variant: 300 FSK, Channel: 915.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

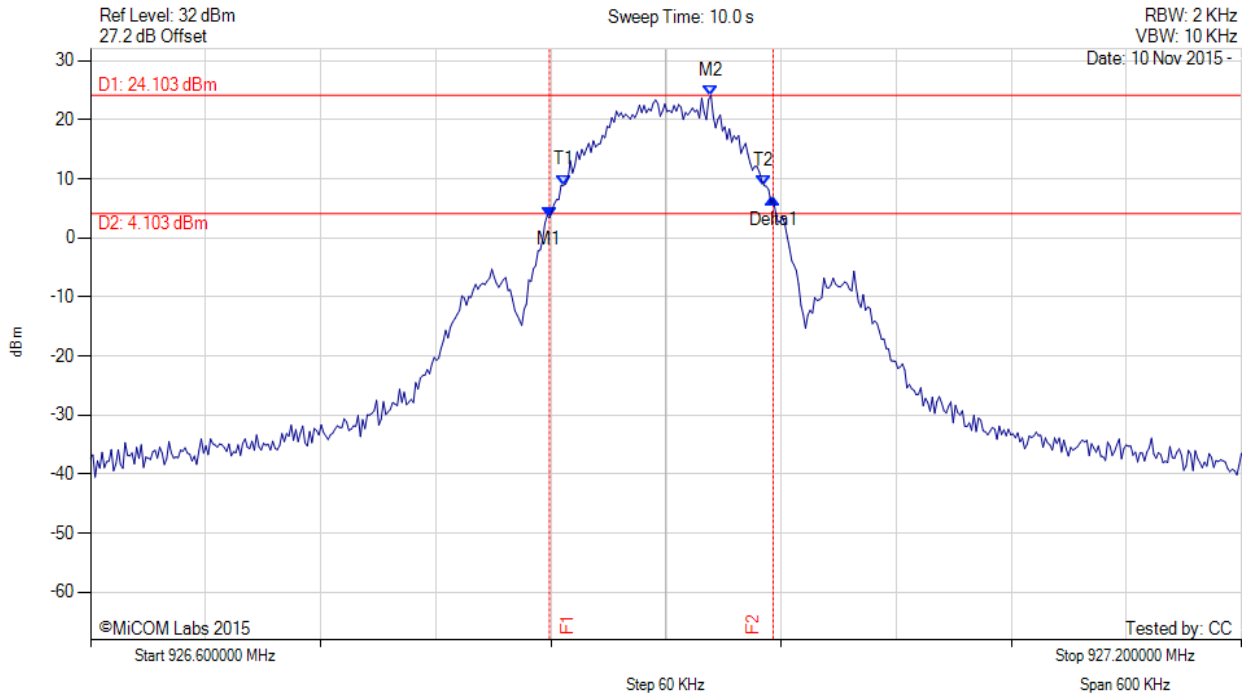


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 915.139 MHz : 3.540 dBm M2 : 915.225 MHz : 25.982 dBm Delta1 : 114 KHz : 5.420 dB T1 : 915.146 MHz : 9.368 dBm T2 : 915.251 MHz : 9.436 dBm OBW : 105 KHz	

back to matrix

20 dB & 99% BANDWIDTH

Variant: 300 FSK, Channel: 926.90 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

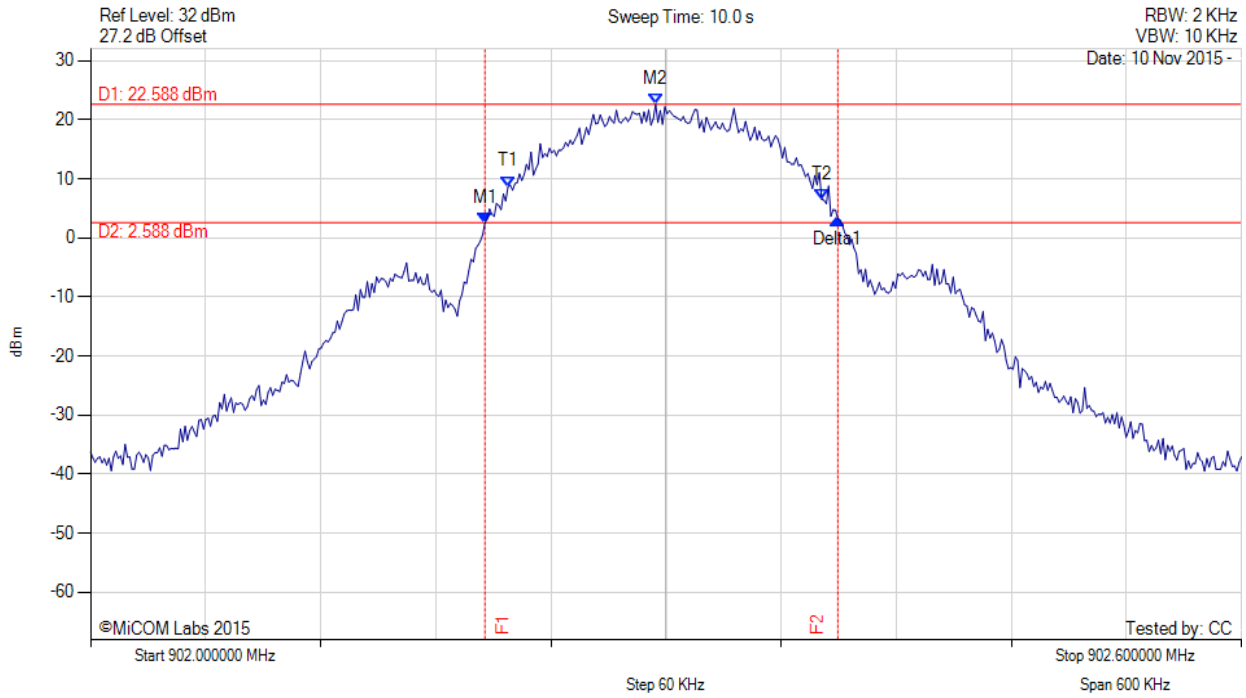


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 926.839 MHz : 3.383 dBm M2 : 926.923 MHz : 24.103 dBm Delta1 : 117 KHz : 3.215 dB T1 : 926.846 MHz : 8.911 dBm T2 : 926.951 MHz : 8.884 dBm OBW : 105 KHz	

back to matrix

20 dB & 99% BANDWIDTH

Variant: 300 GFSK, Channel: 902.30 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

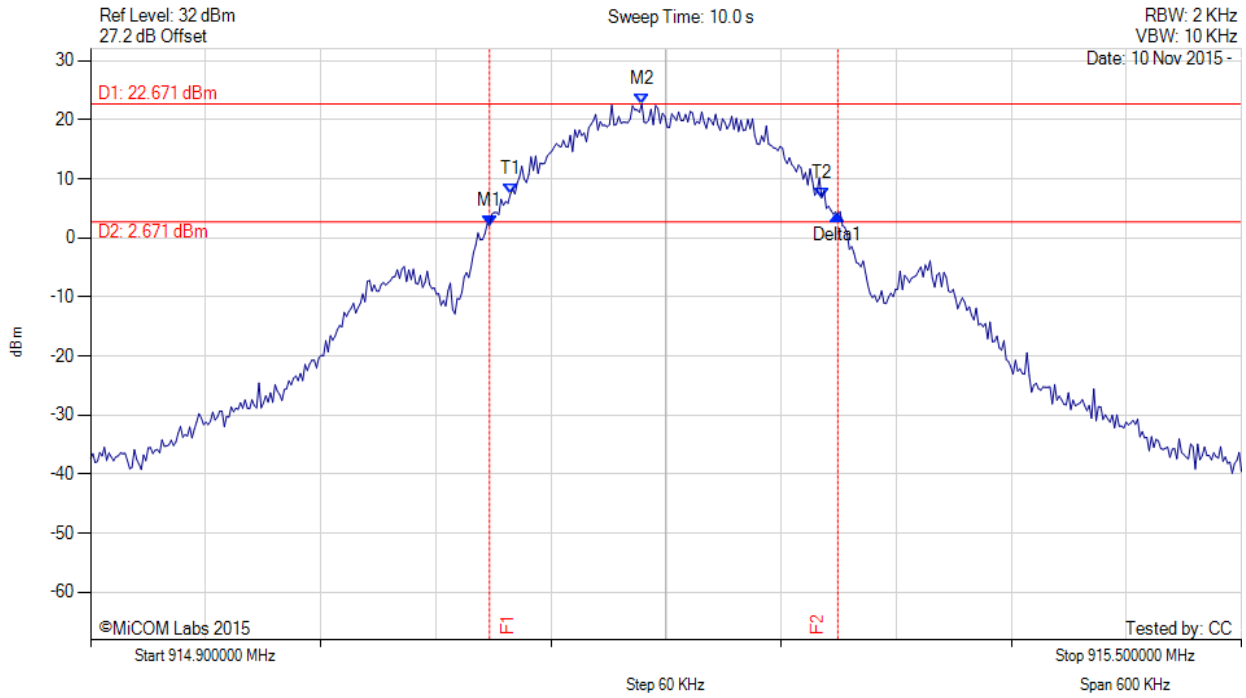


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 902.206 MHz : 2.541 dBm M2 : 902.295 MHz : 22.588 dBm Delta1 : 184 KHz : 0.700 dB T1 : 902.218 MHz : 8.681 dBm T2 : 902.381 MHz : 6.511 dBm OBW : 164 KHz	

back to matrix

20 dB & 99% BANDWIDTH

Variant: 300 GFSK, Channel: 915.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

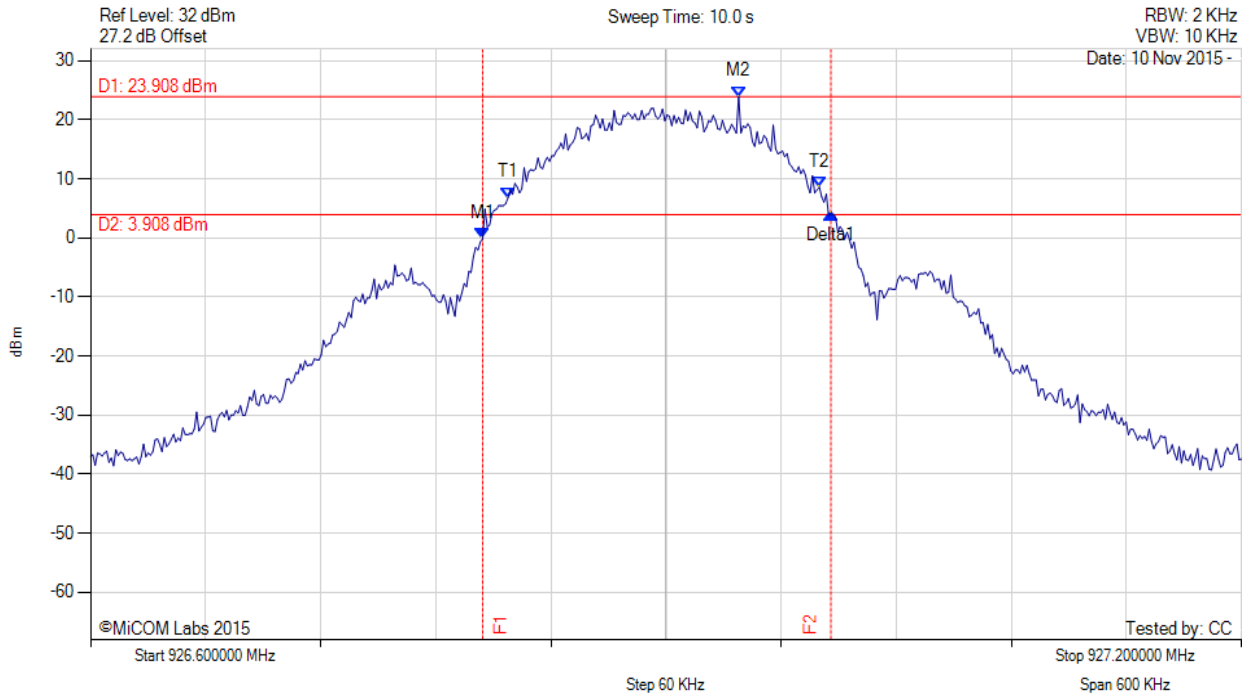


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 915.108 MHz : 2.088 dBm M2 : 915.187 MHz : 22.671 dBm Delta1 : 182 KHz : 1.863 dB T1 : 915.119 MHz : 7.367 dBm T2 : 915.281 MHz : 6.765 dBm OBW : 162 KHz	

back to matrix

20 dB & 99% BANDWIDTH

Variant: 300 GFSK, Channel: 926.90 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

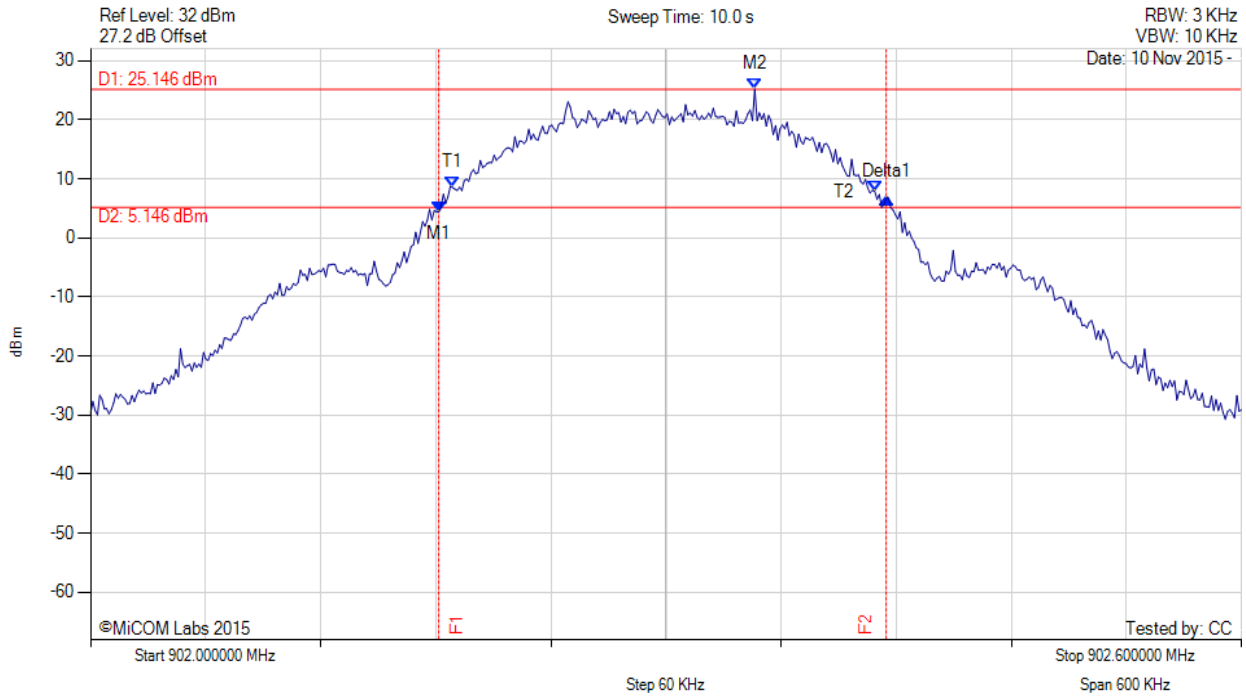


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 926.804 MHz : -0.160 dBm M2 : 926.938 MHz : 23.908 dBm Delta1 : 182 KHz : 4.196 dB T1 : 926.818 MHz : 6.794 dBm T2 : 926.980 MHz : 8.604 dBm OBW : 162 KHz	

back to matrix

20 dB & 99% BANDWIDTH

Variant: 300 GFSK, Channel: 902.30 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

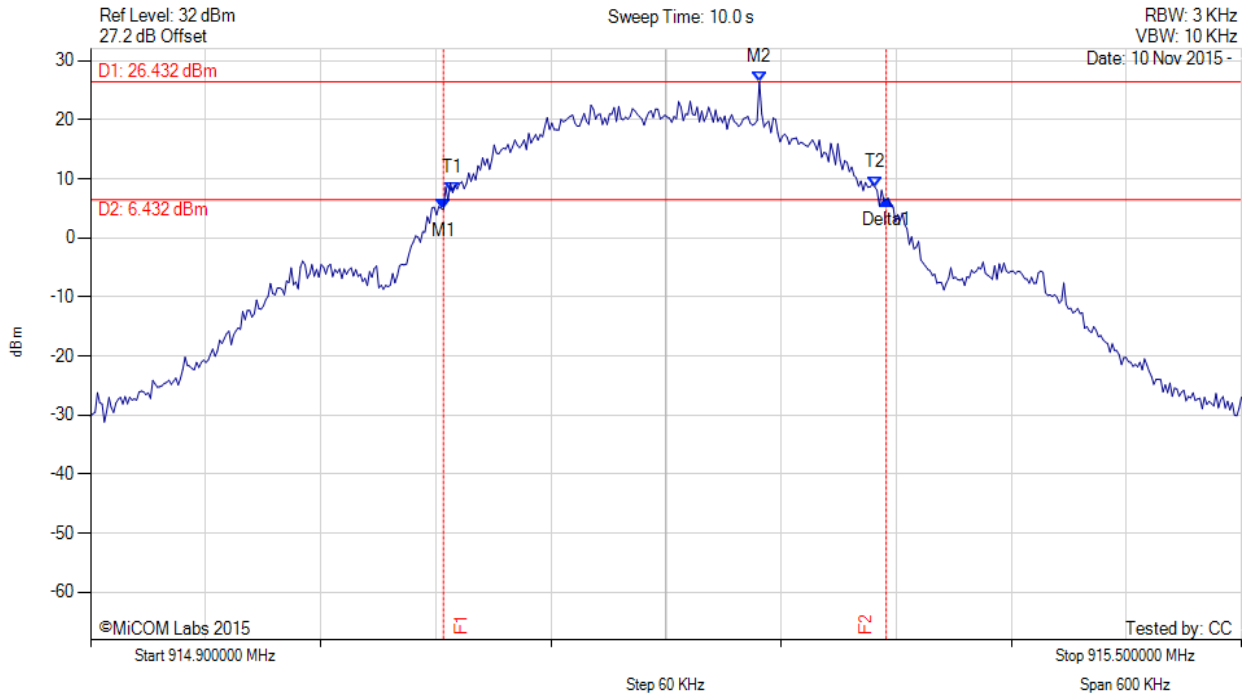


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 902.182 MHz : 4.370 dBm M2 : 902.346 MHz : 25.146 dBm Delta1 : 233 KHz : 2.432 dB T1 : 902.189 MHz : 8.514 dBm T2 : 902.409 MHz : 7.876 dBm OBW : 220 KHz	

back to matrix

20 dB & 99% BANDWIDTH

Variant: 300 GFSK, Channel: 915.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

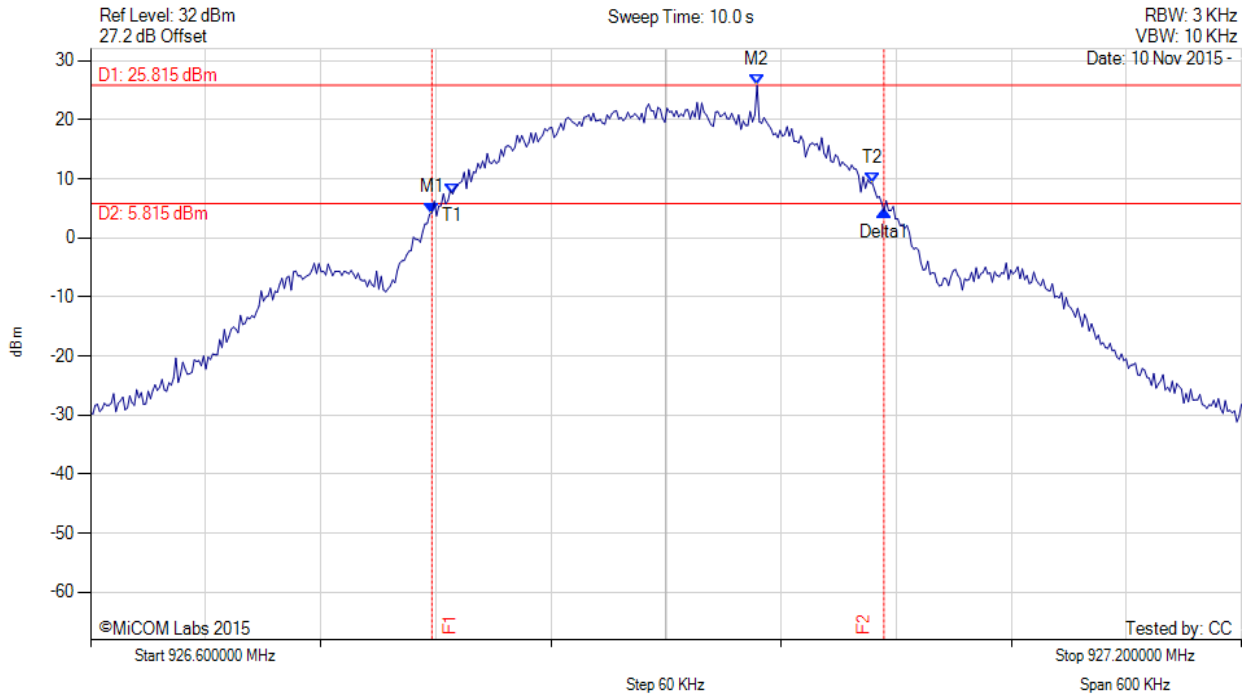


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 915.084 MHz : 4.780 dBm M2 : 915.249 MHz : 26.432 dBm Delta1 : 231 KHz : 1.737 dB T1 : 915.089 MHz : 7.654 dBm T2 : 915.309 MHz : 8.655 dBm OBW : 220 KHz	

back to matrix

20 dB & 99% BANDWIDTH

Variant: 300 GFSK, Channel: 926.90 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

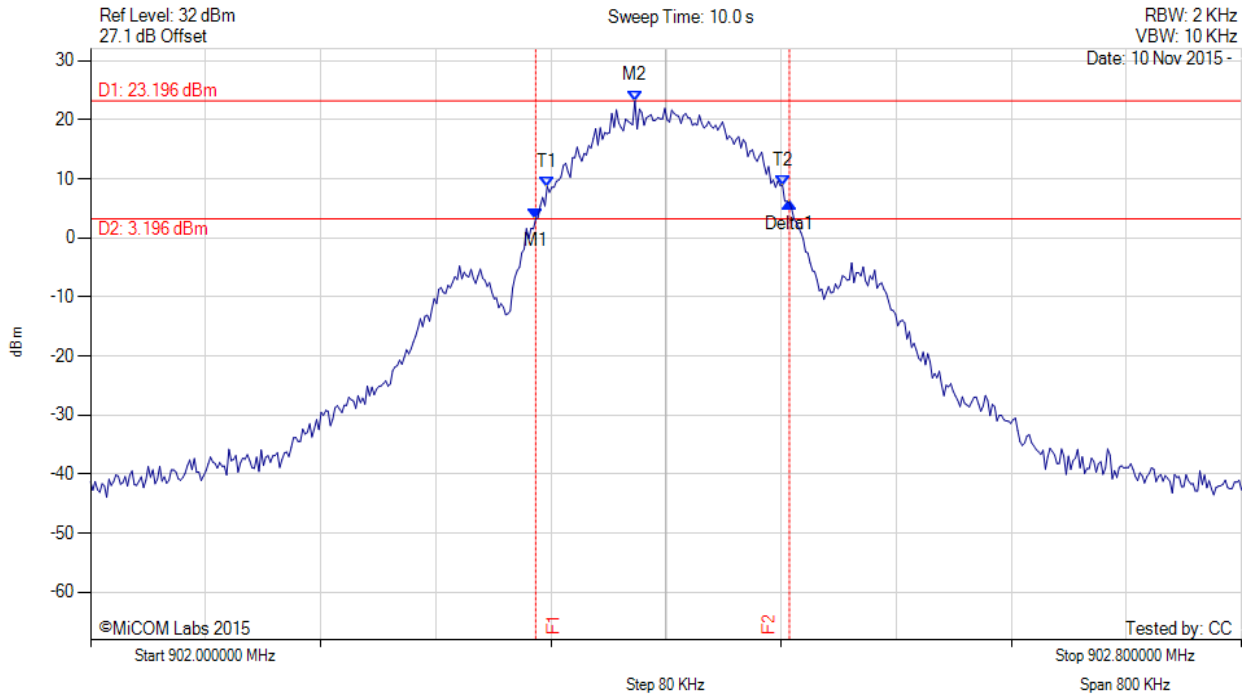


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 926.778 MHz : 4.235 dBm M2 : 926.947 MHz : 25.815 dBm Delta1 : 236 KHz : 0.277 dB T1 : 926.789 MHz : 7.428 dBm T2 : 927.008 MHz : 9.208 dBm OBW : 219 KHz	

back to matrix

20 dB & 99% BANDWIDTH

Variant: 400 FSK, Channel: 902.40 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

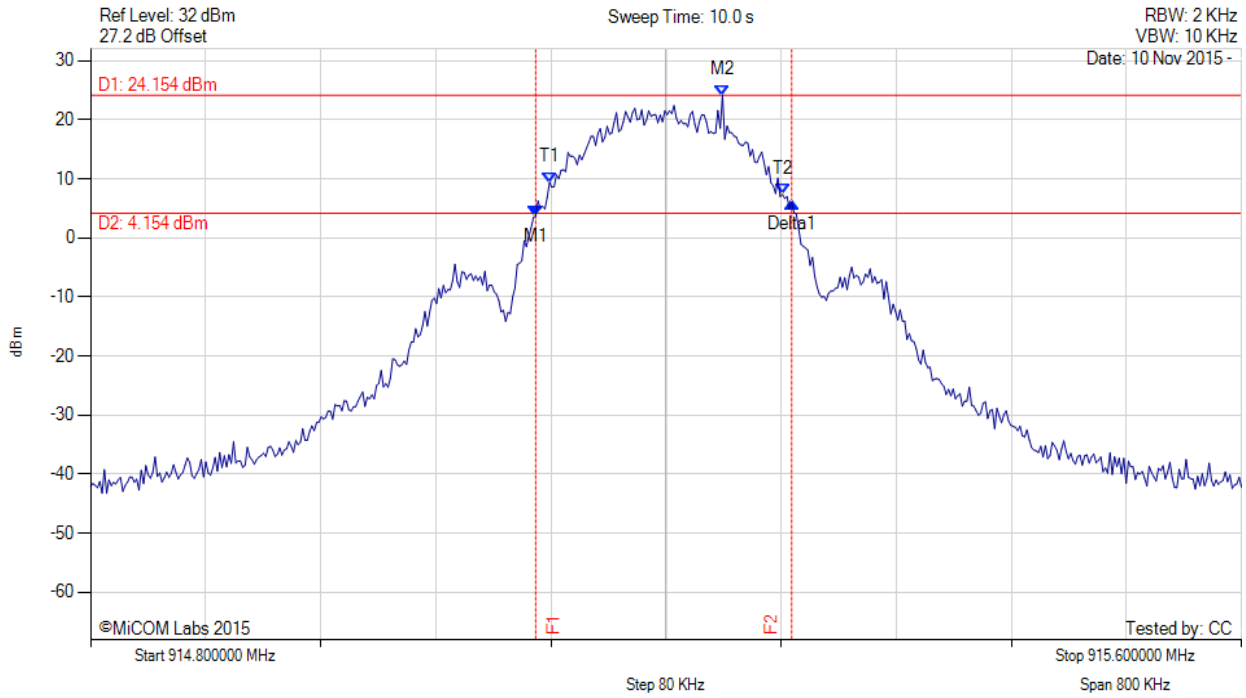


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 902.309 MHz : 3.164 dBm M2 : 902.378 MHz : 23.196 dBm Delta1 : 176 KHz : 2.821 dB T1 : 902.317 MHz : 8.657 dBm T2 : 902.481 MHz : 8.889 dBm OBW : 164 KHz	

back to matrix

20 dB & 99% BANDWIDTH

Variant: 400 FSK, Channel: 915.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

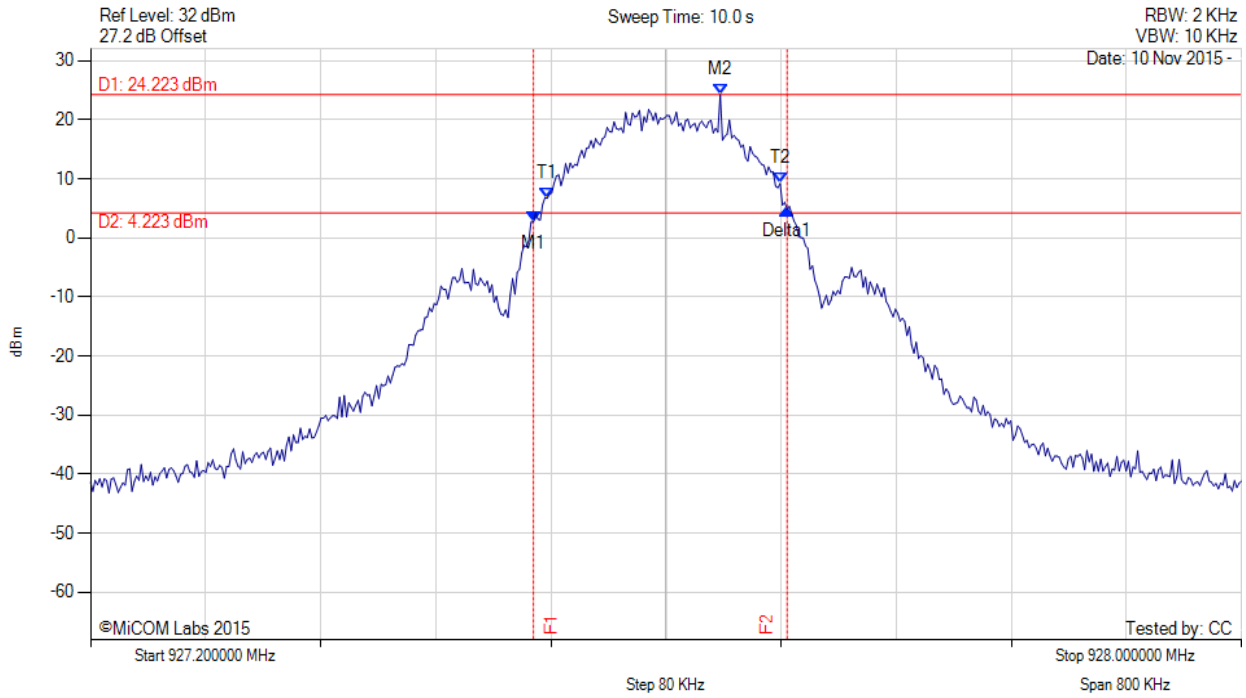


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 915.109 MHz : 3.707 dBm M2 : 915.239 MHz : 24.154 dBm Delta1 : 178 KHz : 2.300 dB T1 : 915.119 MHz : 9.389 dBm T2 : 915.281 MHz : 7.343 dBm OBW : 162 KHz	

back to matrix

20 dB & 99% BANDWIDTH

Variant: 400 FSK, Channel: 927.60 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

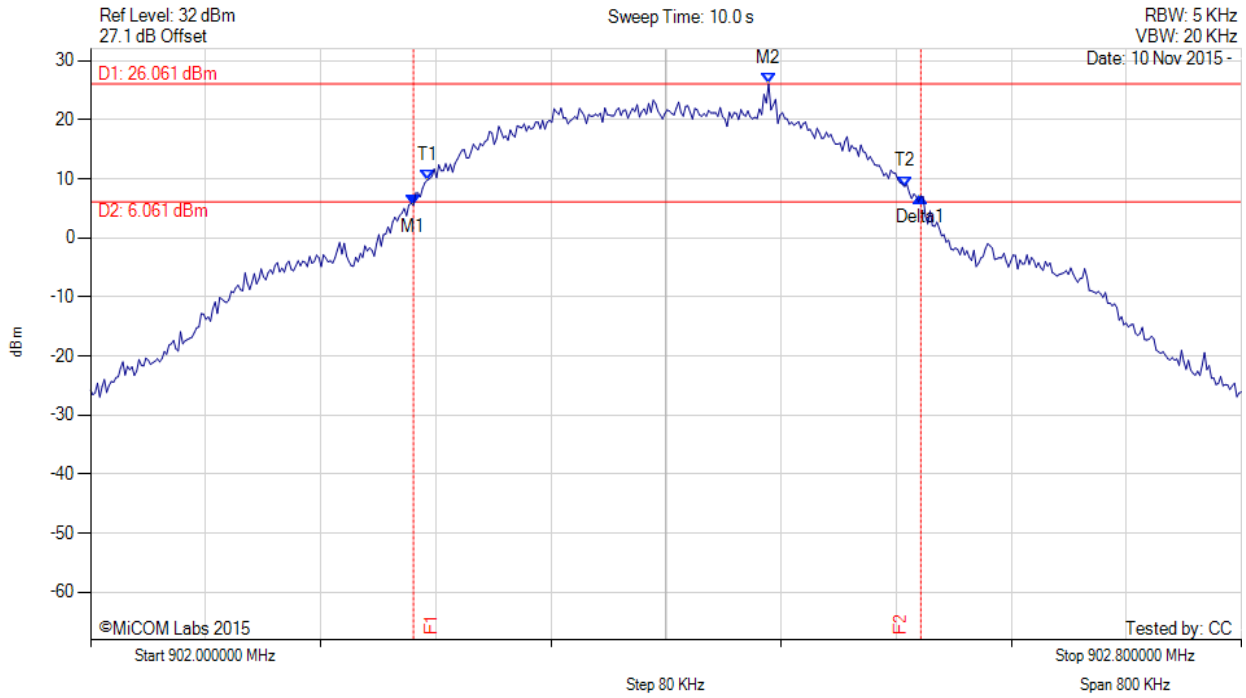


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 927.508 MHz : 2.732 dBm M2 : 927.638 MHz : 24.223 dBm Delta1 : 176 KHz : 2.115 dB T1 : 927.517 MHz : 6.698 dBm T2 : 927.679 MHz : 9.196 dBm OBW : 162 KHz	

back to matrix

20 dB & 99% BANDWIDTH

Variant: 400 GFSK, Channel: 902.40 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

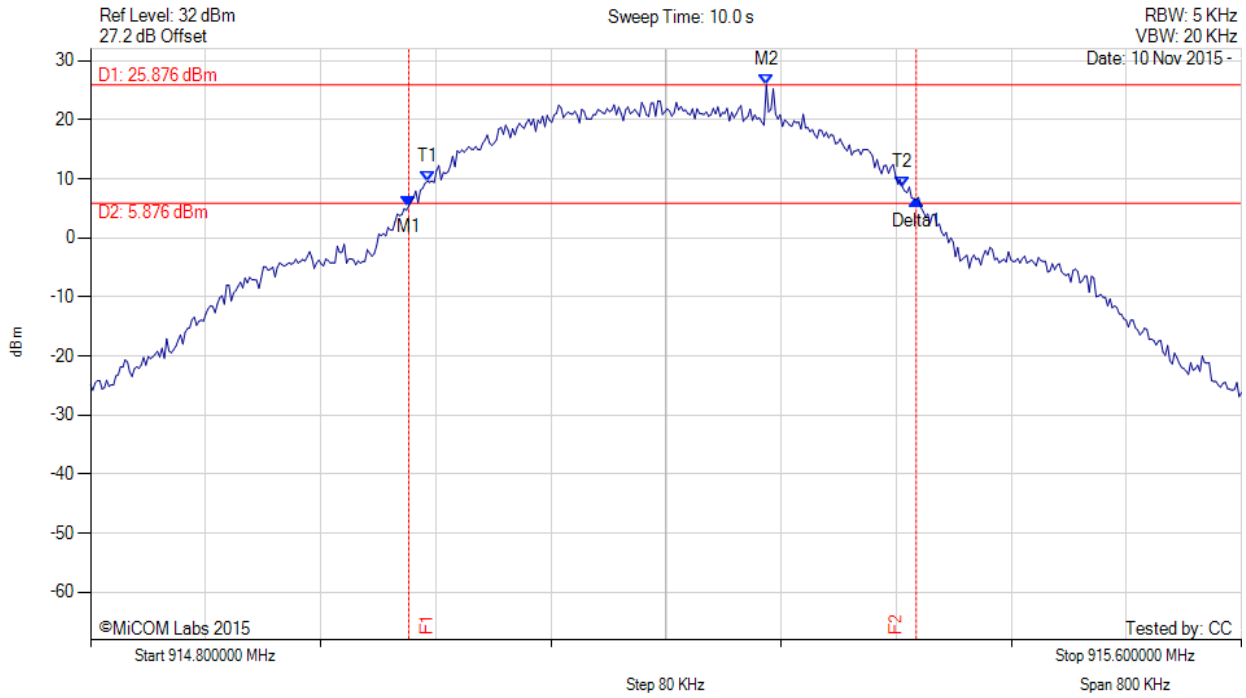


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 902.224 MHz : 5.517 dBm M2 : 902.471 MHz : 26.061 dBm Delta1 : 353 KHz : 1.446 dB T1 : 902.234 MHz : 9.753 dBm T2 : 902.566 MHz : 8.683 dBm OBW : 332 KHz	

back to matrix

20 dB & 99% BANDWIDTH

Variant: 400 GFSK, Channel: 915.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

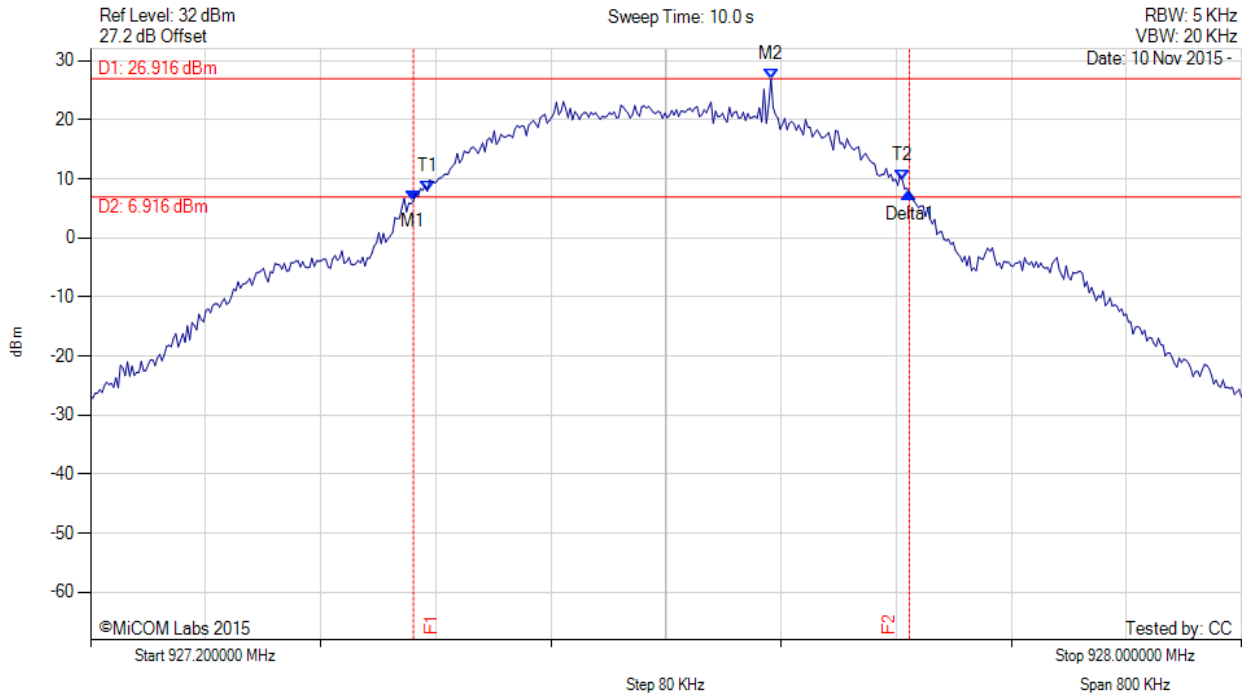


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 915.021 MHz : 5.401 dBm M2 : 915.270 MHz : 25.876 dBm Delta1 : 353 KHz : 1.039 dB T1 : 915.034 MHz : 9.588 dBm T2 : 915.364 MHz : 8.567 dBm OBW : 330 KHz	

back to matrix

20 dB & 99% BANDWIDTH

Variant: 400 GFSK, Channel: 927.60 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

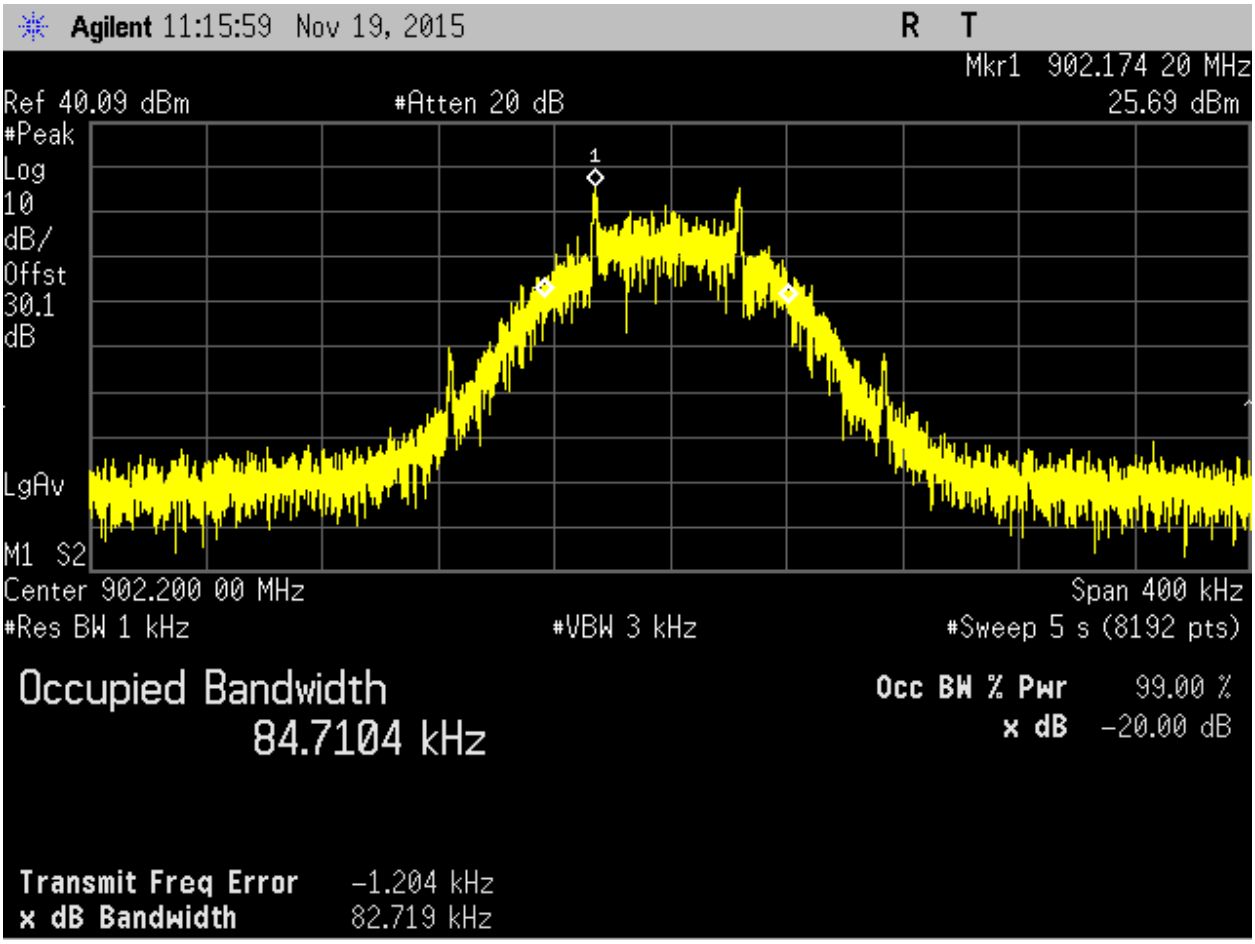


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 927.424 MHz : 6.316 dBm M2 : 927.673 MHz : 26.916 dBm Delta1 : 345 KHz : 1.234 dB T1 : 927.434 MHz : 7.876 dBm T2 : 927.764 MHz : 9.684 dBm OBW : 330 KHz	

back to matrix

20 dB & 99% BANDWIDTH

Variant: 200 2FSK, Channel: 902.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

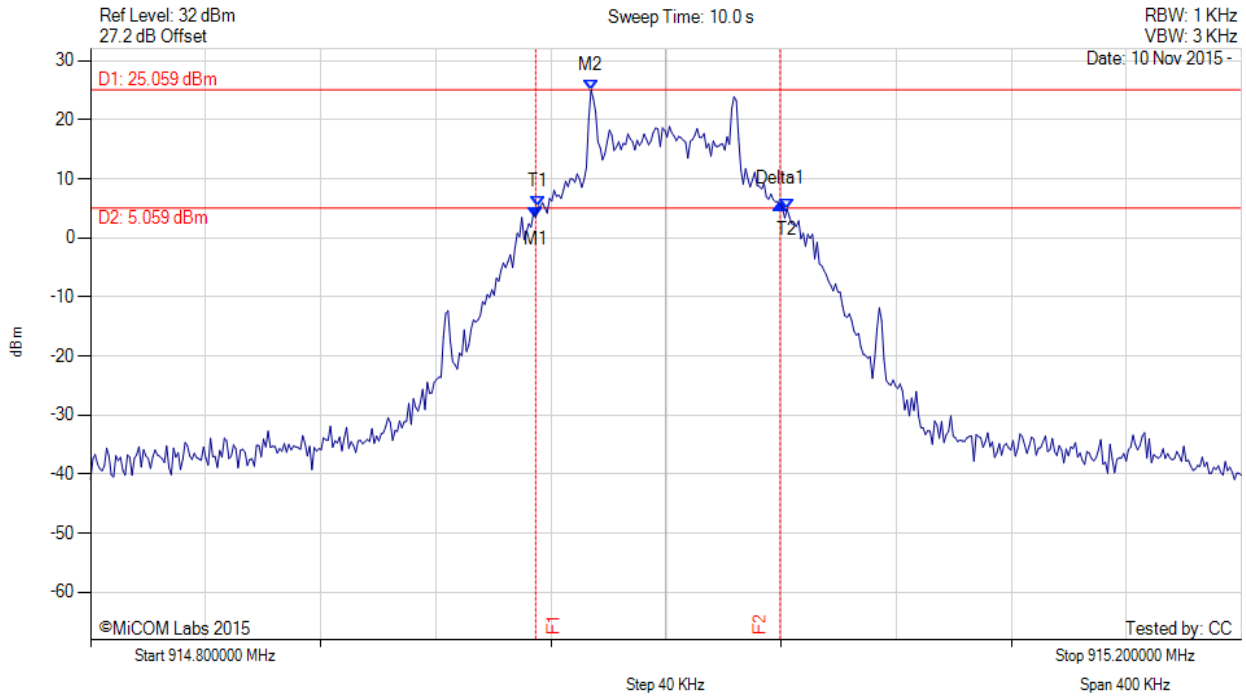


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD		

back to matrix

20 dB & 99% BANDWIDTH

Variant: 200 2FSK, Channel: 915.00 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

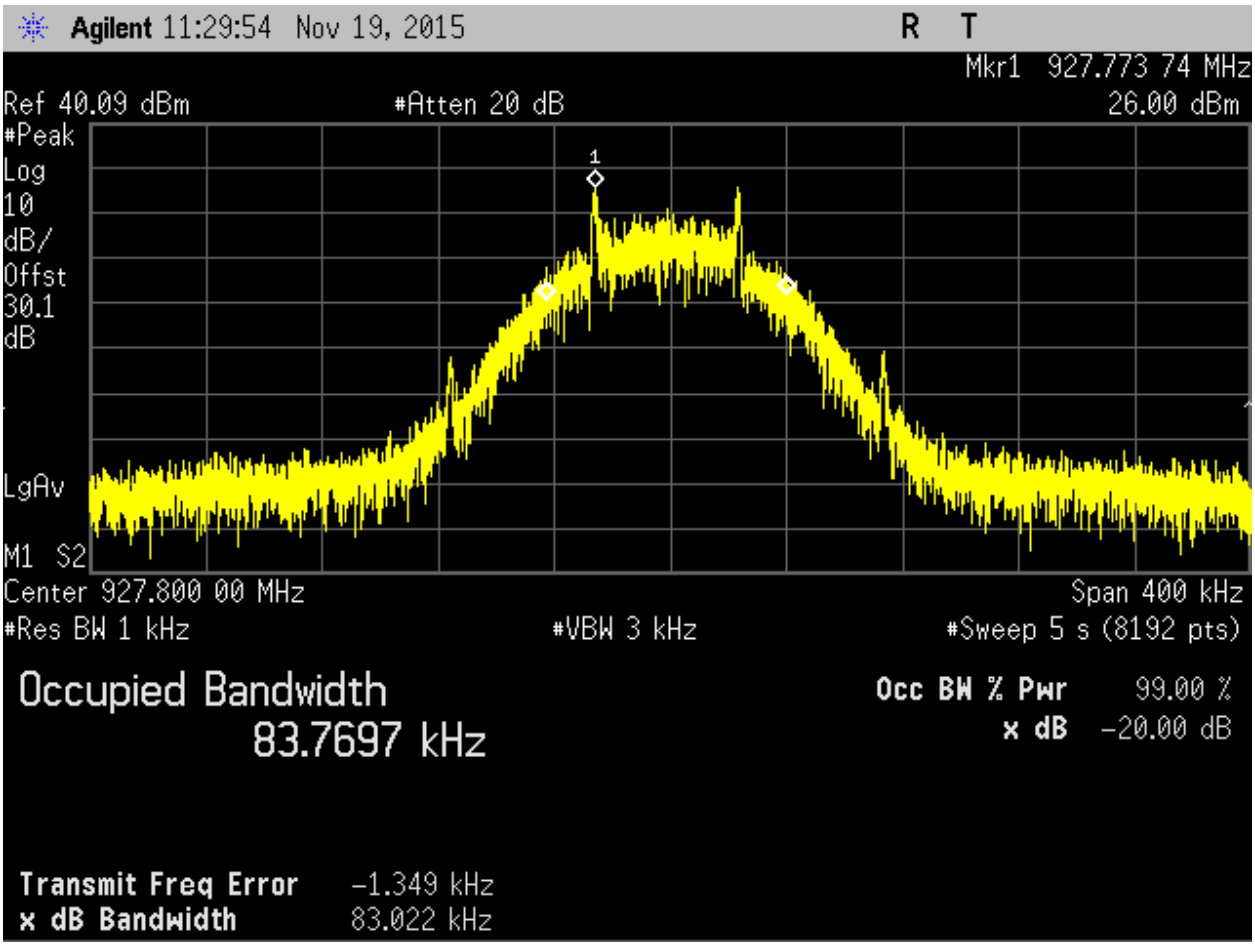


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 914.955 MHz : 3.399 dBm M2 : 914.974 MHz : 25.059 dBm Delta1 : 85 KHz : 2.414 dB T1 : 914.956 MHz : 5.236 dBm T2 : 915.042 MHz : 4.866 dBm OBW : 87 KHz	

back to matrix

20 dB & 99% BANDWIDTH

Variant: 200 2FSK, Channel: 927.80 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

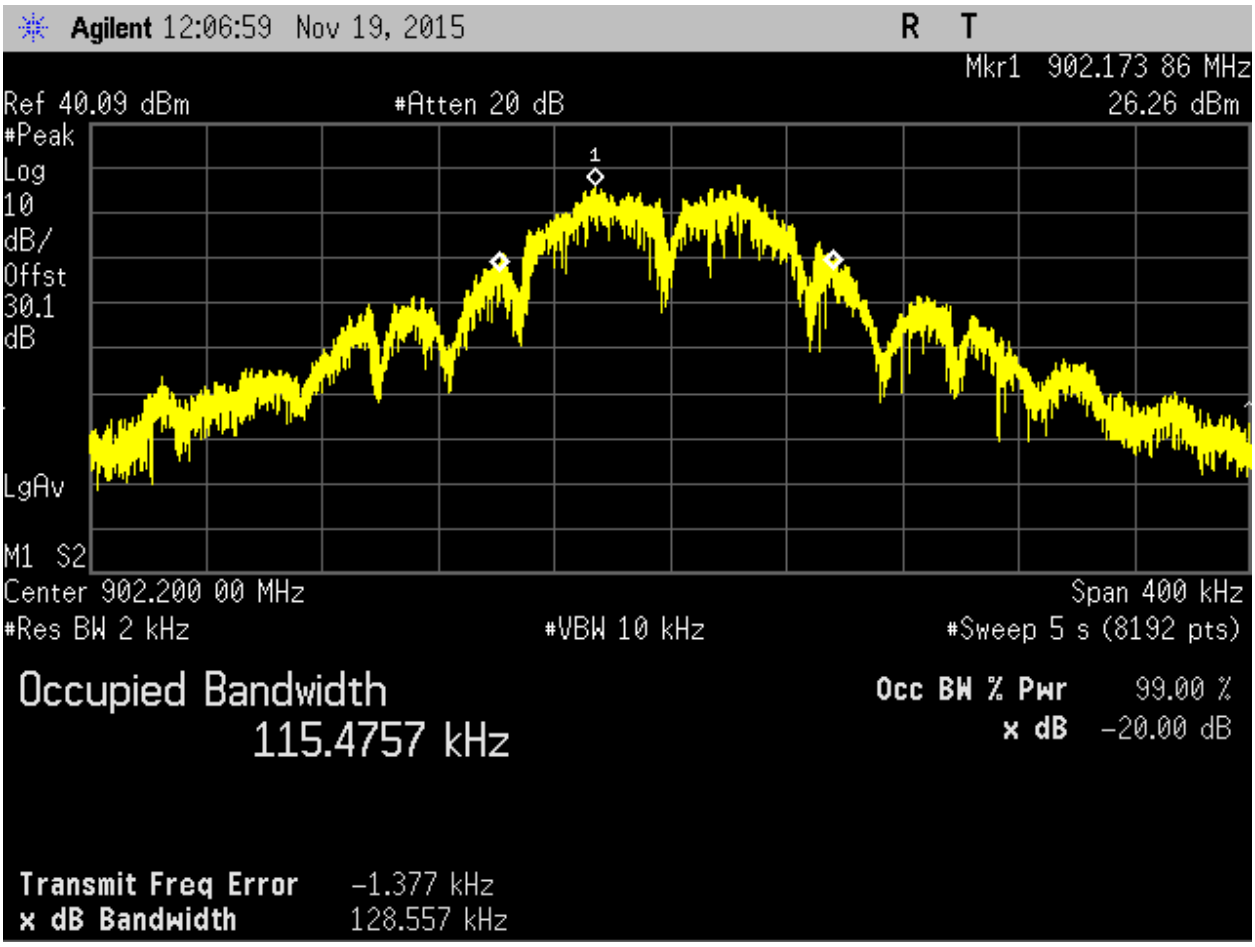


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD		

back to matrix

20 dB & 99% BANDWIDTH

Variant: 200 OQPSK, Channel: 902.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

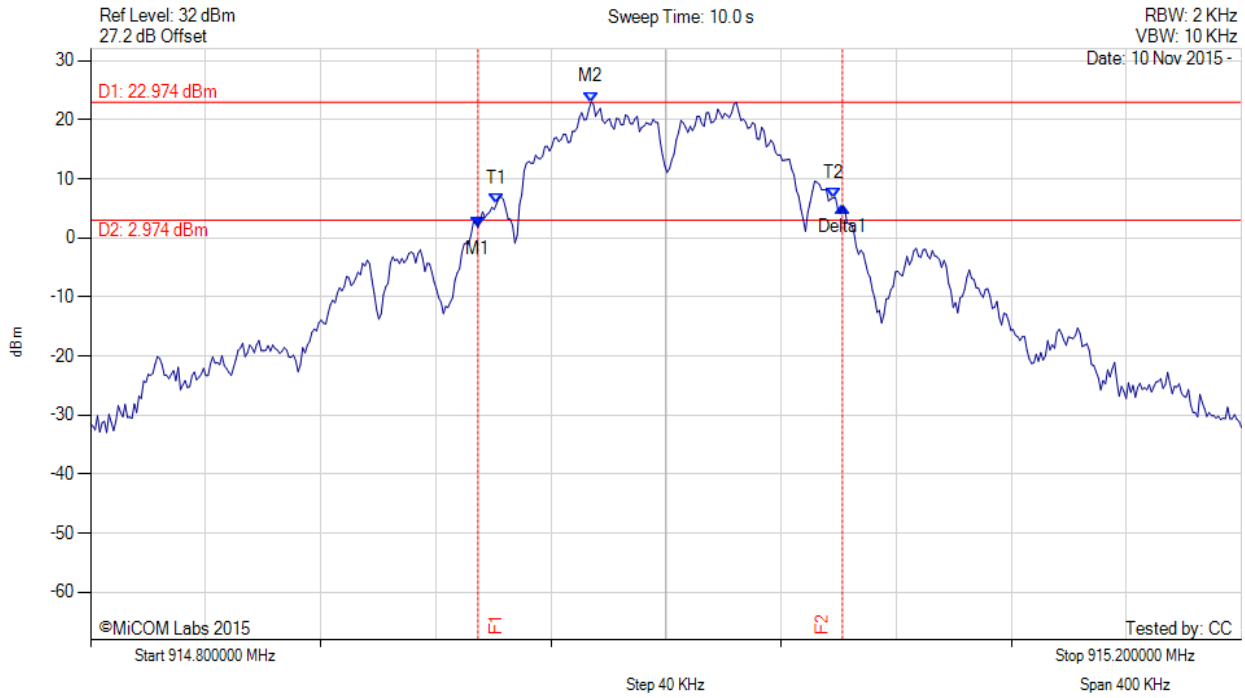


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = MAX HOLD		

back to matrix

20 dB & 99% BANDWIDTH

Variant: 200 OQPSK, Channel: 915.00 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

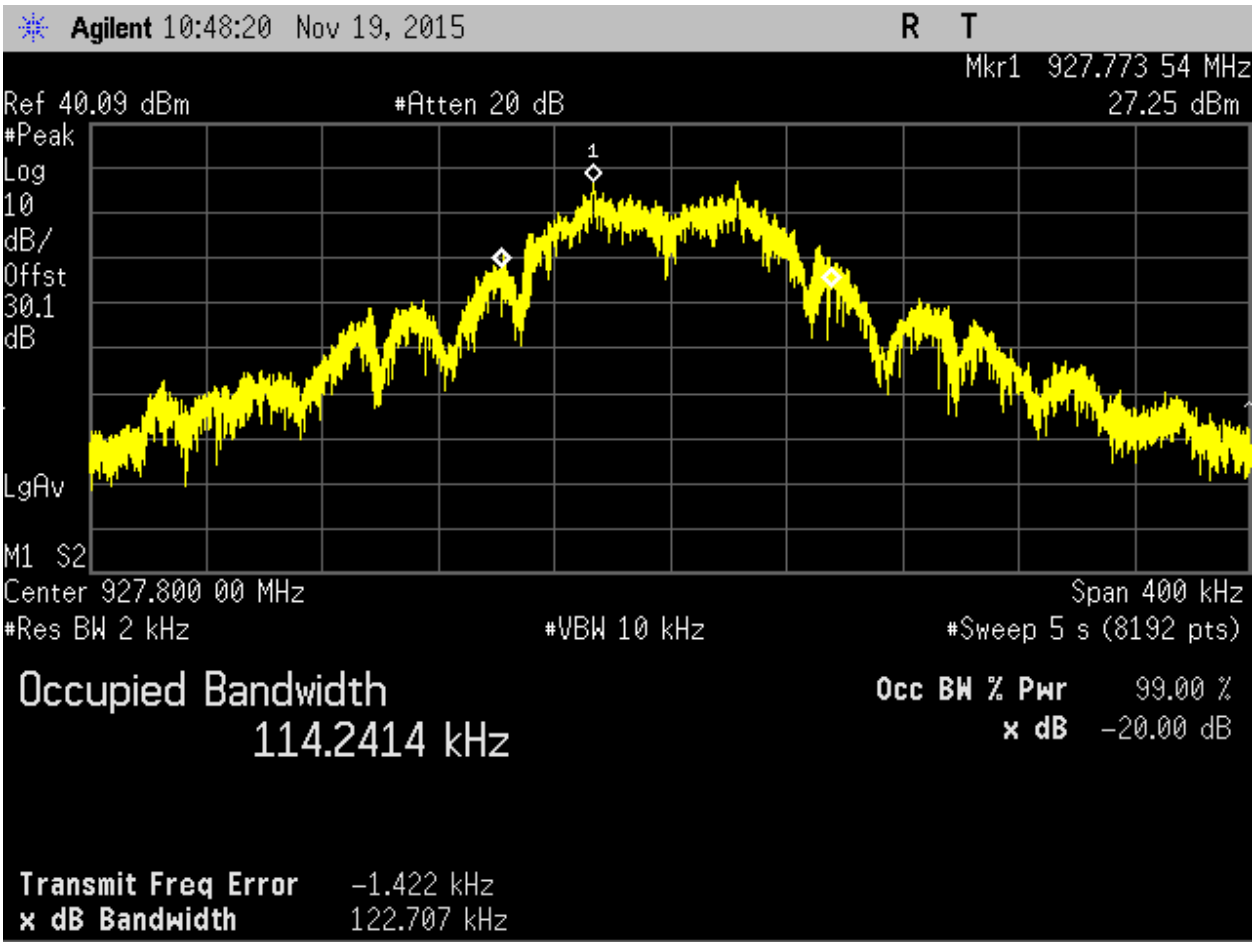


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 914.935 MHz : 1.789 dBm M2 : 914.974 MHz : 22.974 dBm Delta1 : 127 KHz : 3.549 dB T1 : 914.941 MHz : 5.696 dBm T2 : 915.058 MHz : 6.739 dBm OBW : 117 KHz	

back to matrix

20 dB & 99% BANDWIDTH

Variant: 200 OQPSK, Channel: 927.80 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

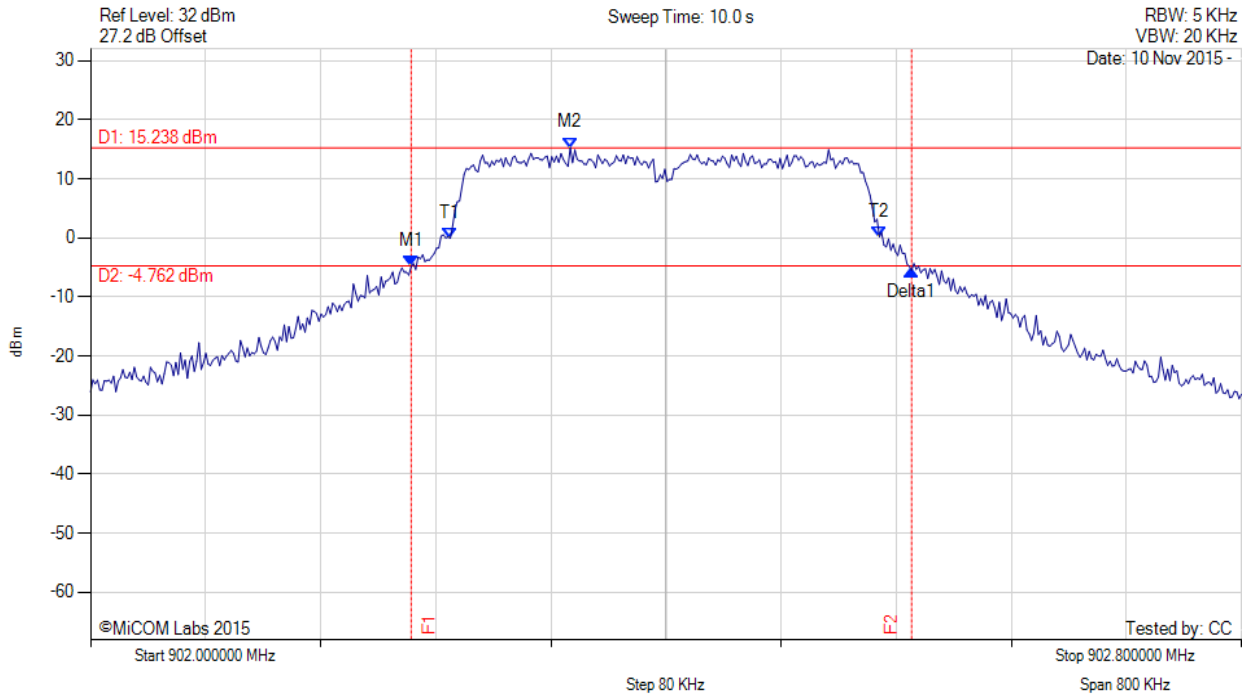


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = MAX HOLD		

back to matrix

20 dB & 99% BANDWIDTH

Variant: 400 OFDM, Channel: 902.40 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

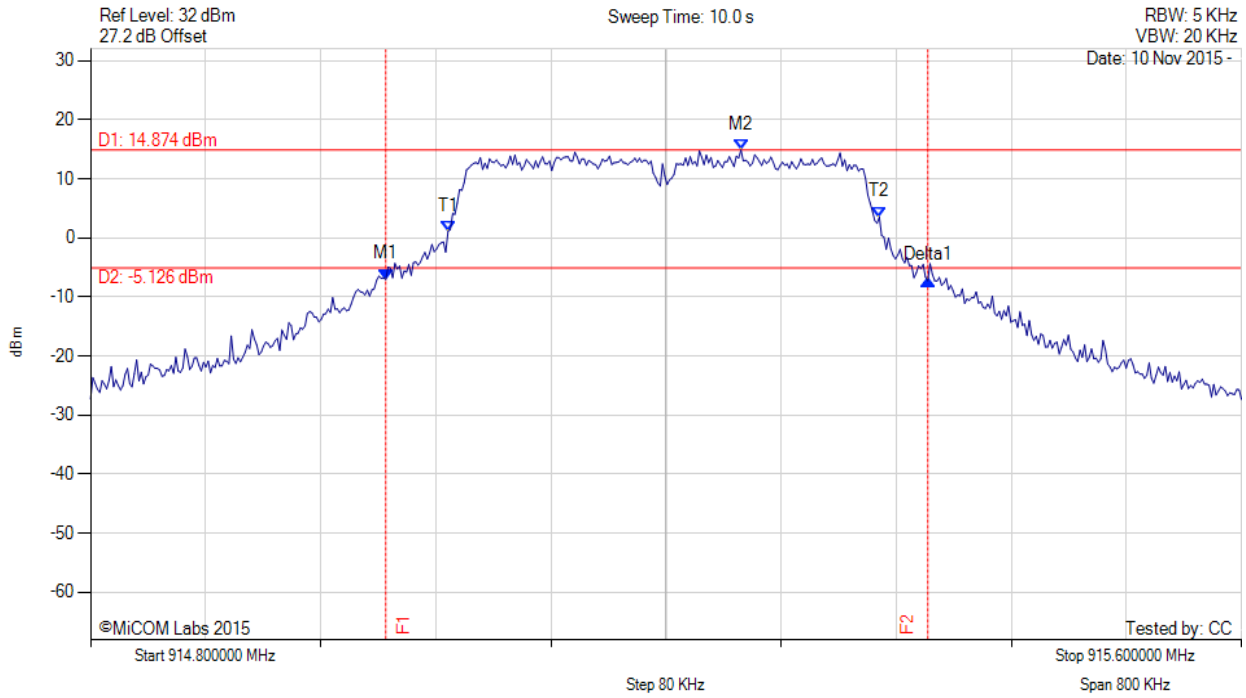


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 902.223 MHz : -4.868 dBm M2 : 902.333 MHz : 15.238 dBm Delta1 : 348 KHz : -0.647 dB T1 : 902.250 MHz : -0.064 dBm T2 : 902.548 MHz : 0.182 dBm OBW : 298 KHz	

back to matrix

20 dB & 99% BANDWIDTH

Variant: 400 OFDM, Channel: 915.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

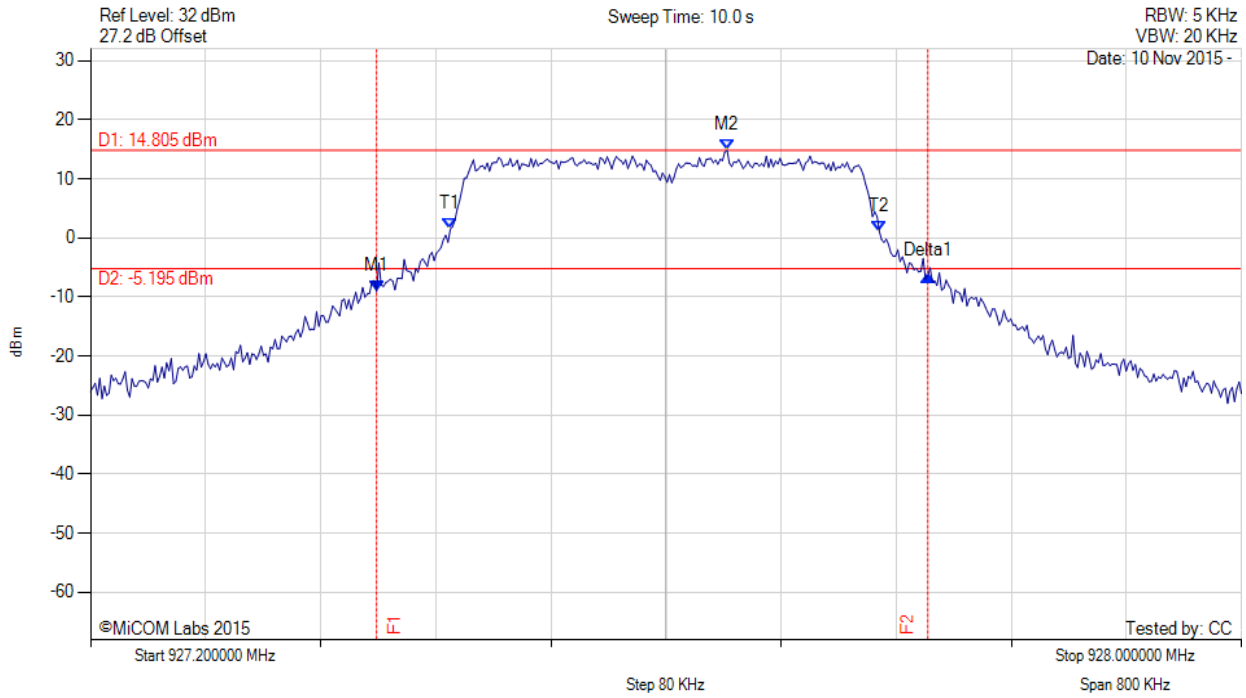


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 915.005 MHz : -7.030 dBm M2 : 915.252 MHz : 14.874 dBm Delta1 : 377 KHz : -0.207 dB T1 : 915.048 MHz : 1.101 dBm T2 : 915.348 MHz : 3.521 dBm OBW : 300 KHz	

back to matrix

20 dB & 99% BANDWIDTH

Variant: 400 OFDM, Channel: 927.60 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



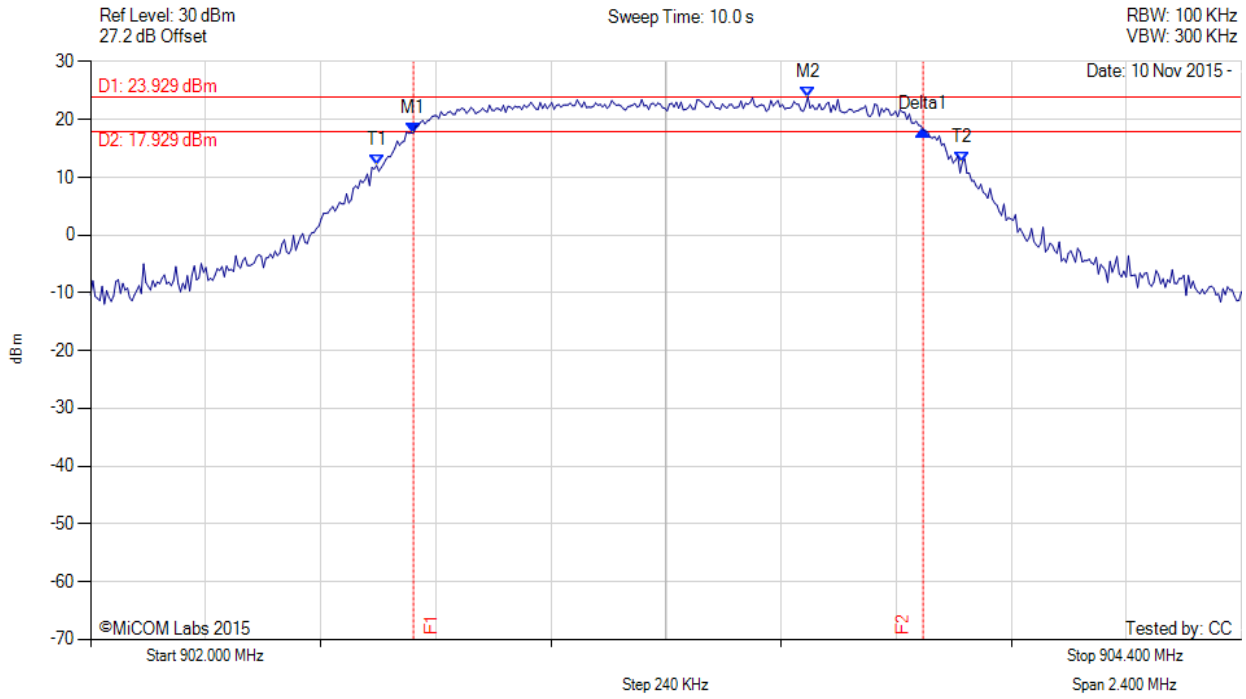
Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 927.399 MHz : -9.090 dBm M2 : 927.642 MHz : 14.805 dBm Delta1 : 383 KHz : 2.676 dB T1 : 927.450 MHz : 1.441 dBm T2 : 927.748 MHz : 1.101 dBm OBW : 298 KHz	

back to matrix

A.2. 6 dB & 99% Bandwidth

6 dB & 99% BANDWIDTH

Variant: 1200 OFDM, Channel: 903.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

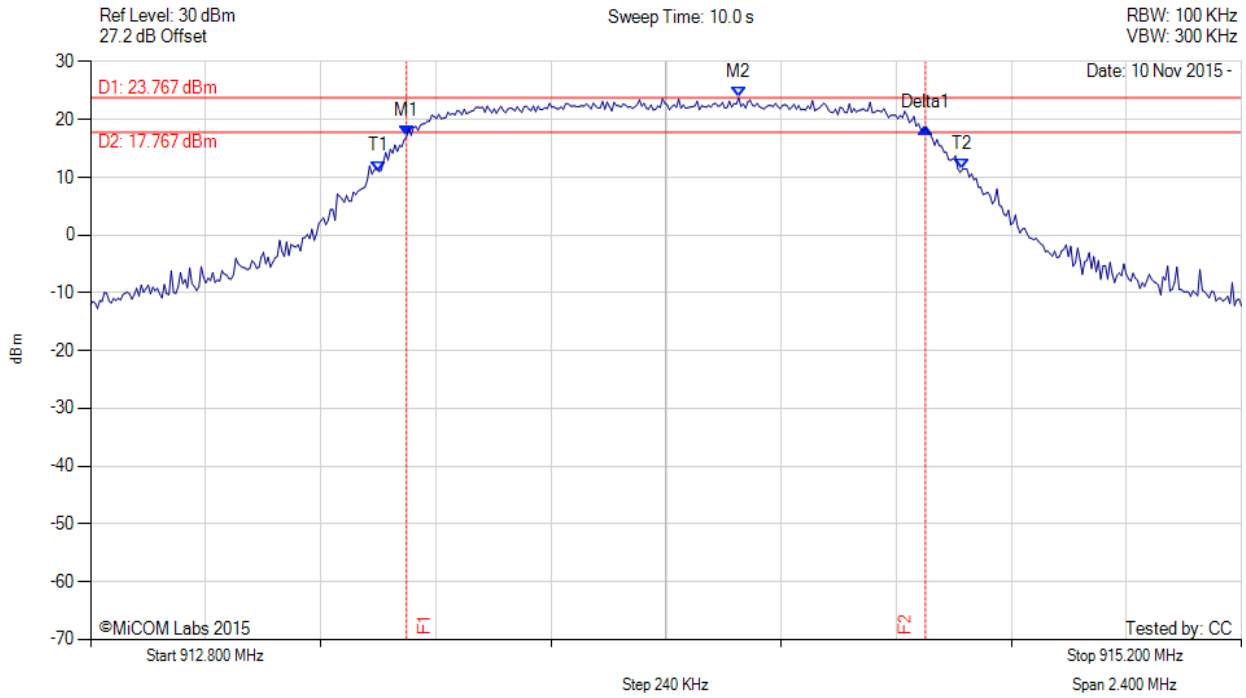


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 902.673 MHz : 17.726 dBm M2 : 903.496 MHz : 23.929 dBm Delta1 : 1.063 MHz : 0.492 dB T1 : 902.596 MHz : 12.064 dBm T2 : 903.818 MHz : 12.591 dBm OBW : 1.222 MHz	Measured 6 dB Bandwidth: 1.063 MHz Limit: ≥500.0 kHz Margin: -0.56 MHz

back to matrix

6 dB & 99% BANDWIDTH

Variant: 1200 OFDM, Channel: 914.00 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

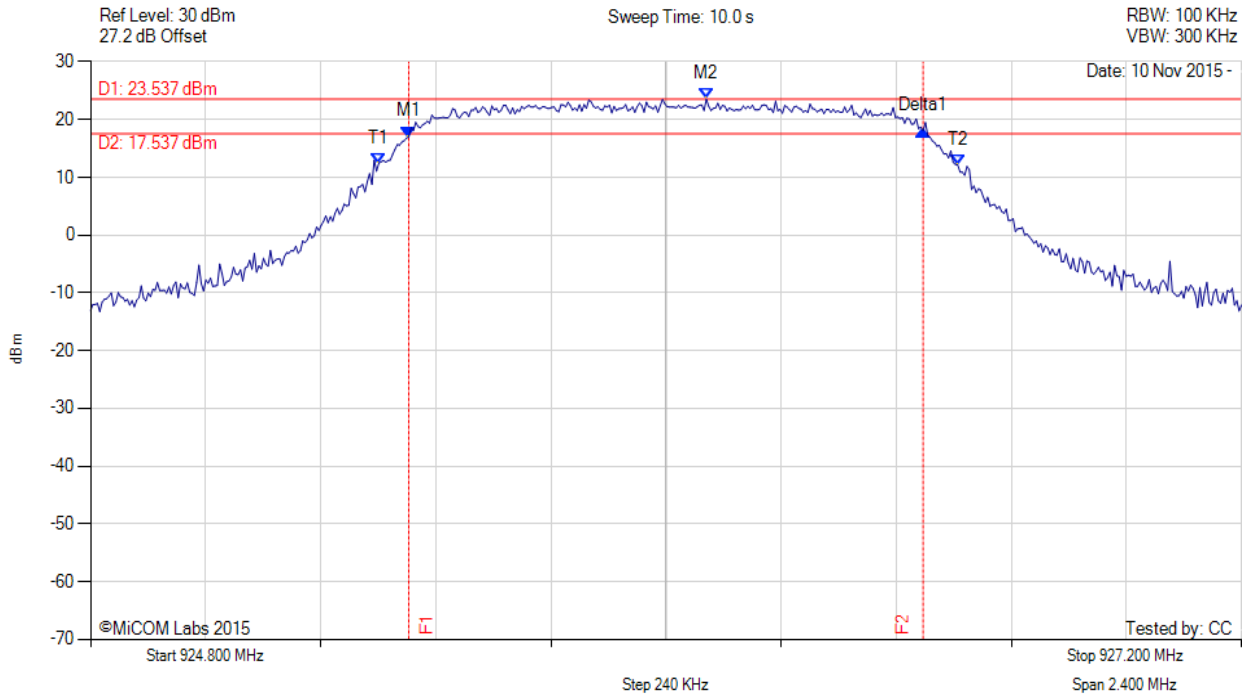


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 913.459 MHz : 17.063 dBm M2 : 914.152 MHz : 23.767 dBm Delta1 : 1.082 MHz : 1.576 dB T1 : 913.401 MHz : 11.035 dBm T2 : 914.618 MHz : 11.363 dBm OBW : 1.217 MHz	Measured 6 dB Bandwidth: 1.082 MHz Limit: ≥500.0 kHz Margin: -0.58 MHz

back to matrix

6 dB & 99% BANDWIDTH

Variant: 1200 OFDM, Channel: 926.00 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



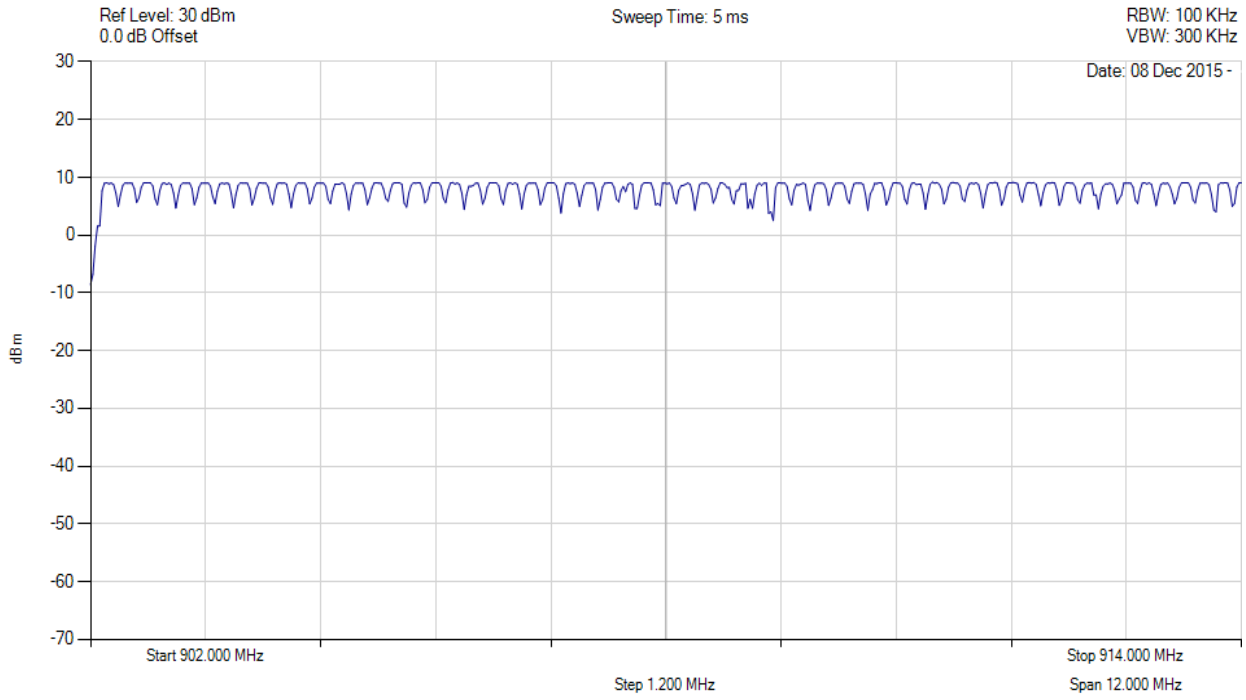
Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = MAX HOLD	M1 : 925.464 MHz : 17.037 dBm M2 : 926.084 MHz : 23.537 dBm Delta1 : 1.073 MHz : 1.025 dB T1 : 925.401 MHz : 12.455 dBm T2 : 926.608 MHz : 12.144 dBm OBW : 1.207 MHz	Measured 6 dB Bandwidth: 1.073 MHz Limit: ≥500.0 kHz Margin: -0.57 MHz

back to matrix

A.3. Number of Channels

Hopping 902-914MHz

Variant: OQPSK, Channel: Hopping, Chain a, Temp: Ambient, Voltage: 4 Vdc

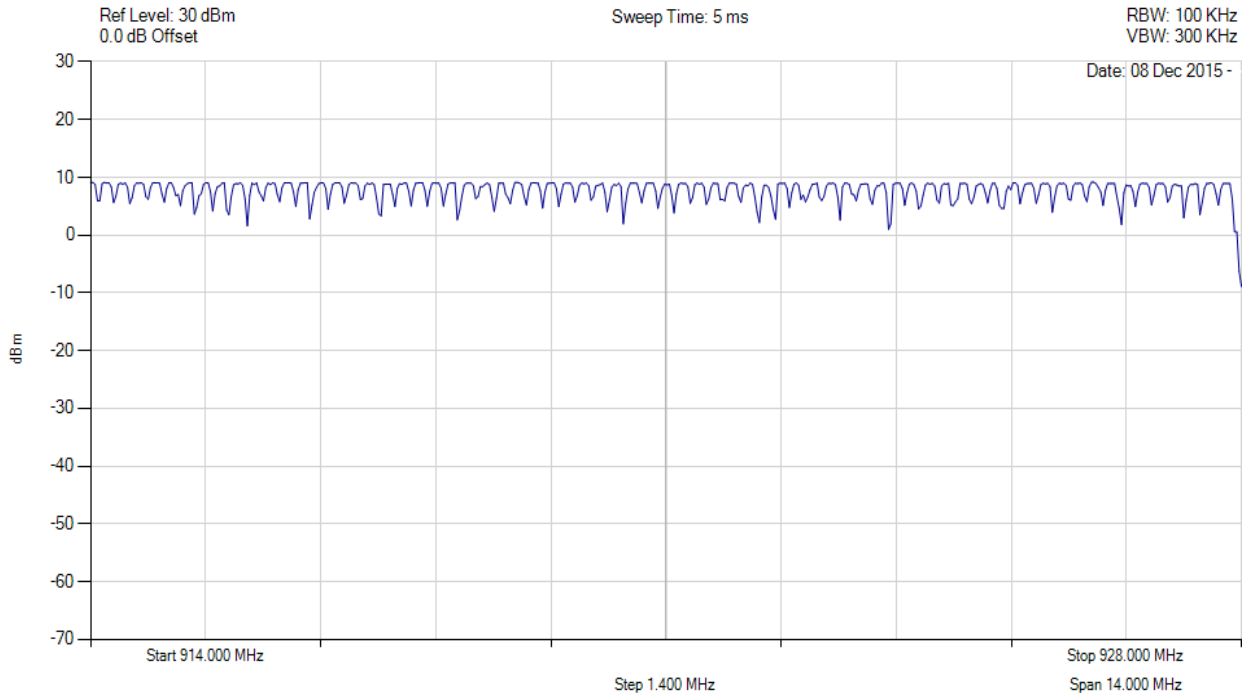


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 40 Trace Mode = VIEW		Channel Frequency: Hopping Number of Hops: 60

back to matrix

Hopping 914.00 – 928.00 MHz

Variant: OQPSK, Channel: Hopping, Chain a, Temp: Ambient, Voltage: 4 Vdc

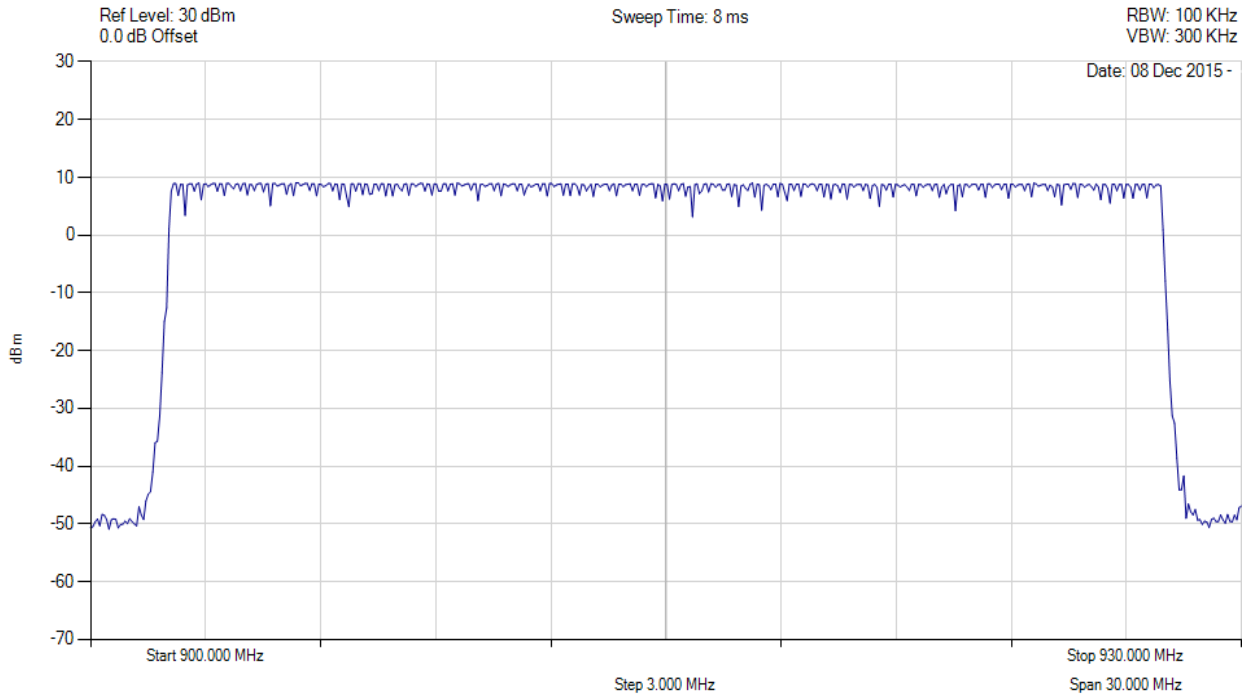


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 40 Trace Mode = VIEW		Channel Frequency: Hopping Number of Hops: 69

back to matrix

Number of Hopping Channels

Variant: OQPSK, Channel: Hopping, Chain a, Temp: Ambient, Voltage: 4 Vdc

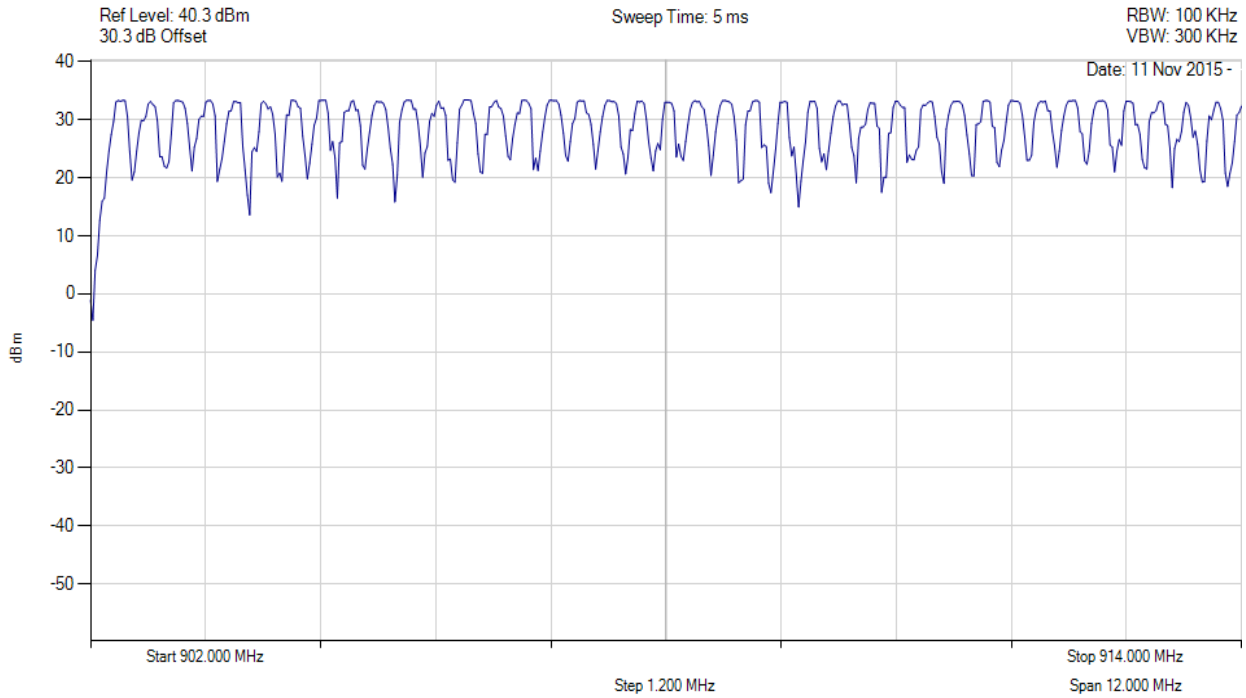


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 40 Trace Mode = VIEW		Channel Frequency: Hopping Number of Hops: 129

back to matrix

Hopping 902-914MHz

Variant: FSK, Channel: Hopping, Chain a, Temp: Ambient, Voltage: 4 Vdc

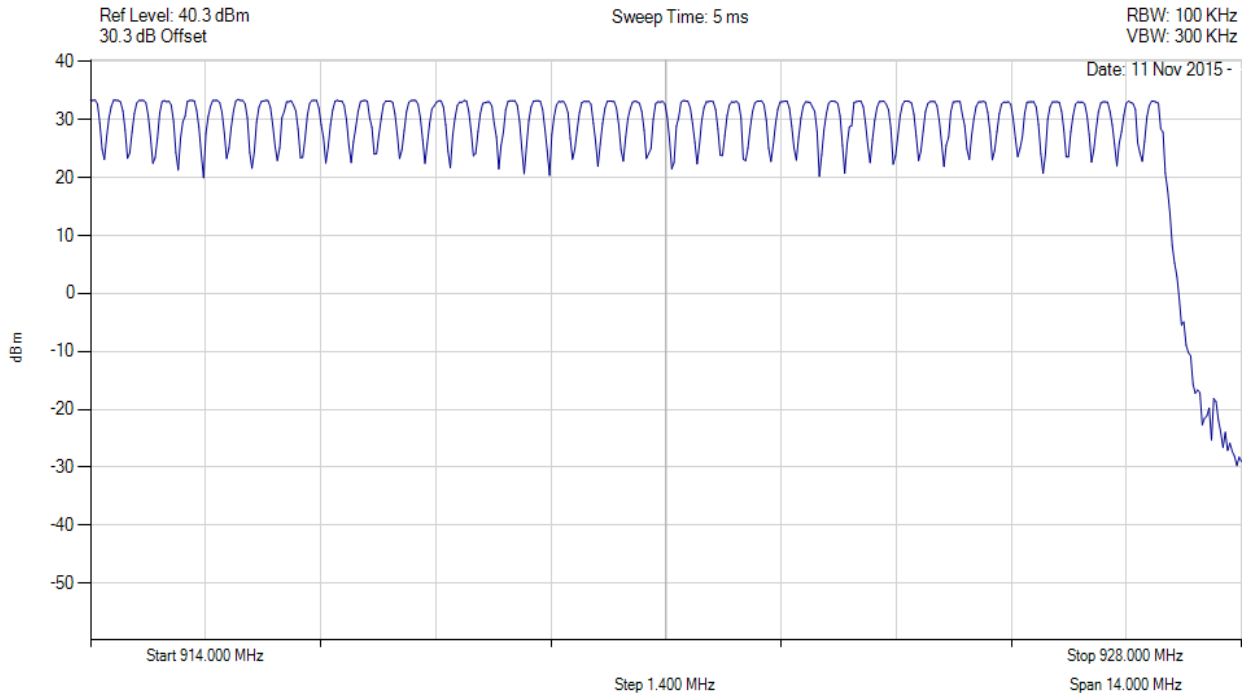


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 40 Trace Mode = VIEW		Channel Frequency: Hopping Number of Hops: 40

back to matrix

Hopping 914.00 – 928.00 MHz

Variant: FSK, Channel: Hopping, Chain a, Temp: Ambient, Voltage: 4 Vdc

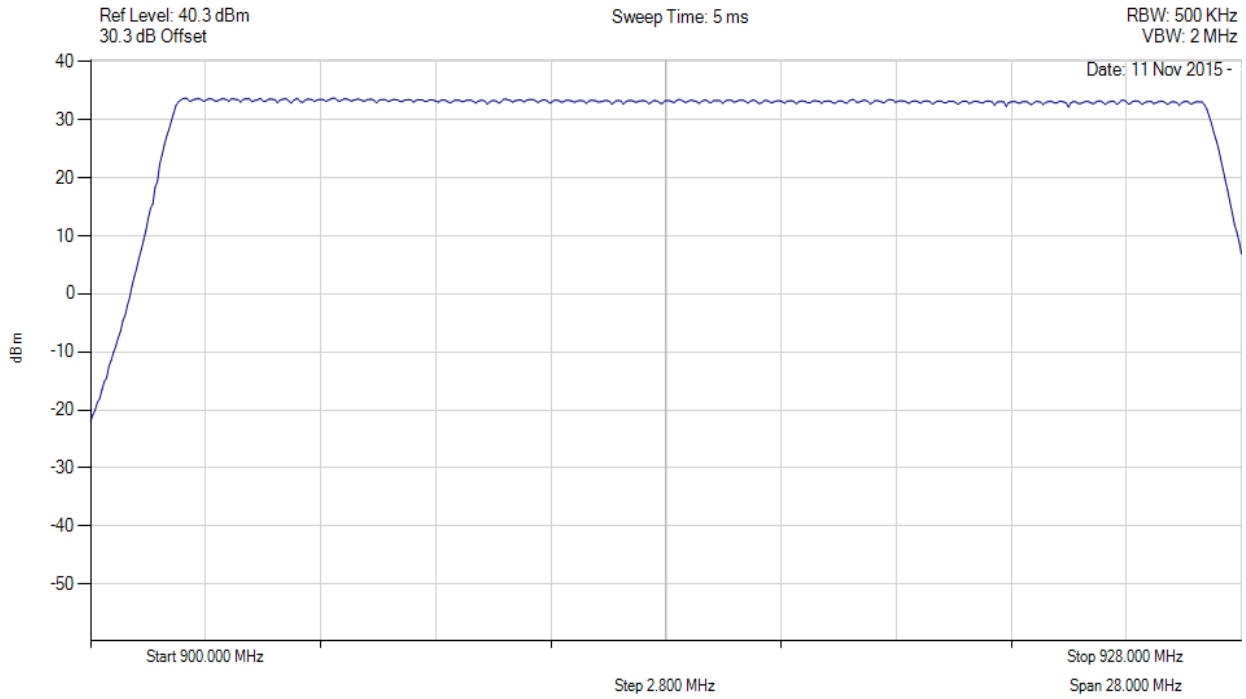


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 40 Trace Mode = VIEW		Channel Frequency: Hopping Number of Hops: 43

back to matrix

Number of Hopping Channels

Variant: FSK, Channel: Hopping, Chain a, Temp: Ambient, Voltage: 4 Vdc

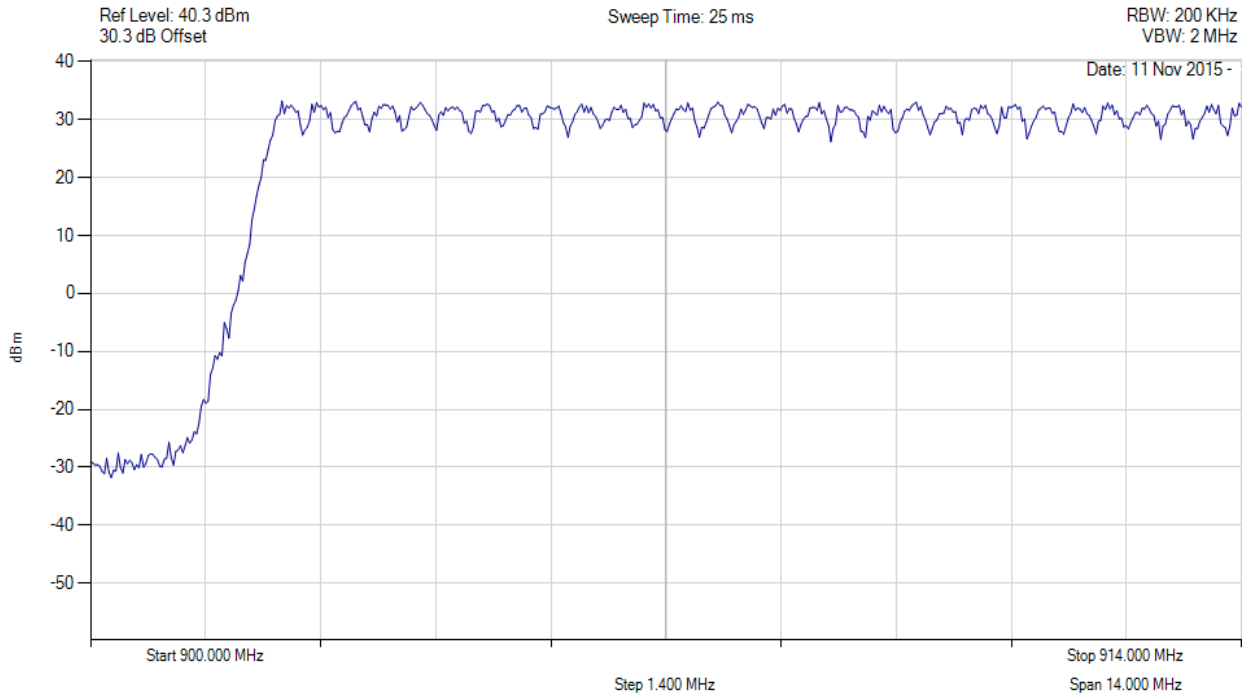


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 40 Trace Mode = VIEW		Channel Frequency: Hopping Number of Hops: 83

back to matrix

Hopping 902-914MHz

Variant: OFDM, Channel: Hopping, Chain a, Temp: Ambient, Voltage: 4 Vdc

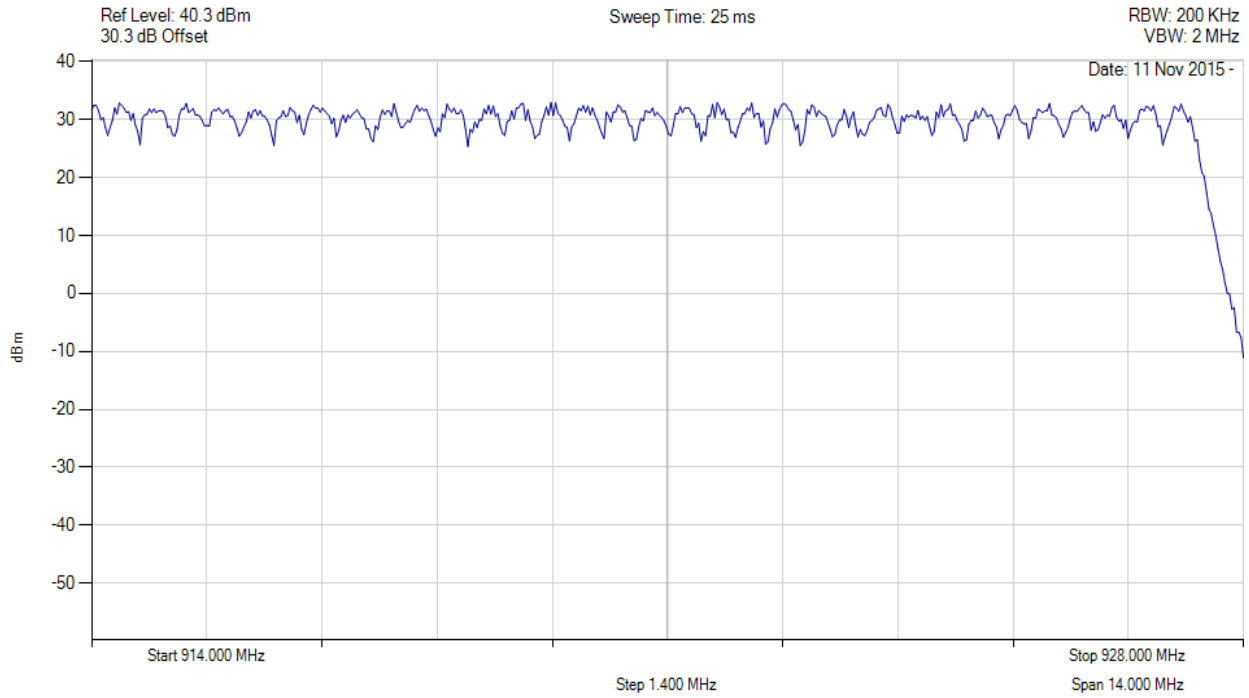


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 40 Trace Mode = VIEW		Channel Frequency: Hopping Number of Hops: 30

back to matrix

Hopping 914.00 – 928.00 MHz

Variant: OFDM, Channel: Hopping, Chain a, Temp: Ambient, Voltage: 4 Vdc

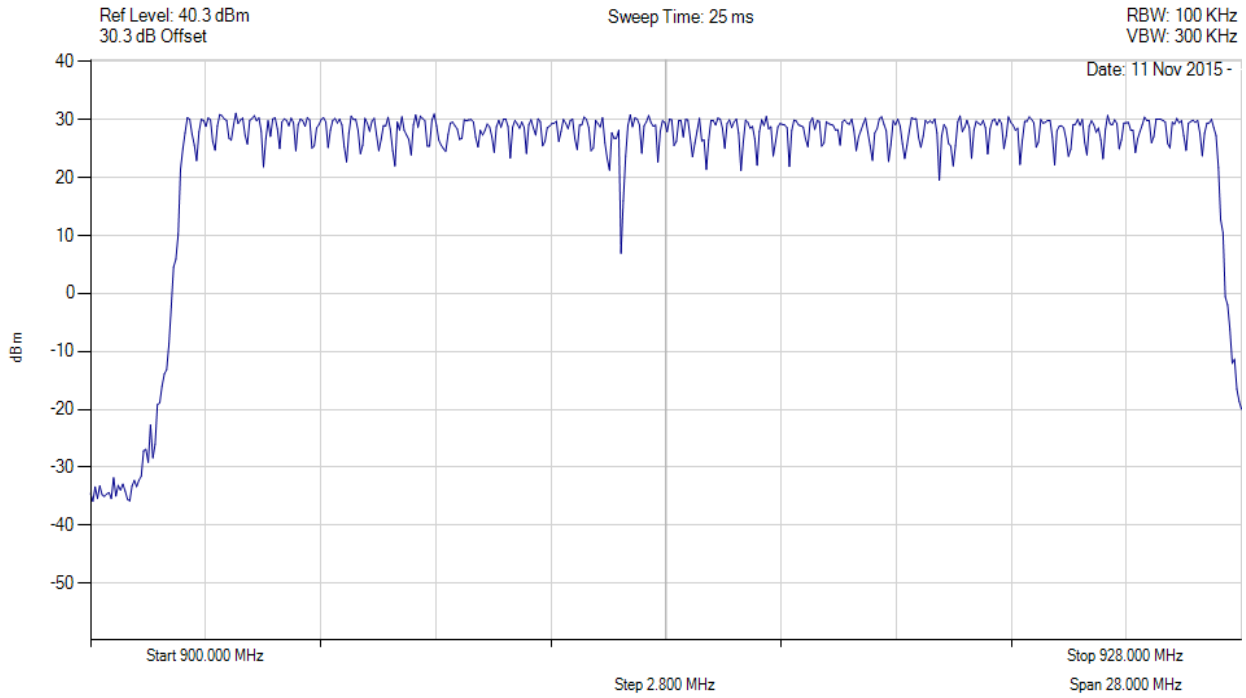


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 40 Trace Mode = VIEW		Channel Frequency: Hopping Number of Hops: 33

back to matrix

Number of Hopping Channels

Variant: OFDM, Channel: Hopping, Chain a, Temp: Ambient, Voltage: 4 Vdc



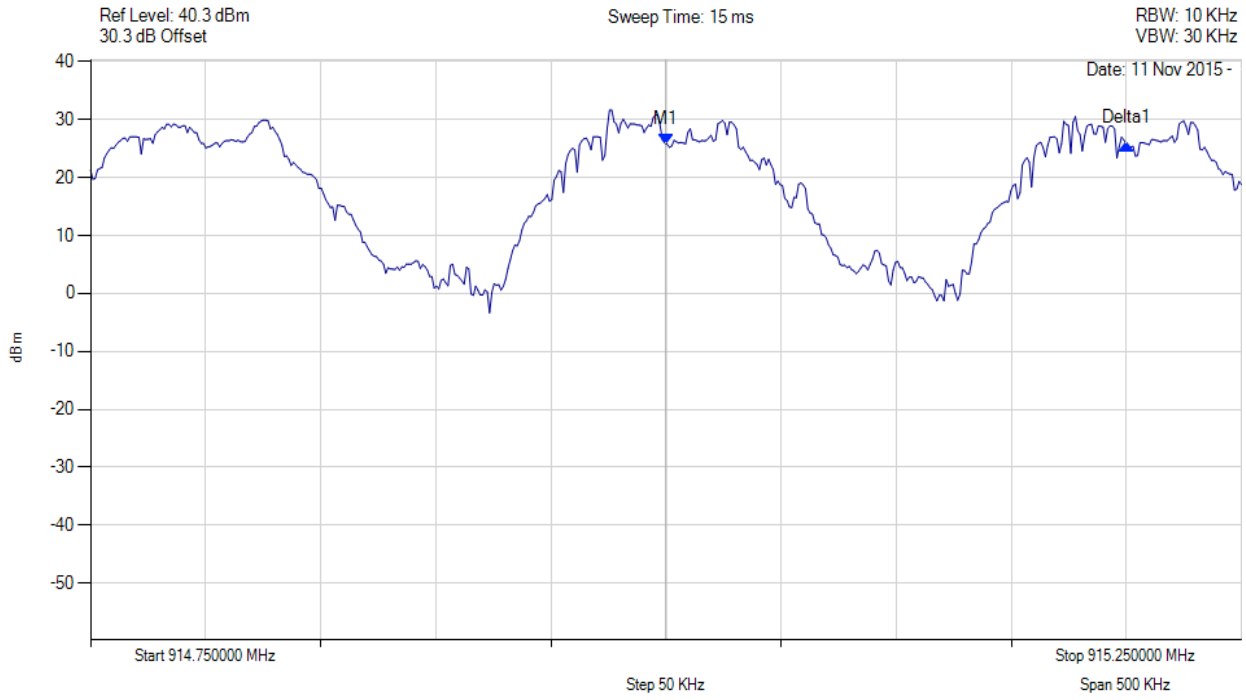
Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 40 Trace Mode = VIEW		Channel Frequency: Hopping Number of Hops: 63

back to matrix

A.4. Channel Spacing

Channel Separation

Variant: OQPSK, Channel: 915.00 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

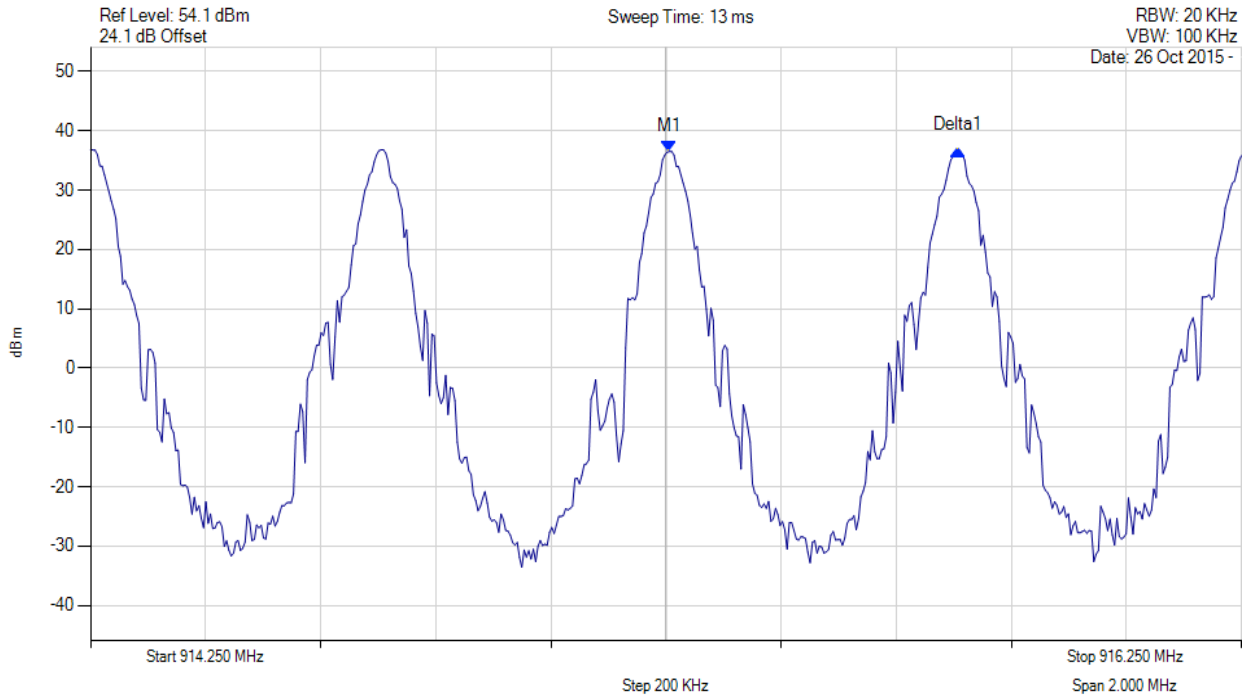


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 915.000 MHz : 25.726 dBm Delta1 : 200 KHz : 0.114 dB	Channel Frequency: 915.00 MHz Channel Separation: 0.200 MHz

back to matrix

Channel Separation

Variant: FSK, Channel: 915.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

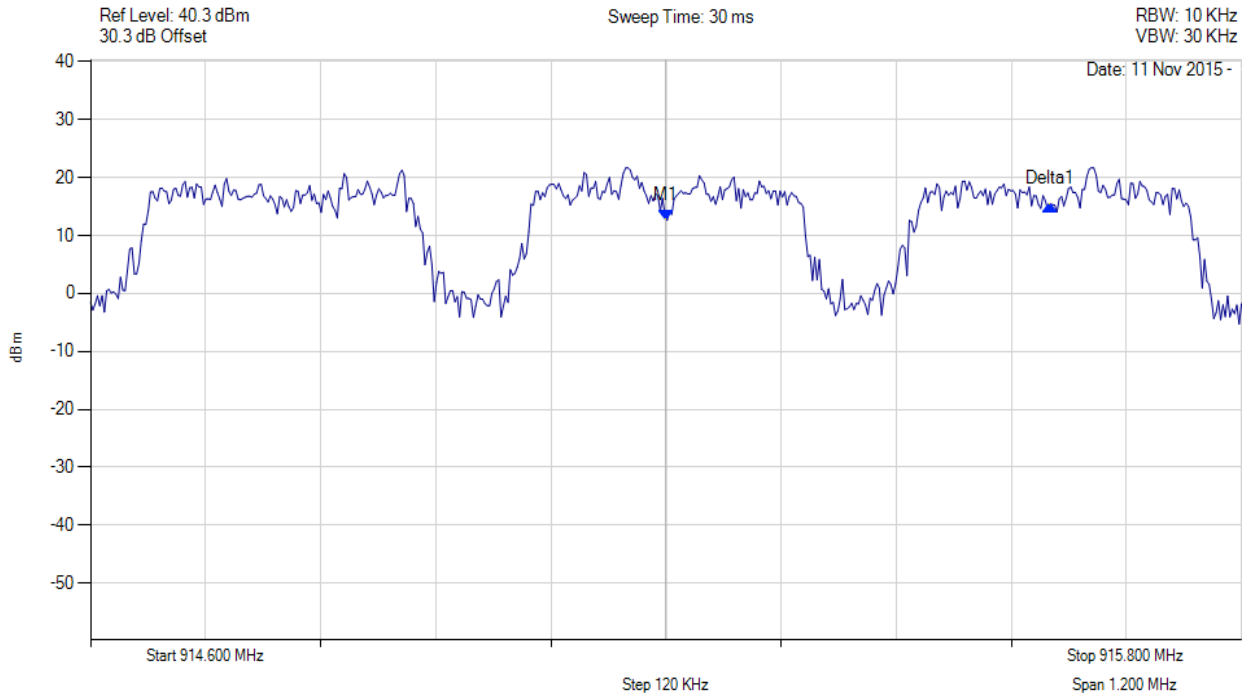


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 915.200 MHz : 31.455 dBm Delta1 : 302 KHz : 0.275 dB	Channel Frequency: 915.20 MHz Channel Separation: 0.300 MHz

back to matrix

Channel Separation

Variant: OFDM, Channel: 915.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



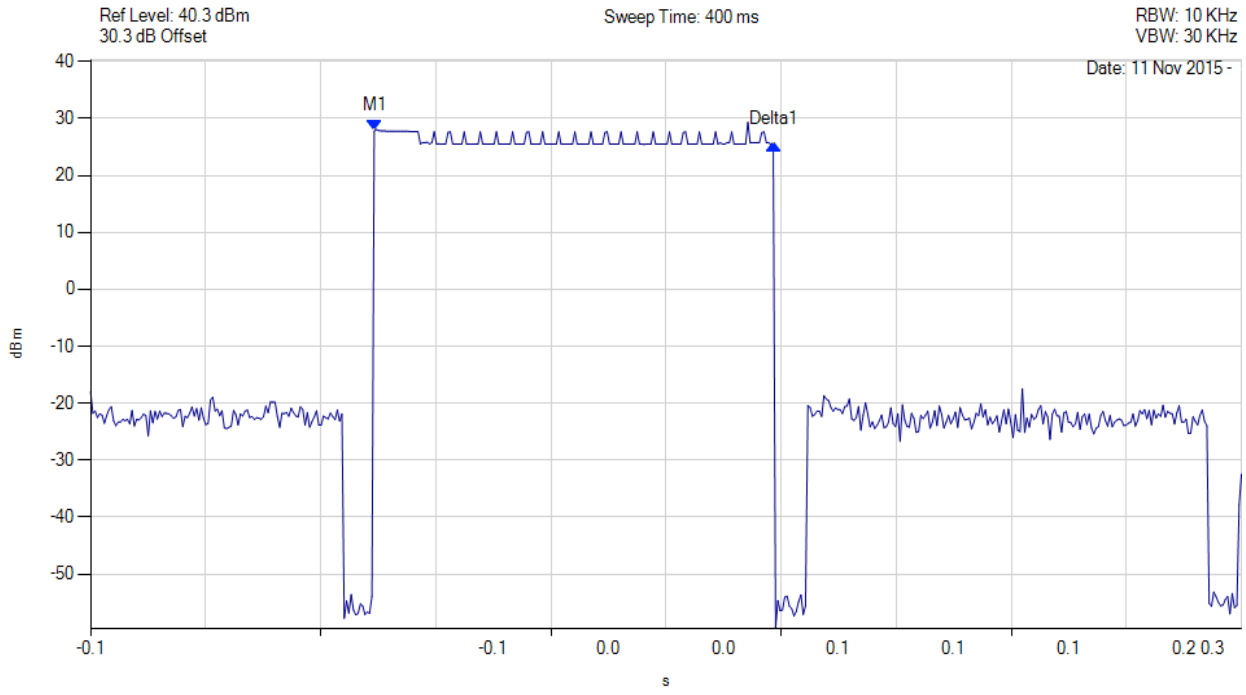
Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 915.200 MHz : 12.617 dBm Delta1 : 400 KHz : 2.731 dB	Channel Frequency: 915.20 MHz Channel Separation: 0.400 MHz

back to matrix

A.5. Dwell Time & Channel Occupancy

Dwell Time

Variant: OQPSK, , Channel: 915.00 MHz, Chain a, Temp: ambient, Voltage: 4 Vdc

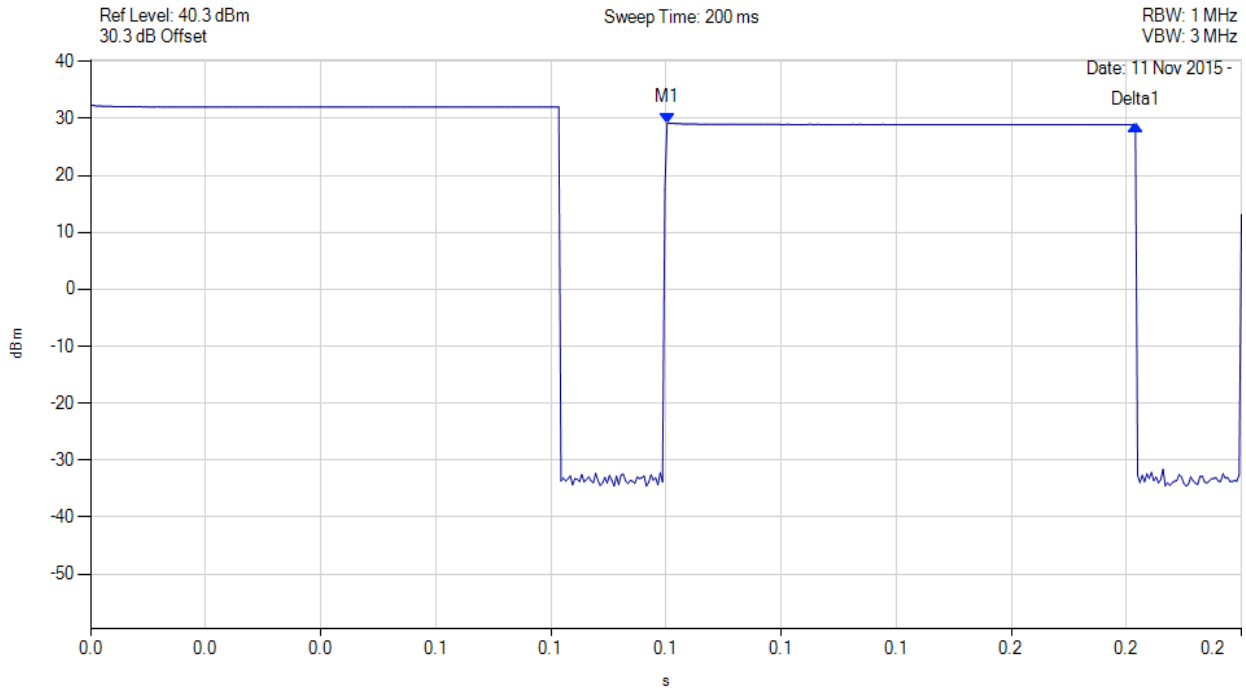


Analyser Setup	Marker:Time:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1(915.00 MHz) : -0.001 s : 27.790 dBm Delta1(915.00 MHz) : 0.139 s : -2.306 dB	Channel Frequency: 915.00 MHz Dwell Time: 0.139 s

back to matrix

Dwell Time

Variant: FSK, Channel: 915.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

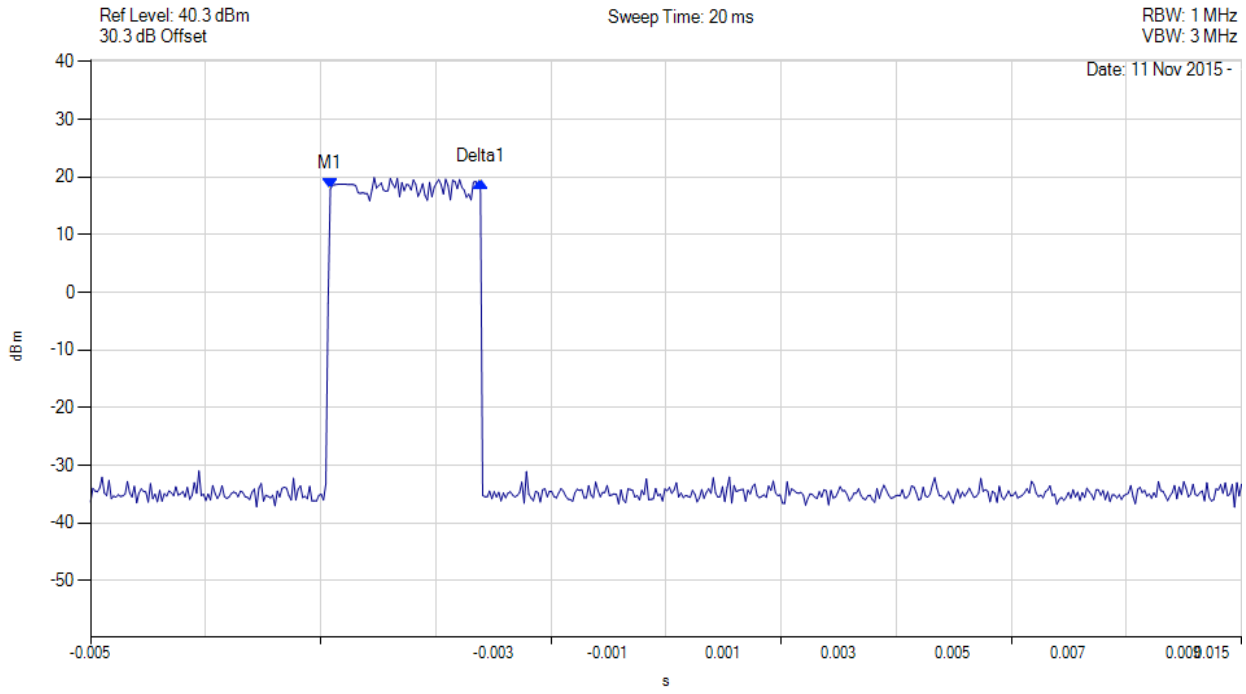


Analyser Setup	Marker:Time:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1(915.20 MHz) : 0.100 s : 29.236 dBm Delta1(915.20 MHz) : 0.081 s : -0.348 dB	Channel Frequency: 915.20 MHz Dwell Time: 0.081 s

back to matrix

Dwell Time

Variant: OFDM, Channel: 915.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

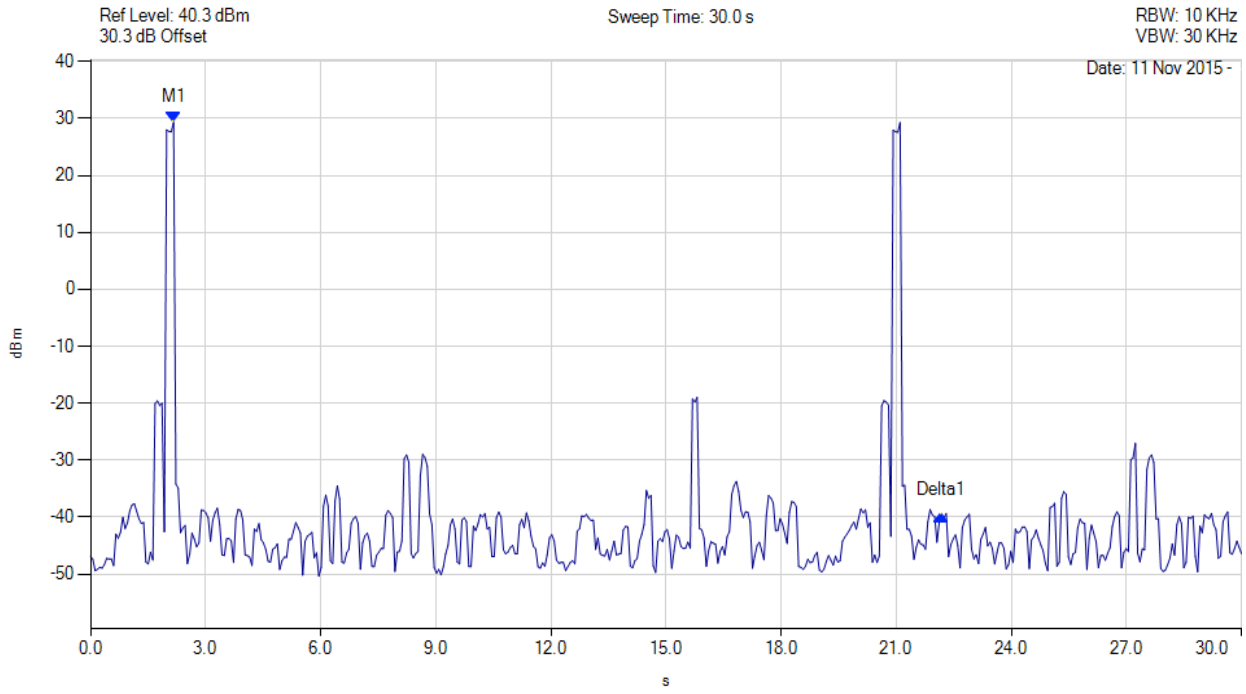


Analyser Setup	Marker:Time:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1(915.20 MHz) : -0.001 s : 17.919 dBm Delta1(915.20 MHz) : 0.003 s : 1.310 dB	Channel Frequency: 915.20 MHz Dwell Time: 0.003 s

back to matrix

Channel Occupancy

Variant: OQPSK, , Channel: 915.00 MHz, Chain a, Temp: ambient, Voltage: 4 Vdc

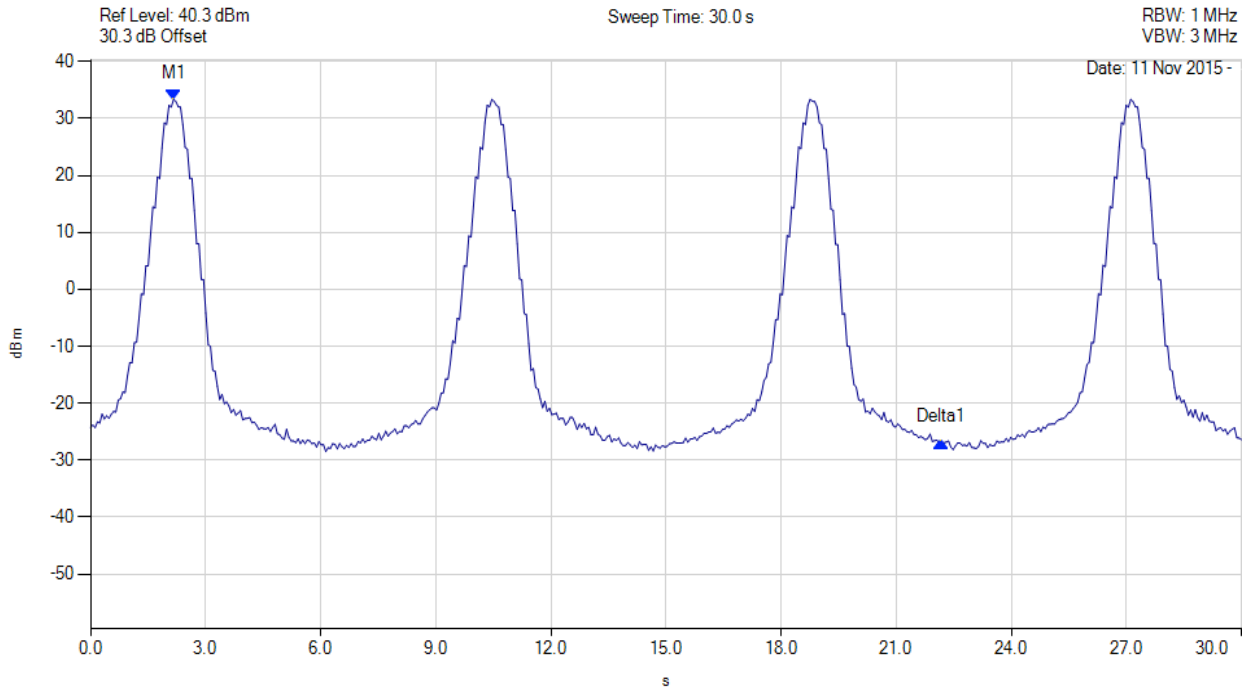


Analyser Setup	Marker:Time:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1(915.00 MHz) : 2.164 s : 29.324 dBm Delta1(915.00 MHz) : 20.000 s : -68.944 dB	Channel Frequency: 902.75 MHz Dwell Time: 139ms Occupancy: 278 ms Limit: 400ms/20s

back to matrix

Channel Occupancy

Variant: FSK, Channel: 915.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

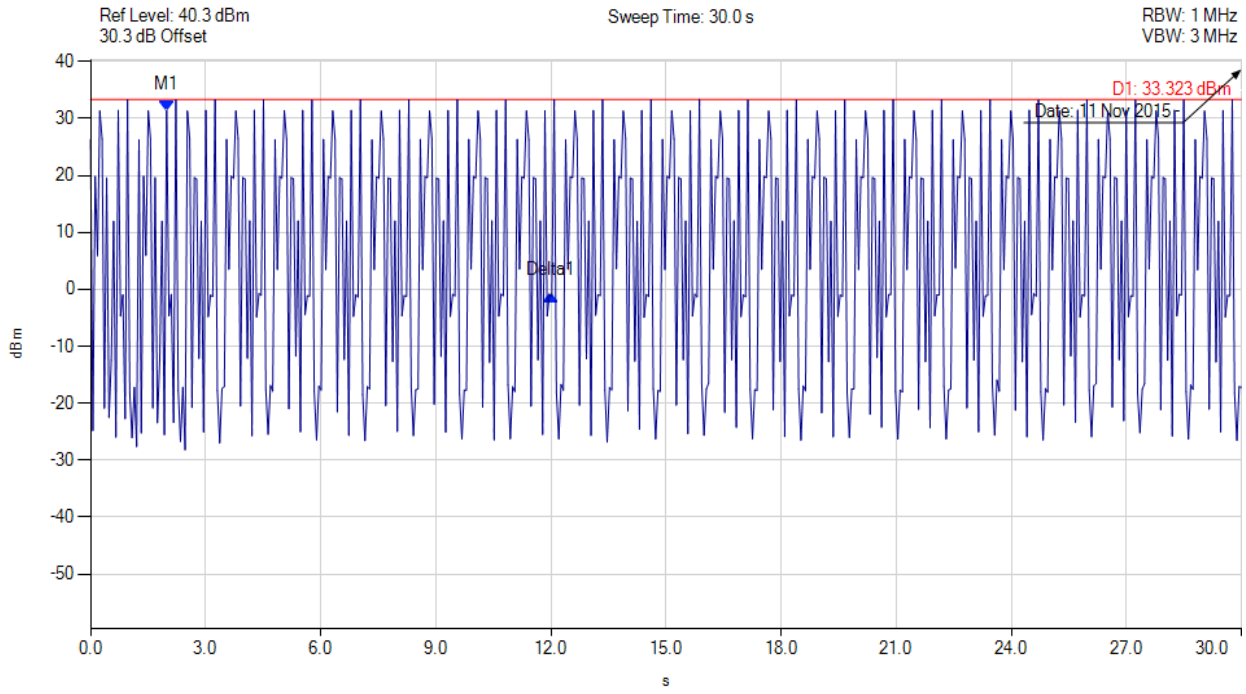


Analyser Setup	Marker:Time:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = MAX HOLD	M1(915.20 MHz) : 2.164 s : 33.371 dBm Delta1(915.20 MHz) : 20.000 s : -60.248 dB	Channel Frequency: 915.20 MHz Dwell Time: 81.00 ms Occupancy: 243.00 ms Limit: 400ms/20s

back to matrix

Channel Occupancy

Variant: OFDM, Channel: 915.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Time:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1(915.20 MHz) : 1.984 s : 31.404 dBm Delta1(915.20 MHz) : 10.000 s : -32.347 dB	Channel Frequency: 927.25 MHz Dwell Time: 3.00 ms Occupancy: 27.00 ms Limit:400ms/10s

back to matrix

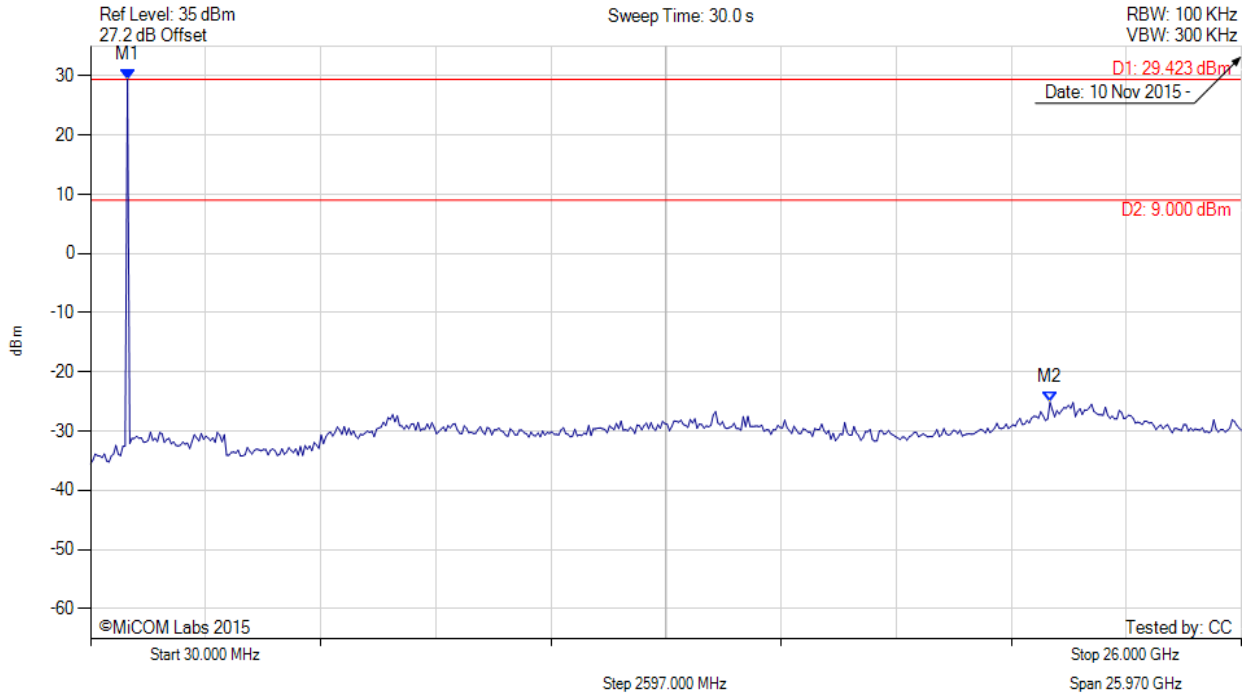
A.6. Emissions

A.6.1. Conducted Emissions

A.6.1.1. Conducted Spurious Emissions

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 300 FSK, Channel: 902.30 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

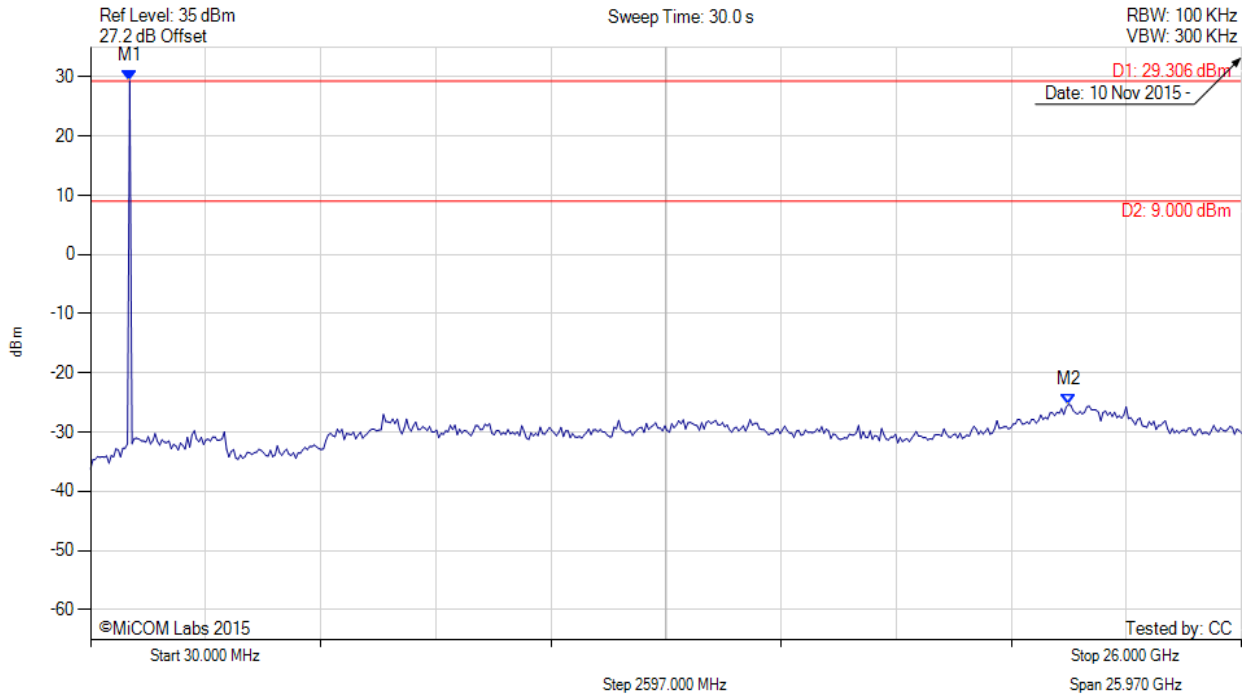


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 862.705 MHz : 29.423 dBm M2 : 21.680 GHz : -25.109 dBm	Limit: 9.00 dBm Margin: -34.11 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 300 FSK, Channel: 915.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

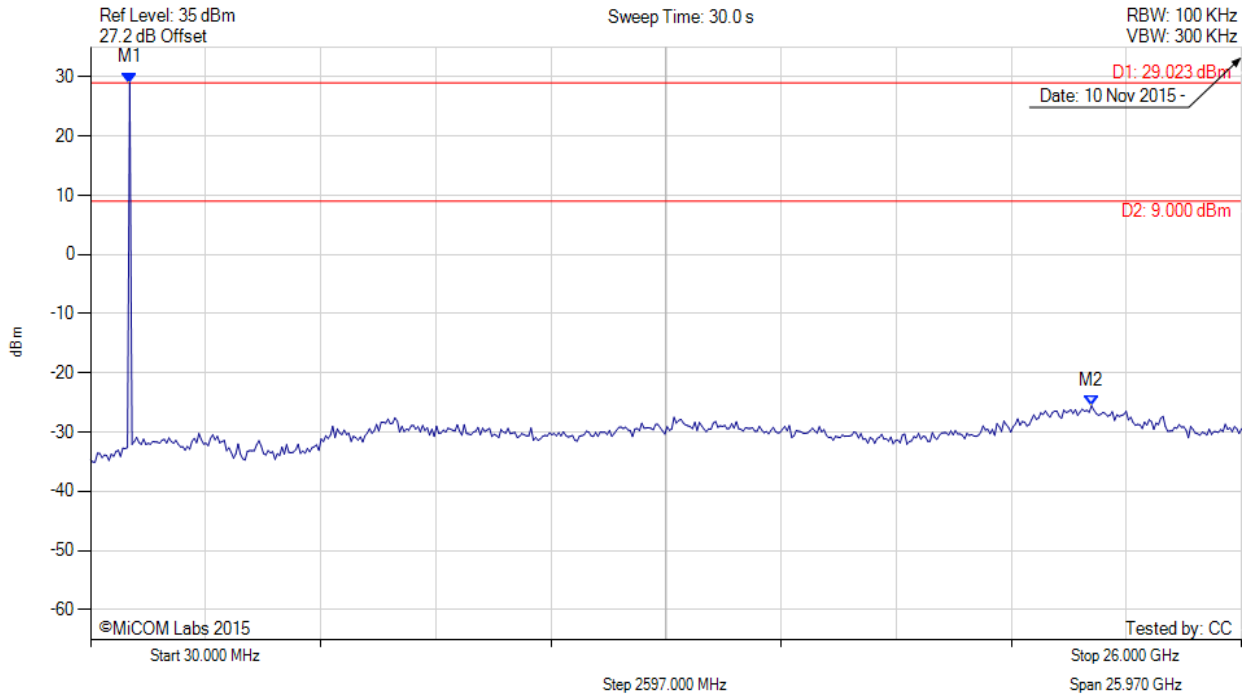


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 914.749 MHz : 29.306 dBm M2 : 22.097 GHz : -25.309 dBm	Limit: 9.00 dBm Margin: -34.31 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 300 FSK, Channel: 926.90 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

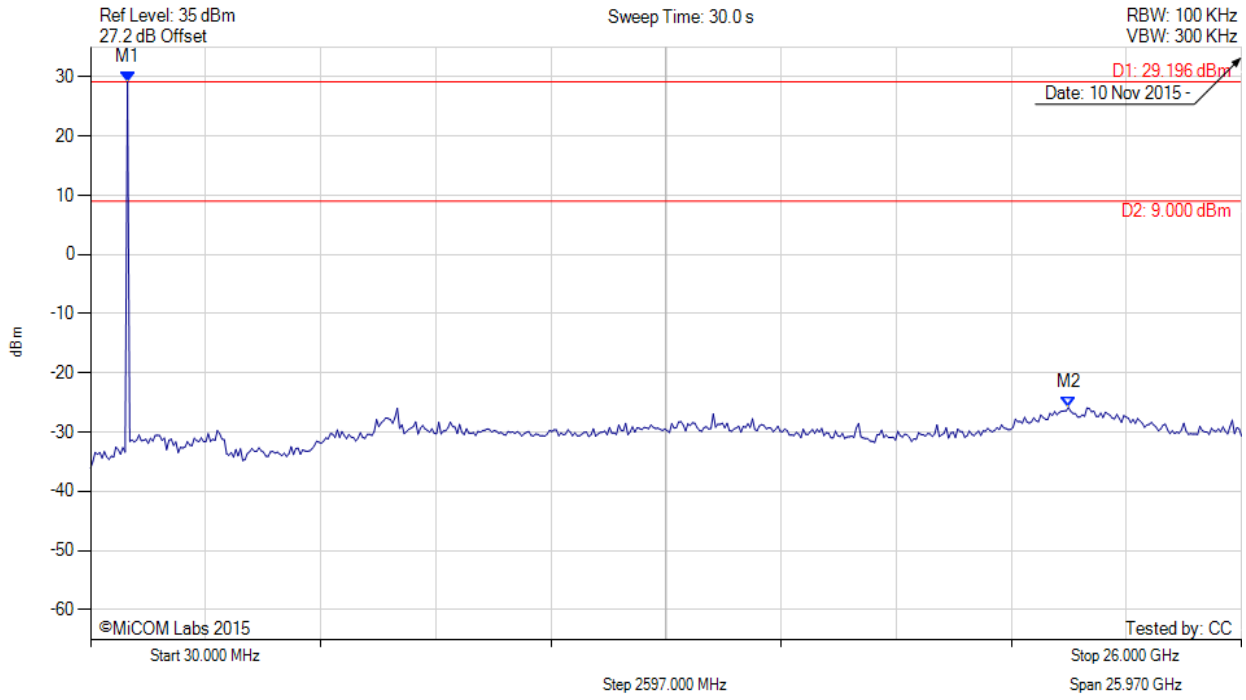


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 914.749 MHz : 29.023 dBm M2 : 22.617 GHz : -25.526 dBm	Limit: 9.00 dBm Margin: -34.53 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 300 GFSK, Channel: 902.30 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

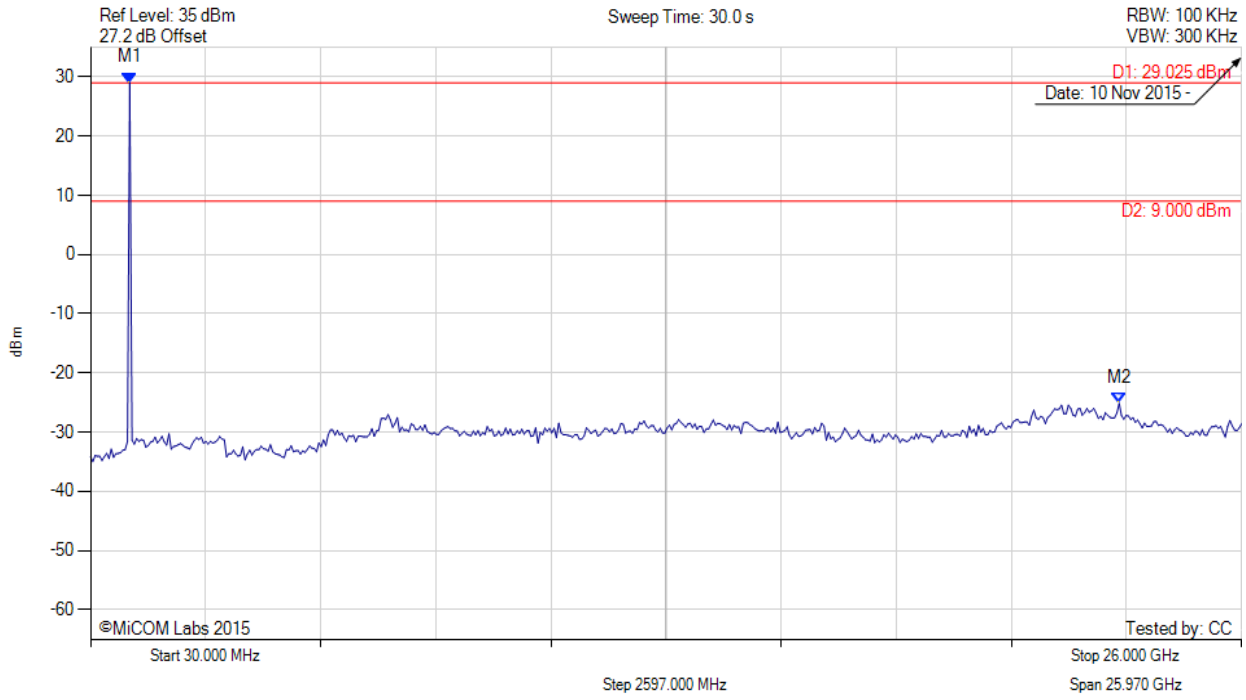


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 862.705 MHz : 29.196 dBm M2 : 22.097 GHz : -25.817 dBm	Limit: 9.00 dBm Margin: -34.82 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 300 GFSK, Channel: 915.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

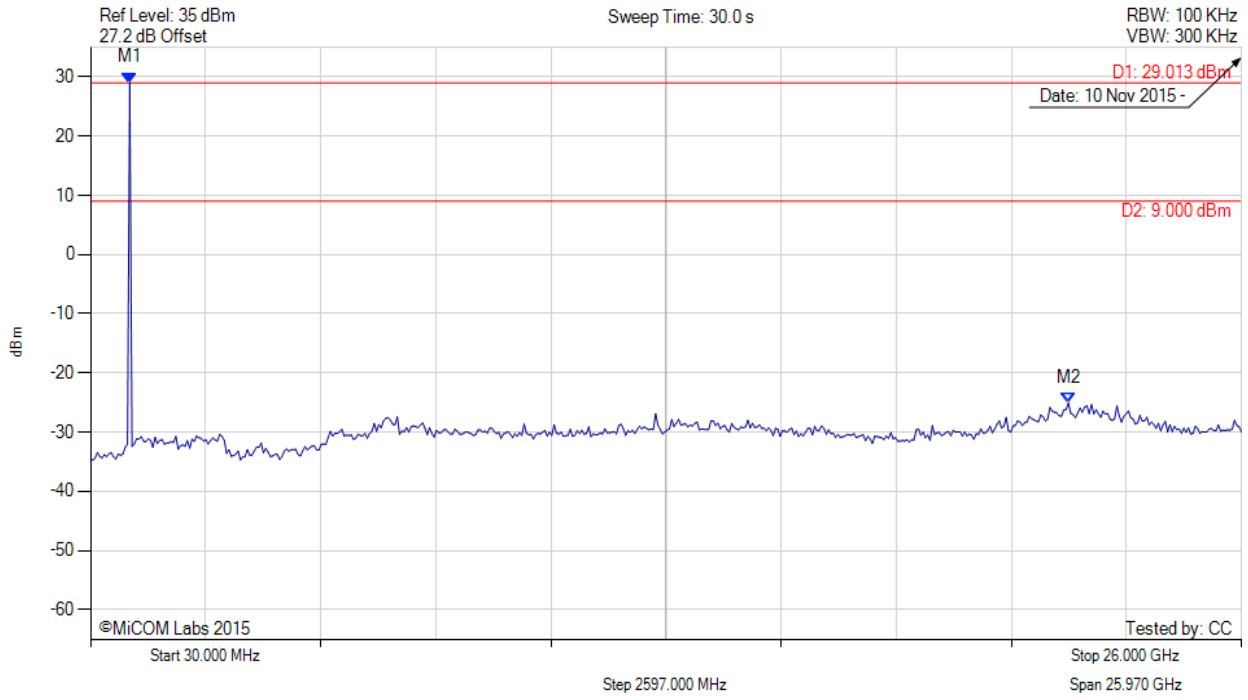


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 914.749 MHz : 29.025 dBm M2 : 23.242 GHz : -25.126 dBm	Limit: 9.00 dBm Margin: -34.13 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 300 GFSK, Channel: 926.90 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

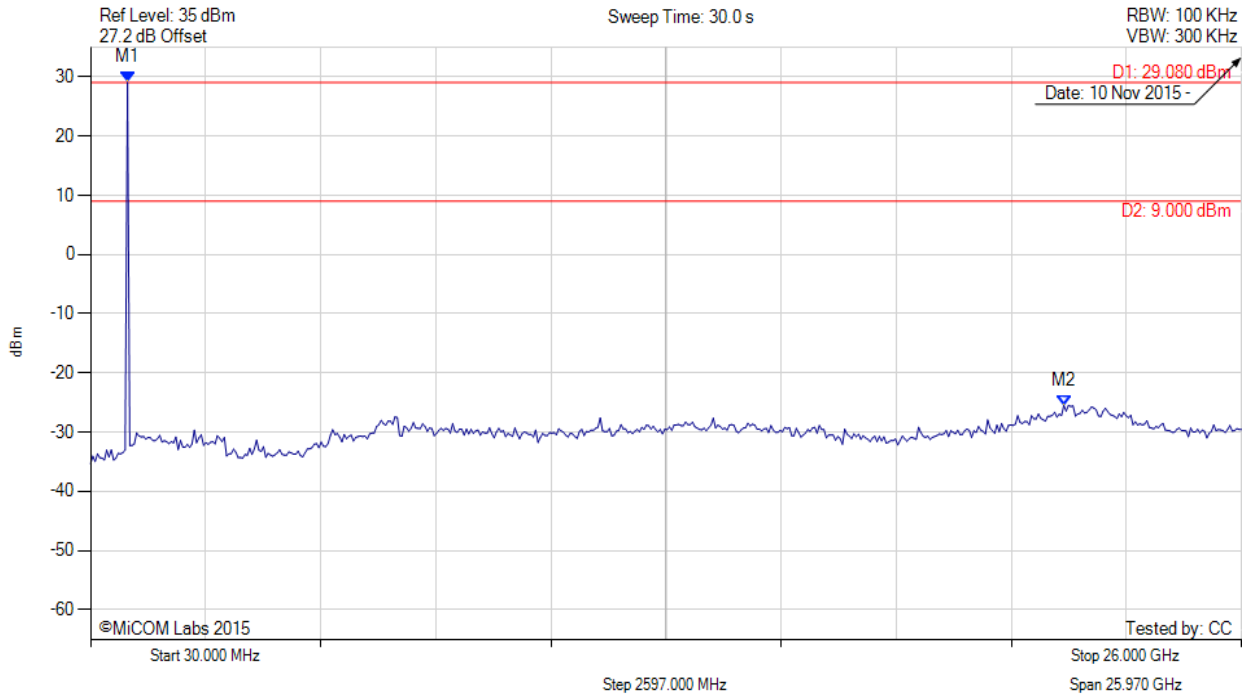


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 914.749 MHz : 29.013 dBm M2 : 22.097 GHz : -25.073 dBm	Limit: 9.00 dBm Margin: -34.07 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 300 GFSK, Channel: 902.30 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

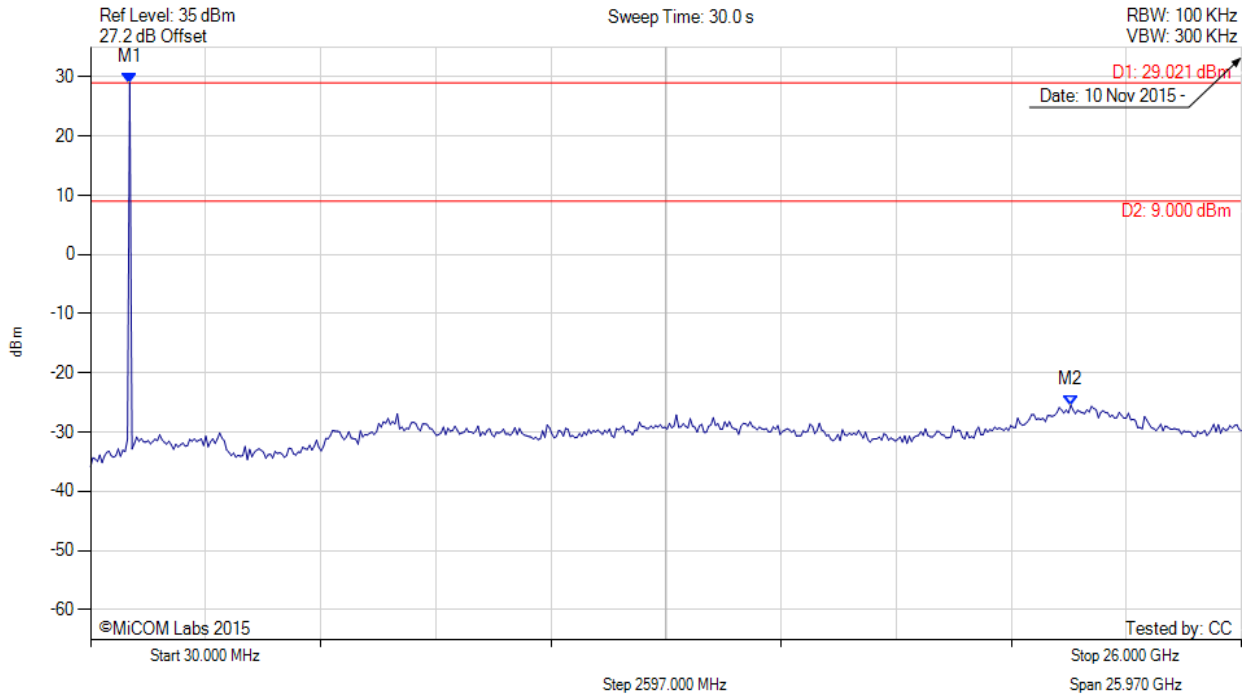


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 862.705 MHz : 29.080 dBm M2 : 21.993 GHz : -25.465 dBm	Limit: 9.00 dBm Margin: -34.47 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 300 GFSK, Channel: 915.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

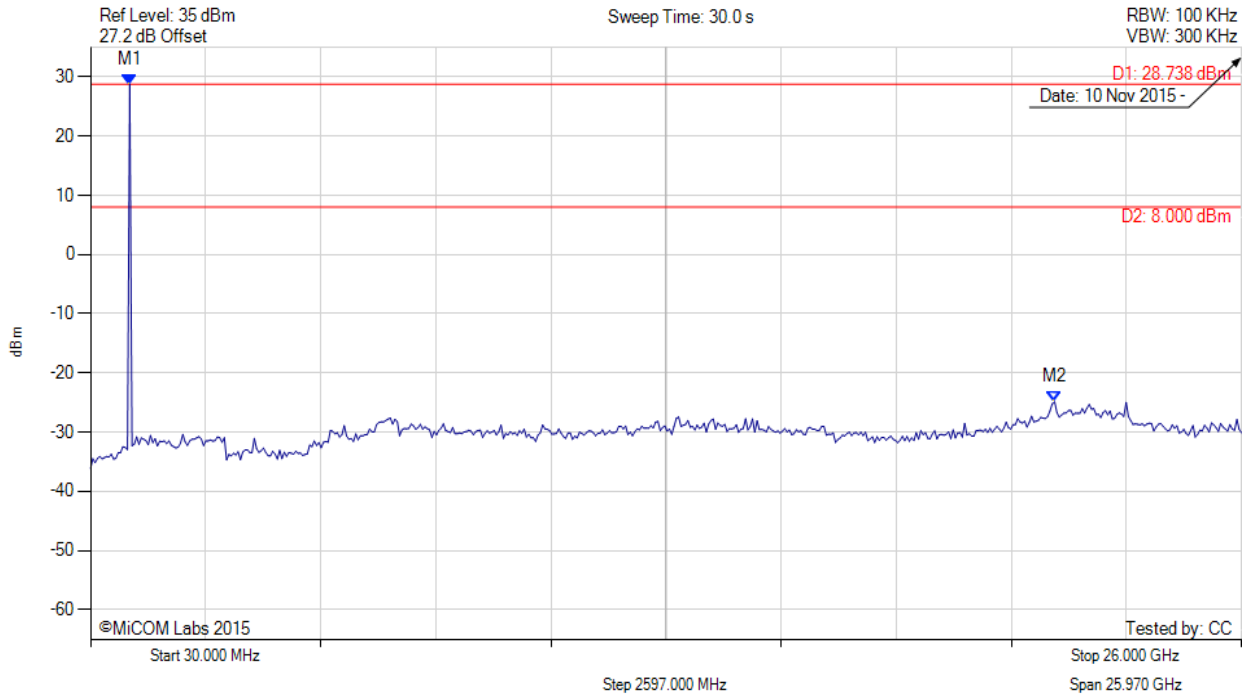


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 914.749 MHz : 29.021 dBm M2 : 22.149 GHz : -25.433 dBm	Limit: 9.00 dBm Margin: -34.43 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 300 GFSK, Channel: 926.90 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

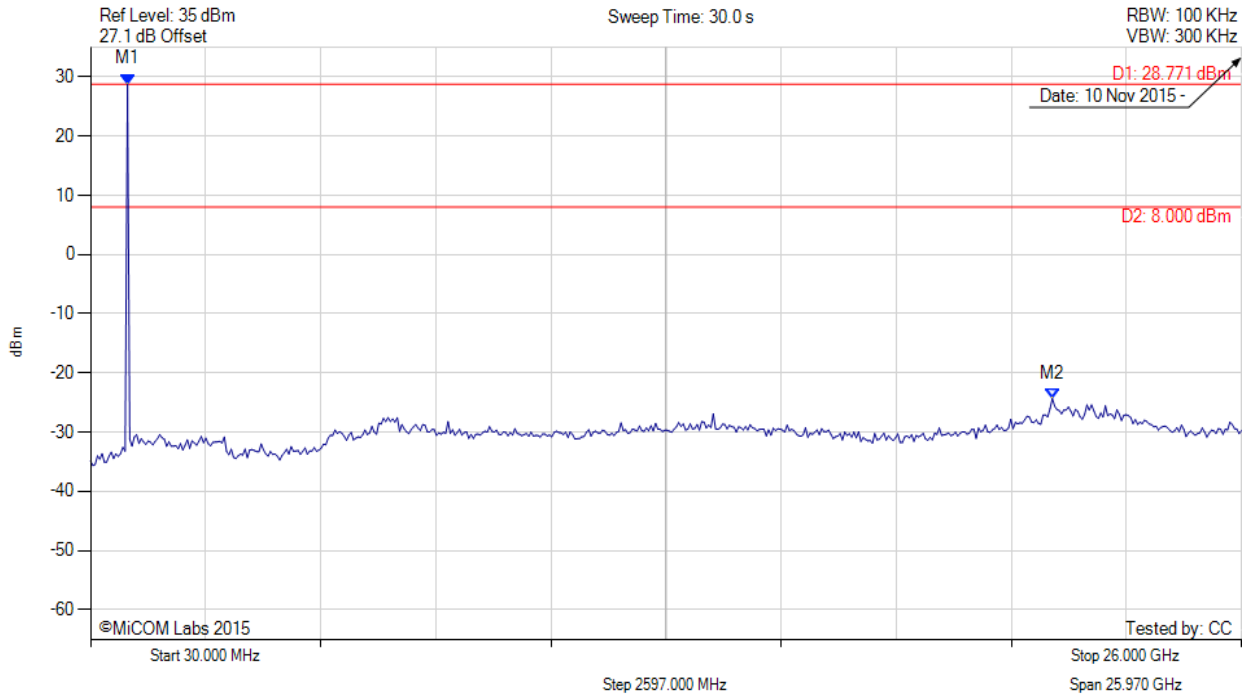


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 914.749 MHz : 28.738 dBm M2 : 21.784 GHz : -24.882 dBm	Limit: 8.00 dBm Margin: -32.88 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 400 FSK, Channel: 902.40 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

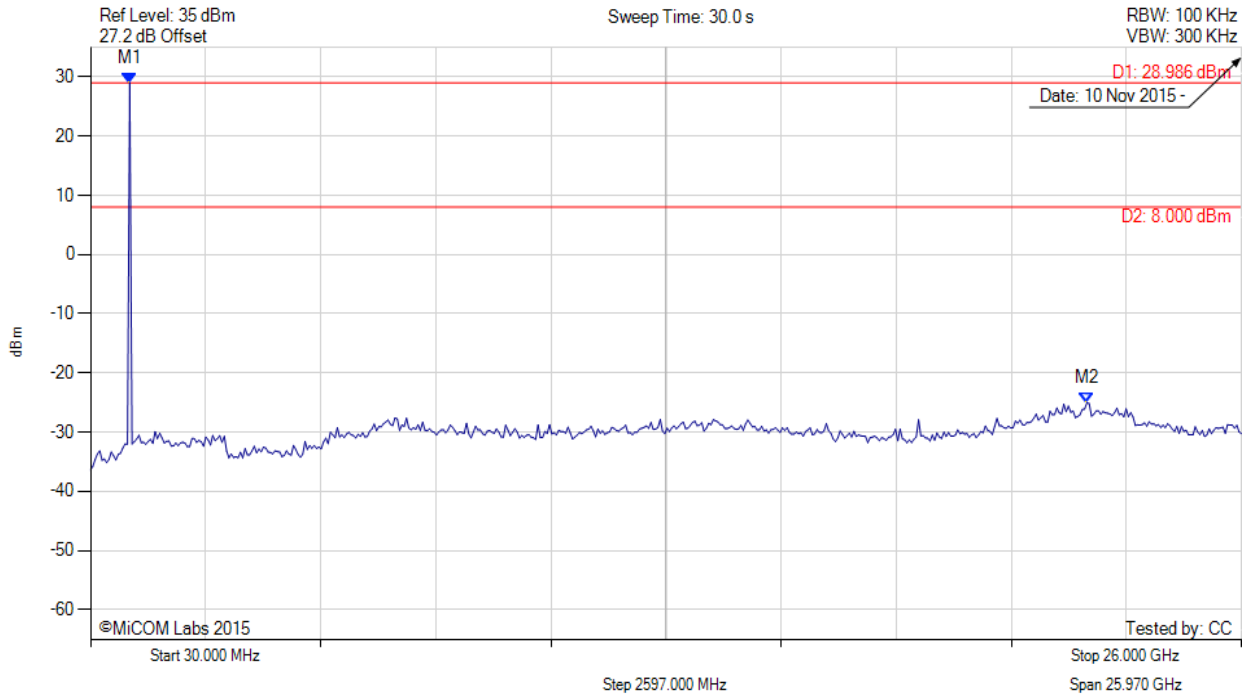


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 862.705 MHz : 28.771 dBm M2 : 21.732 GHz : -24.304 dBm	Limit: 8.00 dBm Margin: -32.30 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 400 FSK, Channel: 915.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

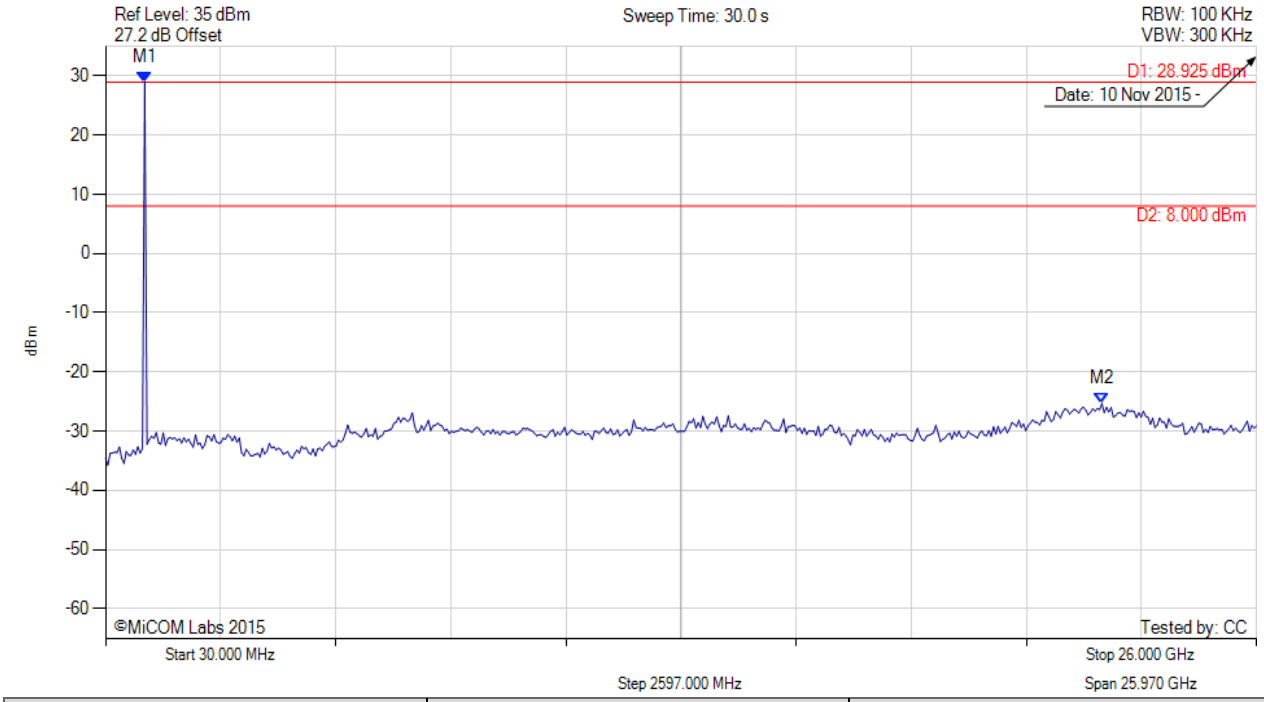


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 914.749 MHz : 28.986 dBm M2 : 22.513 GHz : -25.026 dBm	Limit: 8.00 dBm Margin: -33.03 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 400 FSK, Channel: 927.60 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

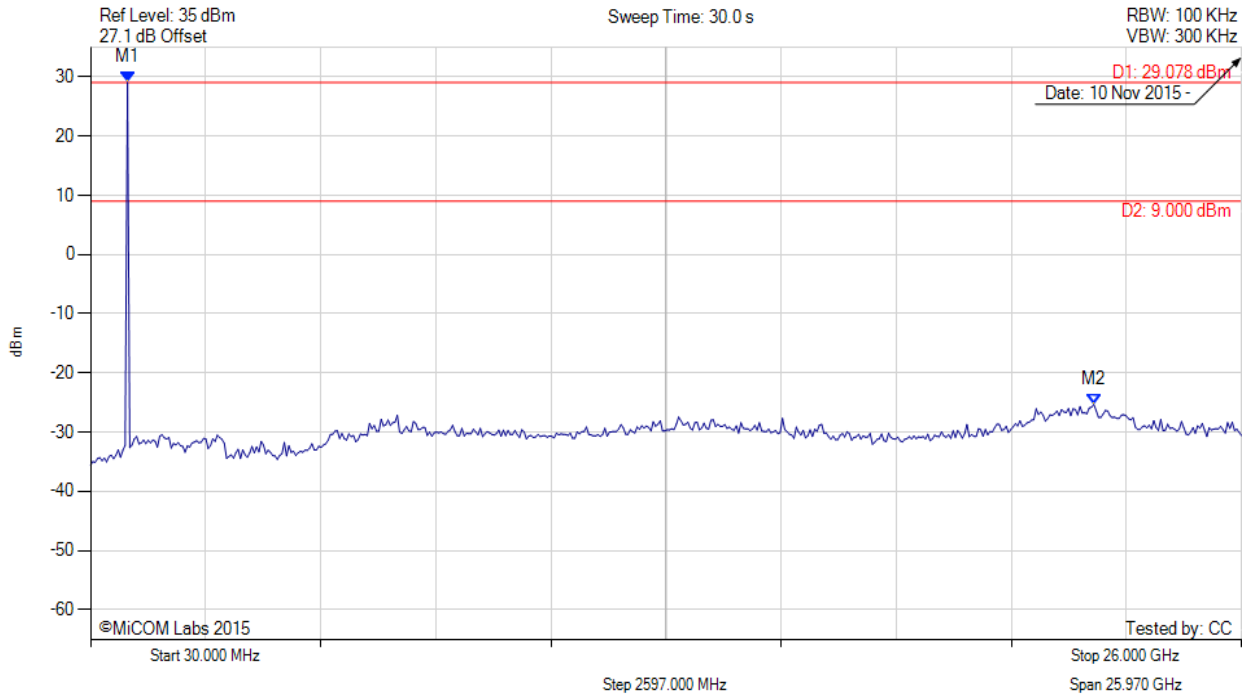


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 914.749 MHz : 28.925 dBm M2 : 22.513 GHz : -25.337 dBm	Limit: 8.00 dBm Margin: -33.34 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 400 GFSK, Channel: 902.40 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

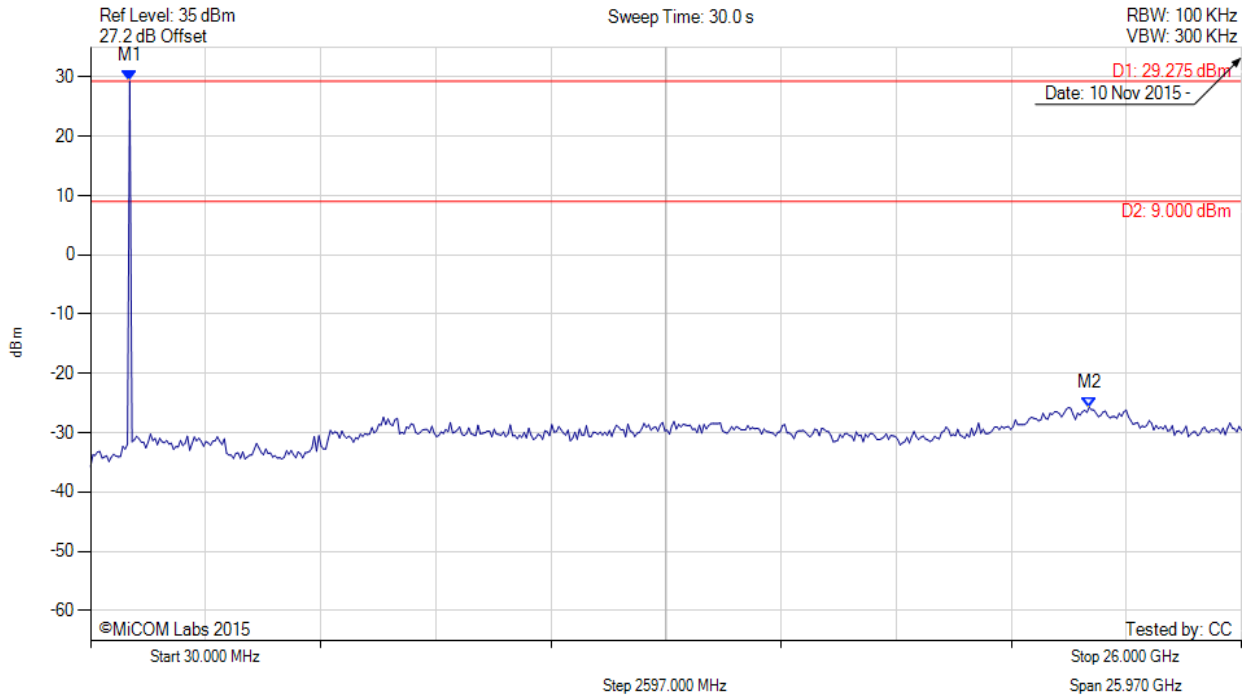


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 862.705 MHz : 29.078 dBm M2 : 22.669 GHz : -25.296 dBm	Limit: 9.00 dBm Margin: -34.30 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 400 GFSK, Channel: 915.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

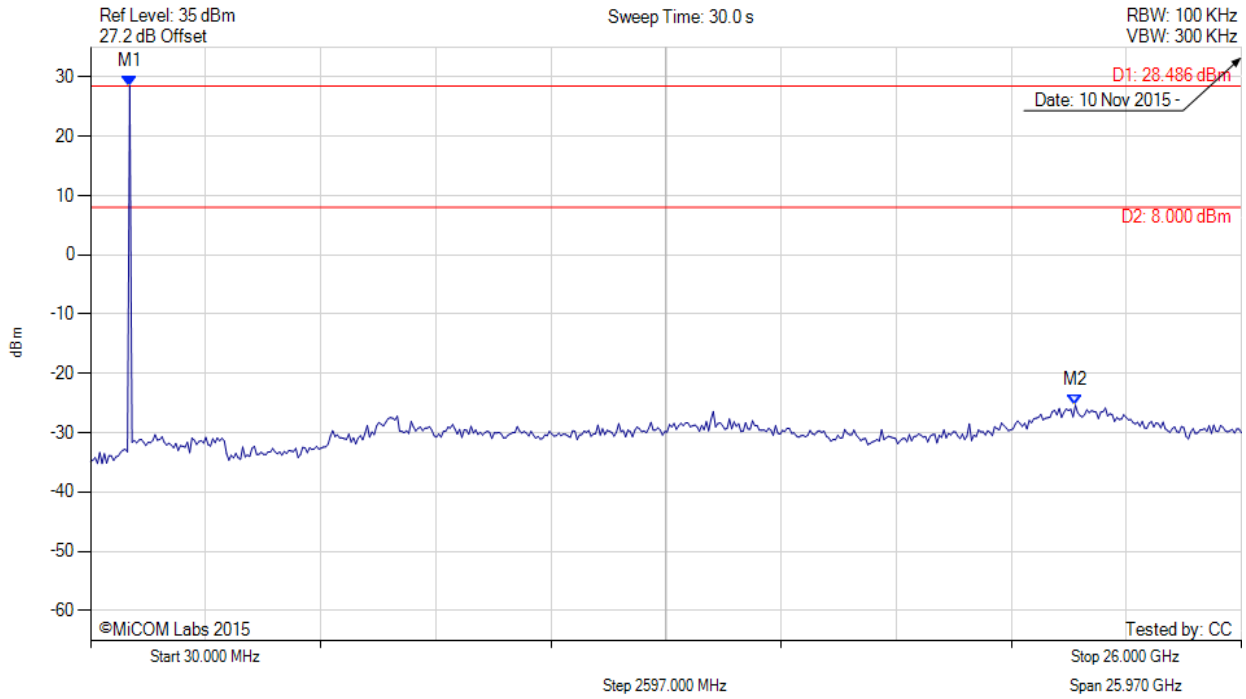


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 914.749 MHz : 29.275 dBm M2 : 22.565 GHz : -25.701 dBm	Limit: 9.00 dBm Margin: -34.70 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 400 GFSK, Channel: 927.60 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

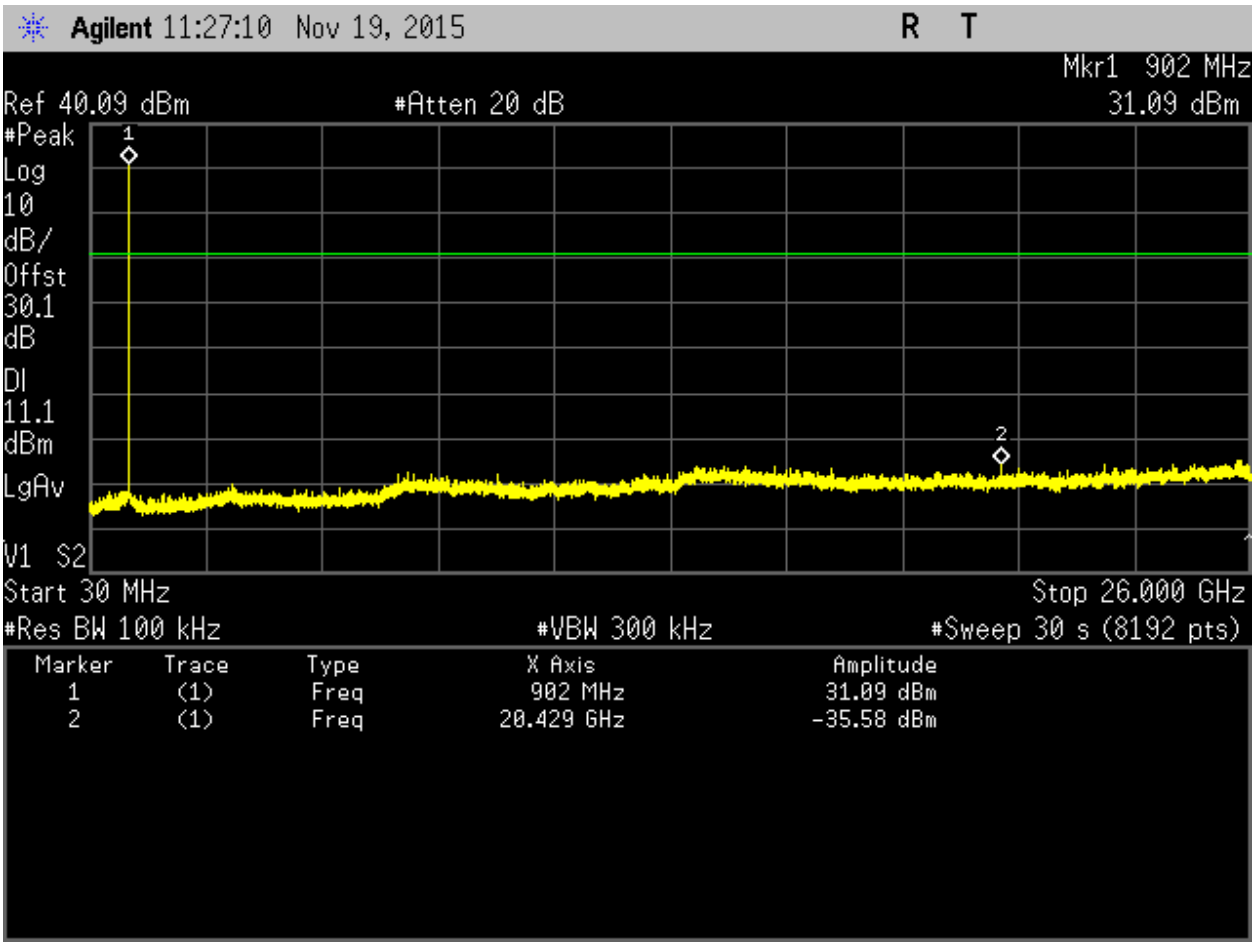


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 914.749 MHz : 28.486 dBm M2 : 22.253 GHz : -25.351 dBm	Limit: 8.00 dBm Margin: -33.35 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 200 2FSK, Channel: 902.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

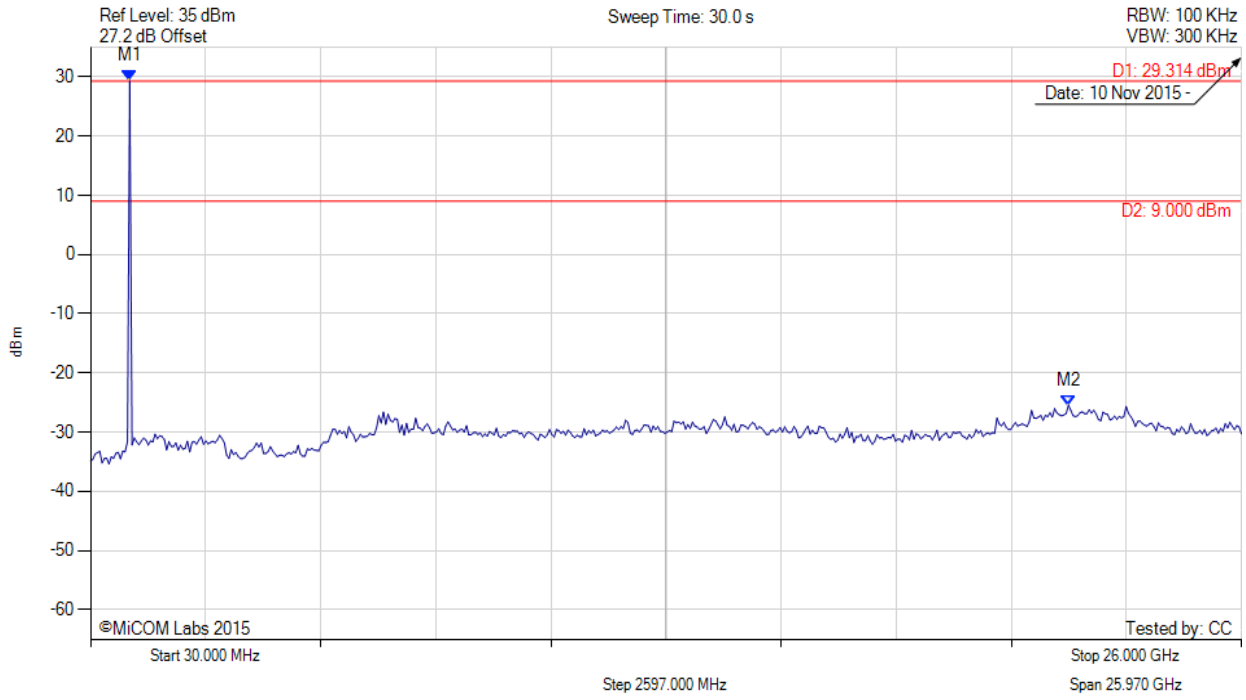


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 902.000 MHz : 31.090 dBm M2 : 20.429 GHz : -35.580 dBm	Limit: 11.09 dBm Margin: -46.67 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 200 2FSK, Channel: 915.00 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

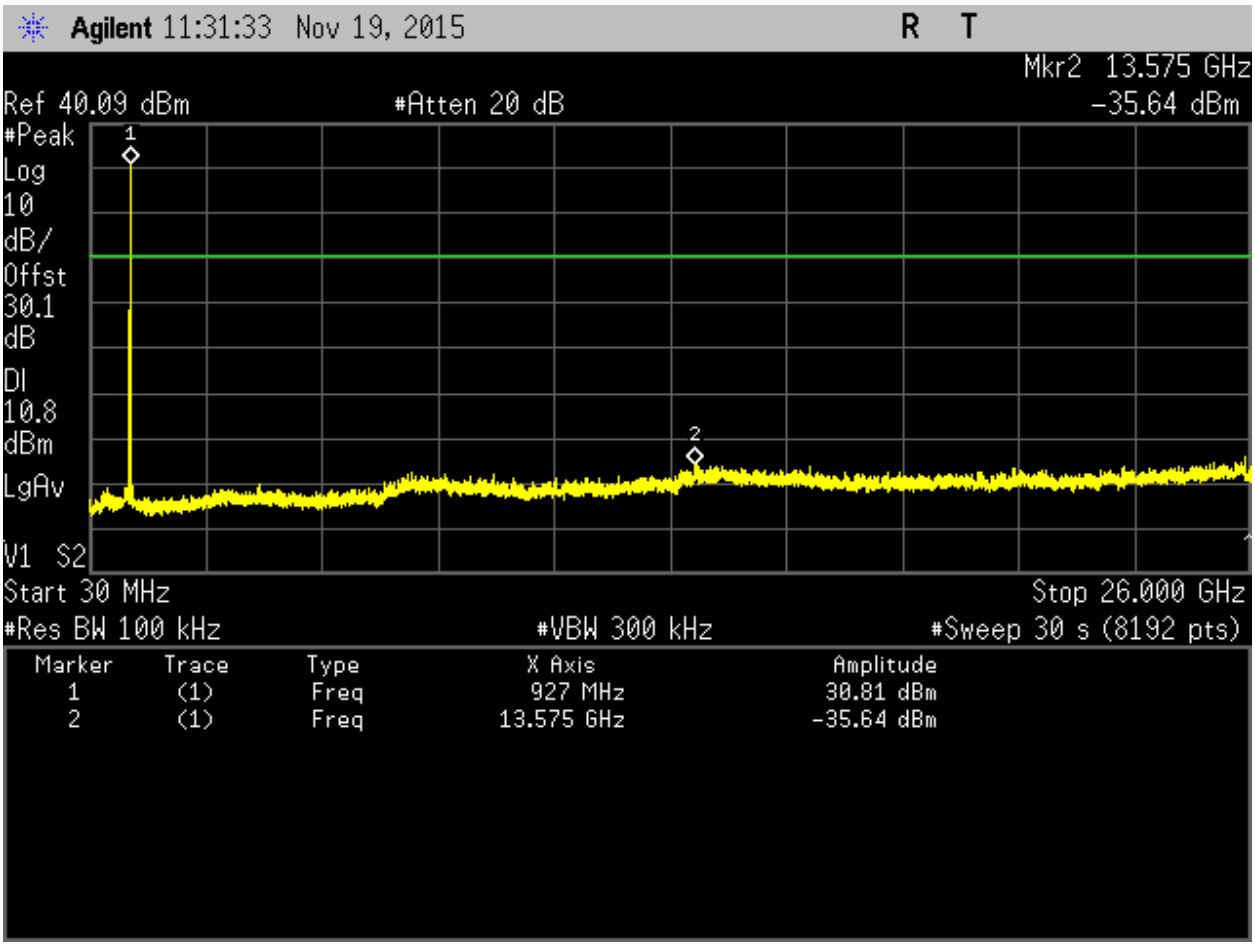


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 914.749 MHz : 29.314 dBm M2 : 22.097 GHz : -25.478 dBm	Limit: 9.00 dBm Margin: -34.48 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 200 2FSK, Channel: 927.80 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

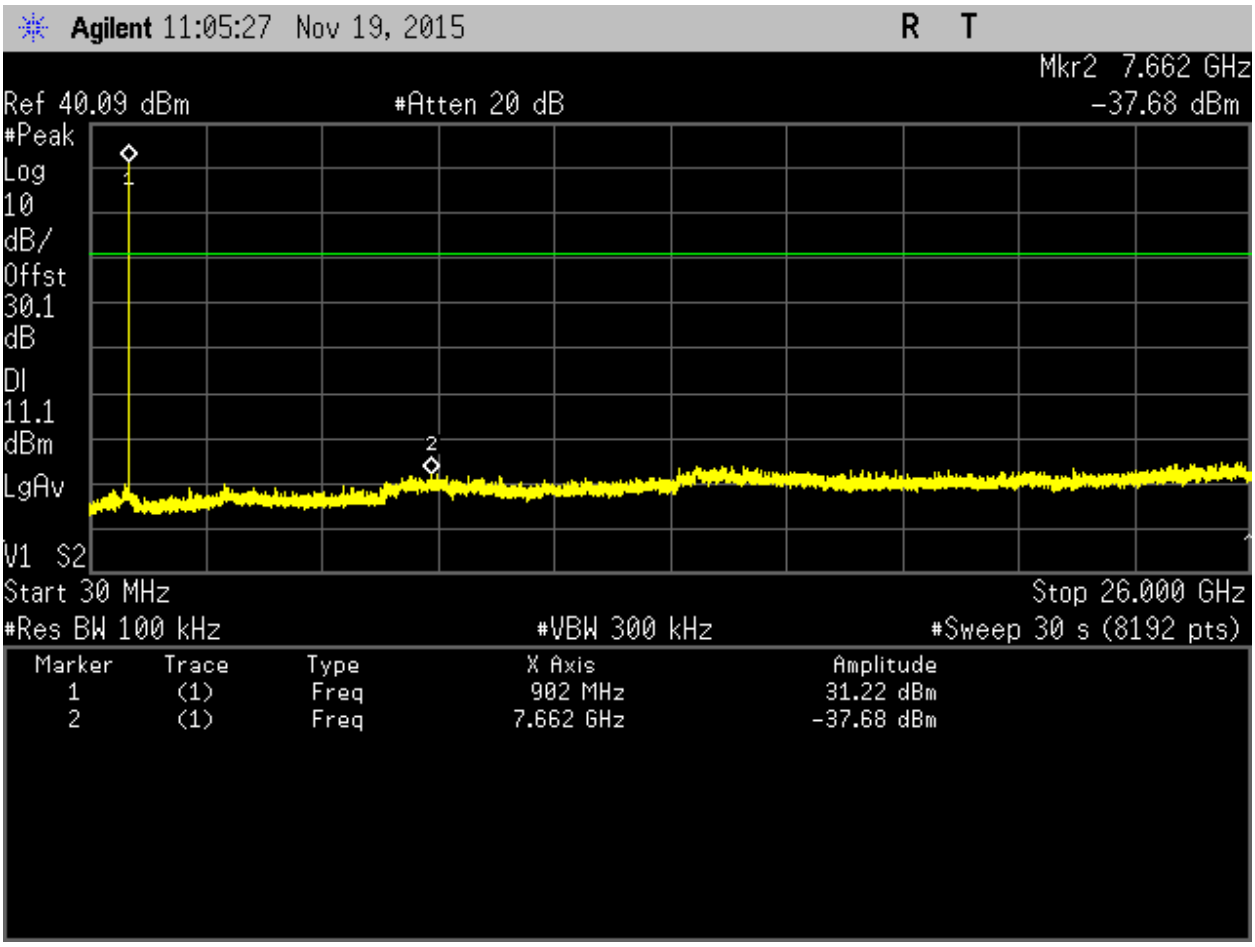


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 927.000 MHz : 30.810 dBm M2 : 13.575 GHz : -35.640 dBm	Limit: 10.81 dBm Margin: -46.45 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 200 OQPSK, Channel: 902.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

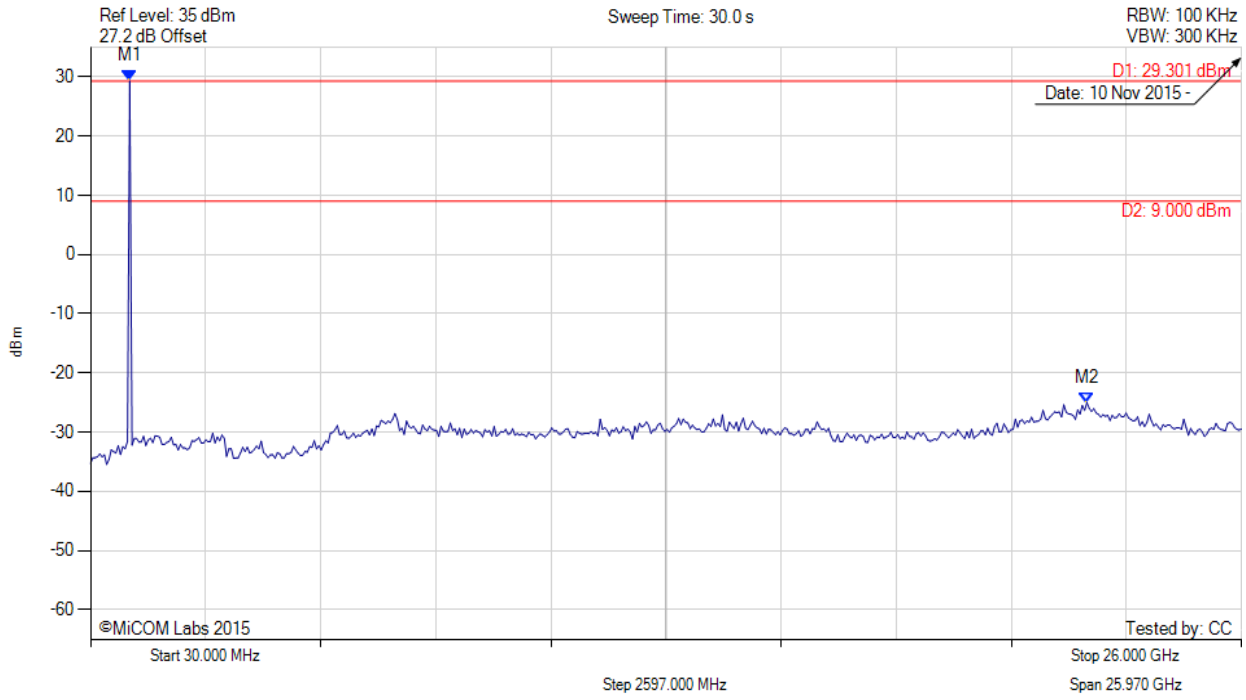


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 902.000 MHz : 31.220 dBm M2 : 7.662 GHz : -37.680 dBm	Limit: 11.22 dBm Margin: -48.90 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 200 OQPSK, Channel: 915.00 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

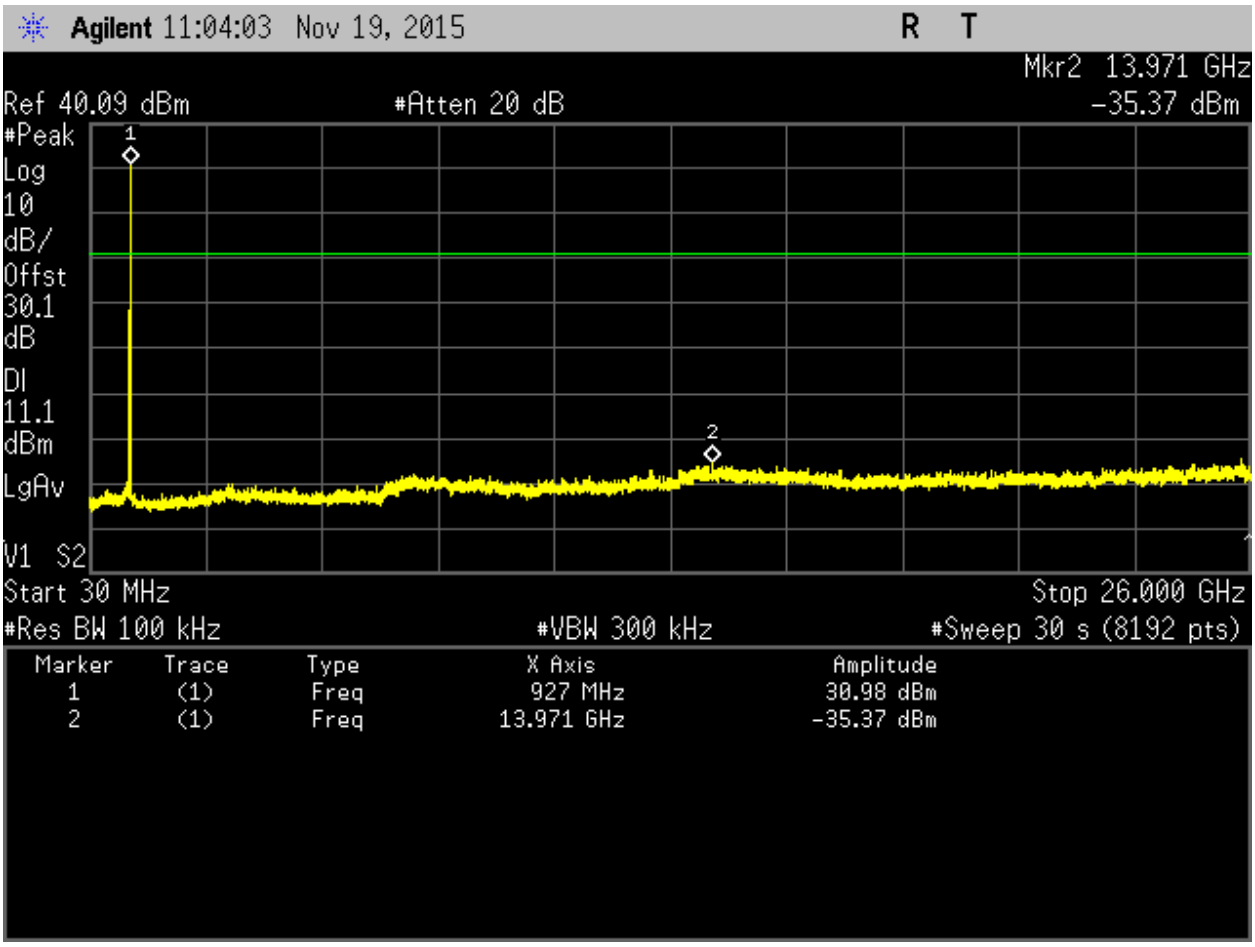


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 914.749 MHz : 29.301 dBm M2 : 22.513 GHz : -25.016 dBm	Limit: 9.00 dBm Margin: -34.02 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 200 OQPSK, Channel: 927.80 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

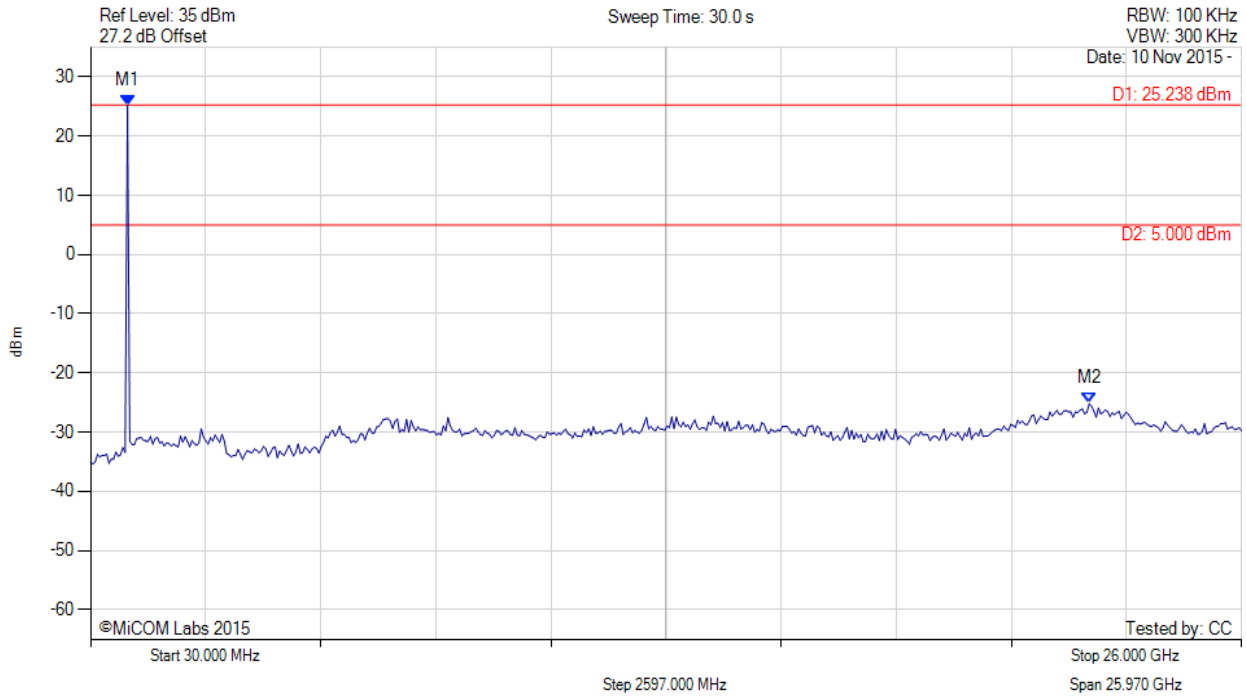


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 927.000 MHz : 30.980 dBm M2 : 13.971 GHz : -35.370 dBm	Limit: 10.98 dBm Margin: -46.35 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 400 OFDM, Channel: 902.40 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

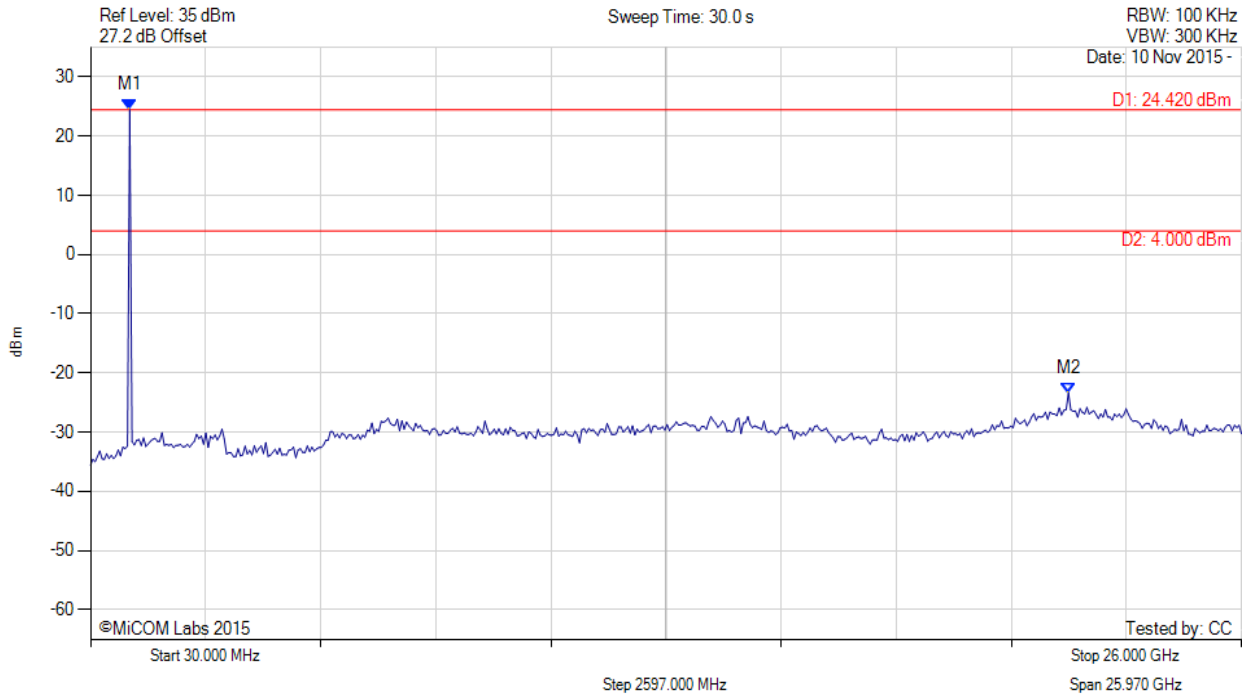


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 862.705 MHz : 25.238 dBm M2 : 22.565 GHz : -25.183 dBm	Limit: 5.00 dBm Margin: -30.18 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 400 OFDM, Channel: 915.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

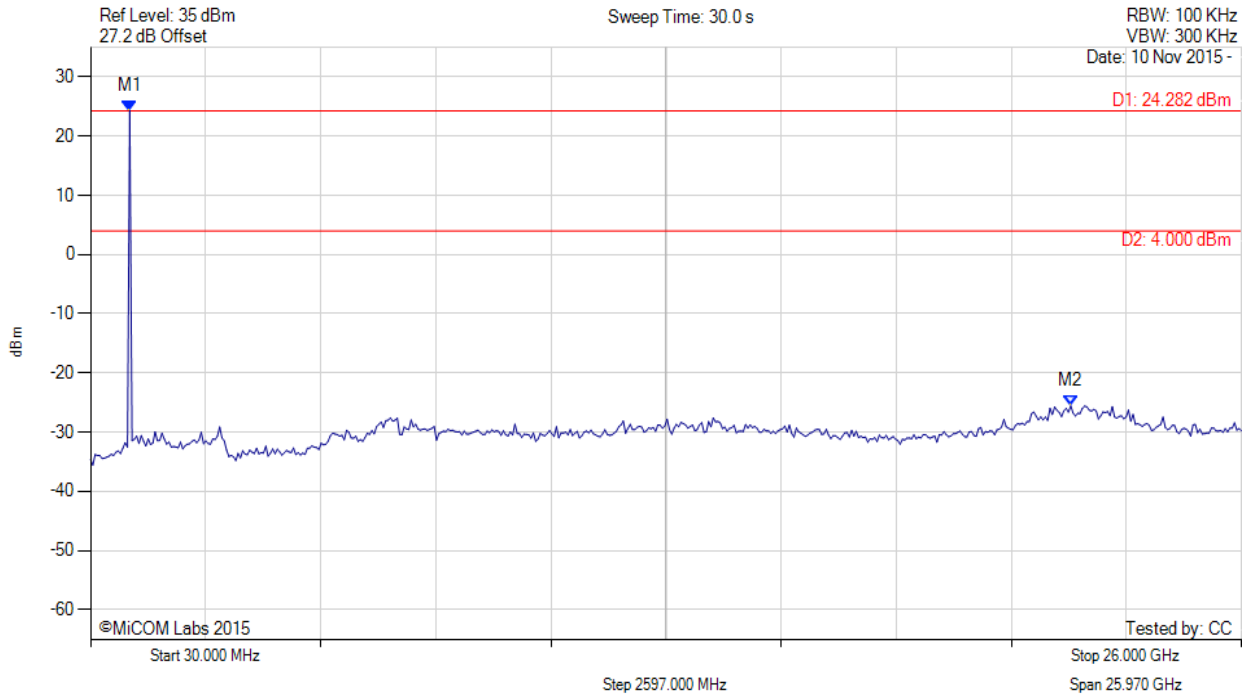


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 914.749 MHz : 24.420 dBm M2 : 22.097 GHz : -23.364 dBm	Limit: 4.00 dBm Margin: -27.36 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 400 OFDM, Channel: 927.60 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

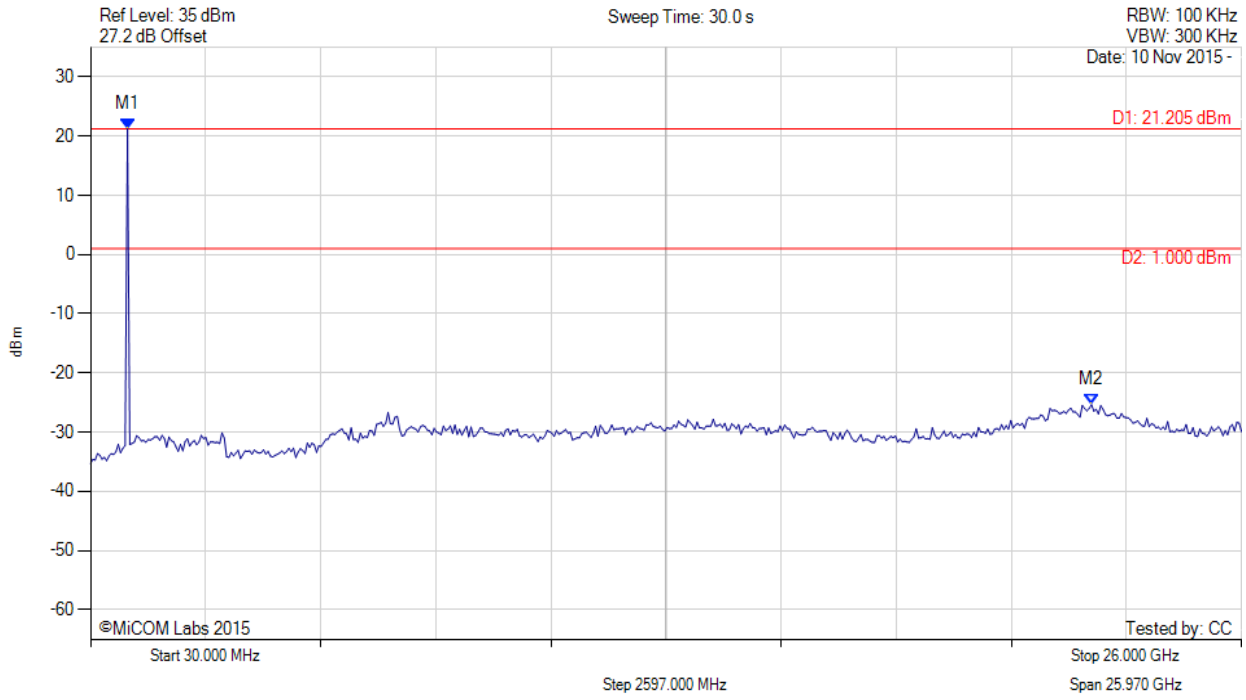


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 914.749 MHz : 24.282 dBm M2 : 22.149 GHz : -25.557 dBm	Limit: 4.00 dBm Margin: -29.56 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 1200 OFDM, Channel: 903.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

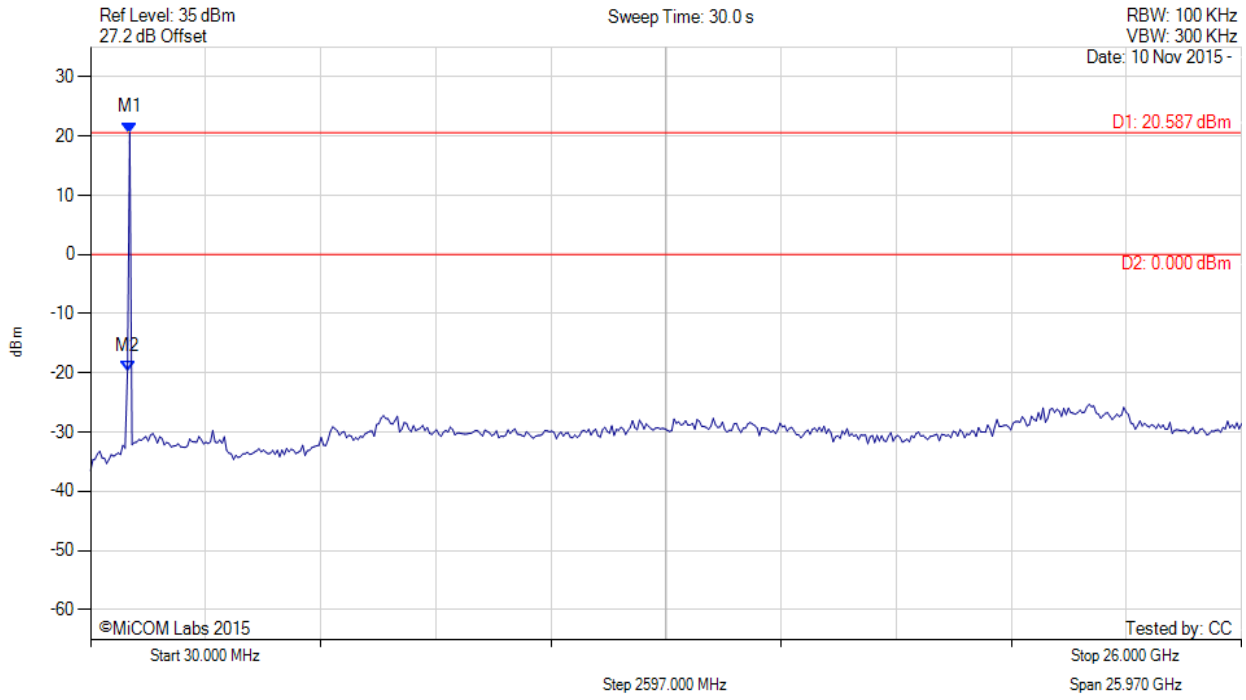


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 862.705 MHz : 21.205 dBm M2 : 22.617 GHz : -25.345 dBm	Limit: 1.00 dBm Margin: -26.34 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 1200 OFDM, Channel: 914.00 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

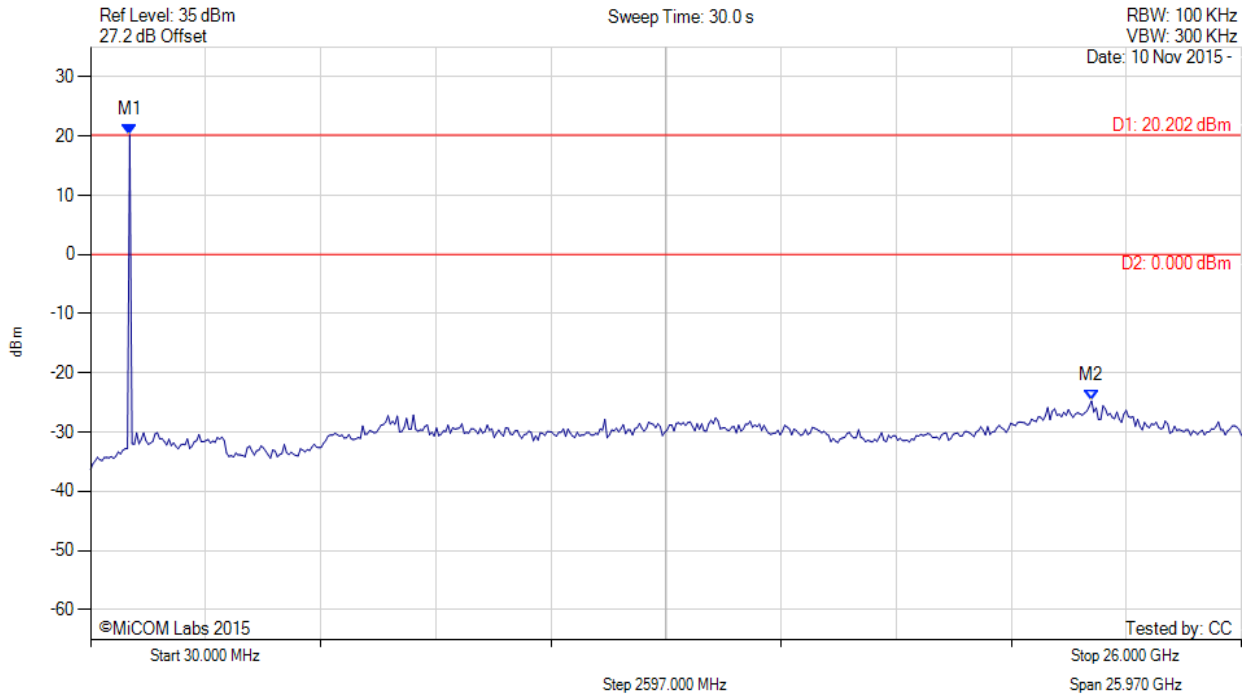


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 914.749 MHz : 20.587 dBm M2 : 862.705 MHz : -19.633 dBm	Limit: 0.00 dBm Margin: -19.63 dB

back to matrix

CONDUCTED SPURIOUS EMISSIONS - PEAK

Variant: 1200 OFDM, Channel: 926.00 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 914.749 MHz : 20.202 dBm M2 : 22.617 GHz : -24.719 dBm	Limit: 0.00 dBm Margin: -24.72 dB

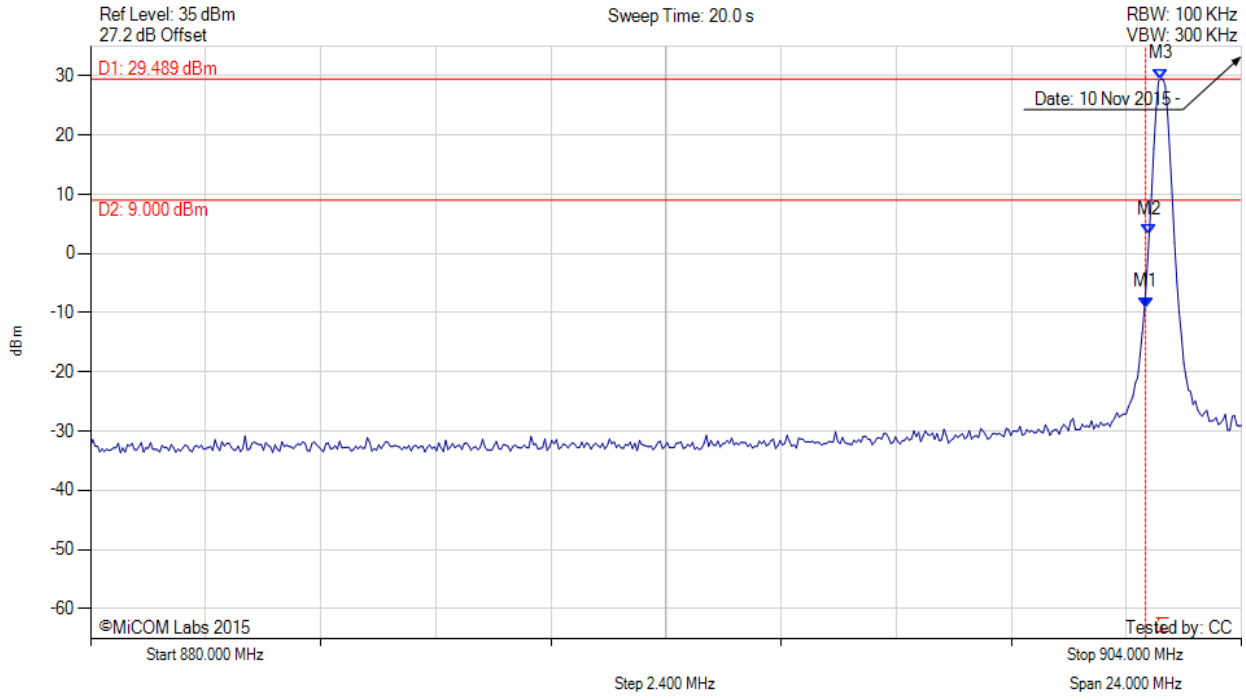
back to matrix

A.6.1.2. Conducted Band-Edge Emissions

A.6.1.2.1. Conducted Low Band-Edge Emissions

CONDUCTED LOW BAND-EDGE EMISSION - PEAK

Variant: 300 FSK, Channel: 902.30 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

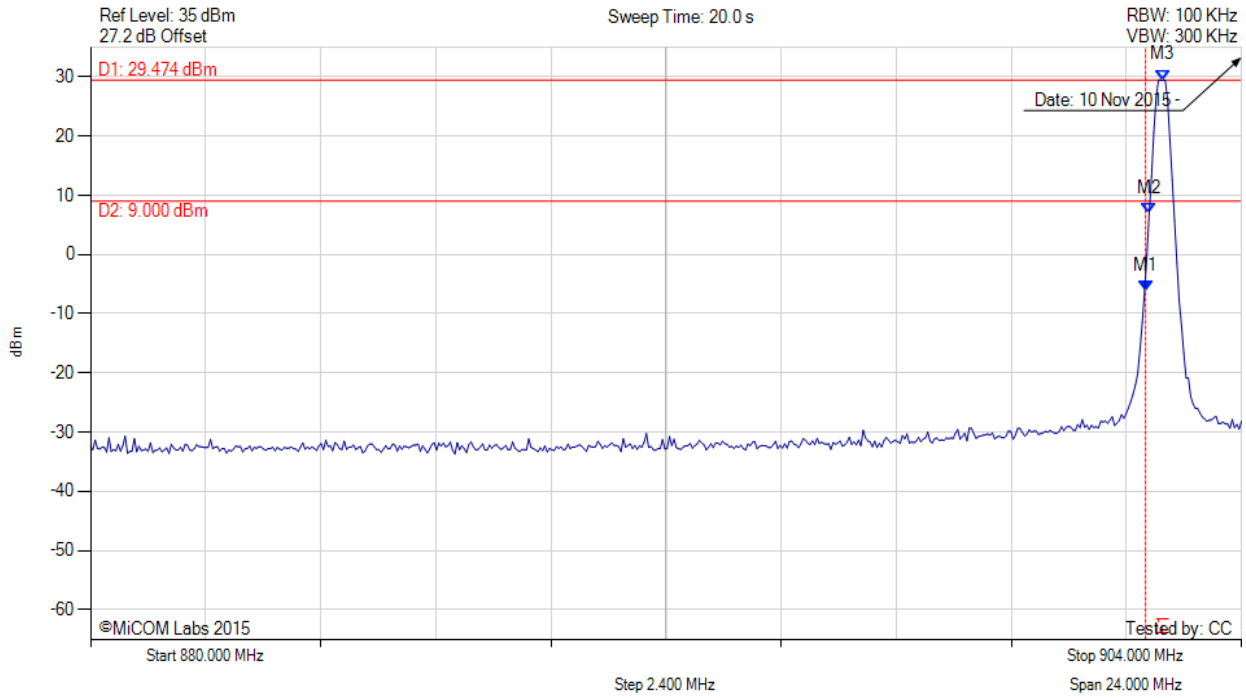


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 902.000 MHz : -9.079 dBm M2 : 902.076 MHz : 3.267 dBm M3 : 902.317 MHz : 29.489 dBm	Channel Frequency: 902.30 MHz

back to matrix

CONDUCTED LOW BAND-EDGE EMISSION - PEAK

Variant: 300 GFSK, Channel: 902.30 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

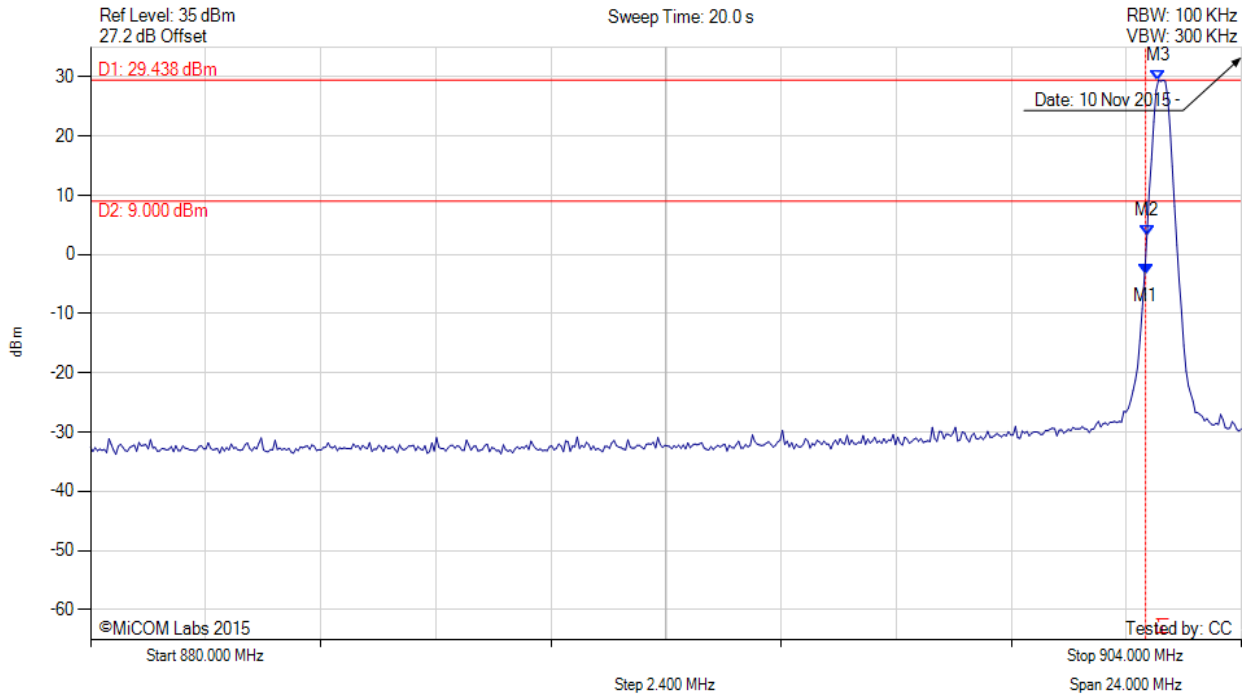


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 902.000 MHz : -6.179 dBm M2 : 902.076 MHz : 6.985 dBm M3 : 902.365 MHz : 29.474 dBm	Channel Frequency: 902.30 MHz

back to matrix

CONDUCTED LOW BAND-EDGE EMISSION - PEAK

Variant: 300 GFSK, Channel: 902.30 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

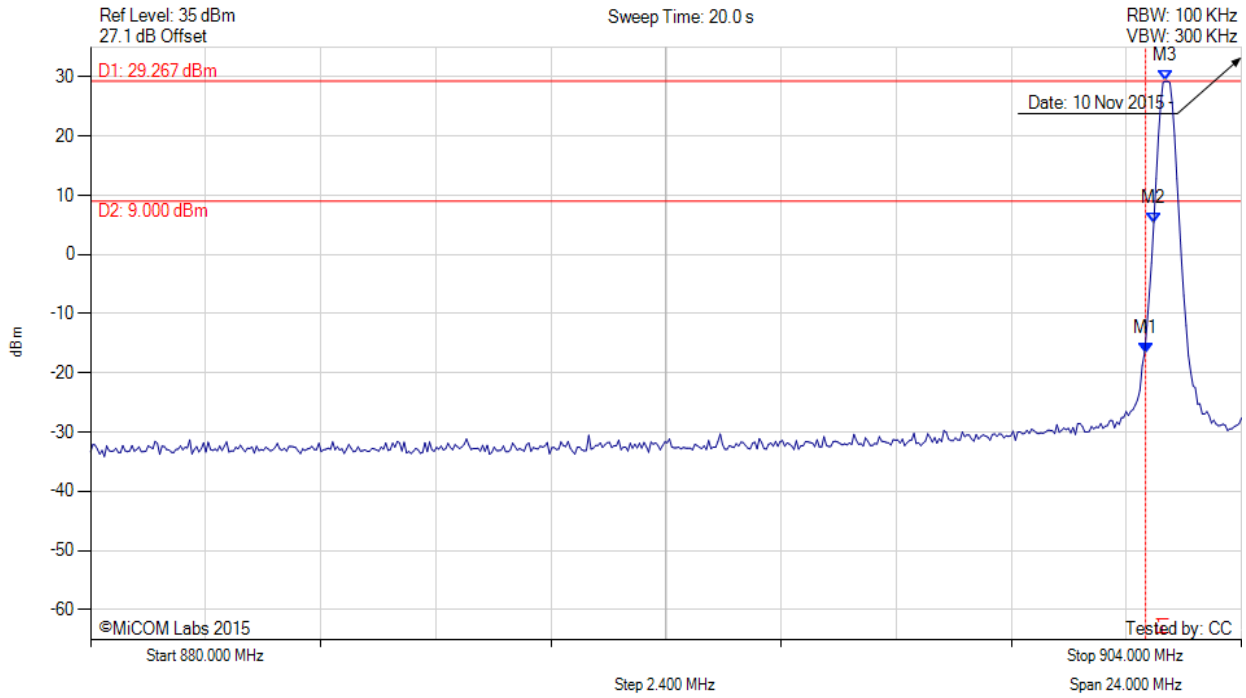


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 902.000 MHz : -3.405 dBm M2 : 902.028 MHz : 3.125 dBm M3 : 902.269 MHz : 29.438 dBm	Channel Frequency: 902.30 MHz

back to matrix

CONDUCTED LOW BAND-EDGE EMISSION - PEAK

Variant: 400 FSK, Channel: 902.40 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

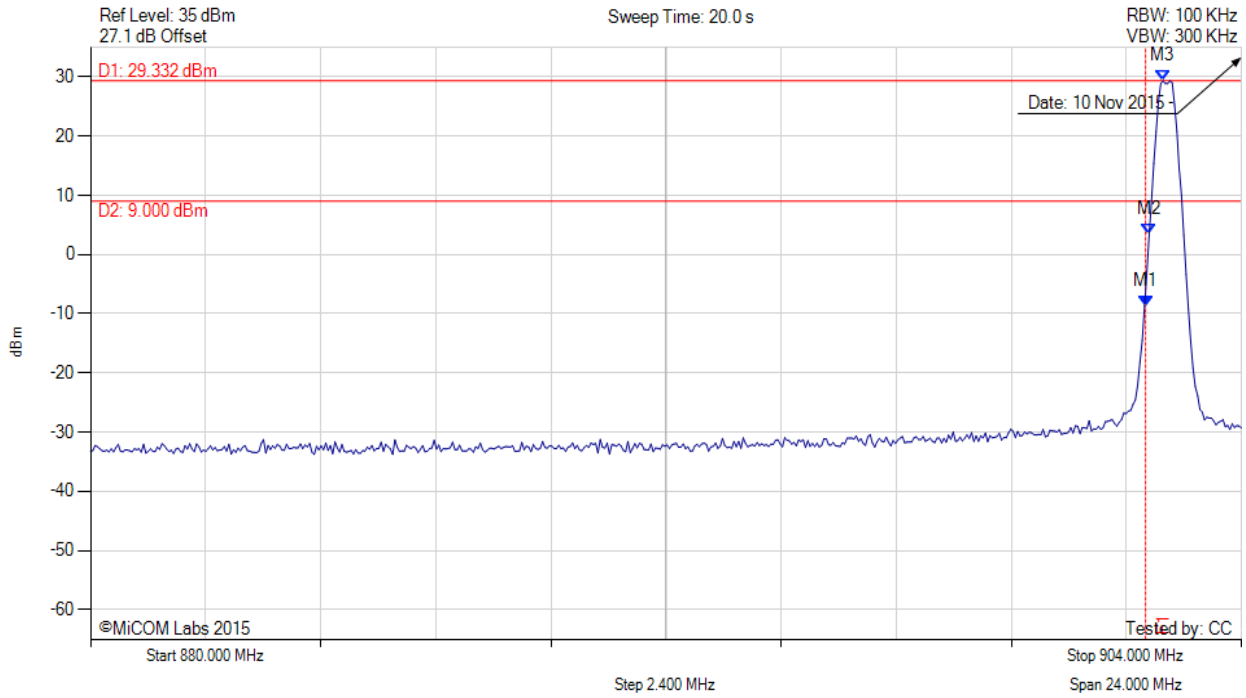


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 902.000 MHz : -16.606 dBm M2 : 902.172 MHz : 5.391 dBm M3 : 902.413 MHz : 29.267 dBm	Channel Frequency: 902.40 MHz

back to matrix

CONDUCTED LOW BAND-EDGE EMISSION - PEAK

Variant: 400 GFSK, Channel: 902.40 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc

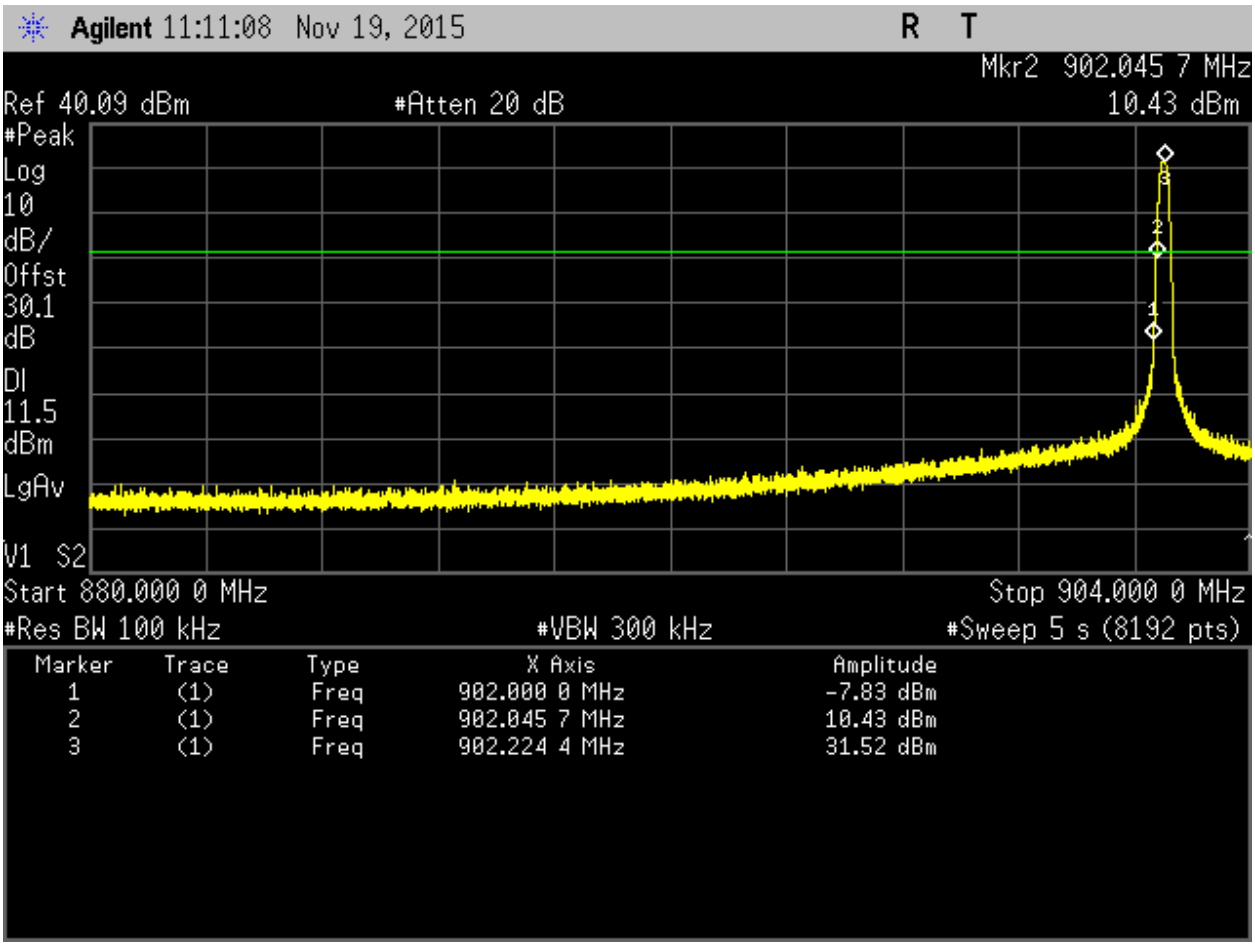


Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 902.000 MHz : -8.636 dBm M2 : 902.076 MHz : 3.420 dBm M3 : 902.365 MHz : 29.332 dBm	Channel Frequency: 902.40 MHz

back to matrix

CONDUCTED LOW BAND-EDGE EMISSION - PEAK

Variant: 200 2FSK, Channel: 902.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 902.000 MHz : -7.83 dBm M2 : 902.045 MHz : 10.43 dBm M3 : 902.224 MHz : 31.52 dBm	Channel Frequency: 902.20 MHz

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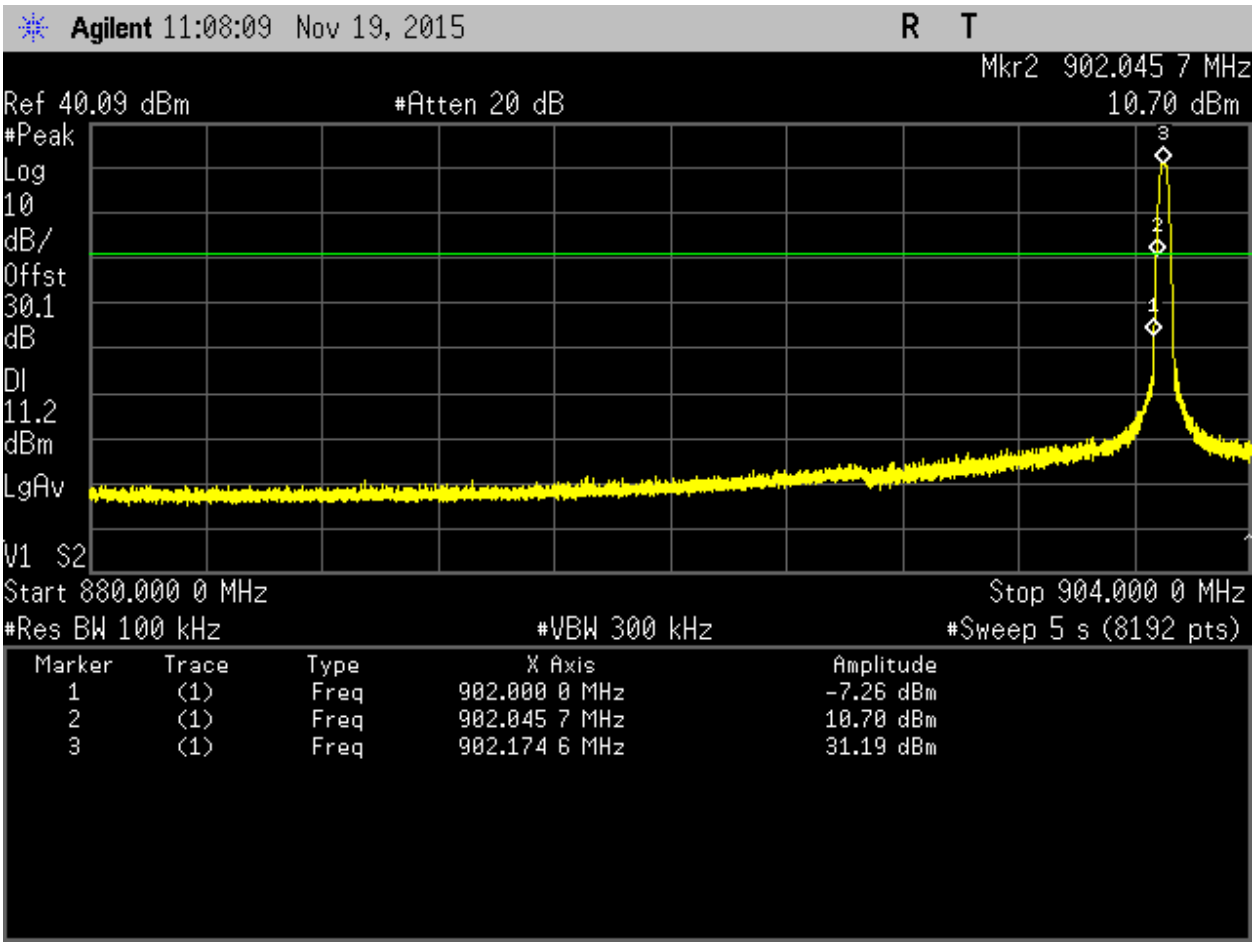
CONDUCTED LOW BAND-EDGE EMISSION - PEAK

Variant: 200 OQPSK, Channel: 902.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 902.000 MHz : -7.26 dBm M2 : 902.045 MHz : 10.70 dBm M3 : 902.174 MHz : 31.19 dBm	Channel Frequency: 902.20 MHz

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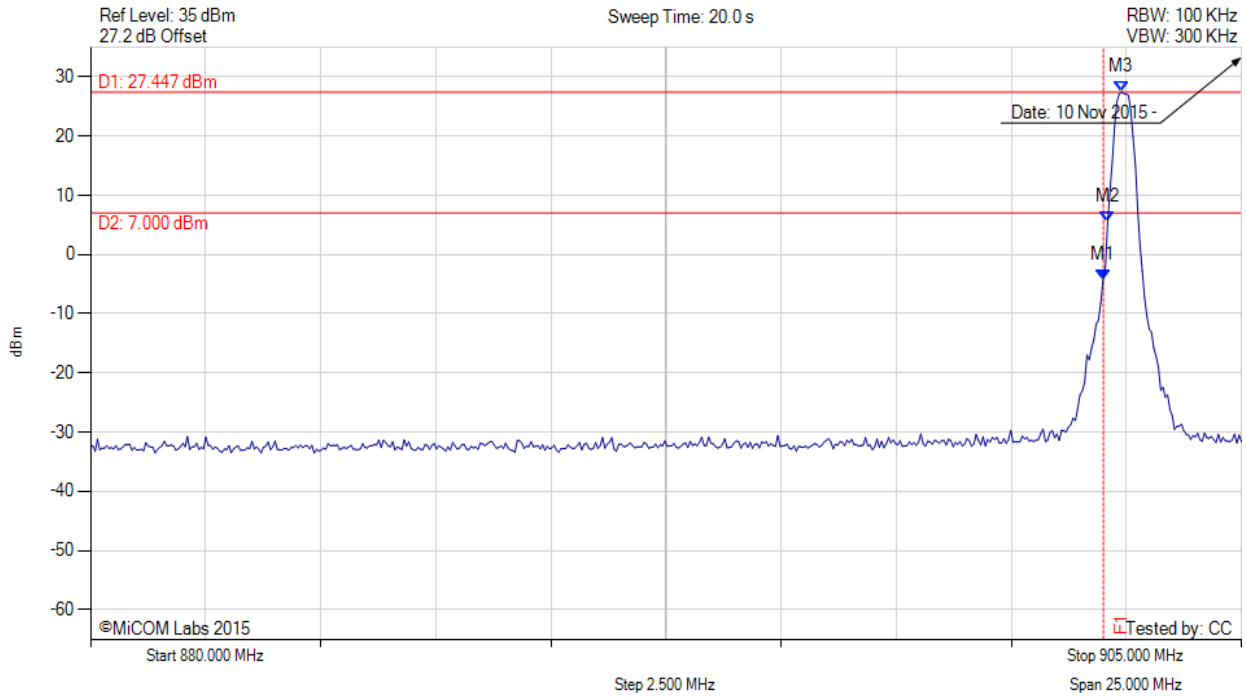
CONDUCTED LOW BAND-EDGE EMISSION - PEAK

Variant: 400 OFDM, Channel: 902.40 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 902.000 MHz : -4.209 dBm M2 : 902.094 MHz : 5.492 dBm M3 : 902.395 MHz : 27.447 dBm	Channel Frequency: 902.40 MHz

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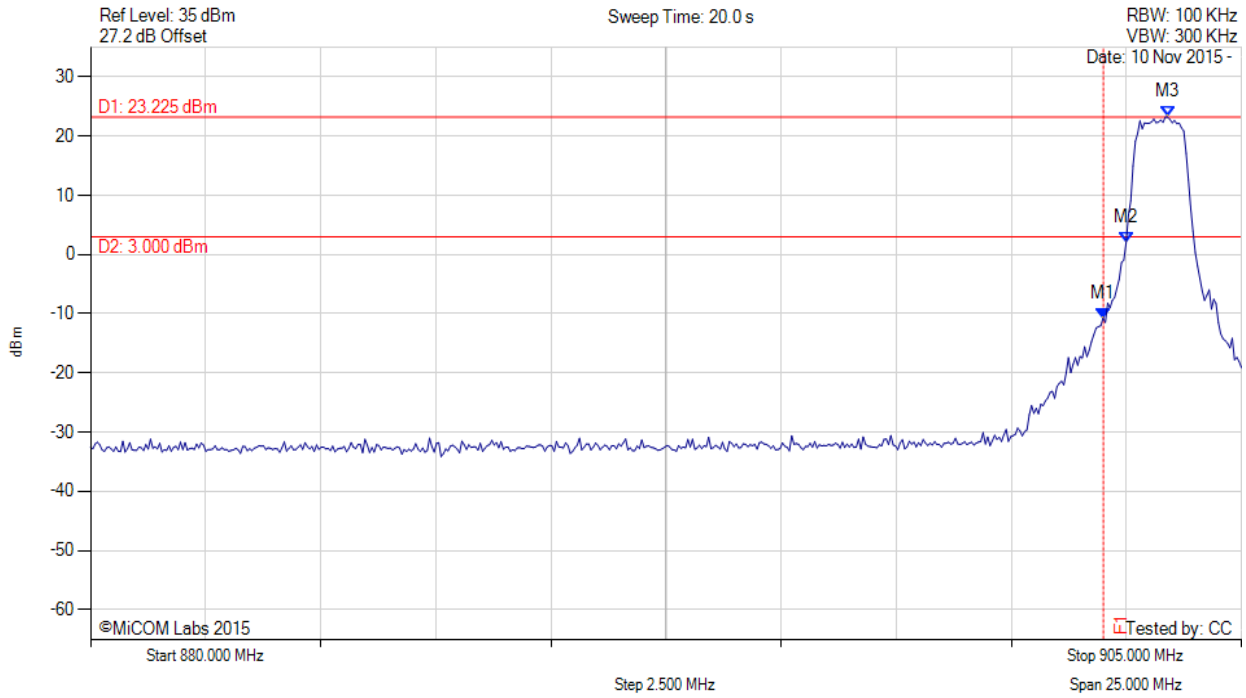
CONDUCTED LOW BAND-EDGE EMISSION - PEAK

Variant: 1200 OFDM, Channel: 903.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 902.000 MHz : -10.739 dBm M2 : 902.495 MHz : 2.061 dBm M3 : 903.397 MHz : 23.225 dBm	Channel Frequency: 903.20 MHz

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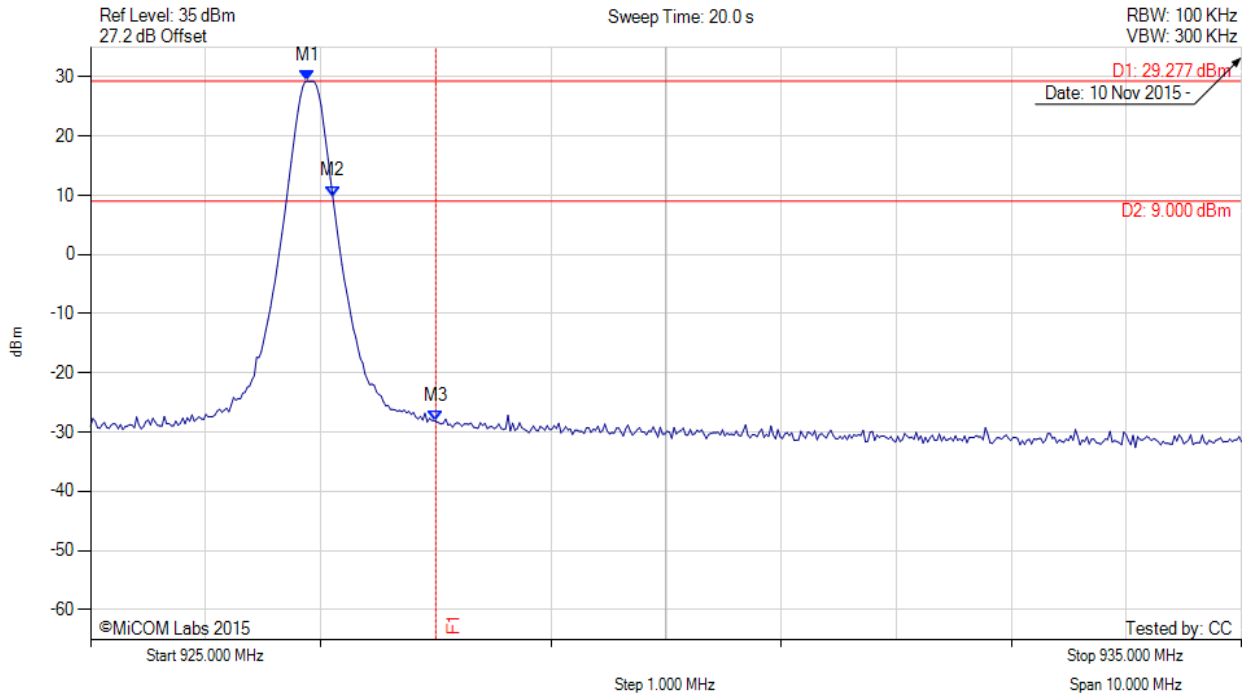
A.6.1.2.2. Conducted High Band-Edge Emissions

CONDUCTED HIGH BAND-EDGE EMISSION - PEAK

Variant: 300 FSK, Channel: 926.90 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 926.884 MHz : 29.277 dBm M2 : 927.104 MHz : 9.855 dBm M3 : 928.000 MHz : -28.231 dBm	Channel Frequency: 926.90 MHz

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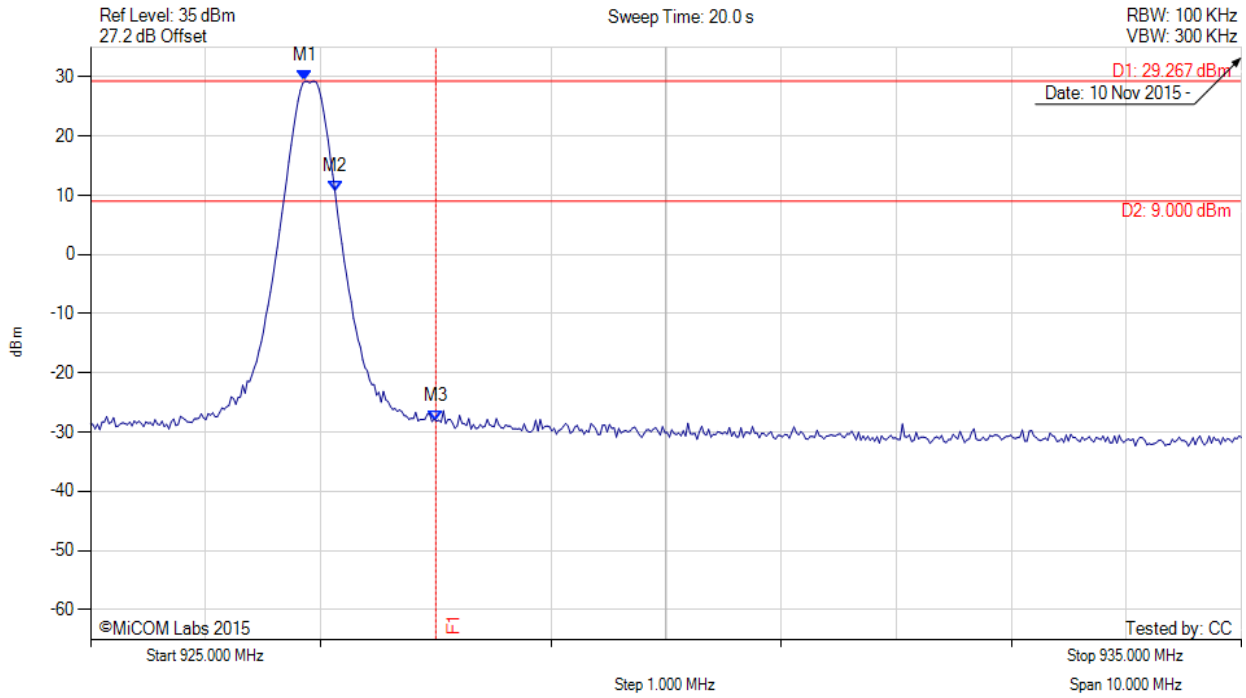
CONDUCTED HIGH BAND-EDGE EMISSION - PEAK

Variant: 300 GFSK, Channel: 926.90 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 926.864 MHz : 29.267 dBm M2 : 927.124 MHz : 10.601 dBm M3 : 928.000 MHz : -28.119 dBm	Channel Frequency: 926.90 MHz

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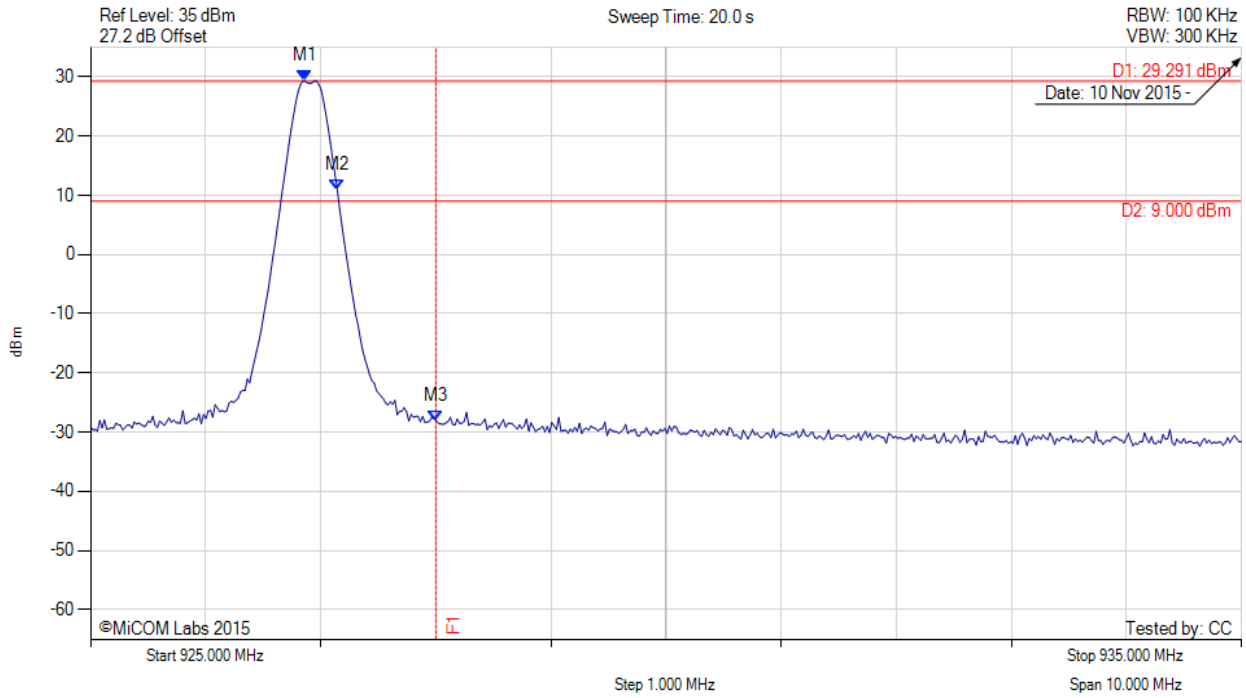
CONDUCTED HIGH BAND-EDGE EMISSION - PEAK

Variant: 300 GFSK, Channel: 926.90 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 926.864 MHz : 29.291 dBm M2 : 927.144 MHz : 10.908 dBm M3 : 928.000 MHz : -28.136 dBm	Channel Frequency: 926.90 MHz

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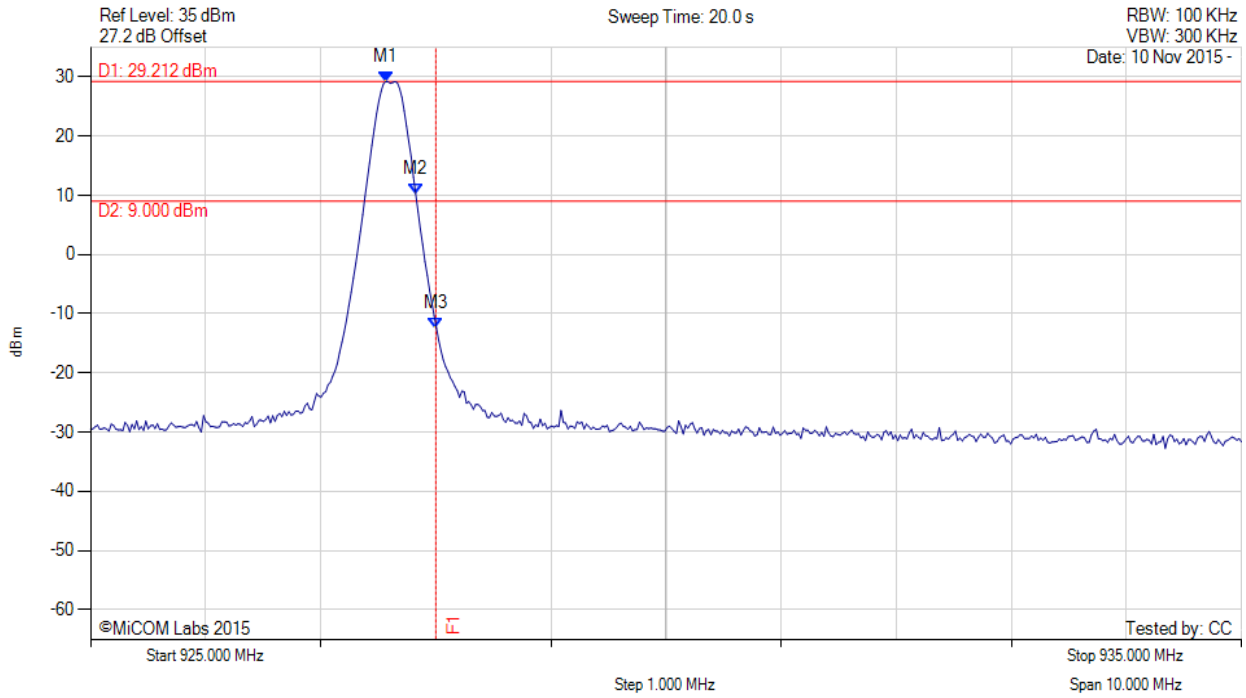
CONDUCTED HIGH BAND-EDGE EMISSION - PEAK

Variant: 400 FSK, Channel: 927.60 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 927.565 MHz : 29.212 dBm M2 : 927.826 MHz : 10.229 dBm M3 : 928.000 MHz : -12.449 dBm	Channel Frequency: 927.60 MHz

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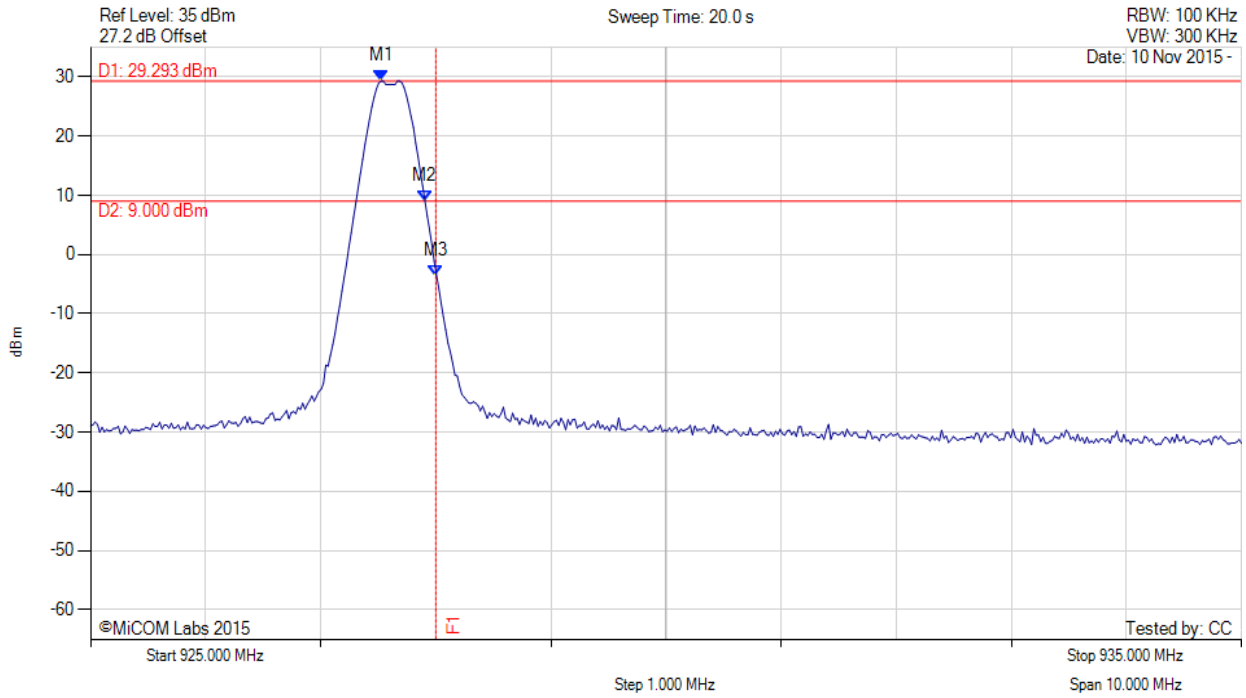
CONDUCTED HIGH BAND-EDGE EMISSION - PEAK

Variant: 400 GFSK, Channel: 927.60 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 927.525 MHz : 29.293 dBm M2 : 927.906 MHz : 9.062 dBm M3 : 928.000 MHz : -3.503 dBm	Channel Frequency: 927.60 MHz

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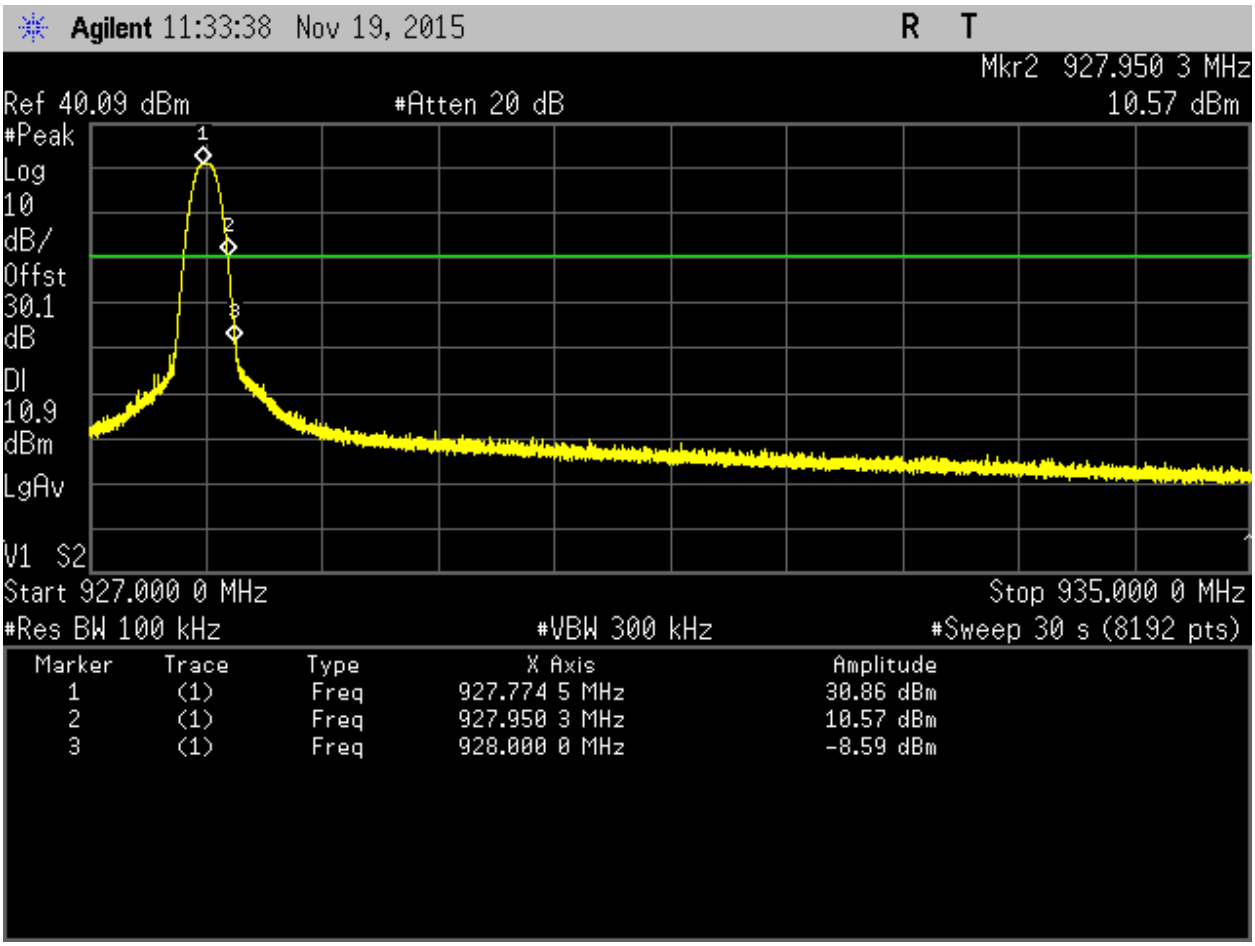
CONDUCTED HIGH BAND-EDGE EMISSION - PEAK

Variant: 200 2FSK, Channel: 927.80 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 927.774 MHz : 30.86 dBm M2 : 927.950 MHz : 10.57 dBm M3 : 928.000 MHz : -8.59 dBm	Channel Frequency: 927.80 MHz

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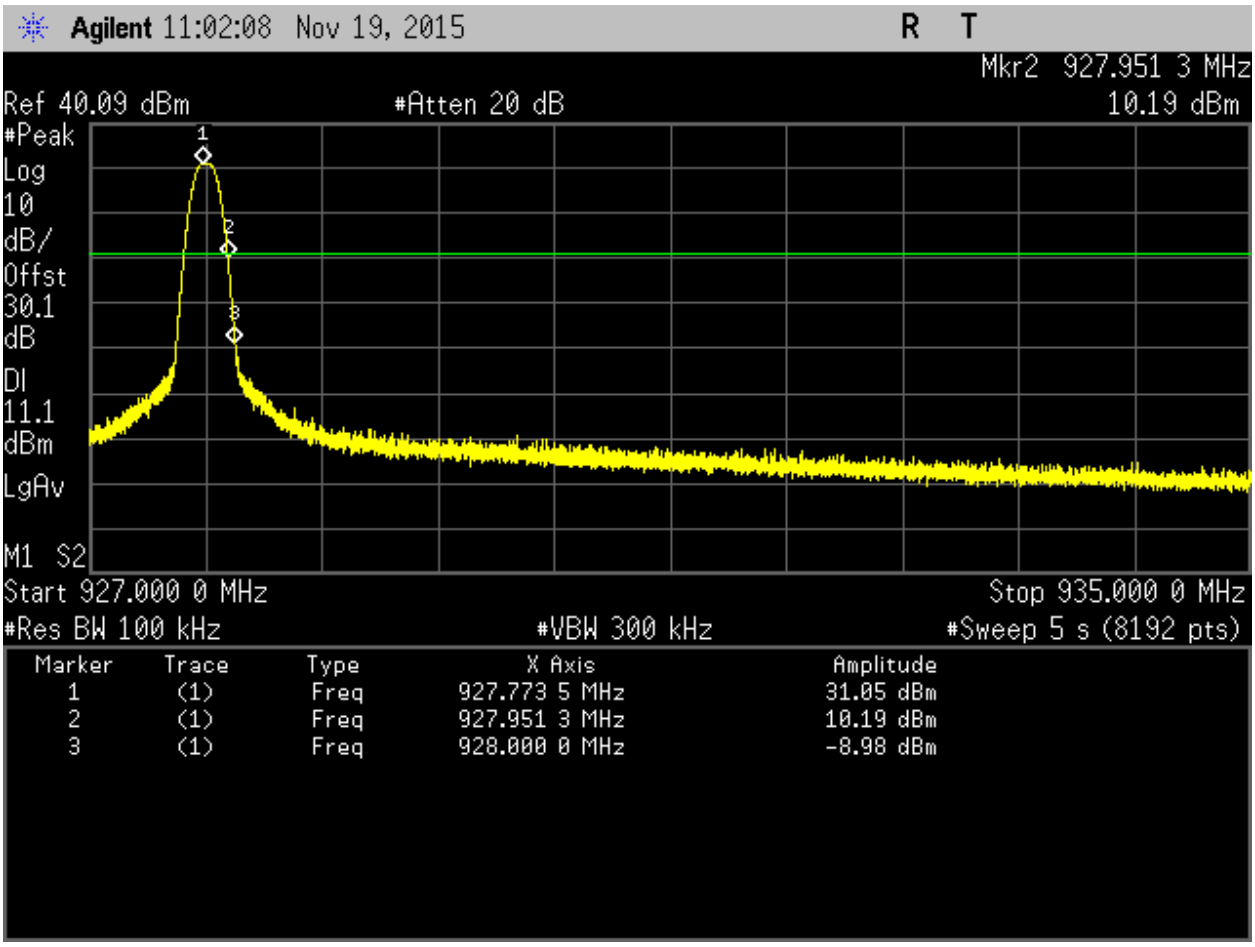
CONDUCTED HIGH BAND-EDGE EMISSION - PEAK

Variant: 200 OQPSK, Channel: 927.80 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 927.773 MHz : 31.05 dBm M2 : 927.951 MHz : 10.19 dBm M3 : 928.000 MHz : -8.98 dBm	Channel Frequency: 927.80 MHz

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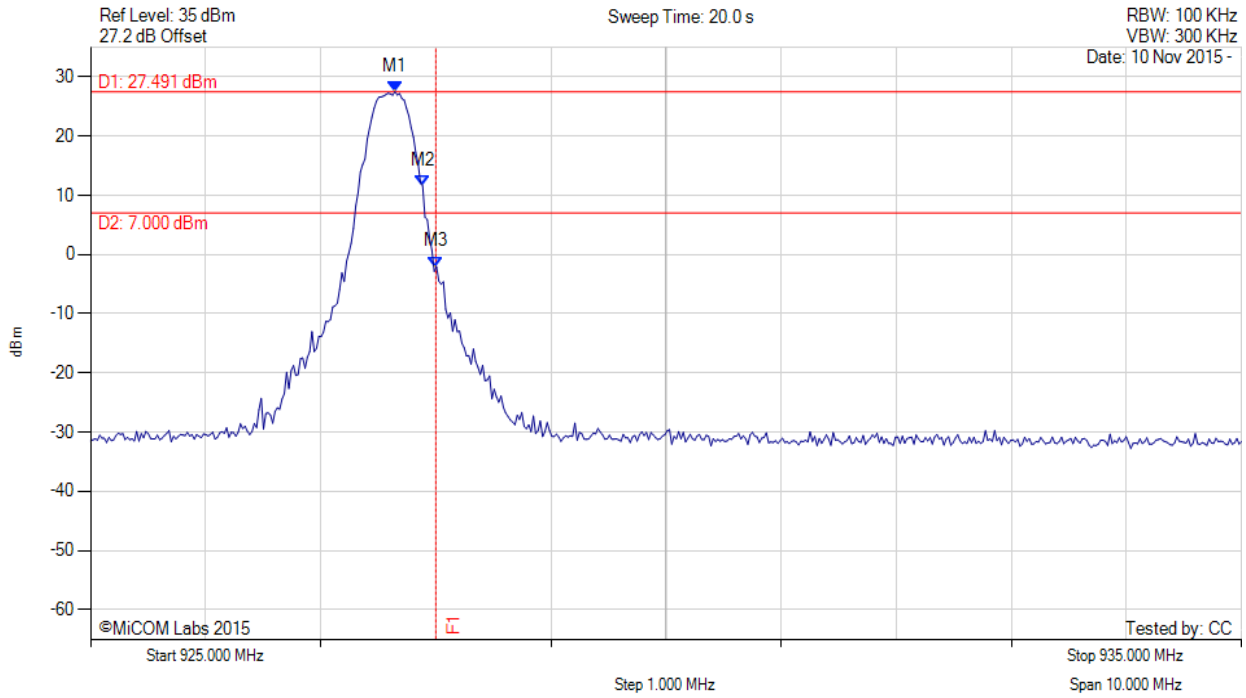
CONDUCTED HIGH BAND-EDGE EMISSION - PEAK

Variant: 400 OFDM, Channel: 927.60 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 927.645 MHz : 27.491 dBm M2 : 927.886 MHz : 11.571 dBm M3 : 928.000 MHz : -2.061 dBm	Channel Frequency: 927.60 MHz

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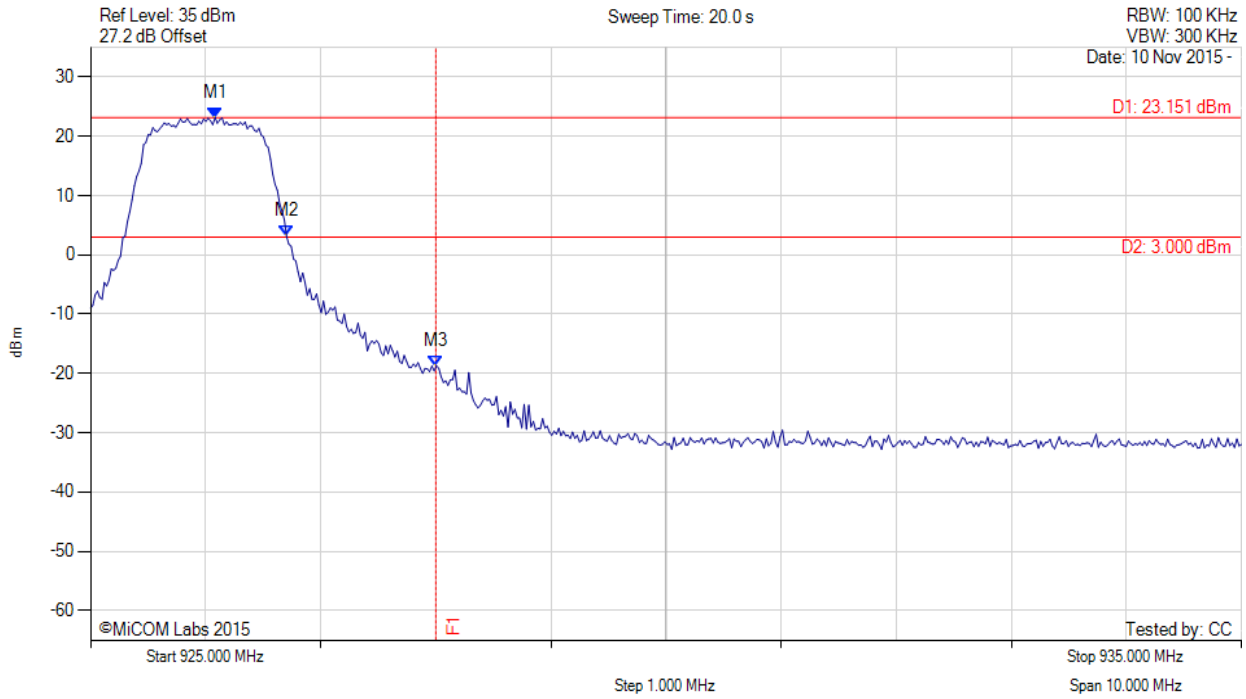
CONDUCTED HIGH BAND-EDGE EMISSION - PEAK

Variant: 1200 OFDM, Channel: 926.00 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 926.082 MHz : 23.151 dBm M2 : 926.703 MHz : 3.125 dBm M3 : 928.000 MHz : -18.707 dBm	Channel Frequency: 926.00 MHz

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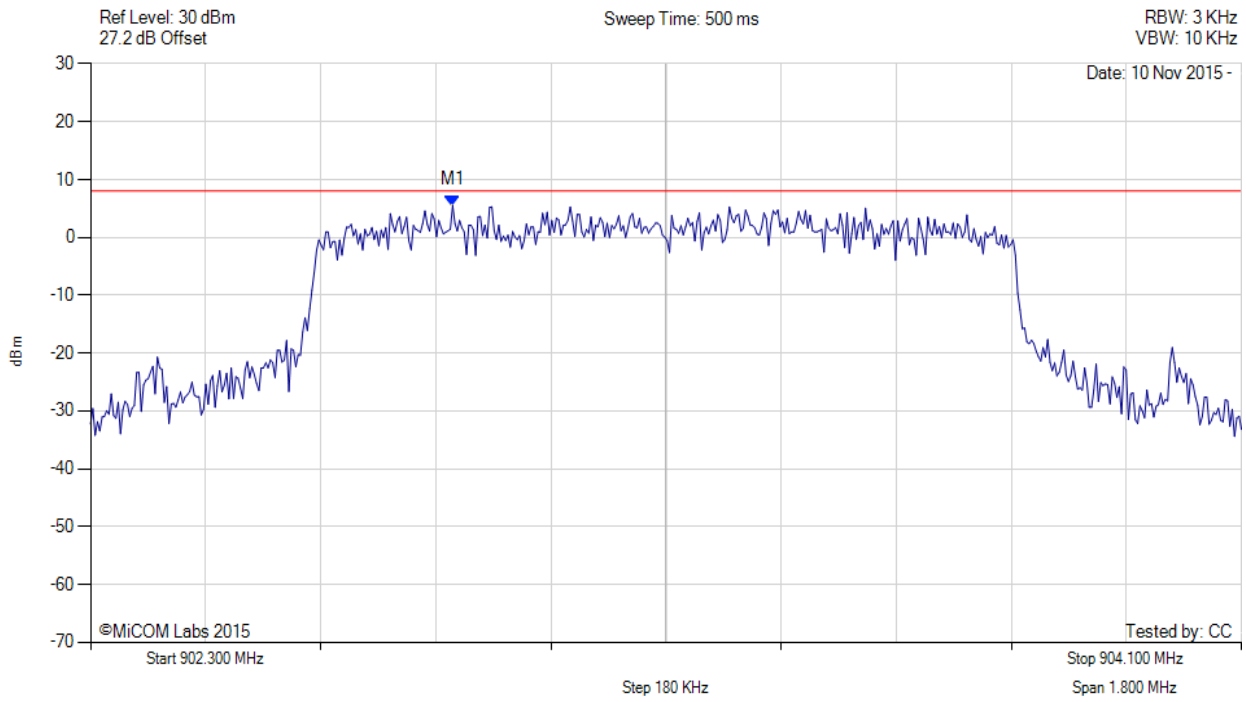
A.7. Power Spectral Density

POWER SPECTRAL DENSITY - PEAK

Variant: 1200 OFDM, Channel: 903.20 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 902.866 MHz : 5.516 dBm	Limit: ≤ 8.000 dBm Margin: -2.48 dB

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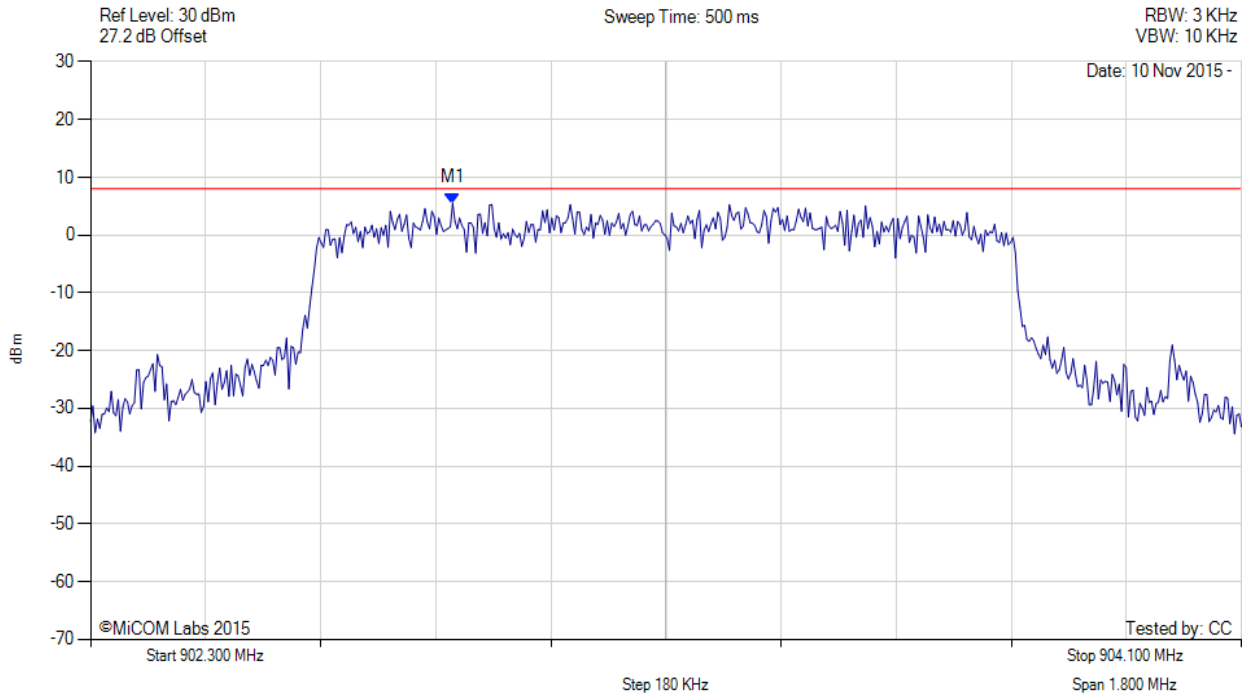
POWER SPECTRAL DENSITY - PEAK

Variant: 1200 OFDM, Channel: 903.20 MHz, SUM, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 902.866 MHz : 5.516 dBm	Limit: ≤ 8.0 dBm Margin: -2.5 dB

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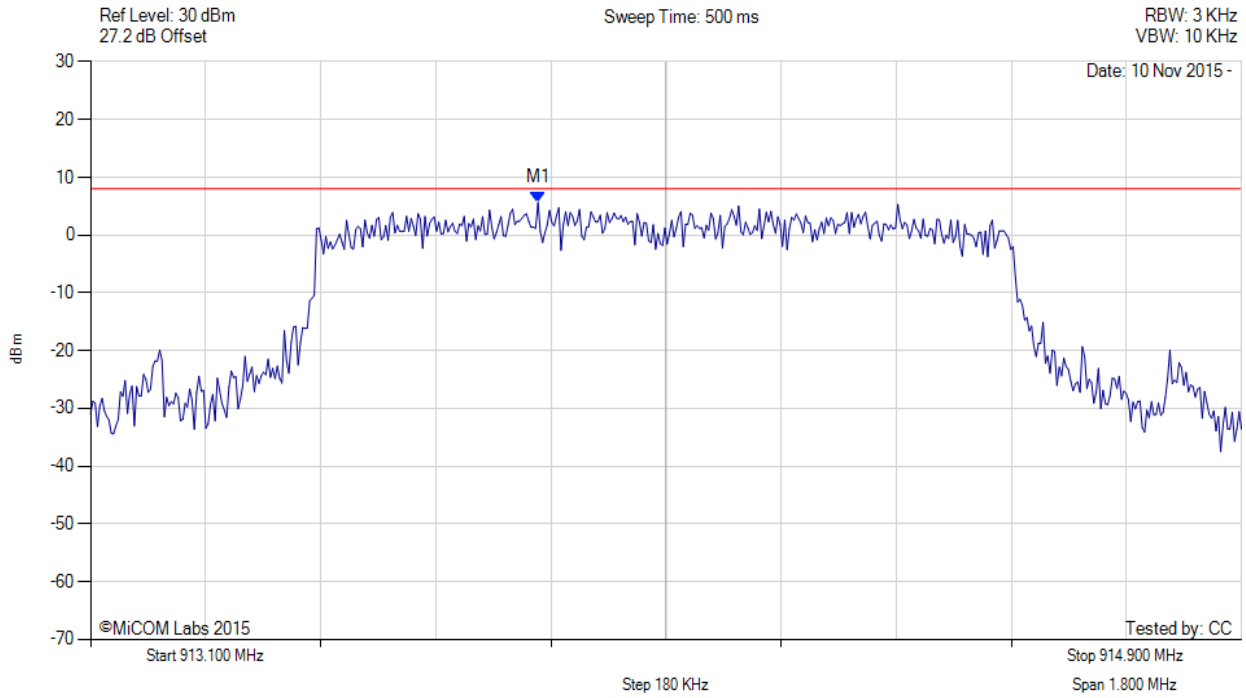
POWER SPECTRAL DENSITY - PEAK

Variant: 1200 OFDM, Channel: 914.00 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 913.800 MHz : 5.621 dBm	Limit: ≤ 8.000 dBm Margin: -2.38 dB

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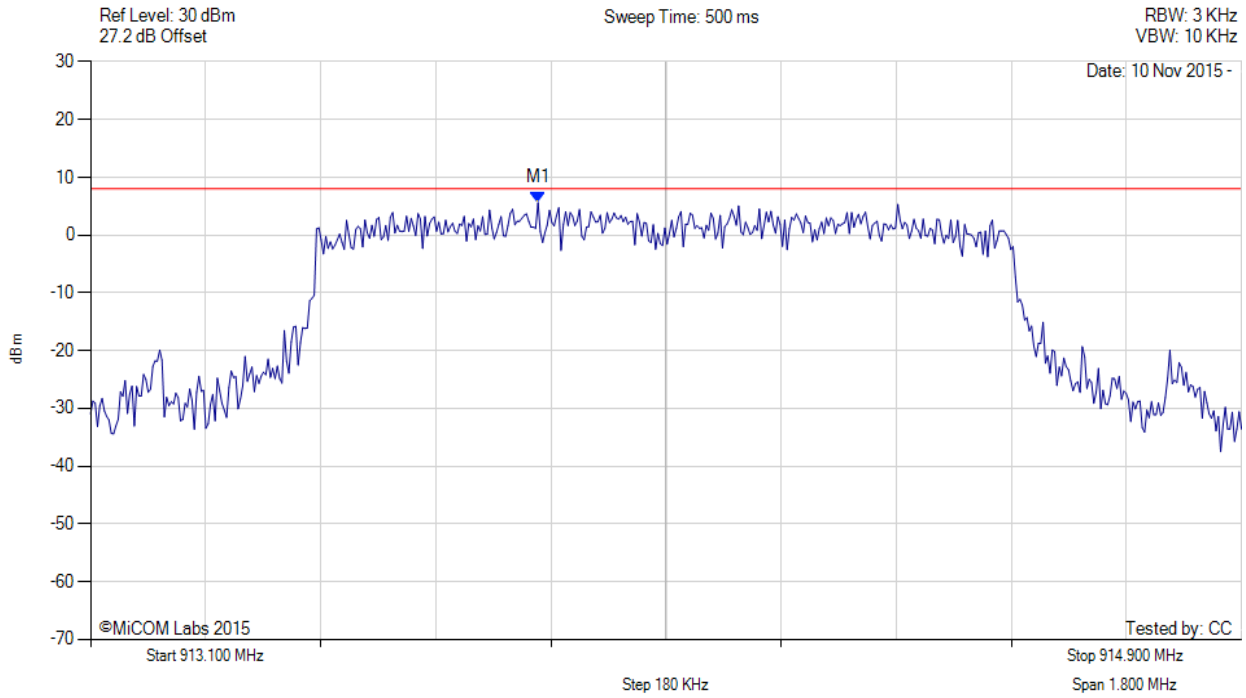
POWER SPECTRAL DENSITY - PEAK

Variant: 1200 OFDM, Channel: 914.00 MHz, SUM, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 913.800 MHz : 5.621 dBm	Limit: ≤ 8.0 dBm Margin: -2.4 dB

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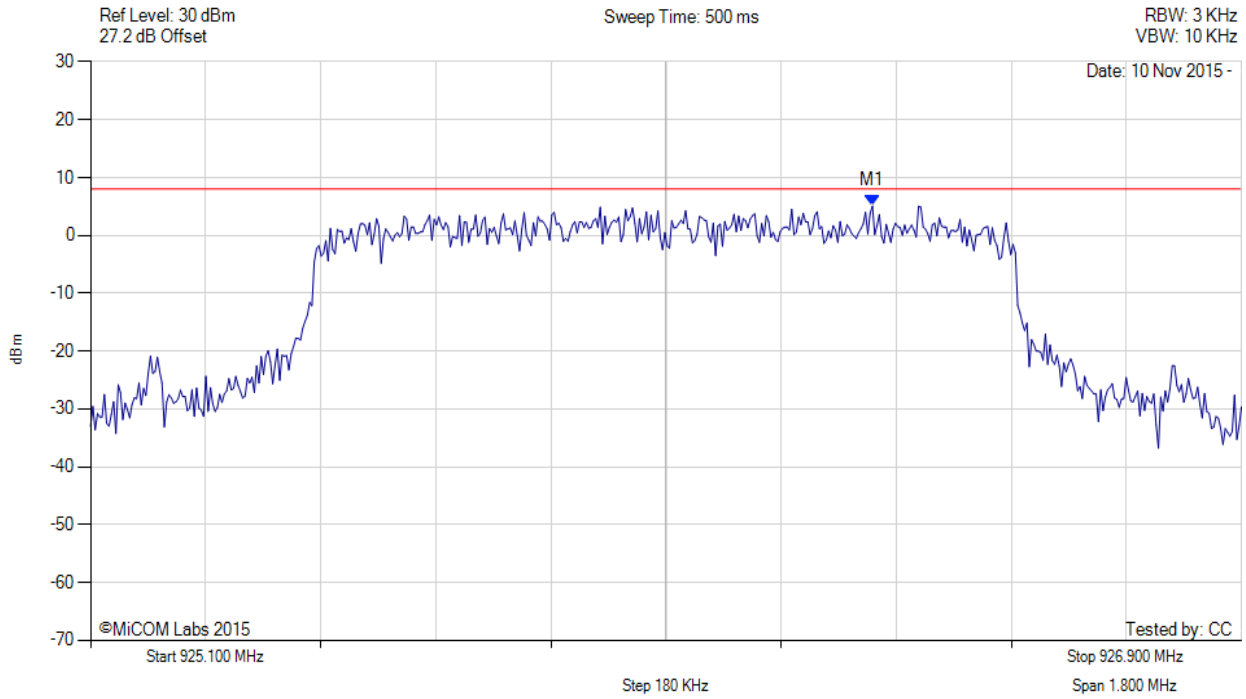
POWER SPECTRAL DENSITY - PEAK

Variant: 1200 OFDM, Channel: 926.00 MHz, Chain a, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 926.323 MHz : 5.091 dBm	Limit: ≤ 8.000 dBm Margin: -2.91 dB

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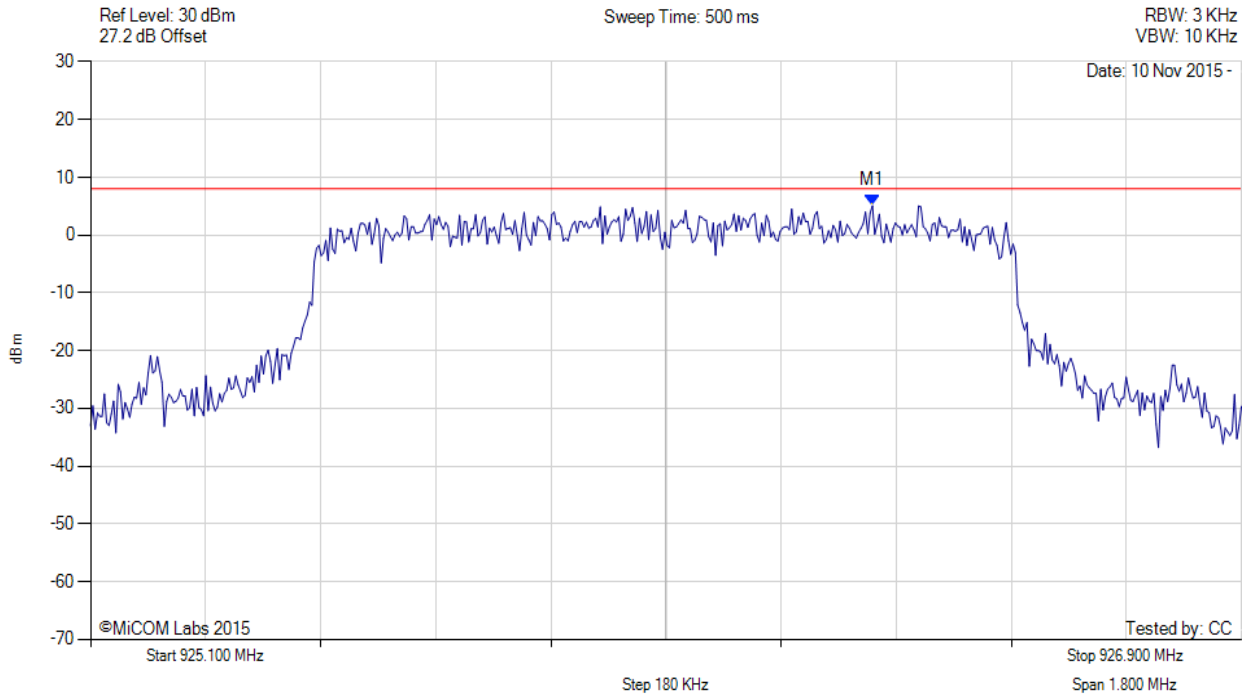
POWER SPECTRAL DENSITY - PEAK

Variant: 1200 OFDM, Channel: 926.00 MHz, SUM, Temp: Ambient, Voltage: 4 Vdc



Analyser Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 30 Trace Mode = VIEW	M1 : 926.323 MHz : 5.091 dBm	Limit: ≤ 8.0 dBm Margin: -2.9 dB

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