Company: Silver Spring Networks

Test of: MicroAP 5
To: FCC CFR 47 Part 15.247 (DTS) &
IC RSS-247 (2400 – 2483.5 MHz)

Report No.: SSNT135-U2_Conducted Rev A

TEST REPORT ADDENDUM - CONDUCTED

Issue Date: 1st February 2017

Master Document Number	Addendum Reports
SSNT135-U2_Master	SSNT135-U2_Conducted
	SSNT135-U2_Radiated

This report is only valid in conjunction with the reports listed in the above table. Together these reports address the requirements for the type of device operating under the standard as listed.

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1. 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)

2. TEST RESULTS

2.1. 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)(1)(i)/(ii)	**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:

(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

(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.

(ii) Frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

Equipment Configuration for 20 dB 99% Bandwidth			
Variant:	300 kbps GFSK	**Duty Cycle (%):**	99
Data Rate:	300.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	GFSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

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	MHz	MHz
2400.8	0.353	--	--	--	0.353	0.353	--	--
2440.0	0.374	--	--	--	0.374	0.374	--	--
2472.8	0.348	--	--	--	0.348	0.348	--	--

Test Frequency	Measured 99% Bandwidth (MHz) Port(s)				Maximum 99% Bandwidth (MHz)		
MHz	a	b	c	d			
2400.8	0.330	--	--	--	0.330		
2440.0	0.332	--	--	--	0.332		
2472.8	0.329	--	--	--	0.329		

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:	50 kbps 2FSK	**Duty Cycle (%):**	99
Data Rate:	50.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	2FSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

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	MHz	MHz
2400.2	0.085	--	--	--	0.085	0.085	--	--
2413.8	0.085	--	--	--	0.085	0.085	--	--
2427.2	0.085	--	--	--	0.085	0.085	--	--

Test Frequency	Measured 99% Bandwidth (MHz) Port(s)				Maximum 99% Bandwidth (MHz)		
MHz	a	b	c	d			
2400.2	0.086	--	--	--	0.086		
2413.8	0.085	--	--	--	0.085		
2427.2	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:	6.25 kbps OQPSK	**Duty Cycle (%):**	99
Data Rate:	6.25 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OQPSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

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	MHz	MHz
2400.2	0.141	--	--	--	0.141	0.141	--	--
2413.8	0.125	--	--	--	0.125	0.125	--	--
2427.2	0.125	--	--	--	0.125	0.125	--	--

Test Frequency	Measured 99% Bandwidth (MHz) Port(s)				Maximum 99% Bandwidth (MHz)		
MHz	a	b	c	d			
2400.2	0.126	--	--	--	0.126		
2413.8	0.116	--	--	--	0.116		
2427.2	0.116	--	--	--	0.116		

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:	600 kbps OFDM	**Duty Cycle (%):**	99
Data Rate:	600.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

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	MHz	MHz
2400.4	0.372	--	--	--	0.372	0.372	--	--
2440.0	0.369	--	--	--	0.369	0.369	--	--
2454.4	0.386	--	--	--	0.386	0.386	--	--

Test Frequency	Measured 99% Bandwidth (MHz) Port(s)				Maximum 99% Bandwidth (MHz)		
MHz	a	b	c	d			
2400.4	0.313	--	--	--	0.313		
2440.0	0.313	--	--	--	0.313		
2454.4	0.317	--	--	--	0.317		

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).

2.2. Frequency Hopping Tests

Conducted Test Conditions for Frequency Hopping Measurements			
Standard:	FCC CFR 47:15.247	**Ambient Temp. (ºC):**	24.0 - 27.5
Test Heading:	Frequency Hopping Tests	**Rel. Humidity (%):**	32 - 45
Standard Section(s):	15.247 (a)(1)(i)/(ii)	**Pressure (mBars):**	999 - 1001
Reference Document(s):	See Normative References, FCC Public Notice DA 00-705		

Test Procedure for Frequency Hopping Measurements

These tests cover the following measurements:

i) channel separation
ii) channel occupancy
iii) dwell time
iv) number of hopping frequencies

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

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 Frequency Hopping Measurements

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

(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

(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.

(ii) Frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

2.2.1. Number of Hopping Channels

Equipment Configuration for Number of Hopping Channels			
Variant:	300 kbps GFSK	**Antenna:**	Not Applicable
Data Rate:	300.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	GFSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
Duty Cycle (%):	99.0	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Frequency Range (MHz)	Number of Hopping Channels	Limit	Pass / Fail
2400.0-2428.0	35	--	--
2428.0-2456.0	35	--	--
2456.0-2483.5	24	--	--
Total number of Hops	**94**	**15**	**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).

Equipment Configuration for Number of Hopping Channels			
Variant:	50 kbps 2FSK	**Antenna:**	Not Applicable
Data Rate:	50.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	2FSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
Duty Cycle (%):	99.0	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Frequency Range (MHz)	Number of Hopping Channels	Limit	Pass / Fail
2400.0-2410.0	50	--	--
2410.0-2420.0	50	--	--
2420.0-2430.0	36	--	--
Total number of Hops	**136**	**15**	**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).

Equipment Configuration for Number of Hopping Channels			
Variant:	6.25 kbps OQPSK	**Antenna:**	Not Applicable
Data Rate:	6.25 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OQPSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
Duty Cycle (%):	99.0	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Frequency Range (MHz)	Number of Hopping Channels	Limit	Pass / Fail
2400.0-2410.0	50	--	--
2410.0-2420.0	50	--	--
2420.0-2430.0	36	--	--
Total number of Hops	**136**	**15**	**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).

Equipment Configuration for Number of Hopping Channels			
Variant:	600 kbps OFDM	**Antenna:**	Not Applicable
Data Rate:	600.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
Duty Cycle (%):	99.0	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Frequency Range (MHz)	Number of Hopping Channels	Limit	Pass / Fail
2400.0-2428.0	70	--	--
2428.0-2456.0	66	--	--
2456.0-2483.5	0	--	--
Total number of Hops	**136**	**15**	**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).

2.2.2. Channel Separation

Equipment Configuration for Channel Separation			
Variant:	300 kbps GFSK	**Antenna:**	Not Applicable
Data Rate:	300.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	GFSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
Duty Cycle (%):	99.0	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Center Frequency (MHz)	Chan Separation (MHz)	Limit (MHz)	Pass / Fail
2440.0	0.803	0.374	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).

Equipment Configuration for Channel Separation			
Variant:	50 kbps 2FSK	**Antenna:**	Not Applicable
Data Rate:	50.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	2FSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
Duty Cycle (%):	99.0	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Center Frequency (MHz)	Chan Separation (MHz)	Limit (MHz)	Pass / Fail
2413.8	0.201	0.085	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).

Equipment Configuration for Channel Separation			
Variant:	6.25 kbps OQPSK	**Antenna:**	Not Applicable
Data Rate:	6.25 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OQPSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
Duty Cycle (%):	99.0	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Center Frequency (MHz)	Chan Separation (MHz)	Limit (MHz)	Pass / Fail
2413.8	0.202	0.141	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).

Equipment Configuration for Channel Separation			
Variant:	600 kbps OFDM	**Antenna:**	Not Applicable
Data Rate:	600.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
Duty Cycle (%):	99.0	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Center Frequency (MHz)	Chan Separation (MHz)	Limit (MHz)	Pass / Fail
2440.0	0.402	0.386	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).

2.2.3. Dwell Time

Equipment Configuration for Channel Occupancy			
Variant:	300 kbps GFSK	**Antenna:**	Not Applicable
Data Rate:	300.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	GFSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
Duty Cycle (%):	99.0	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency(MHz)	Dwell Time (Single Burst) (S)	Channel Occupancy (mS)	Observation Period (S)	Channel Occupancy Limit (mS)	Pass / Fail
2440.00	0.019	19.440	10.00	400.000	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).

Equipment Configuration for Channel Occupancy			
Variant:	50 kbps 2FSK	**Antenna:**	Not Applicable
Data Rate:	50.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	2FSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
Duty Cycle (%):	99.0	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency(MHz)	Dwell Time (Single Burst) (S)	Channel Occupancy (mS)	Observation Period (S)	Channel Occupancy Limit (mS)	Pass / Fail
2413.80	0.023	22.500	10.0	400.000	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).

Equipment Configuration for Channel Occupancy			
Variant:	6.25 kbps OQPSK	**Antenna:**	Not Applicable
Data Rate:	6.25 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OQPSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
Duty Cycle (%):	99.0	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency(MHz)	Dwell Time (Single Burst) (S)	Channel Occupancy (mS)	Observation Period (S)	Channel Occupancy Limit (mS)	Pass / Fail
2413.80	0.052	52.330	0.40	400.000	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).

Equipment Configuration for Channel Occupancy			
Variant:	600 kbps OFDM	**Antenna:**	Not Applicable
Data Rate:	600.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
Duty Cycle (%):	99.0	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency(MHz)	Dwell Time (Single Burst) (S)	Channel Occupancy (mS)	Observation Period (S)	Channel Occupancy Limit (mS)	Pass / Fail
2440.00	0.021	20.840	10.00	400.000	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).

2.3. 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 (a)(1), (b)(1)/(2)/(3)	**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, nominal voltage. 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

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

(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following for frequency hopping systems:

(1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

(2) For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 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.

Equipment Configuration for Output Power Peak			
Variant:	300 kbps GFSK	**Duty Cycle (%):**	99
Data Rate:	300.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	GFSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Test Frequency	Measured Output Power (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dB	
2400.8	25.40	--	--	--	25.40	30.00	-4.60	20.00
2440.0	25.20	--	--	--	25.20	30.00	-4.80	20.00
2472.8	25.64	--	--	--	25.64	30.00	-4.36	20.00

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

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

Equipment Configuration for Output Power Peak			
Variant:	50 kbps 2FSK	**Duty Cycle (%):**	99.0
Data Rate:	50.00 KBit/s	**Antenna Gain (dBi):**	0.00
Modulation:	2FSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Test Frequency	Measured Output Power (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dB	
2400.2	26.11	--	--	--	26.11	30.00	-3.89	20.00
2413.8	26.03	--	--	--	26.03	30.00	-3.97	20.00
2427.2	25.86	--	--	--	25.86	30.00	-4.14	20.00

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

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

Equipment Configuration for Output Power Peak			
Variant:	6.25 kbps OQPSK	**Duty Cycle (%):**	99.0
Data Rate:	6.25 KBit/s	**Antenna Gain (dBi):**	0.00
Modulation:	OQPSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Test Frequency	Measured Output Power (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dB	
2400.2	26.02	--	--	--	26.02	30.00	-3.98	20.00
2413.8	25.39	--	--	--	25.39	30.00	-4.61	20.00
2427.2	25.68	--	--	--	25.68	30.00	-4.32	20.00

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

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

Equipment Configuration for Output Power Peak			
Variant:	600 kbps OFDM	**Duty Cycle (%):**	99.0
Data Rate:	600.00 KBit/s	**Antenna Gain (dBi):**	0.00
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Test Frequency	Measured Output Power (dBm) Port(s)				Calculated Total Power Σ Port(s)	Limit	Margin	EUT Power Setting
MHz	a	b	c	d	dBm	dBm	dB	
2400.4	26.57	--	--	--	26.57	30.00	-3.43	16.00
2440.0	26.38	--	--	--	26.38	30.00	-3.62	16.00
2454.4	25.96	--	--	--	25.96	30.00	-4.04	16.00

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

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

2.4. Emissions

2.4.1. Conducted 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:	Transmitter Conducted Spurious and Band-Edge Emissions	**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)).

2.4.1.1. Conducted Unwanted Spurious Emissions

Equipment Configuration for Unwanted Emissions Peak

Variant:	300 kbps GFSK	**Duty Cycle (%):**	99
Data Rate:	300.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	GFSK	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Test Frequency	Frequency Range	Unwanted Emissions Peak (dBm)							
		Port a		Port b		Port c		Port d	
MHz	MHz	SE	Limit	SE	Limit	SE	Limit	SE	Limit
2400.8	30.0 - 26000.0	-40.457	5.00	--	--	--	--	--	--
2440.0	30.0 - 26000.0	-40.896	4.00	--	--	--	--	--	--
2472.8	30.0 - 26000.0	-46.725	4.94	--	--	--	--	--	--

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 Unwanted Emissions Peak			
Variant:	50 kbps 2FSK	**Duty Cycle (%):**	99
Data Rate:	50.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	2FSK	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Test Frequency	Frequency Range	Unwanted Emissions Peak (dBm)							
		Port a		Port b		Port c		Port d	
MHz	MHz	SE	Limit	SE	Limit	SE	Limit	SE	Limit
2400.2	30.0 - 26000.0	-40.502	5.00	--	--	--	--	--	--
2413.8	30.0 - 26000.0	-46.167	6.50	--	--	--	--	--	--
2427.2	30.0 - 26000.0	-47.971	5.74	--	--	--	--	--	--

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 Unwanted Emissions Peak			
Variant:	6.25 kbps OQPSK	**Duty Cycle (%):**	99
Data Rate:	6.25 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OQPSK	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Test Frequency	Frequency Range	Unwanted Emissions Peak (dBm)							
		Port a		Port b		Port c		Port d	
MHz	MHz	SE	Limit	SE	Limit	SE	Limit	SE	Limit
2400.2	30.0 - 26000.0	-46.588	5.98	--	--	--	--	--	--
2413.8	30.0 - 26000.0	-45.752	6.28	--	--	--	--	--	--
2427.2	30.0 - 26000.0	-47.403	5.74	--	--	--	--	--	--

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 Unwanted Emissions Peak			
Variant:	600 kbps OFDM	**Duty Cycle (%):**	99
Data Rate:	600.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Test Frequency	Frequency Range	Unwanted Emissions Peak (dBm)							
		Port a		Port b		Port c		Port d	
MHz	MHz	SE	Limit	SE	Limit	SE	Limit	SE	Limit
2400.4	30.0 - 26000.0	-40.935	3.00	--	--	--	--	--	--
2440.0	30.0 - 26000.0	-40.496	2.00	--	--	--	--	--	--
2454.4	30.0 - 26000.0	-40.455	2.00	--	--	--	--	--	--

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).

2.4.1.2. Conducted Band-Edge Emissions

Conducted Low Band-Edge Emissions

Equipment Configuration for Conducted Low Band-Edge Emissions (Hopping) Peak			
Variant:	300 kbps GFSK	**Duty Cycle (%):**	99.0
Data Rate:	300.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	GFSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency:	2400.8 MHz					
Band-Edge Frequency:	2400.0 MHz					
Test Frequency Range:	2350.0 - 2405.0 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	-23.44	6.00	2400.50	--	--	-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).

Equipment Configuration for Conducted Low Band-Edge Emissions (Hopping) Peak			
Variant:	50 kbps 2FSK	**Duty Cycle (%):**	99.0
Data Rate:	50.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	2FSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency:	2400.2 MHz					
Band-Edge Frequency:	2400.0 MHz					
Test Frequency Range:	2350.0 - 2405.0 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	-3.12	7.29	2400.00	--	--	0.000

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 (Hopping) Peak			
Variant:	6.25 kbps OQPSK	**Duty Cycle (%):**	99.0
Data Rate:	6.25 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OQPSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency:	2400.2 MHz					
Band-Edge Frequency:	2400.0 MHz					
Test Frequency Range:	2350.0 - 2405.0 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	-0.01	7.23	2400.00	--	--	0.000

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 (Hopping) Peak			
Variant:	600 kbps OFDM	**Duty Cycle (%):**	99.0
Data Rate:	600.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency:	2400.4 MHz					
Band-Edge Frequency:	2400.0 MHz					
Test Frequency Range:	2350.0 - 2405.0 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	-32.66	5.00	2400.50	--	--	-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).

Equipment Configuration for Conducted Low Band-Edge Emissions (Static) Peak			
Variant:	300 kbps GFSK	**Duty Cycle (%):**	99.0
Data Rate:	300.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	GFSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency:	2400.8 MHz					
Band-Edge Frequency:	2400.0 MHz					
Test Frequency Range:	2350.0 - 2405.0 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	-25.90	5.00	2400.50	--	--	-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).

Equipment Configuration for Conducted Low Band-Edge Emissions (Static) Peak			
Variant:	50 kbps 2FSK	**Duty Cycle (%):**	99.0
Data Rate:	50.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	2FSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency:	2400.2 MHz					
Band-Edge Frequency:	2400.0 MHz					
Test Frequency Range:	2350.0 - 2405.0 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	-8.85	6.03	2400.00	--	--	0.000

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 (Static) Peak			
Variant:	6.25 kbps OQPSK	**Duty Cycle (%):**	99.0
Data Rate:	6.25 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OQPSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency:	2400.2 MHz					
Band-Edge Frequency:	2400.0 MHz					
Test Frequency Range:	2350.0 - 2405.0 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	-2.47	6.21	2400.00	--	--	0.000

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 (Static) Peak			
Variant:	600 kbps OFDM	**Duty Cycle (%):**	99.0
Data Rate:	600.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency:	2400.4 MHz					
Band-Edge Frequency:	2400.0 MHz					
Test Frequency Range:	2350.0 - 2405.0 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	-1.33	5.00	2400.00	--	--	0.000

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).

Conducted High Band-Edge Emissions

Equipment Configuration for Conducted Upper Band-Edge Emissions (Hopping) Peak			
Variant:	300 kbps GFSK	**Duty Cycle (%):**	99.0
Data Rate:	300.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	GFSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency:	2472.8 MHz					
Band-Edge Frequency:	2483.5 MHz					
Test Frequency Range:	2470.0 - 2534.0 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	-41.20	6.00	2472.90	--	--	-10.600

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 Upper Band-Edge Emissions (Hopping) Peak			
Variant:	50 kbps 2FSK	**Duty Cycle (%):**	99.0
Data Rate:	50.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	2FSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency:	2427.2 MHz					
Band-Edge Frequency:	2483.6 MHz					
Test Frequency Range:	2420.0 - 2534.0 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	-49.71	7.12	2427.60	--	--	-56.000

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 Upper Band-Edge Emissions (Hopping) Peak			
Variant:	6.25 kbps OQPSK	**Duty Cycle (%):**	99.0
Data Rate:	6.25 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OQPSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency:	2427.2 MHz					
Band-Edge Frequency:	2483.5 MHz					
Test Frequency Range:	2420.0 - 2534.0 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	-49.03	7.01	2427.60	--	--	-55.900

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 Upper Band-Edge Emissions (Hopping) Peak			
Variant:	600 kbps OFDM	**Duty Cycle (%):**	99.0
Data Rate:	600.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency:	2454.4 MHz					
Band-Edge Frequency:	2483.5 MHz					
Test Frequency Range:	2450.0 - 2534.0 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	-43.12	4.00	2454.50	--	--	-29.000

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 Upper Band-Edge Emissions (Static) Peak			
Variant:	300 kbps GFSK	**Duty Cycle (%):**	99.0
Data Rate:	300.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	GFSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency:	2472.8 MHz					
Band-Edge Frequency:	2483.5 MHz					
Test Frequency Range:	2470.0 - 2533.0 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	-34.70	5.00	2473.00	--	--	-10.500

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).

Equipment Configuration for Conducted Upper Band-Edge Emissions (Static) Peak			
Variant:	50 kbps 2FSK	**Duty Cycle (%):**	99.0
Data Rate:	50.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	2FSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency:	2427.2 MHz					
Band-Edge Frequency:	2483.0 MHz					
Test Frequency Range:	2420.0 - 2533.0 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	-48.67	6.39	2427.50	--	--	-55.500

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).

Equipment Configuration for Conducted Upper Band-Edge Emissions (Static) Peak			
Variant:	6.25 kbps OQPSK	**Duty Cycle (%):**	99.0
Data Rate:	6.25 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OQPSK	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency:	2427.2 MHz					
Band-Edge Frequency:	2483.5 MHz					
Test Frequency Range:	2420.0 - 2533.0 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	-49.59	6.20	2427.50	--	--	-56.000

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 Upper Band-Edge Emissions (Static) Peak			
Variant:	600 kbps OFDM	**Duty Cycle (%):**	99.0
Data Rate:	600.00 KBit/s	**Antenna Gain (dBi):**	Not Applicable
Modulation:	OFDM	**Beam Forming Gain (Y)(dB):**	Not Applicable
TPC:	Not Applicable	**Tested By:**	CC
Engineering Test Notes:	None		

Test Measurement Results

Channel Frequency:	2454.4 MHz					
Band-Edge Frequency:	2483.5 MHz					
Test Frequency Range:	2450.0 - 2533.0 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	-45.26	3.00	2454.70	--	--	-28.800

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"

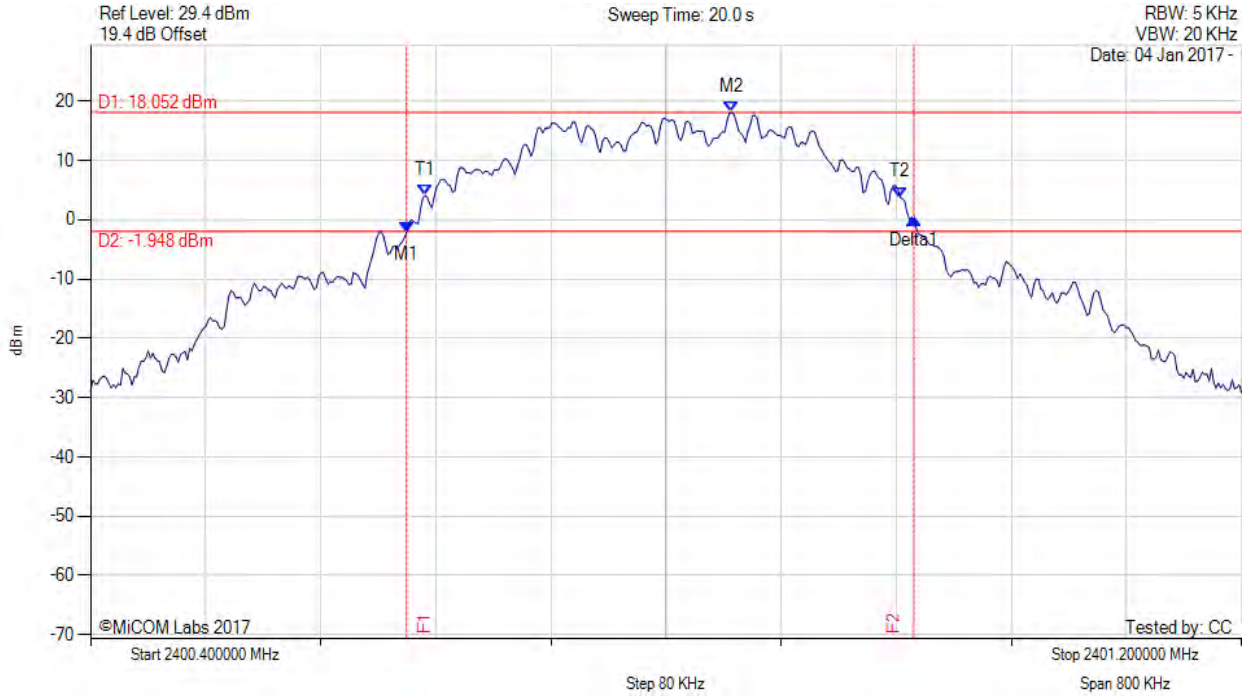
Note: click the links in the above matrix to view the graphical image (plot).

A. APPENDIX - GRAPHICAL IMAGES

A.1. 20 dB & 99% Bandwidth

20 dB 99% BANDWIDTH

Variant: 300 kbps GFSK, Channel: 2400.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

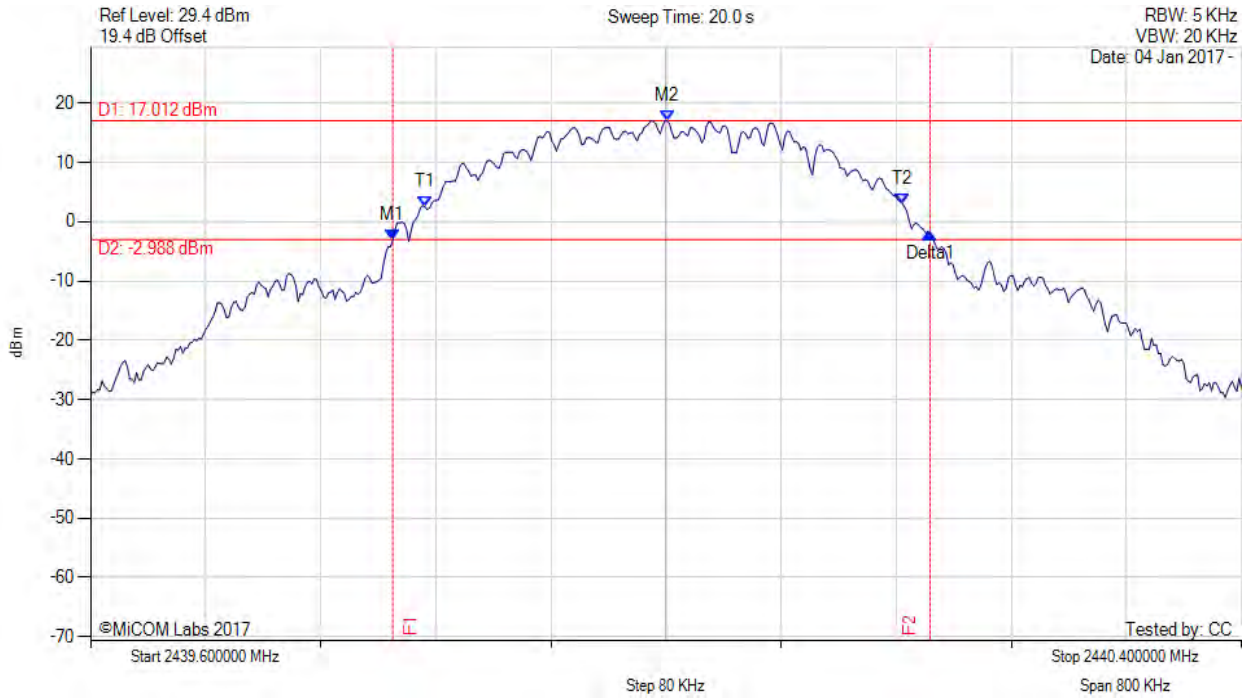


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = MAX HOLD	M1 : 2400.620 MHz : -2.149 dBm M2 : 2400.846 MHz : 18.052 dBm Delta1 : 353 KHz : 2.245 dB T1 : 2400.632 MHz : 4.076 dBm T2 : 2400.963 MHz : 3.771 dBm OBW : 330 KHz	Measured 20 dB Bandwidth: 0.353 MHz Limit: -- kHz Margin: 0.15 MHz

back to matrix

20 dB 99% BANDWIDTH

Variant: 300 kbps GFSK, Channel: 2440.00 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

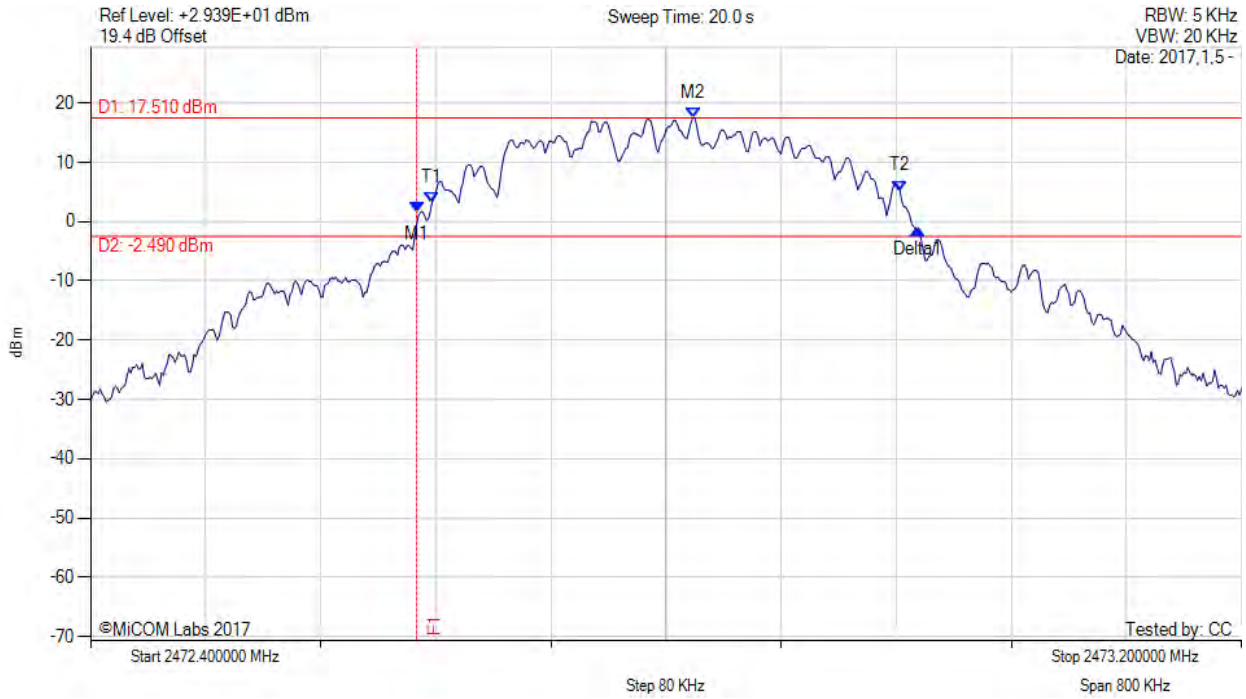


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = MAX HOLD	M1 : 2439.810 MHz : -3.172 dBm M2 : 2440.001 MHz : 17.012 dBm Delta1 : 374 KHz : 1.287 dB T1 : 2439.832 MHz : 2.475 dBm T2 : 2440.164 MHz : 3.055 dBm OBW : 332 KHz	Measured 20 dB Bandwidth: 0.374 MHz Limit: -- kHz Margin: 0.13 MHz

back to matrix

20 dB 99% BANDWIDTH

Variant: 300 kbps GFSK, Channel: 2472.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

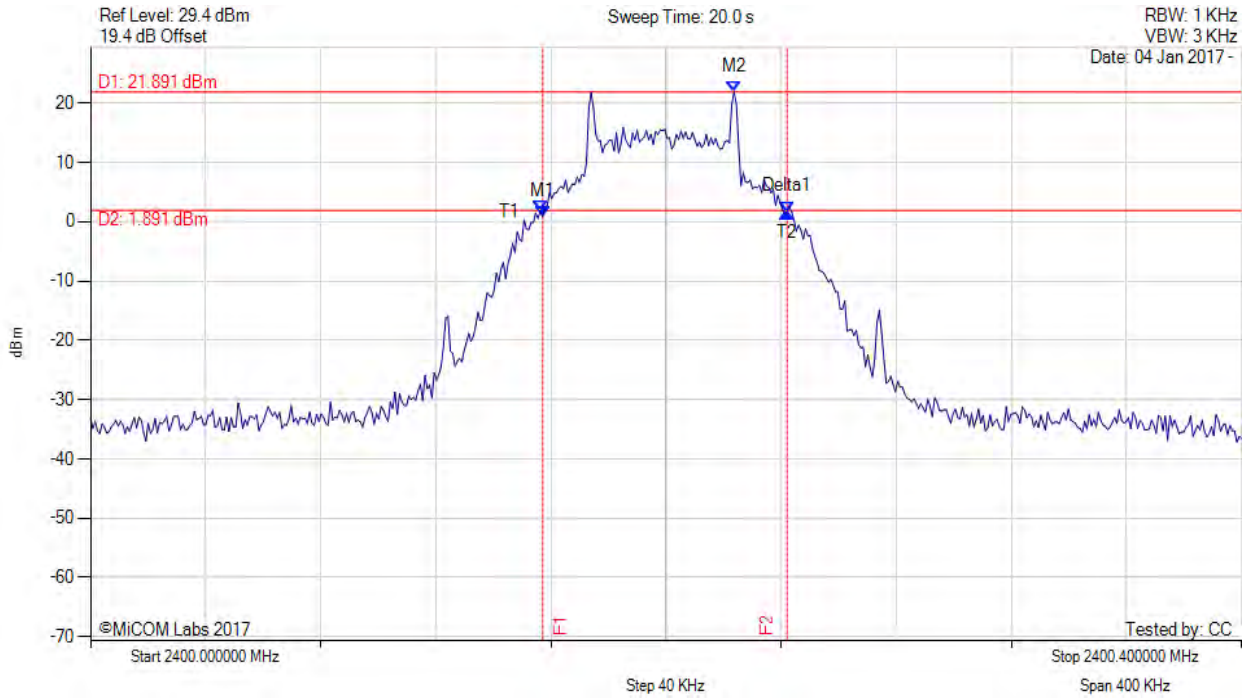


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = MAXH	M1 : 2472.627 MHz : 1.586 dBm M2 : 2472.819 MHz : 17.510 dBm Delta1 : 348 KHz : -2.738 dB T1 : 2472.637 MHz : 3.150 dBm T2 : 2472.963 MHz : 5.161 dBm OBW : 329 KHz	Measured 20 dB Bandwidth: 0.348 MHz Limit: -- kHz Margin: 0.15 MHz

back to matrix

20 dB 99% BANDWIDTH

Variant: 50 kbps 2FSK, Channel: 2400.20 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

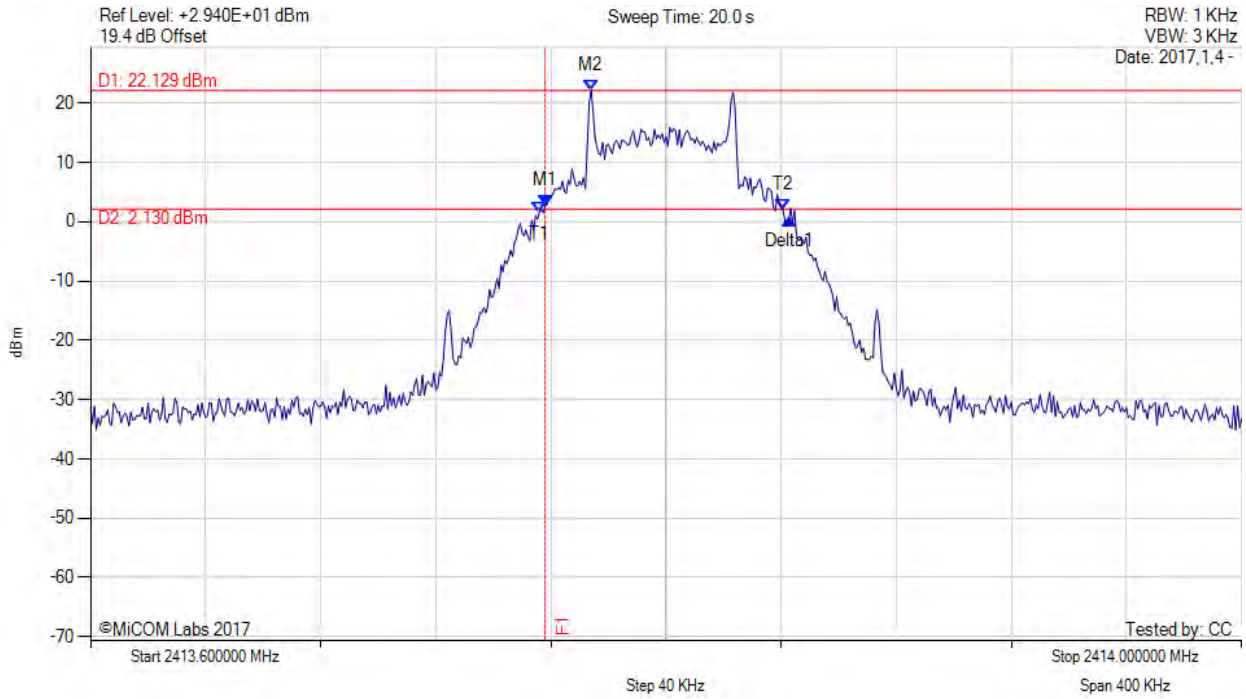


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = MAX HOLD	M1 : 2400.157 MHz : 0.883 dBm M2 : 2400.224 MHz : 21.891 dBm Delta1 : 85 KHz : 0.787 dB T1 : 2400.156 MHz : 1.835 dBm T2 : 2400.242 MHz : 1.670 dBm OBW : 86 KHz	Measured 20 dB Bandwidth: 0.085 MHz Limit: -- kHz Margin: 0.41 MHz

back to matrix

20 dB 99% BANDWIDTH

Variant: 50 kbps 2FSK, Channel: 2413.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

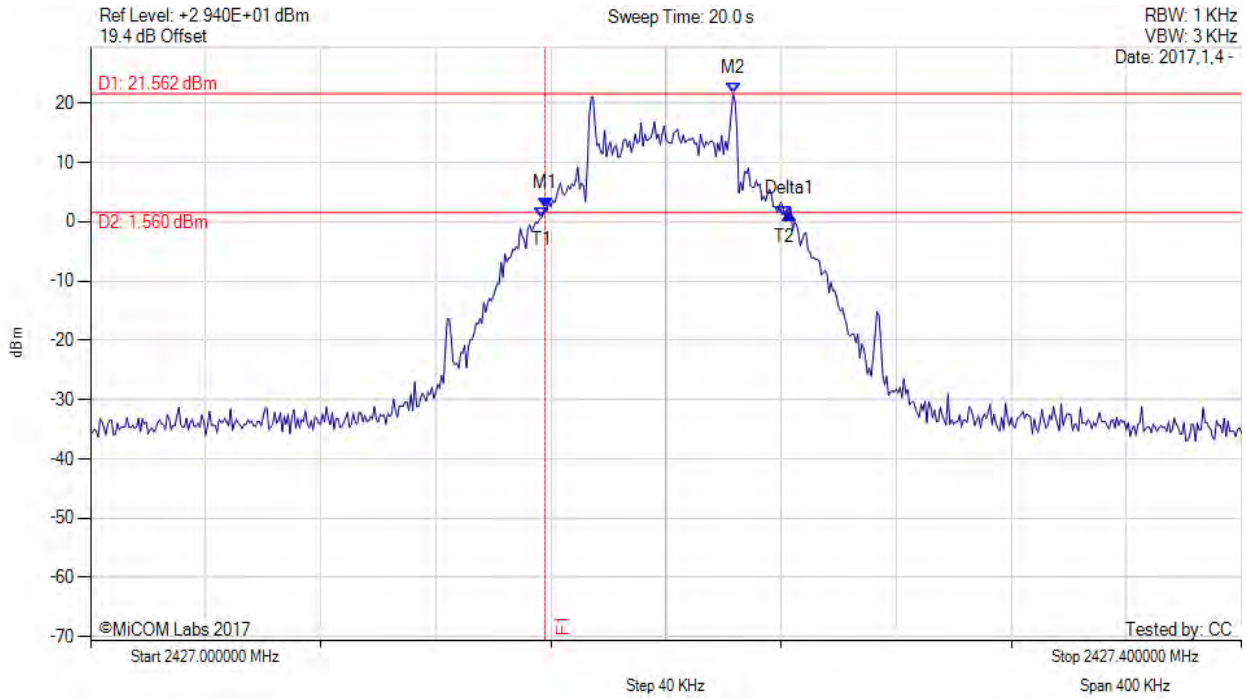


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = MAXH	M1 : 2413.758 MHz : 2.730 dBm M2 : 2413.774 MHz : 22.129 dBm Delta1 : 85 KHz : -2.303 dB T1 : 2413.756 MHz : 1.559 dBm T2 : 2413.841 MHz : 2.011 dBm OBW : 85 KHz	Measured 20 dB Bandwidth: 0.085 MHz Limit: -- kHz Margin: 0.41 MHz

back to matrix

20 dB 99% BANDWIDTH

Variant: 50 kbps 2FSK, Channel: 2427.20 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

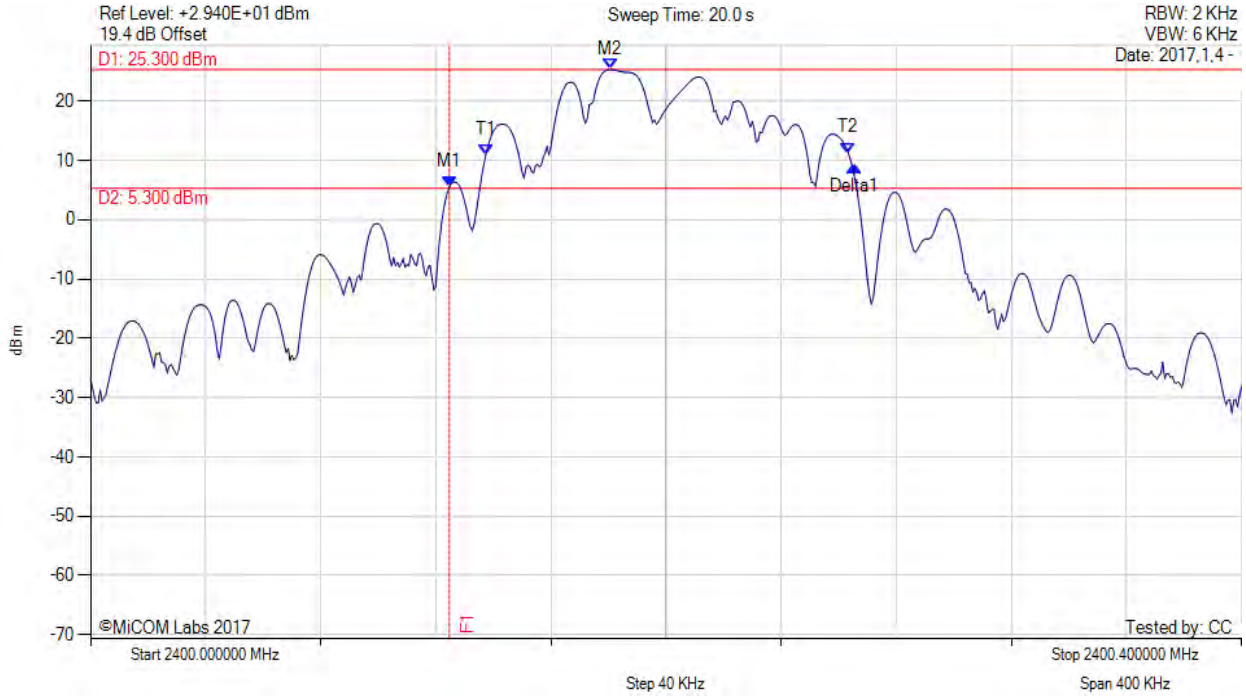


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = MAXH	M1 : 2427.158 MHz : 2.312 dBm M2 : 2427.223 MHz : 21.562 dBm Delta1 : 85 KHz : -0.884 dB T1 : 2427.157 MHz : 0.659 dBm T2 : 2427.241 MHz : 0.964 dBm OBW : 85 KHz	Measured 20 dB Bandwidth: 0.085 MHz Limit: -- kHz Margin: 0.41 MHz

back to matrix

20 dB 99% BANDWIDTH

Variant: 6.25 kbps OQPSK, Channel: 2400.20 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

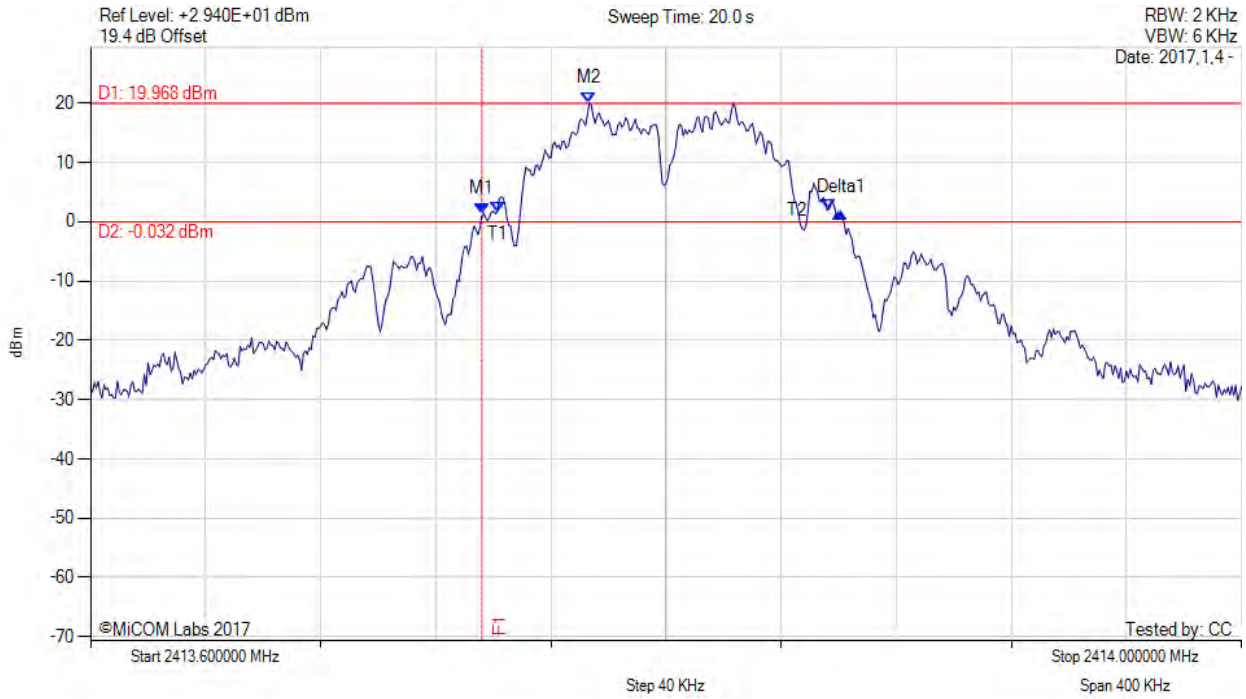


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = MAXH	M1 : 2400.125 MHz : 5.483 dBm M2 : 2400.181 MHz : 25.300 dBm Delta1 : 141 KHz : 3.605 dB T1 : 2400.137 MHz : 10.842 dBm T2 : 2400.263 MHz : 11.263 dBm OBW : 126 KHz	Measured 20 dB Bandwidth: 0.141 MHz Limit: -- kHz Margin: 0.36 MHz

back to matrix

20 dB 99% BANDWIDTH

Variant: 6.25 kbps OQPSK, Channel: 2413.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

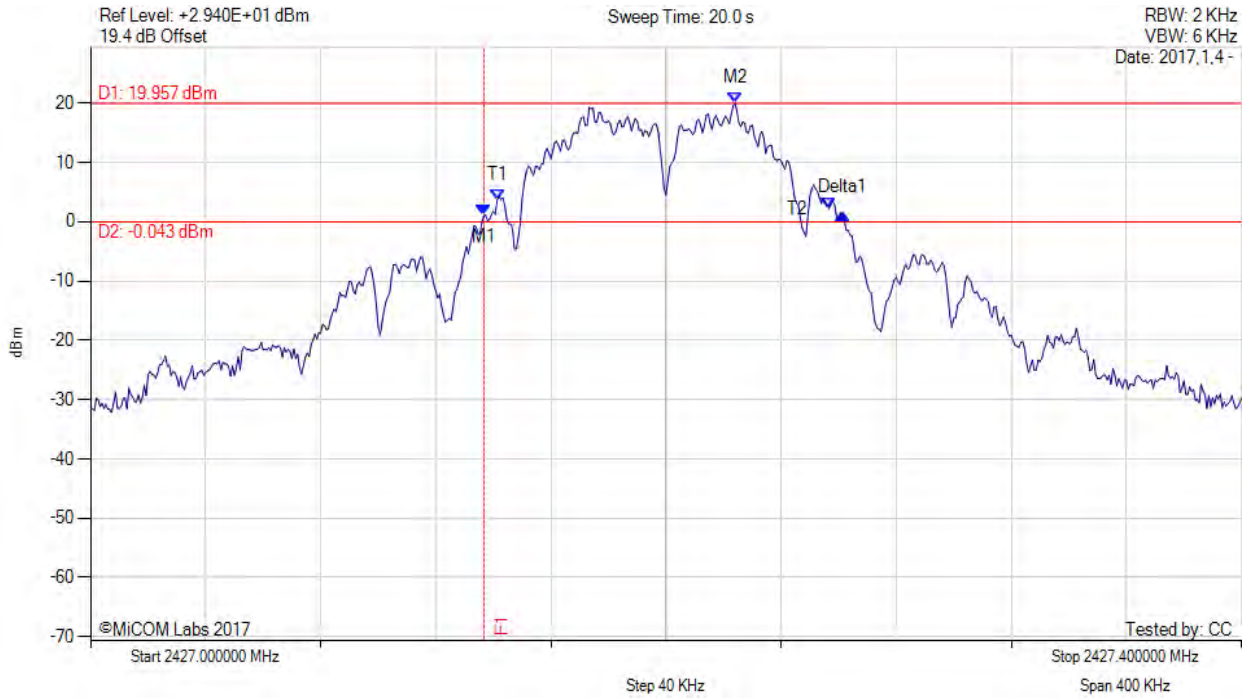


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = MAXH	M1 : 2413.736 MHz : 1.395 dBm M2 : 2413.773 MHz : 19.968 dBm Delta1 : 125 KHz : 0.130 dB T1 : 2413.741 MHz : 1.560 dBm T2 : 2413.857 MHz : 2.026 dBm OBW : 116 KHz	Measured 20 dB Bandwidth: 0.125 MHz Limit: -- kHz Margin: 0.38 MHz

back to matrix

20 dB 99% BANDWIDTH

Variant: 6.25 kbps OQPSK, Channel: 2427.20 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

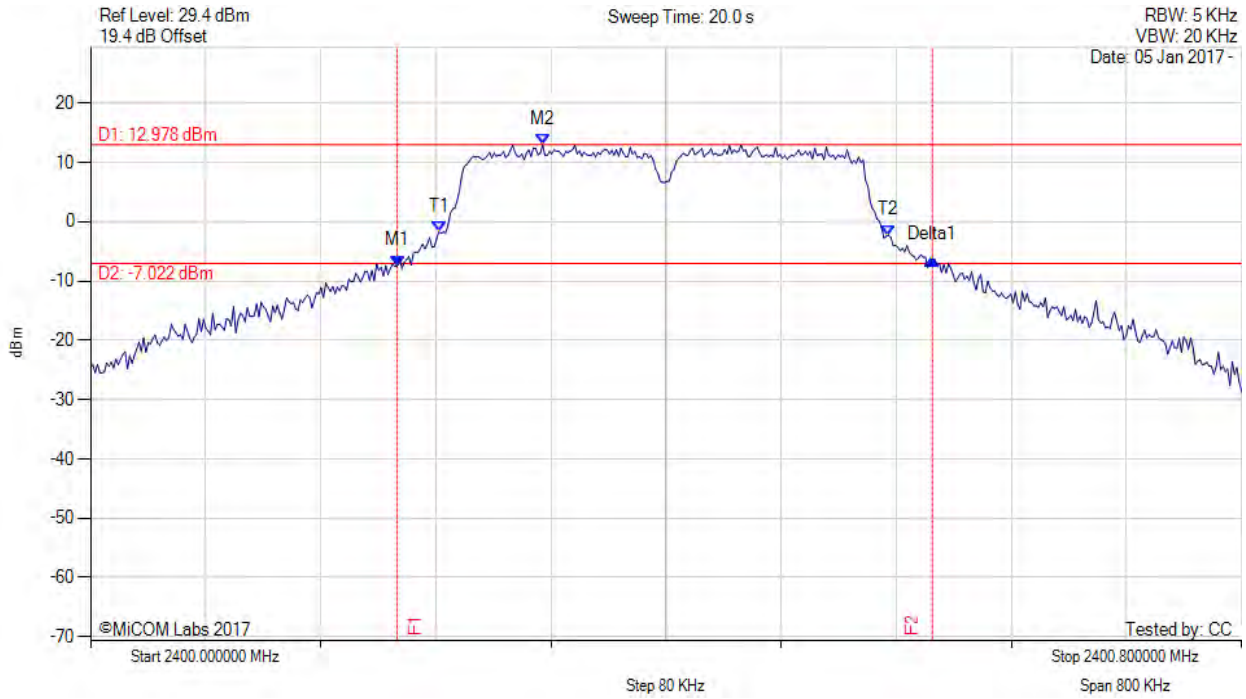


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = MAXH	M1 : 2427.137 MHz : 1.125 dBm M2 : 2427.224 MHz : 19.957 dBm Delta1 : 125 KHz : 0.308 dB T1 : 2427.141 MHz : 3.659 dBm T2 : 2427.257 MHz : 2.211 dBm OBW : 116 KHz	Measured 20 dB Bandwidth: 0.125 MHz Limit: -- kHz Margin: 0.38 MHz

back to matrix

20 dB 99% BANDWIDTH

Variant: 600 kbps OFDM, Channel: 2400.40 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

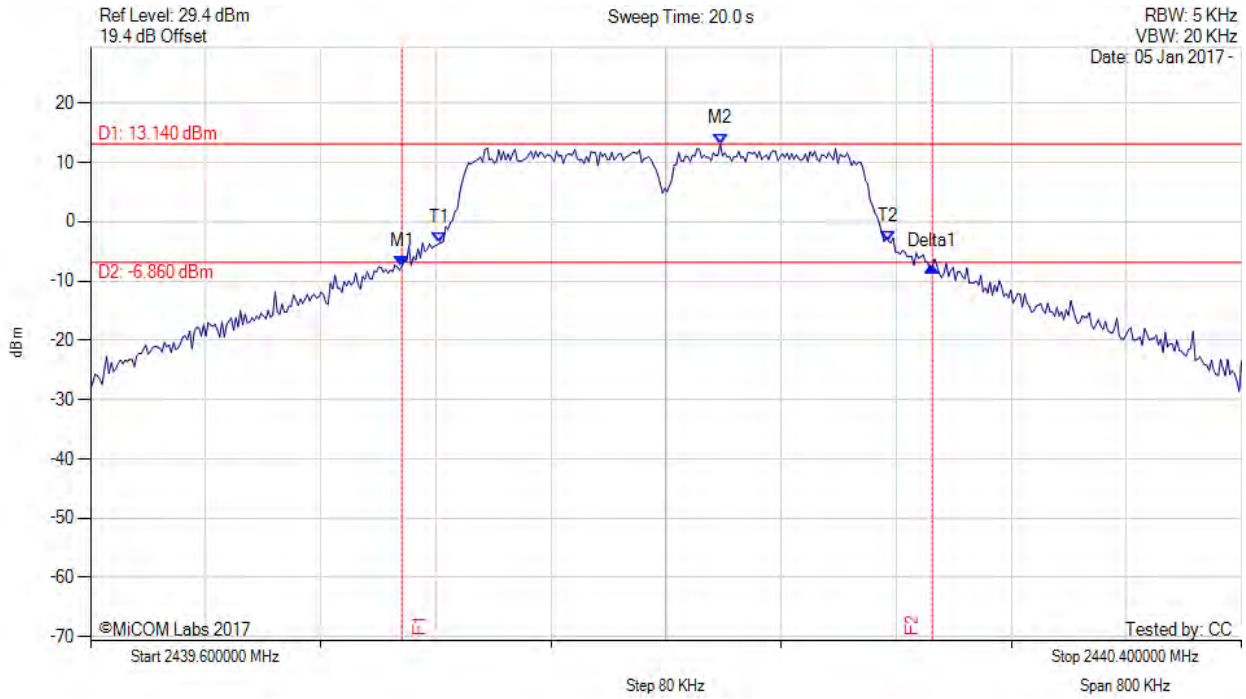


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = MAX HOLD	M1 : 2400.213 MHz : -7.443 dBm M2 : 2400.314 MHz : 12.978 dBm Delta1 : 372 KHz : 1.149 dB T1 : 2400.242 MHz : -1.753 dBm T2 : 2400.555 MHz : -2.284 dBm OBW : 313 KHz	Measured 20 dB Bandwidth: 0.372 MHz Limit: -- kHz Margin: 0.13 MHz

back to matrix

20 dB 99% BANDWIDTH

Variant: 600 kbps OFDM, Channel: 2440.00 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

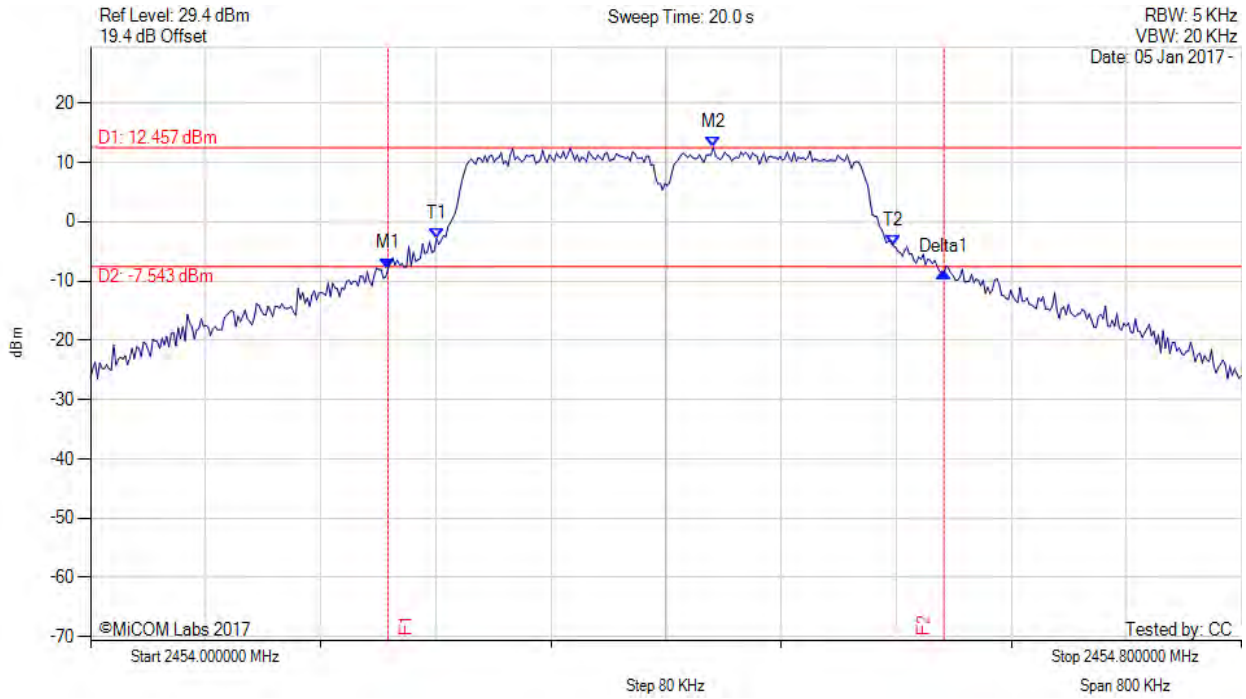


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = MAX HOLD	M1 : 2439.816 MHz : -7.498 dBm M2 : 2440.038 MHz : 13.140 dBm Delta1 : 369 KHz : -0.026 dB T1 : 2439.842 MHz : -3.677 dBm T2 : 2440.155 MHz : -3.315 dBm OBW : 313 KHz	Measured 20 dB Bandwidth: 0.369 MHz Limit: -- kHz Margin: 0.13 MHz

back to matrix

20 dB 99% BANDWIDTH

Variant: 600 kbps OFDM, Channel: 2454.40 MHz, Chain a, Temp: 20, Voltage: 4 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = MAX HOLD	M1 : 2454.207 MHz : -7.897 dBm M2 : 2454.433 MHz : 12.457 dBm Delta1 : 386 KHz : -0.679 dB T1 : 2454.240 MHz : -2.825 dBm T2 : 2454.558 MHz : -4.051 dBm OBW : 317 KHz	Measured 20 dB Bandwidth: 0.386 MHz Limit: -- kHz Margin: 0.11 MHz

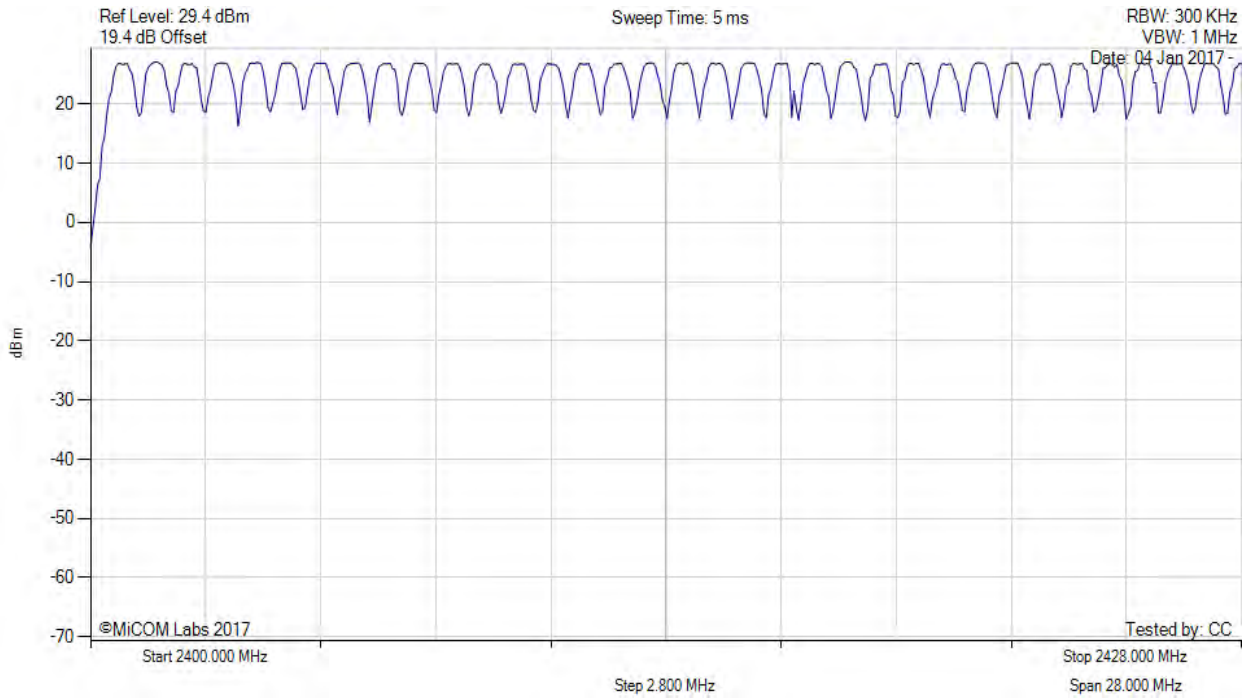
back to matrix

A.2. Frequency Hopping Tests

A.2.1. Number of Hopping Channels

NUMBER OF HOPPING CHANNELS

Variant: 300 kbps GFSK, Channel: 2440.00 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

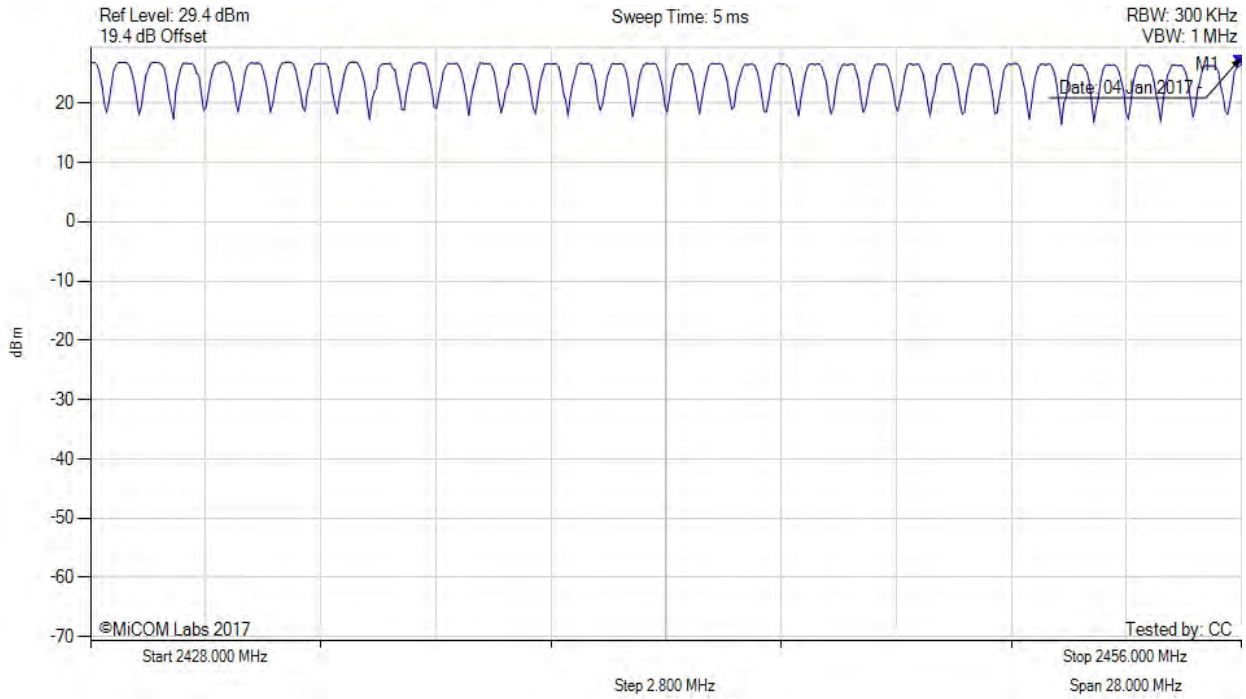


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW		Channel Frequency: 2440.00 MHz

back to matrix

NUMBER OF HOPPING CHANNELS

Variant: 300 kbps GFSK, Channel: 2440.00 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

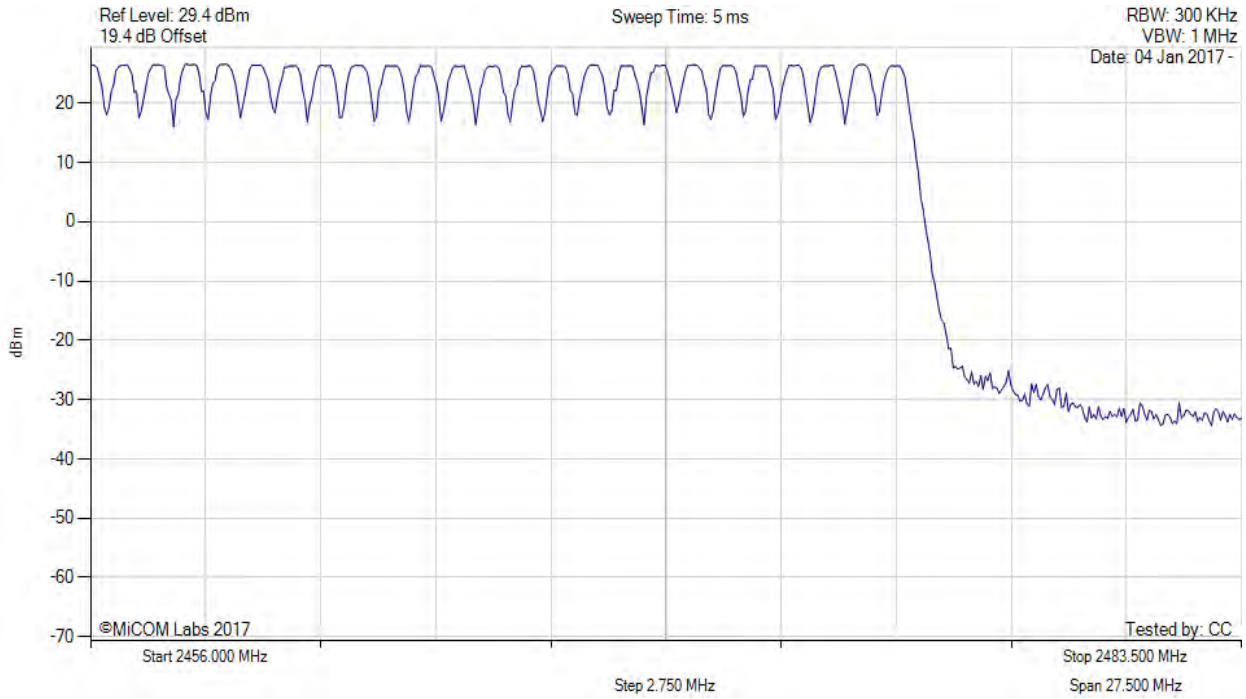


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2456.000 MHz : 26.435 dBm	Channel Frequency: 2440.00 MHz

back to matrix

NUMBER OF HOPPING CHANNELS

Variant: 300 kbps GFSK, Channel: 2440.00 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

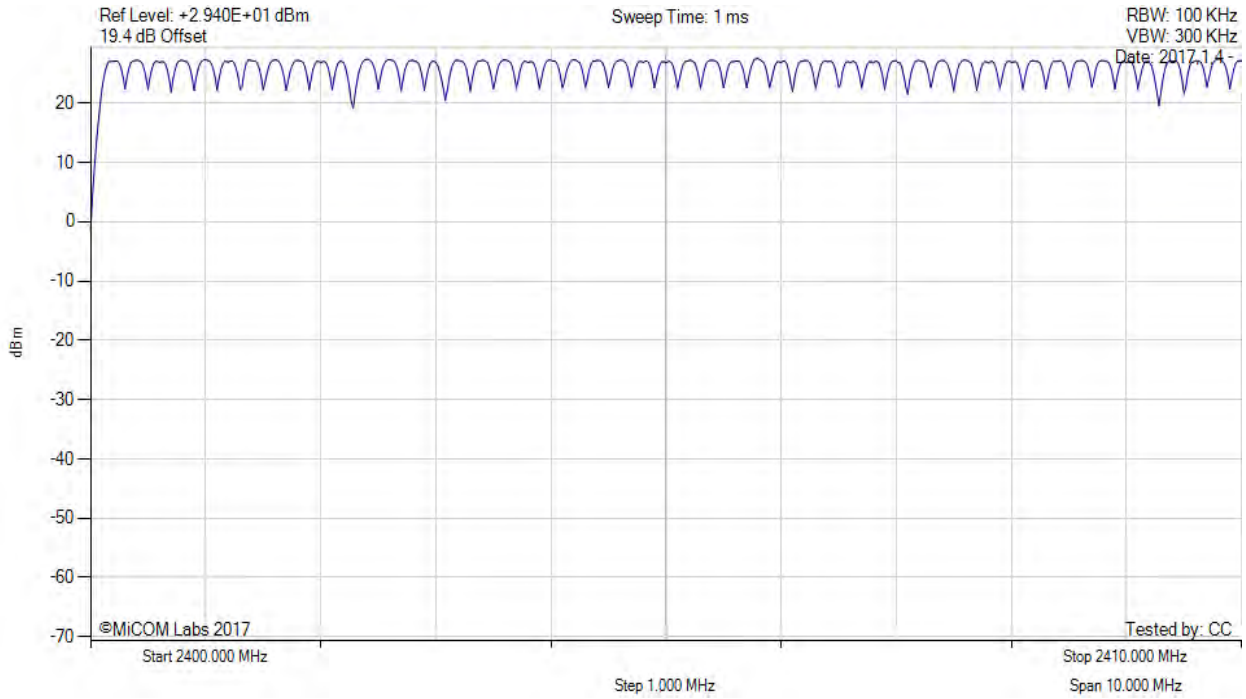


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW		Channel Frequency: 2440.00 MHz

back to matrix

NUMBER OF HOPPING CHANNELS

Variant: 50 kbps 2FSK, Channel: 2413.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

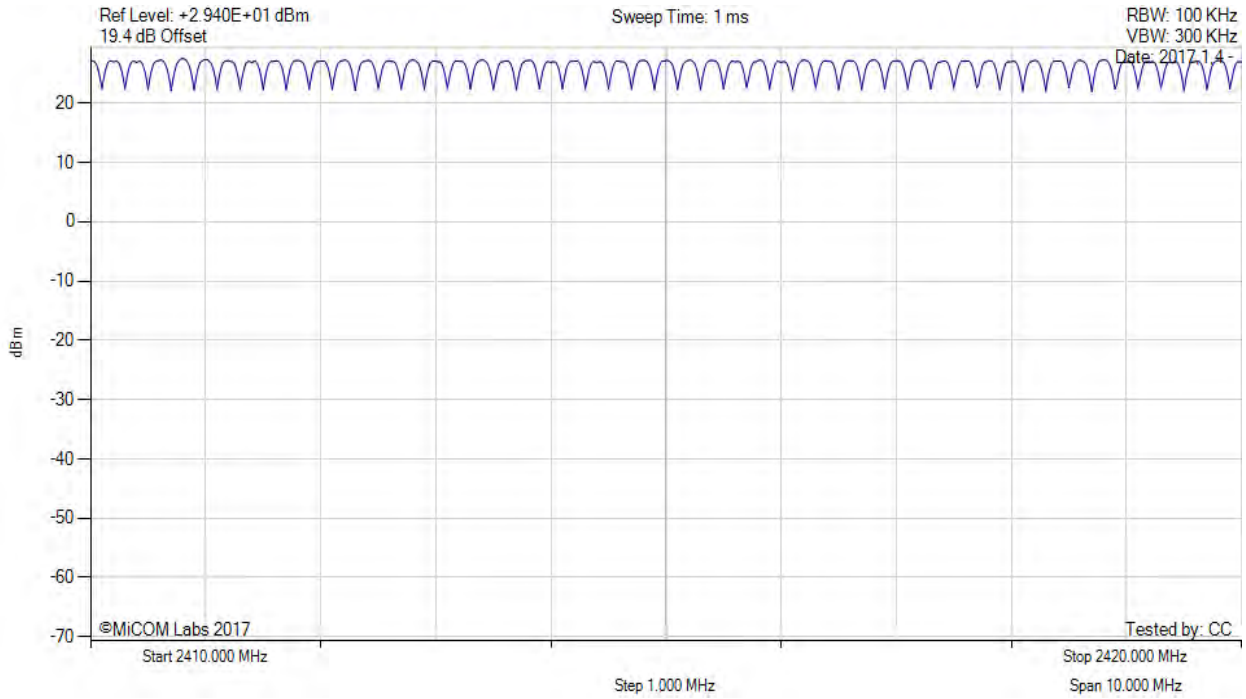


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW		Channel Frequency: 2413.80 MHz

back to matrix

NUMBER OF HOPPING CHANNELS

Variant: 50 kbps 2FSK, Channel: 2413.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

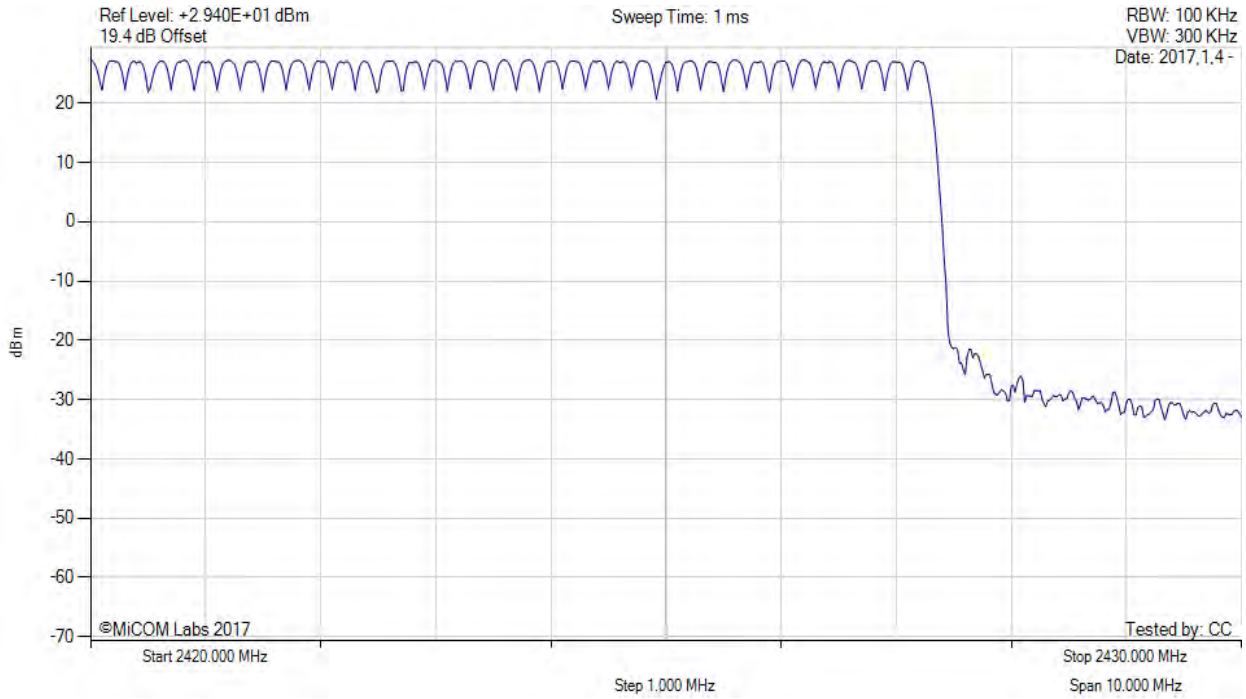


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW		Channel Frequency: 2413.80 MHz

back to matrix

NUMBER OF HOPPING CHANNELS

Variant: 50 kbps 2FSK, Channel: 2413.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

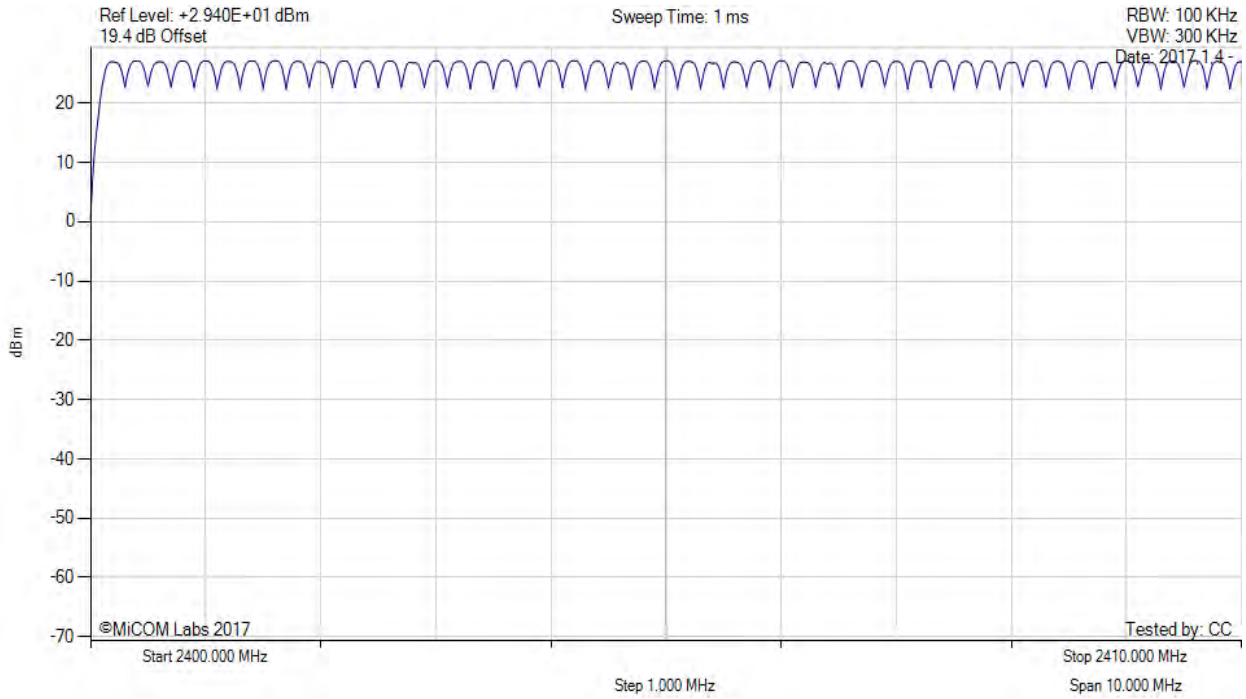


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW		Channel Frequency: 2413.80 MHz

back to matrix

NUMBER OF HOPPING CHANNELS

Variant: 6.25 kbps OQPSK, Channel: 2413.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

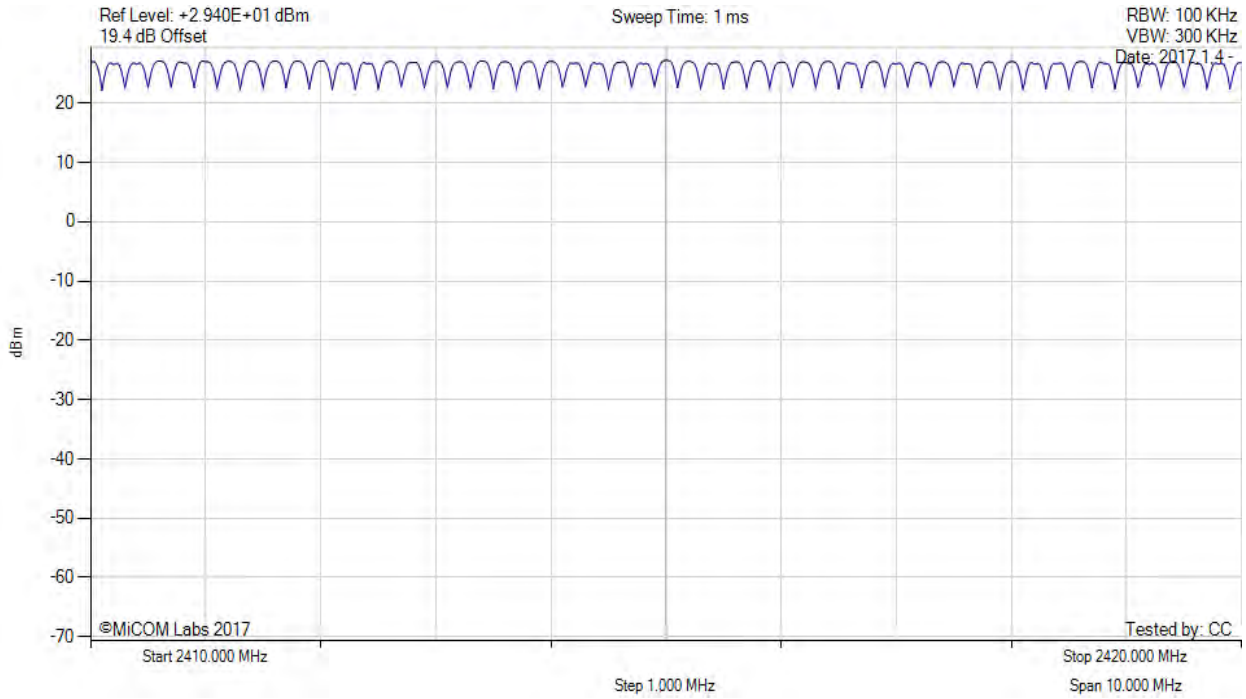


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW		Channel Frequency: 2413.80 MHz

back to matrix

NUMBER OF HOPPING CHANNELS

Variant: 6.25 kbps OQPSK, Channel: 2413.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

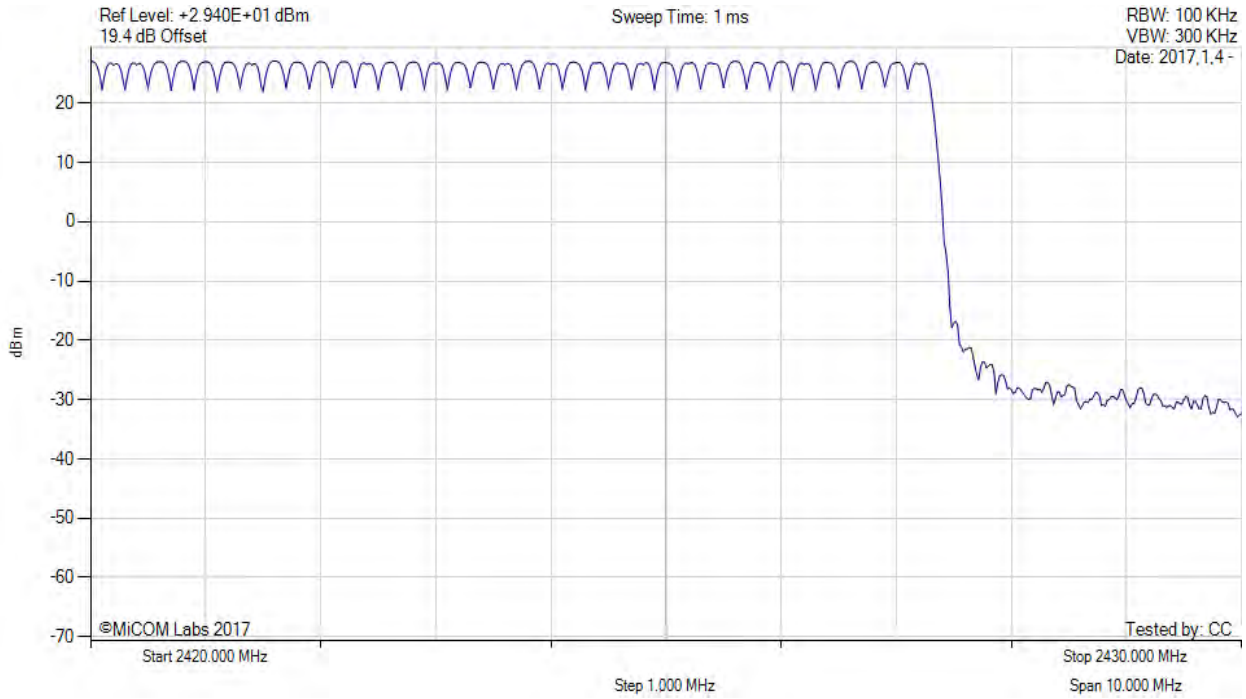


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW		Channel Frequency: 2413.80 MHz

back to matrix

NUMBER OF HOPPING CHANNELS

Variant: 6.25 kbps OQPSK, Channel: 2413.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

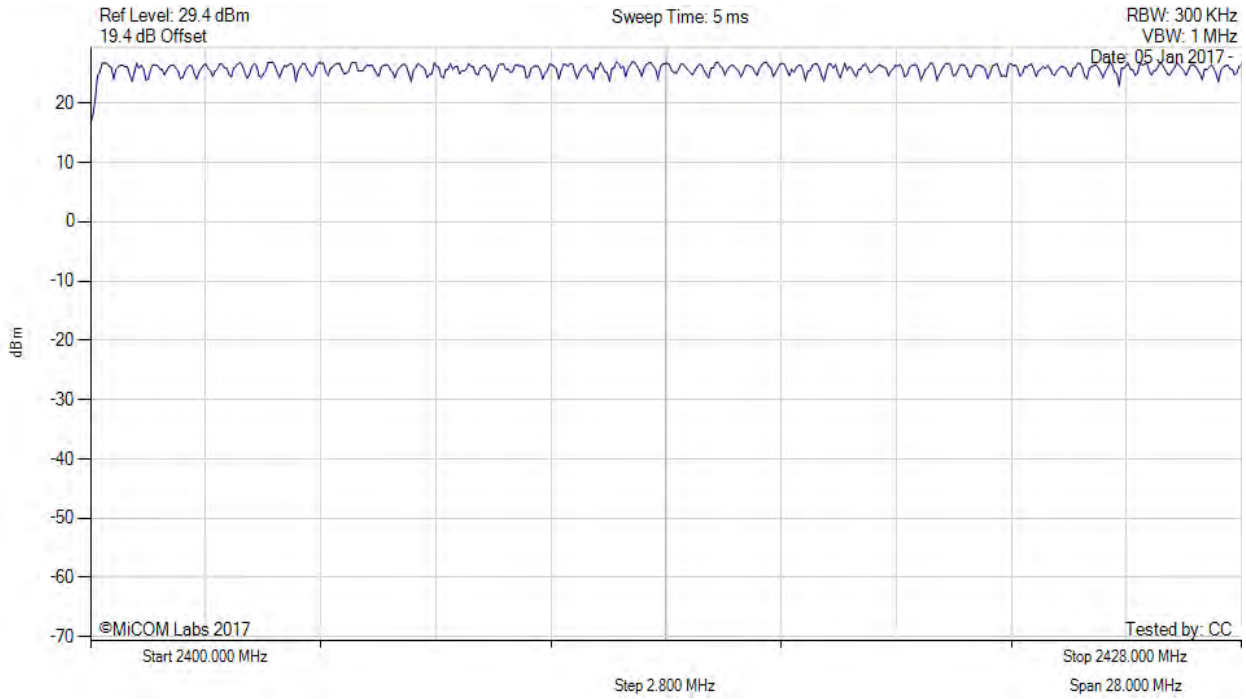


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW		Channel Frequency: 2413.80 MHz

back to matrix

NUMBER OF HOPPING CHANNELS

Variant: 600 kbps OFDM, Channel: 2440.00 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

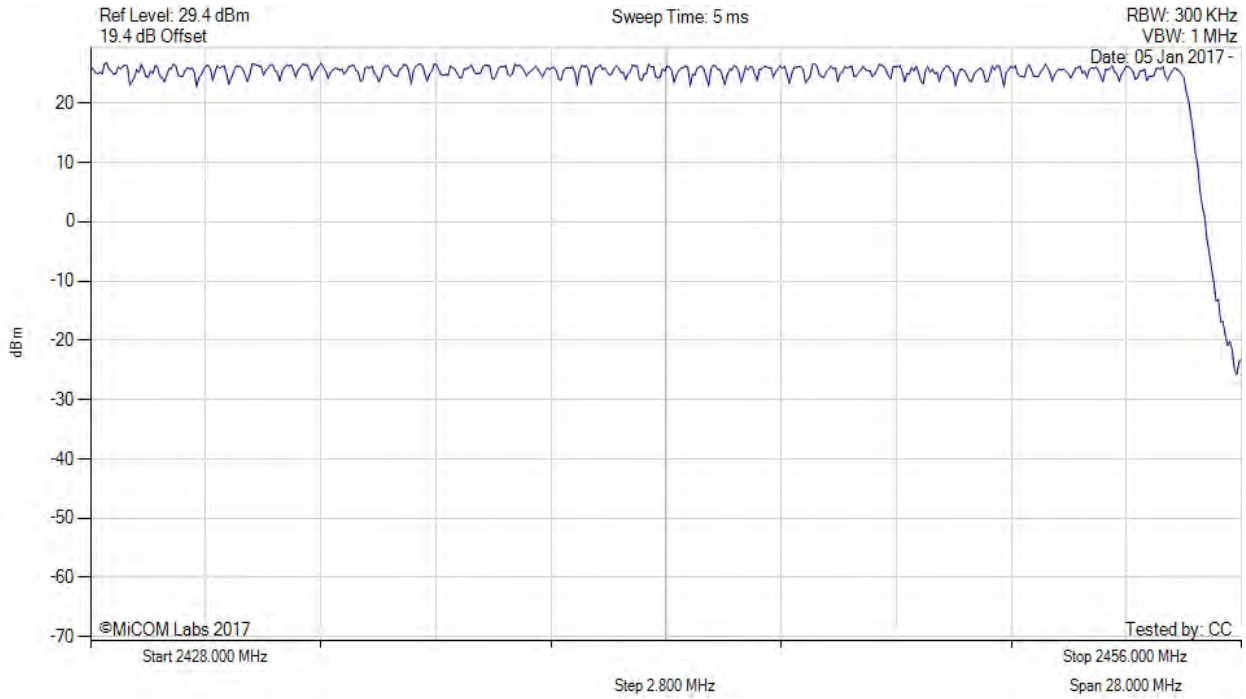


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW		Channel Frequency: 2440.00 MHz

back to matrix

NUMBER OF HOPPING CHANNELS

Variant: 600 kbps OFDM, Channel: 2440.00 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

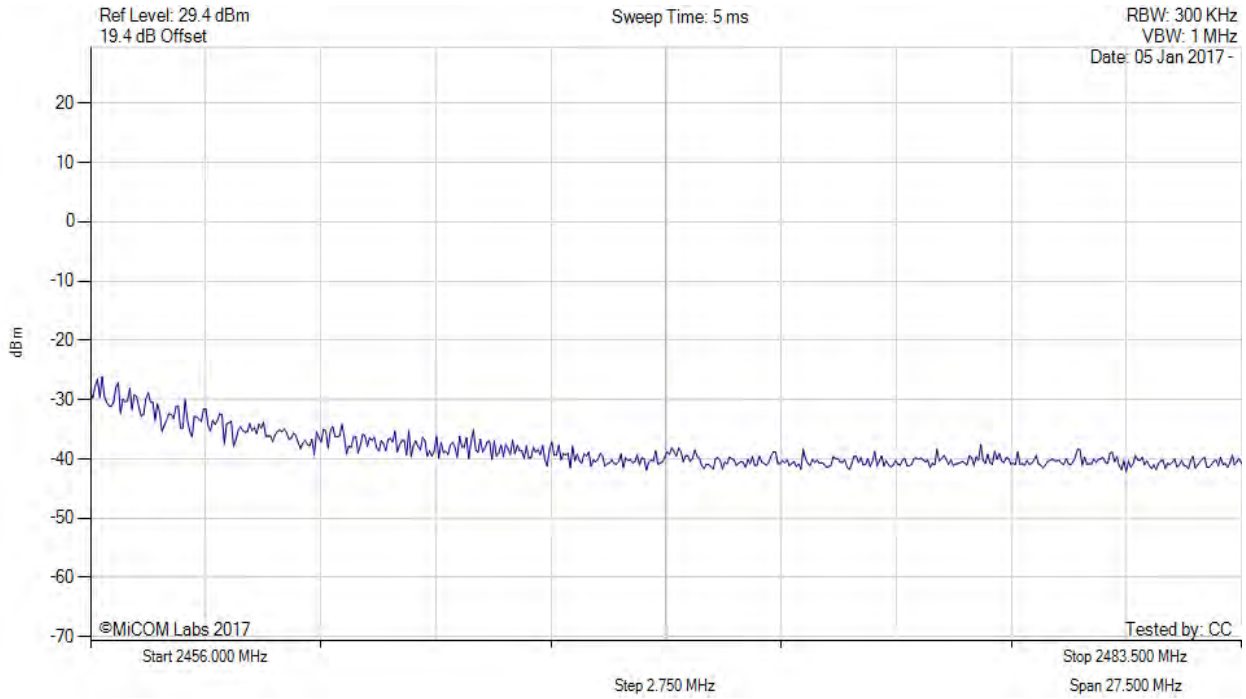


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW		Channel Frequency: 2440.00 MHz

back to matrix

NUMBER OF HOPPING CHANNELS

Variant: 600 kbps OFDM, Channel: 2440.00 MHz, Chain a, Temp: 20, Voltage: 4 Vdc



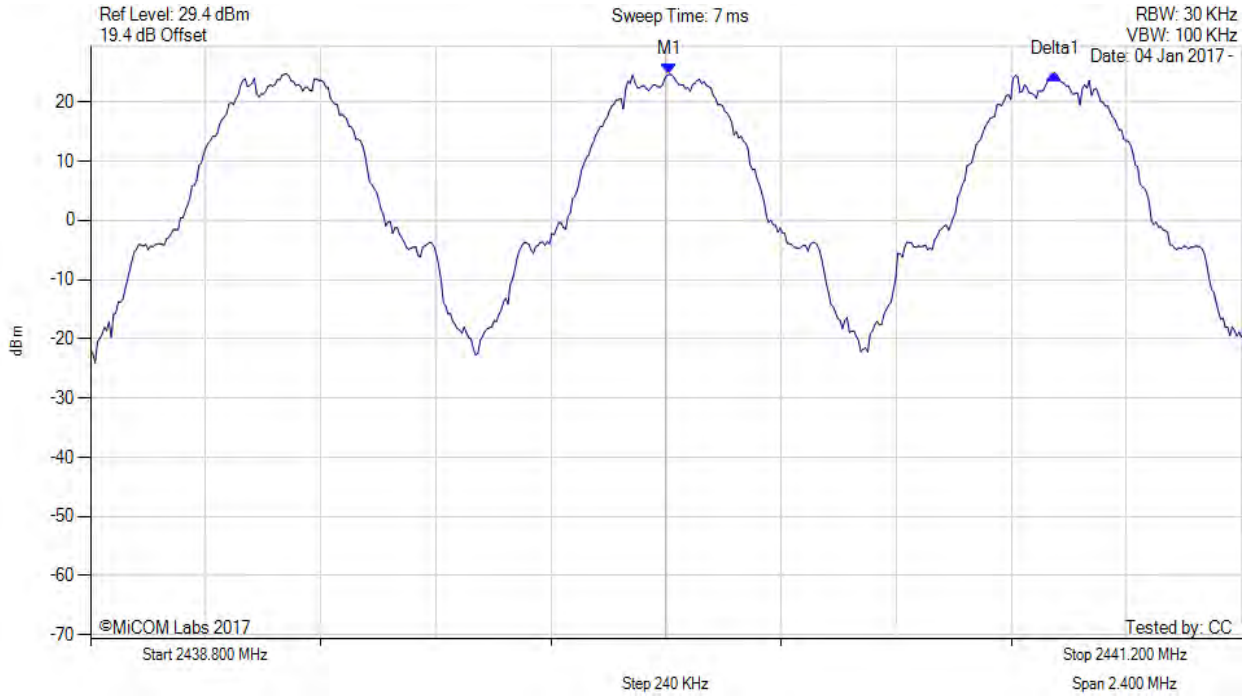
Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW		Channel Frequency: 2440.00 MHz

back to matrix

A.2.2. Channel Separation

CHANNEL SEPARATION

Variant: 300 kbps GFSK, Channel: 2440.00 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

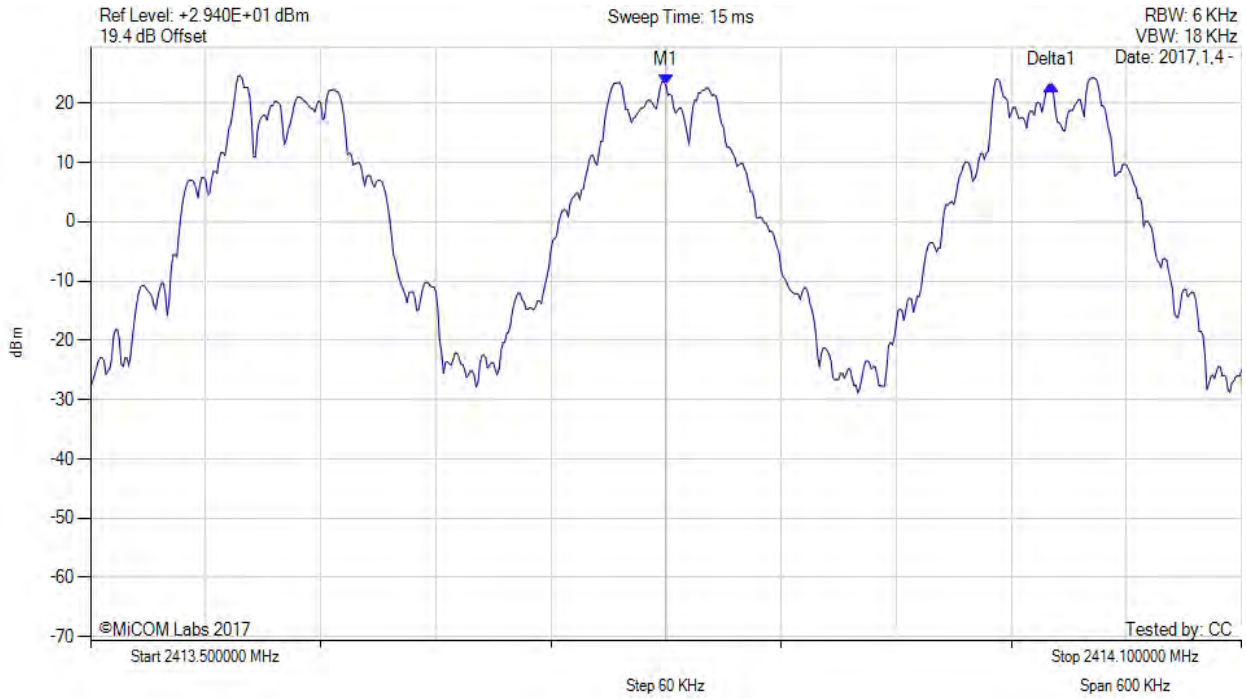


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2440.007 MHz : 24.625 dBm Delta1 : 803 KHz : 0.134 dB	Channel Frequency: 2440.00 MHz

back to matrix

CHANNEL SEPARATION

Variant: 50 kbps 2FSK, Channel: 2413.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

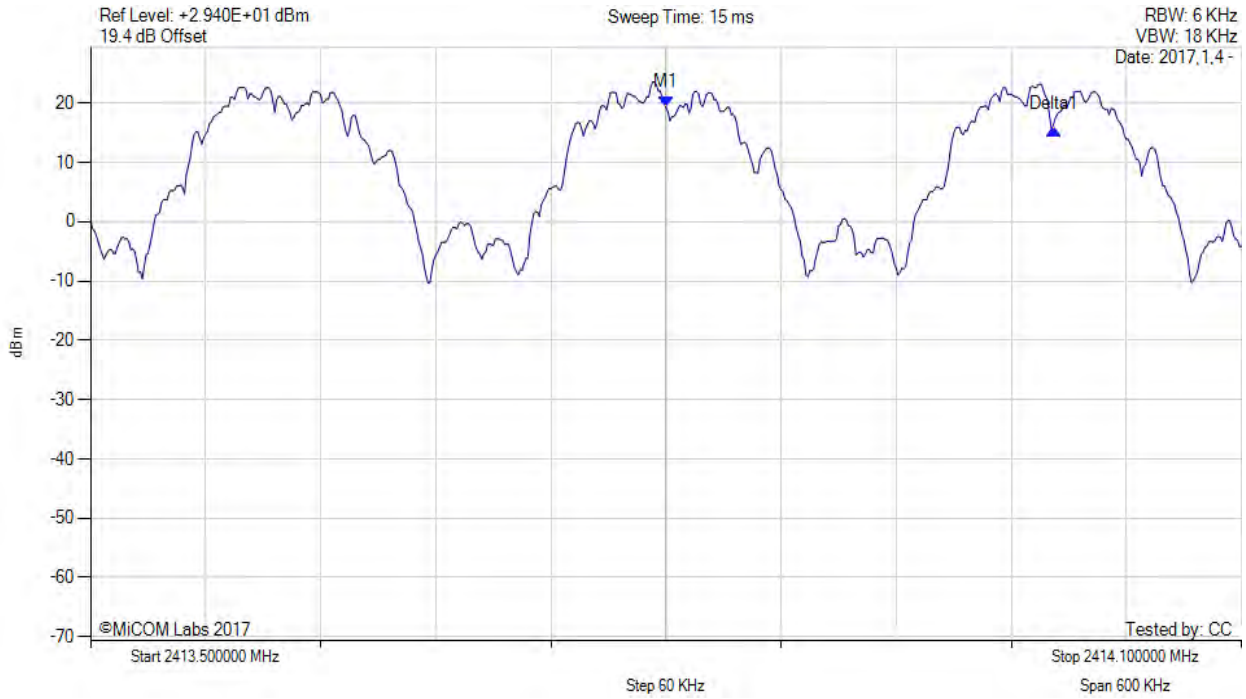


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2413.800 MHz : 23.011 dBm Delta1 : 201 KHz : 0.115 dB	Channel Frequency: 2413.80 MHz

back to matrix

CHANNEL SEPARATION

Variant: 6.25 kbps OQPSK, Channel: 2413.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

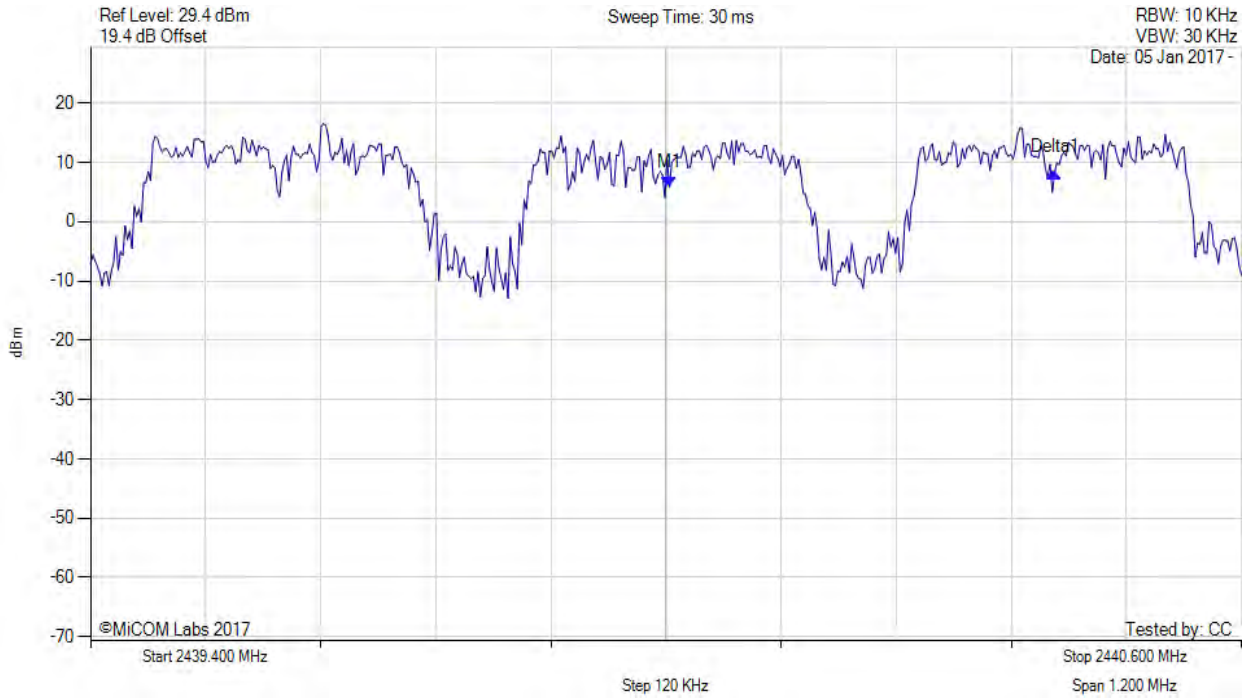


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2413.800 MHz : 19.250 dBm Delta1 : 202 KHz : -3.756 dB	Channel Frequency: 2413.80 MHz

back to matrix

CHANNEL SEPARATION

Variant: 600 kbps OFDM, Channel: 2440.00 MHz, Chain a, Temp: 20, Voltage: 4 Vdc



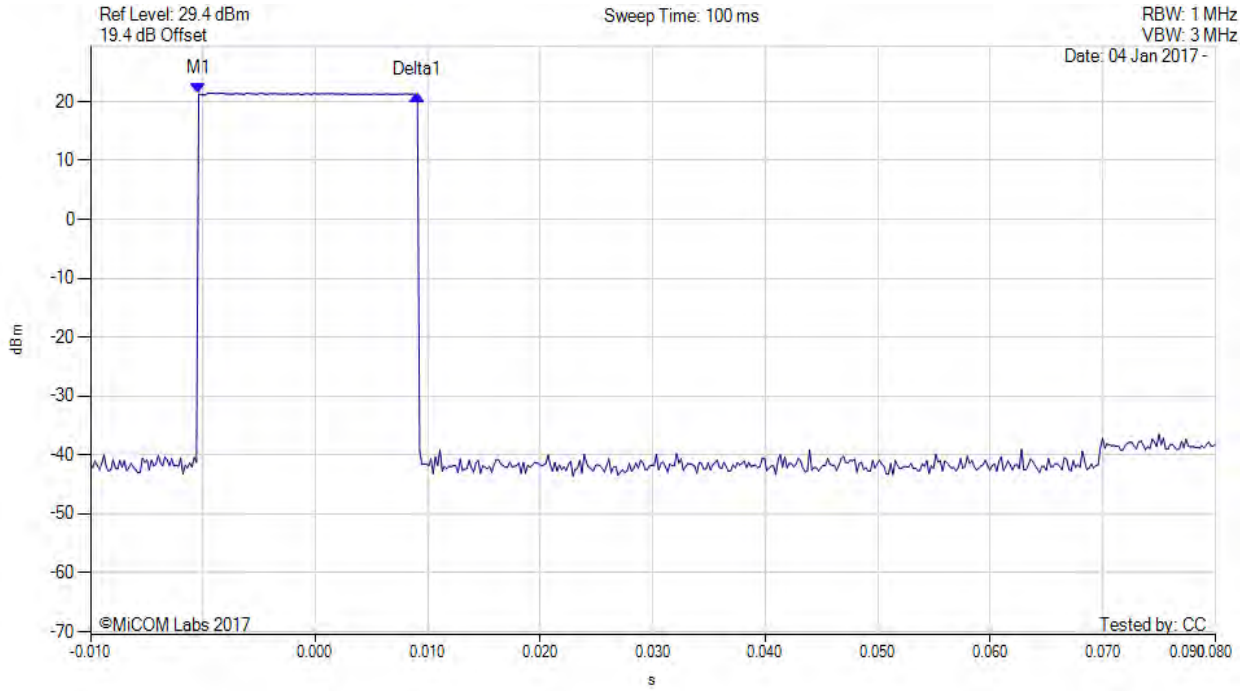
Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2440.004 MHz : 5.772 dBm Delta1 : 402 KHz : 2.558 dB	Channel Frequency: 2440.00 MHz

back to matrix

A.2.3. Dwell Time

DWELL TIME

Variant: 300 kbps GFSK, Channel: 2440.00 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

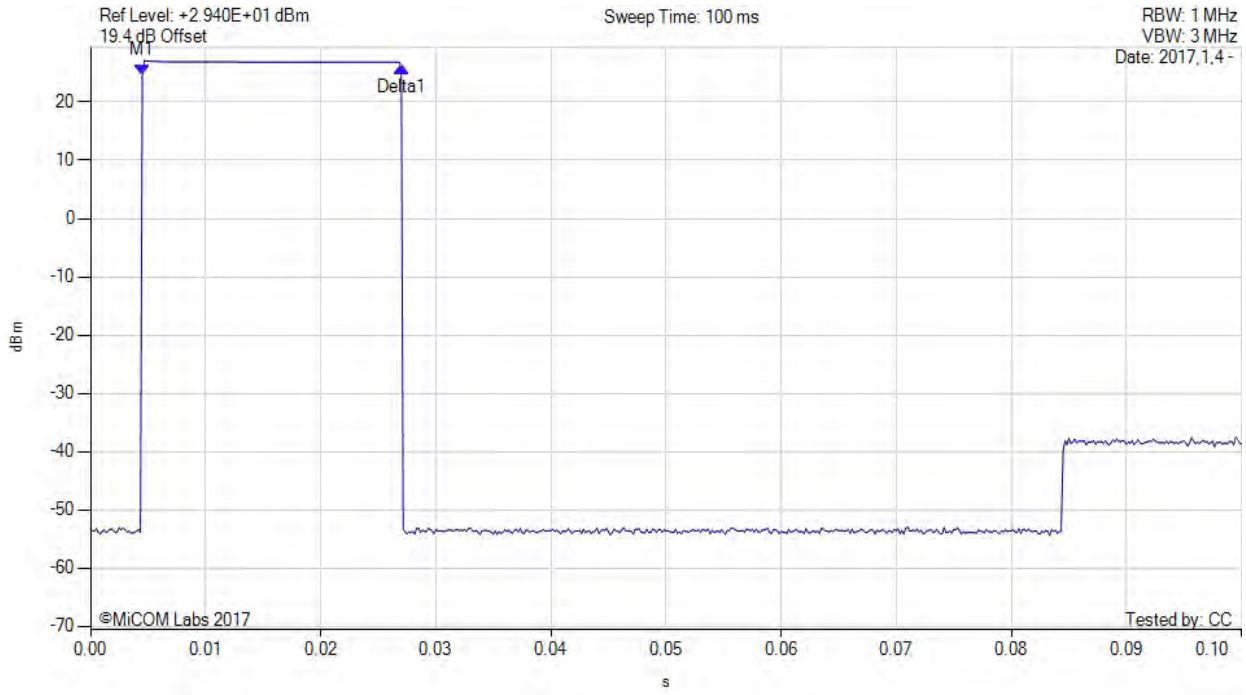


Analyzer Setup	Marker:Time:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1(2440.00 MHz) : 0.000 s : 21.312 dBm Delta1(2440.00 MHz) : 0.019 s : -0.087 dB	Channel Frequency: 2440.00 MHz

back to matrix

DWELL TIME

Variant: 50 kbps 2FSK, Channel: 2413.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

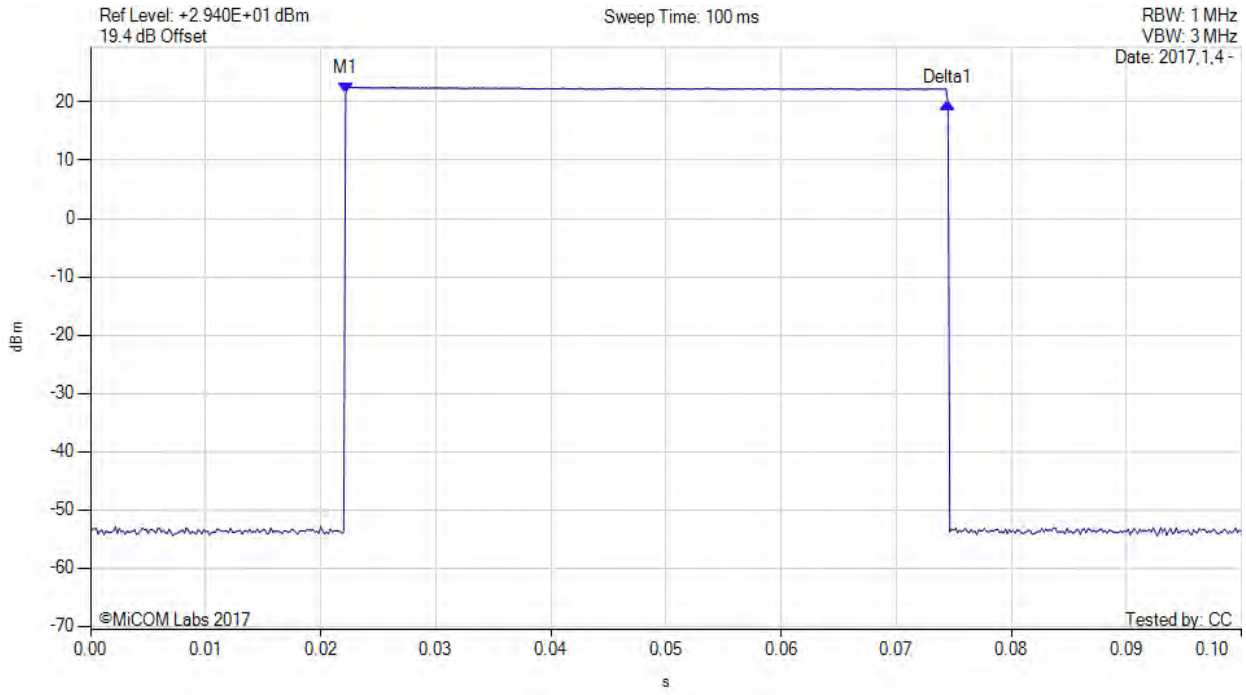


Analyzer Setup	Marker:Time:Amplitude	Test Results
Detector = AVER Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1(2413.80 MHz) : 0.005 s : 24.710 dBm Delta1(2413.80 MHz) : 0.023 s : 1.393 dB	Channel Frequency: 2413.80 MHz

back to matrix

DWELL TIME

Variant: 6.25 kbps OQPSK, Channel: 2413.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

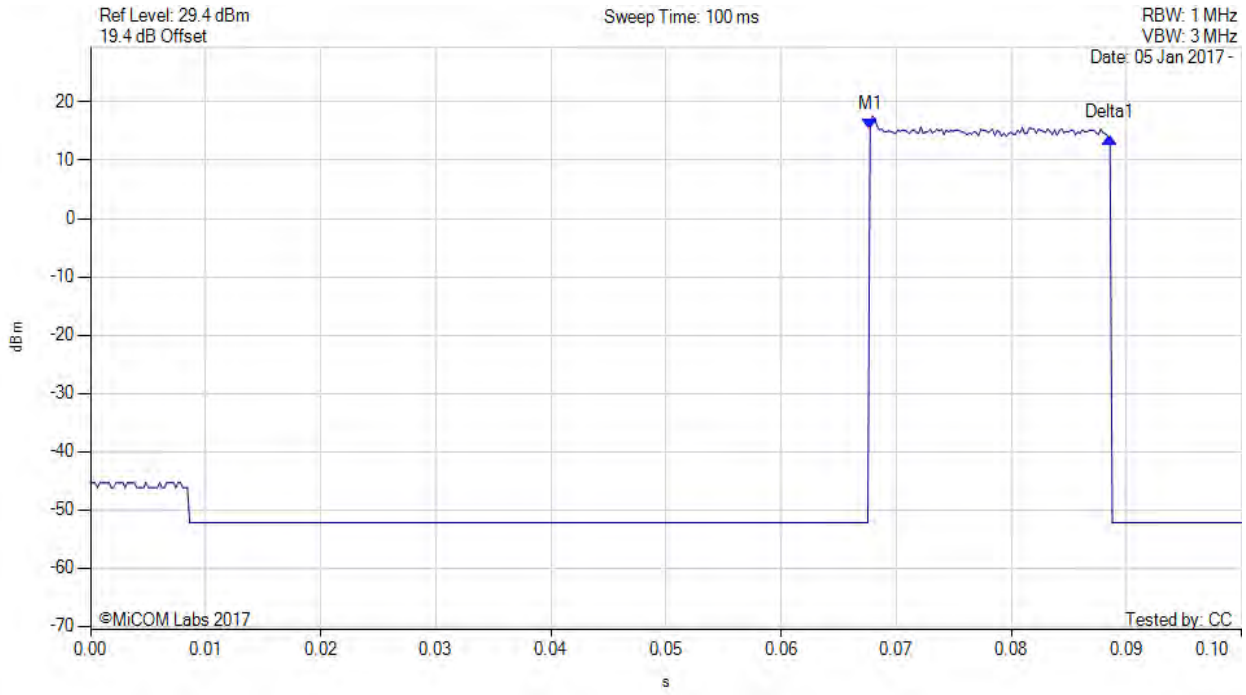


Analyzer Setup	Marker:Time:Amplitude	Test Results
Detector = AVER Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1(2413.80 MHz) : 0.022 s : 21.450 dBm Delta1(2413.80 MHz) : 0.052 s : -1.608 dB	Channel Frequency: 2413.80 MHz

back to matrix

DWELL TIME

Variant: 600 kbps OFDM, Channel: 2440.00 MHz, Chain a, Temp: 20, Voltage: 4 Vdc



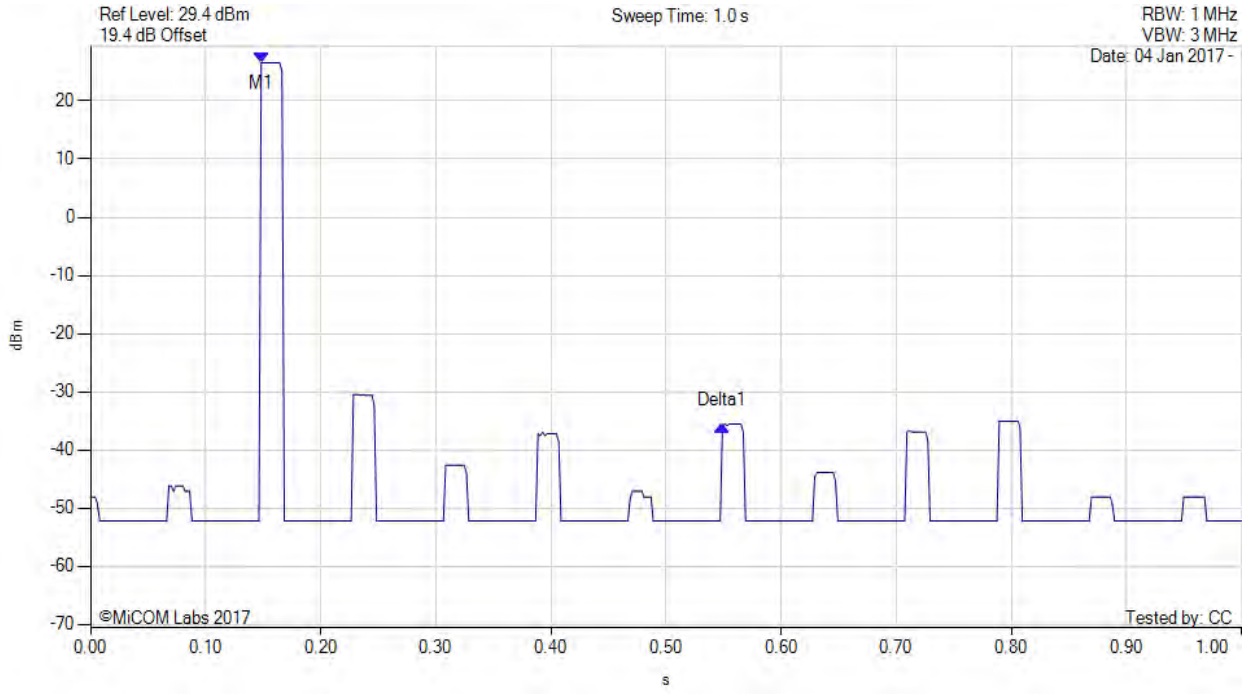
Analyzer Setup	Marker:Time:Amplitude	Test Results
Detector = RMS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1(2440.00 MHz) : 0.068 s : 15.287 dBm Delta1(2440.00 MHz) : 0.021 s : -1.397 dB	Channel Frequency: 2440.00 MHz

back to matrix

A.2.4. Channel Occupancy

CHANNEL OCCUPANCY

Variant: 300 kbps GFSK, Channel: 2440.00 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

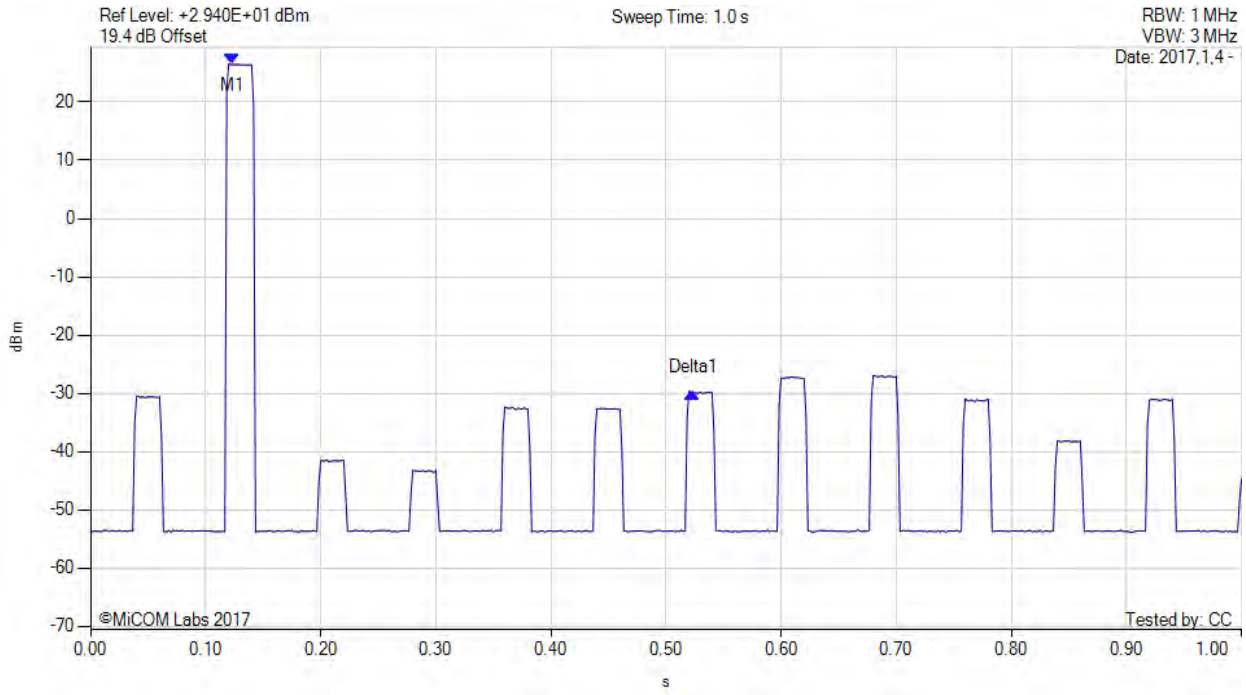


Analyzer Setup	Marker:Time:Amplitude	Test Results
Detector = RMS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1(2440.00 MHz) : 0.148 s : 26.564 dBm Delta1(2440.00 MHz) : 0.400 s : -62.359 dB	Channel Frequency: 2440.00 MHz

back to matrix

CHANNEL OCCUPANCY

Variant: 50 kbps 2FSK, Channel: 2413.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

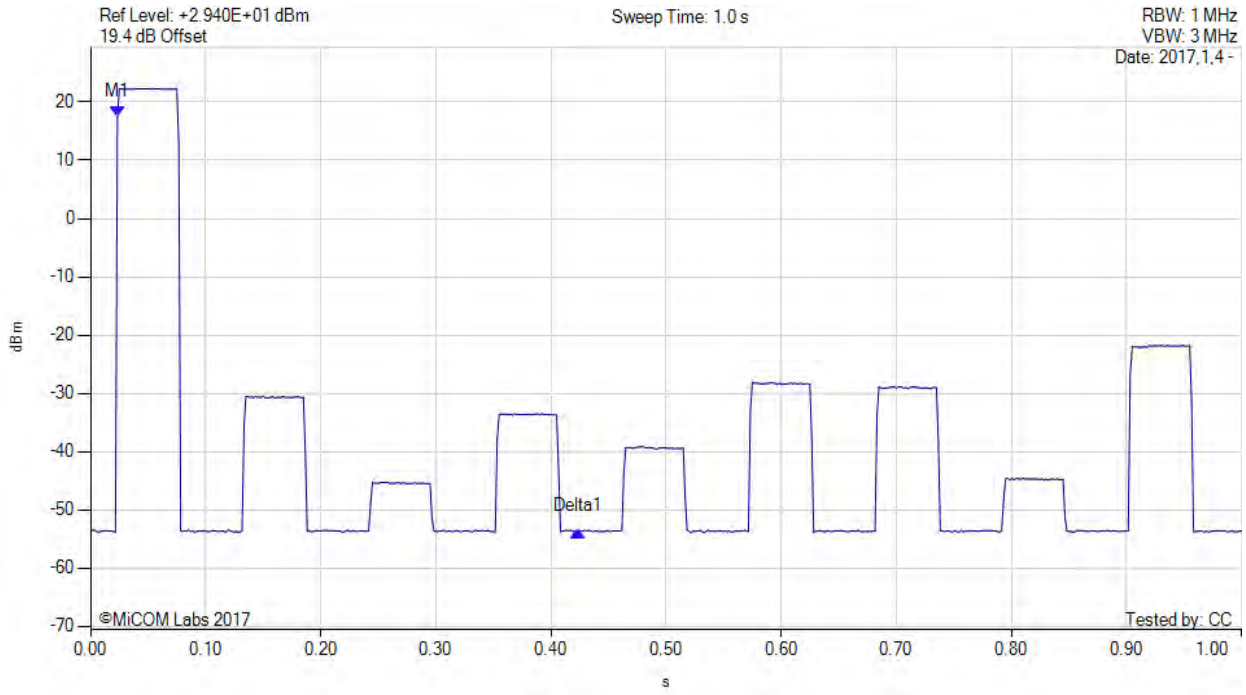


Analyzer Setup	Marker:Time:Amplitude	Test Results
Detector = AVER Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1(2413.80 MHz) : 0.123 s : 26.436 dBm Delta1(2413.80 MHz) : 0.400 s : -56.258 dB	Channel Frequency: 2413.80 MHz

back to matrix

CHANNEL OCCUPANCY

Variant: 6.25 kbps OQPSK, Channel: 2413.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

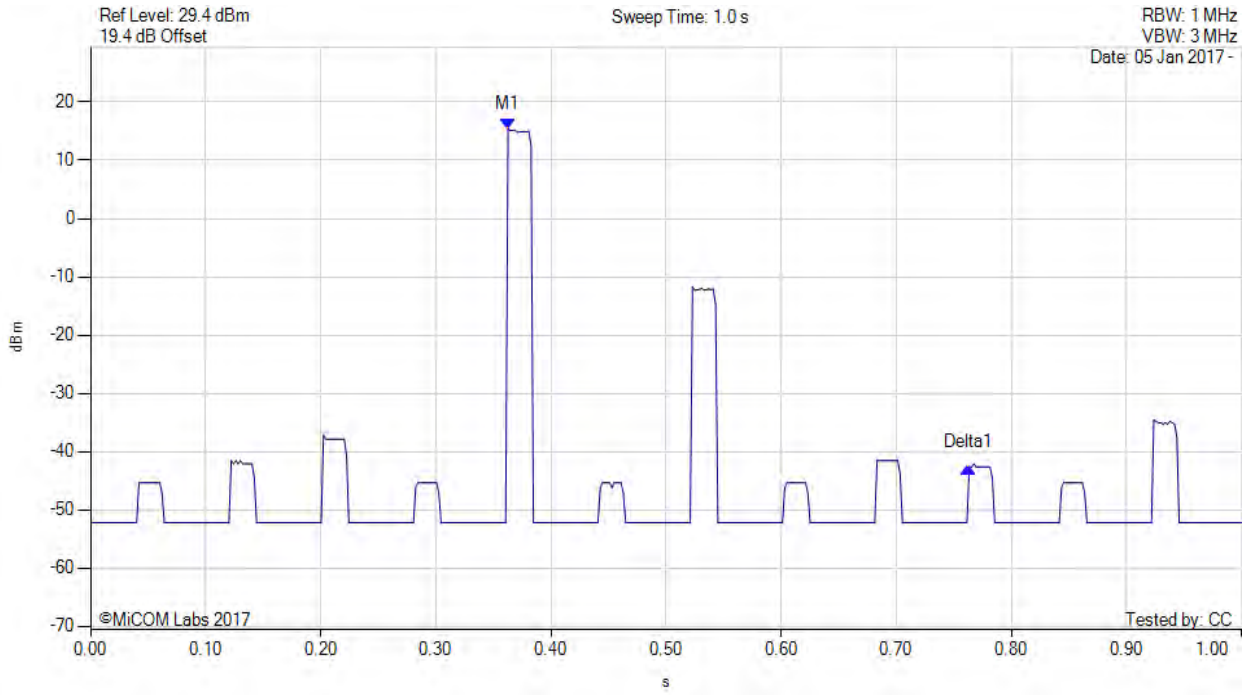


Analyzer Setup	Marker:Time:Amplitude	Test Results
Detector = AVER Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1(2413.80 MHz) : 0.023 s : 17.488 dBm Delta1(2413.80 MHz) : 0.400 s : -71.084 dB	Channel Frequency: 2413.80 MHz

back to matrix

CHANNEL OCCUPANCY

Variant: 600 kbps OFDM, Channel: 2440.00 MHz, Chain a, Temp: 20, Voltage: 4 Vdc



Analyzer Setup	Marker:Time:Amplitude	Test Results
Detector = RMS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1(2440.00 MHz) : 0.363 s : 15.418 dBm Delta1(2440.00 MHz) : 0.400 s : -58.061 dB	Channel Frequency: 2440.00 MHz

back to matrix

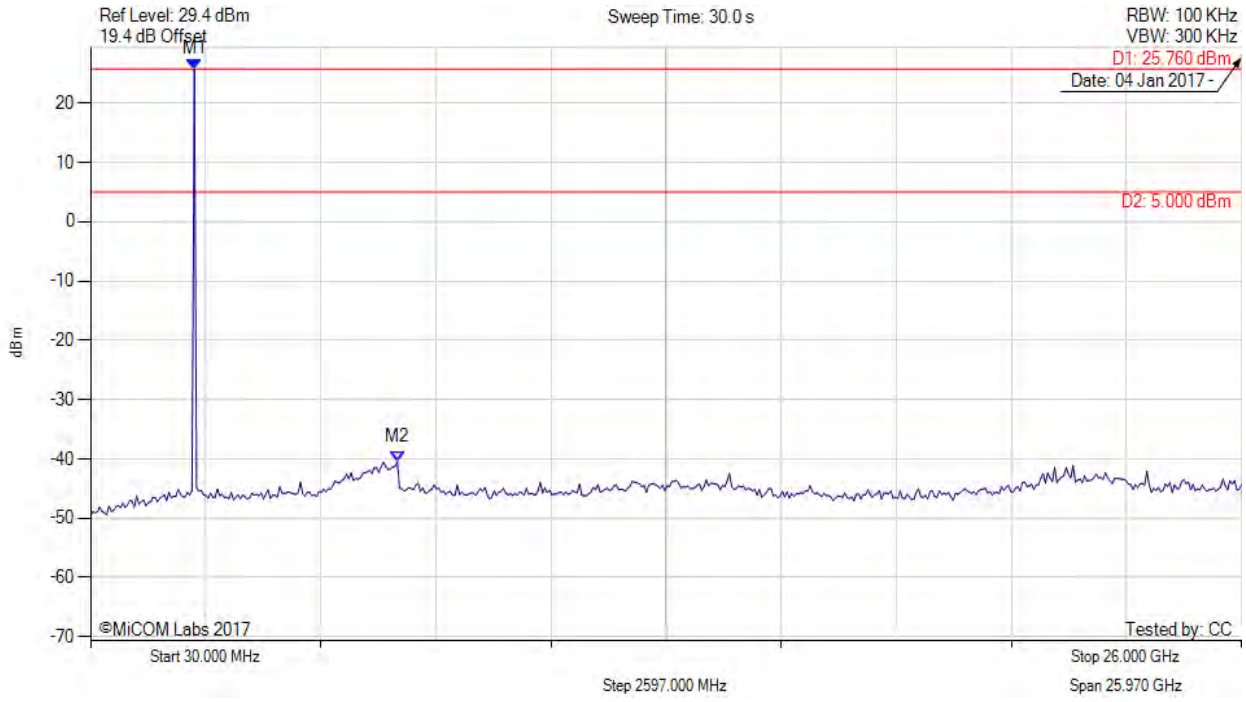
A.3. Emissions

A.3.1. Conducted Emissions

A.3.1.1. Conducted Unwanted Spurious Emissions

UNWANTED EMISSIONS PEAK

Variant: 300 kbps GFSK, Channel: 2400.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

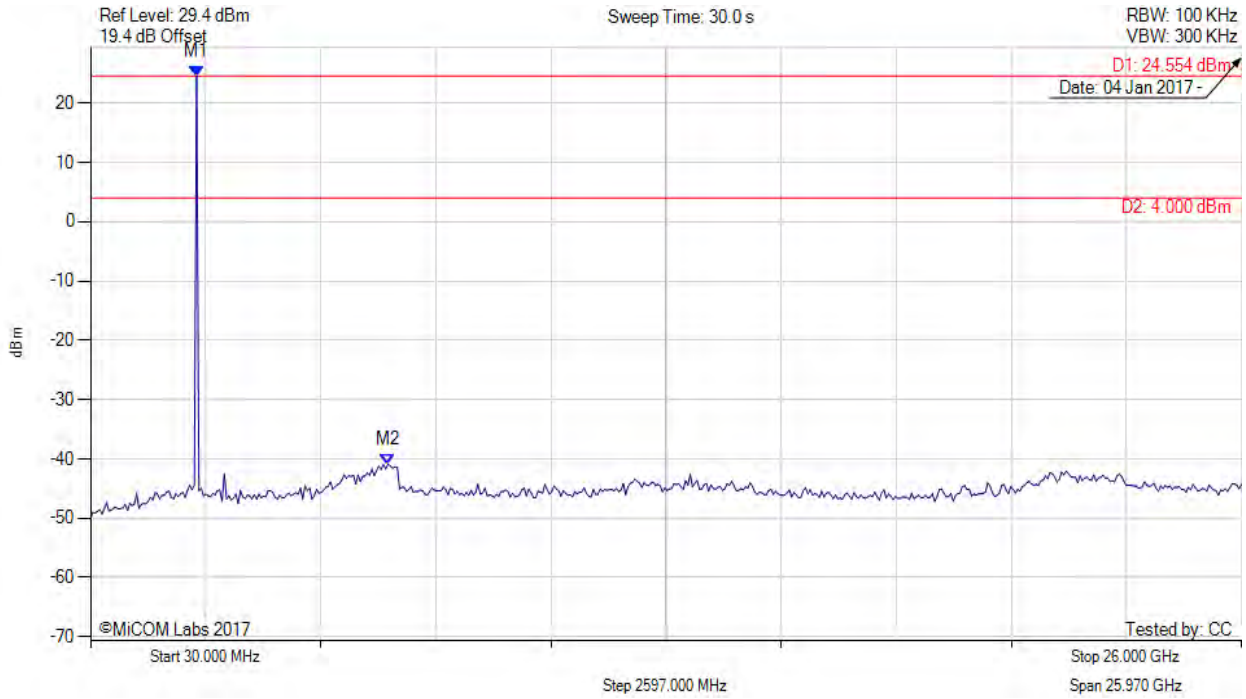


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2371.984 MHz : 25.760 dBm M2 : 6951.864 MHz : -40.457 dBm	Limit: 5.00 dBm Margin: -45.46 dB

back to matrix

UNWANTED EMISSIONS PEAK

Variant: 300 kbps GFSK, Channel: 2440.00 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

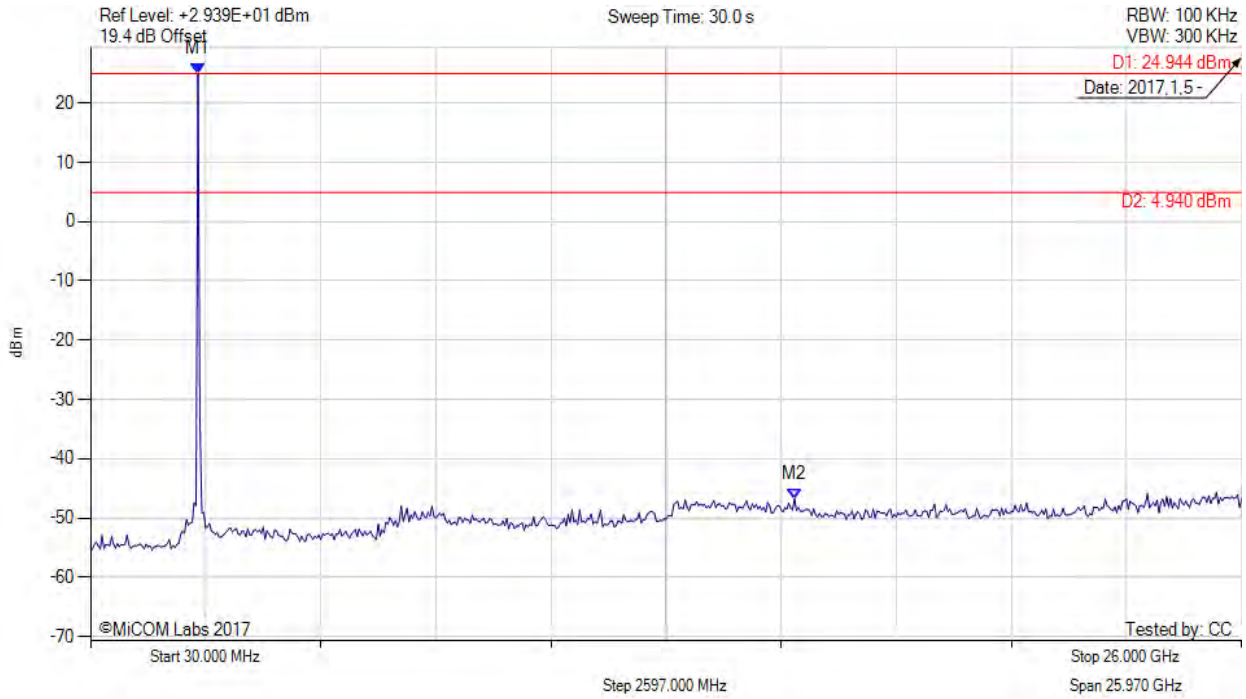


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2424.028 MHz : 24.554 dBm M2 : 6743.687 MHz : -40.896 dBm	Limit: 4.00 dBm Margin: -44.90 dB

back to matrix

UNWANTED EMISSIONS PEAK

Variant: 300 kbps GFSK, Channel: 2472.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

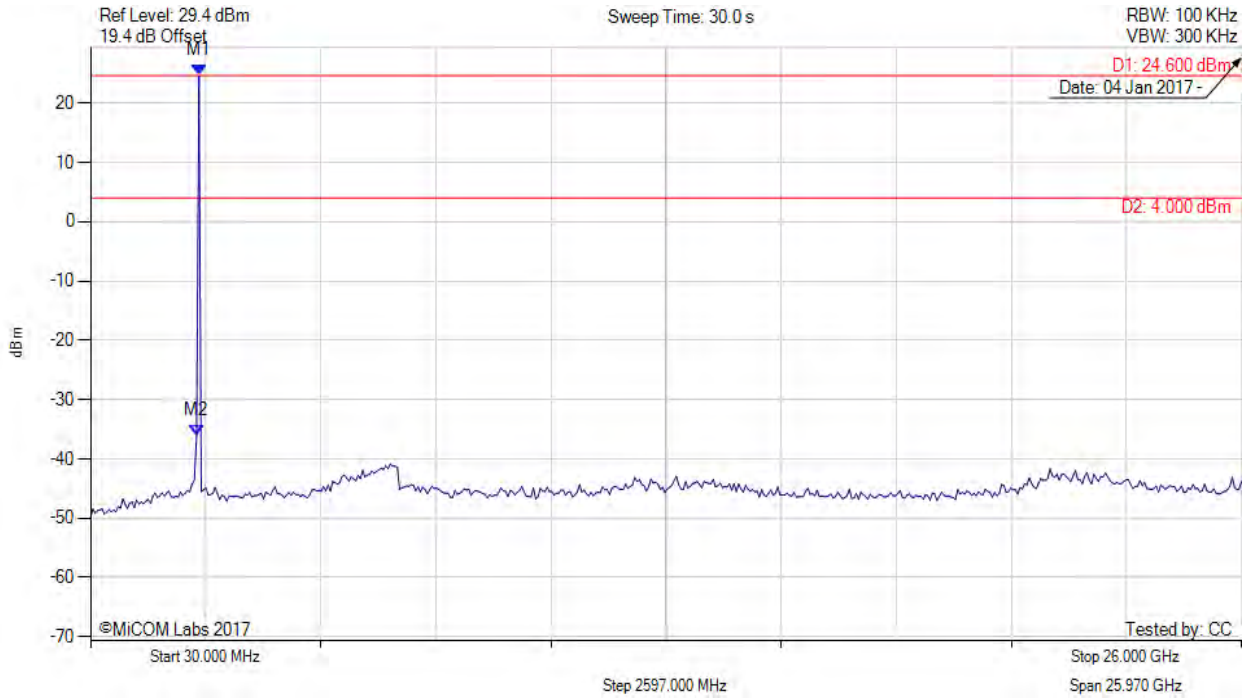


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2450.000 MHz : 24.944 dBm M2 : 15.910 GHz : -46.725 dBm	Limit: 4.94 dBm Margin: -51.66 dB

back to matrix

UNWANTED EMISSIONS PEAK

Variant: 300 kbps GFSK, Channel: 2475.20 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

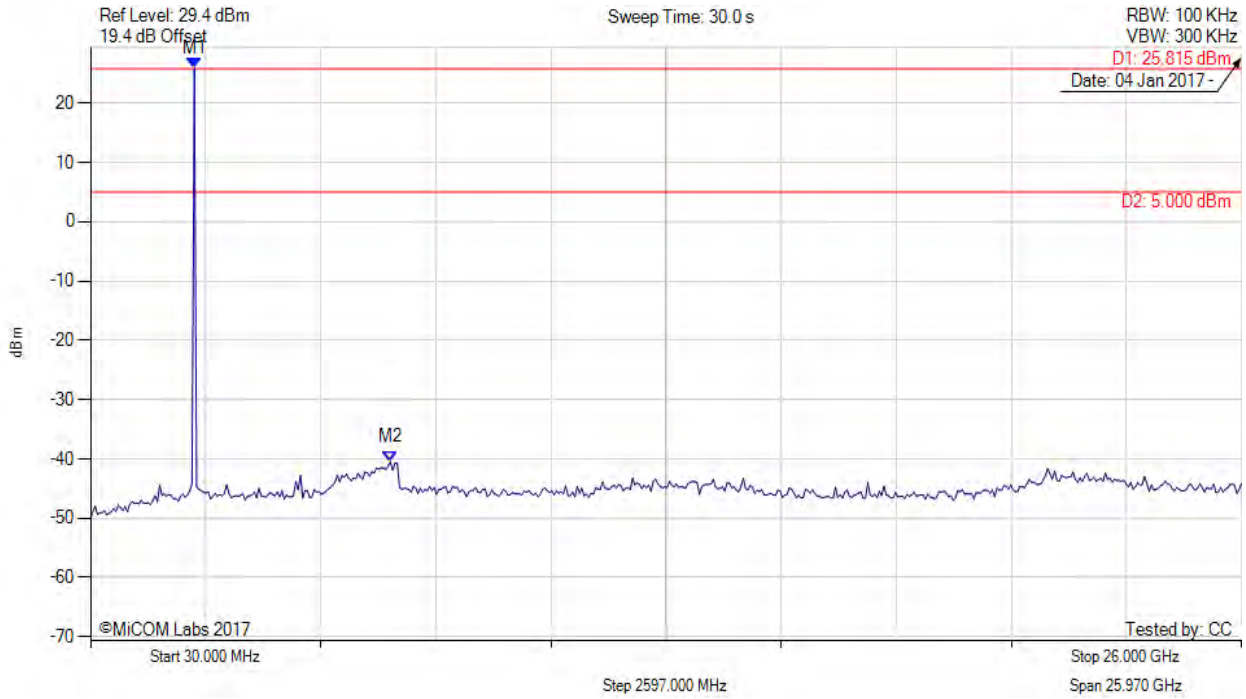


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2476.072 MHz : 24.600 dBm M2 : 2424.028 MHz : -36.133 dBm	Channel Frequency: 2475.20 MHz

back to matrix

UNWANTED EMISSIONS PEAK

Variant: 50 kbps 2FSK, Channel: 2400.20 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

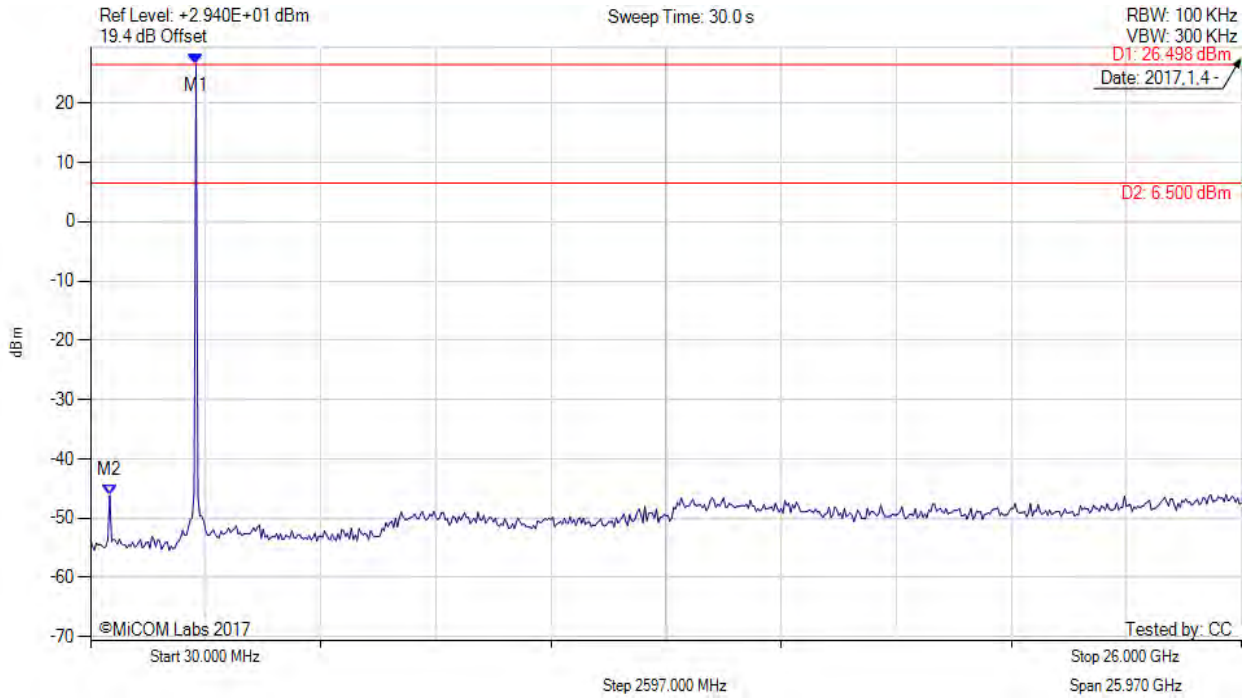


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2371.984 MHz : 25.815 dBm M2 : 6795.731 MHz : -40.502 dBm	Limit: 5.00 dBm Margin: -45.50 dB

back to matrix

UNWANTED EMISSIONS PEAK

Variant: 50 kbps 2FSK, Channel: 2413.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

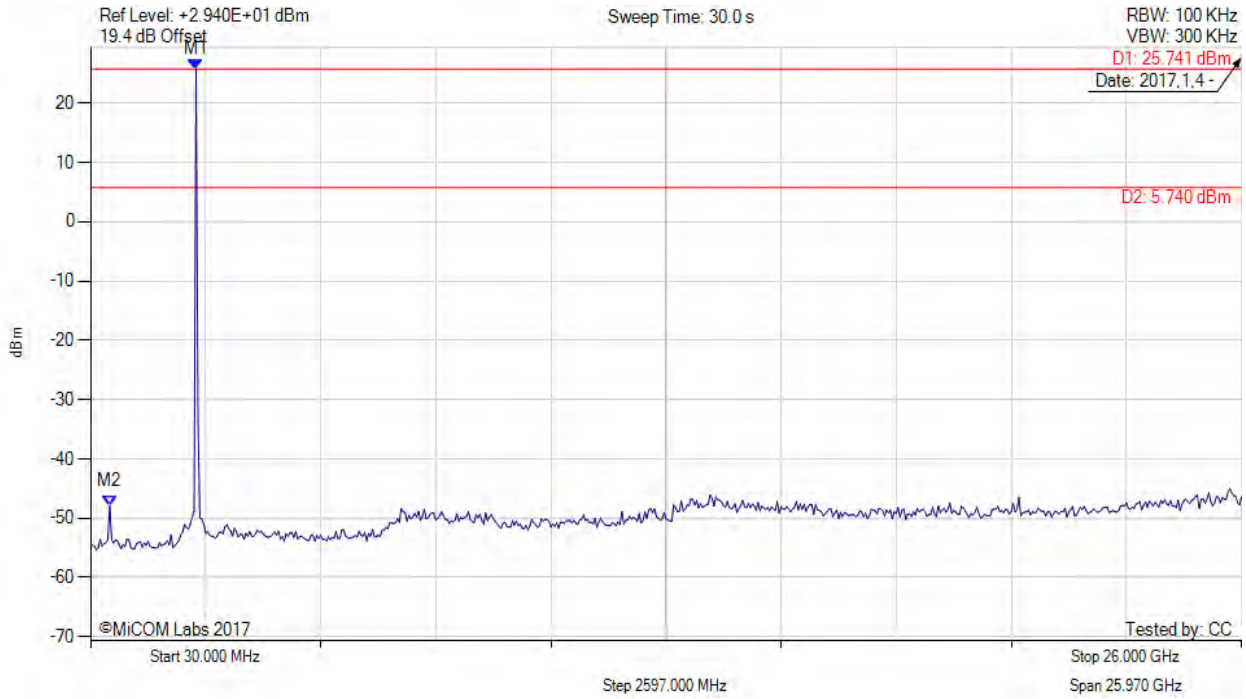


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2410.000 MHz : 26.498 dBm M2 : 460.000 MHz : -46.167 dBm	Limit: 6.50 dBm Margin: -52.67 dB

back to matrix

UNWANTED EMISSIONS PEAK

Variant: 50 kbps 2FSK, Channel: 2427.20 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

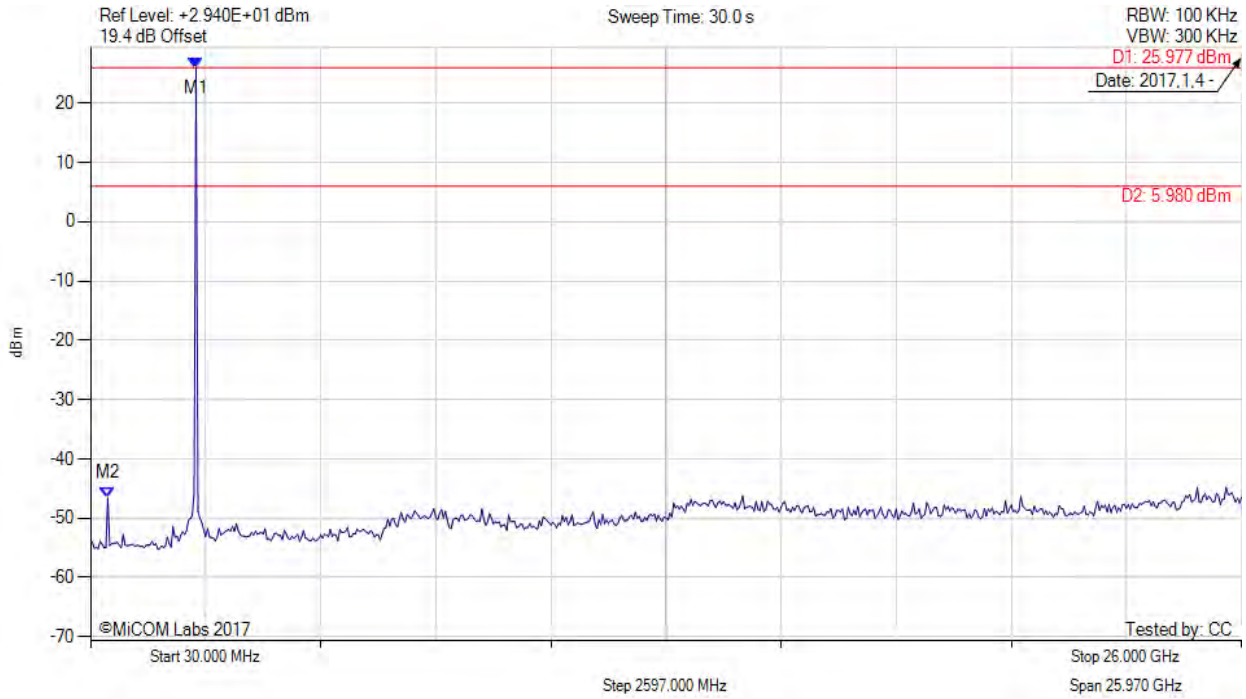


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2410.000 MHz : 25.741 dBm M2 : 460.000 MHz : -47.971 dBm	Limit: 5.74 dBm Margin: -53.71 dB

back to matrix

UNWANTED EMISSIONS PEAK

Variant: 6.25 kbps OQPSK, Channel: 2400.20 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

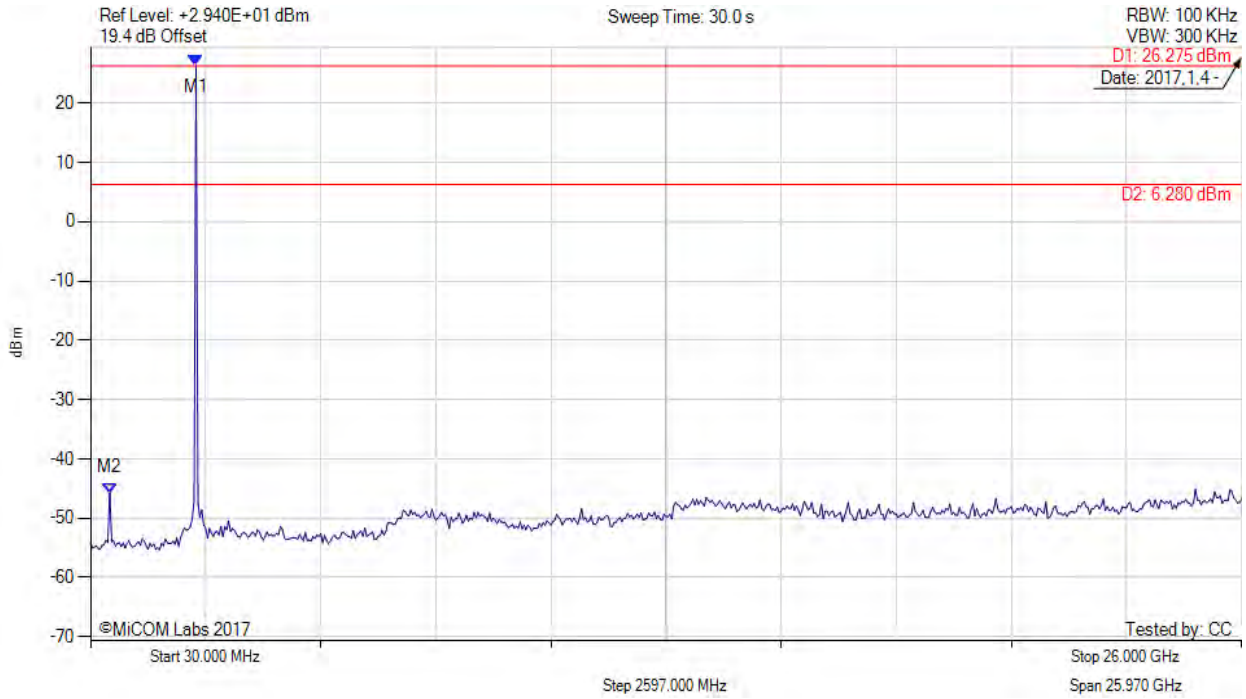


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2410.000 MHz : 25.977 dBm M2 : 420.000 MHz : -46.588 dBm	Limit: 5.98 dBm Margin: -52.57 dB

back to matrix

UNWANTED EMISSIONS PEAK

Variant: 6.25 kbps OQPSK, Channel: 2413.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

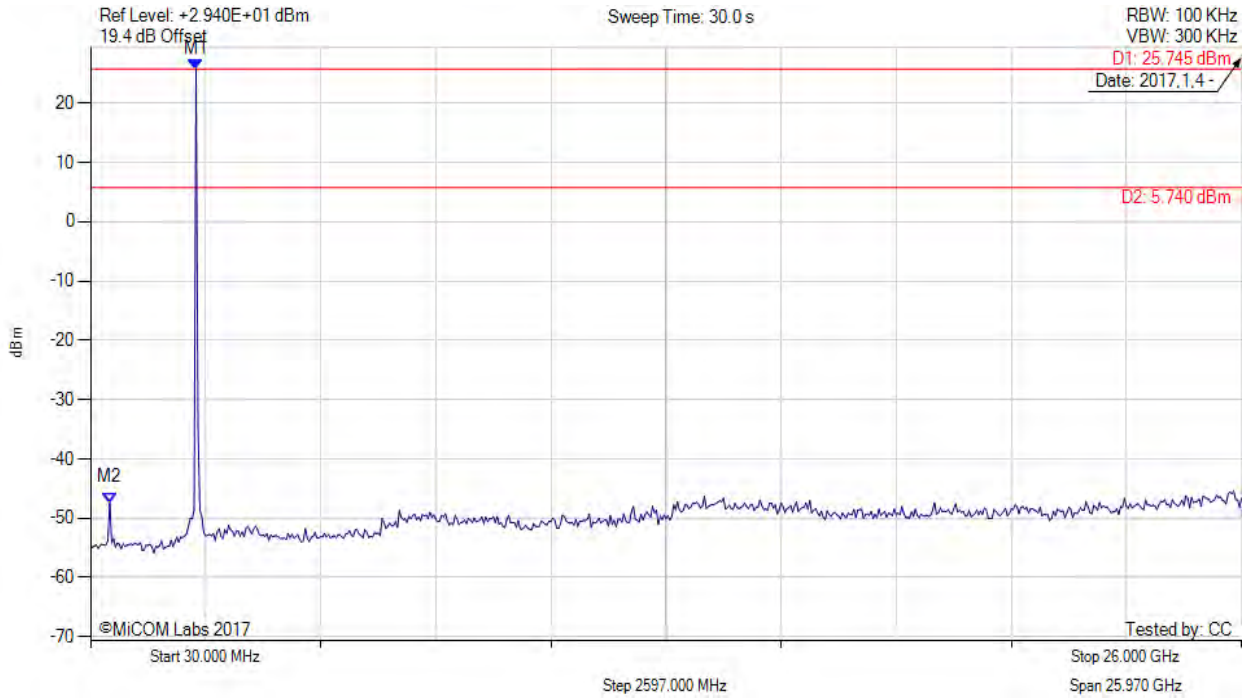


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2410.000 MHz : 26.275 dBm M2 : 460.000 MHz : -45.752 dBm	Limit: 6.28 dBm Margin: -52.03 dB

back to matrix

UNWANTED EMISSIONS PEAK

Variant: 6.25 kbps OQPSK, Channel: 2427.20 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

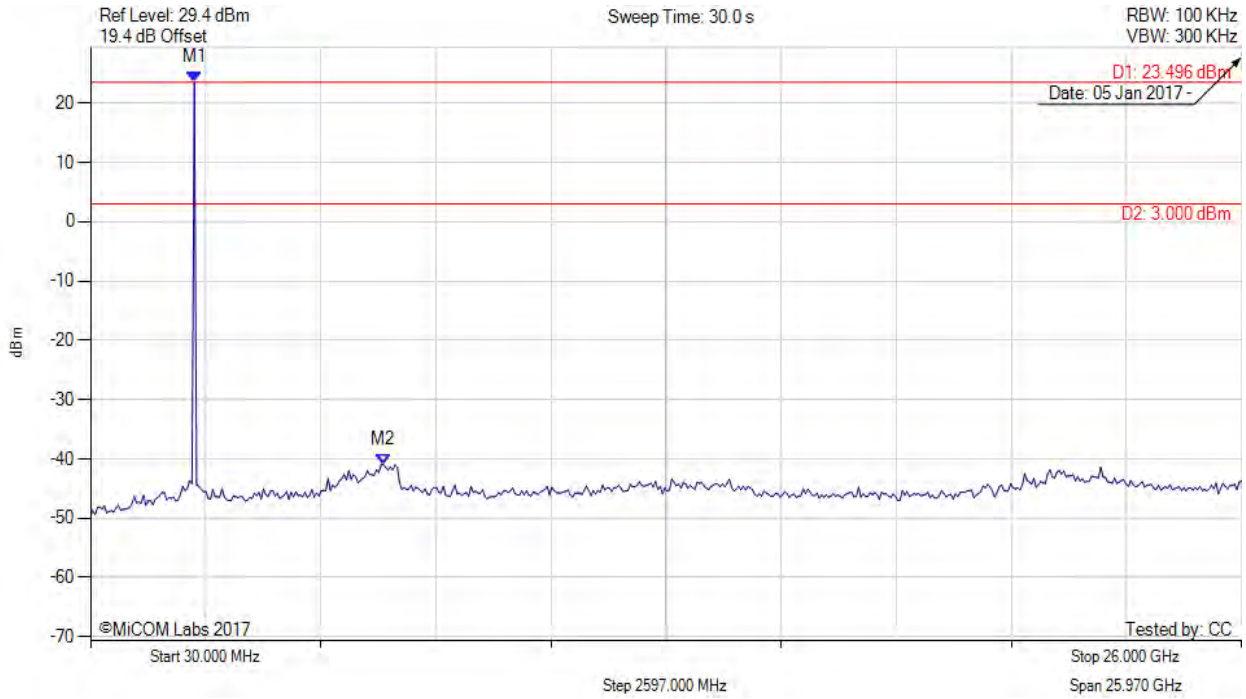


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2410.000 MHz : 25.745 dBm M2 : 460.000 MHz : -47.403 dBm	Limit: 5.74 dBm Margin: -53.14 dB

back to matrix

UNWANTED EMISSIONS PEAK

Variant: 600 kbps OFDM, Channel: 2400.40 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

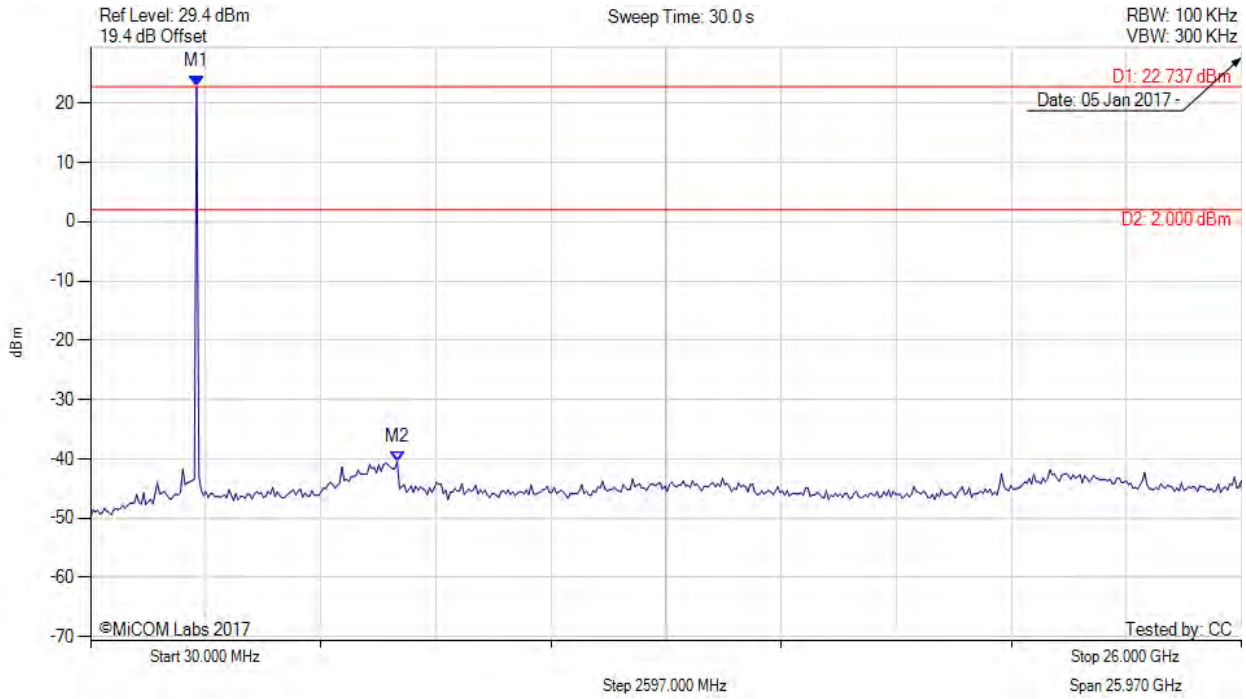


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2371.984 MHz : 23.496 dBm M2 : 6639.599 MHz : -40.935 dBm	Limit: 3.00 dBm Margin: -43.94 dB

back to matrix

UNWANTED EMISSIONS PEAK

Variant: 600 kbps OFDM, Channel: 2440.00 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

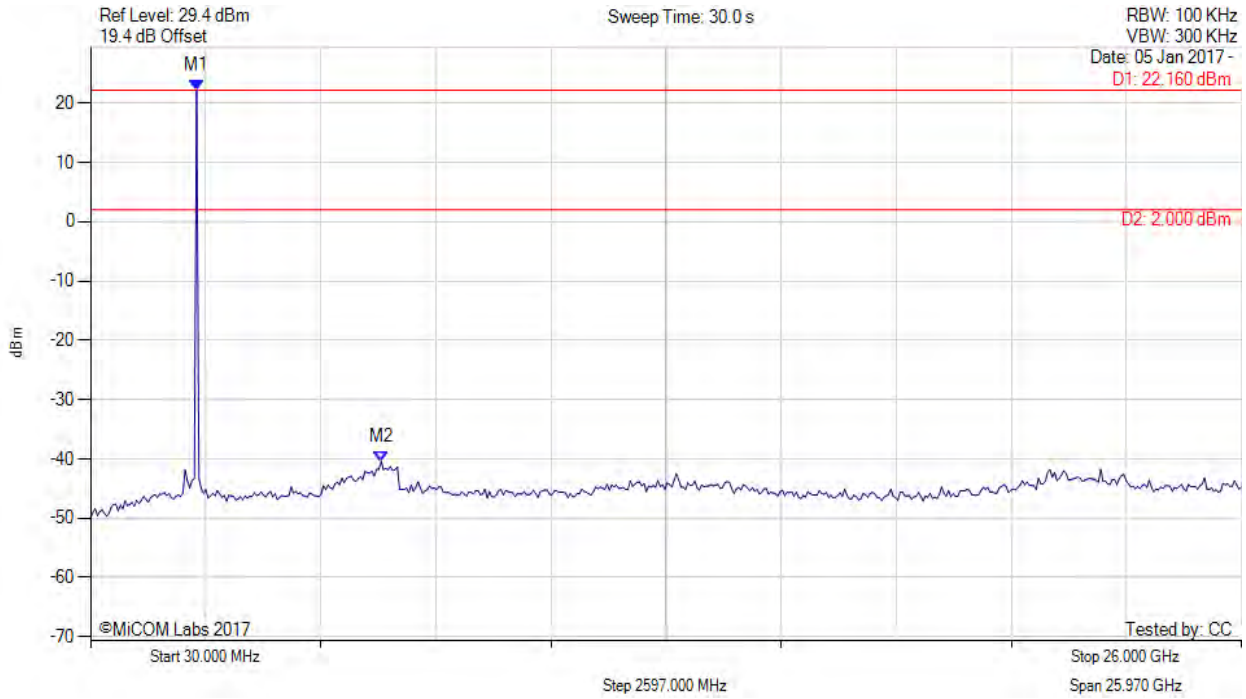


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2424.028 MHz : 22.737 dBm M2 : 6951.864 MHz : -40.496 dBm	Limit: 2.00 dBm Margin: -42.50 dB

back to matrix

UNWANTED EMISSIONS PEAK

Variant: 600 kbps OFDM, Channel: 2454.40 MHz, Chain a, Temp: 20, Voltage: 4 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2424.028 MHz : 22.160 dBm M2 : 6587.555 MHz : -40.455 dBm	Limit: 2.00 dBm Margin: -42.45 dB

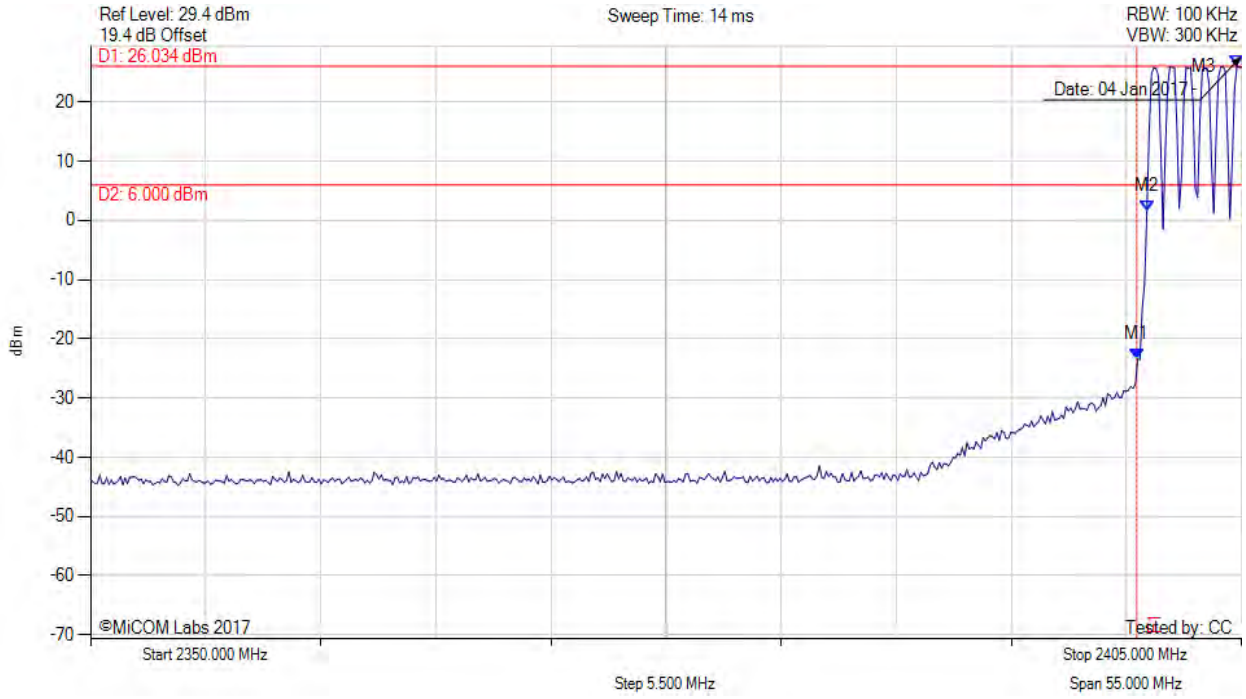
back to matrix

A.3.1.2. Conducted Band-Edge Emissions

A.3.1.3. Conducted Low Band-Edge Emissions

CONDUCTED LOW BAND-EDGE EMISSIONS (HOPPING) PEAK

Variant: 300 kbps GFSK, Channel: 2400.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

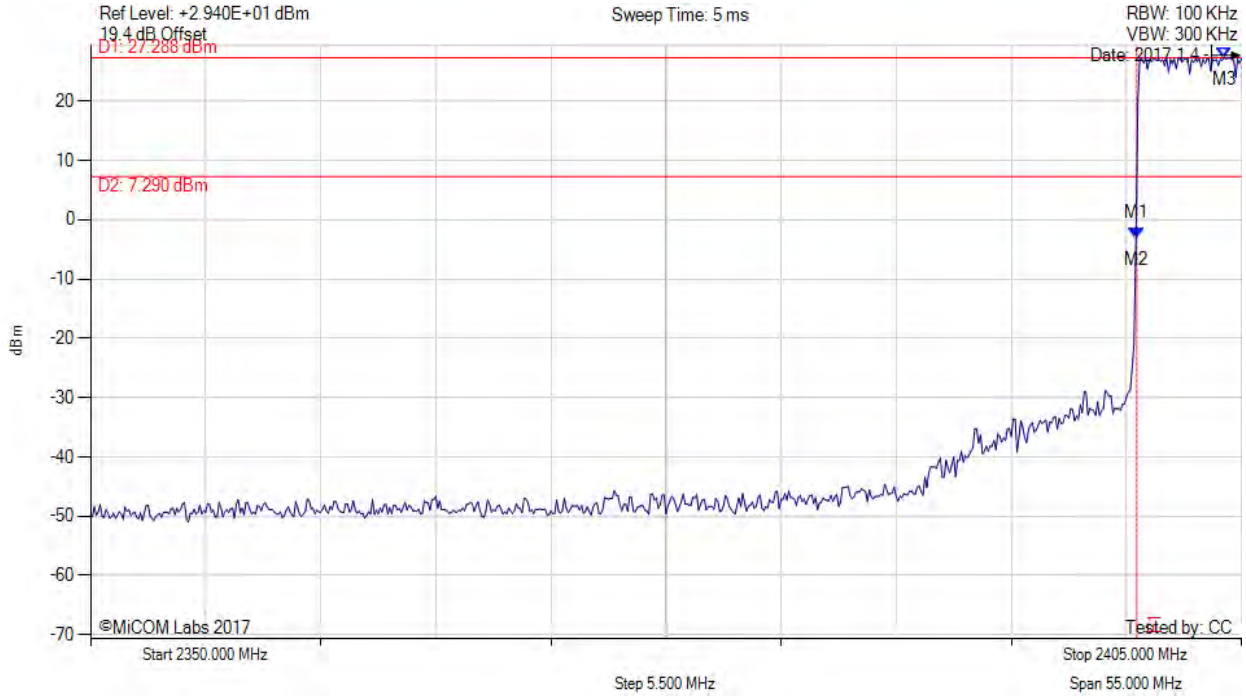


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2400.000 MHz : -23.443 dBm M2 : 2400.481 MHz : 1.515 dBm M3 : 2404.780 MHz : 26.034 dBm	Channel Frequency: 2400.80 MHz

back to matrix

CONDUCTED LOW BAND-EDGE EMISSIONS (HOPPING) PEAK

Variant: 50 kbps 2FSK, Channel: 2400.20 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

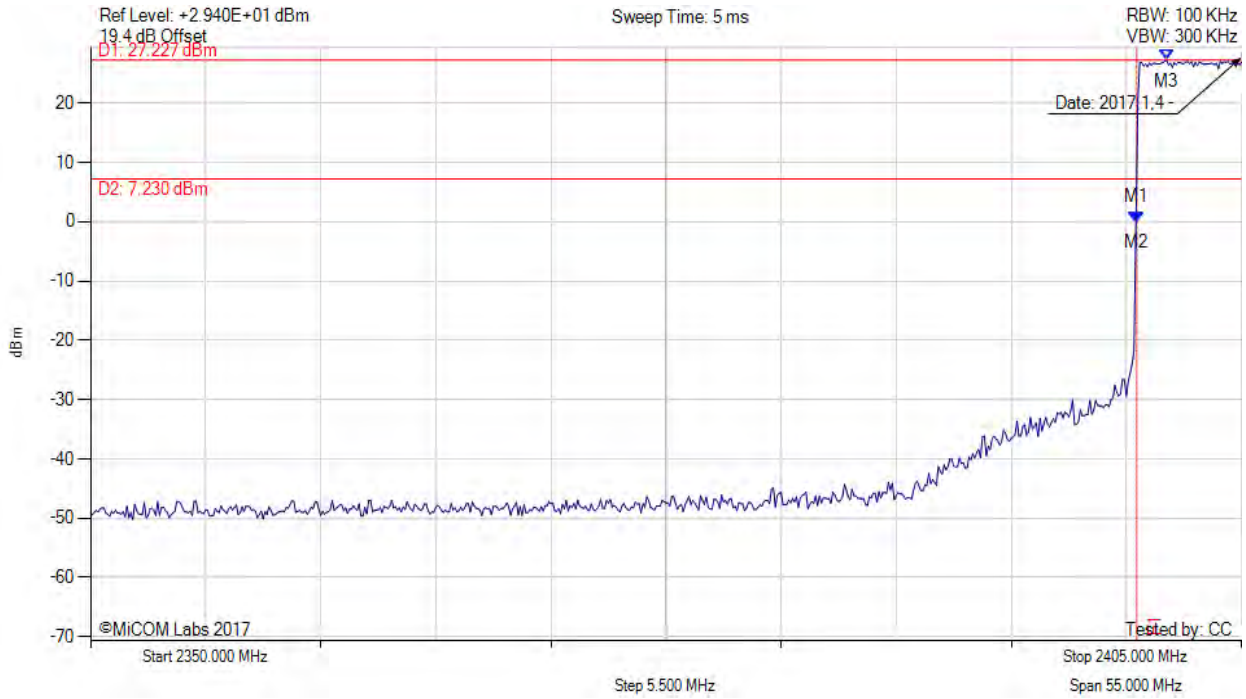


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2400.000 MHz : -3.123 dBm M2 : 2399.960 MHz : -3.123 dBm M3 : 2404.180 MHz : 27.288 dBm	Channel Frequency: 2400.20 MHz

back to matrix

CONDUCTED LOW BAND-EDGE EMISSIONS (HOPPING) PEAK

Variant: 6.25 kbps OQPSK, Channel: 2400.20 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

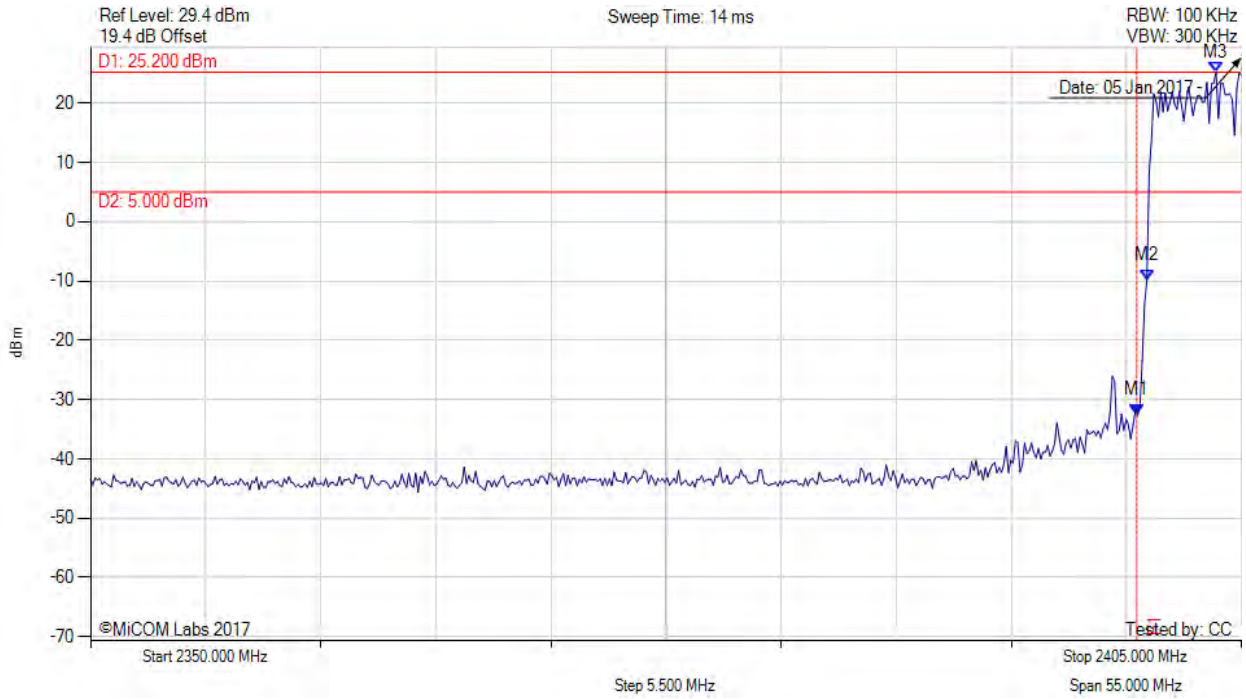


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2400.000 MHz : -0.005 dBm M2 : 2399.960 MHz : -0.005 dBm M3 : 2401.430 MHz : 27.227 dBm	Channel Frequency: 2400.20 MHz

back to matrix

CONDUCTED LOW BAND-EDGE EMISSIONS (HOPPING) PEAK

Variant: 600 kbps OFDM, Channel: 2400.40 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

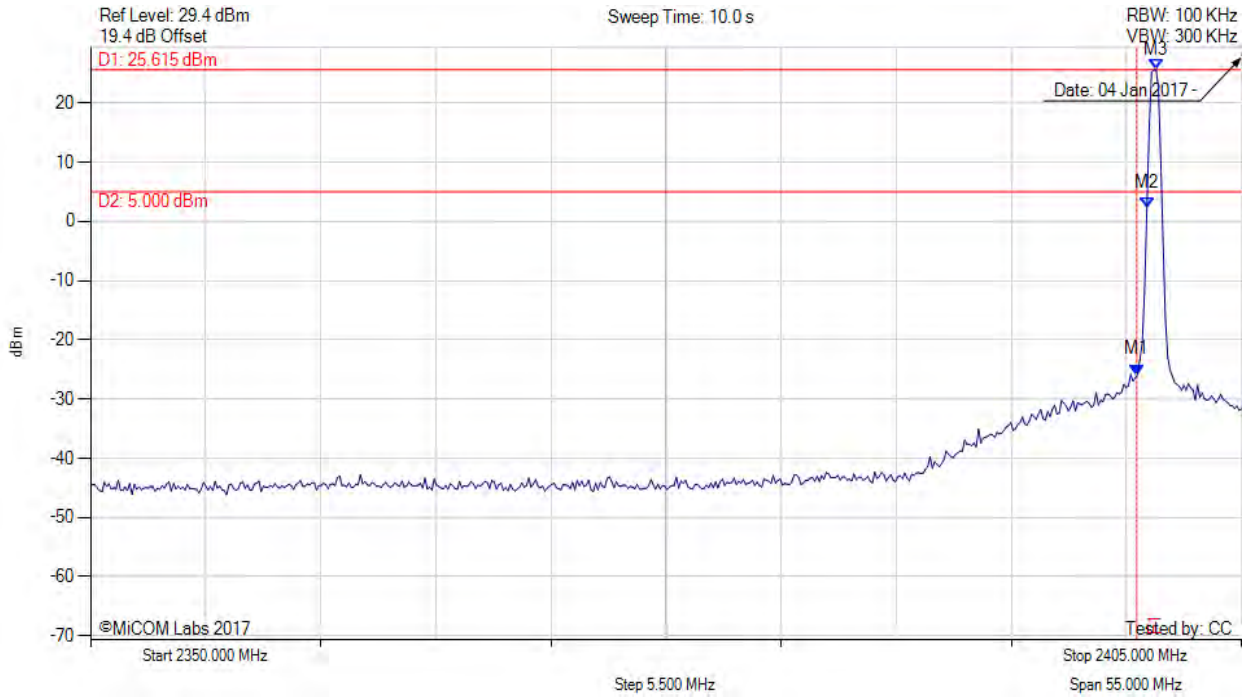


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2400.000 MHz : -32.664 dBm M2 : 2400.481 MHz : -9.886 dBm M3 : 2403.788 MHz : 25.200 dBm	Channel Frequency: 2400.40 MHz

back to matrix

CONDUCTED LOW BAND-EDGE EMISSIONS (STATIC) PEAK

Variant: 300 kbps GFSK, Channel: 2400.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

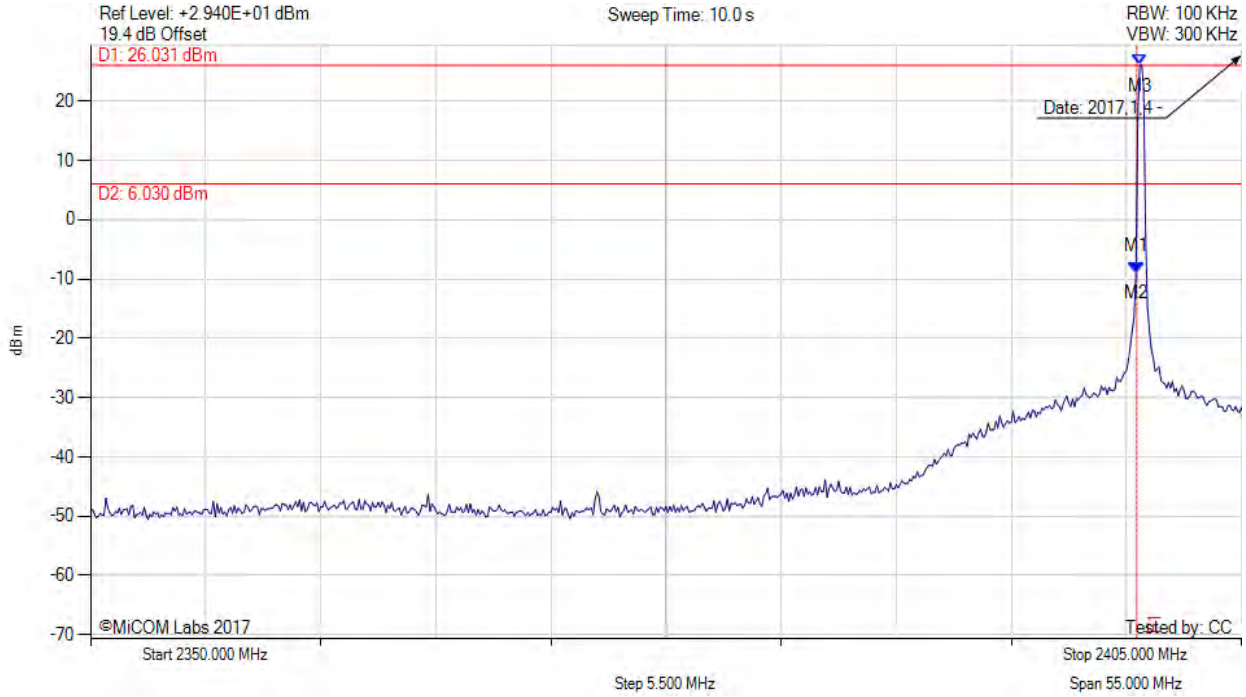


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2400.000 MHz : -25.898 dBm M2 : 2400.481 MHz : 2.186 dBm M3 : 2400.922 MHz : 25.615 dBm	Channel Frequency: 2400.80 MHz

back to matrix

CONDUCTED LOW BAND-EDGE EMISSIONS (STATIC) PEAK

Variant: 50 kbps 2FSK, Channel: 2400.20 MHz, Chain a, Temp: 20, Voltage: 4 Vdc

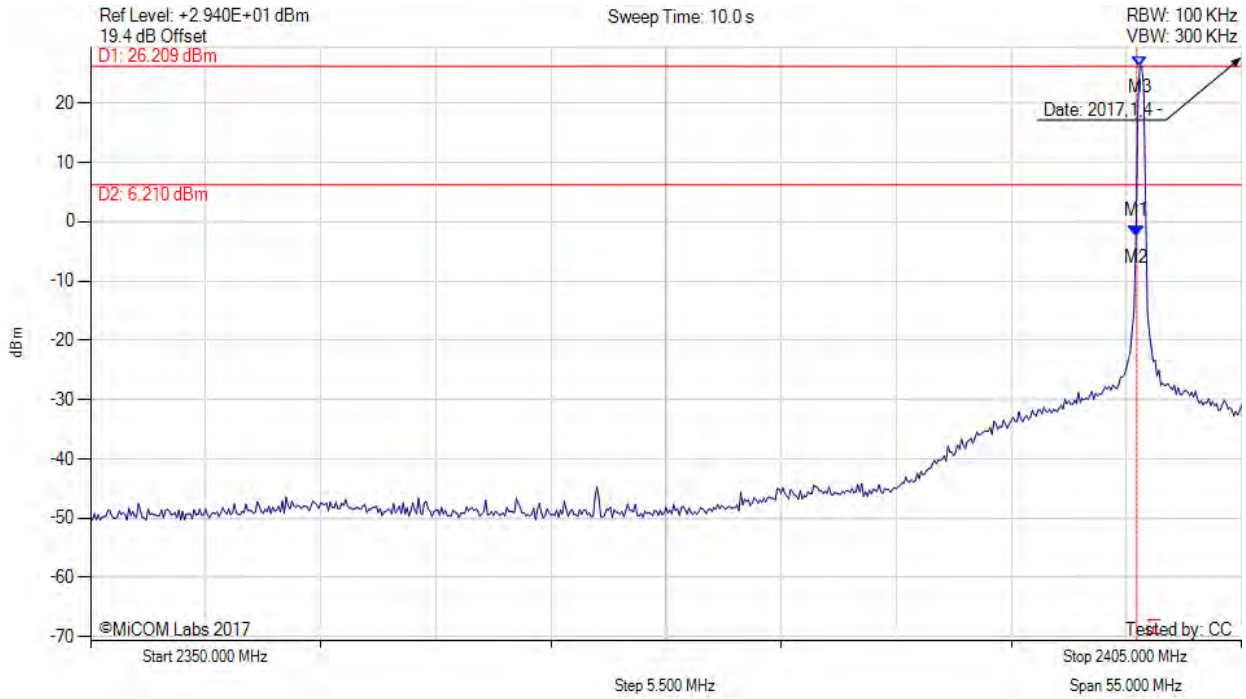


Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2400.000 MHz : -8.849 dBm M2 : 2399.960 MHz : -8.849 dBm M3 : 2400.140 MHz : 26.031 dBm	Channel Frequency: 2400.20 MHz

back to matrix

CONDUCTED LOW BAND-EDGE EMISSIONS (STATIC) PEAK

Variant: 6.25 kbps OQPSK, Channel: 2400.20 MHz, Chain a, Temp: 20, Voltage: 4 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2400.000 MHz : -2.467 dBm M2 : 2399.960 MHz : -2.467 dBm M3 : 2400.140 MHz : 26.209 dBm	Channel Frequency: 2400.20 MHz

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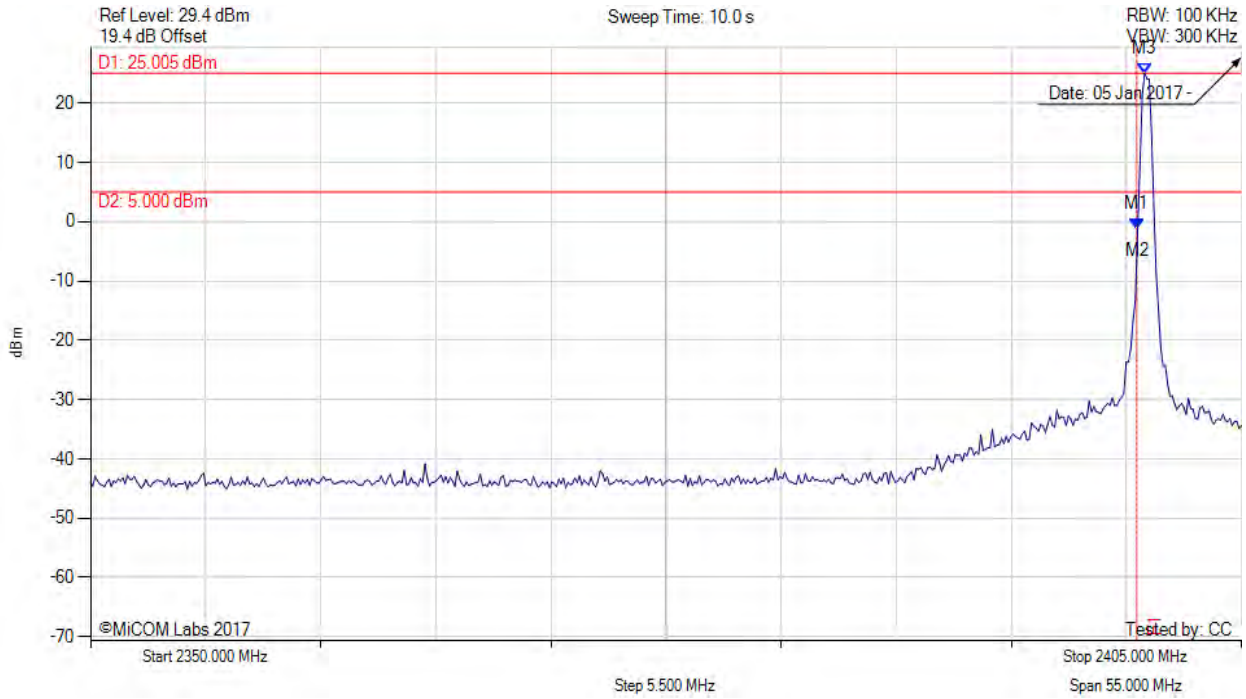
CONDUCTED LOW BAND-EDGE EMISSIONS (STATIC) PEAK

Variant: 600 kbps OFDM, Channel: 2400.40 MHz, Chain a, Temp: 20, Voltage: 4 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2400.000 MHz : -1.334 dBm M2 : 2400.040 MHz : -1.334 dBm M3 : 2400.371 MHz : 25.005 dBm	Channel Frequency: 2400.40 MHz

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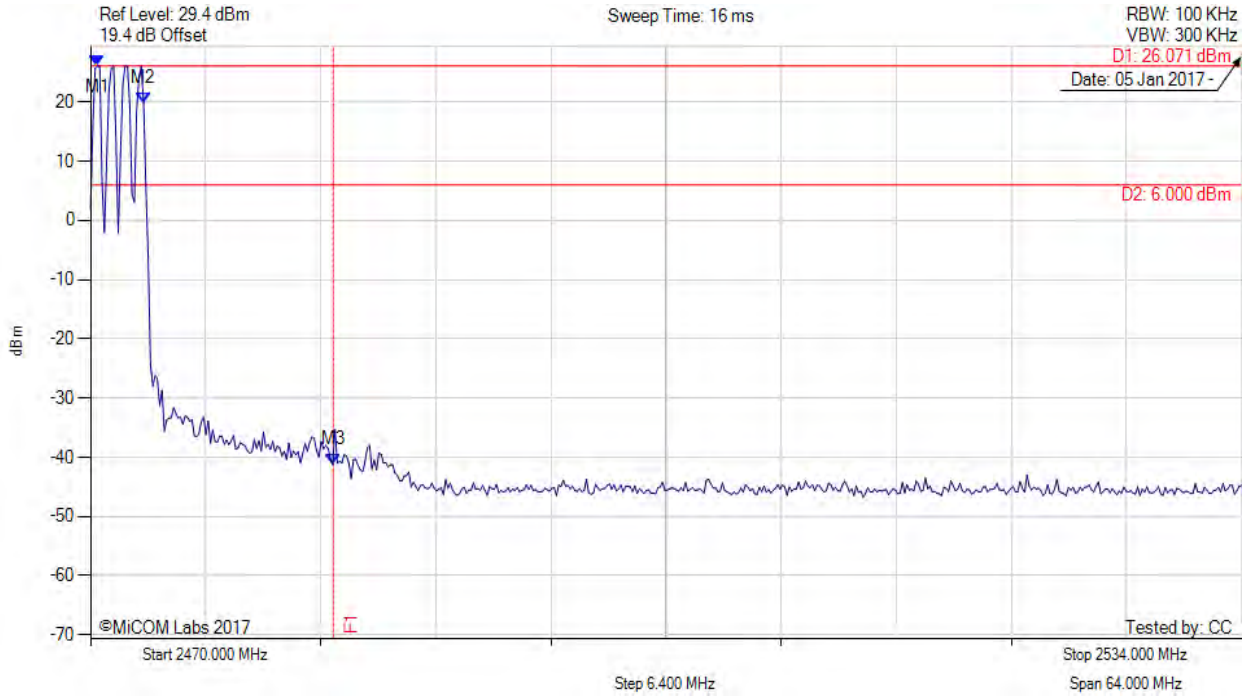
A.3.1.4. Conducted High Band-Edge Emissions

CONDUCTED UPPER BAND-EDGE EMISSIONS (HOPPING) PEAK

Variant: 300 kbps GFSK, Channel: 2472.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2470.385 MHz : 26.071 dBm M2 : 2472.950 MHz : 19.876 dBm M3 : 2483.500 MHz : -41.204 dBm	Channel Frequency: 2472.80 MHz

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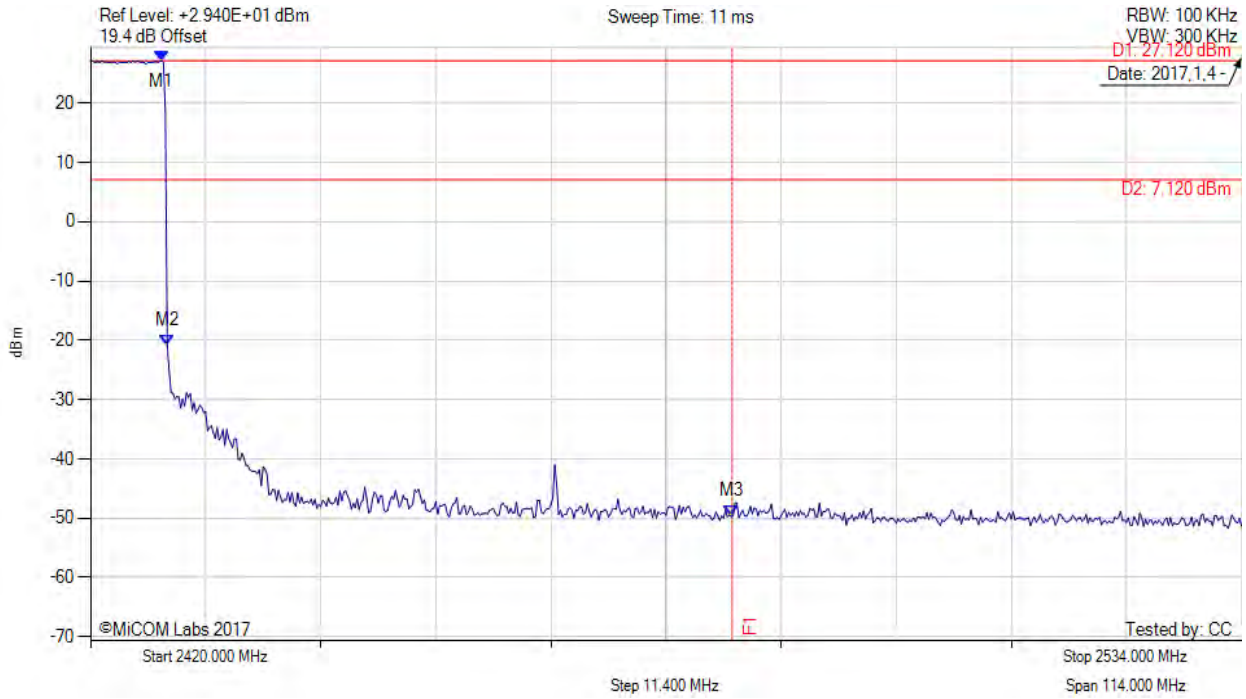
CONDUCTED UPPER BAND-EDGE EMISSIONS (HOPPING) PEAK

Variant: 50 kbps 2FSK, Channel: 2427.20 MHz, Chain a, Temp: 20, Voltage: 4 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2427.030 MHz : 27.120 dBm M2 : 2427.600 MHz : -20.910 dBm M3 : 2483.460 MHz : -49.705 dBm	Channel Frequency: 2427.20 MHz

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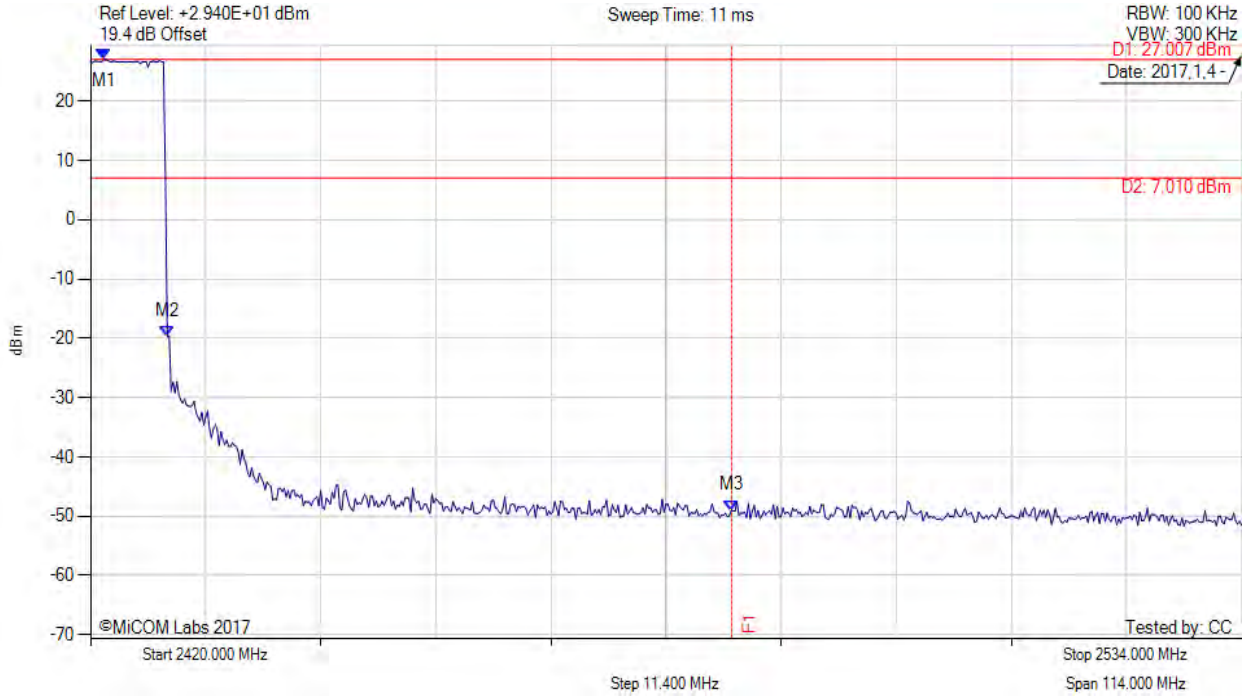
CONDUCTED UPPER BAND-EDGE EMISSIONS (HOPPING) PEAK

Variant: 6.25 kbps OQPSK, Channel: 2427.20 MHz, Chain a, Temp: 20, Voltage: 4 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2421.330 MHz : 27.007 dBm M2 : 2427.600 MHz : -19.621 dBm M3 : 2483.460 MHz : -49.028 dBm	Channel Frequency: 2427.20 MHz

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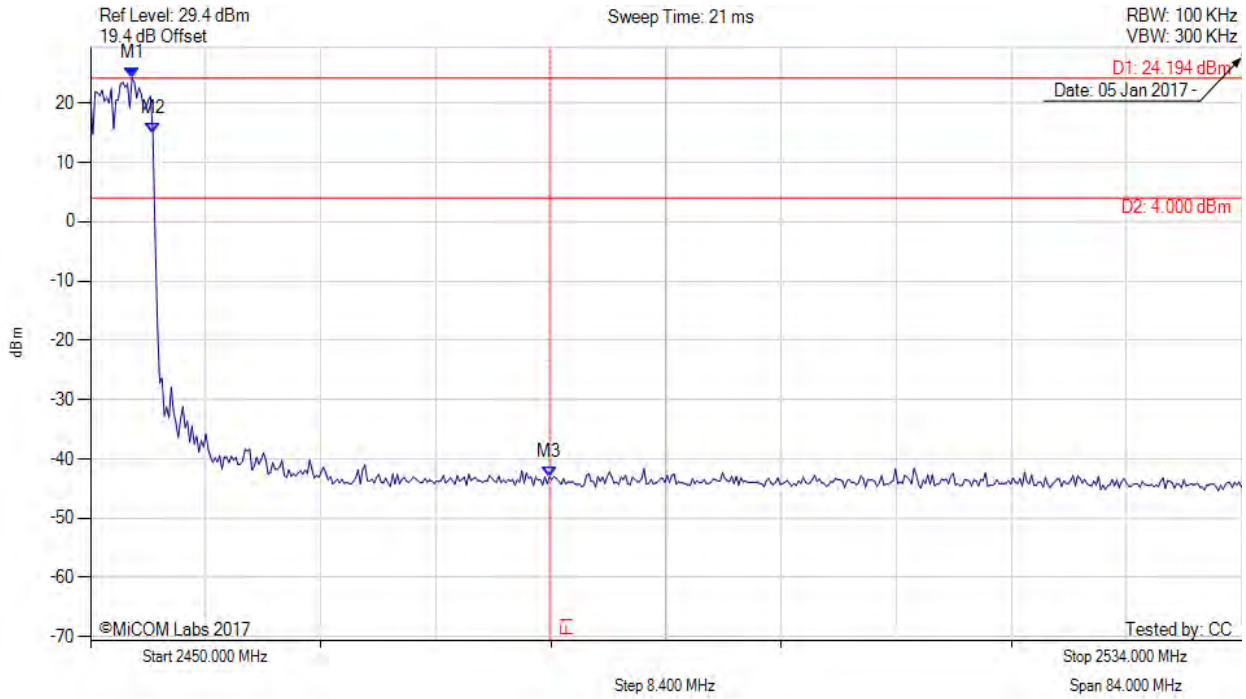
CONDUCTED UPPER BAND-EDGE EMISSIONS (HOPPING) PEAK

Variant: 600 kbps OFDM, Channel: 2454.40 MHz, Chain a, Temp: 20, Voltage: 4 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2453.030 MHz : 24.194 dBm M2 : 2454.545 MHz : 14.928 dBm M3 : 2483.500 MHz : -43.117 dBm	Channel Frequency: 2454.40 MHz

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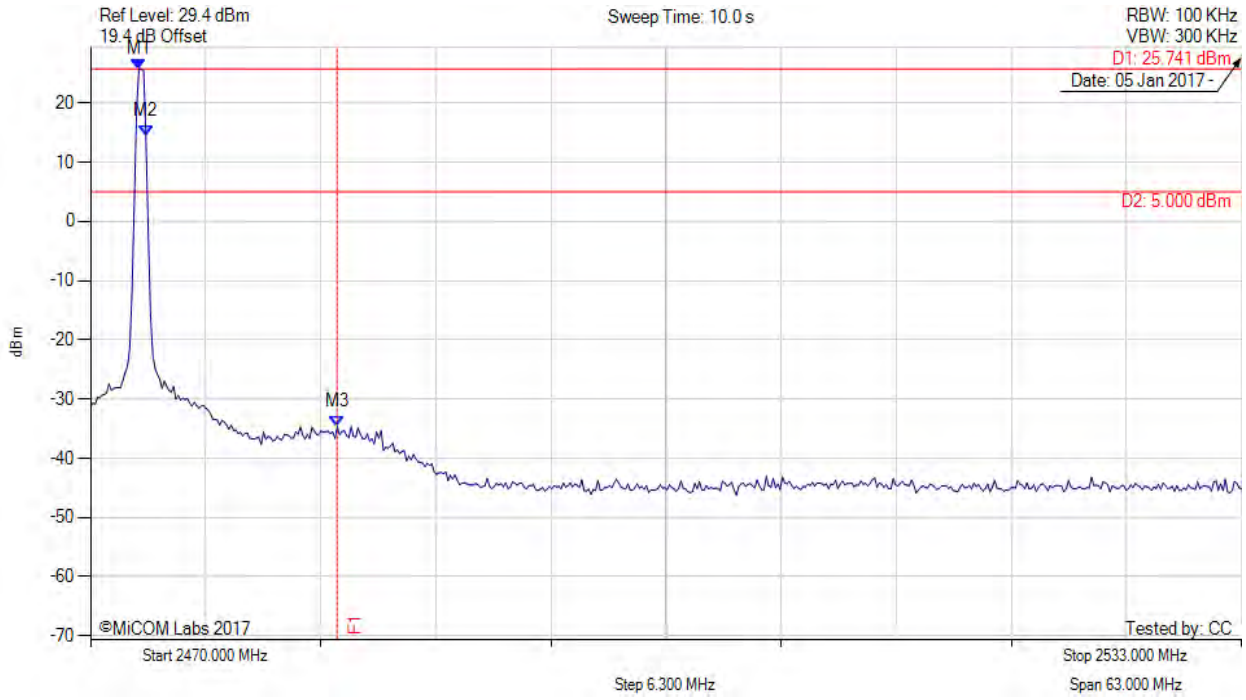
CONDUCTED UPPER BAND-EDGE EMISSIONS (STATIC) PEAK

Variant: 300 kbps GFSK, Channel: 2472.80 MHz, Chain a, Temp: 20, Voltage: 4 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2472.651 MHz : 25.741 dBm M2 : 2473.030 MHz : 14.397 dBm M3 : 2483.500 MHz : -34.704 dBm	Channel Frequency: 2472.80 MHz

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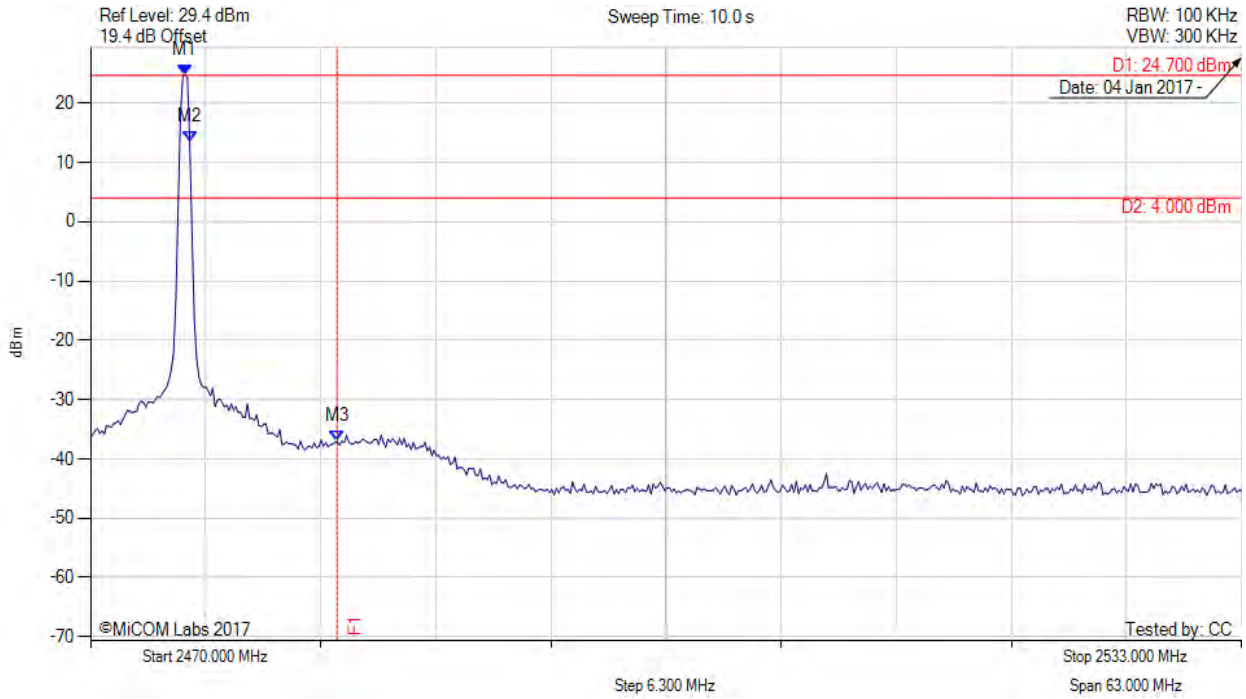
CONDUCTED UPPER BAND-EDGE EMISSIONS (STATIC) PEAK

Variant: 300 kbps GFSK, Channel: 2475.20 MHz, Chain a, Temp: 20, Voltage: 4 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2475.176 MHz : 24.700 dBm M2 : 2475.429 MHz : 13.577 dBm M3 : 2483.500 MHz : -37.067 dBm	Channel Frequency: 2475.20 MHz

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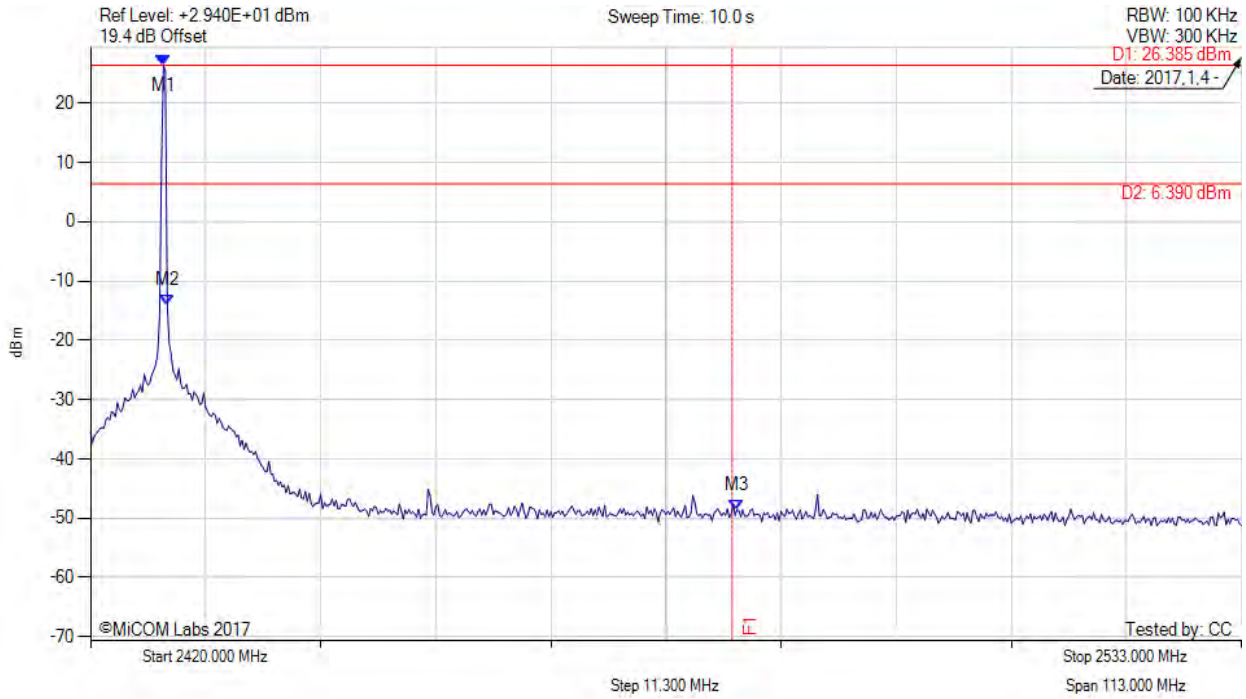
CONDUCTED UPPER BAND-EDGE EMISSIONS (STATIC) PEAK

Variant: 50 kbps 2FSK, Channel: 2427.20 MHz, Chain a, Temp: 20, Voltage: 4 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2427.160 MHz : 26.385 dBm M2 : 2427.533 MHz : -14.014 dBm M3 : 2483.468 MHz : -48.669 dBm	Channel Frequency: 2427.20 MHz

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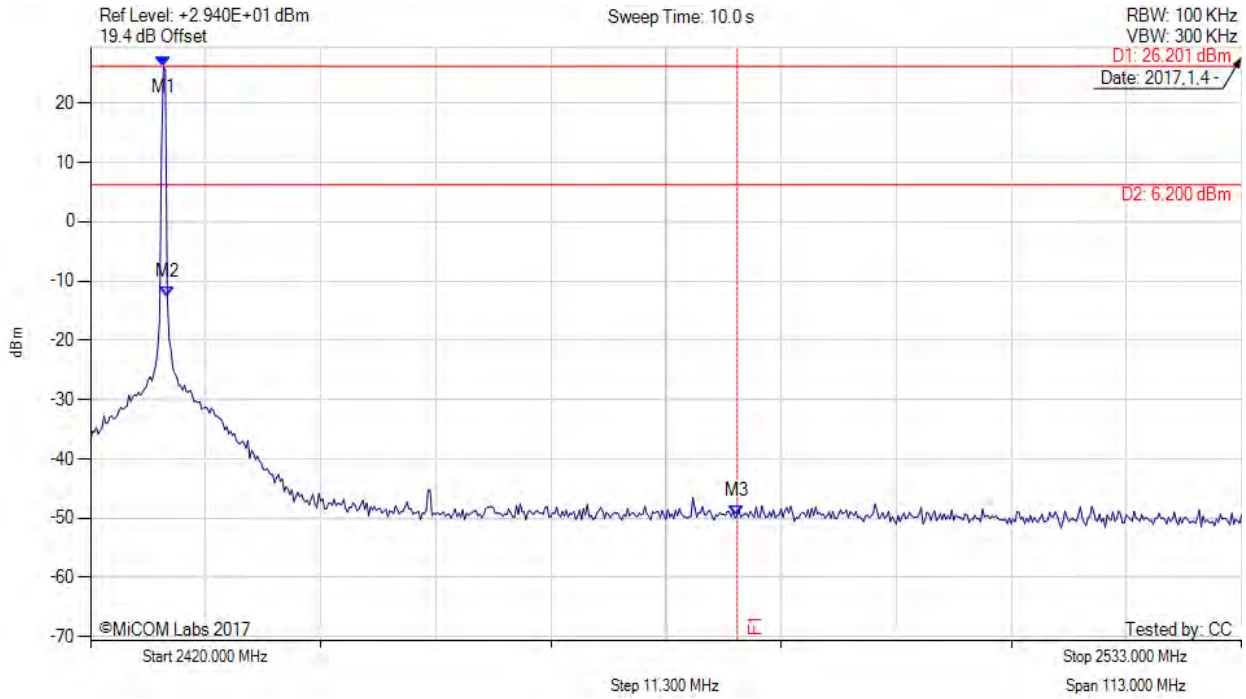
CONDUCTED UPPER BAND-EDGE EMISSIONS (STATIC) PEAK

Variant: 6.25 kbps OQPSK, Channel: 2427.20 MHz, Chain a, Temp: 20, Voltage: 4 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = POS Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2427.160 MHz : 26.201 dBm M2 : 2427.533 MHz : -12.702 dBm M3 : 2483.468 MHz : -49.585 dBm	Channel Frequency: 2427.20 MHz

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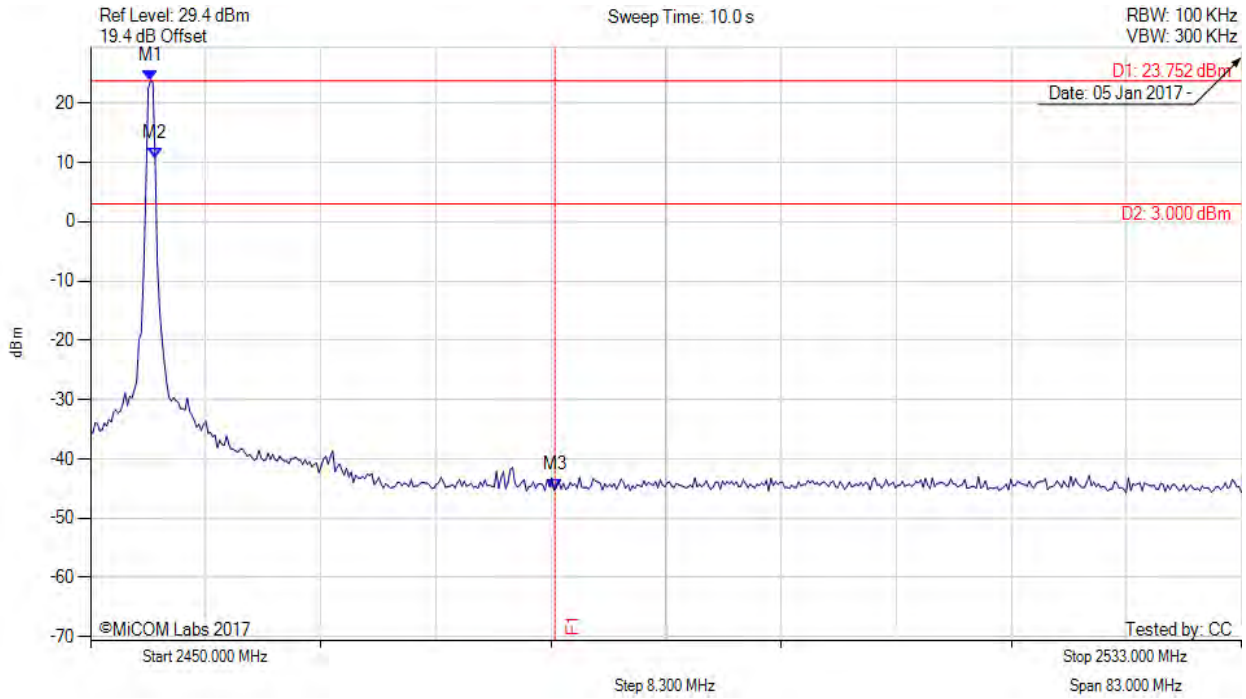
CONDUCTED UPPER BAND-EDGE EMISSIONS (STATIC) PEAK

Variant: 600 kbps OFDM, Channel: 2454.40 MHz, Chain a, Temp: 20, Voltage: 4 Vdc



Analyzer Setup	Marker:Frequency:Amplitude	Test Results
Detector = MAX PEAK Sweep Count = 0 RF Atten (dB) = 20 Trace Mode = VIEW	M1 : 2454.325 MHz : 23.752 dBm M2 : 2454.657 MHz : 10.653 dBm M3 : 2483.500 MHz : -45.257 dBm	Channel Frequency: 2454.40 MHz

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