

CERTIFICATION TEST REPORT

Report Number.: 16U23813-E2V3

- Applicant : APPLE, INC 1 INFINITE LOOP CUPERTINO, CA 95014, U.S.A.
 - **Model :** A1822
 - FCC ID : BCGA1822
 - **IC** : 579C-A1822
- EUT Description : TABLET DEVICE
- Test Standard(s) : FCC 47 CFR PART 15 SUBPART C INDUSTRY CANADA RSS - 247 ISSUE 1

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(R)

NVLAP LAB CODE 200065-0

Revision History

Rev.	lssue Date	Revisions	Revised By
V1	01/30/2017	Initial Issue	Mengistu Mekuria
V2	02/08/2017	Address TCB's Questions.	Chin Pang
V3	02/10/2017	Address TCB's Questions.	Chin Pang

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10.2. EUT POWERED BY HOST PC VIA	JSB CABLE
11. SETUP PHOTOS	

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Pass

Pass

1. ATTESTATION OF TEST RESULTS

INDUSTRY CANADA RSS-247 Issue 1

INDUSTRY CANADA RSS-GEN Issue 4

COMPANY NAME:			
EUT DESCRIPTION:	TABLET DEVICE		
MODEL:	A1822		
SERIAL NUMBER:	CONDUCTED (F9FSQ02CHQNX), RADIATED (F9FSJ00HHN9P)		
DATE TESTED:	NOVEMVER 16, 2016 – JANUAR	Y 18, 2017	
	APPLICABLE STANDARDS		
ST	ANDARD	TEST RESULTS	
CFR 47 P	art 15 Subpart C	Pass	

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

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Prepared By:

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2013, RSS-GEN Issue 4, and RSS-247 Issue 1.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
Chamber A (IC:2324B-1)	Chamber D (IC:2324B-4)
Chamber B (IC:2324B-2)	Chamber E (IC:2324B-5)
Chamber C (IC:2324B-3)	Chamber F (IC:2324B-6)
	Chamber G (IC:2324B-7)
	Chamber H (IC:2324B-8)

The above test sites and facilities are covered under FCC Test Firm Registration # 208313.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <u>http://ts.nist.gov/standards/scopes/2000650.htm</u>.

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4. CALIBRATION AND UNCERTAINTY

4.1. **MEASURING INSTRUMENT CALIBRATION**

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) 36.5 dBuV + 18.7 dB/m + 0.6 dB - 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 dB

Uncertainty figures are valid to a confidence level of 95%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a tablet with multimedia functions (music, application support, and video), IEEE 802.11a/b/g/n/ac radio, and Bluetooth radio. The rechargeable battery is not user accessible.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range	Mode	Output Power	Output Power
(MHz)		(dBm)	(mW)
	Basic GFSK	17.30	53.70
2402 - 2480	DQPSK	18.05	63.83
	Enhanced 8PSK	18.15	65.31

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (GHz)	Antenna Gain (dBi)	
2.4	1.91	

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was 14E232.

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5.5. WORST-CASE CONFIGURATION AND MODE

For below 1G, 18-26GHz radiated emission, and power line conducted emissions were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X/Y/Z, it was determined that Y (Landscape) orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in Y orientation.

Worst-case data rates were:

GFSK mode: DH5 8PSK mode: 3-DH5

DQPSK mode has been verified to have the lowest power.

There are two vendors of the WiFi/Bluetooth radio modules: variant 1 and variant 2. The Wi-Fi/Bluetooth radio modules have the same mechanical outline (e.g., the same package dimension and pin-out layout), use the same on-board antenna matching circuit, have an identical antenna structure, and are built and tested to conform to the same specifications and to operate within the same tolerances.

Baseline testing was performed on the two variants to determine the worst case on all conducted power and radiated emissions.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List							
Description Manufacturer Model Serial Number F							
Laptop	Apple	A1286	7313700NAGW	N/A			
Laptop AC/DC adapter	Apple	A1343	C062172045DDJ94A6	N/A			
Earphone	Apple	NA	NA	N/A			
EUT AC/DC adapter	Apple	A1357	W010A051	N/A			

I/O CABLES (CONDUCTED TEST)

	I/O Cable List								
Cable Port # of identical Co			Connector	Cable Type	Cable	Remarks			
No		ports	Туре		Length (m)				
1	Antenna	1	SMA	Un-Shielded	0.2	To spectrum Analyzer			
2	USB	1	USB	Shielded	1	N/A			
3	AC	1	AC	Un-shielded	2	N/A			

I/O CABLES (RADIATED ABOVE 1 GHZ)

I/O Cable List							
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks	
None Used							

I/O CABLES (RADIATED BELOW 1 GHZ AND AC LINE CONDUCTED: AC/DC ADAPTER CONFIGURATION)

	I/O Cable List									
Cable	Port	# of	Connector	Cable Type	Cable	Remarks				
No		identical	Туре		Length (m)					
1	Earphone Jack	1	3.5mm Audio	Shielded	0.9	N/A				
2	USB	1	USB	shielded	1	N/A				

I/O CABLES (AC LINE CONDUCTED: LAPTOP CONFIGUARTION)

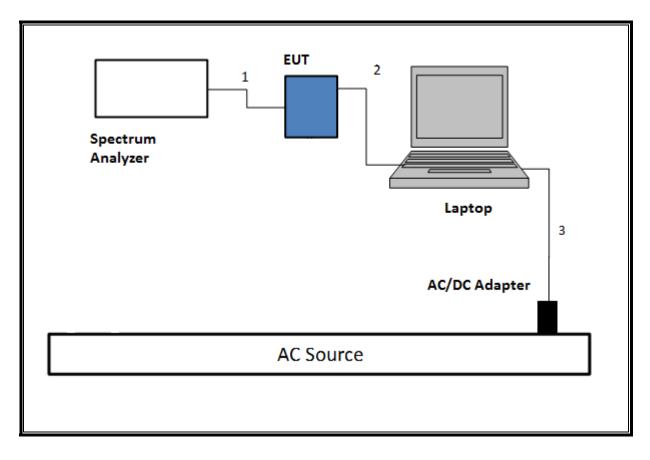
	I/O Cable List									
Cable	Port	# of	Connector	Cable Type	Cable	Remarks				
No		identical	Туре		Length (m)					
1	Earphone Jack	1	3.5mm Audio	Shielded	0.9	N/A				
2	USB	1	USB	Shielded	1	N/A				
3	AC	1	AC	Un-shielded	2	N/A				

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TEST SETUP - CONDUCTED TESTS

The EUT was connected to a host Laptop via USB cable adapter and spectrum analyzer to antenna port. Test software exercised the EUT.

SETUP DIAGRAM

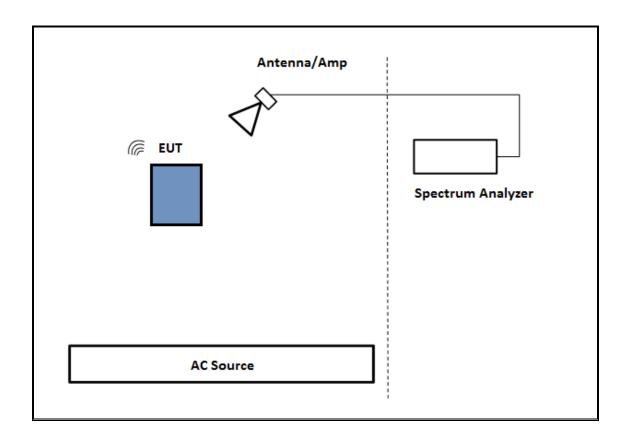


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TEST SETUP- RADIATED-ABOVE 1 GHZ

The EUT was powered by battery. Test software exercised the EUT.

SETUP DIAGRAM

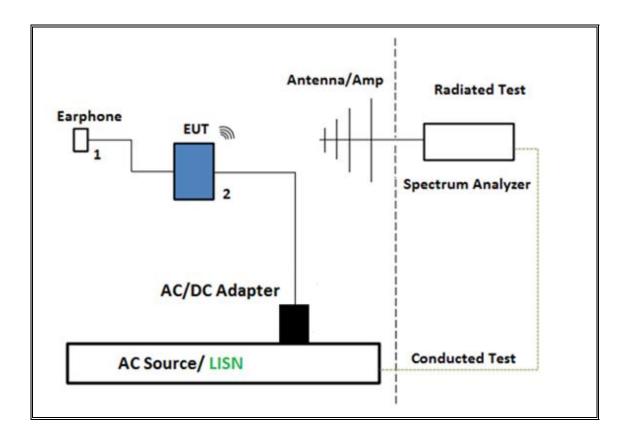


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TEST SETUP- BELOW 1GHz

The EUT was powered by AC/DC adapter and connected with earphone. Test software exercised the EUT.

SETUP DIAGRAM

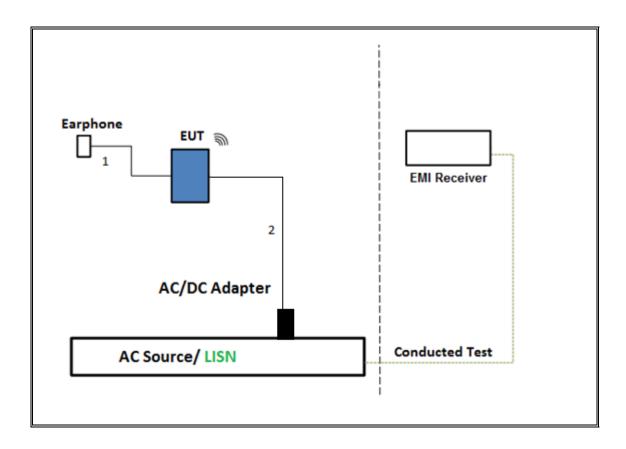


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TEST SETUP- AC LINE CONDUCTED: AC/DC ADAPTER CONFIGURATION

The EUT was tested with earphone connected and powered by AC/DC adapter via USB cable. Test software exercised the EUT.

SETUP DIAGRAM

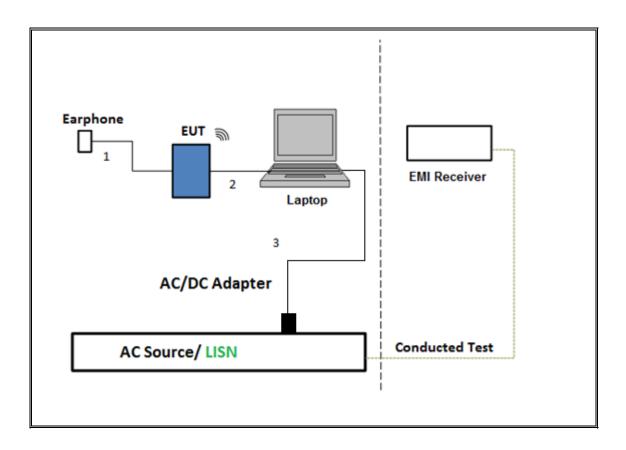


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TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION

The EUT was tested with earphone connected and powered by host PC via USB cable. Test software exercised the EUT.

SETUP DIAGRAM



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6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

	TEST EQUIPN	IENT LIST		
Description	Manufacturer	Model	Asset	Cal Due
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T344	02/22/2017
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T740	11/29/2017
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T300	11/10/2017
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	T426	09/23/2017
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T243	10/11/2017
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T285	06/20/2017
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T1613	09/23/2017
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T120	04/5/2017
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T742	11/29/2017
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T341	10/25/2017
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	т899	05/26/2017
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T834	06/17/2017
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A-544	T1210	06/30/2017
Power Meter, P-series single channel	Keysight	N1912A	T1244	05/03/2017
Power Sensor	ETS LINDGREN	7002-006	T1126	02/10/2017
Power Sensor, Peak and average, 50 MHz to 18 GHz, 5 MHz BW	HEWLET PACKARD	8481A	T246	06/24/2017
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A-544	T1210	06/30/2017
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	T339	09/22/2017
Spectrum Analyzer	Keysight	8564E	T106	09/07/2017
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826/B	T447	06/16/2017
Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum	Keysight	8449B	T402	07/5/2017
	AC Line Con	ducted		
*EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESCI7	T1436	12/19/2016
LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2-01	T1310	06/08/2017
Power Cable, Line Conducted Emissions	UL	PG1	T861	9/1/2017
	UL AUTOMATION	N SOFTWARE		
Radiated Software	UL	UL EMC	Ver 9.5,	April 26, 2016
Conducted Software	UL	UL EMC	Ver 5.4, O	ctober 13, 2016
AC Line Conducted Software	UL	UL EMC		May 26, 2015

NOTE: *testing is completed before equipment calibration expiration date.

7. MEASUREMENT METHODS

On Time and Duty Cycle: ANSI C63.10-2013 Section 11.6

Occupied BW (99%): ANSI C63.10-2013 Section 6.9.3

Carrier Frequency Separation: ANSI C63.10-2013 Section 7.8.2

Number of Hopping Frequencies: ANSI C63.10-2013 Section 7.8.3

Time of Occupancy (Dwell Time): ANSI C63.10-2013 Section 7.8.4

Peak Output Power: ANSI C63.10-2013 Section 7.8.5

Conducted Spurious Emissions: ANSI C63.10-2013 Section 7.8.8

Conducted Band-Edge: ANSI C63.10-2013 Section 6.10.4

Radiated Spurious Emissions 30-1000MHz: ANSI C63.10-2013 Section 6.3 and 6.5

Radiated Spurious Emissions above 1GHz: ANSI C63.10-2013 Section 6.3 and 6.6

Radiated Band-edge: ANSI C63.10-2013 Section 6.10.5

AC Power-line conducted emissions: ANSI C63.10-2013, Section 6.2.

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8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

<u>LIMITS</u>

None; for reporting purposes only.

PROCEDURE

ANSI C63.10, Section 11.6 : Zero-Span Spectrum Analyzer Method.

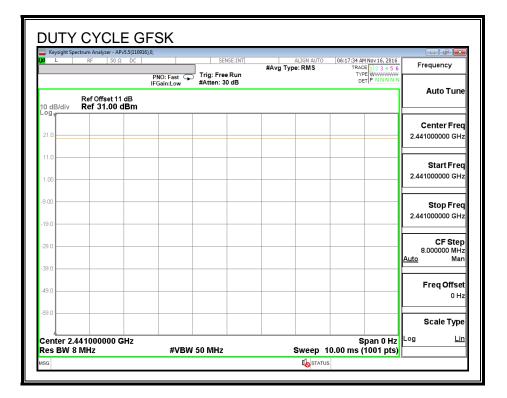
ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time	Period	Duty Cycle	Duty	Duty Cycle	1/B
	В		x	Cycle	Correction Factor	Minimum VBW
	(msec)	(msec)	(linear)	(%)	(dB)	(kHz)
GFSK HIGH POWER	1.000	1.000	1.000	100.00%	0.00	0.010
8PSK HIGH POWER	1.000	1.000	1.000	100.00%	0.00	0.010
GFSK LOW POWER	1.000	1.000	1.000	100.00%	0.00	0.010
8PSK LOW POWER	1.000	1.000	1.000	100.00%	0.00	0.010

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DUTY CYCLE PLOTS

8.1.1. HIGH POWER MODE

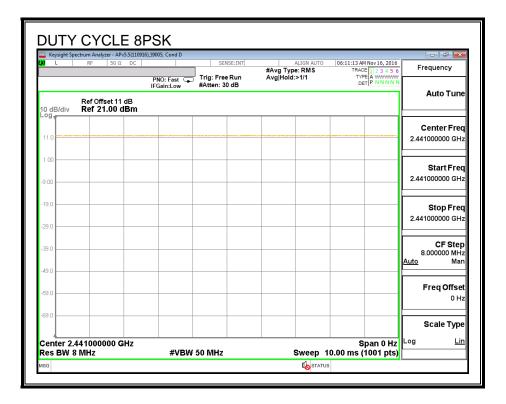


	trum Analyzer - APv5.5(11091	.6),0,				- 6
	RF 50 Ω DC	PNO: Fast	SENSE:INT	ALIGN AUTO #Avg Type: RMS	06:16:22 AM Nov 16, 2016 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P N N N N	Frequency
		IFGain:Low	#Atten: 30 dB		DET P NNNN	Auto Tun
10 dB/div Log	Ref Offset 11 dB Ref 31.00 dBm					
						Center Fre
21.0			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	**** <mark>}~~~~*****************************</mark>	*****	2.441000000 GH
11.0						Start Fre
1.00						2.441000000 GH
-9.00						Stop Fre
-19.0						2.441000000 GH
						CF Ster
-29.0						8.000000 MH <u>Auto</u> Ma
-39.0						-
-49.0						Freq Offse 0 H
-59.0						
						Scale Type
Center 2.4 Res BW 8	41000000 GHz	#\/B\M	50 MHz	Sween 1	Span 0 Hz 0.00 ms (1001 pts)	Log <u>Li</u>

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8.1.2. LOW POWER MODE

Keysight Spectrum Analyz	er - APv5.5(11091 50 Ω DC	6),39005, Cond D	SENSE:INT	ALIGN AUTO	06:08:58 AM Nov 16, 2016	
- 10	0011 00	PNO: Fast 🖵	Trig: Free Run #Atten: 30 dB	#Avg Type: RMS Avg Hold:>1/1	TRACE 1 2 3 4 5 6 TYPE A WWWW DET P N N N N	Frequency
	et 11 dB .00 dBm					Auto Tune
og						Center Freq
11.0						2.441000000 GHz
1.00						Start Fred
9.00						2.441000000 GHz
19.0						Stop Freq
29.0						2.441000000 GHz
19.0						CF Step 8.000000 MHz <u>Auto</u> Man
49.0						
59.0						Freq Offset 0 Hz
59.0						Scale Type
enter 2.4410000 es BW 8 MHz	00 GHz		50 MHz		Span 0 Hz 0.00 ms (1001 pts)	Log <u>Lin</u>



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8.2. HIGH POWER BASIC DATA RATE GFSK MODULATION

8.2.1. 20 dB AND 99% BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

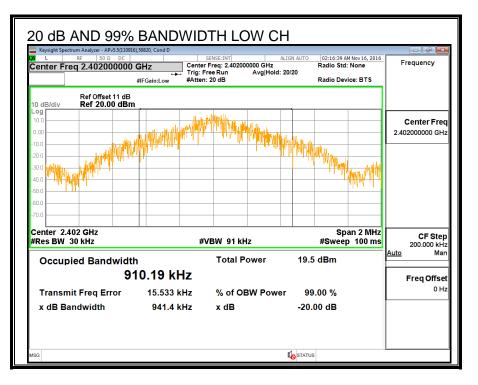
TEST PROCEDURE

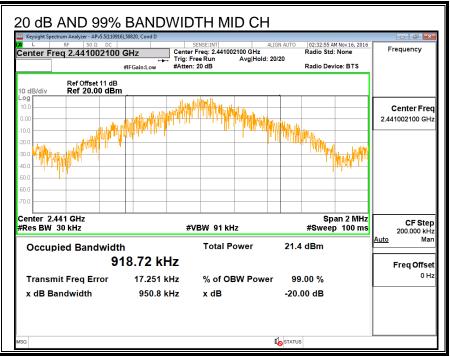
The transmitter output is connected to a spectrum analyzer. The RBW is set to \geq 1% of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

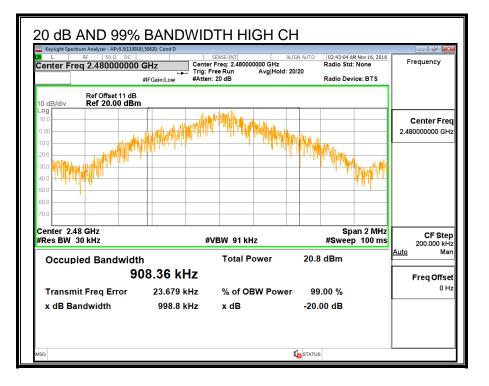
Channel	Frequency (MHz)	20 dB Bandwidth (KHz)	99% Bandwidth (KHz)
Low	2402	941.4	910.19
Middle	2441	950.8	918.72
High	2480	998.8	908.36

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8.2.2. HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)

IC RSS-247 (5.1) (2)

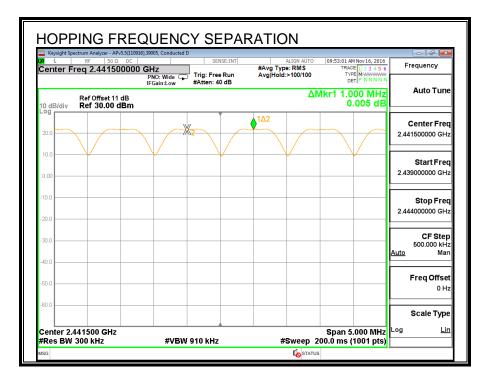
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

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.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 910 kHz. The sweep time is coupled.

RESULTS



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8.2.3. NUMBER OF HOPPING CHANNELS

<u>LIMITS</u>

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

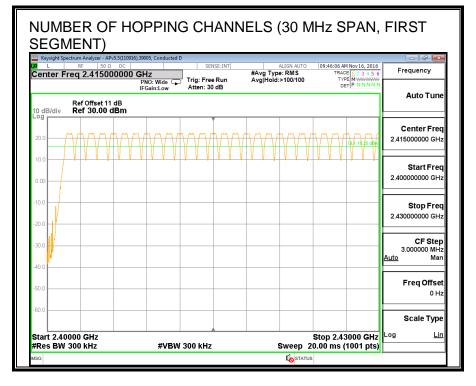
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

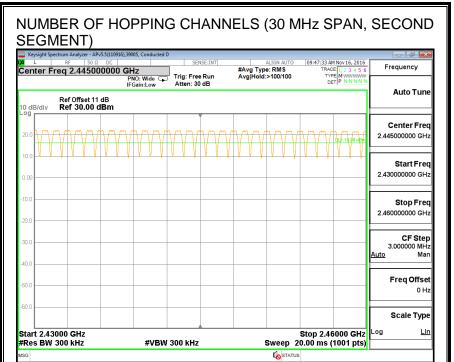
RESULTS

Normal Mode: 79 Channels observed.

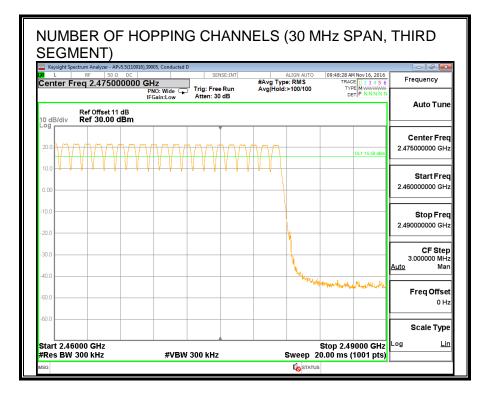
u ∟ RF Center Freq∶	50 Ω DC 2.440000000	GHz	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	09:50:00 AM Nov 16, 2016 TRACE 1 2 3 4 5 6 TYPE M WWWWW	Frequency
	Offset 11 dB 5 30.00 dBm	IFGain:Low	Atten: 30 dB		DET P NNNN	Auto Tune
20.0				<u></u>		Center Fred 2.440000000 GH;
0.00					DL1 2.20 dBm	Start Free 2.390000000 GH:
20.0						Stop Fre 2.490000000 GH
30.0 40.0					human	CF Step 10.000000 MH <u>Auto</u> Ma
50.0						Freq Offse 0 H
60.0						Scale Type

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8.2.4. AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

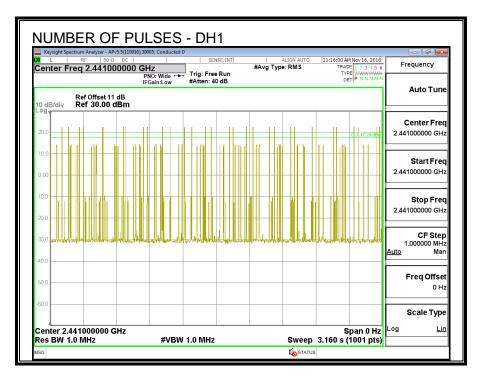
For AFH mode, the average time of occupancy in the specified 8 second period (20 channels * 0.4 seconds) is equal to 10 * (# of pulses in 0.8 s) * pulse width.

DH Packet	Pulse Width	Number of Pulses in	Average Time of Occupancy	Limit	Margin
	(msec)	3.16	(sec)	(sec)	(sec)
		seconds			
GFSK Norma	I Mode				
DH1	0.385	30	0.116	0.4	-0.285
DH3	1.64	14	0.230	0.4	-0.170
DH5	2.888	12	0.347	0.4	-0.053
DH Packet	Pulse	Number of	Average Time	Limit	Margin
	Width	Pulses in	of Occupancy		
	(msec)	0.8	(sec)	(sec)	(sec)
		seconds			
GFSK AFH M	lode				
DH1	0.385	7.5	0.029	0.4	-0.371
DH3	1.64	3.5	0.057	0.4	-0.343
DH5	2.888	3	0.087	0.4	-0.313

RESULTS

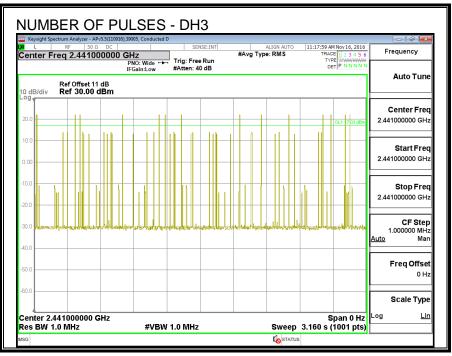
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L RF	/zer - APv5.5(110916),39005, Conduc 50 Ω DC	SENS			ALIGN AUTO	11:15:38 AM	Nov 16, 2016	- 6 ×
Center Freq 2.4	41000000 GHz PNO: Wide	Trig Delay-		#Avg Type	RMS	TYP	1 2 3 4 5 6 WWWWWWWW P N N N N N	Frequency
	IFGain:Low set 11 dB 0.00 dBm	#Atten: 40	dB		4	Mkr1 3		Auto Tune
og								Center Freq
20.0								2.441000000 GHz
10.0								Start Freq
0.00		1/	12					2.441000000 GHz
10.0							TRIG LVL	Stop Freq 2.441000000 GHz
20.0								
			hill later	Ali dadi dh		المسطيان	malta n	CF Step 1.000000 MHz <u>Auto</u> Man
40.0			<u>um nind</u>	NY WAN	YYYNNYY		a had had had a	
50.0				1			- 1	Freq Offset 0 Hz
60.0								Scale Type
enter 2.441000	000 GHz					S	oan 0 Hz	Log <u>Lin</u>

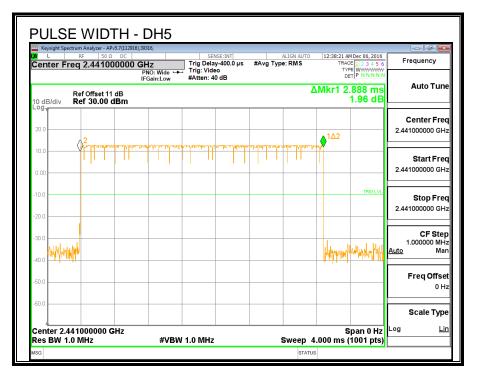


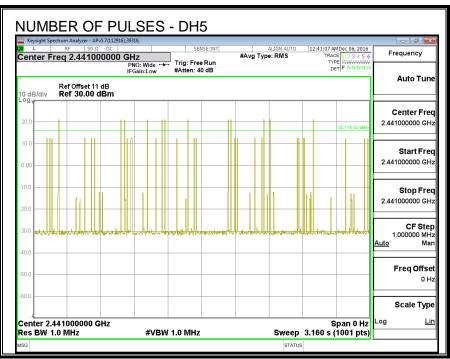
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8.2.5. OUTPUT POWER

ID: 30606 **Date:** 1/18/17

LIMITS

§15.247 (b) (1)

RSS-247 (5.4) (2)

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a wideband peak and average power meter.

<u>RESULTS</u>

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	16.59	30	-13.41
Middle	2441	16.77	30	-13.23
High	2480	17.30	30	-12.70

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8.2.6. AVERAGE POWER

ID: 30606 **Date:** 1/18/17

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

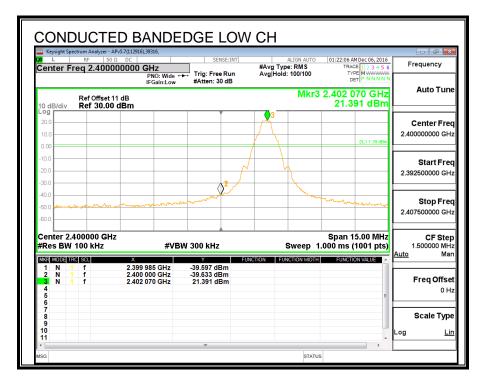
RESULTS

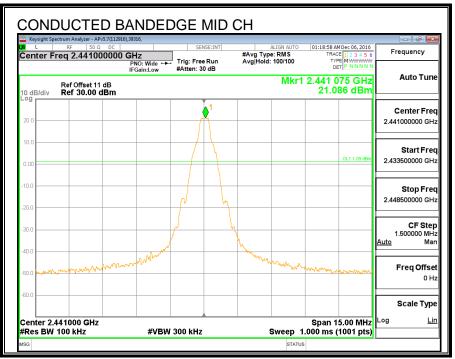
The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	16.29
Middle	2441	16.52
High	2480	17.00

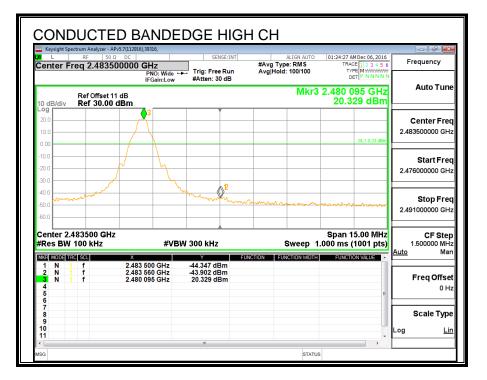
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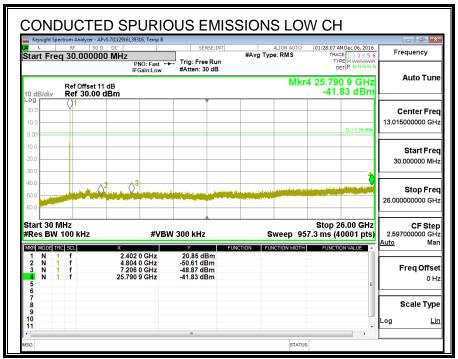
8.2.7. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

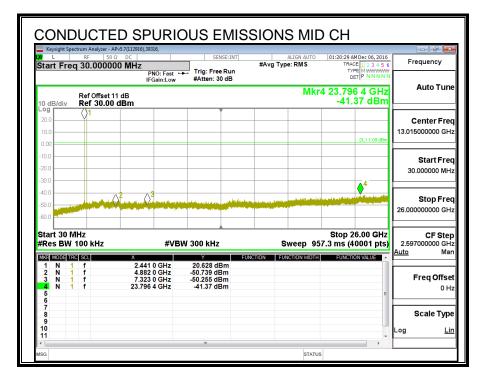


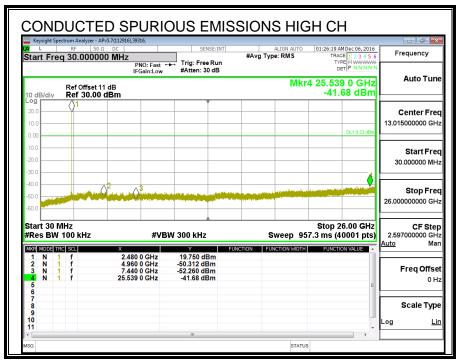


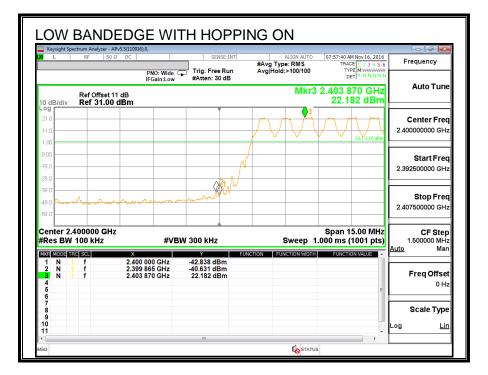
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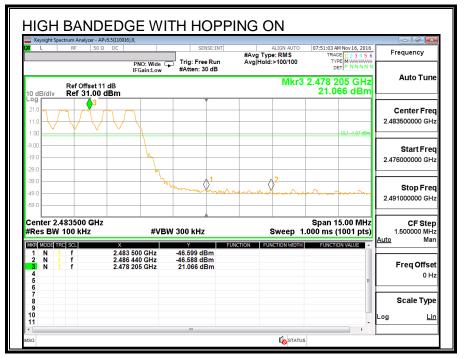












8.3. HIGH POWER ENHANCED DATA RATE QPSK MODULATION 8.3.1. OUTPUT POWER

ID: 30606 **Date:** 1/18/17

LIMITS

§15.247 (b) (1)

RSS-247 (5.4) (2)

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm. 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

TEST PROCEDURE

The transmitter output is connected to a wideband peak and average power meter.

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	17.90	21	-3.10
Middle	2441	18.05	21	-2.95
High	2480	17.52	21	-3.48

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8.3.2. AVERAGE POWER

ID: 30606 **Date:** 1/18/17

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)		
Low	2402	15.80		
Middle	2441	15.90		
High	2480	15.38		

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8.4. HIGH POWER ENHANCED DATA RATE 8PSK MODULATION

8.4.1. 20 dB AND 99% BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

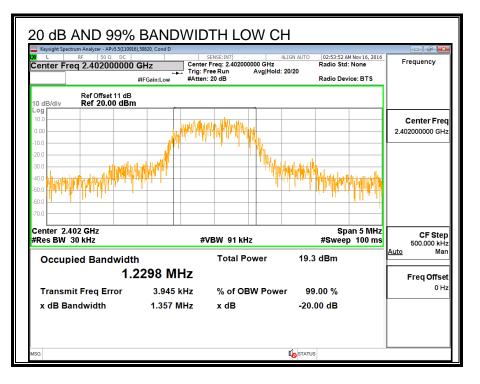
TEST PROCEDURE

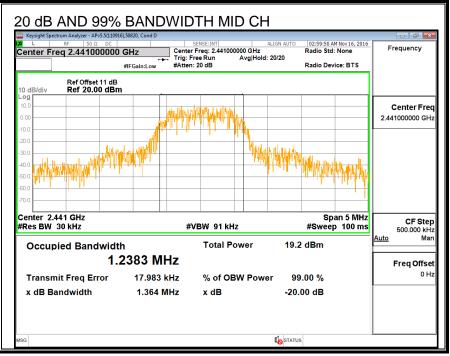
The transmitter output is connected to a spectrum analyzer. The RBW is set to \geq 1% of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

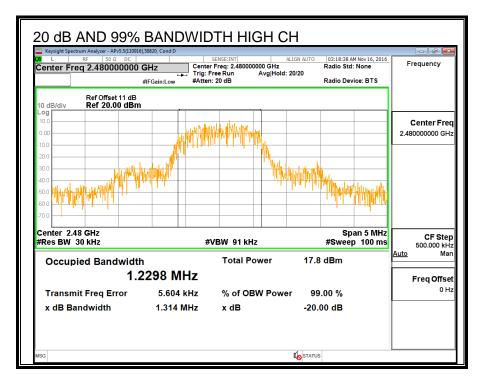
Channel	Frequency (MHz)	20 dB Bandwidth (KHz)	99% Bandwidth (KHz)	
Low	2402	1357	1229.8	
Middle	2441	1364	1238.3	
High	2480	1314	1229.8	

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8.4.2. HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)

IC RSS-247 (5.1) (2)

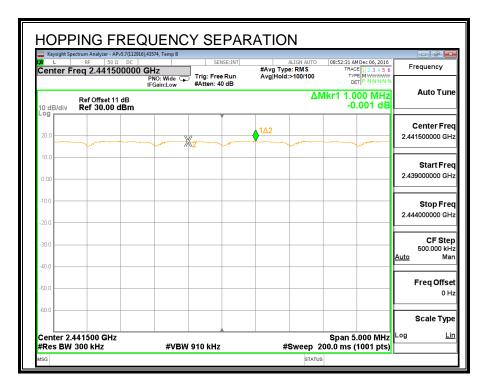
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

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.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 910 kHz. The sweep time is coupled.

<u>RESULTS</u>



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8.4.3. NUMBER OF HOPPING CHANNELS

<u>LIMITS</u>

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

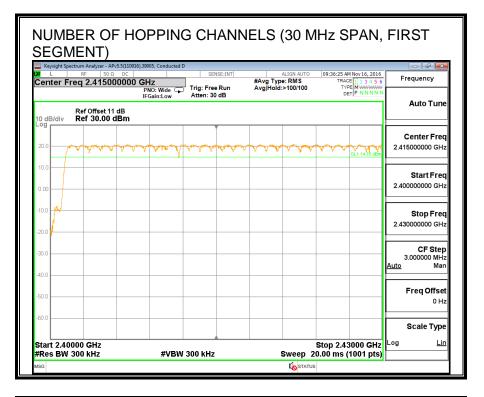
TEST PROCEDURE

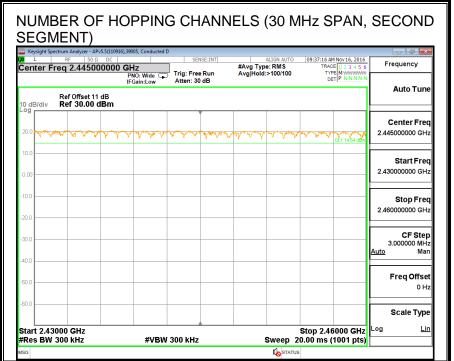
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 79 Channels observed.

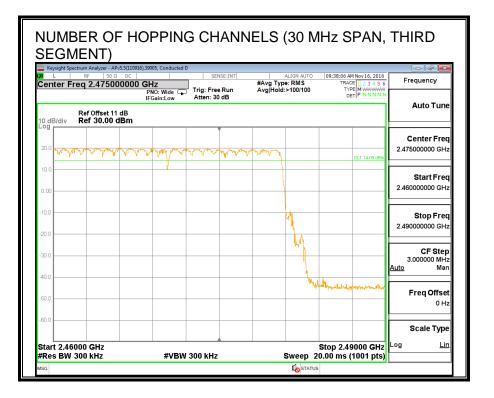
L RF 50 Ω Center Freq 2.44000	DC 00000 GHz PNO: Fast	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	09:39:10 AM Nov 16, 2016 TRACE 1 2 3 4 5 6 TYPE M WWWWWW DET P N N N N N	Frequency
Ref Offset 11		Atten: 30 dB		DETJP NNNN	Auto Tune
	mmm		and a second	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Center Fred 2.440000000 GHz
0.00				DL1 2.03 dBm	Start Fred 2.390000000 GH;
20.0					Stop Free 2.49000000 GH
30.0				have	CF Step 10.000000 MH: <u>Auto</u> Mar
50.0					Freq Offse 0 H
60.0					Scale Type





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8.4.4. AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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.

TEST PROCEDURE

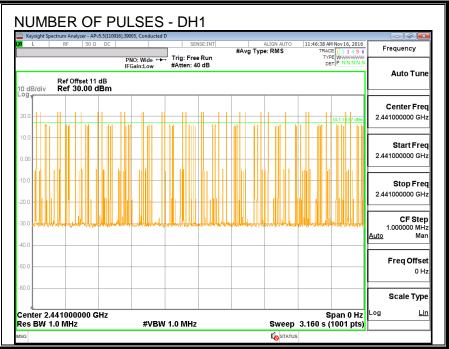
The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

DH Packet	Pulse	Number of	Average Time	Limit	Margin				
	Width (msec)	Pulses in 3.16 seconds	of Occupancy (sec)	(sec)	(sec)				
8PSK (EDR) Mode									
3DH1	0.391	31	0.121	0.4	-0.279				
3DH3	1.074	15	0.161	0.4	-0.239				
3DH5	2.892	11	0.318	0.4	-0.082				

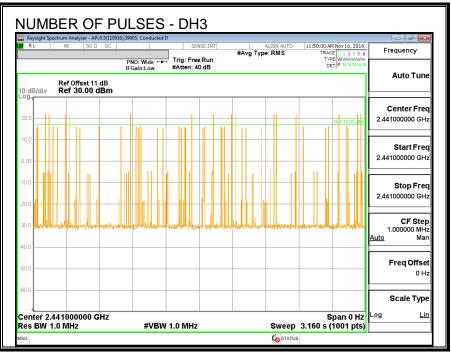
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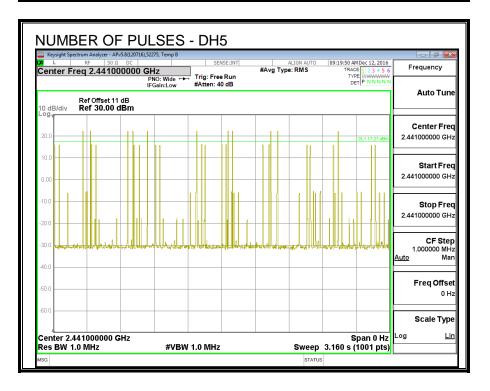
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Keysight Sp	ectrum Analyzer - A		275, Temp B						
enter F	req 2.4410	Ω DC 100000 G	Hz NO:Wide ↔	Trig Dela Trig: Vide		#Avg Typ	ALIGN AUTO e: RMS	09:23:21 AM Dec 12, 20 TRACE 1 2 3 4 TYPE WWWW	5 6 Frequency
0 dB/div	Ref Offset 1 Ref 30.00	IF 1 dB	Gain:Low	#Atten: 4	0 dB			DET P NNN ∆Mkr1 2.892 n -0.65 c	ns Auto Tun
									Center Fre
20.0	<u>∧2 ∖₩₩</u> ₩	where where the	nin hindra	(mprovident	The second se	WARAN WAR	Marina da finale da fi	₩ ⁴ 1∆2	2.441000000 GH
0.00			1	· · · · · ·					Start Fre 2.441000000 GH
20.0								TRIG	Stop Free 2.441000000 GH
30.0 40.0	HAN .							nyunith kyrnationan	CF Stej 1.000000 MH <u>Auto</u> Ma
50.0									Freq Offse 0 H
50.0		_							Scale Typ
Center 2.4 Res BW 1	441000000	GHz		1.0 MHz				Span 0 I 4.000 ms (1001 p	



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8.4.5. OUTPUT POWER

ID: 30606 **Date:** 1/18/17

LIMITS

§15.247 (b) (1)

RSS-247 (5.4) (2)

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

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

TEST PROCEDURE

The transmitter output is connected to a wideband peak and average power meter.

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	18.10	21	-2.90
Middle	2441	18.15	21	-2.85
High	2480	17.62	21	-3.38

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8.4.6. AVERAGE POWER

ID:	30606	Date:	1/18/17	1
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<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

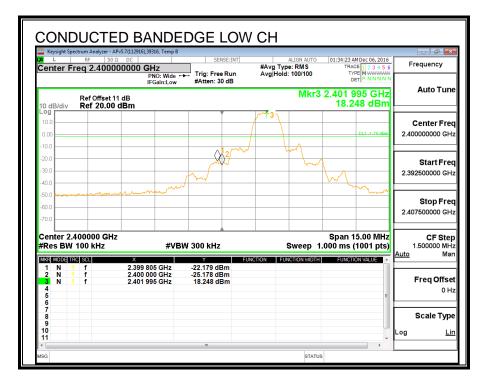
RESULTS

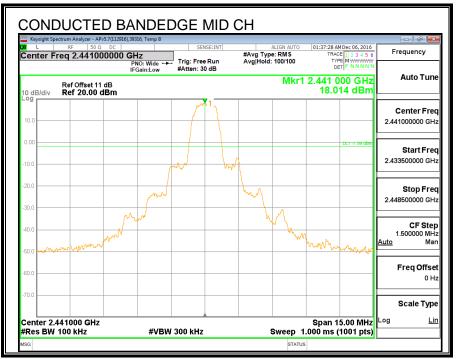
The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)		
Low	2402	15.89		
Middle	2441	15.91		
High	2480	15.41		

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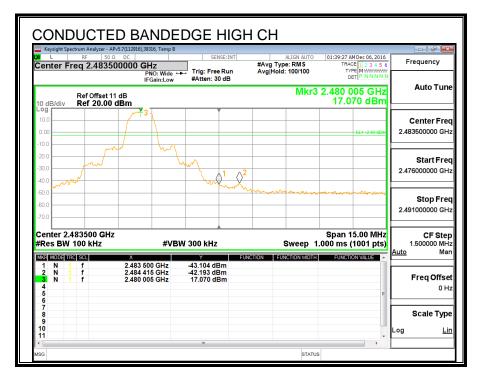
8.4.7. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

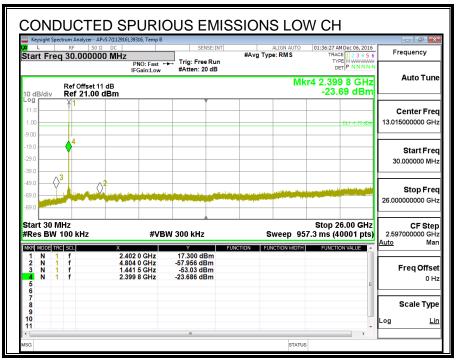


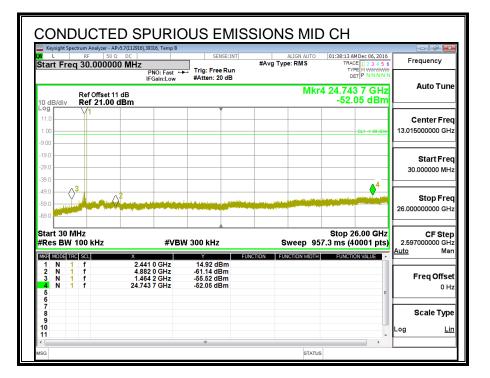


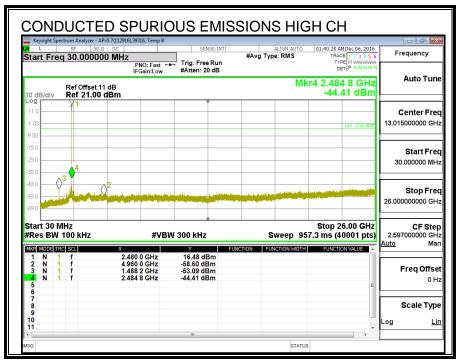
UL VERIFICATION SERVICES INC. 47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888 This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc.

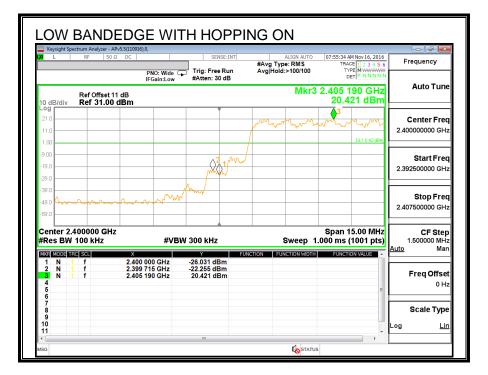
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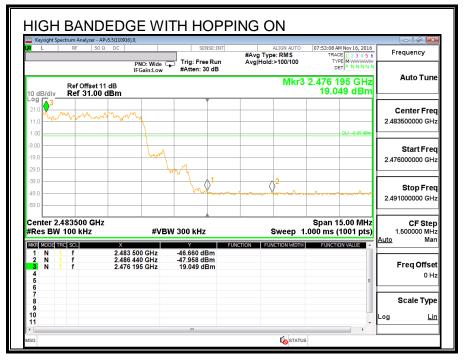












8.5. LOW POWER BASIC DATA RATE GFSK MODULATION

8.5.1. 20 dB AND 99% BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

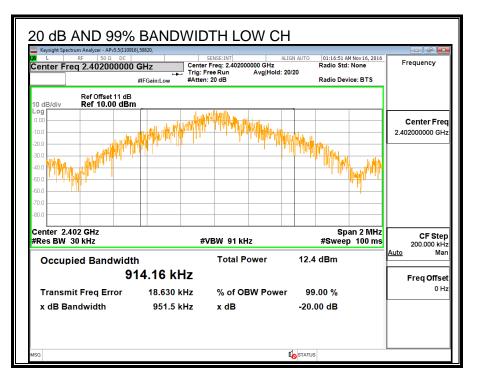
TEST PROCEDURE

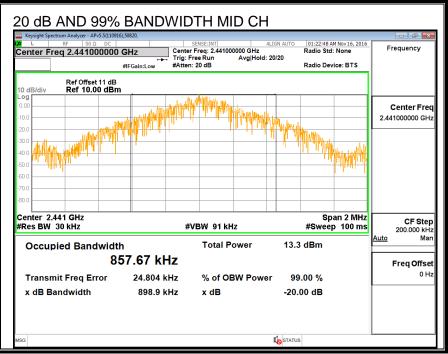
The transmitter output is connected to a spectrum analyzer. The RBW is set to \geq 1% of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

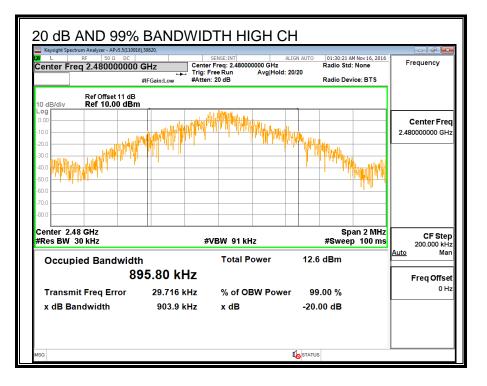
Channel	Frequency (MHz)	20 dB Bandwidth (KHz)	99% Bandwidth (KHz)	
Low	2402	951.5	914.16	
Middle	2441	898.9	857.67	
High	2480	903.9	895.80	

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8.5.2. HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)

IC RSS-247 (5.1) (2)

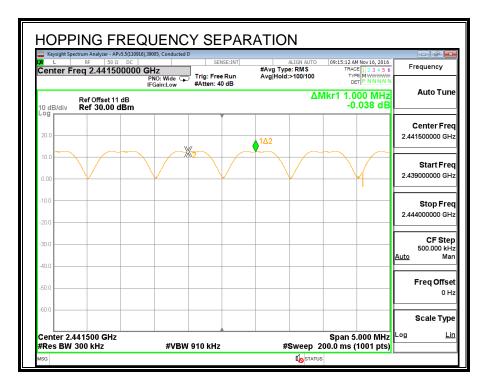
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

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.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 910 kHz. The sweep time is coupled.

RESULTS



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8.5.3. NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

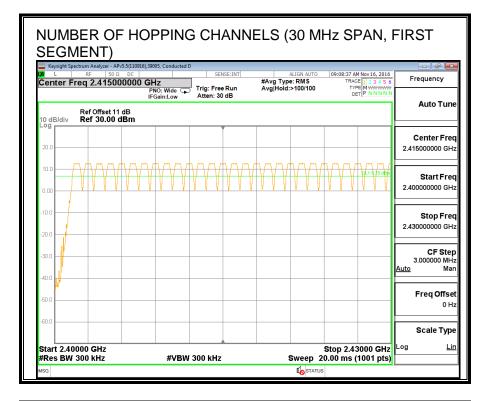
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

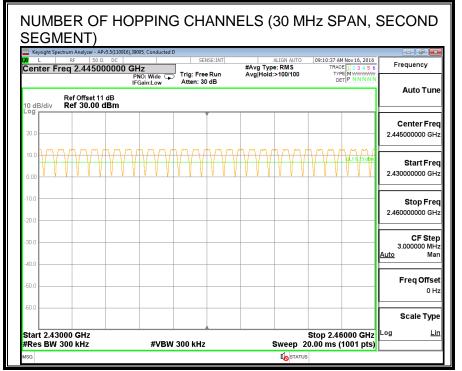
<u>RESULTS</u>

Normal Mode: 79 Channels observed.

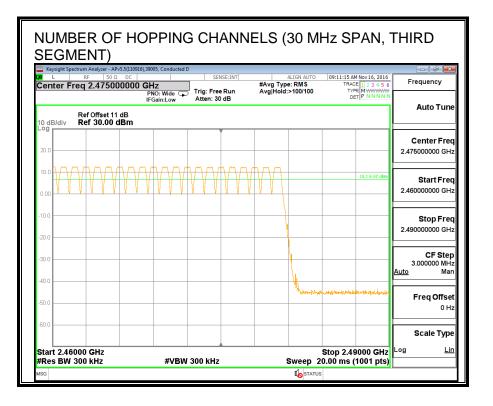
Keysight Spect	rum Analyzer - AP RF 50 Ω		5, Conducted I		NSE:INT				Nov 16, 2016	- 6
	q 2.44000	00000 GH	Z IO: Fast				LIGN AUTO Log-Pwr >100/100	TRAC		Frequency
	Ref Offset 11 Ref 30.00 (dB	ain:Low	Atten: 30		0.		DE	T P NNNNN	Auto Tur
										Center Fre
20.0										2.440000000 GH
0.00								******		Start Fre 2.390000000 GH
0.00									DL1 -7.26 dBm	
10.0	1									Stop Fre 2.490000000 GH
20.0										05.04
30.0										CF Ste 10.000000 Mi <u>Auto</u> Mi
40.0 -4-46-40-40-4	4,								Uniorithy	Freg Offs
50.0										
50.0										Scale Typ
tart 2.390	00 GHz							Stop 2.49	000 GHz	Log <u>L</u>

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8.5.4. AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

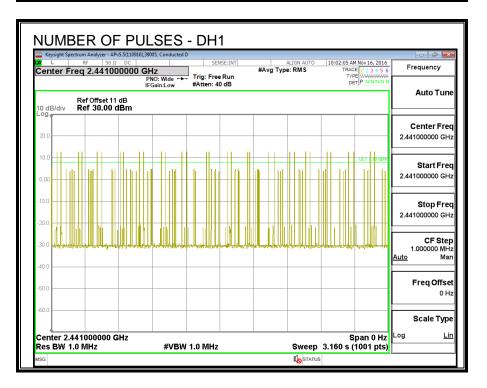
For AFH mode, the average time of occupancy in the specified 8 second period (20 channels * 0.4 seconds) is equal to 10 * (# of pulses in 0.8 s) * pulse width.

DH Packet	Pulse Width	Number of Pulses in	Average Time of Occupancy	Limit	Margin
	(msec)	3.16	(sec)	(sec)	(sec)
		seconds			
GFSK Norma	I Mode				
DH1	0.385	32	0.123	0.4	-0.277
DH3	1.64	15	0.246	0.4	-0.154
DH5	2.888	12	0.347	0.4	-0.053
DH Packet	Pulse	Number of	Average Time	Limit	Margin
	Width	Pulses in	of Occupancy		
	(msec)	0.8	(sec)	(sec)	(sec)
		seconds			
GFSK AFH Mode					
DH1	0.385	8	0.031	0.4	-0.369
DH3	1.64	3.75	0.062	0.4	-0.339
DH5	2.888	3	0.087	0.4	-0.313

<u>RESULTS</u>

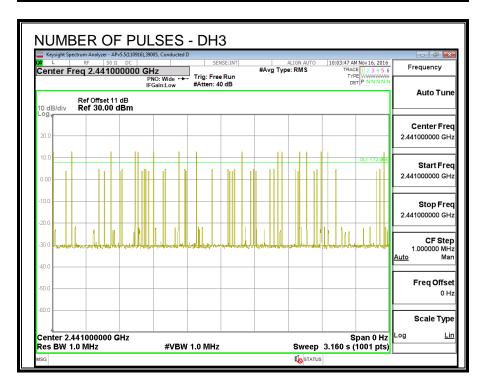
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Keysight Sp L	RF 50 Ω		d D SENSE	INT		ALIGN AUTO	10:01:34 AM	1 Nov 16, 2016	- 7 💌
Center F	req 2.441000	DOO GHz PNO: Wide +	Trig Delay-	100.0 µs	#Avg Type	e:RMS	TRAC		Frequency
		PNO: Wide ← IFGain:Low	#Atten: 40 o	IB			DE	T P N N N N N	Auto Tune
10 dB/div	Ref Offset 11 dE Ref 30.00 dB	3 m					ΔMkr1 3 -	85.0 µs 7.86 dB	AutoTune
									Center Free
20.0									2.441000000 GH;
10.0	2								Start Free
0.00			14	2					2.441000000 GH;
10.0			∲ ^	12				TRIG LVL	
10.0									Stop Fred 2.441000000 GH;
20.0	n								
30.0									CF Step 1.000000 MH
In the second	huð			milliour	de Aufbland	Holmer Mh	When the Acastl	kwik Antri	Auto Mar
40.0	·Matt				Y Y W WAY	hukhlis		LIMALINA	
50.0				1				·	Freq Offse 0 Hi
.60.0									
									Scale Type
Center 2	441000000 GH	7					S	pan 0 Hz	Log <u>Lir</u>



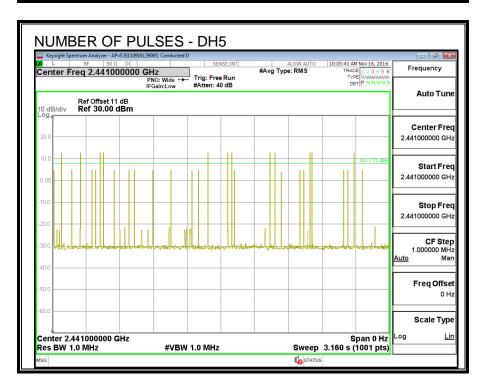
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Keysight Sp Ki L	pectrum Analyzer - APv5.5 RF 50 Ω 0		d D SENSE:INT	ALIGN AUTO	10:03:25 AM Nov 16, 2016	
Center F	req 2.441000	000 GHz	Trig Delay-200.0 µs	#Avg Type: RMS	TRACE 1 2 3 4 5 6 TYPE WWWWWW	Frequency
		PNO: Wide + IFGain:Low	#Atten: 40 dB		DET P NNNN	
10 dB/div	Ref Offset 11 dE Ref 30.00 dB			۵	Mkr1 1.640 ms 0.73 dB	Auto Tune
-og						Center Free
20.0	Q ²				∆2	2.441000000 GH
10.0						Start Free
0.00						2.441000000 GH
-10.0					TRIG LVL	Stop Free
-20.0	_					2.441000000 GH
-30.0						CF Step
-40.0	4W				- MANY	1.000000 MH <u>Auto</u> Mai
-50.0						Freq Offse
-60.0						
						Scale Type
Center 2. Res BW	.441000000 GH	2			Span 0 Hz .000 ms (1001 pts)	Log <u>Lii</u>



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Keysight Spectrum Analyzer - APv5					
xu ∟ RF 50Ω Center Freq 2.441000	DC DOOD GHz PNO: Wide ↔ IFGain:Low	SENSE:INT Trig Delay-400.0 µs Trig: Video #Atten: 40 dB	ALIGN AUTO #Avg Type: RMS	10:05:05 AM Nov 16, 2016 TRACE 1 2 3 4 5 6 TYPE WWWWW DET P N N N N	Frequency
Ref Offset 11 c 10 dB/div Ref 30.00 dB	IB		۵	Mkr1 2.888 ms 3.15 dB	Auto Tune
_og					Center Fred
20.0				1∆2	2.441000000 GH;
10.0					Start Free
0.00					2.441000000 GH
-10.0				TRIG LVL	Stop Free
-20.0					2.441000000 GH;
30.0					CF Step 1.000000 MH
-40.0				N'ingriger/high	<u>Auto</u> Mar
-50.0					Freq Offse
-60.0					0 H:
					Scale Type
Center 2.441000000 GH Res BW 1.0 MHz	lz #VBW [/]			Span 0 Hz .000 ms (1001 pts)	Log <u>Lir</u>



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8.5.5. OUTPUT POWER

ID: 30606 **Date:** 1/18/17

LIMITS

§15.247 (b) (1)

RSS-247 (5.4) (2)

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a wideband peak and average power meter.

<u>RESULTS</u>

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	10.16	30	-19.84
Middle	2441	10.06	30	-19.94
High	2480	9.86	30	-20.14

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8.5.6. AVERAGE POWER

ID: 30606 **Date:** 1/18/17

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

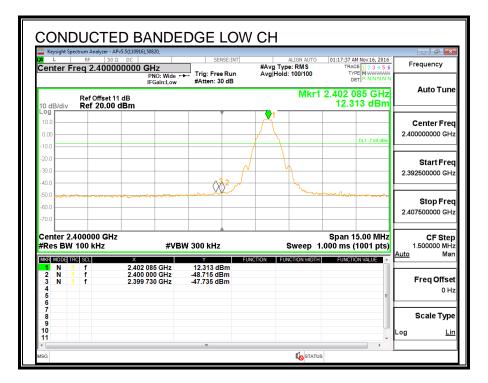
RESULTS

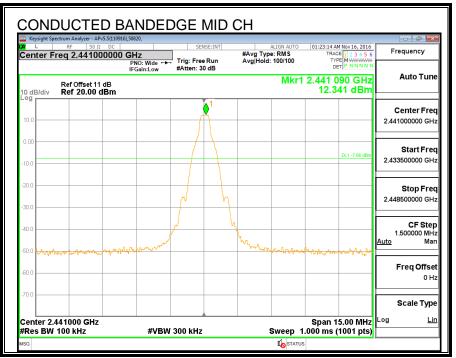
The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	9.91
Middle	2441	9.82
High	2480	9.60

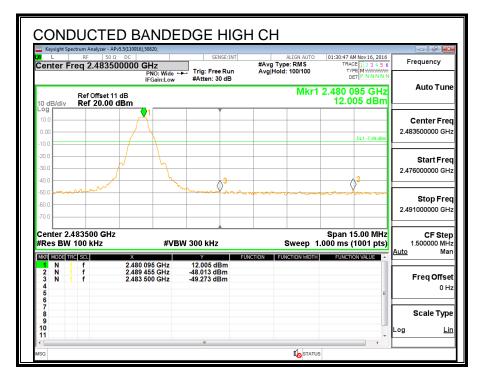
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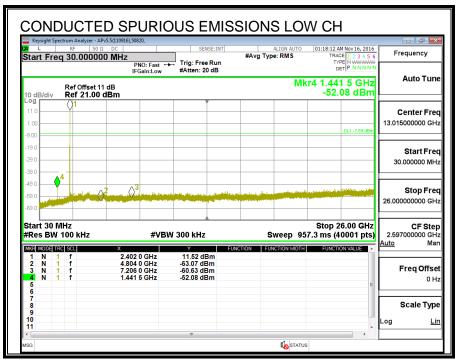
8.5.7. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS



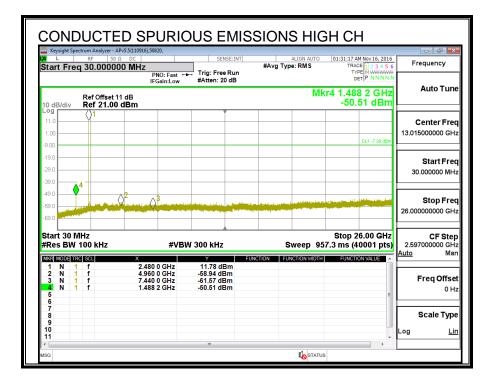


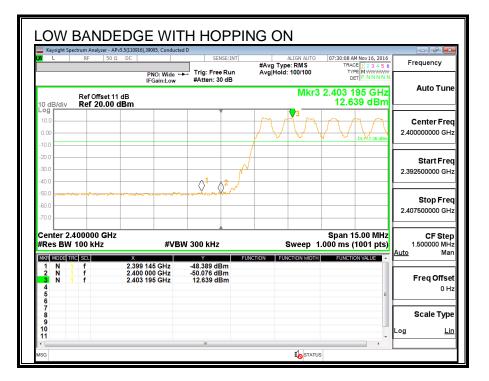
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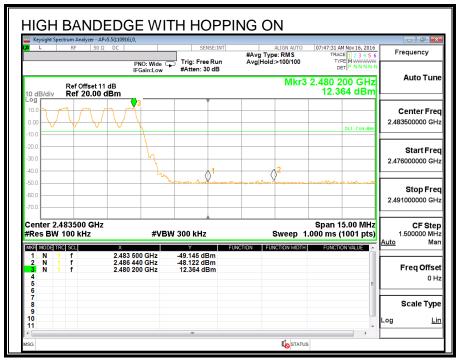




		APv5.5(110916),50820,				
tart Fre	RF 50 eq 30.0000	00 MHz PNO: Fast ← IFGain:Low	SENSE:INT	#Avg Type: RMS	01:23:46 AM Nov 16, 2016 TRACE 1 2 3 4 5 6 TYPE M WWWWW DET P N N N N N	Frequency
10 dB/div	Ref Offset Ref 21.00	11 dB	#Atten: 20 ab	M	(r4 1.464 8 GHz -51.21 dBm	Auto Tun
- og 11.00 -9.00	⊘ 1				DL1 -7.66 dBm	Center Fre 13.015000000 GH
-19.0 -29.0 -39.0	4					Start Fre 30.000000 MH
49.0 59.0 69.0						Stop Fre 26.000000000 GH
MKR MODE	/ 100 kHz	X		Sweep 95	Stop 26.00 GHz 7.3 ms (40001 pts) FUNCTION VALUE	CF Ste 2.597000000 GH <u>Auto</u> Ma
1 N 2 N 3 N 4 N 5 6	1 f 1 f 1 f 1 f	2.441 0 GHz 4.882 0 GHz 7.323 0 GHz 1.464 8 GHz	12.21 dBm -59.41 dBm -61.00 dBm -51.21 dBm		E	Freq Offse 0 H
7 8 9						Scale Typ
10 11					•	Log <u>Li</u>







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8.6. LOW POWER ENHANCED DATA RATE QPSK MODULATION

8.6.1. OUTPUT POWER

ID: 30606 **Date:** 1/18/17

LIMITS

§15.247 (b) (1)

RSS-247 (5.4) (2)

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm. 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

TEST PROCEDURE

The transmitter output is connected to a wideband peak and average power meter.

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	10.65	21	-9.98
Middle	2441	11.02	21	-9.52
High	2480	11.10	21	-9.61

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8.6.2. AVERAGE POWER

ID: 30606 **Date:** 1/18/17

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.44
Middle	2441	8.83
High	2480	8.90

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8.7. LOW POWER ENHANCED DATA RATE 8PSK MODULATION

8.7.1. 20 dB AND 99% BANDWIDTH

<u>LIMITS</u>

None; for reporting purposes only.

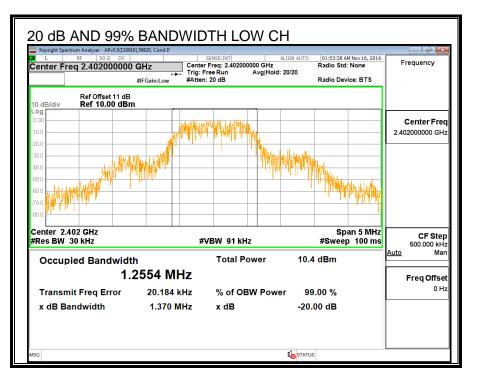
TEST PROCEDURE

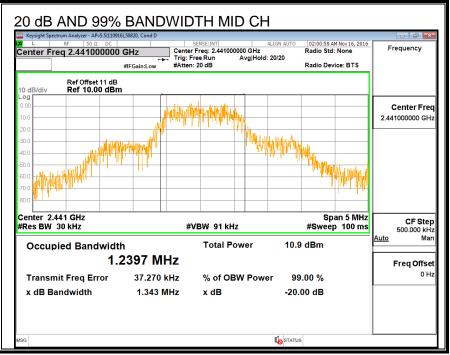
The transmitter output is connected to a spectrum analyzer. The RBW is set to \geq 1% of the 20 dB bandwidth. The VBW is set to \geq RBW. The sweep time is coupled.

RESULTS

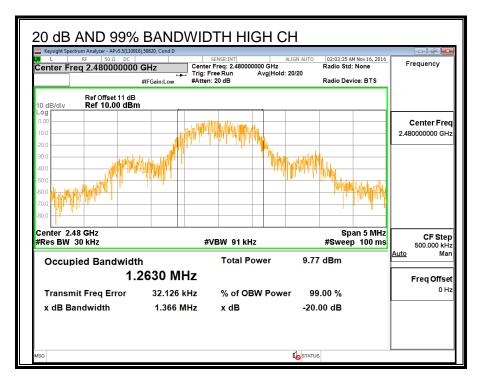
Channel	Frequency (MHz)	20 dB Bandwidth (KHz)	99% Bandwidth (KHz)
Low	2402	1370	1255.4
Middle	2441	1343	1239.7
High	2480	1366	1263.0

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8.7.2. HOPPING FREQUENCY SEPARATION

<u>LIMITS</u>

FCC §15.247 (a) (1)

IC RSS-247 (5.1) (2)

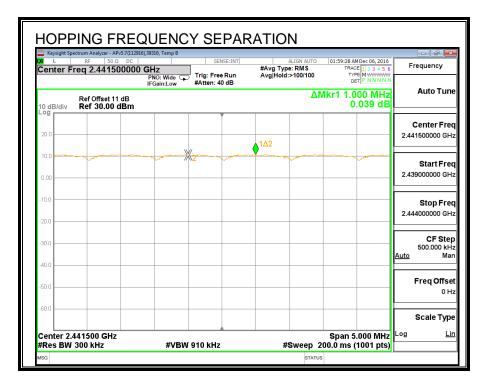
Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

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.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to 910 kHz. The sweep time is coupled.

<u>RESULTS</u>



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8.7.3. NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

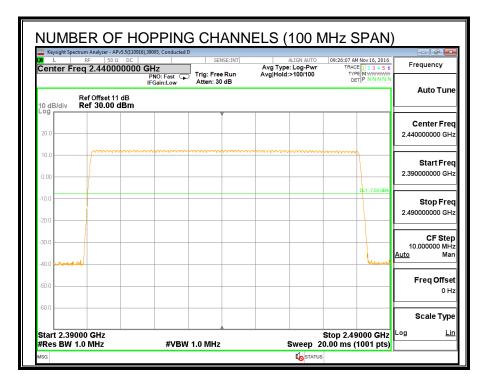
Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

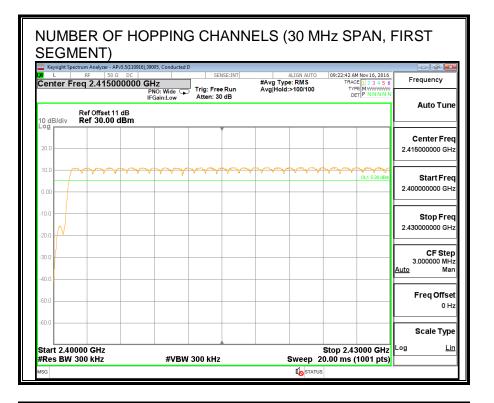
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

Normal Mode: 79 Channels observed.



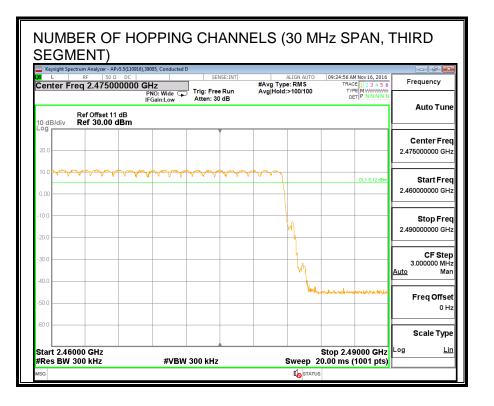
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NUMBER OF HOPPING CHANNELS (30 MHz SPAN, SECOND SEGMENT)

	15000000 GHz PNO:	Wide Trig: Free		pe:RMS d:>100/100	TRACE 1 2 3 4 5 6 TYPE M WWWW DET P N N N N N	Frequency
10 dB/div Ref 30	et 11 dB .00 dBm	n:Low Atten: 30	ab		DET .	Auto Tui
20.0						Center Fre 2.445000000 GR
10.0		and and a second se			Contraction of the second seco	Start Fre 2.430000000 GI
20.0						Stop Fro 2.460000000 GI
30.0						CF Ste 3.000000 Mi <u>Auto</u> Mi
50.0						Freq Offs
60.0 Start 2.43000 GHz					Stop 2.46000 GHz	Scale Typ

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8.7.4. AVERAGE TIME OF OCCUPANCY

<u>LIMITS</u>

FCC §15.247 (a) (1) (iii)

IC RSS-247 (5.1) (4)

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.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

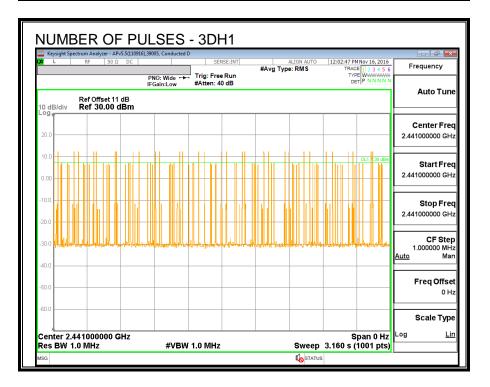
The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

RESULTS

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK (EDR)	Mode	00001140			
3DH1	0.392	31	0.122	0.4	-0.278
3DH3	1.642	14	0.230	0.4	-0.170
3DH5	2.896	12	0.348	0.4	-0.052

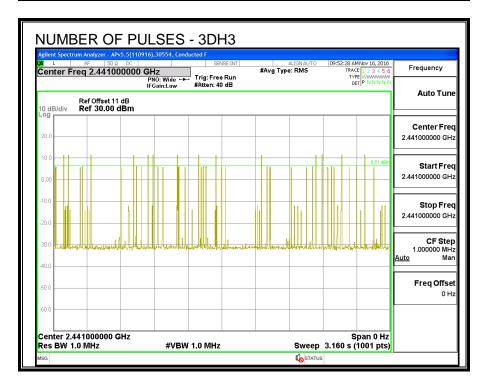
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	Pv5.5(110916),39005, Conducted				- 7 -
Center Freq 2.4410	PNO: Wide 🕶	SENSE:INT Trig Delay-100.0 µs Trig: Video	#Avg Type: RMS	10:16:12 AM Nov 16, 2016 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P NNNNN	Frequency
Ref Offset 1 10 dB/div Ref 30.00		#Atten: 40 dB		ΔMkr1 392.0 μs 34.56 dB	Auto Tune
20.0					Center Free 2.441000000 GH:
10.0		1Δ2 12/http://			Start Free
0.00					2.441000000 GH;
20.0				TRIG LVL	Stop Free 2.441000000 GH
30.0 - 1		Lunda d	lad i në nëtë të ba da k anë nëtë	k the Lathlet I ha	CF Step 1.000000 MH <u>Auto</u> Mai
40.0 40.0 50.0		- WIMM	ka Mina ka	al Alla Andrea an an Alla An An	Freq Offse
-60.0				· ·	0 H
				Span 0 Hz	Scale Type



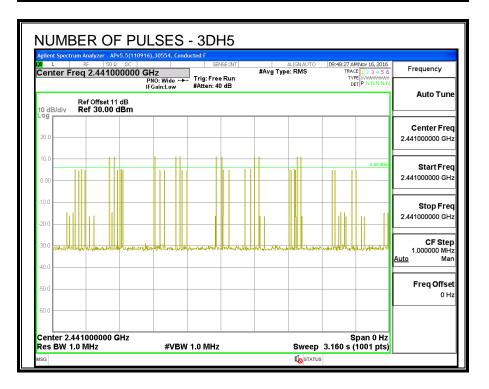
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anter F		APv5.5(110916		SE	vse:INT	#Avg Type			MNov 16, 2016	Frequency
enter F	req 2.441(F	HZ PNO: Wide ↔ FGain:Low		0	#Avg typ		TY D	PE WWWWWWW ET P N N N N N	Auto Tun
0 dB/div	Ref Offset (Ref 30.00						Δ		.642 ms 1.62 dB	Auto Tun
20.0										Center Fre 2.441000000 G⊦
10.0 0.00	¢²	and the second	WPMAN	halpportfil	hennyahata	MANYANA	WIMP	wp r 7W	к <u>і</u>	Start Fre 2.441000000 G⊦
0.0	r · · P								TRIG LVL	Stop Fre 2.441000000 GF
80.0 10.0 <mark>/4/4</mark> 4									142	CF Ste 1.000000 MH <u>Auto</u> Ma
50.0									- P	Freq Offs 0 H
50.0										



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Agilent Spectrum Analy:	zer - APv5.5(11091 50 Ω DC	6),30554, Cond		ISE:INT		LIGNAUTO	09:47:107	MNov 16, 2016	
Center Freq 2.4	41000000 C	SHz PNO: Wide ++	Trig Dela	y-400.0 µs	#Avg Type:		TRA	CE 1 2 3 4 5 6 VPE WWWWWWWWWWW DET P NNNNN	Frequency
10 dB/div Ref 3	fset 11 dB 0.00 dBm					4		.896 ms 9.01 dB	Auto Tun
og									Center Fre
20.0									2.441000000 GH
10.0 A2 WW	Nyeryananyana	id Museum and	Url-Automotal	NATURALAM	MARKIN MANA	unnanna			Start Fre
0.00	and a strend at a	M all a de la	11 11114-0	<u>, 1111, 111, 111, 111, 111, 111, 111, </u>	1 and do d	 			2.441000000 GH
-10.0								TRIG LVL	Stop Fre 2.441000000 GH
20.0							140		2.44100000 GH
30.0							1Δ2		CF Ste 1.000000 MH
-40.0 MM							WHY WHAT	n hall land	<u>Auto</u> Ma
-50.0									Freq Offse
									0 H
-60.0									
Center 2.441000	000 GHz							Span 0 Hz	



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8.7.5. OUTPUT POWER

ID: 30606 **Date:** 1/18/17

LIMITS

§15.247 (b) (1)

RSS-247 (5.4) (2)

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

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

TEST PROCEDURE

The transmitter output is connected to a wideband peak and average power meter.

RESULTS

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	10.65	21	-9.64
Middle	2441	11.00	21	-9.29
High	2480	11.15	21	-9.42

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8.7.6. AVERAGE POWER

ID: 30606 **Date:** 1/18/17

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

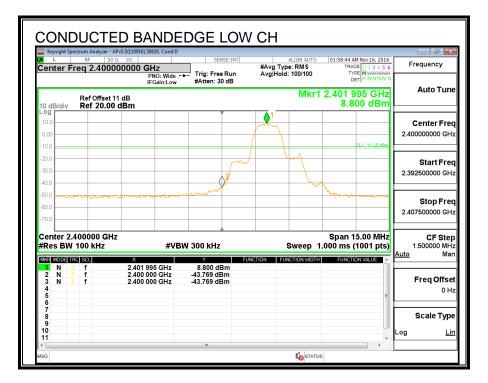
RESULTS

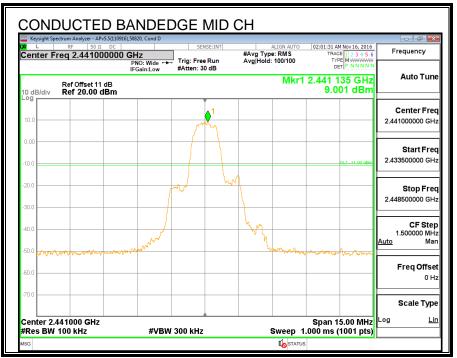
The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	8.49
Middle	2441	8.87
High	2480	8.94

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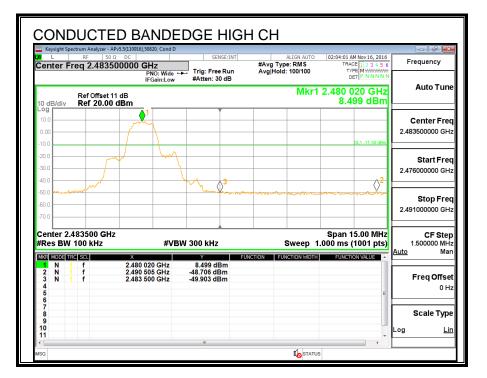
8.7.7. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

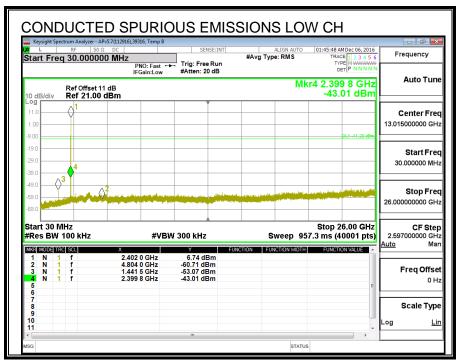




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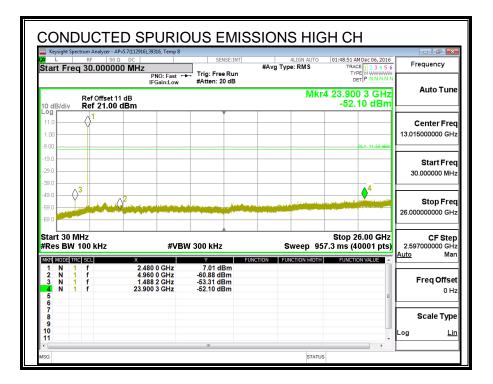
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	- APv5.7(112916),39316, Temp B				- 6 -
L RF 5 Start Freq 30.000	DOO MHZ PNO: Fast • IFGain:Low	SENSE:INT → Trig: Free Run #Atten: 20 dB	ALIGN AUTO #Avg Type: RMS	01:46:52 AM Dec 06, 2016 TRACE 1 2 3 4 5 6 TYPE M WWWW DET P N N N N N	Frequency
Ref Offse 10 dB/div Ref 21.0	t 11 dB		M	(r4 1.464 8 GHz -53.40 dBm	Auto Tun
-og 11.0 9.00				DL1 -11.00 dBm.	Center Fre 13.015000000 GH
19.0 29.0 39.0					Start Fre 30.000000 MH
49.0 59.0 69.0					Stop Fre 26.000000000 GH
Start 30 MHz Res BW 100 kHz		W 300 kHz	•	Stop 26.00 GHz 57.3 ms (40001 pts)	CF Ste 2.597000000 GH Auto Ma
MKR MODE TRC SCL 1 N 1 f 2 N 1 f 3 N 1 f 4 N 1 f 5 6 7	x 2.441 0 GHz 4.882 0 GHz 7.323 0 GHz 1.464 8 GHz	7.64 dBm -60.90 dBm -61.58 dBm -53.40 dBm	INCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offse 0 ⊦
8					Scale Typ
10 11					Log <u>Li</u>



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