CERTIFICATION TEST REPORT

Report Number. : 13018918-E2V2

Applicant	:	APPLE, INC. 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	:	A2296
FCC ID	:	BCG-E3501A
IC	:	579C-E3501A
EUT Description	:	SMARTPHONE
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C ISED RSS-247 ISSUE 2 ISED RSS-GEN ISSUE 5

Date Of Issue:
March 23, 2020

Prepared by:
UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538 U.S.A.
TEL: (510) 319-4000
FAX: (510) 661-0888

NVLAP Lab code: 200065-0

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2/10/2020	Initial Issue	Chris Xiong
V2	3/23/2020	Addressed TCB Feedback on Sections 5, 6, 8, 9	Tony Li

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE, INC.
1 APPLE PARK WAY
CUPERTINO, CA 95014, U.S.A.

EUT DESCRIPTION: Smartphone

MODEL: A2296

SERIAL NUMBER: FFMZW00APM7C, FFMZW06XPM62

DATE TESTED: AUGUST 30, 2019 – DECMBER 12, 2019

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Complies
ISED RSS-247 Issue 2	Complies
ISED RSS-GEN Issue 5	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

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 the U.S. government.

Approved & Released For
UL Verification Services Inc. By:

Chin Pang
Senior Engineer
Consumer Technology Division
UL Verification Services Inc.

Prepared By:

Tony Li
Test Engineer
Consumer Technology Division
UL Verification Services Inc.

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, KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 662911, RSS-GEN Issue 5, and RSS-247 Issue 2.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, 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	47658 Kato Rd.
☐ Chamber A (IC:2324B-1)	☒ Chamber D (IC:22541-1)	☐ Chamber I (IC: 2324A-5)
☐ Chamber B (IC:2324B-2)	☒ Chamber E (IC:22541-2)	☐ Chamber J (IC: 2324A-6)
☐ Chamber C (IC:2324B-3)	☒ Chamber F (IC:22541-3)	☐ Chamber K (IC: 2324A-1)
	☒ Chamber G (IC:22541-4)	☐ Chamber L (IC: 2324A-3)
	☒ Chamber H (IC:22541-5)	☐ Chamber M (IC: 2324A-2)

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0

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4. DECISION RULES AND MEASUREMENT UNCERTAINTY

4.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

4.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement
uncertainty is not taken into account when stating conformity with a specified requirement.)

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	U_{LAB}
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.39 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.07 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.17 dB

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

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5. EQUIPMENT UNDER TEST

5.1. EUT DESCRIPTION

The EUT is a smartphone with multimedia functions (music, application support, and video), cellular GSM, GPRS, EGPRS, UMTS, LTE, TD-SCDMA, CDMA, IEEEE 802.11 a/b/g/n/ac/ax, Bluetooth, GPS and NFC. All models support at least one UICC based SIM. The second SIM, if present, is either UICC based p-SIM (physical SIM or e-SIM (electronic SIM). The device has a built-in inductive charging receiver. The rechargeable battery is also not user accessible.

5.2. MAXIMUM OUTPUT POWER

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

Antenna	Config	Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
UAT 1	High Power	2402 - 2480	Basic GFSK	18.98	79.07
		2402 - 2480	QPSK	18.40	69.18
		2402 - 2480	Enhanced 8PSK	18.42	69.50
	Low Power	2402 - 2480	Basic GFSK	12.55	17.99
		2402 - 2480	QPSK	11.41	13.84
		2402 - 2480	Enhanced 8PSK	11.44	13.93
LAT 3	High Power	2402 - 2480	Basic GFSK	19.93	98.40
		2402 - 2480	QPSK	18.39	69.02
		2402 - 2480	Enhanced 8PSK	18.44	69.82
	Low Power	2402 - 2480	Basic GFSK	12.55	17.99
		2402 - 2480	QPSK	11.37	13.71
		2402 - 2480	Enhanced 8PSK	11.44	13.93
UAT 1+ LAT 3	High Power	2402 - 2480	Basic GFSK TxBF	20.10	102.33
		2402 - 2480	QPSK TxBF	19.83	96.16
		2402 - 2480	Enhanced 8PSK TxBF	19.84	96.38
	Low Power	2402 - 2480	Basic GFSK TxBF	15.54	35.81
		2402 - 2480	QPSK TxBF	14.36	27.29
		2402 - 2480	Enhanced 8PSK TxBF	14.37	27.35

Note: GFSK, DQPSK, 8PSK average Power are all investigated, The GFSK & 8PSK Power are the worst case. Testing is based on these modes to showing compliance.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Range (GHz)	LAT 3 (Core 1) (dBi)	UAT 1 (Core 0) (dBi)
2.4	-0.4	-2.2

5.4. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was BT FW Version: 17.1.210.2193.

5.5. WORST-CASE CONFIGURATION AND MODE

The EUT was investigated in three orthogonal orientations X, Y and Z on UAT 1 (Core 0) and LAT 3 (Core 1). It was determined that X (Flatbed) orientation was the worst-case orientation for UAT 1 and 2TX BF, and Y (Landscape) was the worst case for LAT 3.

Radiated band edge, harmonic, and spurious emissions from 1GHz to 18GHz were performed with the EUT set to transmit at highest power on Low/Middle/High channels.

Radiated emissions below 30MHz, below 1GHz, 18-26GHz and power line conducted emissions were performed with the EUT transmits at the channel with the highest output power as worst-case scenario

For below 1GHz tests EUT was connected to AC power adapter as the worst case; and for above 1GHz, the worst-case configuration reported was tested with EUT only. There were no emissions found below 30MHz within 20dB of the limit. For AC line conducted emission, test was investigated with AC power adapter and with laptop.

For simultaneous transmission of multiple channels in the 2.4GHz BT and 5GHz bands, No noticeable emission was found.

Worst-case data rates as provided by the client were:

GFSK mode: DH5
8PSK mode: 3-DH5
Beamforming, GFSK, DH5
Beamforming, 8PSK, 3-DH5

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**	**FCC ID**
laptop	Apple	A1502	HRP003436	QDS-BRCM1080
Laptop AC/DC adapter	Liteon Technology	PA-1450-BA1	B123	NA
EUT AC Adapter	Apple	A1385	D29325SM03XDHLHC9	NA

I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
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

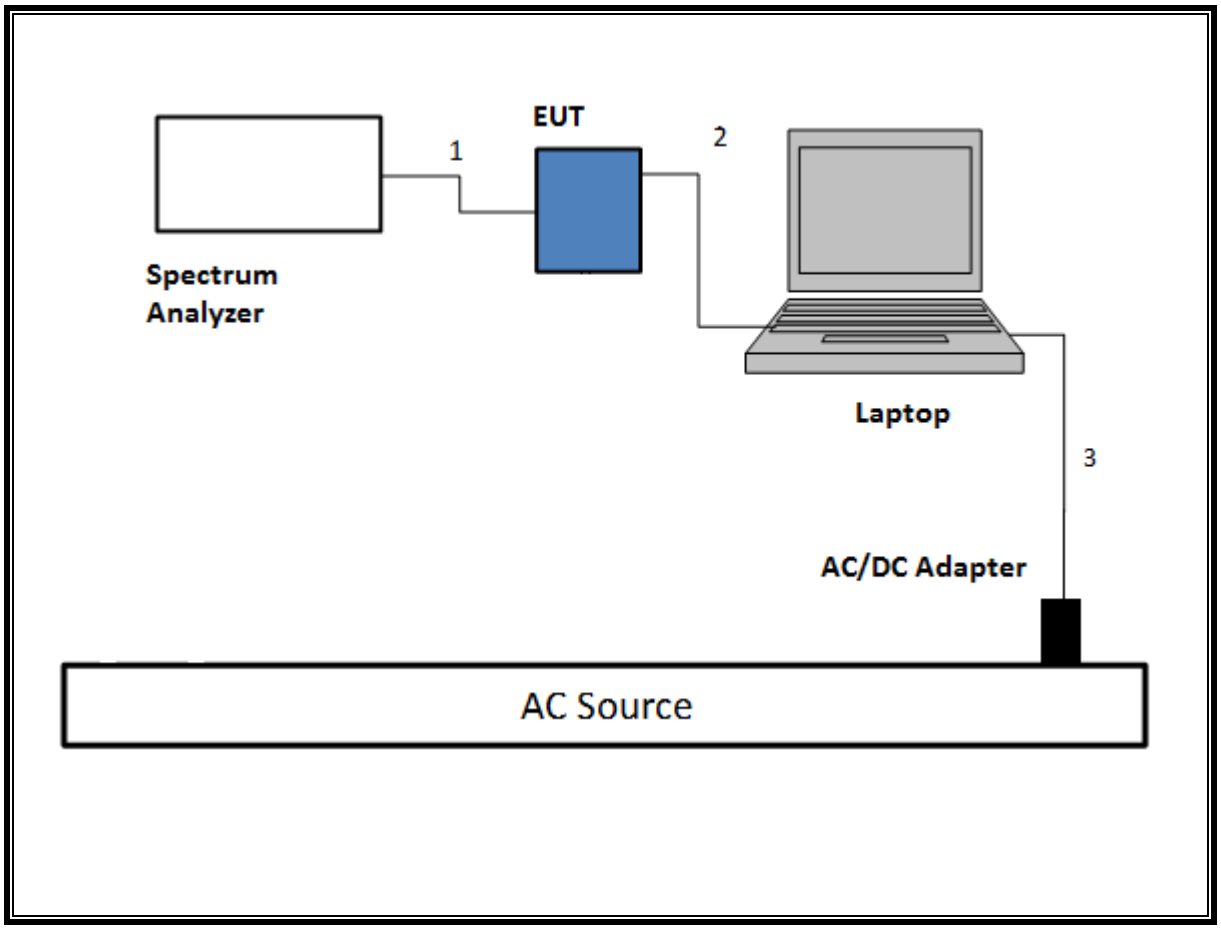
I/O CABLES (BELOW 1GHz AND AC POWER LINE TEST WITH ADAPTER AND LAPTOP)

I/O Cable List						
Cable No	**Port**	**# of identical**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	1	AC	Un-shielded	2	N/A
2	USB	1	USB	Un-shielded	1	N/A

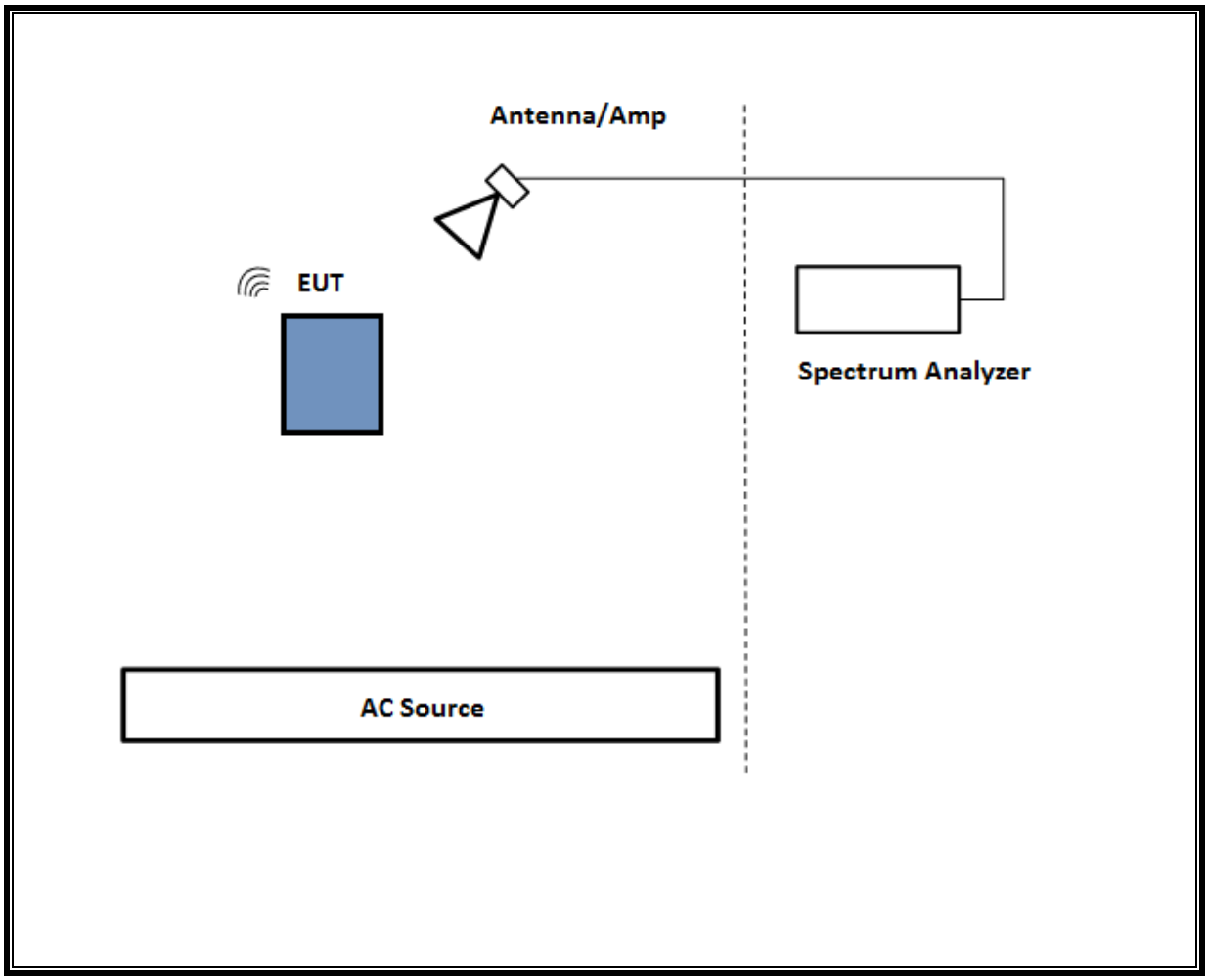
TEST SETUP

The EUT is connected to a test laptop during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR CONDUCTED TESTS



SETUP DIAGRAM FOR RADIATED TESTS Above 1 GHz



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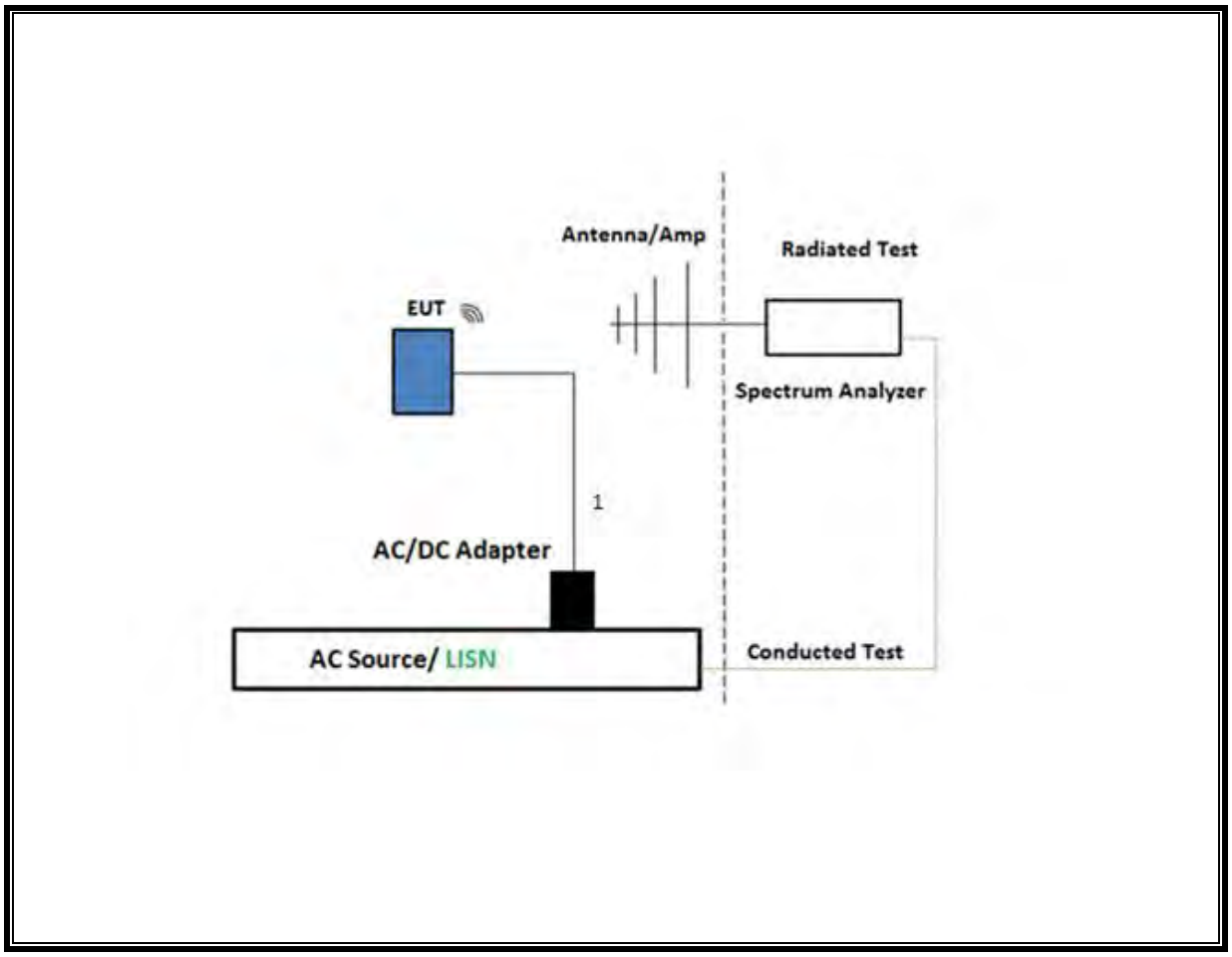
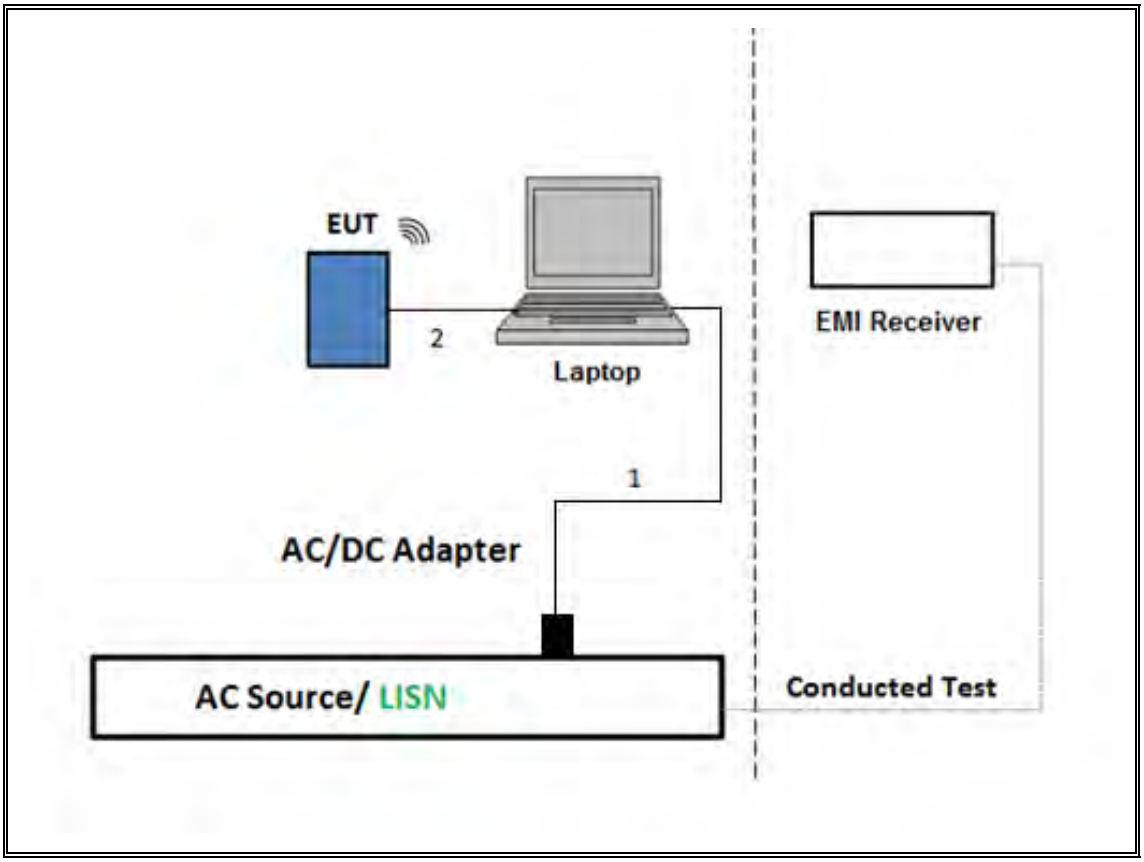
SETUP DIAGRAM FOR Below 1GHz and AC LINE CONDUCTED TEST



TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST					
Description	**Manufacturer**	**Model**	**ID Num**	**Cal Due**	**Last Cal**
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T119	03/22/2020	03/22/2019
*Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T740	10/06/2019	10/06/2018
*Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T905	01/24/2020	01/24/2019
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T136	06/14/2020	06/14/2019
*Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T342	01/23/2020	01/23/2019
*Amplifier, 1 to 18GHz, 35dB	Amplical	AFS42-00101800-25-S-42	T1567	01/26/2020	01/26/2019
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T863	05/30/2020	05/30/2019
*Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T493	08/30/2019	08/30/2018
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T712	02/26/2020	02/26/2019
Amplifier, 1 to 18GHz	Miteq	AFS42-00101800-25-S-42	T931	05/11/2020	05/11/2019
Antenna, Horn 1-18GHz	ETS Lindgren	3117	T345	04/20/2020	04/20/2019
Amplifier, 1 to 18GHz	Amplical	AMP0.1G18-47-20	172121	07/15/2020	07/15/2019
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	T286	06/06/2020	06/06/2019
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB1	T407	05/11/2020	05/11/2019
*Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A	T1454	01/23/2020	01/23/2019
Antenna Horn, 18 to 26GHz	ARA	MWH-1826	T447	08/13/2020	08/13/2019
Antenna, Horn 26.5GHz to 40GHz	ARA	MWH-2640/B	T446	08/13/2020	08/13/2019
Pre-Amp 18-26GHz	Agilent Technology	8449B	T404	03/23/2020	03/23/2019
Spectrum Analyzer, PXA 3Hz to 44GHz	Keysight	N9030A-544	T1113	1/22/2020	01/22/2019
*Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T342	01/23/2020	01/23/209
*Power Meter, P-series single channel	Keysight	N1912A	T1244	01/30/2020	01/30/2019
Power Sensor	Keysight	N1921A	T1224	02/22/2020	02/22/2019
Antenna, Active Loop 9kHz-30MHz	ETS-Lindgren	6502	T1683	06/06/2020	06/06/2019
*Filter, HPF 3.0GHz	MICROTRONICS	HPM17543	T487	12/15/2019	12/15/2018

AC Line Conducted					
*EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESCI7	T1436	02/14/2020	02/14/2019
*Power Cable, Line Conducted Emissions	UL	PG1	T861	10/19/2019	10/19/2018
*LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2-01	T1310	01/24/2020	01/24/2019
UL AUTOMATION SOFTWARE					
Radiated Software	UL	UL EMC	Ver 9.5, April 26, 2016		
Conducted Software	UL	UL EMC	Ver 5.4, October 13, 2016		
AC Line Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015		

*Testing is completed before equipment expiration date.

7. MEASUREMENT METHODS

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

Occupied BW (20dB): ANSI C63.10-2013 Section 6.9.2

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 Below 30MHz: ANSI C63.10-2013 Section 6.4 & 13

Radiated Spurious Emissions 30-1000MHz: ANSI C63.10-2013 Section 6.3, 6.5 & 13

Radiated Spurious Emissions above 1GHz: ANSI C63.10-2013 Section 6.3, 6.6 & 13

Radiated Band-edge: ANSI C63.10-2013 Section 6.10.5 & section 13

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

LIMITS

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 B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (kHz)
Bluetooth GFSK	1.00	1.00	1.000	100.0%	0.00	0.010
Bluetooth 8PSK	1.00	1.00	1.000	100.0%	0.00	0.010
Bluetooth GFSK TxBF	1.00	1.00	1.000	100.0%	0.00	0.010
Bluetooth 8PSK TxBF	1.00	1.00	1.000	100.0%	0.00	0.010

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DUTY CYCLE PLOTS

BLUETOOTH GFSK

BLUETOOTH 8PSK

BLUETOOTH TxBF GFSK

BLUETOOTH TxBF 8PSK

8.2. 20 dB AND 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to 3x RBW. The sweep time is coupled.

RESULTS

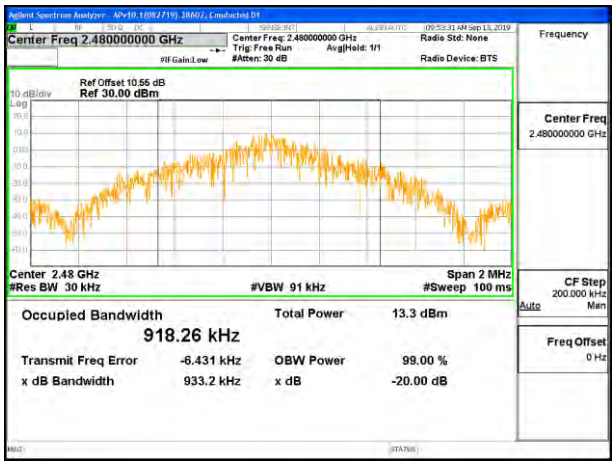
8.2.1. HIGH POWER BASIC DATA RATE GFSK MODULATION

UAT 1

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	0.939	0.913
Mid	2441	0.956	0.920
High	2480	0.933	0.918

LOW CHANNEL

MID CHANNEL

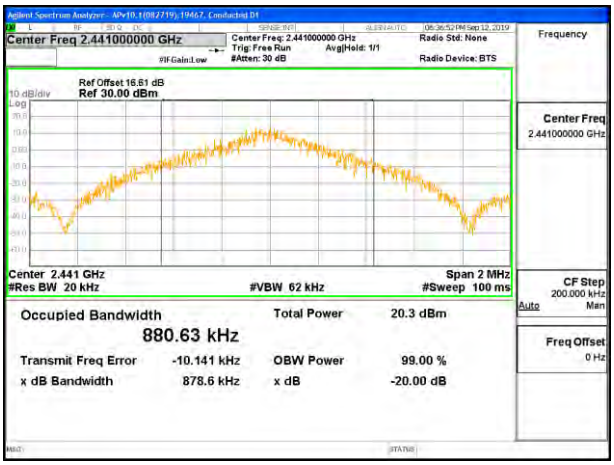


HIGH CHANNEL

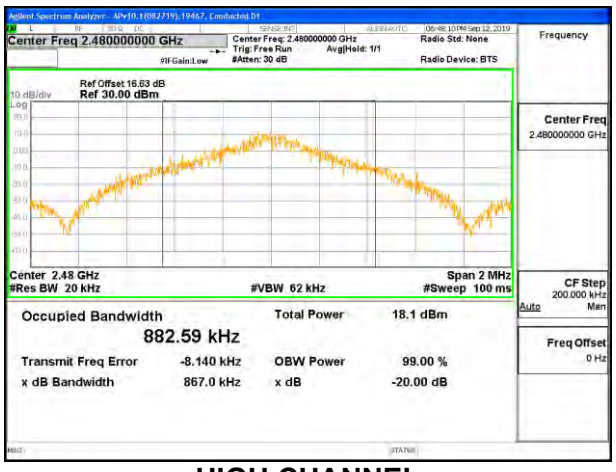
LAT 3

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	0.827	0.865
Mid	2441	0.879	0.881
High	2480	0.867	0.883

LOW CHANNEL



MID CHANNEL

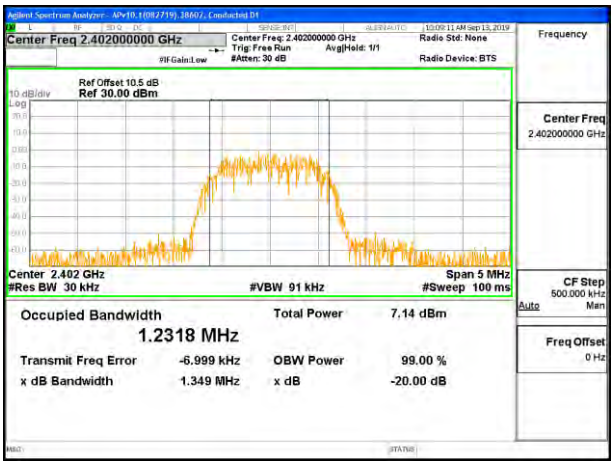


HIGH CHANNEL

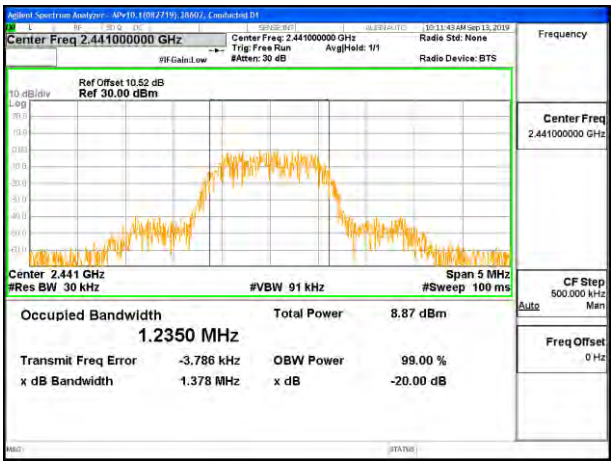
8.2.2. HIGH POWER ENHANCED DATA RATE 8PSK MODULATION

UAT 1

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.349	1.232
Mid	2441	1.378	1.235
High	2480	1.329	1.221



LOW CHANNEL



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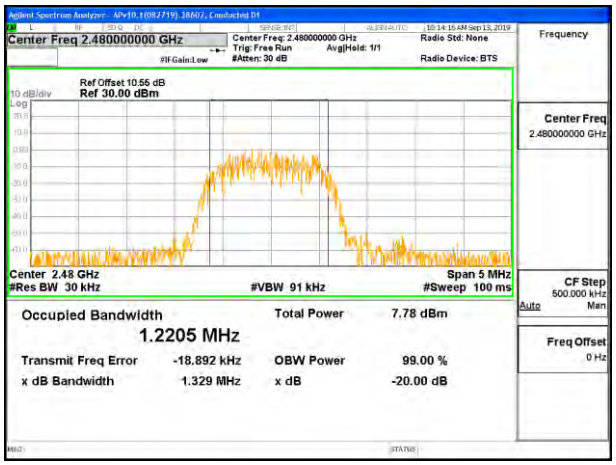


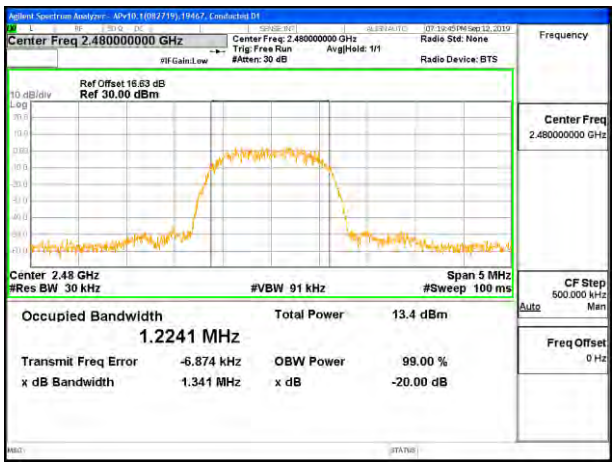
HIGH CHANNEL

LAT 3

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.350	1.211
Mid	2441	1.332	1.220
High	2480	1.341	1.224

LOW CHANNEL

MID CHANNEL



HIGH CHANNEL

8.2.3. LOW POWER BASIC DATA RATE GFSK MODULATION

UAT 1

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.022	0.912
Mid	2441	0.934	0.919
High	2480	0.934	0.921

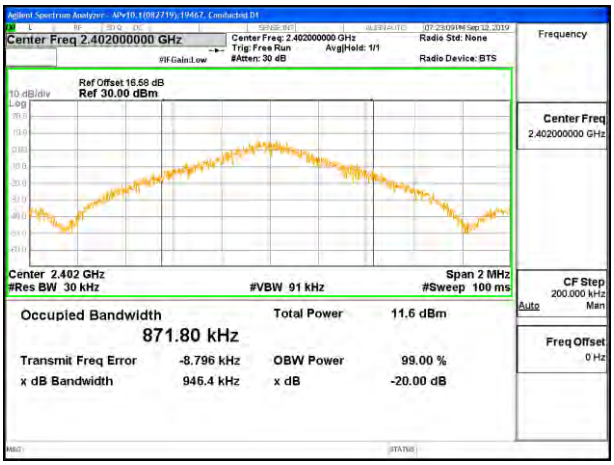
LOW CHANNEL

MID CHANNEL

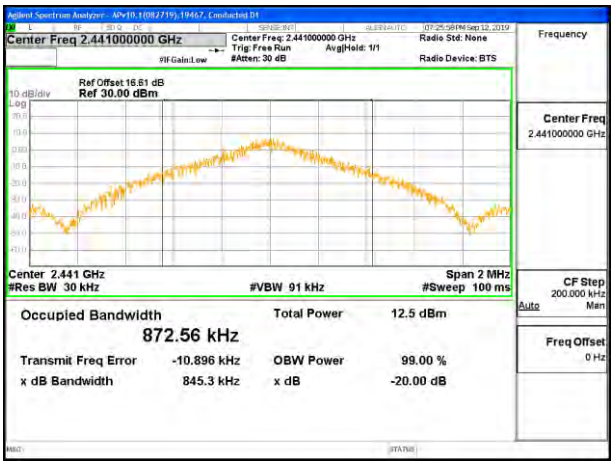
HIGH CHANNEL

LAT 3

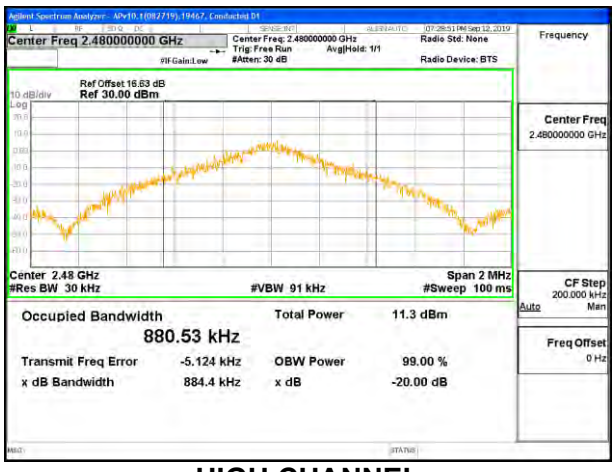
Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	0.946	0.872
Mid	2441	0.845	0.873
High	2480	0.884	0.881



LOW CHANNEL



MID CHANNEL

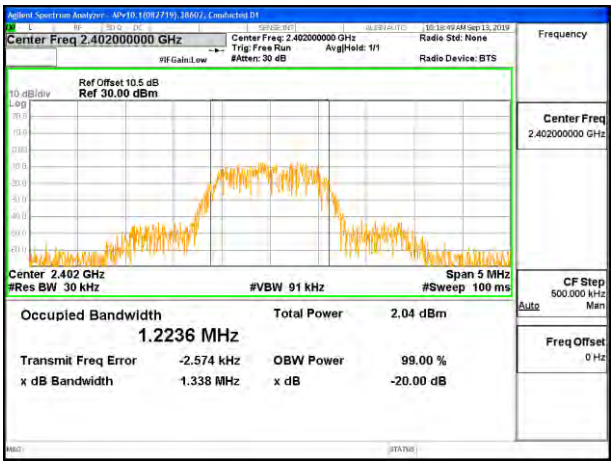


HIGH CHANNEL

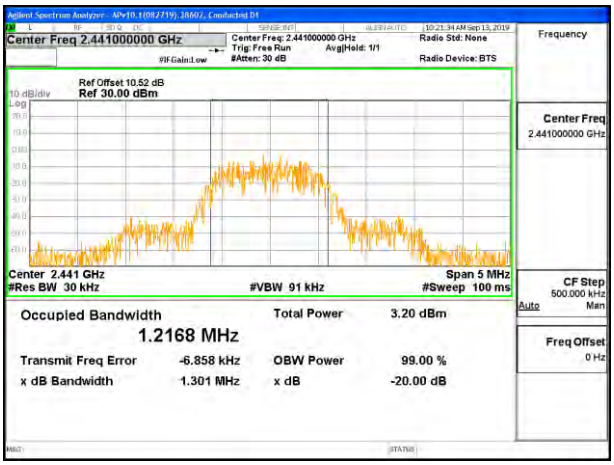
8.2.4. LOW POWER ENHANCED DATA RATE 8PSK MODULATION

UAT 1

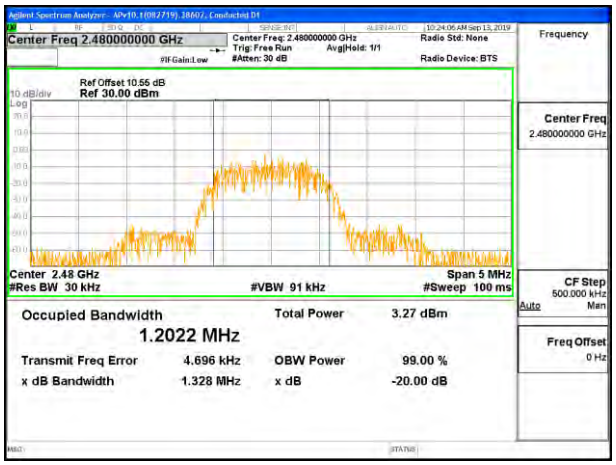
Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.338	1.224
Mid	2441	1.301	1.217
High	2480	1.328	1.202



LOW CHANNEL



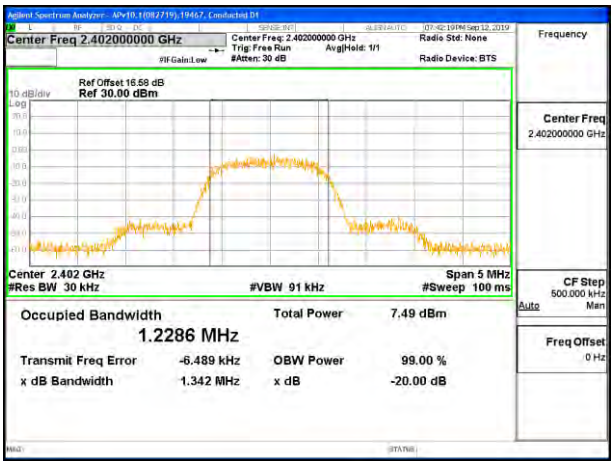
MID CHANNEL



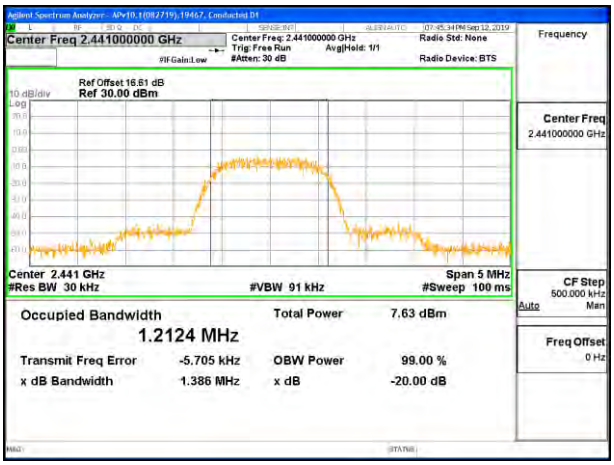
HIGH CHANNEL

LAT 3

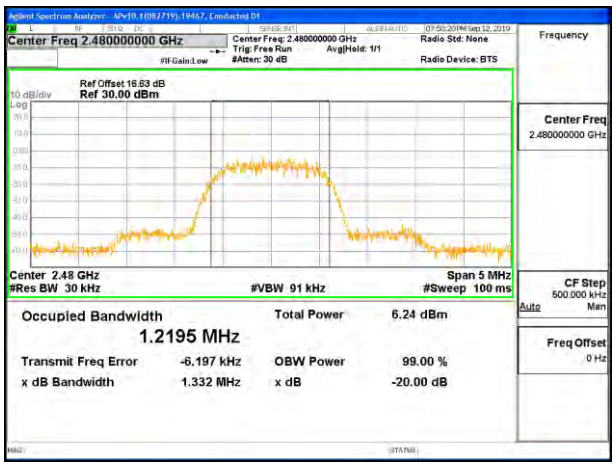
Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.342	1.229
Mid	2441	1.386	1.212
High	2480	1.332	1.220



LOW CHANNEL



MID CHANNEL



HIGH CHANNEL

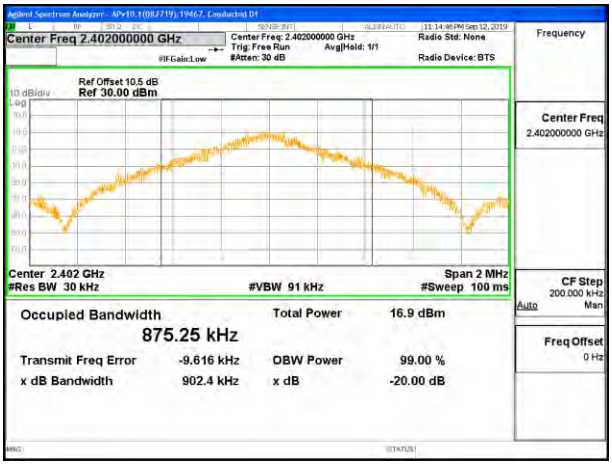
8.3. BEAMFORMING 20 dB AND 99% BANDWIDTH

Note: Test procedure on beamforming mode is same as BT basic and EDR mode

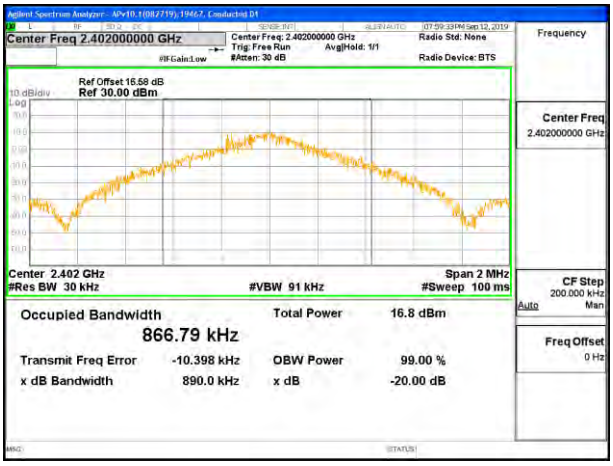
8.3.1. HIGH POWER BASIC DATA RATE GFSK MODULATION

2TX UAT 1 + LAT 3 TxBF MODE

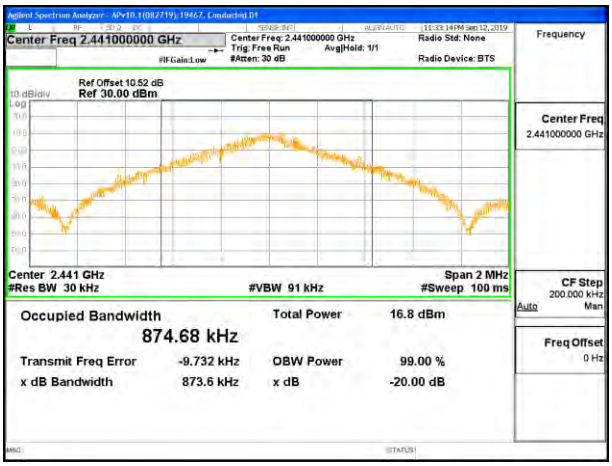
Channel	Frequency (MHz)	20dB Bandwidth UAT 1 (MHz)	99% Bandwidth UAT 1 (MHz)	20dB Bandwidth LAT 3 (MHz)	99% Bandwidth LAT 3 (MHz)
Low	2402	0.902	0.875	0.890	0.867
Mid	2441	0.874	0.875	0.893	0.882
High	2480	0.873	0.874	0.922	0.883



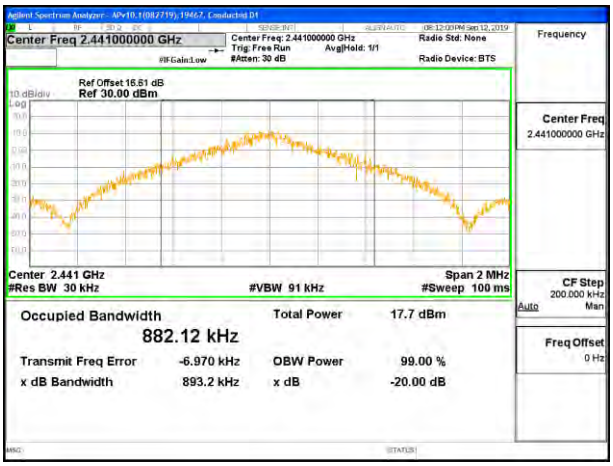
LOW CHANNEL UAT 1



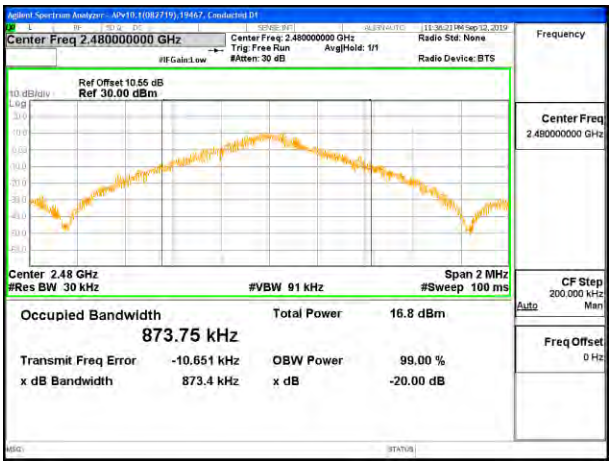
LOW CHANNEL LAT 3



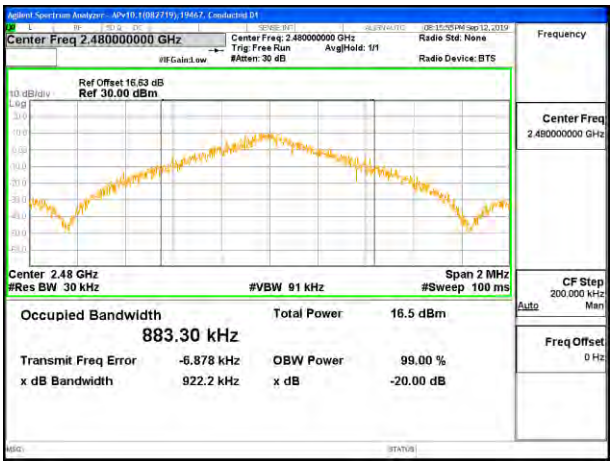
MID CHANNEL UAT 1



MID CHANNEL LAT 3



HIGH CHANNEL UAT 1



HIGH CHANNEL LAT 3

8.3.2. HIGH POWER ENHANCED DATA RATE 8PSK MODULATION

2TX UAT 1 + LAT 3 TxBF MODE

Channel	Frequency (MHz)	20dB Bandwidth UAT 1 (MHz)	99% Bandwidth UAT 1 (MHz)	20dB Bandwidth LAT 3 (MHz)	99% Bandwidth LAT 3 (MHz)
Low	2402	1.367	1.224	1.365	1.225
Mid	2441	1.361	1.220	1.317	1.216
High	2480	1.352	1.209	1.354	1.229

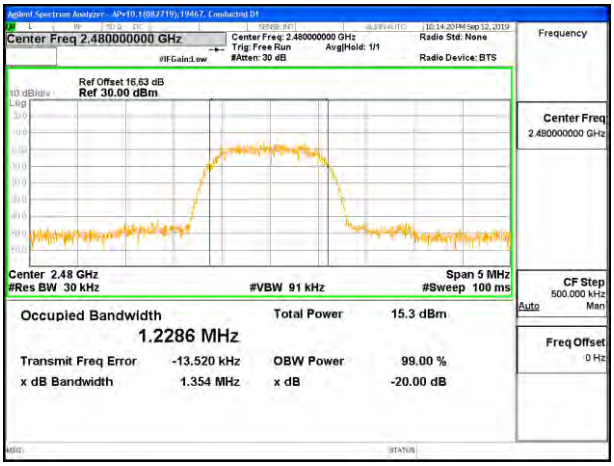
LOW CHANNEL UAT 1

LOW CHANNEL LAT 3

MID CHANNEL UAT 1

MID CHANNEL LAT 3

HIGH CHANNEL UAT 1



HIGH CHANNEL LAT 3

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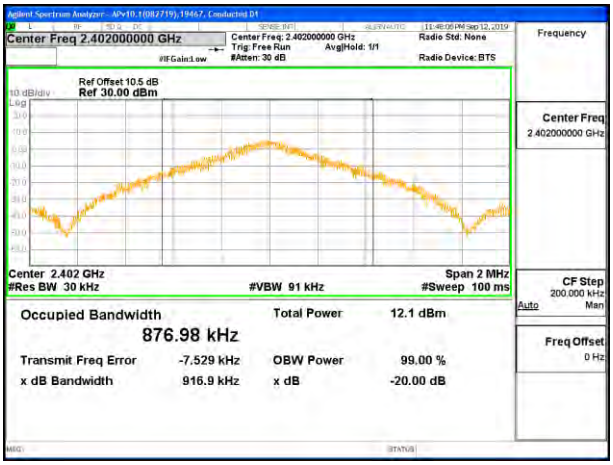
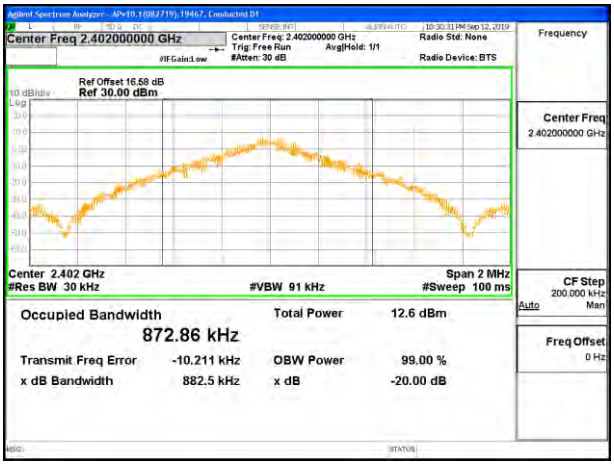
8.3.3. LOW POWER BASIC DATA RATE GFSK MODULATION

2TX UAT 1 + LAT 3 TxBF MODE

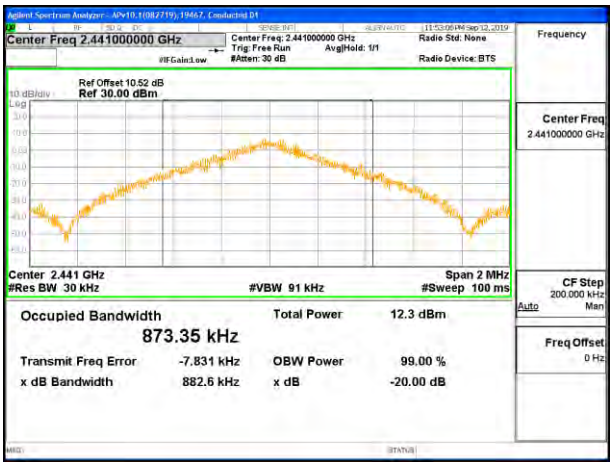
Channel	Frequency (MHz)	20dB Bandwidth UAT 1 (MHz)	99% Bandwidth UAT 1 (MHz)	20dB Bandwidth LAT 3 (MHz)	99% Bandwidth LAT 3 (MHz)
Low	2402	0.917	0.877	0.883	0.873
Mid	2441	0.883	0.873	0.931	0.875
High	2480	0.873	0.874	0.782	0.874



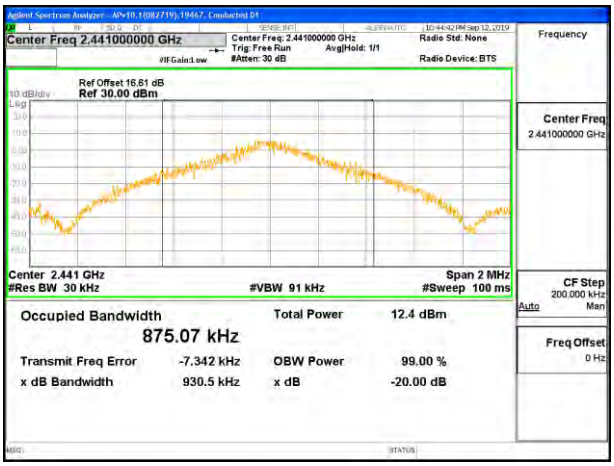
LOW CHANNEL UAT 1



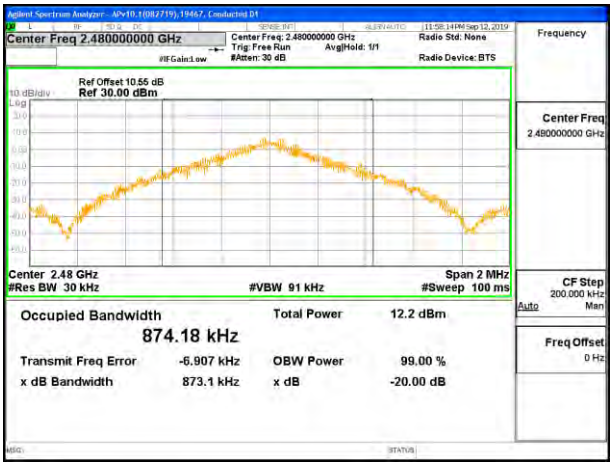
LOW CHANNEL LAT 3



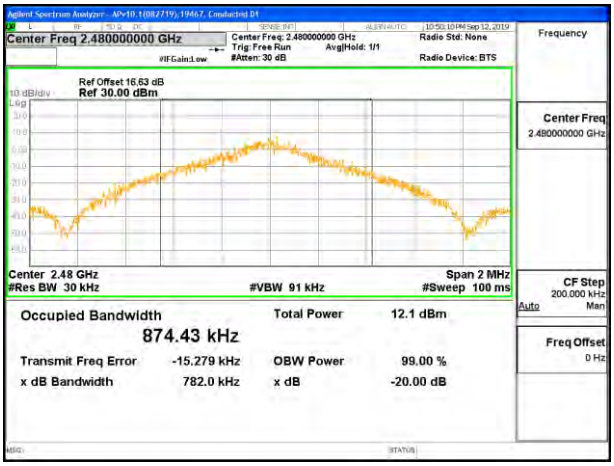
MID CHANNEL UAT 1



MID CHANNEL LAT 3



HIGH CHANNEL UAT 1

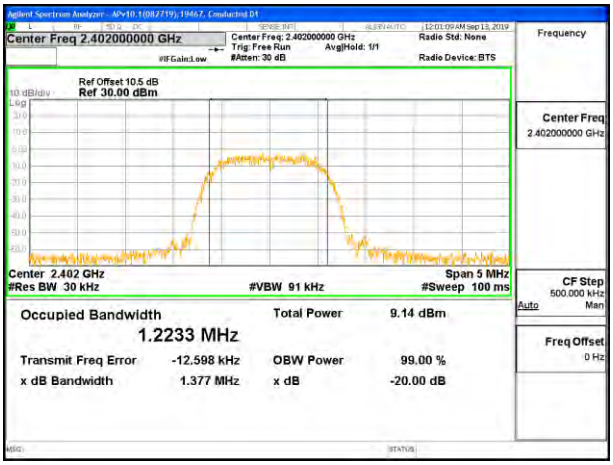


HIGH CHANNEL LAT 3

8.3.4. LOW POWER ENHANCED DATA RATE 8PSK MODULATION

2TX UAT 1 + LAT 3 TxBF MODE

Channel	Frequency (MHz)	20dB Bandwidth UAT 1 (MHz)	99% Bandwidth UAT 1 (MHz)	20dB Bandwidth LAT 3 (MHz)	99% Bandwidth LAT 3 (MHz)
Low	2402	1.377	1.223	1.345	1.209
Mid	2441	1.368	1.230	1.350	1.216
High	2480	1.377	1.223	1.368	1.217

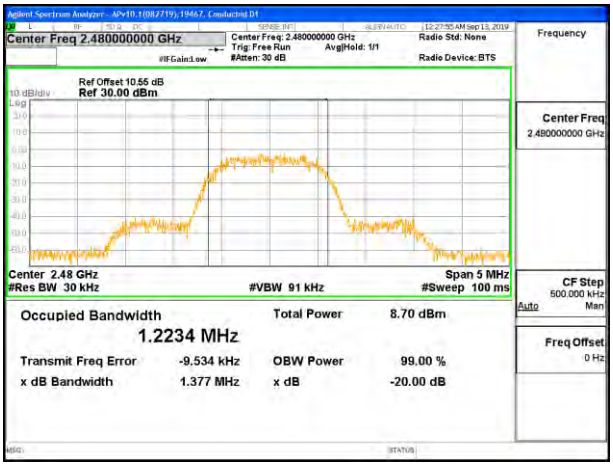


LOW CHANNEL UAT 1

LOW CHANNEL LAT 3

MID CHANNEL UAT 1

MID CHANNEL LAT 3



HIGH CHANNEL UAT 1

HIGH CHANNEL LAT 3

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8.4. HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)

RSS-247 (5.1) (b)

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.

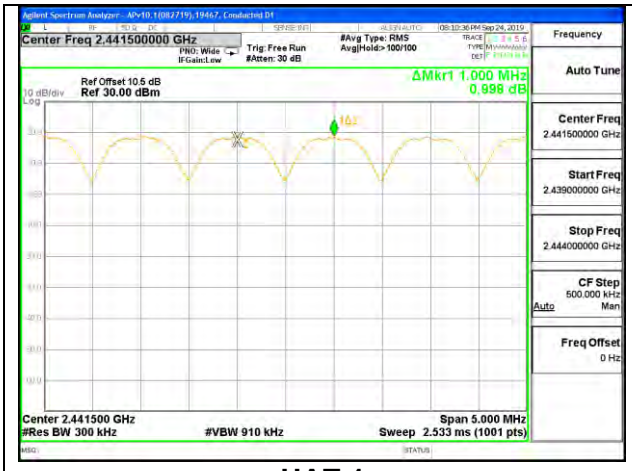
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

TEST PROCEDURE

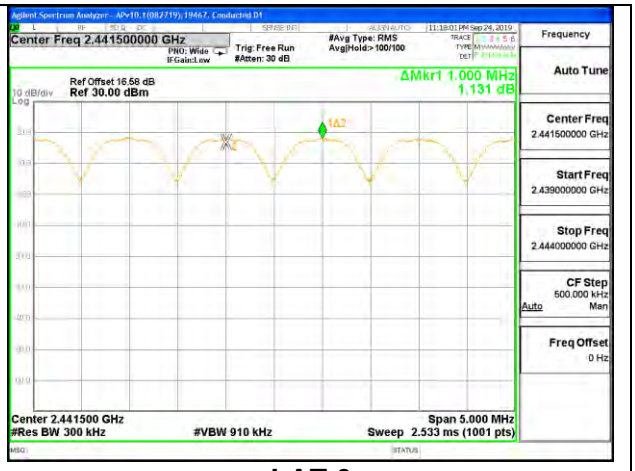
The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to VBW >=3x RBW. The sweep time is coupled.

RESULTS

8.4.1. HIGH POWER BASIC DATA RATE GFSK MODULATION

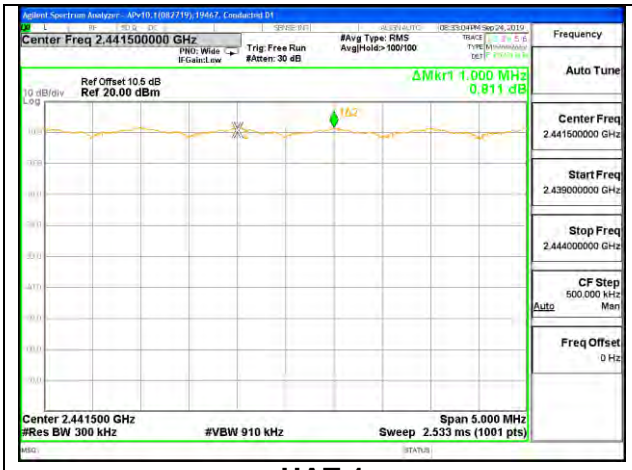


UAT 1

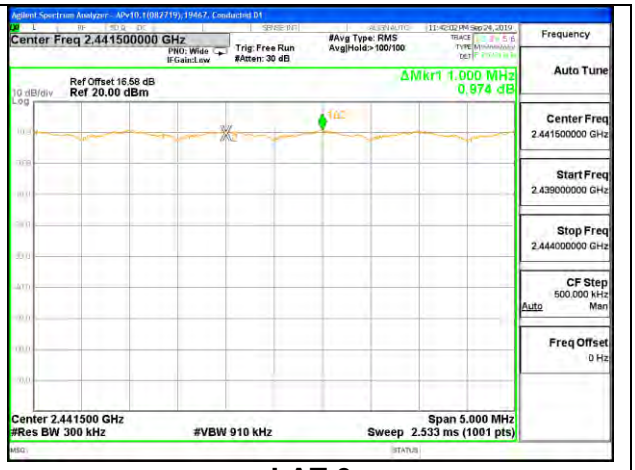


LAT 3

8.4.2. HIGH POWER ENHANCED DATA RATE 8PSK MODULATION

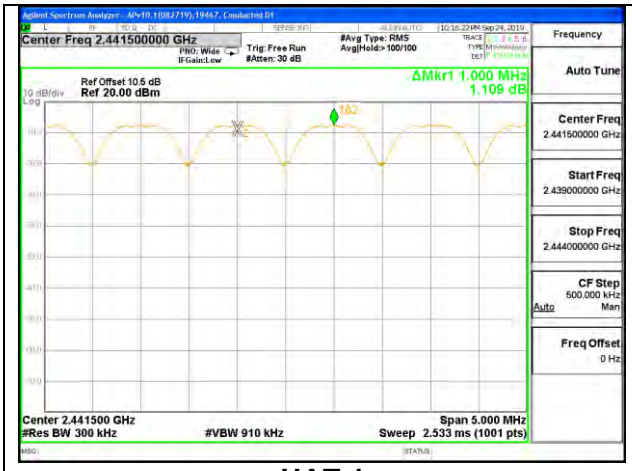


UAT 1

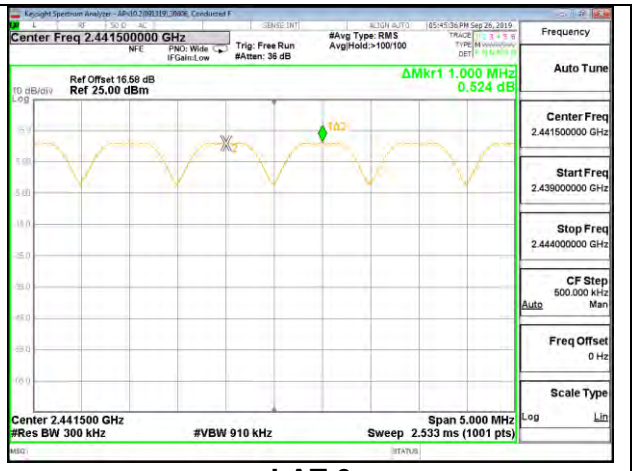


LAT 3

8.4.3. LOW POWER BASIC DATA RATE GFSK MODULATION

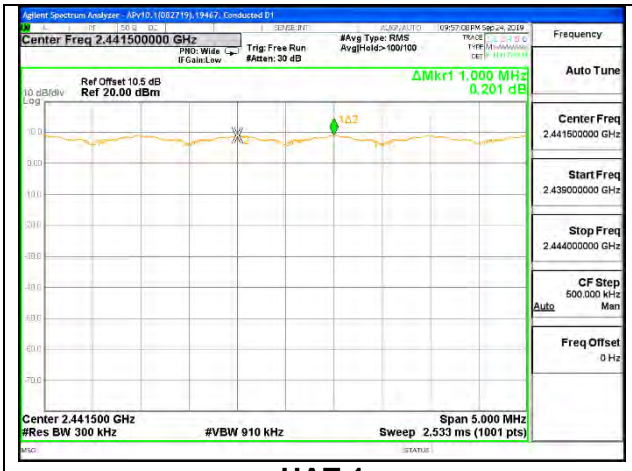


UAT 1



LAT 3

8.4.4. LOW POWER ENHANCED DATA RATE 8PSK MODULATION



UAT 1

LAT 3

8.5. BEAMFORMING HOPPING FREQUENCY SEPARATION

LIMITS

FCC §15.247 (a) (1)

RSS-247 (5.1) (b)

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 3x VBW. The sweep time is coupled.

Note: Test procedure on beamforming mode is same as BT basic and EDR mode

RESULTS

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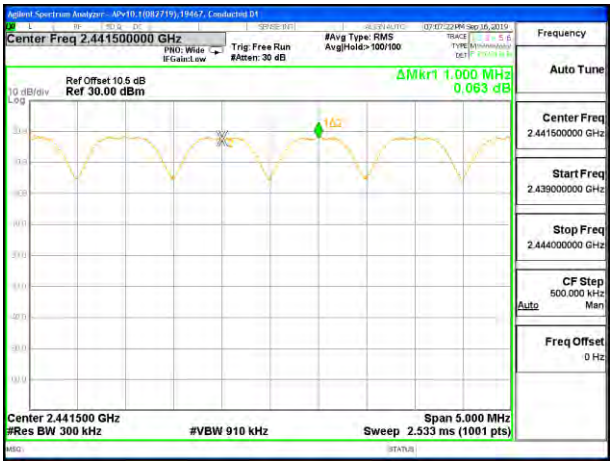
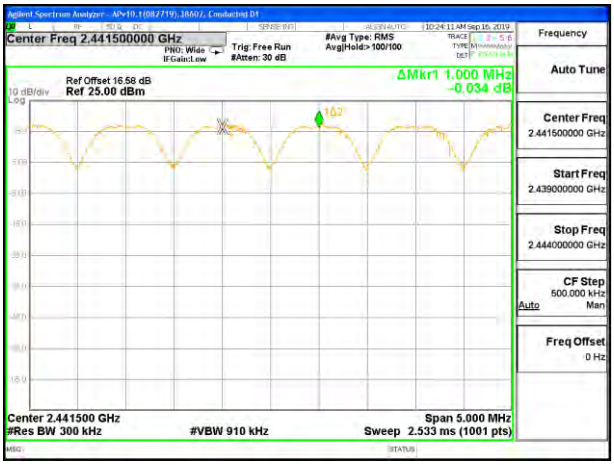
8.5.1. HIGH POWER BASIC DATA RATE GFSK MODULATION

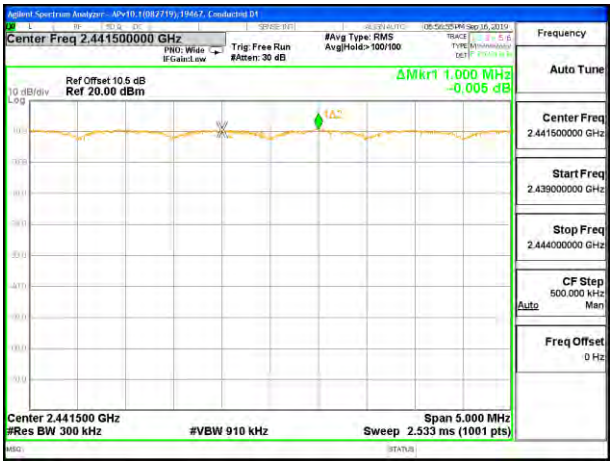


UAT 1

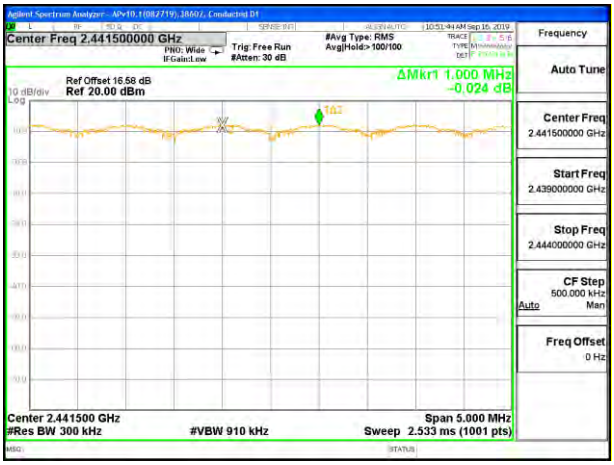


LAT 3

8.5.2. HIGH POWER ENHANCED DATA RATE 8PSK MODULATION

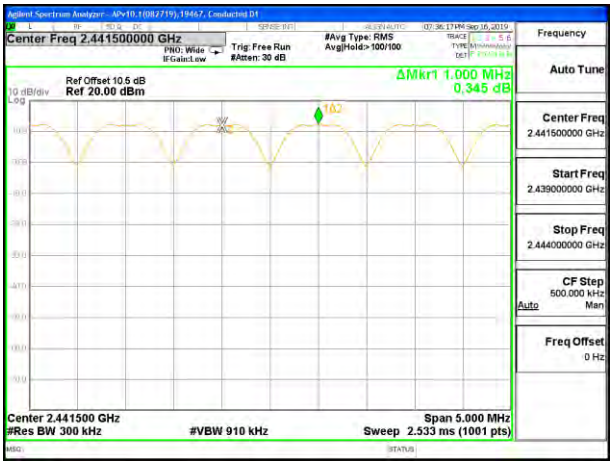


UAT 1

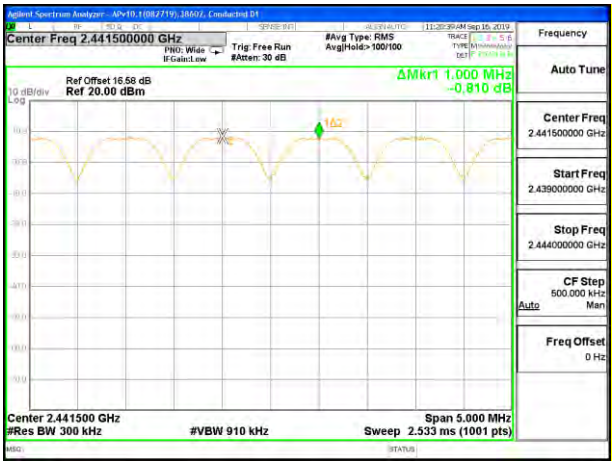


LAT 3

8.5.3. LOW POWER BASIC DATA RATE GFSK MODULATION

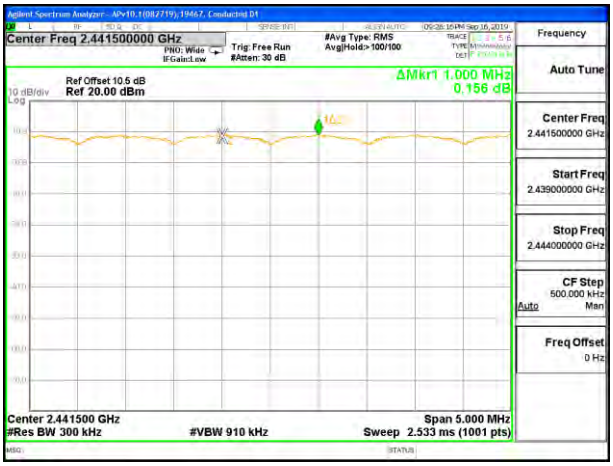


UAT 1

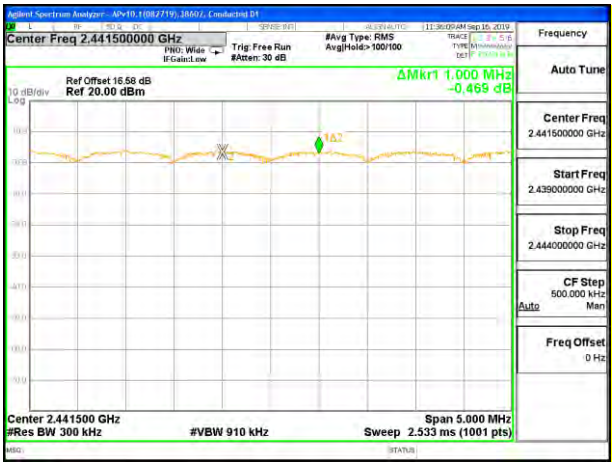


LAT 3

8.5.4. LOW POWER ENHANCED DATA RATE 8PSK MODULATION



UAT 1



LAT 3

8.6. NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (iii)

RSS-247 (5.1) (d)

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

79 Channels observed

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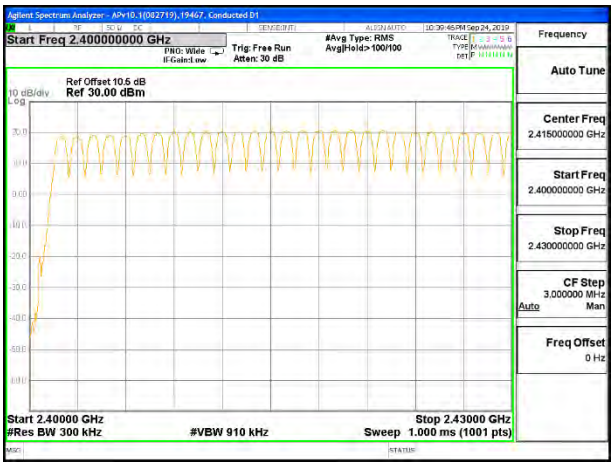
8.6.1. HIGH POWER BASIC DATA RATE GFSK MODULATION

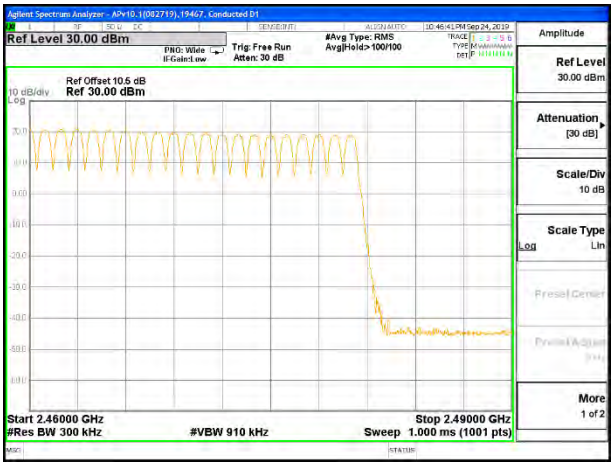
UAT 1

100MHz SPAN



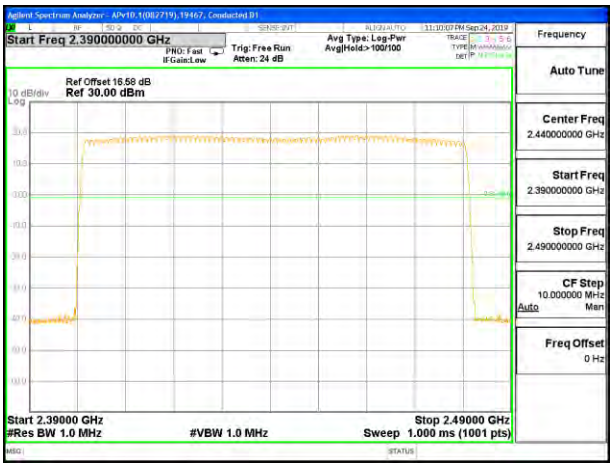
30MHz SPAN, SEGMENT 1 OF 3

30MHz SPAN, SEGMENT 2 OF 3

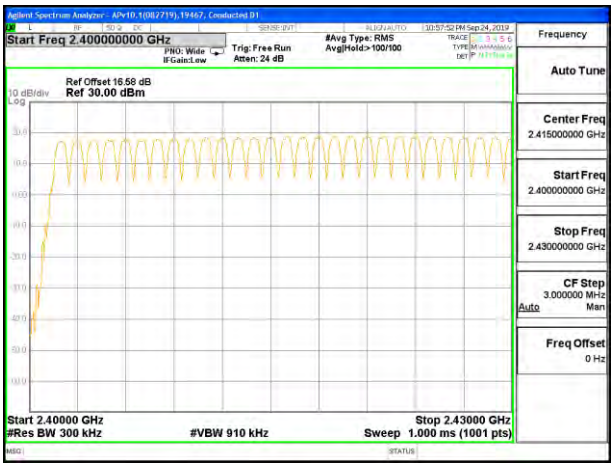


30MHz SPAN, SEGMENT 3 OF 3

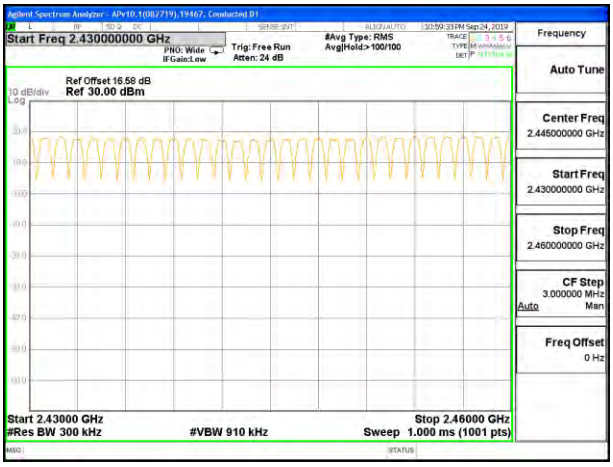
LAT 3



100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3



30MHz SPAN, SEGMENT 2 OF 3

30MHz SPAN, SEGMENT 3 OF 3

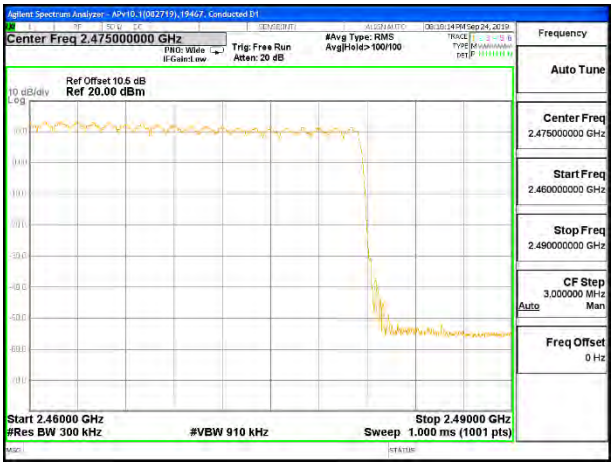
8.6.2. HIGH POWER ENHANCED DATA RATE 8PSK MODULATION

UAT 1

100MHz SPAN

30MHz SPAN, SEGMENT 1 OF 3

30MHz SPAN, SEGMENT 2 OF 3

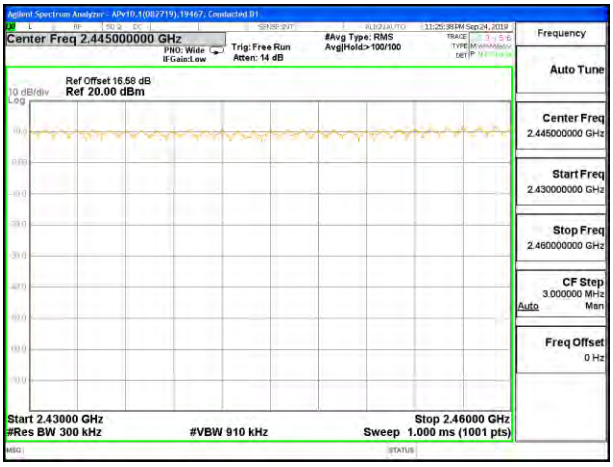


30MHz SPAN, SEGMENT 3 OF 3

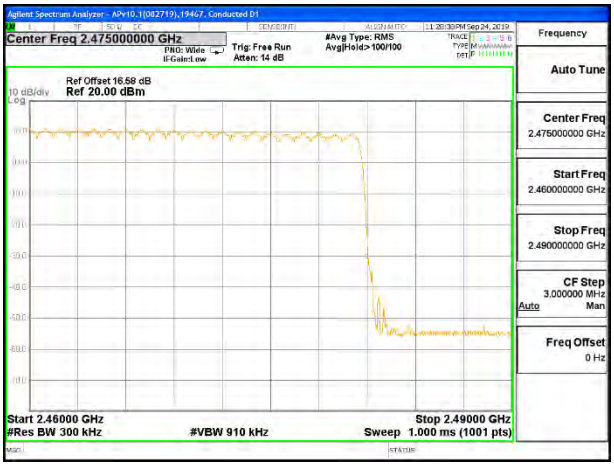
LAT 3

100MHz SPAN

30MHz SPAN, SEGMENT 1 OF 3



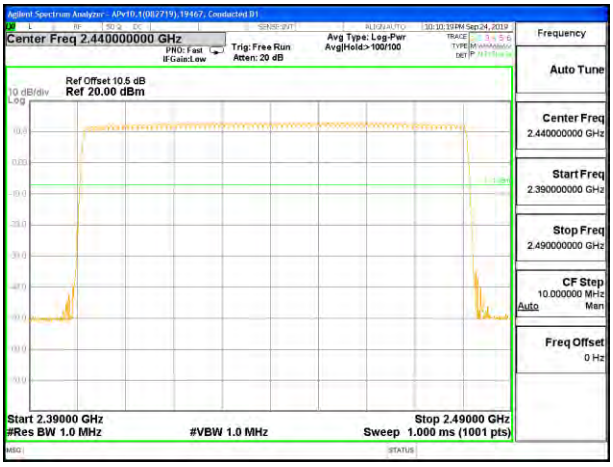
30MHz SPAN, SEGMENT 2 OF 3



30MHz SPAN, SEGMENT 3 OF 3

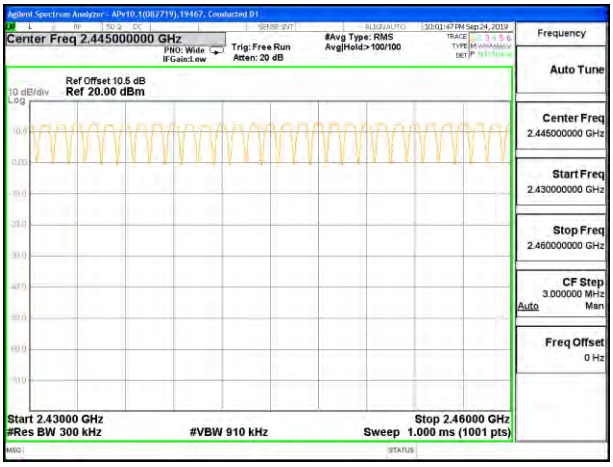
8.6.3. LOW POWER BASIC DATA RATE GFSK MODULATION

UAT 1

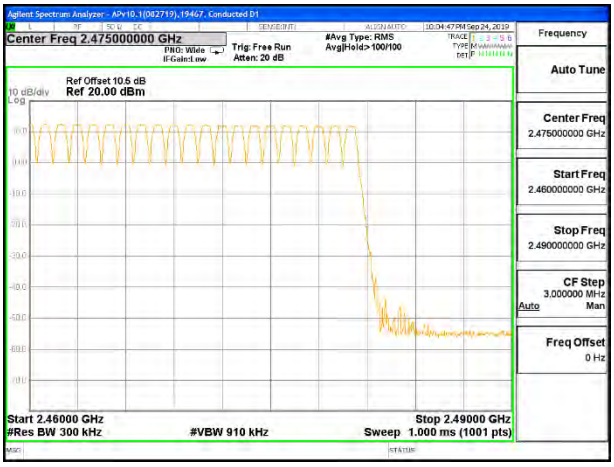


100MHz SPAN

30MHz SPAN, SEGMENT 1 OF 3

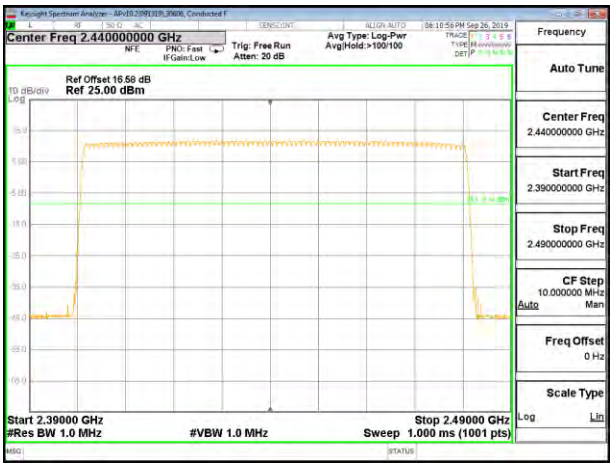


30MHz SPAN, SEGMENT 2 OF 3

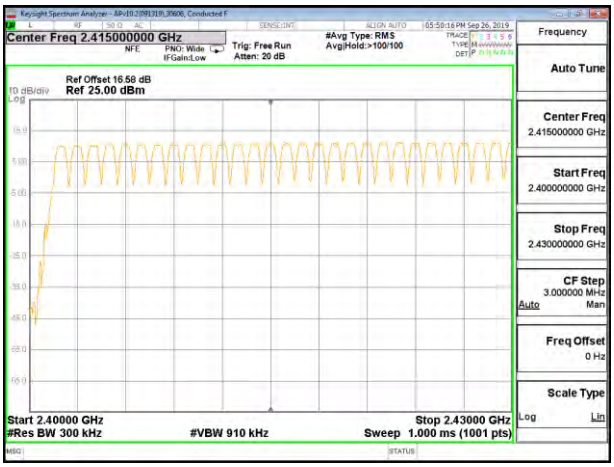


30MHz SPAN, SEGMENT 3 OF 3

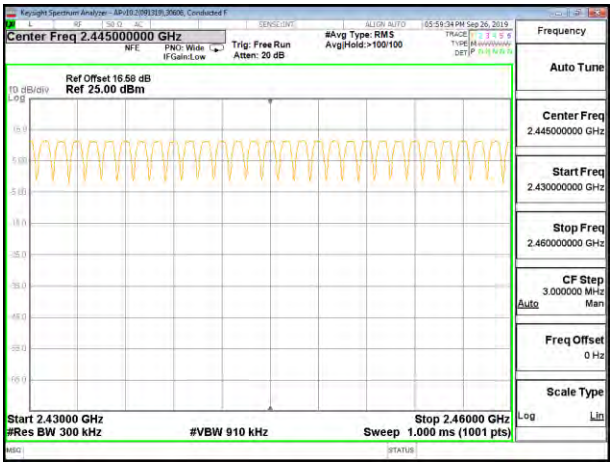
LAT 3



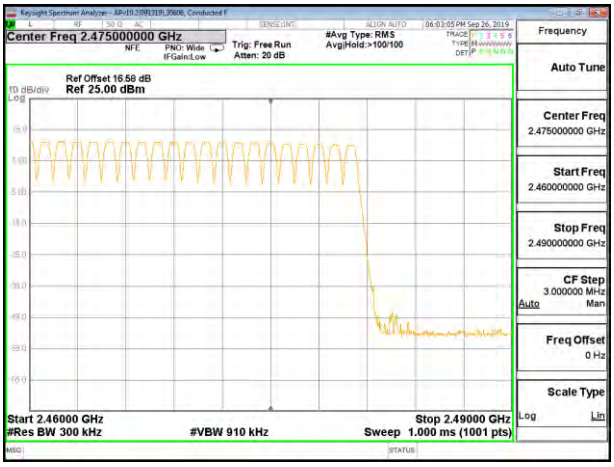
100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3



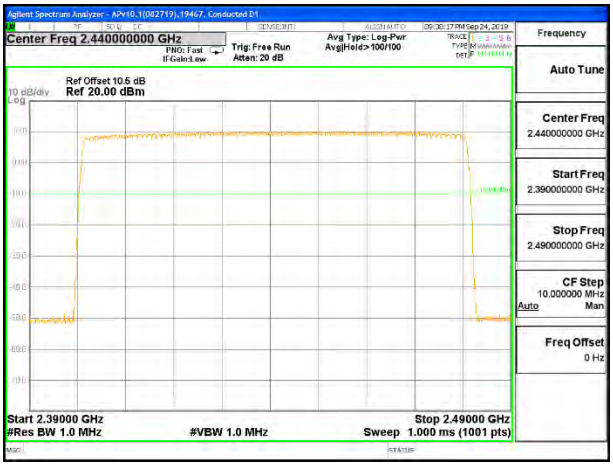
30MHz SPAN, SEGMENT 2 OF 3



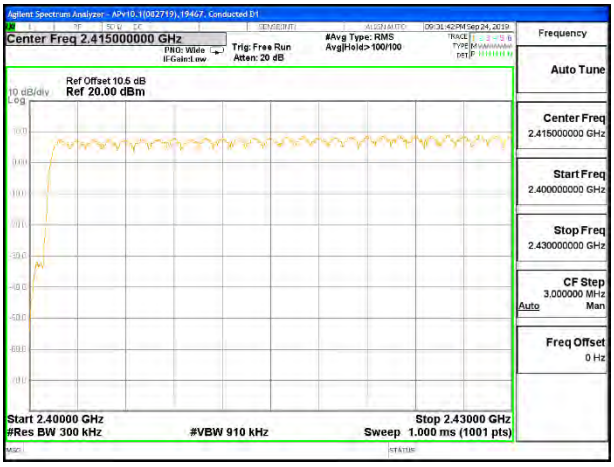
30MHz SPAN, SEGMENT 3 OF 3

8.6.4. LOW POWER ENHANCED DATA RATE 8PSK MODULATION

UAT 1



100MHz SPAN

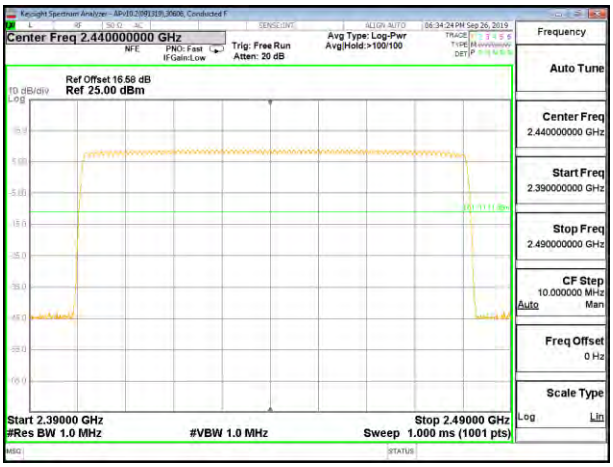


30MHz SPAN, SEGMENT 1 OF 3

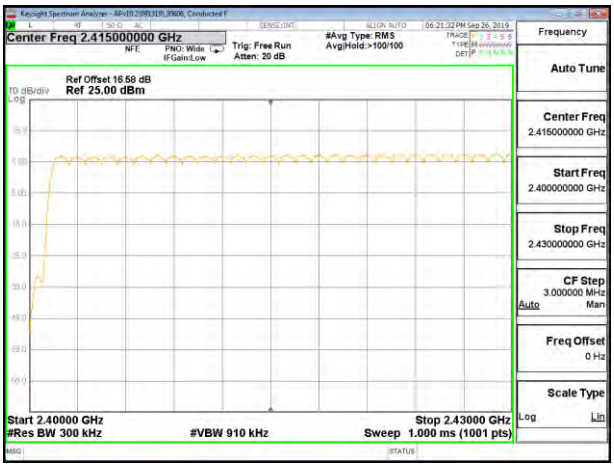
30MHz SPAN, SEGMENT 2 OF 3

30MHz SPAN, SEGMENT 3 OF 3

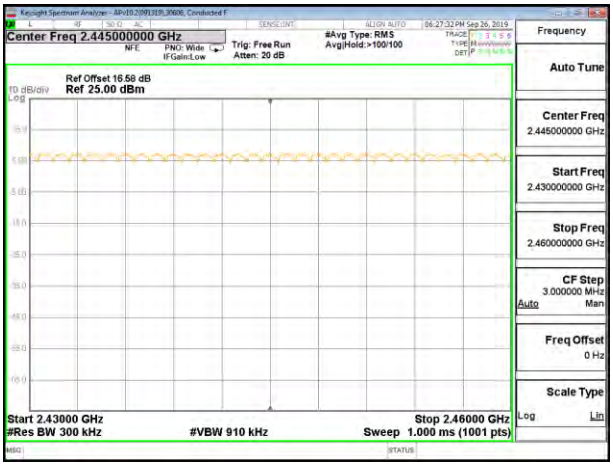
LAT 3



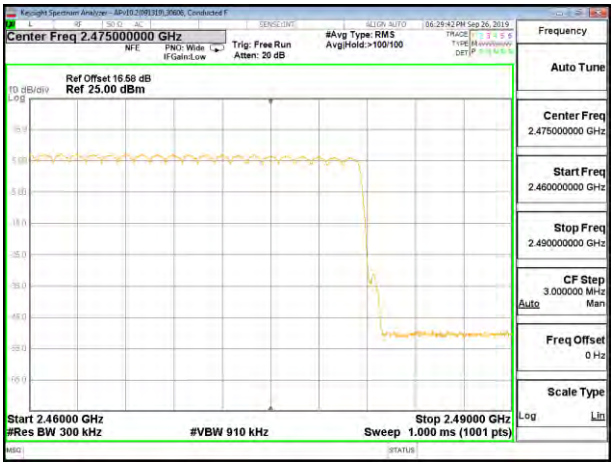
100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3



30MHz SPAN, SEGMENT 2 OF 3



30MHz SPAN, SEGMENT 3 OF 3

8.7. BEAMFORMING NUMBER OF HOPPING CHANNELS

LIMITS

FCC §15.247 (a) (1) (iii)

RSS-247 (5.1) (d)

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.

Note: Test procedure on beamforming mode is same as BT basic and EDR mode

RESULTS

Normal Mode: 79 Channels Observed

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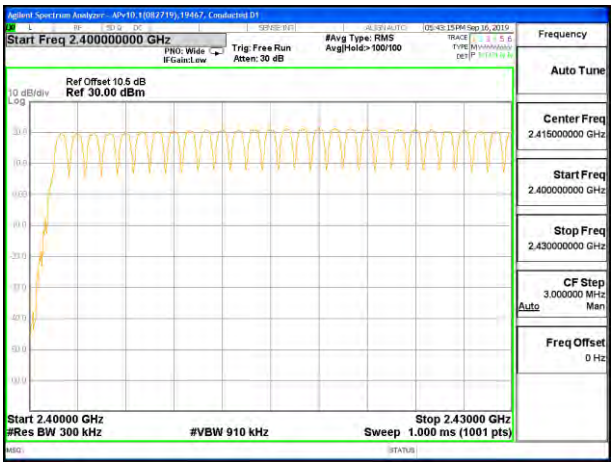
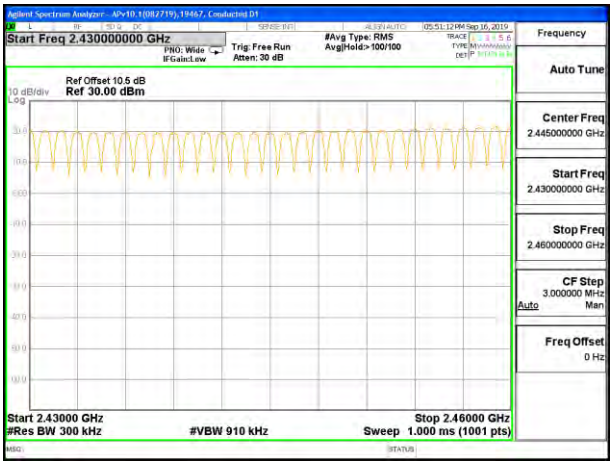
8.7.1. HIGH POWER BASIC DATA RATE GFSK MODULATION

UAT 1

100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3

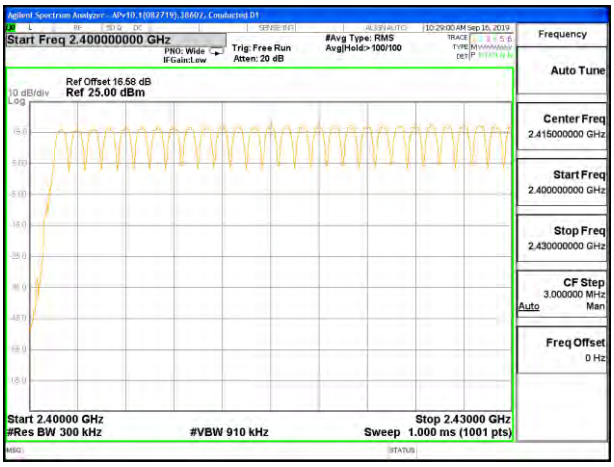


30MHz SPAN, SEGMENT 2 OF 3

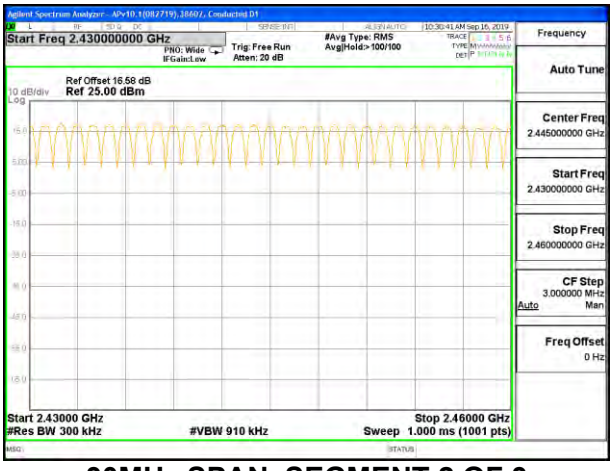
30MHz SPAN, SEGMENT 3 OF 3

LAT 3

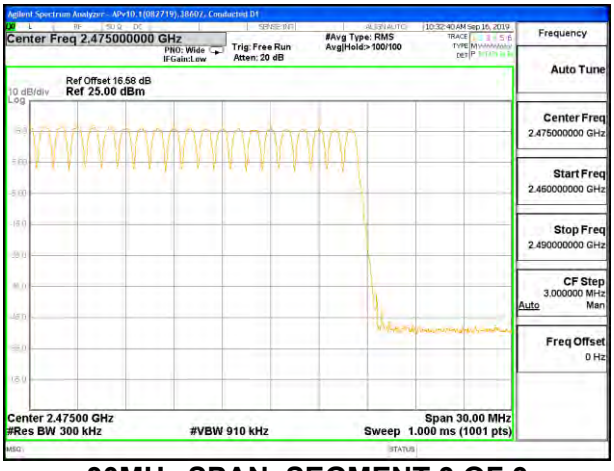
100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3



30MHz SPAN, SEGMENT 2 OF 3



30MHz SPAN, SEGMENT 3 OF 3

8.7.2. HIGH POWER ENHANCED DATA RATE 8PSK MODULATION

UAT 1

100MHz SPAN

30MHz SPAN, SEGMENT 1 OF 3

30MHz SPAN, SEGMENT 2 OF 3

30MHz SPAN, SEGMENT 3 OF 3

LAT 3

100MHz SPAN

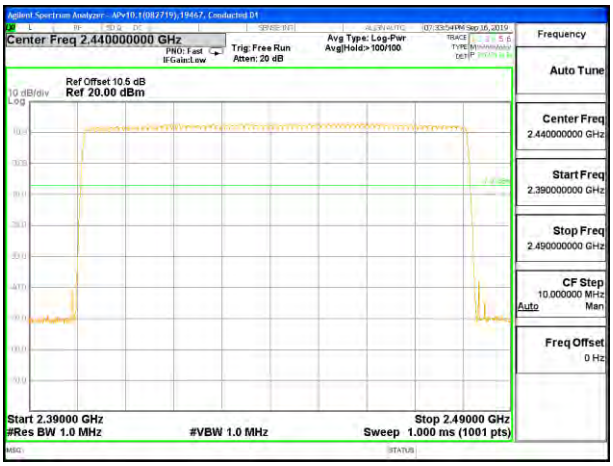
30MHz SPAN, SEGMENT 1 OF 3

30MHz SPAN, SEGMENT 2 OF 3

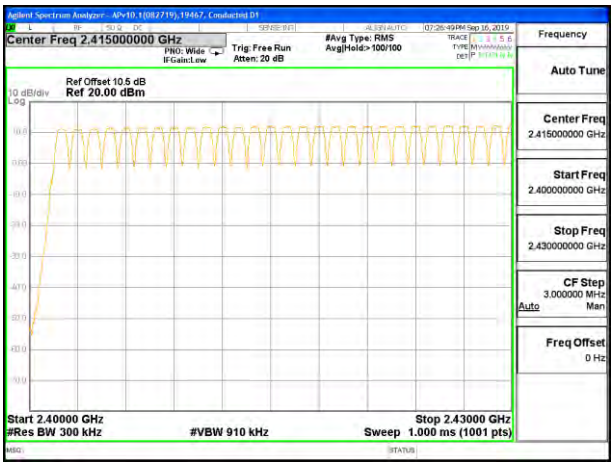
30MHz SPAN, SEGMENT 3 OF 3

8.7.3. LOW POWER BASIC DATA RATE GFSK MODULATION

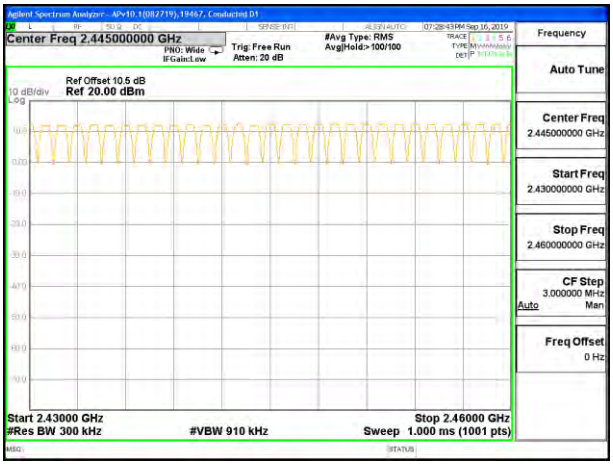
UAT 1



100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3

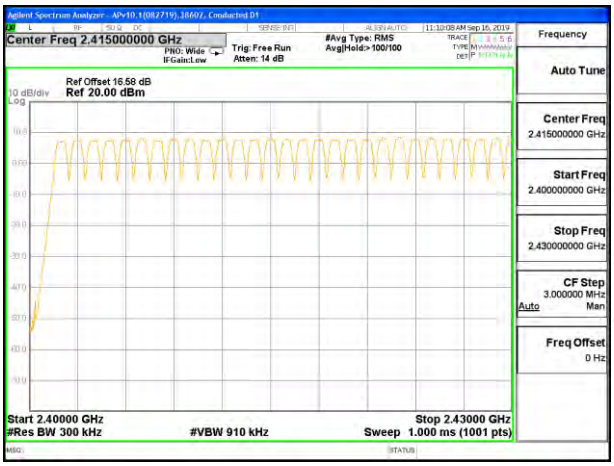


30MHz SPAN, SEGMENT 2 OF 3

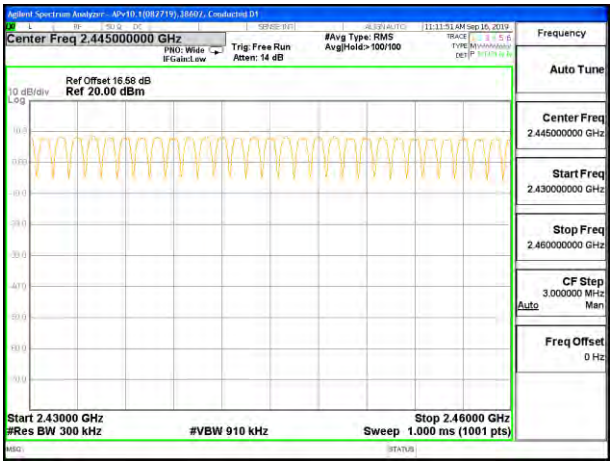
30MHz SPAN, SEGMENT 3 OF 3

LAT 3

100MHz SPAN



30MHz SPAN, SEGMENT 1 OF 3



30MHz SPAN, SEGMENT 2 OF 3

30MHz SPAN, SEGMENT 3 OF 3

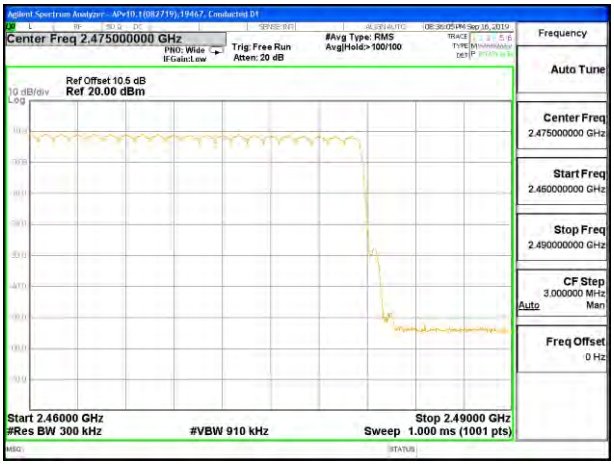
8.7.4. LOW POWER ENHANCED DATA RATE 8PSK MODULATION

UAT 1

100MHz SPAN

30MHz SPAN, SEGMENT 1 OF 3

30MHz SPAN, SEGMENT 2 OF 3



30MHz SPAN, SEGMENT 3 OF 3

LAT 3

100MHz SPAN

30MHz SPAN, SEGMENT 1 OF 3

30MHz SPAN, SEGMENT 2 OF 3

30MHz SPAN, SEGMENT 3 OF 3

8.8. AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (iii)

RSS-247 (5.1) (d)

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 3.16 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.

RESULTS

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8.8.1. HIGH POWER BASIC DATA RATE GFSK MODULATION

UAT 1

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.381	32	0.1219	0.4	-0.2781
DH3	1.638	17	0.2785	0.4	-0.1215
DH5	2.888	13	0.3754	0.4	-0.0246
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.381	8.00	0.03048	0.4	-0.3695
DH3	1.638	4.25	0.06962	0.4	-0.3304
DH5	2.888	3.25	0.09386	0.4	-0.3061

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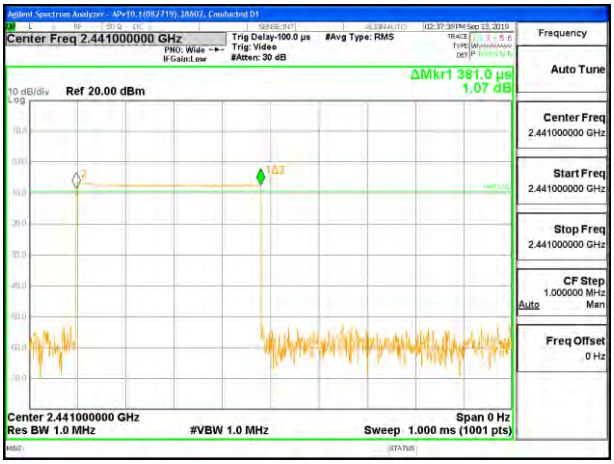

PULSE WIDTH – DH1

PULSE WIDTH – DH3

PULSE WIDTH – DH5

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

LAT 3

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.381	32	0.1219	0.4	-0.2781
DH3	1.636	17	0.2781	0.4	-0.1219
DH5	2.884	11	0.3172	0.4	-0.0828
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.381	8	0.03048	0.4	-0.3695
DH3	1.636	4.25	0.06953	0.4	-0.3305
DH5	2.884	2.75	0.07931	0.4	-0.3207

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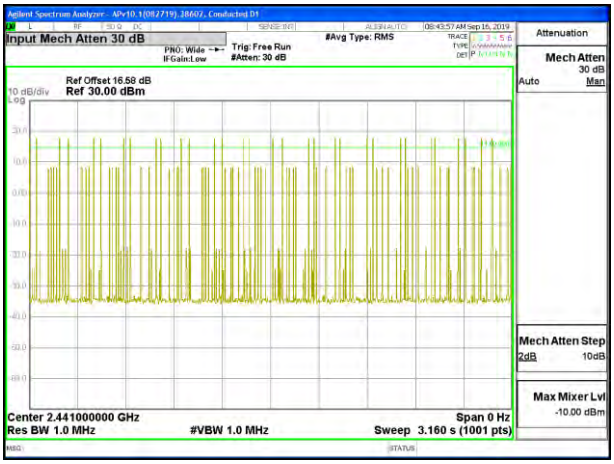
PULSE WIDTH – DH1

PULSE WIDTH – DH3

PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

8.8.2. HIGH POWER ENHANCED DATA RATE 8PSK MODULATION

UAT 1

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal Mode					
3DH1	0.388	32	0.12416	0.4	-0.2758
3DH3	1.638	16	0.26208	0.4	-0.1379
3DH5	2.888	10	0.28880	0.4	-0.1112

Note: for AFH(8PSK) mode, please refer to the results of AFH(GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate demonstrates compliance with channel occupancy when AFH is employed.

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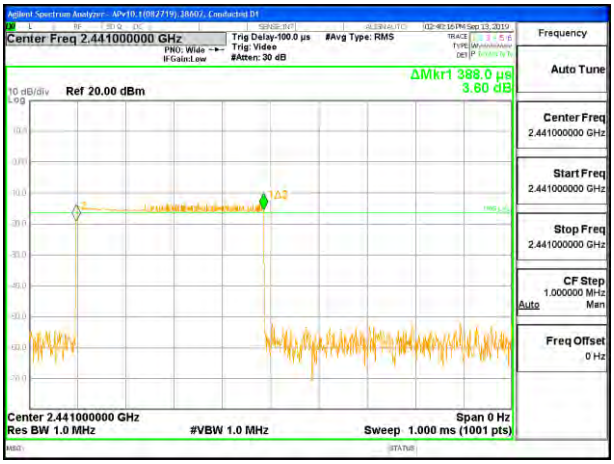


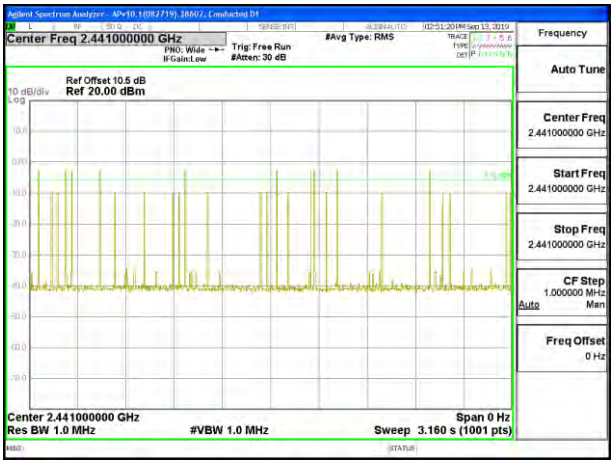
PULSE WIDTH – 3DH1

PULSE WIDTH – 3DH3

PULSE WIDTH – 3DH5

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH1

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH5

LAT 3

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal	Mode				
3DH1	0.387	32	0.12384	0.4	-0.2762
3DH3	1.638	17	0.27846	0.4	-0.1215
3DH5	2.888	11	0.31768	0.4	-0.0823

Note: for AFH(8PSK) mode, please refer to the results of AFH(GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate demonstrates compliance with channel occupancy when AFH is employed.

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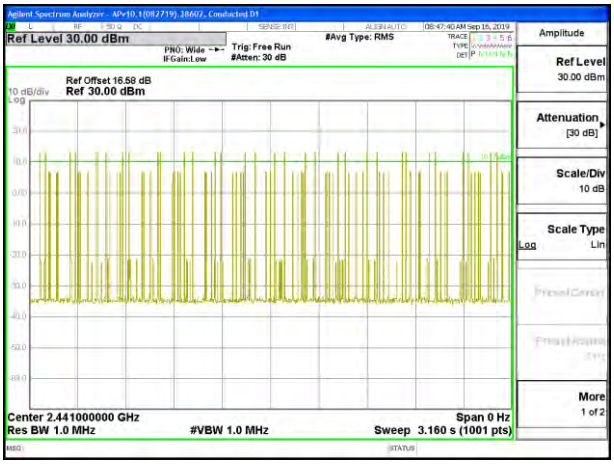
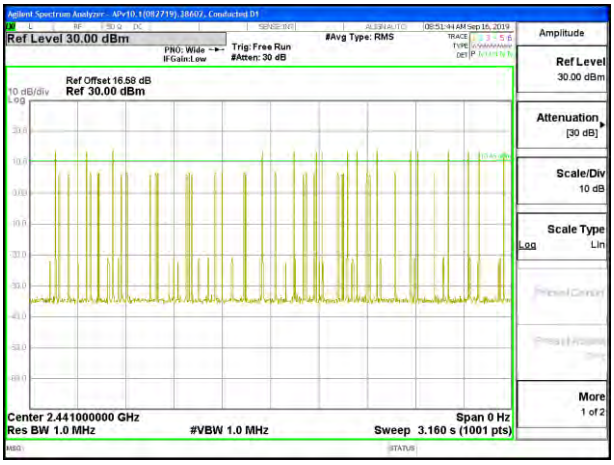
PULSE WIDTH – 3DH1

PULSE WIDTH – 3DH3

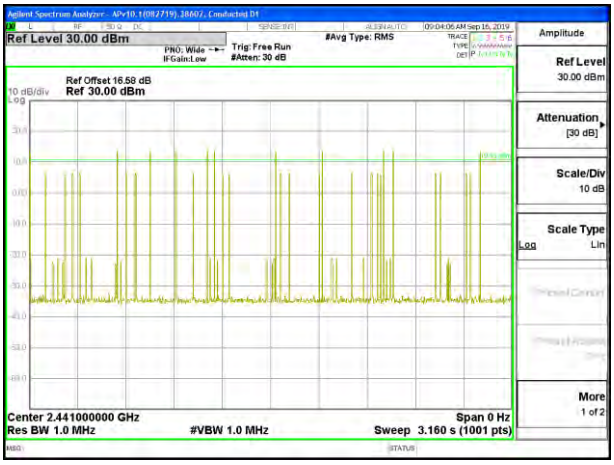
PULSE WIDTH – 3DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH5

8.8.3. LOW POWER BASIC DATA RATE GFSK MODULATION

UAT 1

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.382	32	0.1222	0.4	-0.2778
DH3	1.636	17	0.2781	0.4	-0.1219
DH5	2.884	9	0.2596	0.4	-0.1404
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.382	8	0.03056	0.4	-0.3694
DH3	1.636	4.25	0.06953	0.4	-0.3305
DH5	2.884	2.25	0.06489	0.4	-0.3351

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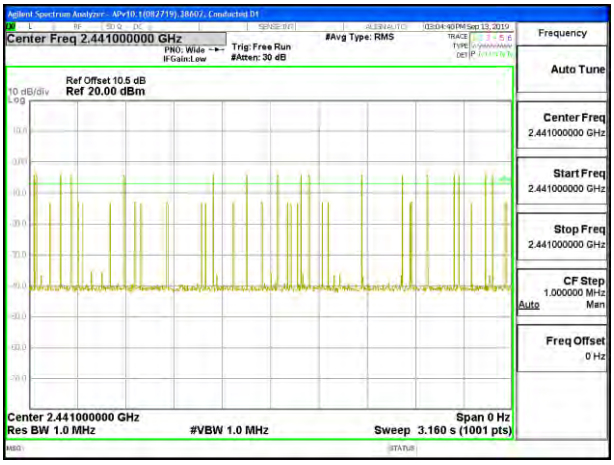
PULSE WIDTH – DH1

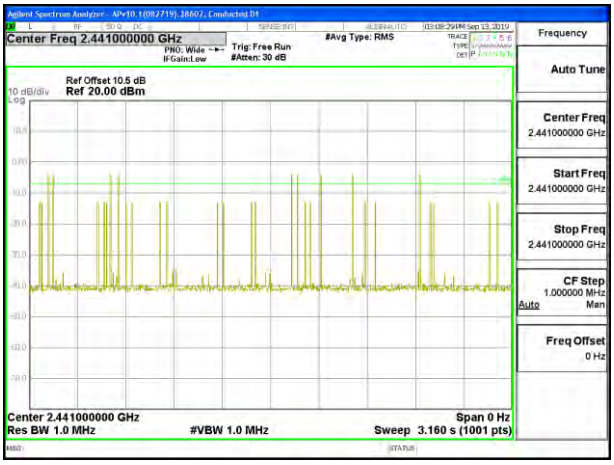
PULSE WIDTH – DH3

PULSE WIDTH – DH5

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



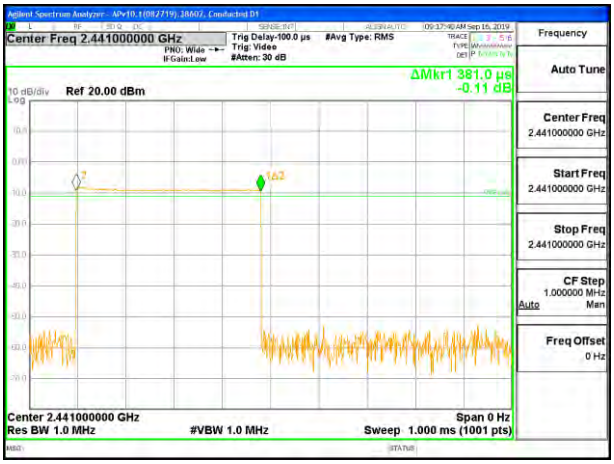
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



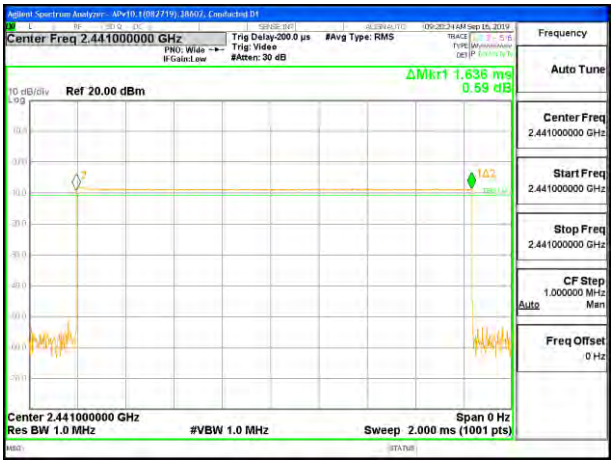
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

LAT 3

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.381	32	0.1219	0.4	-0.2781
DH3	1.636	16	0.2618	0.4	-0.1382
DH5	2.884	12	0.3461	0.4	-0.0539
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.381	8	0.03048	0.4	-0.3695
DH3	1.636	4.00	0.06544	0.4	-0.3346
DH5	2.884	3.00	0.08652	0.4	-0.3135



PULSE WIDTH – DH1



PULSE WIDTH – DH3

PULSE WIDTH – DH5

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

8.8.4. LOW POWER ENHANCED DATA RATE 8PSK MODULATION

UAT 1

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal	Mode				
3DH1	0.387	32	0.12384	0.4	-0.2762
3DH3	1.638	18	0.29484	0.4	-0.1052
3DH5	2.888	12	0.34656	0.4	-0.0534

Note: for AFH(8PSK) mode, please refer to the results of AFH(GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate demonstrates compliance with channel occupancy when AFH is employed.

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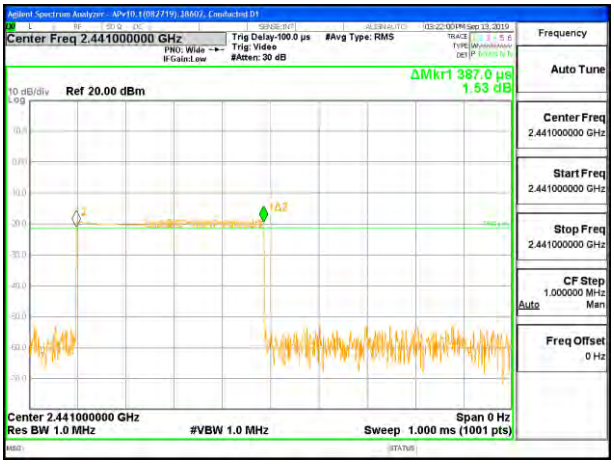

PULSE WIDTH – 3DH1

PULSE WIDTH – 3DH3

PULSE WIDTH – 3DH5

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH1

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH3

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH5

LAT 3

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal	Mode				
3DH1	0.388	32	0.12416	0.4	-0.2758
3DH3	1.638	17	0.27846	0.4	-0.1215
3DH5	2.888	12	0.34656	0.4	-0.0534

Note: for AFH(8PSK) mode, please refer to the results of AFH(GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate demonstrates compliance with channel occupancy when AFH is employed.

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PULSE WIDTH – 3DH1

PULSE WIDTH – 3DH3

PULSE WIDTH – 3DH5

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH1

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH3

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH5

8.9. BEAMFORMING AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (iii)

RSS-247 (5.1) (d)

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 3.16 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.

Note: Test procedure on beamforming mode is same as BT basic and EDR mode

RESULTS

UL VERIFICATION SERVICES INC.
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8.9.1. HIGH POWER BASIC DATA RATE GFSK MODULATION

UAT 1

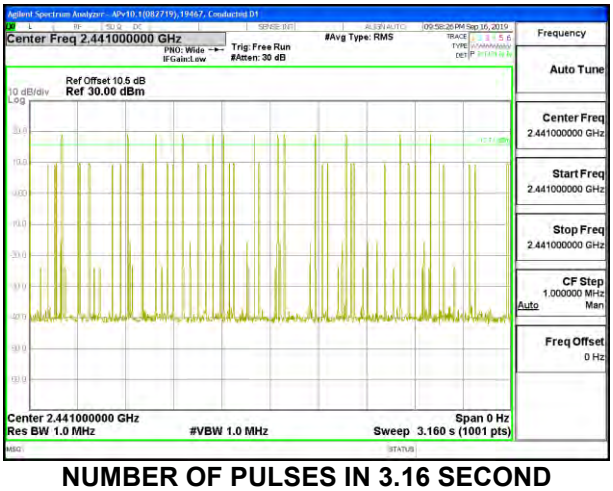
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.381	31	0.1181	0.4	-0.2819
DH3	1.636	13	0.2127	0.4	-0.1873
DH5	2.884	11	0.3172	0.4	-0.0828
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.381	7.75	0.02953	0.4	-0.3705
DH3	1.636	3.25	0.05317	0.4	-0.3468
DH5	2.884	2.75	0.07931	0.4	-0.3207

PULSE WIDTH – DH1

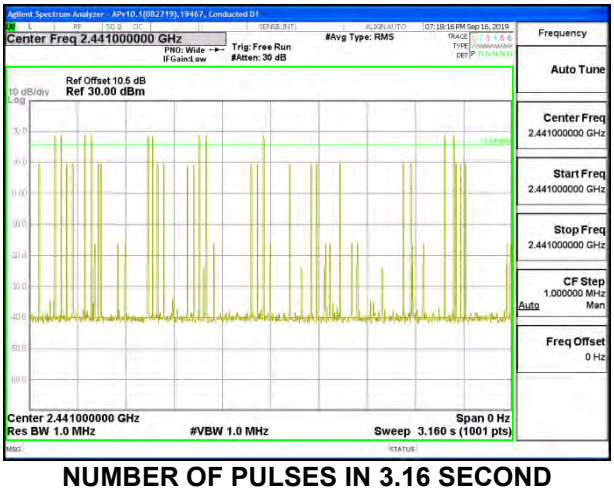
PULSE WIDTH– DH3

PULSE WIDTH – DH5

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

LAT 3

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.381	32	0.1219	0.4	-0.2781
DH3	1.636	17	0.2781	0.4	-0.1219
DH5	2.884	12	0.3461	0.4	-0.0539
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.381	7.75	0.02953	0.4	-0.3705
DH3	1.636	3.25	0.05317	0.4	-0.3468
DH5	2.884	2.75	0.07931	0.4	-0.3207

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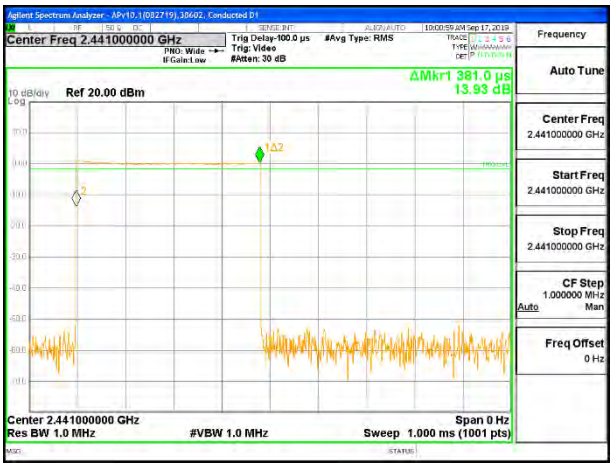
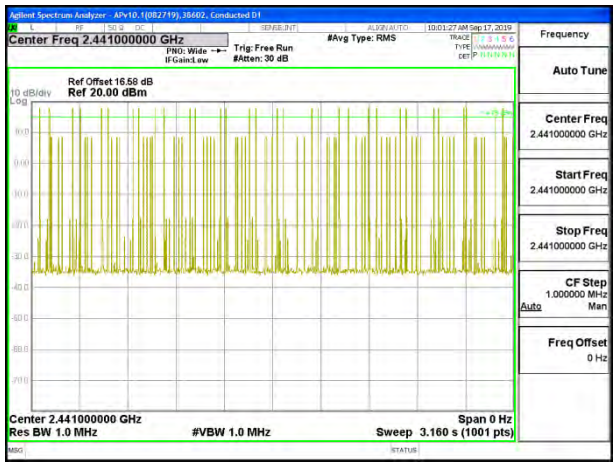


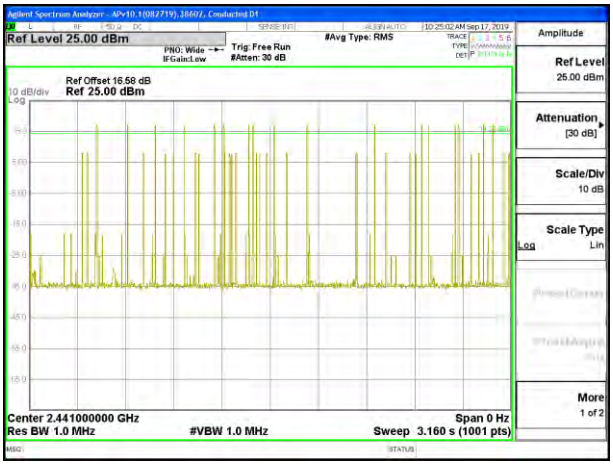
PULSE WIDTH – DH1

PULSE WIDTH – DH3

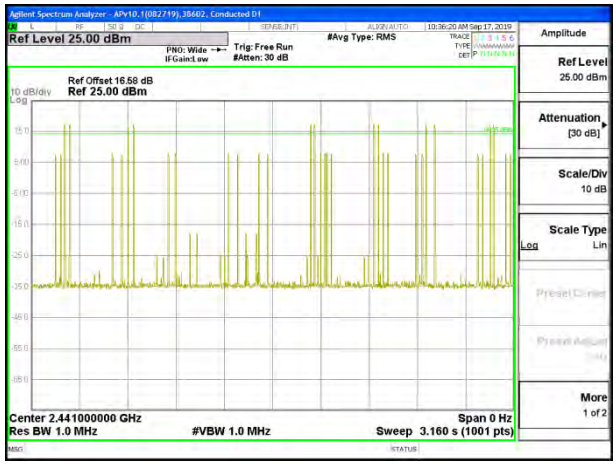
PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



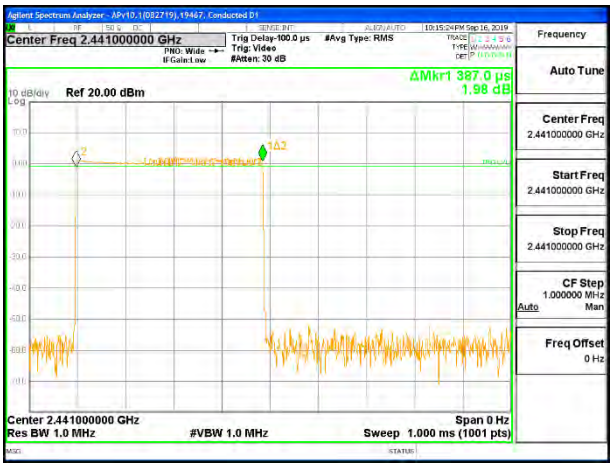
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

8.9.2. HIGH POWER ENHANCED DATA RATE 8PSK MODULATION

UAT 1

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal Mode					
3DH1	0.387	31	0.11997	0.4	-0.2800
3DH3	1.638	16	0.26208	0.4	-0.1379
3DH5	2.888	10	0.28880	0.4	-0.1112

Note: for AFH(8PSK) mode, please refer to the results of AFH(GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate demonstrates compliance with channel occupancy when AFH is employed.

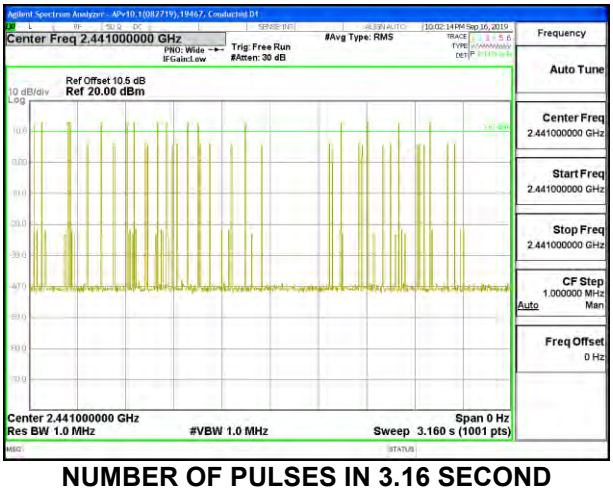


PULSE WIDTH – 3DH1

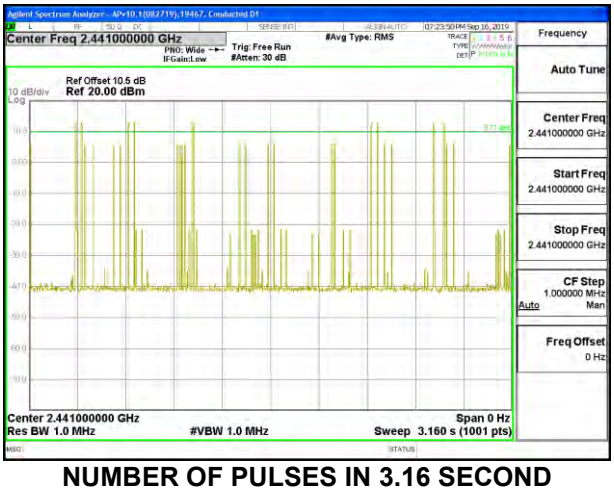
PULSE WIDTH – 3DH3

PULSE WIDTH – 3DH5

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH5

LAT 3

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal Mode					
3DH1	0.387	32	0.12384	0.4	-0.2762
3DH3	1.638	16	0.26208	0.4	-0.1379
3DH5	2.888	11	0.31768	0.4	-0.0823

Note: for AFH(8PSK) mode, please refer to the results of AFH(GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate demonstrates compliance with channel occupancy when AFH is employed.

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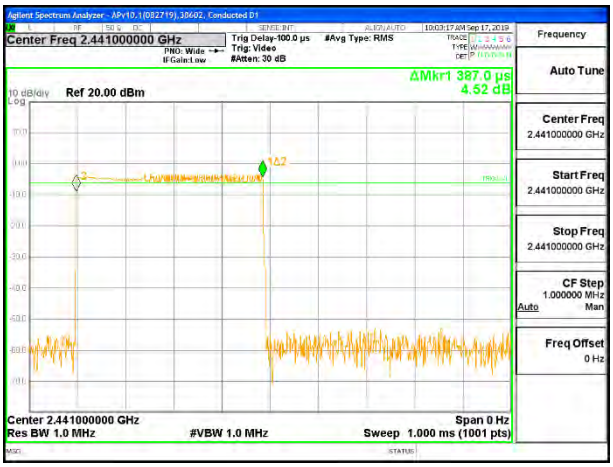
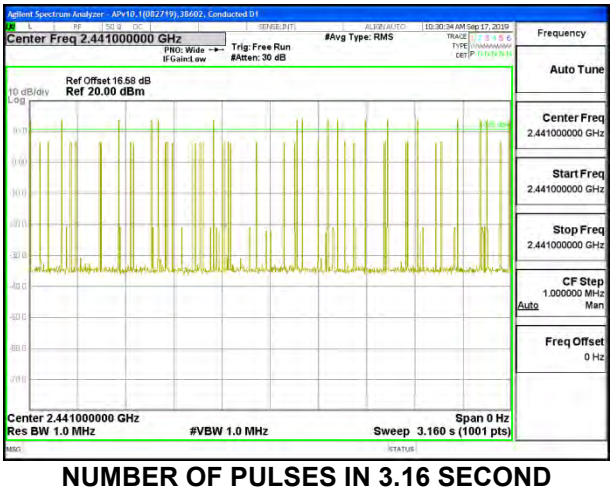


PULSE WIDTH – 3DH1

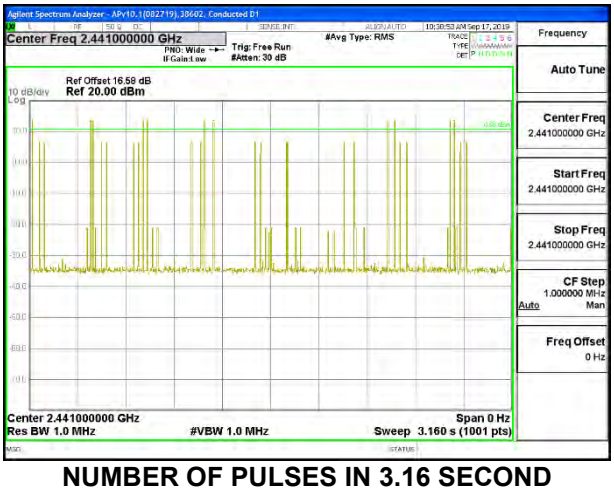
PULSE WIDTH – 3DH3

PULSE WIDTH – 3DH5

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH5

8.9.3. LOW POWER BASIC DATA RATE GFSK MODULATION

UAT 1

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.381	31	0.1181	0.4	-0.2819
DH3	1.638	15	0.2457	0.4	-0.1543
DH5	2.884	9	0.2596	0.4	-0.1404
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.381	7.75	0.02953	0.4	-0.3705
DH3	1.638	3.75	0.06143	0.4	-0.3386
DH5	2.884	2.25	0.06489	0.4	-0.3351

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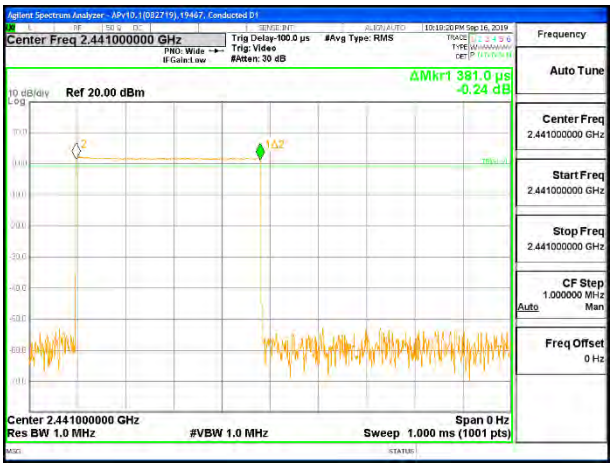
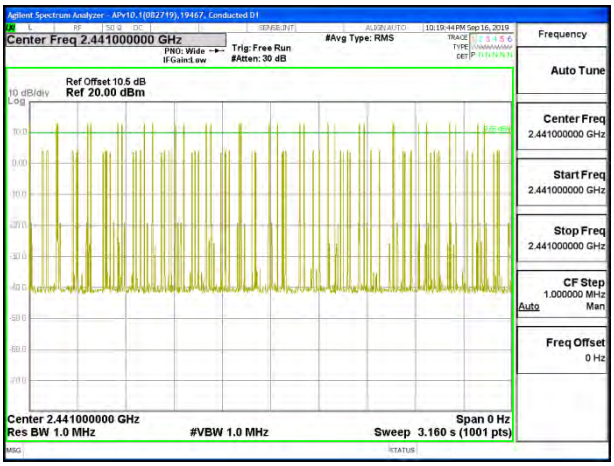


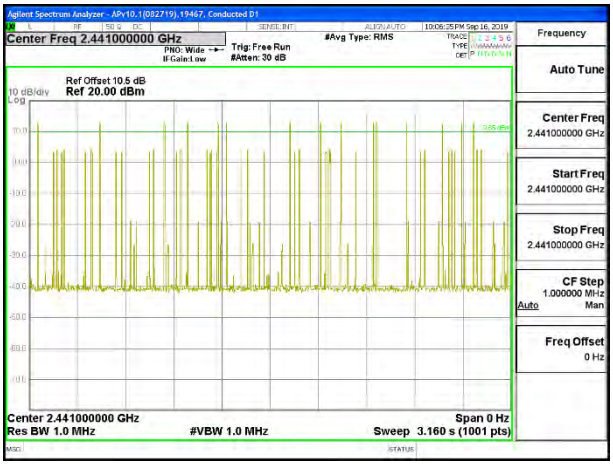
PULSE WIDTH – DH1

PULSE WIDTH – DH3

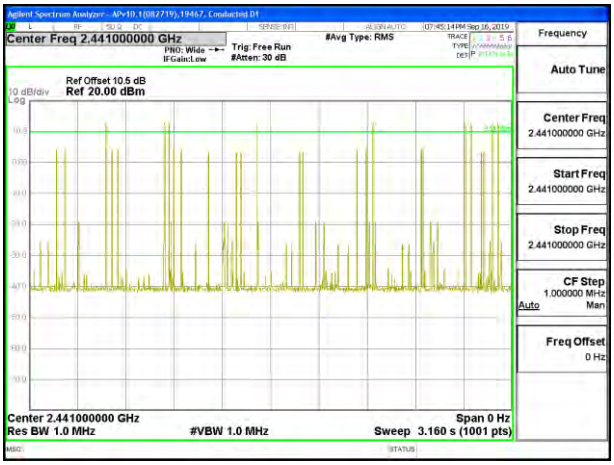
PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

LAT 3

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK Normal Mode					
DH1	0.381	31	0.1181	0.4	-0.2819
DH3	1.636	17	0.2781	0.4	-0.1219
DH5	2.884	12	0.3461	0.4	-0.0539
DH Packet	Pulse Width (sec)	Number of Pulses in 0.8 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
GFSK AFH Mode					
DH1	0.381	7.75	0.02953	0.4	-0.3705
DH3	1.638	3.75	0.06143	0.4	-0.3386
DH5	2.884	2.25	0.06489	0.4	-0.3351

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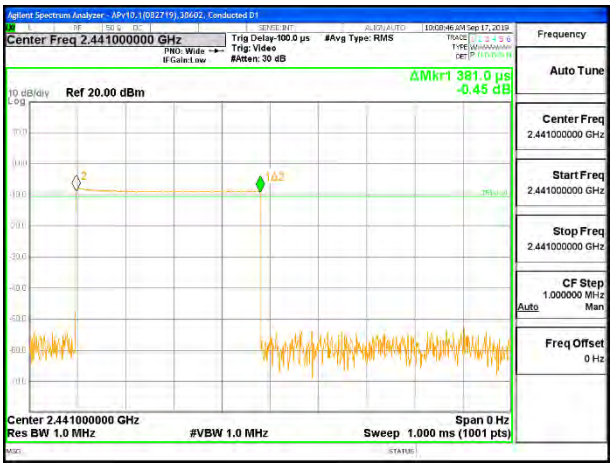
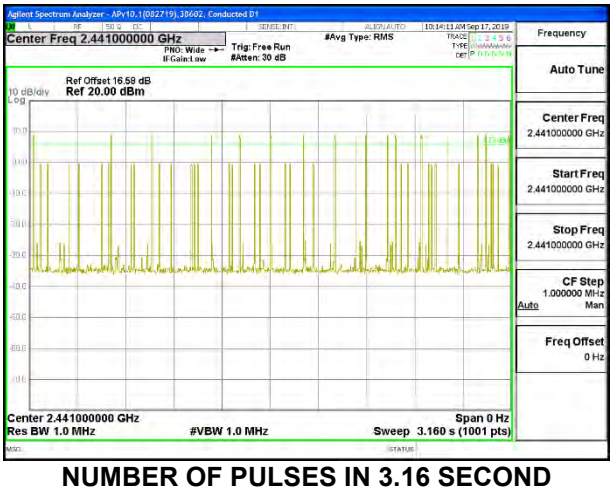


PULSE WIDTH – DH1

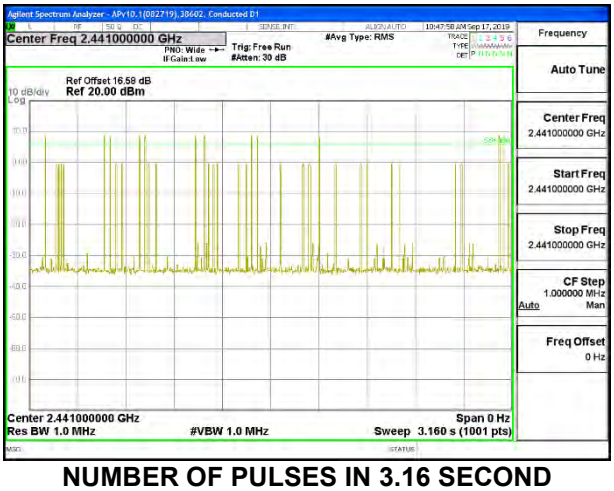
PULSE WIDTH – DH3

PULSE WIDTH – DH5

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

8.9.4. LOW POWER ENHANCED DATA RATE 8PSK MODULATION

UAT 1

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal Mode					
3DH1	0.388	29	0.11252	0.4	-0.2875
3DH3	1.638	16	0.26208	0.4	-0.1379
3DH5	2.888	10	0.28880	0.4	-0.1112

Note: for AFH(8PSK) mode, please refer to the results of AFH(GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate demonstrates compliance with channel occupancy when AFH is employed.

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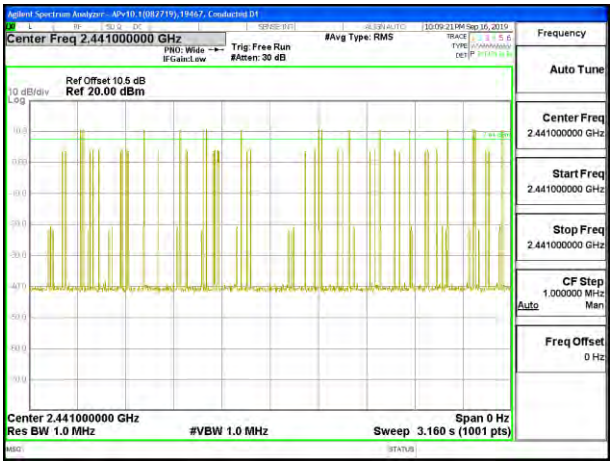
PULSE WIDTH – 3DH1

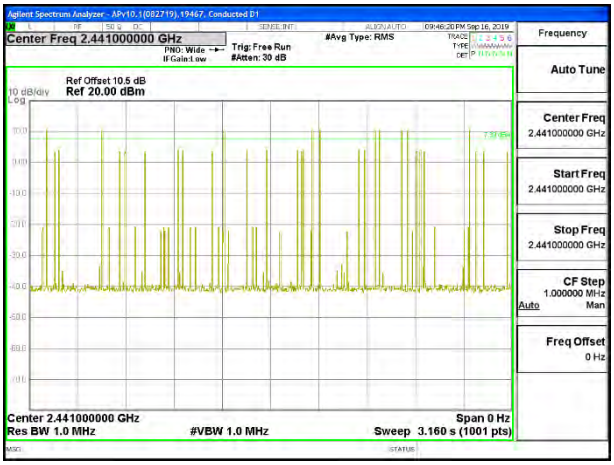
PULSE WIDTH – 3DH3

PULSE WIDTH – 3DH5

NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3DH5

LAT 3

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
8PSK Normal Mode					
3DH1	0.387	31	0.11997	0.4	-0.28
3DH3	1.638	17	0.27846	0.4	-0.1215
3DH5	2.888	12	0.34656	0.4	-0.0534

Note: for AFH(8PSK) mode, please refer to the results of AFH(GFSK) mode; the channel selection and hopping rate are the same for both EDR and Basic Rate operation, data for Basic Rate demonstrates compliance with channel occupancy when AFH is employed.

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