

FCC Test Report

Product Name	OTT BOX
Model No.	SB520
FCC ID.	JCK-SB5204KOTTBK

Applicant	Giga Byte Technology Co Ltd.	
Address	No.6, Bau Chiang Road,Hsin-Tien,Taipei Hsien,Taiwan	

Date of Receipt	Aug. 04, 2015			
Issued Date	Sep. 01, 2015			
Report No.	1580191R-RFUSP23V00			
Report Version	V1.0			
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The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

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Test Report

Issued Date: Sep. 01, 2015 Report No.: 1580191R-RFUSP23V00



Product Name	OTT BOX	
Applicant	Giga Byte Technology Co Ltd.	
Address	No.6, Bau Chiang Road, Hsin-Tien, Taipei Hsien, Taiwan	
Manufacturer	GIGA-BYTE TECHNOLOGY CO., LTD	
Model No.	SB520	
FCC ID.	JCK-SB5204KOTTBK	
EUT Rated Voltage	AC 100-240V, 50-60Hz	
EUT Test Voltage	AC 120V/60Hz	
Trade Name	GIGABYTE	
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2014	
	ANSI C63.4: 2014, ANSI C63.10: 2013	
Test Result	Complied	

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	OTT BOX	
Trade Name	GIGABYTE	
Model No.	SB520	
FCC ID.	JCK-SB5204KOTTBK	
Frequency Range	2402-2480MHz	
Channel Number	79	
Type of Modulation	FHSS: GFSK(1Mbps) / π /4DQPSK(2Mbps) / 8DPSK(3Mbps)	
Antenna Type	PIFA Antenna	
Channel Control	Auto	
Antenna Gain	Refer to the table "Antenna List"	
Remote control	1 set	
HDMI Cable	Shielded, 1.2m	
IR Cable	Non-Shielded, 1.8m	
Power Adapter	MFR: APD, M/N: WB-18D12R	
	Input: AC 100-240V~50-60Hz, 0.5A Max	
	Output: 12V==1.5A	
	Cable Out: Non-Shielded, 1.5m, with one ferrite core bonded.	

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	ACON	APP6P-701316	PIFA	-0.54dBi for 2.4 GHz

Note: The antenna of EUT conforms to FCC 15.203.

Center Frequency of Each Channel:

· · · · · · · · · · · · · · · · · · ·	-)						
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 00:	2402 MHz	Channel 20:	2422 MHz	Channel 40:	2442 MHz	Channel 60:	2462 MHz
Channel 01:	2403 MHz	Channel 21:	2423 MHz	Channel 41:	2443 MHz	Channel 61:	2463 MHz
Channel 02:	2404 MHz	Channel 22:	2424 MHz	Channel 42:	2444 MHz	Channel 62:	2464 MHz
Channel 03:	2405 MHz	Channel 23:	2425 MHz	Channel 43:	2445 MHz	Channel 63:	2465 MHz
Channel 04:	2406 MHz	Channel 24:	2426 MHz	Channel 44:	2446 MHz	Channel 64:	2466 MHz
Channel 05:	2407 MHz	Channel 25:	2427 MHz	Channel 45:	2447 MHz	Channel 65:	2467 MHz
Channel 06:	2408 MHz	Channel 26:	2428 MHz	Channel 46:	2448 MHz	Channel 66:	2468 MHz
Channel 07:	2409 MHz	Channel 27:	2429 MHz	Channel 47:	2449 MHz	Channel 67:	2469 MHz
Channel 08:	2410 MHz	Channel 28:	2430 MHz	Channel 48:	2450 MHz	Channel 68:	2470 MHz
Channel 09:	2411 MHz	Channel 29:	2431 MHz	Channel 49:	2451 MHz	Channel 69:	2471 MHz
Channel 10:	2412 MHz	Channel 30:	2432 MHz	Channel 50:	2452 MHz	Channel 70:	2472 MHz
Channel 11:	2413 MHz	Channel 31:	2433 MHz	Channel 51:	2453 MHz	Channel 71:	2473 MHz
Channel 12:	2414 MHz	Channel 32:	2434 MHz	Channel 52:	2454 MHz	Channel 72:	2474 MHz
Channel 13:	2415 MHz	Channel 33:	2435 MHz	Channel 53:	2455 MHz	Channel 73:	2475 MHz
Channel 14:	2416 MHz	Channel 34:	2436 MHz	Channel 54:	2456 MHz	Channel 74:	2476 MHz
Channel 15:	2417 MHz	Channel 35:	2437 MHz	Channel 55:	2457 MHz	Channel 75:	2477 MHz
Channel 16:	2418 MHz	Channel 36:	2438 MHz	Channel 56:	2458 MHz	Channel 76:	2478 MHz
Channel 17:	2419 MHz	Channel 37:	2439 MHz	Channel 57:	2459 MHz	Channel 77:	2479 MHz
Channel 18:	2420 MHz	Channel 38:	2440 MHz	Channel 58:	2460 MHz	Channel 78:	2480 MHz
Channel 19:	2421 MHz	Channel 39:	2441 MHz	Channel 59:	2461 MHz		

- 1. The EUT is a OTT BOX with a built-in WLAN Bluetooth transceiver, this report for Bluetooth.
- 2. These tests were conducted on a sample for the purpose of demonstrating compliance of Bluetooth transmitter with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
- 3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
- 4. Bluetooth operation was evaluated at both 1Mb/s and 3Mb/s data rates. 2Mb/s data rate was found, through pre-testing, to produce emissions similar to those for 3Mb/s.

Test Mode	Mode 1: Transmit - 1Mbps (GFSK)
	Mode 2: Transmit - 3Mbps (8DPSK)



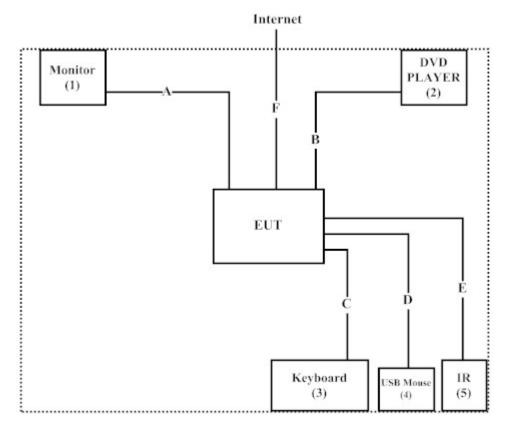
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Prod	uct	Manufacturer	Model No.	Serial No.	Power Cord
1	Monitor	Dell	2407WFPb	CN-0FC255-46633-67T-047S	Non-Shielded, 1.8m
2	DVD PLAYER	Panasonic	DVD-S97	VC6GG001022R	Non-Shielded, 1.8m
3	Keyboard	DELL	SK-8115	MY-0DJ325-71619-6A3-1911	N/A
4	USB Mouse	DELL	M056U0A	F0Y01YEQ	N/A
5	IR	Always Tai Lai	Y001-0572	N/A	N/A
3		CO.,LTD.			

Signal Cable Type		Signal cable Description
Α	HDMI Cable	Shielded, 1.2m
В	OPTICAL Cable	Non-Shielded, 1.8m
С	USB Cable	Shielded, 1.8m, with one ferrite core bonded.
D	USB Cable	Shielded, 1.8m
Е	IR Cable	Non-Shielded, 1.8m
F	RJ-45 Cable	Non-Shielded, 3m

1.4. Configuration of Tested System



1.5. EUT Exercise Software

- 1. Setup the EUT as shown in Section 1.4.
- 2. Execute "Ampak RF Test Tool V5.2" program on the EUT.
- 3. Configure the test mode, the test channel, and the data rate.
- 4. Start the continuous transmission.
- 5. Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	30-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded

from QuieTek Corporation's Web Site: <u>http://www.quietek.com/chinese/about/certificates.aspx?bval=5</u> The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site: <u>http://www.quietek.com/</u>

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	FCC Engineering Laboratory
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	E-Mail : service@quietek.com

FCC Accreditation Number: TW1014

2. Conducted Emission

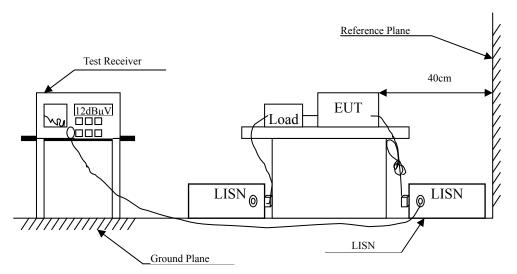
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
Х	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2015	
Х	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2015	Peripherals
Х	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2015	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar., 2015	EUT
Х	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2015	
	No.1 Shielded Room				

Note:

- 1. All equipments are calibrated every one year.
- 2. The test instruments marked by "X" are used to measure the final test results.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBµV) Limit					
Frequency	Limits				
MHz	QP	AV			
0.15 - 0.50	66-56	56-46			
0.50-5.0	56	46			
5.0 - 30	60	50			

Remarks: In the above table, the tighter limit applies at the band edges.

2.4. Test Procedure

The EUT and Peripherals are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

:	OTT BOX
:	Conducted Emission Test
:	Line 1
:	Mode 2: Transmit - 3Mbps (8DPSK) (2441MHz)
	:

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	dBµV	dB	dBµV
LINE 1					
Quasi-Peak					
0.162	9.657	34.240	43.897	-21.760	65.657
0.193	9.650	30.700	40.350	-24.421	64.771
0.255	9.653	25.110	34.763	-28.237	63.000
0.392	9.661	28.490	38.151	-20.935	59.086
0.548	9.669	17.090	26.759	-29.241	56.000
0.959	9.692	16.770	26.462	-29.538	56.000
Average					
0.162	9.657	20.940	30.597	-25.060	55.657
0.193	9.650	19.430	29.080	-25.691	54.771
0.255	9.653	15.300	24.953	-28.047	53.000
0.392	9.661	22.330	31.991	-17.095	49.086
0.548	9.669	6.820	16.489	-29.511	46.000
0.959	9.692	10.150	19.842	-26.158	46.000

- 1. All Reading Levels are Quasi-Peak and average value.
- 2. " " means the worst emission level.
- 3. Measurement Level = Reading Level + Correct Factor

Product Test Item Power Line Test Mode	 OTT BOX Conducted Emission Test Line 2 Mode 2: Transmit - 3Mbps (8DPSK) (2441MHz) 					
Frequency	Correct	Reading N	Aeasurement	Margin	Limit	
	Factor	Level	Level			
MHz	dB	dBµV	dBµV	dB	dBµV	
LINE 2						
Quasi-Peak						
0.177	9.659	30.560	40.219	-25.010	65.229	
0.224	9.662	25.280	34.942	-28.944	63.886	
0.283	9.664	18.340	28.004	-34.196	62.200	
0.380	9.660	17.840	27.500	-31.929	59.429	
0.595	9.672	15.650	25.322	-30.678	56.000	
0.904	9.699	15.120	24.819	-31.181	56.000	
Average						
0.177	9.659	15.720	25.379	-29.850	55.229	
0.224	9.662	10.590	20.252	-33.634	53.886	
0.283	9.664	6.080	15.744	-36.456	52.200	
0.380	9.660	10.450	20.110	-29.319	49.429	
0.595	9.672	3.520	13.192	-32.808	46.000	
0.904	9.699	6.160	15.859	-30.141	46.000	

- 1. All Reading Levels are Quasi-Peak and average value.
- 2. " means the worst emission level.
- 3. Measurement Level = Reading Level + Correct Factor

3. Peak Power Output

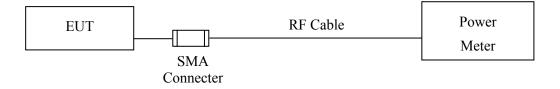
3.1. Test Equipment

_	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Х	Power Meter	Anritsu	ML2495A/6K00003357	May, 2015
Х	Power Sensor	Anritsu	MA2411B/0738448	Jun., 2015

Note: 1. All equipments are calibrated every one year.

2. The test instruments marked by "X" are used to measure the final test results.

3.2. Test Setup



3.3. Limit

The maximum peak power shall be less 1Watt.

3.4. Test Procedure

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Peak Power Output

Product	:	OTT BOX
Test Item	:	Peak Power Output
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK)

Channel No.	Frequency Measurement		Required Limit	Result
	(MHz)	(dBm)		
Channel 00	2402.00	5.61	1 Watt= 30 dBm	Pass
Channel 39	2441.00	6.89	1 Watt= 30 dBm	Pass
Channel 78	2480.00	6.31	1 Watt= 30 dBm	Pass



Product	:	OTT BOX
Test Item	:	Peak Power Output
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK)

Channel No.	Frequency	Measurement	Required Limit	Result
	(MHz)	(dBm)		
Channel 00	2402.00	5.94	1 Watt= 30 dBm	Pass
Channel 39	2441.00	7.15	1 Watt= 30 dBm	Pass
Channel 78	2480.00	6.73	1 Watt= 30 dBm	Pass



4. **Radiated Emission**

4.1. Test Equipment

The following test equipments are used during the radiated emission test:

Test Site	Equipment		Manufacturer	Model No./Serial No.	Last Cal.
Site # 3	Х	Magnetic Loop Antenna	Teseq	HLA6121/ 37133	Sep., 2015
	Х	Bilog Antenna	Schaffner Chase	CBL6112B/ 2707	Jun., 2015
	Х	EMI Test Receiver	R&S	ESCS 30/838251/ 001	Jun., 2015
	Х	Coaxial Cable	QTK(Arnist)	RG 214/ LC003-RG	Jun., 2015
	Х	Coaxial signal switch	Arnist	MP59B/ 6200798682	Jun., 2015

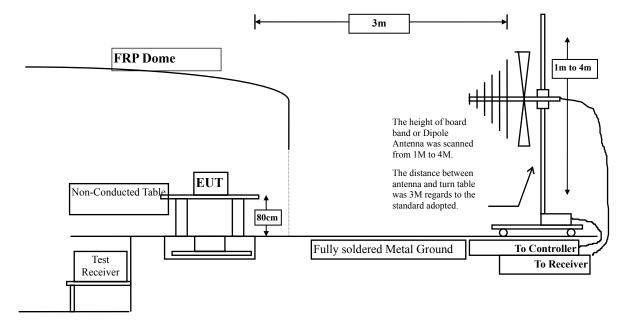
Test Site	Equipment		Manufacturer	Model No./Serial No.	Last Cal.
CB # 8	Х	Spectrum Analyzer	R&S	FSP40/ 100339	Oct., 2014
			ETS-Lindgren	3117/ 35205	Mar., 2015
			Schwarzbeck	BBHA9170/209	Jan., 2015
			TRC	AH-0801/95051	Aug., 2015
	Х	Pre-Amplifier	EMCI	EMC012630SE/980210	Jan., 2015
	X Pre-Amplifier		MITEQ	JS41-001040000-58-5P/153945	Jul., 2014
	Х	Pre-Amplifier	NARDA	DBL-1840N506/013	Jul., 2014

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

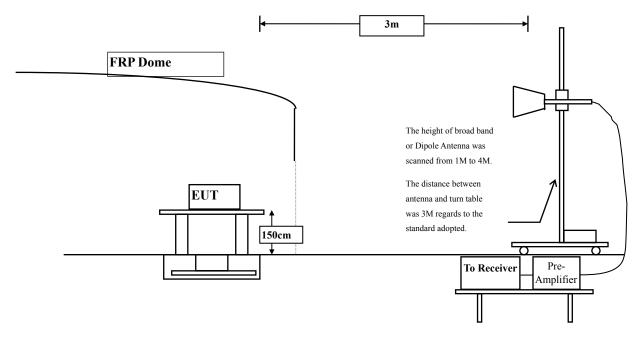
2. The test instruments marked with "X" are used to measure the final test results.

4.2. Test Setup

sBelow 1GHz



Above 1GHz



4.3. Limits

General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits						
Frequency MHz	uV/m @3m	dBµV/m@3m				
30-88	100	40				
88-216	150	43.5				
216-960	200	46				
Above 960	500	54				

Remarks: 1. RF Voltage $(dB\mu V) = 20 \log RF$ Voltage (uV)

- 2. In the Above Table, the tighter limit applies at the band edges.
- 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.4. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested compliance to FCC 47CFR 15.249 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna. The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

The measurement frequency range form 9kHz - 10th Harmonic of fundamental was investigated.

4.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

Product Test Item Test Site Test Mode	 OTT BOX Harmonic Radiated Emission No.3 OATS Mode 1: Transmit - 1Mbps (GFSK)(2402MHz) 				
Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	$dB\mu V/m$	dB	dBµV/m
Horizontal					
Peak Detector:					
4804.000	2.511	49.430	51.940	-22.060	74.000
7206.000	9.511	40.130	49.641	-24.359	74.000
9608.000	10.394	38.700	49.094	-24.906	74.000
Average					
Detector:					
Vertical					
Peak Detector:					
4804.000	2.923	48.840	51.762	-22.238	74.000
7206.000	9.988	39.900	49.889	-24.111	74.000
9608.000	10.847	38.650	49.497	-24.503	74.000
Average					
Detector:					

4.6. Test Result of Radiated Emission

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product Test Item Test Site Test Mode	 OTT BOX Harmonic Radiated Emission No.3 OATS Mode 1: Transmit - 1Mbps (GFSK)(2441MHz) 				
Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	dBµV/m	dB	dBµV/m
Horizontal					
Peak Detector:					
4882.000	2.025	51.130	53.155	-20.845	74.000
7323.000	10.375	41.140	51.514	-22.486	74.000
9764.000	10.315	39.230	49.545	-24.455	74.000
Average					
Detector:					
Vertical					
Peak Detector:					
4882.000	2.488	50.670	53.158	-20.842	74.000
7323.000	10.375	39.350	49.724	-24.276	74.000
9764.000	10.315	38.440	48.755	-25.245	74.000
Average					

Detector:

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

:	OTT BOX
:	Harmonic Radiated Emission
:	No.3 OATS
:	Mode 1: Transmit - 1Mbps (GFSK)(2480MHz)
	:

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	$dB\mu V/m$	dB	dBµV/m
Horizontal					
Peak Detector:					
4960.000	2.582	46.750	49.332	-24.668	74.000
7440.000	10.555	37.600	48.155	-25.845	74.000
9920.000	10.206	38.010	48.216	-25.784	74.000
Average					
Detector:					
Vertical					
Peak Detector:					
4960.000	3.398	45.680	49.079	-24.921	74.000
7440.000	11.214	37.710	48.924	-25.076	74.000
9920.000	11.245	38.700	49.945	-24.055	74.000
Average					
Detector:					

--

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product Test Item Test Site Test Mode	 OTT BOX Harmonic Radiated Emission No.3 OATS Mode 2: Transmit - 3Mbps (8DPSK) (2402MHz) 				
Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	$dB\mu V/m$	dB	dBµV/m
Horizontal					
Peak Detector:					
4804.000	2.511	43.920	46.430	-27.570	74.000
7206.000	9.511	39.380	48.891	-25.109	74.000
9608.000	10.394	38.380	48.774	-25.226	74.000
Average					
Detector:					
Vertical					
Peak Detector:					
4804.000	2.923	44.400	47.322	-26.678	74.000
7206.000	9.988	39.100	49.089	-24.911	74.000
9608.000	10.847	38.770	49.617	-24.383	74.000
Average					
Detector:					

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	: OTT BOX						
Test Item	: Harmonic Radiated Emission						
Test Site	: No.3 OATS						
Test Mode	: Mode 2	: Transmit - 3Mbp	s (8DPSK) (2441MH	z)			
Frequency	Correct	Reading	Measurement	Margin	Limit		
	Factor	Level	Level				
MHz	dB	dBµV	$dB\mu V/m$	dB	$dB\mu V/m$		
Horizontal							
Peak Detector:							
4882.000	2.025	47.670	49.695	-24.305	74.000		
7323.000	9.762	40.180	49.941	-24.059	74.000		
9764.000	9.682	39.020	48.701	-25.299	74.000		
Average							
Detector:							
Vertical							
Peak Detector:							
4882.000	2.488	46.900	49.388	-24.612	74.000		
7323.000	10.375	39.250	49.624	-24.376	74.000		
9764.000	10.315	39.120	49.435	-24.565	74.000		
Average							
Detector:							

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



Product	: OTT BOX							
Test Item	: Harmonic Radiated Emission							
Test Site	: No.3 OA	: No.3 OATS						
Test Mode	: Mode 2	: Transmit - 3Mbp	s (8DPSK) (2480MH	[z)				
Frequency	Correct	Reading	Measurement	Margin	Limit			
	Factor	Level	Level					
MHz	dB	dBµV	$dB\mu V/m$	dB	dBµV/m			
Horizontal								
Peak Detector:								
4960.000	2.582	44.680	47.262	-26.738	74.000			
7440.000	10.555	38.370	48.925	-25.075	74.000			
9920.000	10.206	38.160	48.366	-25.634	74.000			
Average								
Detector:								
Vertical								
Peak Detector:								
4960.000	3.398	43.650	47.049	-26.951	74.000			
7440.000	11.214	37.680	48.894	-25.106	74.000			
9920.000	11.245	38.100	49.345	-24.655	74.000			
Average								
Detector:								

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	OTT BOX
Test Item	:	General Radiated Emission
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK) (2441MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	$dB\mu V/m$	dB	dBµV/m
Horizontal					
229.820	-8.001	48.641	40.640	-5.360	46.000
297.720	-4.756	46.061	41.305	-4.695	46.000
412.180	-0.171	43.953	43.782	-2.218	46.000
594.540	3.555	36.667	40.222	-5.778	46.000
794.360	6.387	31.253	37.640	-8.360	46.000
932.100	7.270	28.739	36.009	-9.991	46.000
Vertical					
258.920	-4.900	41.409	36.509	-9.491	46.000
458.740	-2.562	38.480	35.918	-10.082	46.000
565.440	-2.433	29.455	27.022	-18.978	46.000
743.920	0.718	37.573	38.291	-7.709	46.000
881.660	1.379	29.318	30.697	-15.303	46.000
957.320	3.015	32.402	35.417	-10.583	46.000

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	:	OTT BOX
Test Item	:	General Radiated Emission
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK) (2441MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBµV	$dB\mu V/m$	dB	$dB\mu V/m$
Horizontal					
161.920	-10.074	43.512	33.438	-10.062	43.500
299.660	-4.751	39.855	35.104	-10.896	46.000
421.880	-0.260	38.280	38.020	-7.980	46.000
664.380	1.882	32.262	34.144	-11.856	46.000
806.000	6.206	29.581	35.787	-10.213	46.000
924.340	6.589	28.614	35.203	-10.797	46.000
Vertical					
258.920	-4.900	37.809	32.909	-13.091	46.000
416.060	-6.381	45.155	38.774	-7.226	46.000
600.360	1.302	33.736	35.038	-10.962	46.000
710.940	-0.936	31.925	30.988	-15.012	46.000
823.460	3.081	35.624	38.705	-7.295	46.000
930.160	3.830	29.420	33.250	-12.750	46.000

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.
- 8. No emission found between lowest internal used/generated frequency to 30MHz.

5. **RF Antenna Conducted Test**

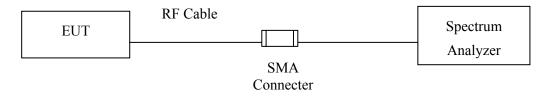
5.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2015
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2015
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2015

Note: 1. All equipments are calibrated every one year.

2. The test instruments Marked "X" are used to measure the final test results.

5.2. Test Setup



5.3. Limits

According to FCC Section 15.247(d). In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

5.4. Test Procedure

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

5.5. Uncertainty

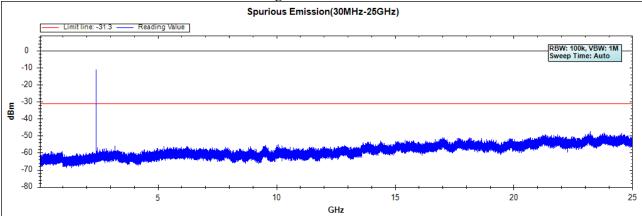
± 150Hz

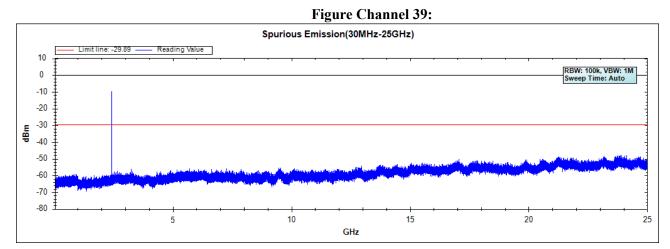


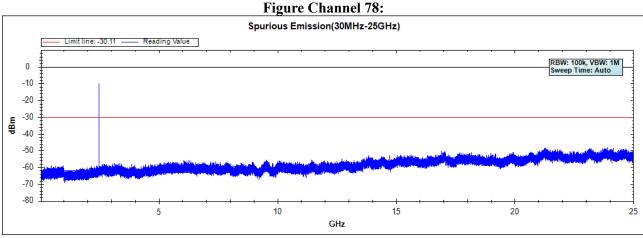
5.6. Test Result of RF Antenna Conducted Test

Product	:	OTT BOX
Test Item	:	RF Antenna Conducted Test
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK)

Figure Channel 00:







Note: The above test pattern is synthesized by multiple of the frequency range.



Product	:	OTT BOX
Test Item	:	RF Antenna Conducted Test
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK)

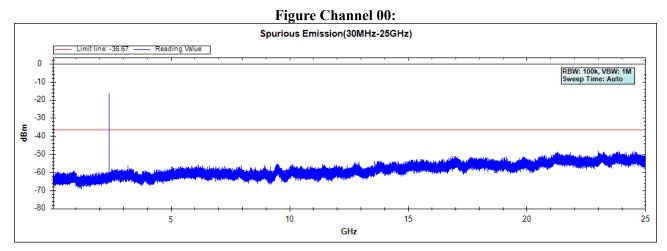


Figure Channel 39:

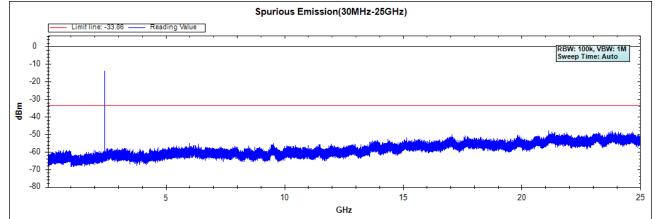
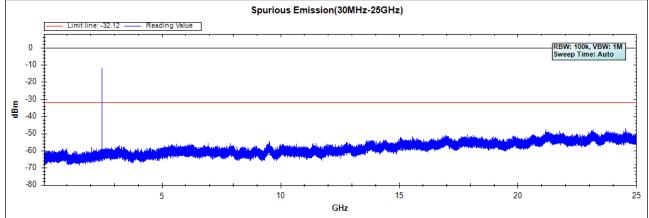


Figure Channel 78:



Note: The above test pattern is synthesized by multiple of the frequency range.

6. Band Edge

6.1. Test Equipment

RF Radiated Measurement:

The following test equipments are used during the band edge tests:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
CB # 8	Х	Spectrum Analyzer	R&S	FSP40/ 100339	Oct., 2014
	Х	Horn Antenna	ETS-Lindgren	3117/ 35205	Mar., 2015
	Х	Horn Antenna	Schwarzbeck	BBHA9170/209	Jan., 2015
	Х	Horn Antenna	TRC	AH-0801/95051	Aug., 2015
	Х	Pre-Amplifier	EMCI	EMC012630SE/980210	Jan., 2015
	Х	Pre-Amplifier	MITEQ	JS41-001040000-58-5P/153945	Jul., 2015
	Х	Pre-Amplifier	NARDA	DBL-1840N506/013	Jul., 2015

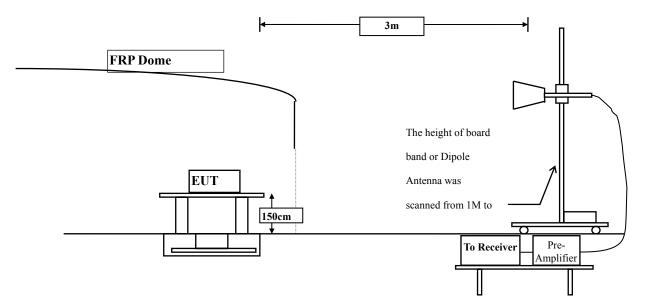
Note: 1. All equipments are calibrated every one year.

2. The test instruments marked by "X" are used to measure the final test results.

6.2. Test Setup

RF Radiated Measurement:

Above 1GHz



6.3. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

6.4. Test Procedure

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

The bandwidth setting below 1GHz and above 1GHz on the field strength meter is 120 kHz and 1MHz, respectively.

6.5. Uncertainty

- ± 3.9 dB above 1GHz
- ± 3.8 dB below 1GHz

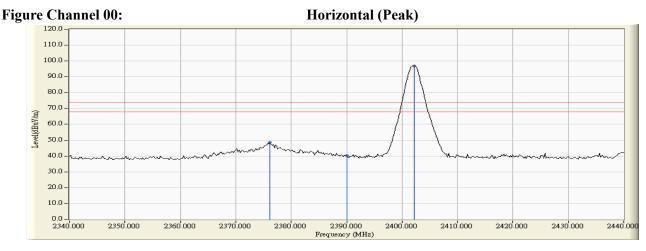


6.6. **Test Result of Band Edge**

Product	:	OTT BOX
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK) (2402MHz)

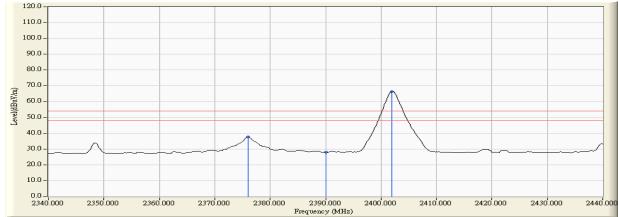
RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBµV)	Emission Level (dBµV/m)	Peak Limit (dBµV/m)	Arerage Limit (dBµV/m)	Result
00 (Peak)	2376.200	-2.748	51.187	48.439	74.00	54.00	Pass
00 (Peak)	2390.000	-2.687	42.896	40.209	74.00	54.00	Pass
00 (Peak)	2402.200	-2.657	99.586	96.929			
00 (Average)	2376.000	-2.748	40.378	37.629	74.00	54.00	Pass
00 (Average)	2390.000	-2.687	30.671	27.984	74.00	54.00	Pass
00 (Average)	2402.000	-2.657	69.091	66.434			





Horizontal (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level. 1. 2. 3.

- 4. 5.
- Measurement Level = Reading Level + Correction Factor. The average measurement was not performed when the peak measured data is under the limit of 6. average detection.



Product	:	OTT BOX
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK) (2402MHz)

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Result
Channel No.	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
00 (Peak)	2376.400	-4.114	49.433	45.320	74.00	54.00	Pass
00 (Peak)	2390.000	-4.159	41.620	37.461	74.00	54.00	Pass
00 (Peak)	2402.200	-4.171	92.858	88.687			
00 (Average)	2376.200	-4.113	35.256	31.143	74.00	54.00	Pass
00 (Average)	2390.000	-4.159	30.231	26.072	74.00	54.00	Pass
00 (Average)	2402.200	-4.171	65.078	60.907			

Figure Channel 00:

VERTICAL (Peak)

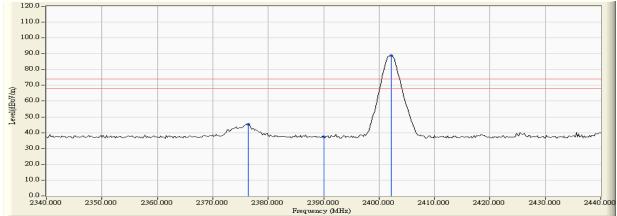
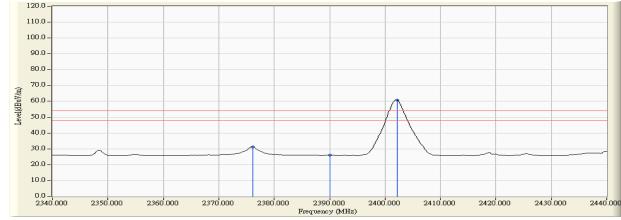


Figure Channel 00:

VERTICAL (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level.
- 1. 2. 3. 4. 5. 6.
- Measurement Level = Reading Level + Correction Factor.
- The average measurement was not performed when the peak measured data is under the limit of average detection.



Product	:	OTT BOX
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK) (2480MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBµV)	Emission Level (dBµV/m)	Peak Limit (dBµV/m)	Arerage Limit (dBµV/m)	Result
78 (Peak)	2479.900	-2.605	99.760	97.155			Pass
78 (Peak)	2483.500	-2.601	61.190	58.588	74.00	54.00	Pass
78 (Average)	2479.900	-2.605	69.204	66.599			Pass
78 (Average)	2483.500	-2.601	46.147	43.545	74.00	54.00	Pass

Figure Channel 78:

Horizontal (Peak)

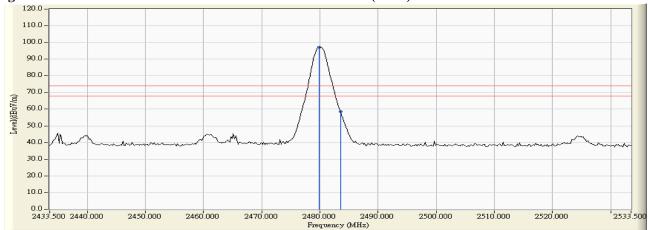
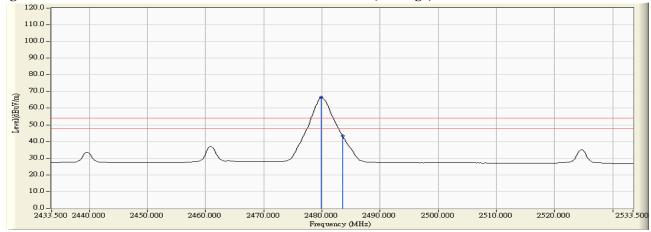


Figure Channel 78:

Horizontal (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level. 1.
- 2. 3. 4. 5. 6.
- "*", means this data is the worst emission level. Measurement Level = Reading Level + Correction Factor.
- The average measurement was not performed when the peak measured data is under the limit of average detection.



Product	:	OTT BOX
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK) (2480MHz)

RF Radiated Measurement (VERTICAL):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBµV/m)	Result
78 (Peak)	2479.900	-3.978	95.059	91.081	(uDµ v/III) 	(dDµ v/III) 	Pass
78 (Peak)	2483.500	-3.966	56.662	52.695	74.00	54.00	Pass
78 (Average)	2479.900	-3.978	66.442	62.464			Pass
78 (Average)	2483.500	-3.966	43.198	39.231	74.00	54.00	Pass

Figure Channel 78:

VERTICAL (Peak)

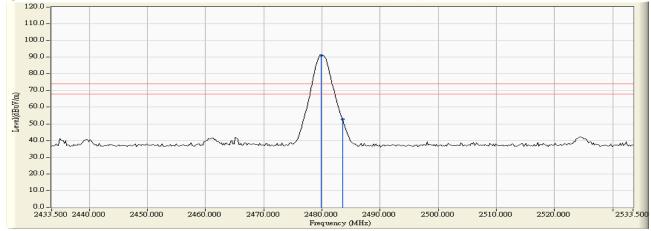
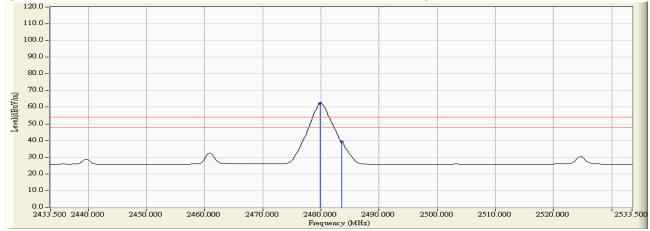


Figure Channel 78:

VERTICAL (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level. 1.
- 2.
- 3.
- 4.
- 5. Measurement Level = Reading Level + Correction Factor.
- 6. The average measurement was not performed when the peak measured data is under the limit of average detection.



Product	:	OTT BOX
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK) (2402MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Result
(MHz)		(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
00 (Peak)	2376.000	-2.748	51.307	48.558	74.00	54.00	Pass
00 (Peak)	2390.000	-2.687	42.653	39.966	74.00	54.00	Pass
00 (Peak)	2402.000	-2.657	97.710	95.053			
00 (Average)	2376.000	-2.748	40.004	37.255	74.00	54.00	Pass
00 (Average)	2390.000	-2.687	30.495	27.808	74.00	54.00	Pass
00 (Average)	2402.000	-2.657	66.115	63.458			

Figure Channel 00:

Horizontal (Peak)

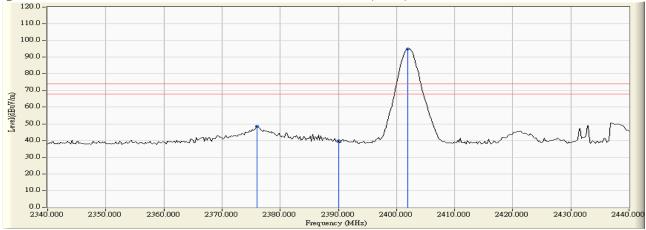
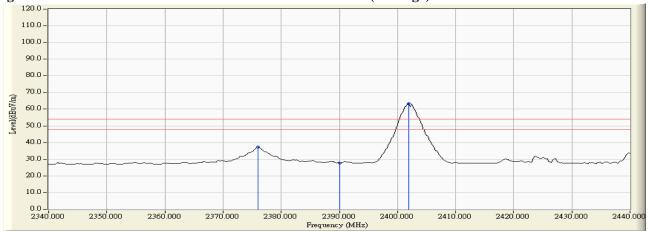


Figure Channel 00:

Horizontal (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level. 1. 2. 3. 4.

- 5. Measurement Level = Reading Level + Correction Factor.
- The average measurement was not performed when the peak measured data is under the limit of 6. average detection.



Product	:	OTT BOX
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK) (2402MHz)

RF Radiated Measurement (VERTICAL):

Channel No.	1 2	Correct Factor	Reading Level	Emission Level		Ç	Result
Channel NO.	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	Result
00 (Peak)	2376.200	-4.113	52.023	47.910	74.00	54.00	Pass
00 (Peak)	2390.000	-4.159	41.473	37.314	74.00	54.00	Pass
00 (Peak)	2402.000	-4.171	91.024	86.853			
00 (Average)	2376.000	-4.112	37.388	33.276	74.00	54.00	Pass
00 (Average)	2390.000	-4.159	30.261	26.102	74.00	54.00	Pass
00 (Average)	2402.200	-4.171	62.044	57.873			

Figure Channel 00:

VERTICAL (Peak)

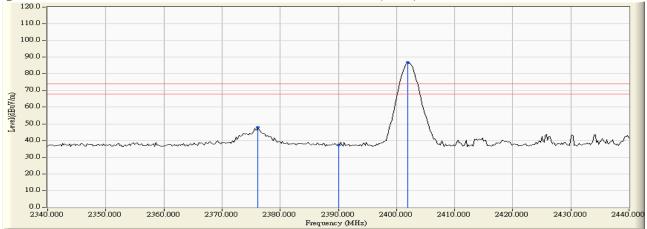
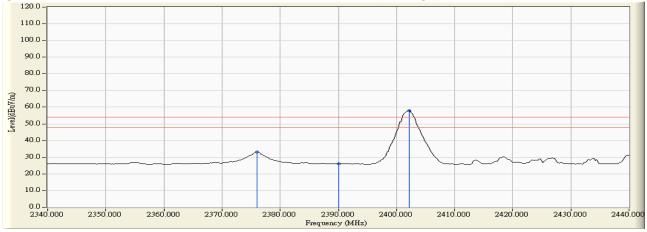


Figure Channel 00:

VERTICAL (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level. 1. 2. 3. 4.

- 5. Measurement Level = Reading Level + Correction Factor.
- The average measurement was not performed when the peak measured data is under the limit of 6. average detection.



Product	:	OTT BOX
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK) (2480MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency	Correct Factor	Reading Level	Emission Level	Peak Limit	Arerage Limit	Result
Channel No.	(MHz)	(dB)	(dBµV)	(dBµV/m)	$(dB\mu V/m)$	(dBµV/m)	Result
78 (Peak)	2480.100	-2.605	97.817	95.212			Pass
78 (Peak)	2483.500	-2.601	59.589	56.987	74.00	54.00	Pass
78 (Average)	2480.100	-2.605	66.270	63.665			Pass
78 (Average)	2483.500	-2.601	43.909	41.307	74.00	54.00	Pass

Figure Channel 00:

Horizontal (Peak)

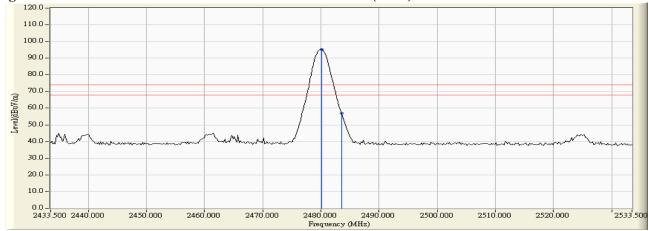
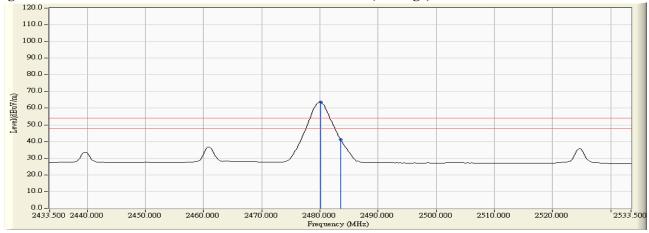


Figure Channel 00:

Horizontal (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level. 1.
- 2. 3.
- 4.
- 5. Measurement Level = Reading Level + Correction Factor.
- The average measurement was not performed when the peak measured data is under the limit of 6. average detection.



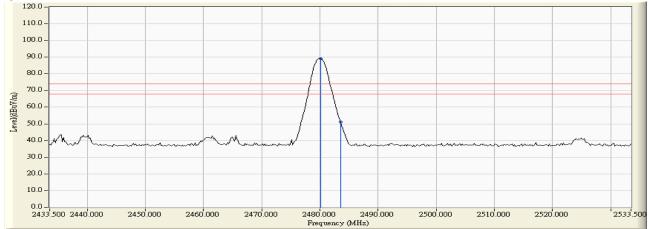
Product	:	OTT BOX
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK) (2480MHz)

RF Radiated Measurement (VERTICAL):

Channel No.	1 2		U	Emission Level		Ç	Result
Chamber 100.	(MHz)	(dB)	(dBµV)	$(dB\mu V/m)$	$(dB\mu V/m)$	$(dB\mu V/m)$	itesuit
78 (Peak)	2480.100	-3.977	93.251	89.274			Pass
78 (Peak)	2483.500	-3.966	55.008	51.041	74.00	54.00	Pass
78 (Average)	2480.100	-3.977	63.606	59.629			Pass
78 (Average)	2483.500	-3.966	41.548	37.581	74.00	54.00	Pass

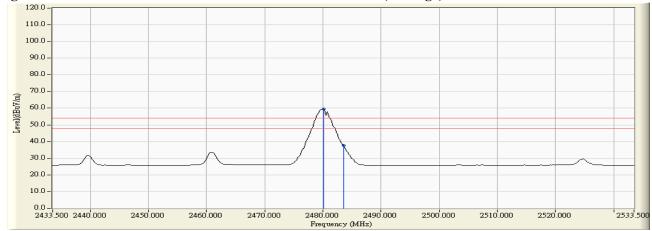
Figure Channel 78:

VERTICAL (Peak)





VERTICAL (Average)



- All readings above 1GHz are performed with peak and/or average measurements as necessary. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. "*", means this data is the worst emission level. 1.
- 2. 3. 4. 5. 6.
- "*", means this data is the worst emission level. Measurement Level = Reading Level + Correction Factor.
- The average measurement was not performed when the peak measured data is under the limit of average detection.



Product	:	OTT BOX
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK)

Test Frequency	Measurement Level	Limit	Result
(MHz)	Δ (dB)	Δ (dB)	
2402	43.68	>20	PASS
2480	44.15	>20	PASS

		AC .	SENSE:		ALIGN AUTO	08:16:12PM AL		Mandana
Marker 2	2.4000000	00000 GHz	Trig: Free Ru	in Avg Hol	pe:Log-Pwr ld:79/100	TYPE N	23456 NNNNN	Marker
		IFGain:Low	Atten: 30 dB		MIL	r2 2.400 (Select Marker
10 dB/div	Ref Offset 0. Ref 20.50				IVIK	-54.595		
.og								
10.5								Norm
.500								Norm
9.50				0'				
19.5				1 1				
				11				Del
29.5	_	+ + -			+			De
39.5								
49.5				21				
69.6	~~~~		****	warmout been	*******	man up a poly way	alsone-sees.	-
								Fixed
69.5		1 1						
00.0								
	20000 CH-					Chan 100		
Center 2.3	39000 GHz	#	BW 300 kHz		#Sween 5	Span 100		
Center 2.3 Res BW	100 kHz	#V	BW 300 kHz		<u> </u>	00.0 ms (10	01 pts)	c
Center 2.3 #Res BW	100 kHz	X	Y		#Sweep 5		01 pts)	c
Center 2.3 Res BW	100 kHz	× 2.402 15 GHz	7 -10.916 dBm		<u> </u>	00.0 ms (10	01 pts)	c
Center 2.3 Res BW	100 kHz	X	Y		<u> </u>	00.0 ms (10	01 pts)	
Center 2.3 Res BW	100 kHz	× 2.402 15 GHz	7 -10.916 dBm		<u> </u>	00.0 ms (10	01 pts)	
Center 2.3 #Res BW	100 kHz	× 2.402 15 GHz	7 -10.916 dBm		<u> </u>	00.0 ms (10	01 pts)	
Center 2.3 Res BW 1 N 1 2 N 1 3 4 5 6 7	100 kHz	× 2.402 15 GHz	7 -10.916 dBm		<u> </u>	00.0 ms (10	01 pts)	Propertie
Center 2.3 Res BW 1 N 1 2 N 1 3 4 5 6 7 8	100 kHz	× 2.402 15 GHz	7 -10.916 dBm		<u> </u>	00.0 ms (10	01 pts)	
Center 2.3 Res BW 1 N 1 2 N 1 3 4 5 6 6 7 8 9 10	100 kHz	× 2.402 15 GHz	7 -10.916 dBm		<u> </u>	00.0 ms (10	01 pts)	Propertie
Center 2.3 Res BW 1 N 1 2 N 1 3 4 5 6 7 8 9	100 kHz	× 2.402 15 GHz	7 -10.916 dBm		<u> </u>	00.0 ms (10	01 pts)	Properties

gilent Spectru RL	Im Analyzer - Sv RF 50 S	Vept SA		_	SENSE:0	œ.		ULIGN AUTO	00-10-070	M Aug 25, 2015	
	2.4835000	00000 GH	iz ain:Low	Trig: I	Free Ru : 30 dB	A	g Type	Log-Pwr 100/100	TRA T)	CE 123456 PE MWWWWW PE NNNNN	Marker
0 dB/div	Ref Offset 0 Ref 20.50	6 dB	01112.011					Mk		3 5 GHz 55 dBm	Select Marker 2
og 10.5 500					51						Norm
9.5							_				Del
9.5 9.5 9.5	4,13mJa.phaniba.a.		Haufq*11/L-cr	••••••	2		a	يد مريد و مو ^ر يد را را شداد	a de la composition de		Fixe
	8350 GHz				<u> </u>				Span 1	00.0 MHz	
ResBW	C SCL	× 2.480 2		V 300 k	HZ 4 dBm	FUNCTION	_	sweep 5 номмотн		(1001 pts)	
2 N 1 3 4 5 6		2.483 5		-53.05							Propertie
7 8 9 0											Mc 1 o
				Ш						<u> </u>	



Product	:	OTT BOX
Test Item	:	Band Edge
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK)

Test Frequency	Measurement Level	Limit	Result
(MHz)	Δ (dB)	Δ (dB)	
2402	38.94	>20	PASS
2480	41.14	>20	PASS

	08:21:26 PM Aug 25, 2015	ALIGN AUTO		SENSE:0		50 Q AC	RF		R
Units	TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P N N N N N	e: Log-Pwr I>100/100		Trig: Free Ru Atten: 30 dB	IFGain:Low		80	n 24	pa
	r2 2.400 0 GHz -53.910 dBm	Mk				fset 0.5 dB 0.50 dBm		B/div	
									og
					_		_		10.5
									500
			()1		_		_	-	3.50
			A		_				9.5
									29.5
									39.5
			2						
		-	men from		س سبر لد است	maria		*****	\$9.5
									59.5
					_			L-	39.5
	Span 100.0 MHz			3W 300 kHz	#VI		.39000 / 100 kl		
	00.0 ms (1001 pts)	Sweep 5						_	
	00.0 ms (1001 pts) FUNCTION VALUE	Sweep 5	FUNCTION	Y 44.074 dBm		×	TAC SCL		
	· · · ·		FUNCTION	-14.974 dBm -53.910 dBm	401 9 GHz 400 0 GHz	2.4	TRC SCL	N	1
	· · · ·		FUNCTION	-14.974 dBm -53.910 dBm	401 9 GHz 400 0 GHz	2.4	1 f		1 2 3
	· · · ·		FUNCTION	-14.974 dBm -53.910 dBm	401 9 GHz 400 0 GHz	2.4	1 f	N	1 2 3 4
	· · · ·		FUNCTION	-14.974 dBm -53.910 dBm	401 9 GHz 400 0 GHz	2.4	1 f	N	1 3 4 5 6
	· · · ·		FUNCTION	-14.974 dBm -53.910 dBm	401 9 GHz 400 0 GHz	2.4	1 f	N	1 2 3 4 5 6 7
	· · · ·		FUNCTION	-14.974 dBm -53.910 dBm	401 9 GHz 400 0 GHz	2.4	1 f	N	1 3 4 5 6 7 8 9
	· · · ·		FUNCTION	-14.974 dBm -53.910 dBm	401 9 GHz 400 0 GHz	2.4	1 f	N	1 3 4 5 6 7 8 9 0
	· · · ·		FUNCTION	-14.974 dBm -53.910 dBm	401 9 GHz 400 0 GHz	2.4	1 f	N	1 3 4 5 6

	RF 50 Ω		SENSE:INT	ALIGNAUTO	00:23:12PM Aug 25, 2015	Marker
larker 2	2.483500000	IFGain:Low	Trig: Free Run Atten: 30 dB	Avg Type: Log-Pwr Avg Hold: 56/100	TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P N N N N N	Select Marker
0 dB/div	Ref Offset 0.5 d Ref 20.50 dE			Mk	r2 2.483 5 GHz -53.644 dBm	2
10.5						
500						Norm
3.50			1			
9.5			- A			
29.5	_					De
9.5			2			
9.5					construction and	
9.6						Fixe
9.5			+	+ +		
	.48350 GHz / 100 kHz	#VB)	W 300 kHz	#Sweep 5	Span 100.0 MHz 00.0 ms (1001 pts)	
		*		INCTION FUNCTION WIDTH	FUNCTION VALUE	
			-12.502 dBm			
KR MODE T	1 f	2.480 1 GHz	-12.502 dBm			
XFI MODE 1 1 N 2 N 3		2.480 1 GHz 2.483 5 GHz	-53.644 dBm			Propertie
20 1 N 2 N 3 4 5 5	1 f	2.480 1 GHz 2.483 5 GHz	-53.644 dBm			Propertie
N MODE 1 N 2 N 3 4 5 6 7	1 f	2.480 1 GHz 2.483 5 GHz	-12.502 dBm -53.644 dBm			Propertie
3 NOOD 1 1 N 2 N 3 4 5 5 6 7 8	1 f	2.480 1 GHz 2.483 5 GHz	-12.302 dBm -53.644 dBm		g	
KA MODE T	1 f	2.480 1 GHz 2.483 5 GHz	-12.502 dBm 53.644 dBm			Propertie: Ma



7. Channel Number

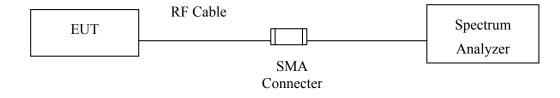
7.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2015
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2015
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2015

Note: 1. All equipments are calibrated every one year.

2. The test instruments marked by "X" are used to measure the final test results.

7.2. Test Setup



7.3. Limit

Frequency hopping systems operating in the 2400-2483.5 MHz bands shall use at least 75 hopping frequencies.

7.4. Test Procedure

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

7.5. Uncertainty

N/A

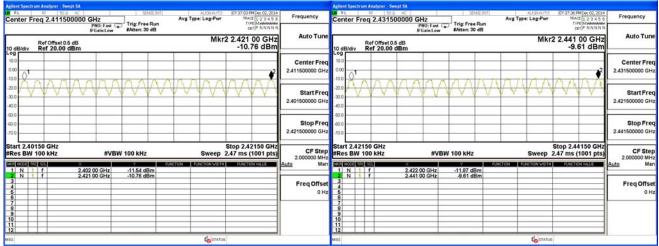
7.6. Test Result of Channel Number

:	OTT BOX
:	Channel Number
:	No.3 OATS
:	Mode 1: Transmit - 1Mbps (GFSK)
	:

Frequency Range	Measurement	Required Limit	Result
(MHz)	(Hopping Channel)	(Hopping Channel)	
2402 ~ 2480	79	>75	Pass

2402-2421MHz

2422-2441MHz



2442-2461MHz

2462-2480MHz

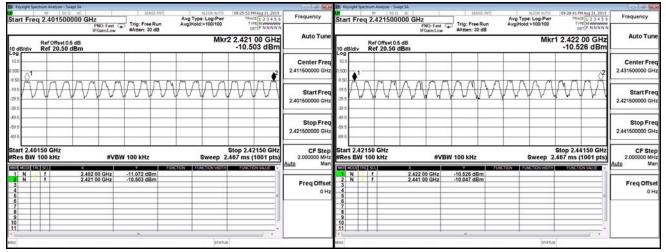
nt Spectrum Analyzer - Swept SA		Agilent Spectrum Analyzes - Swept SA
nter Freq 2.451500000 GHZ	Frequency	00 AL NF 200 AC 2015
Ref Offset 0.5 dB Mkr2 2.461 00 GHz B/div Ref 20.00 dBm -9.80 dBm	Auto Tune	Ref Offset 0.5 dB Mkr2 2.480 00 GHz Auto Tu 10 dB/dly Ref 20.00 dBm -9.17 dBm
	Center Freq 2.451500000 GHz	Log 100 000 1 2.471500000 G 2.471500000 G
	Start Freq 2.441500000 GHz	300 StartFr 300 400
2	Stop Freq 2.461500000 GHz	
nt 2.44150 GHz Stop 2.46150 GHz ss BW 100 kHz #VBW 100 kHz Sweep 2.47 ms (1001 pts) test Inz 101 kHz sv 100 kHz Sweep 2.47 ms (1001 pts)	CF Step 2.000000 MHz	Start 2.46150 GHz Storp 2.48150 GHz CFst #Res BW 100 kHz #VBW 100 kHz Sweep 2.47 ms (1001 pts) 2.000000 Mg/ms/ms/ms/ms/ms/ms/ms/ms/ms/ms/ms/ms/ms/
N I f 2.442 00 GHz 3.14 dBm N I r 2.461 00 GHz 3.80 dBm	Freq Offset 0 Hz	1 N 1 F 2.482.00.0Hz 9.43.0Bm Latas 3 N F 2.480.00.0Hz 9.17.0Bm Freq Offs 4 - - - - Freq Offs 6 - - - 0 -
		7
Gestatus .		MSG Contraction

Product	:	OTT BOX
Test Item	:	Channel Number
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK)

Frequency Range (MHz)	Measurement (Hopping Channel)	Required Limit (Hopping Channel)	Result
$2402 \sim 2480$	79	>75	Pass

2402-2421MHz

2422-2441MHz



2442-2461MHz

2462-2480MHz

nalyzer - Swegit SA 🛛 🕹 🗰 🗽 Keysight Spectrum Analy	
41500000 GHz Avg Type: Log-Pwr TRACE 1 2 3 4 5 6 Frequency Start Freq 2.461	500 AC SENSE.INT AUDR AUTO 093135914Aug 31,2015 Frequency 1500000 GHz Trig: FreeRun Avg Thys: Log-Pwc Trike: [2:2:3:5:6 Frequency PND: Fast Trig: FreeRun Avg Thys:Log-Pwc Trike: [2:2:3:5:6 Frequency
Offset 0.5 dB Mkr2 2.461 00 GHz Auto Tune	Better So dB Mkr1 2.462 00 GHz Auto Tut 59 dBm -9.387 dBm -9.387 dBm -9.387 dBm
245150000 GHz 2500 1	Center Fn 2.471500000 G
Start Freq 2.441500000 GHz 295	Start Fr 2.451500000 G
485 2.461500000 GHz 005	Stop Fr 2.49150000 G
CHz Stop 2.46150 GHz CF Step Start 2.46150 GH KHz #VBW 100 kHz Sweep 2.467 ms (1001 pts) 2000000 MHz #Res BW 100 kH x y Fourtion Fourtion word Fourtion word Fourtion word	z #VBW 100 kHz Sweep 2.467 ms (1001 pts) x y FUNKTION FUNCTION WORK FUNCTION WALK
2.442.00 GHz -9.433 gBm 2.461.00 GHz -9.399 dBm 	2,462 00 GHz - 9,387 dBm 2,480 00 GHz - 8,899 dBm 0
7 9 10 11	
status wisg	STATUS



8. Channel Separation

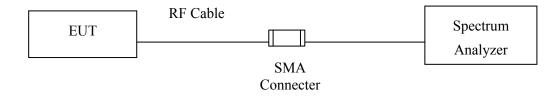
8.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2015
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2015
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2015

Note: 1. All equipments are calibrated every one year.

2. The test instruments mark by "X" are used to measure the final test results.

8.2. Test Setup



8.3. Limit

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

8.4. Test Procedure

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

8.5. Uncertainty

 \pm 150Hz

8.6. Test Result of Channel Separation

Product	:	OTT BOX
Test Item	:	Channel Separation
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK)

	Frequency		Limit	Limit of (2/3)*20dB		
Channel No.	Frequency (MHz)	Level	(kHz)	Bandwidth (kHz)	Result	
	(1.1111)	(kHz)	(11112)			
00	2402	1000	>25 kHz	773.3	Pass	
39	2441	1000	>25 kHz	766.7	Pass	
78	2480	1000	>25 kHz	766.7	Pass	

NOTE: The 20dB Bandwidth is refer to section 10.

gilent Spectrum Analyzer - Swi					
RL RF 50 Ω Center Freg 2.40200		SENSE:INT	ALIGNAUTO Avg Type: Log-Pwr	04:10:08 PM Dec 02, 2014 TRACE 1 2 3 4 5 6	Frequency
enter Fred 2.40200	PNO: Wide 😱 IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Type. Log-r wi	TYPE MWWWWWW DET P N N N N N	
Ref Offset 0.6 0 dB/div Ref 20.00 d			Mkr	2 2.403 00 GHz -11.43 dBm	Auto Tun
10.0					Center Fre
10.0		1	2		2.402000000 GH
0.0					Start Fr
10.0		and the second s			2.397000000 GI
	and a stand		Mary		Stop Fr
0.0	and a stand and			antenden der under einer der der der der der der der der der d	2.407000000 G
enter 2.402000 GHz Res BW 100 kHz	#VBW	100 kHz	#Sweep	Span 10.00 MHz 500 ms (1001 pts)	CF Sto 1.000000 M
KR MODE TRC SCL	× 2.402 00 GHz	-11.14 dBm	UNCTION FUNCTION WIDTH	FUNCTION VALUE	Auto M
2 N 1 f 3 4	2.403 00 GHz	-11.43 dBm			Freq Offs
4 5 5					0
7					
9 0 1					
2					

Channel 00 (2402MHz)



								the second states		
		ALIGN AUTO	1	NSE:INT			- Swept SA 50 Ω AC	n Analyzer RF	pectru	Agilent XI RL
Frequency	04:19:38 PM Dec 02, 2014 TRACE 1 2 3 4 5 6	: Log-Pwr		VSE:INT] 58	247	50 Ω AC 1000000 0		r Fre	
	TYPE MWWWWW DET P N N N N N				Trig: Free #Atten: 30	PNO: Wide 😱 IFGain:Low		y 2.44		Cont
Auto Tune	2.442 00 GHz -8.85 dBm	Mkr2					et 0.5 dB 00 dBm			10 dB/
Center Fred										10.0
2.441000000 GH2			2	1						0.00
~										-10.0 -
Start Fred 2.436000000 GH:								_		-30.0 -
			k	- 						-40.0 -
Stop Free 2.446000000 GH	ระการใหญ่ในการการการการการการการการการการการการการก	Mr. dicators				wildow Joseph Part and	ward and the state	contraction and the	thereast	-60.0
2.446000000 GH										-70.0
CF Stej 1.000000 MH	Span 10.00 MHz i00 ms (1001 pts)	#Sweep :			100 kHz	#VBW	SHz	1000 (00 kHz		
Auto Ma	FUNCTION VALUE	NCTION WIDTH	CTION FUI		Y -8.92 di	1 00 GHz	× 2.441	SCL	DE TRC	
					-8.85 di	2 00 GHz		f		2 I 3
Freq Offse										4 5
UII									-	6
										8
										10 11 12
										/IZ

Channel 39 (2441MHz)

Channel 78 (2480MHz)

Agilent Spectrum Analyzer - Sv					
Center Freq 2.4800	00000 GHz PNO: Wide C	SENSE:INT	ALIGNAUTO Avg Type: Log-Pwr	04:40:22 PM Dec 02, 2014 TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P N N N N N	Frequency
Ref Offset 0 10 dB/div Ref 20.00		#Atten: 30 dB	Mkr	1 2.479 00 GHz -8.78 dBm	Auto Tune
10.0 0.00 -10.0		12			Center Free 2.480000000 GH
-20.0					Start Fre 2.475000000 GH
50.0 60.0 70.0	and a start of the		The second secon	n fan de ferste fan de fers	Stop Fre 2.485000000 G⊦
Center 2.480000 GHz #Res BW 100 kHz MKR MODE TRC SCL	#VBV		#Sweep	Span 10.00 MHz 500 ms (1001 pts) FUNCTION VALUE	CF Ste 1.000000 M⊦ <u>Auto</u> Ma
1 N 1 f 2 N 1 f 3 - - - 4 - - - 5 - - - 6 - - -	2.479 00 GHz 2.480 00 GHz	-8.78 dBm -8.71 dBm			Freq Offs 0 F
7 8 9 10 11 12					
ISG				3	

Product	:	OTT BOX
Test Item	:	Channel Separation
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK)

	Frequency		Limit	Limit of (2/3)*20dB		
Channel No.	(MHz)	Level	(kHz)	Bandwidth (kHz)	Result	
		(kHz)				
00	2402	1000	>25 kHz	953.3	Pass	
39	2441	1000	>25 kHz	946.7	Pass	
78	2480	1000	>25 kHz	946.7	Pass	

NOTE: The 20dB Bandwidth is refer to section 10.

Agilent Spectrum Analyzer - Swe					
RL RF 50 Ω Center Freq 2.40200		SENSE:INT	ALIGNAUTO Avg Type: Log-Pwr	04:54:14 PMDec 02, 2014 TRACE 1 2 3 4 5 6	Frequency
	PNO: Wide 🕞 IFGain:Low	J Trig: Free Run #Atten: 30 dB	Mkr		Auto Tune
Ref Offset 0.5 10 dB/div Ref 20.00 d Log				-17.10 dBm	
10.0					Center Fre
0.00		1	2		2.402000000 GH
20.0		min	many		
30.0					Start Fre 2.397000000 GH
40.0					
60.0 martine and a state	man and more March	Y	Mundautoning	aternation at control public was not	Stop Fre
70.0					2.407000000 GH
Center 2.402000 GHz Res BW 100 kHz	#VBW	100 kHz	#Sweep	Span 10.00 MHz 500 ms (1001 pts)	CF Ste
IKR MODE TRC SCL	X		UNCTION FUNCTION WIDTH		1.000000 MH <u>Auto</u> Ma
1 N 1 f 2 N 1 f 3	2.402 00 GHz 2.403 00 GHz	-14.42 dBm -17.10 dBm			
4 5					Freq Offs 0 H
6 7					01
8 9					
10 11 12					
ISG	I]	

Channel 00 (2402MHz)



		,	`	iumer 5	-	1.54	lyzer - Swe			
	05:03:52 PMDec 02, 2014	ALIGN AUTO		SENSE:INT			lyzer - Swe 50 Ω	ITT A NA	spectru	RL
Frequency	TRACE 1 2 3 4 5 6 TYPE MWWWWWW DET P N N N N N	: Log-Pwr	Avg Ty	Frig: Free Run Atten: 30 dB	Z I: Wide 😱 Iin:Low	1000 GH2 PNC IFG2	.44100	eq 2	er Fre	ent
Auto Tur	2.442 00 GHz -11.84 dBm	Mkr2					Offset 0.5 20.00 d			0 dE
Center Fre			_					_		10.0
2.441000000 GI			¢2	1						0.00
Start Fro			many	mon				_		D.O
2.436000000 Gł										0.0 0.0
Stop Fr		may			Jundo			-		0.0 0.0
2.446000000 GI	and the second side of the second second				pmo	lauen en e	-OCHANDER BORNES	accessory and	NAN AND AND AND AND AND AND AND AND AND	0.0
CF Ste 1.000000 M	Span 10.00 MHz 500 ms (1001 pts)	#Sweep :		00 kHz	#VBW		00 GHz (Hz		er 2.44 BW 1	
Auto M	FUNCTION VALUE	NCTION WIDTH	NCTION	Y 11.92 dBm		× 2.441 00		f	ide tro V 1	1
Freq Offs		1		-11.84 dBm	GHz	2.442 00		f	N 1	3
01					_					4 5
										6 7 8
					_				+	9
		1					<u></u>		-	1
								<u> </u>		G

Channel 39 (2441MHz)

Channel 78 (2480MHz)

Agilent Spectrum Analyzer - Swe					
KL RF 50 Ω Center Freq 2.48000	PNO: Wide 🕞	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr		Frequency
Ref Offset 0.5 10 dB/div Ref 20.00 d		#Atten: 30 dB	Mk	r1 2.479 00 GHz -12.21 dBm	Auto Tune
10.0 0.00 -10.0		1 2			Center Frec 2.480000000 GHz
-20.0					Start Free 2.475000000 GH:
-50.0 -60.0	want		And second and	สูโฟไม่รับชอกกรพีมไฟหลังรู้()เมื่อสู่สะเหล่าสาวีจะไม่สาว	Stop Free 2.485000000 GH:
Center 2.480000 GHz #Res BW 100 kHz MKR MODE TRE SCL	×		#Sweep	Span 10.00 MHz 500 ms (1001 pts) FUNCTION VALUE	CF Step 1.000000 MH <u>Auto</u> Ma
1 N 1 f 2 N 1 f 3 - - - 4 - - - 5 - - - 6 - - - -	2.479 00 GHz 2.480 00 GHz	-12.21 dBm -12.19 dBm			Freq Offse 0 H
7 8 9 10 11 12					
MSG			Stati	s	1

9. Dwell Time

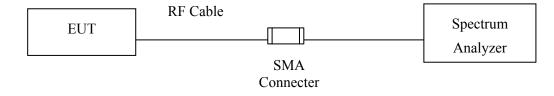
9.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2015
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2015
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2015

Note: 1. All equipments are calibrated every one year.

2. The test instruments marked by "X" are used to measure the final test results.

9.2. Test Setup



9.3. Limit

The dwell time shall be the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

9.4. Test Procedure

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

9.5. Uncertainty

± 25msec

9.6. Test Result of Dwell Time

Product	:	OTT BOX
Test Item	:	Dwell Time
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK) (Channel 00,39,78 –DH5)

Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2402	2.890	13	50	0.75	0.301	0.4	Pass
2441	2.890	13	50	0.75	0.301	0.4	Pass
2480	2.880	13	50	0.75	0.300	0.4	Pass

Duty cycle = ((Time slot length(ms)*Hopping of Number) / Sweep time (ms)

Dwell time = (Duty cycle /79) * (79*0.4)

CH 00 Time Interval between hops

CH 00 Transmission Time

			nalyzer																			Agilent	Spectru			r - Swept S											
ent			2.40			CL	lz	-] 14	g: Fre	e Run		A	vg Typ		Pwr	04	07:51 P TRAC TVF	MDec 02 E 1 2 3 E WWW T P N N	2,2014	Frequency	Cente				50 0 A	DOD CL	z	Trig: Fi	SENSE INT	Av	Log-Pw		1:08:30 PM TRACE TVH	Dec 02, 201	Fre	equency
0 dB	/div		f Offse			IFC	iaincl.	ow	#At	tten: 3	0 dB							DE	TP Nh	INNN	Auto Tune	10 dB/				et 0.5 dB	3	ainclow	#Atten:	30 dB			Mk	r3 4.	090 ms 090 dBm		Auto Tune
og																					Center Freq 2.402000000 GHz	10.0 0.00	0 ¹						♦ ³								enter Fred
0.0	_	_	70	_	_	71		1			-	_		76	5	[-		_		Start Freq 2.402000000 GHz	-20.0 - -30.0 -				_											Start Fre
0.0																					Stop Freq 2.402000000 GHz	-50.0 -60.0	m					(UPDATP)	er l	-	-	letritoritor		_			Stop Fre
0.0				-	+							+			$\left \right $		╟				CF Step 1.000000 MHz Auto Man	Res E	3W 1.	.0 M	/Hz	00 GHz	x	-	V 1.0 MH		PUNCTION		12.92		pan 0 Hi 1001 pts	1. Auto	CF Ste 000000 M⊢ Ma
80.0	1	Ŵ	ų	1	P	V	1	W	4		d			Ŵ	4	ł	4	¥		W	Freq Offset 0 Hz	1 1 2 1 3 1 4 5 6	N 1	tt			3.2	0.0 µs 30 ms 90 ms	-11.25 -10.82 -11.25	dBm dBm dBm						F	Freq Offse
		4020 1.0 N	00000 MHz	00 GI	Hz		#	VBW	1.0	MHz					Swe	ep 5	50.00		pan (7 8 9 10 11 12															
9G															4	STATU	5					MSG										STAT	rus				

CH39 Time Interval between hops

CH 39Transmission Time

Agilent S																		t Spectrum											
Cente			50 g		GHz				NSE INT	,	Avg Typ	ALIGNAL e: Log-P	ло wr	04:17:43 TR	PMDec 02, 20 ACE 1 2 3 4 5 YFE WWWW DET P NNNN	Frequency	Cen	ter Fred	2.44	50 Q AC	00 GHz	-		NSE INT	Avg Ty	ALIGNAUTO pe: Log-Pwr	04:18:23 F	MDec 02, 2014 CE 1 2 3 4 5 6 PE WWWWWW ET P NNNNN	Frequency
10 dB/d	liv	Ref 0	offset 0.0	dB	PNO: IFGain	Fast G	#A	tten: 30	dB						DET P NNNN	Auto Tune				et 0.5 dB .00 dBm	PNO: F IFGaind	low	#Atten: 3				Mkr3 5	.910 ms 58 dBm	Auto Tune
10.0		+			+					-			_			Center Freq 2.441000000 GHz				1				Q ²	3				Center Freq 2.441000000 GHz
0.00 +10.0 -	ſ	1	7		-	_	_	٦r			\square	h		1		Start Freq 2.441000000 GHz	-20.0 -30.0 -40.0												Start Freq 2.441000000 GHz
-20.0																Stop Freq 2.441000000 GHz			W	latern d				Longer		-	M	harah	Stop Freq 2.441000000 GHz
-40.0		\parallel	+			_										CF Step 1.000000 MHz Auto Man	Res	ter 2.44 BW 1.0	MHz	00 GHz		#VBW	1.0 MHz		NCTION	Sweep 1	0.00 ms (CF Step 1.000000 MHz Auto Man
-50.0			41	ų	V		v	М	V	4	ļ		V	м	4	Freq Offset	1 2 3 4	N 1	t		2.160 n 6.060 n 6.910 n	ns	-8,57 d -8,71 d -8,58 d	Bm					Freq Offset 0 Hz
Cente Res B				Hz		#VBV	V 1.0	MHz				Sweep			Span 0 H (1001 pts		7 8 9 10 11 12									G STATU:			



CH 78 Time Interval between hops

CH 78 Transmission Time

gilent Spect																		Agilent	Spectrum	Anal	lyzer Swept	SA									
Center F		2.480		000 0	Hz	ast 😱	Tria	SEN Free	Run	-	Avg Typ		-Pwr	04:33:1 T	RACE 1 2 TYPE WM DET P N	3456	Frequency	Cent	er Fre		50 Q	000 G	Hz PNO: Fast		ig: Free F		Avg 1	ALIGNAUTI	- TI	5 PM Dec 02, 2014 (ACE 1 2 3 4 5 6 TYPE WWWWWWW DET P NNNNN	Frequency
0 dB/div		Offsel		в	FGain:L	ast 😱	#Atte	en: 30	dB						DET P N	INNNN	Auto Tune	10 dBi	/div	Ref C Ref	Offset 0.5 d 20.00 dB	B	Gainclow		itten: 30 d	dB			Mkr3	6.120 ms 3.39 dBm	Auto Tun
0.0			_		_				<u> </u>	-							Center Freq 2.480000000 GHz	10.0			_	Q1		_		$\langle \rangle^2$	♦3				Center Fre 2.480000000 GH
00	10	1		F		76			1		-		1			76	Start Freq 2.48000000 GHz	-20.0 -30.0 -40.0		+		+		-	_	-					Start Fre 2.480000000 GH
0.0																	Stop Freq 2.480000000 GHz	-50.0 -60.0 -70.0		-	hruhyt	*				Loliosy	h		-	eijyesyle yer	Stop Fr 2.480000000 G
												-					CF Step 1.000000 MHz Auto Man	Res E	BW 1.0	MH	00000 GH Iz	×		BW 1.0	Ŷ		ection	Sweep	Contraction of the local division of the loc	Span 0 Hz (1001 pts)	CF St 1.000000 M Auto M
00	ų	ŀ	,	¥	,w	k)	Y	6	U	¥	ł		Ŵ	4	ų.	ы,	Freq Offset 0 Hz	1 1	N 1	t t		5.	370 ms 260 ms 120 ms		8.38 dB 8.39 dB 8.39 dB	m m m					Freq Offs 0
0.0	1000															0.11-		6 7 8 9													-
enter 2. les BW			0 GH	z	#	VBW	1.0 N	٨Hz					ep 5	0.00 m	Span s (100	1 pts)		11 12										E STAT			

Note:

The dwell times of the packet type of DH1, DH3, and DH5 are tested. Only the worst case is shown on the report.



Product	:	OTT BOX	
Test Item	:	Dwell Time	
Test Site	:	No.3 OATS	
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK) (Channel 00,39,78 –DH5)	

Frequency (MHz)	Time slot length (ms)	Hopping of Number	Sweep time (ms)	Duty cycle	Dwell Time (Sec)	Limit (Sec)	Result
2402	2.750	13	50	0.72	0.286	0.4	Pass
2441	2.890	13	50	0.75	0.301	0.4	Pass
2480	2.890	14	50	0.81	0.324	0.4	Pass

Duty cycle =((Time slot length(ms)*Hopping of Number) / Sweep time (ms)

Dwell time = (Duty cycle /79) * (79*0.4)

CH 00 Time Interval between hops

AUTER Deserverse and the second secon Center Freq 2.402000000 GHz FN0: Fast FAtten: 30 dB ALIGNAUTO Avg Type: Log-Pwr Frequency Frequency Aug Type: Log-Pw Auto Tu Auto Ti Mkr3 5.010 ms -13.05 dBm Ref Offset 0.5 dB Ref 20.00 dBm Ref Offset 0.5 dB Ref 20.00 dBm 10 di Log Center Fre Center Fre 402000000 G Start Fre Start Fre Stop Fre 2000000 GH ALCONO. Stop Fre 2.40 000000 GI Center 2.402000000 G Res BW 1.0 MHz Span 0 Ha Sweep 10.00 ms (1001 pts CF Step 1.000000 MHz Man CF Step 1.000000 MH: Mar #VBW 1.0 MHz þ -13.00 dBm -12.98 dBm -13.05 dBm ų Ņ U NN 1.260 ms 4.010 ms 5.010 ms 4 N W ų. ų 1 1 Freq Offse Freq Offse 0 1 Center 2.402000000 GHz Res BW 1.0 MHz Span 0 Hz Sweep 50.00 ms (1001 pts) #VBW 1.0 MHz th. the

CH39 Time Interval between hops

CH 39Transmission Time

CH 00 Transmission Time

igilent Sp	pectru																					um An	alyzer - S	wept SA									
Cente	r Fre		.441			Hz		7		NSEINT		Avg T)	ALI (pe: Le	GNAUTO og-Pwr	05.0	10:07 P	MDec 02, 2 1 2 3 4	2014	Frequency	Cent		rea	2.4410	0 40) GHz	-	SENSE		Avg Typ	ALIGNAUT	0 05:01:3 r 19	L PM Dec 02, 2014 ACE 1 2 3 4 5 6 TYPE WWWWWW	Frequency
						PNO: F	ast C.	Tri #At	ig: Free tten: 30	e Run D dB						DE	E 1234 E WWW TP NNN	NNN	Auto Tune	_					PNO: Fa IFGain:L	ast 🗭 .ew	Trig: Free Ru #Atten: 30 dB	un B	1222		3	DET P NNNN	Auto Tun
0 dB/d			offset																Huto Tulk	10 de	3/div	Ref	f Offset 0	dBm	8						Mkr3 - -11	4.930 ms .62 dBm	0.0000000000000000000000000000000000000
10.0		-		_							_		_					_	Center Freq 2.441000000 GHz	10.0			01			0	2 3	-					Center Fre 2.441000000 GH
10.0							~~~,		۰.		~~~					~~~	,	77	Start Freq 2.441000000 GHz	-20.0													Start Fre 2.441000000 GH
20.0	_															_			Stop Freq 2.441000000 GHz		44	, dala i		-							want		Stop Fre 2.441000000 GH
40.0			+								+								CF Step 1.000000 MHz Auto Man	Res	BW 1	.0 M	_	GHz			1.0 MHz			Sweep	10.00 ms	Span 0 Hz (1001 pts)	
60.0		N	h		N	V	M		V	V	h		v.	μ	M		ba	ų	Freq Offset 0 Hz	1 2 3 4 5 6	NNN	t			1.180 m 4.070 m 4.930 m	15	-11.59 dBm -10.70 dBm -11.62 dBm	1					Freq Offse
Center				GHz	:		#VBW										pan 0 1001 p			7 8 9 10 11													
Res Bl	W 1.	U WIH	12			- 3	#VBV	¥ 1.0	MHZ					STATU		ins (1001 p	pts)		12 MSG	_	-				_			_	E STAT	rus		



CH 78 Time Interval between hops

CH 78 Transmission Time

Igilent Sport																		Agilent Sp	pectrum	Analyzer - Sw	rept SA									
Center F	req 2			000	PNO:	Fast C	2	Trig: Fr	ee Ru	in	Av	g Type	-Pwr	05:09	19 PM TRACE TYPE	Dec 82, 201- 1 2 3 4 5 4 P NNNN	Frequency	Cente		2.4800		PNO: Fast	Trig: F	sense ree Ru	un	Avg Type	ALIGNAUTO	05:11:13 1%	PMDec 02, 2014 ACE 1 2 3 4 5 6 YPE WWWWW DET P NNNNN	Frequency
10 dB/div		Offsel		B	IFGair	clow		Atten:	30 dB						Det	- NANN	Auto Tune		R liv R	ef Offset 0. ef 20.00	5 dB dBm	IFGain:Low	#Atten	c 30 dE	в	21.	1	Mkr3 5	5.430 ms .86 dBm	Auto Tun
10.0	_		_		_				-						-		Center Freq 2.480000000 GHz	10.0		Q.			Q2	2	♦ ³					Center Fre 2.480000000 GH
10.0				77	-		-		+	<i></i>	-	••••	 ٦,~	•••17**	_	/	Start Freq 2.480000000 GHz	-20.0 -30.0 -40.0						+						Start Fre 2.480000000 GH
30.0																	Stop Freq 2.480000000 GHz			entreet op			h	handhay	W			Republic	es .	Stop Fre 2.480000000 GH
40.0															+		CF Step 1.000000 MHz Auto Man	Res B	W 1.0		×		1.0 M				Sweep 1	0.00 ms	Span 0 Hz (1001 pts)	CF Ste 1.000000 MH Auto Ma
60.0	*	r	,	ų	~	2	V	М	1	لع		4	H	H	ł	4	Freq Offset 0 Hz	1 N 2 N 3 N 4 5	1	t		1,690 ms 4,670 ms 5,430 ms	-11.85 -10.72 -11.86	dBm	1					Freq Offse
Center 2			0 GH	z	1	#3/8		.0 MH				_				an 0 Hz 001 pts		7 8 9 10 11												
Res BW	1.0 M	In 2				#VB	VV 1	.u MH	2				STATUS		is (1)	ou i pts		12 M9G		_				_		_	K STATUS			

Note:

The dwell times of the packet type of DH1, DH3, and DH5 are tested. Only the worst case is shown on the report.



10. Occupied Bandwidth

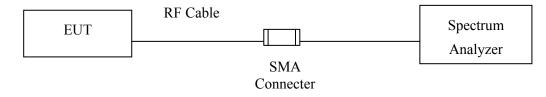
10.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2015
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2015
Х	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2015

Note: 1. All equipments are calibrated every one year.

2. The test instruments marked by "X" are used to measure the final test results.

10.2. Test Setup



10.3. Limits

N/A

10.4. Test Procedure

The EUT was setup to ANSI C63.4, 2014; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

10.5. Uncertainty

± 150Hz



10.6. Test Result of Occupied Bandwidth

Product	:	OTT BOX
Test Item	:	Occupied Bandwidth Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 1: Transmit - 1Mbps (GFSK)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	1160		NA
39	2441	1150		NA
78	2480	1150		NA

Figure Channel 00:

Agilent Spectrum Analyzer - Swe						
Center Freq 2.40200		SENSE:IN		ALIGNAUTO e: Log-Pwr	03:57:58 PM Dec 02, 20 TRACE 1 2 3 4 5	5 6 Frequency
	PNO: Wide 🕞 IFGain:Low	Trig: Free Run #Atten: 30 dB		Mkr	TYPE MWWW DET P NNN1 2 2.401 42 GH	1 N
Ref Offset 0.5 10 dB/div Ref 20.00 d Log		1		1.10.10.10	-31.00 dBi	
10.0				-		Center Fre
-10.0						2.402000000 GH
-20.0		2	<u>3</u>			
-30.0		7	\times		-30.71 d	Em Start Fre 2.397000000 GH
-40.0		rr'	L.			
-60.0 mmmmmmmmmm	mannahand		James	man	mmummm	
70.0						
Center 2.402000 GHz #Res BW 100 kHz	#VBV	V 100 kHz		Sweep ′	Span 10.00 MH 1.27 ms (1001 pt	
MKR MODE TRC SCL	× 2.402 17 GHz	-10.71 dBm	FUNCTION FL	JNCTION WIDTH	FUNCTION VALUE	Auto Ma
2 N 1 f 3 N 1 f	2.402 17 GHz 2.401 42 GHz 2.402 58 GHz	-31.00 dBm -30.86 dBm				
4 5						Freq Offs
6 7						_
8 9 10						
11 12						
ISG				K STATUS		



Figure Channel 39:

	rum Analyzer - Sw								
Center F	RF 50 Ω Freq 2.44100	00000 GHz				ALIGNAUTO : Log-Pwr	TRAC	MDec 02, 2014	Frequency
10 dB/div	Ref Offset 0.5 dB Mkr2 2.440 42 GHz 10 dB/div Ref 20.00 dBm -28.63 dBm								Auto Tune
Log 10.0 0.00				21					Center Freq 2.441000000 GHz
-20.0 -30.0			* ²	3				-28.47 dBm	Start Freq 2.436000000 GHz
-50.0 -60.0	mmmm	- mar marked and and		}	Jun and and a	hemphanta	m	- white the the second	Stop Freq 2.446000000 GHz
Center 2. #Res BW			W 100 kHz	FUNCTIO	N FUI	Sweep	1.27 ms (0.00 MHz 1001 pts) IN VALUE	CF Step 1.000000 MHz <u>Auto</u> Man
1 N 2 N 3 N 4 5 6	1 f 1 f 1 f	2.441 16 GHz 2.440 42 GHz 2.441 57 GHz	-8.47 dBı -28.63 dBr -28.58 dBr	n					Freq Offset 0 Hz
7 8 9 10 11 12									
MSG									

Figure Channel 78:

Agilent Spectrum Analyzer - Swe						
Center Freq 2.48000		SENSE:INT	Avg Type	ALIGNAUTO : Log-Pwr	04:26:26 PM Dec 02, 20 TRACE 1 2 3 4 5 TYPE MWWWW	Frequency
Ref Offset 0.5 10 dB/div Ref 20.00 d	IFGain:Low	#Atten: 30 dB		Mkr2	2 2.479 42 GH -28.66 dBi	z Auto Tune
10.0 0.00 -10.0		1				Center Freq 2.480000000 GHz
-20.0		2 ² 3			-28.27 d	Bm Start Freq 2.475000000 GHz
-50.0 -60.0	must want on the former		Anna caroso	Calantingeror Andrew		Stop Fred 2.485000000 GHz
Center 2.480000 GHz #Res BW 100 kHz MKB MODE TRO SCL	#VBW	100 kHz		Sweep 1	Span 10.00 Mi I.27 ms (1001 pt FUNCTION VALUE	
1 N 1 f 2 N 1 f 3 N 1 f 4 5 6	2.480 15 GHz 2.479 42 GHz 2.480 57 GHz	-8.27 dBm -28.66 dBm -28.97 dBm				Freq Offset
7 8 9 10 11 12						
MSG				I status		

Product	:	OTT BOX
Test Item	:	Occupied Bandwidth Data
Test Site	:	No.3 OATS
Test Mode	:	Mode 2: Transmit - 3Mbps (8DPSK) (2402MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	1430		NA
39	2441	1420		NA
78	2480	1420		NA

Figure Channel 00:

Agilent Spectrum Analyzer - Sw							
M RL RF 50 Ω Center Freq 2.40200		SENSE:IN		ALIGNAUTO e: Log-Pwr	04:46:16 PM Dec TRACE 1 2	3456	Frequency
	PNO: Wide G IFGain:Low	Trig: Free Run #Atten: 30 dB		Mkr			Auto Tune
Ref Offset 0.1 10 dB/div Ref 20.00					-34.43		
10.0						_	Center Fre
0.00							2.402000000 GH
20.0		▲2	3			— I	Start Fre
40.0		7	Ŷ			34.06 dBm	2.397000000 GH
50.0	mmm	m	Im				Stop Er
50.0 				hard	malesmalesherman	erman	Stop Fre 2.407000000 GI
enter 2.402000 GHz Res BW 100 kHz	#VBW	100 kHz		Sweep	Span 10.00 1.27 ms (100	0 MHz 1 pts)	CF Ste 1.000000 M
IKR MODE TRO SCL	× 2.402 17 GHz	-14.06 dBm	FUNCTION FL	INCTION WIDTH	FUNCTION VAL		Auto M
2 N 1 f 3 N 1 f	2.401 30 GHz 2.402 73 GHz	-34.43 dBm -35.42 dBm					Freq Offs
4 5							0
6 7							
8 9 10							
5G	I						



Figure Channel 39:

	trum Analyzer - Sw	ept SA						
Center F	RF 50 Ω Freq 2.44100	00000 GHz	SENSE:	Avg Typ	ALIGNAUTO be: Log-Pwr	04:56:08 PMD TRACE	Dec 02, 2014 1 2 3 4 5 6 MWWWWW	Frequency
10 dB/div	IFGain:Low #Atten: 30 dB Mkr2 2.440 30 GHz Ref Offset 0.5 dB 21.54 dB							
Log 10.0 0.00				1				Center Freq 2.441000000 GHz
-20.0 -30.0 -40.0			2	3			<u>-31.51 dBm</u>	Start Freq 2.436000000 GHz
-50.0 -60.0	marken marked	warman and the		- And - A	Control Marian	en all and a second	whytered	Stop Freq 2.446000000 GHz
#Res BW	.441000 GHz / 100 kHz	#VBI	W 100 kHz			Span 10. 1.27 ms (10	001 pts)	CF Step 1.000000 MHz
2 N 3 N 4 5 6 7 8	HU SUL 1 f 1 f 1 f 1 f	X 2.441 16 GHz 2.440 30 GHz 2.441 72 GHz	<u>-11.51 dBm</u> -31.51 dBm -32.24 dBm		UNCTION WIDTH	FUNCTION		<u>Auto</u> Man Freq Offset 0 Hz
9 10 11 12 MSG					I status			

Figure Channel 78:

Agilent Spectrum Analyzer - Swe					
X RL RF 50 Ω Center Freq 2.48000	AC 0000 GHz PNO: Wide 😱	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	05:04:57 PMDec 02, 2014 TRACE 1 2 3 4 5 6 TYPE MWWWWW	Frequency
Ref Offset 0.5 10 dB/div Ref 20.00 d	IFGain:Low	#Atten: 30 dB	Mkr	2 2.479 29 GHz -32.05 dBm	Auto Tune
10.0 0.00 -10.0		1			Center Freq 2.480000000 GHz
-20.0		¢ ² (³		31.77 dBm	Start Fred 2.475000000 GHz
-50.0 -60.0	variant mart	J 1	James	galman from a familie af a second a se	Stop Fred 2.485000000 GHz
Center 2.480000 GHz #Res BW 100 kHz	#VBW	100 kHz	Sweep	Span 10.00 MHz 1.27 ms (1001 pts)	CF Step 1.000000 MH: Auto Mar
I N I F 2 N 1 f 3 N 1 f 4	2.480 15 GHz 2.479 29 GHz 2.480 71 GHz	-11.77 dBm -32.05 dBm -32.02 dBm			Freq Offset
7 8 9 9 10 11 12 12					
MSG				5	



11. EMI Reduction Method During Compliance Testing

No modification was made during testing.



Attachment 1: EUT Test Photographs



Attachment 2: EUT Detailed Photographs