

CERTIFICATION TEST REPORT

FCC CFR47 Part 15 Subpart C

Test Report File No.	13-IST-0272	<input checked="" type="checkbox"/> Basic	<input type="checkbox"/> Alternate
Date of Receipt	March 20, 2013	Begin of test date	April 1, 2013
Date of Issue	April 27, 2013	End of test date	April 4, 2013
Kind of Product	Portable Music Player		
Model(s)	AK120		
FCC ID	QDMAK120		
Applicant	IRIVER LIMITED.		
Address	iriverhouse, 902-5, Bangbae-dong, Seocho-gu, Seoul, Korea		
Manufacturer	IRIVER LIMITED.		
Address	iriverhouse, 902-5, Bangbae-dong, Seocho-gu, Seoul, Korea		

Test Result

Positive

Negative

Tested By

Reviewed By




B.O. KO.

S.J. CHO

Comment (s)

- Investigations requested : Measurement to the relevant clauses of FCC rules and regulations Part 15 Subpart C.
 - The test report is consists of 33 pages.
 - The test result only responds to the tested sample.
 - It is not allowed to copy this report even partly without the allowance of IST Co., Ltd.
 - This equipment as for has been shown to be capable of continued compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4
- I assume full responsibility for accuracy and completeness of these data.

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INFORMATIONS OF TEST LABORATORY

EMC LABORATORY of IST Co., Ltd.
 400-19, Singal-dong, Giheung-gu, Yongin-si,
 Gyeonggi-Do, 446-599, Korea
 TEL: +82 31 326 6700 FAX: +82 31 326 6797

VCCI Registration No. : 1739
 FCC Registration No. : 400603
 KCC Registration No. : KR0018
 KOLAS Registration No. : KT118



PRODUCT INFORMATION

Portable Music Player

<i>General Specifications</i>		
	Product Color	Black
	Dimensions	59.2 * 89 * 14.4
	Weight	143g
	Operational Temperature	-5°C ~ 40°C
	Connection Type	USB 2.0 High Speed
	Language Support	UTF-8
	Storage type	moviNAND
	External Storage type	Micro SD x 2ea (SDHC max 32GB X 2)
	Menu Language	<English/ Korean>
	UI structure	Power(LCD Off),REW(pervious song), Play(pause), FF(next song), Volume Wheel(+/-)
	Continuous Playback Time	AUDIO: Min 20Hrs (128kbps, MP3, Vol 44, LCD Off) Min 15Hrs (16bit/44.1KHz, FLAC, Vol 44, LCD Off)
	File storage capacity	eMMC
	Equalizer	Equalizer (10 Band)
	Audio Line In/Out	Optical I/O & Headphone Out (3.5mm)
	PC Application	Iriver Plus4
	Supported O/S	Windows 2K / Windows XP / Windows Vista 32bit / Windows 7 / Windows 8
Platform	CPU	Telechips TCC 9201
	OS	Linux + Flow 1.2
	Font	Window Font; True type (RIVER_Gothic.ttf), (TBD)
SDRAM	Support Window Font (ttf. Text)	128MB
Display	Type	2.4" 1600M
	Resolution	320 X 240
	Color Depth	16M color(RGB 888)
	Battery	2000mAh Li-Polymer, micro USB Charge (460mA)
	Charging Time	5H 30M
<i>Feature Specifications</i>		
Audio	Frequency Range	20Hz~20KHz

	Headphone Output Power	L: 1.5VRMS + R: 1.5VRMS (Condition No Load)
	Vol	MAX 152 Grade(0~75)
	S/N Ratio	103dB @ 1KHz, No Laod
	Frequency Characteristics	±0.1dB (Condition : 20Hz~20KHz)
	No. Channels	STEREO
	Codec supported	Decoder : WAV, FLAC, WMA, MP3, OGG,APE
	Bit Rate	44.1kHz, 48kHz, 96kHz, 192kHz (16/24bit per sample)
	Tag	ID3 V1 Tag, ID3 V2 2.0, ID3 V2 3.0
Bluetooth	Bluetooth Version	v 3.0
	Profile	A2DP, HFP
	Frequency Range	2400~2483.5MHz(2402~2480MHz)
	CH	79EA

Test Mode :

Mode 1: Transmit (DH5)

Mode 2: Transmit (3DH5)

1. DH5 is for GFSK modulation, and 3DH5 is for 8DPSK
2. Regards to the frequency band operation; the highest that was included the lowest, middle and highest frequency of channel were selected to perform the test, and then shown on this report.

- Please refer to user's manual.

Measurement Uncertainty

Conducted Emissions	$U = 2.98$ [dB] (Confidence level approximately 95 %, $k = 2$)
Radiated Emissions (Antenna - Horizontal)	$U = 3.83$ [dB] (Confidence level approximately 95 %, $k = 2$)
Radiated Emissions (Antenna - Verical)	$U = 4.50$ [dB] (Confidence level approximately 95 %, $k = 2$)

SUMMARY

Bluetooth Mode(2402MHz ~2480MHz)

Applied Standard : FCC CRF Part 15 Subpart C

Description of Test	FCC Rule Parts	Results
Carrier Frequency Separation	15.247(a)(1)	Compliant
20 dB Bandwidth	15.247(a)(1)(ii) or (iii)	Compliant
Time of Occupancy	15.247(a)(1)(ii) or (iii)	Compliant
Number of Hopping Frequencies	15.247(a)(1)(ii) or (iii)	Compliant
Conducted Maximum Peak Output Power	15.247(b)(1)	Compliant
Spurious RF Conducted Emission	15.247(d)	Compliant
Spurious Radiated Emission	15.247(d), 15.209	Compliant
Receiver Spurious Emission		Compliant
Out-of- Band Emission	15.247(d)	Compliant
Occupied Bandwidth		Compliant

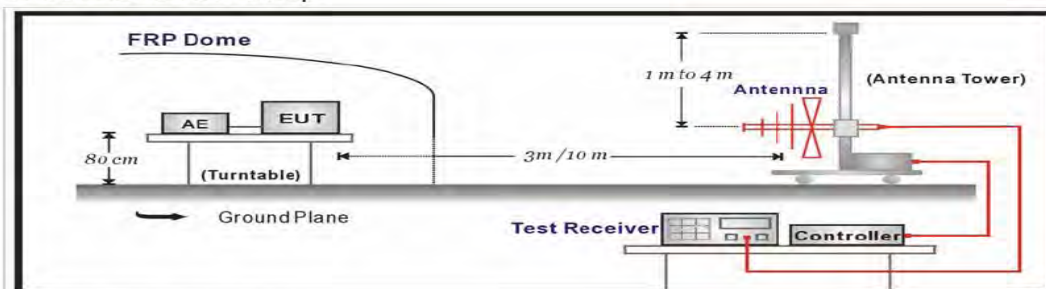
Descriptions of Test

Radiated Emissions:

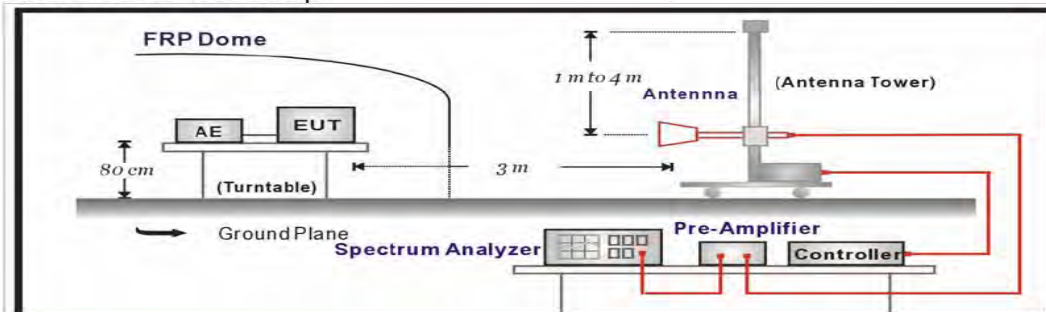
The measurement was performed over the frequency range of 30MHz to 1GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurement was made with the detector set for "quasi-peak" within a bandwidth of 120kHz. Procedure of Test

Preliminary measurements were made at 3 meter using bi-log antennas, and spectrum analyzer to determine the frequency producing the max. emission in anechoic chamber. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turn-table azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30MHz to 1000MHz using bi-log antenna. Above 1GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 3-meters test distance using bi-log antenna or horn antenna. The OATS have been verified in regular for its normalized site attenuation. The test equipment was placed on a wooden table. Sufficient time for the EUT, peripheral equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined by manual. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120kHz or 1MHz depending on the frequency of type of signal. The EUT, peripheral equipment and interconnecting cables were re-configured to the set-up producing the max. emission for the frequency and were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter table. The EUT, peripheral equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation to the EUT and/or peripheral equipment and changing the polarity of the antenna, whichever determined the worst-case emission. (The bandwidth below 1GHz setting on the field strength meter is 120KHz and above 1GHz is 1MHz.)

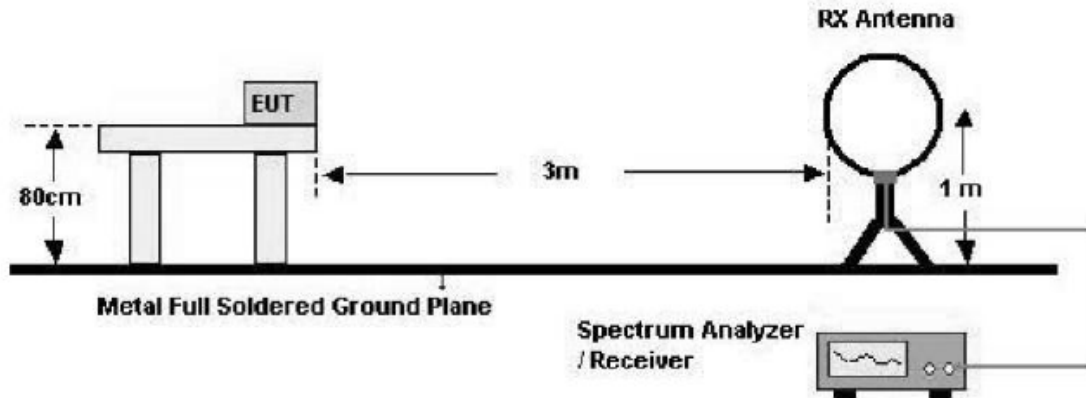
Under 1GHz Test Setup:



Above 1GHz Test Setup:



Below 30 MHz



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 Section 15.209 Limits		
Frequency(MHz)	$\mu\text{V}/\text{meter}$	$\text{dB}\mu\text{V}/\text{meter}(3\text{m})$
0.009-0.490	$2400/F(\text{KHz})$ at 300 m	$20\log 2400/F(\text{KHz})+80$
0.490-1.705	$24000/F(\text{KHz})$ at 30m	$20\log 24000/F(\text{KHz})+40$
1.705-30	30 at 30 m	49.5
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks :

1. $\text{RF Voltage}(\text{dB}\mu\text{v})=20\log \text{RF Voltage}(\mu\text{v})$
2. $\text{dB}\mu\text{V}/\text{m} = \text{ERP}(\text{dBm})+106.92 \text{ dB} + 20\log(10\text{m}/3\text{m}) + 2.15\text{dB}(\text{conversion Factor for E.I.R.P})$
3. In the Above Table, the tighter limit applies at the band edges.
4. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Test specification.

According to FCC CFR Title 47 Part 15 Subpart C Section 15.209.

Radiated Spurious Emission

[Applicable]

◆ Test Equipment Used

Name	Type	Manufacturer	Calibration. Date	Serial Number
ESCS30	EMI Receiver	Rohde & Schwarz	May 10, 2012	100171
SPECTRUM ANALYZER	R3273	ADVANTEST	Oct. 10, 2012	95090431
Loop Antenna	HFH2-Z2	Rohde & Schwarz	Oct. 26, 2012	8620771017
Log-bicon Antenna	VULB9161SE	Schwarz beck	Jul. 28, 2011	4089
HORN-Antenna	3115	EMCO	Nov. 21, 2011	9012-3602
HORN-Antenna	SAS-571	A.H. SYSTEMS	Nov. 21, 2011	500
PRE AMPLIFIER	8449B OPT H02	Rohde & Schwarz	Oct. 11, 2012	3008A0530

Note : 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to RRA, KRISS, KTL and HCT.
 2. The calibration interval of horn ant. and loop ant. is 24 months

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

$$Peak = Reading + Corrected Factor$$

Where Corr. Factor = Antenna Factor + Cable Factor - Amplifier Gain (if any)

Radiated Emissions Test, 9 kHz to 30 MHz (Magnetic Field Test)

1. The preliminary radiated measurements were performed to determine the frequency producing the maximum emissions at a distance of 3 meters according to Section 15.31(f)(2).
2. The EUT was placed on the top of the 0.8-meter height, 1 x 1.5 meter non-metallic table.
3. Emissions from the EUT are maximized by adjusting the orientation of the Loop antenna and rotating the EUT on the turntable. Manipulating the system cables also maximizes EUT emissions if applicable.
4. To obtain the final measurement data, each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector with specified bandwidth.
5. The result was 20dB lower than the limit line 15.31(o) was not reported.

Radiated Emission Result
Under 1GHz

[Applicable]

DH5

Frequency MHz	Reading dBuV	P (H, V)	Ant. Factor dB	Cable Loss dB	Limit dBuV	Total dBuV	Margin dB
65.892	8.10	H	10.14	1.38	40.00	19.62	-20.38
159.982	4.50	V	13.34	2.12	43.50	19.96	-23.54
457.771	6.60	V	16.82	3.61	46.00	27.03	-18.97
*665.349	7.10	V	20.01	4.54	46.00	31.65	-14.35

3DH5

Frequency MHz	Reading dBuV	P (H, V)	Ant. Factor dB	Cable Loss dB	Limit dBuV	Total dBuV	Margin dB
59.284	9.90	V	10.86	1.33	40.00	22.09	-17.91
121.236	6.40	V	11.23	1.84	43.50	19.47	-24.03
167.828	5.30	H	12.31	2.16	43.50	19.77	-23.73
*634.292	6.60	V	19.78	4.46	46.00	30.84	-15.16

Note :

1. Remark "*" means that the data is the worst emission level.
2. All reading levels are Quasi-peak value.
3. Measurement level = reading level + correct factor

Above 1Ghz

EUT :	AK120	PROBE :	Above 1 GHz
MODE :	DH5	NOTE :	Low Ch

Test Data

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
1.723	38.71	24.42	V	74.00	54.00	35.29	29.58
4.821	50.02	36.82	V	74.00	54.00	23.98	17.18
4.894	54.09	35.63	V	74.00	54.00	19.91	18.37
1.623	39.88	26.06	H	74.00	54.00	34.12	27.94
3.205	43.40	31.98	H	74.00	54.00	30.60	22.02
4.823	48.07	35.26	H	74.00	54.00	25.93	18.74
5.772	46.78	34.51	H	74.00	54.00	27.22	19.49

Restricted Band Edge Test Data

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
2.383	49.32	34.26	V	74.00	54.00	24.68	19.74
2.384	50.98	33.59	H	74.00	54.00	23.02	20.41

EUT :	AK120	PROBE :	Above 1 GHz
MODE :	DH5	NOTE :	Middle Ch

Test Data

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
1.843	41.68	26.58	V	74.00	54.00	32.32	27.42
4.921	49.87	35.24	V	74.00	54.00	24.13	18.76
5.237	55.19	36.54	V	74.00	54.00	18.81	17.46
7.068	54.27	38.69	V	74.00	54.00	19.73	15.31
1.689	37.61	25.32	H	74.00	54.00	36.39	28.68
4.812	47.34	33.58	H	74.00	54.00	26.66	20.42
5.623	45.72	33.58	H	74.00	54.00	28.28	20.42

EUT :	AK120	PROBE :	Above 1 GHz
MODE :	DH5	NOTE :	High Ch

Test Data

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
	1.845	50.82		25.38	V	74.00	54.00
4.934	48.99	36.32	V	74.00	54.00	25.01	17.68
5.465	56.41	37.62	V	74.00	54.00	17.59	16.38
7.122	55.02	37.78	V	74.00	54.00	18.98	16.22
3.357	44.84	32.65	H	74.00	54.00	29.16	21.35
4.881	47.64	35.22	H	74.00	54.00	26.36	18.78
7.282	49.82	35.62	H	74.00	54.00	24.18	18.38

Restricted Band Edge Test Data

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
	2.485	46.87		35.47	V	74.00	54.00
2.485	52.62	41.25	H	74.00	54.00	21.38	12.75

Note : Reading(dBuv) : Measurement Level + Ant Factor + Cable Loss - Amp Gain

EUT :	AK120	PROBE :	Above 1 GHz
MODE :	3DH5	NOTE :	Low Ch

Test Data

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
	1.872	41.92		28.47	V	74.00	54.00
3.264	48.28	39.31	V	74.00	54.00	25.72	14.69
5.026	47.46	37.45	V	74.00	54.00	26.54	16.55
3.402	41.25	34.82	H	74.00	54.00	32.75	19.18
4.424	44.68	33.25	H	74.00	54.00	29.32	20.75
4.918	46.37	34.15	H	74.00	54.00	27.63	19.85
8.004	53.61	38.49	H	74.00	54.00	20.39	15.51

Restricted Band Edge Test Data

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
	2.387	55.93		34.41	V	74.00	54.00
2.386	52.64	32.64	H	74.00	54.00	21.36	21.36

EUT :	AK120	PROBE :	Above 1 GHz
MODE :	3DH5	NOTE :	Middle Ch

Test Data

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
	1.886	54.19		33.43	V	74.00	54.00
3.335	48.84	29.36	V	74.00	54.00	25.16	24.64
4.726	50.42	35.74	V	74.00	54.00	23.58	18.26
5.131	54.36	36.28	H	74.00	54.00	19.64	17.72
1.825	47.24	26.58	H	74.00	54.00	26.76	27.42
4.521	43.85	34.69	H	74.00	54.00	30.15	19.31
5.146	48.34	36.82	H	74.00	54.00	25.66	17.18
7.982	53.52	40.42	H	74.00	54.00	20.48	13.58

EUT :	AK120	PROBE :	Above 1 GHz
MODE :	3DH5	NOTE :	High Ch

Test Data

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
	1.894	52.37		31.82	V	74.00	54.00
3.359	45.28	28.94	V	74.00	54.00	28.72	25.06
5.216	55.17	36.54	V	74.00	54.00	18.83	17.46
1.841	45.36	28.46	H	74.00	54.00	28.64	25.54
4.625	44.63	35.12	H	74.00	54.00	29.37	18.88
5.284	47.53	34.25	H	74.00	54.00	26.47	19.75
8.122	54.74	37.93	H	74.00	54.00	19.26	16.07

Restricted Band Edge Test Data

Frequency GHz	Reading dBuV		P	Limit dBuV		Margin dB	
	Peak	AV		Peak	AV	Peak	AV
	2.485	45.69		38.43	H	74.00	54.00
2.485	51.34	43.79	V	74.00	54.00	22.66	10.21

Note : Reading(dBuv) : Measurement Level + Ant Factor + Cable Loss - Amp Gain

Peak Power Output

◆ Test Equipment

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model no/Serial No.	Last Cal.
1	Spectrum Analyzer	ADVANTEST	R3273 / 95090431	Oct. 10, 2012
2	RF ROOM			

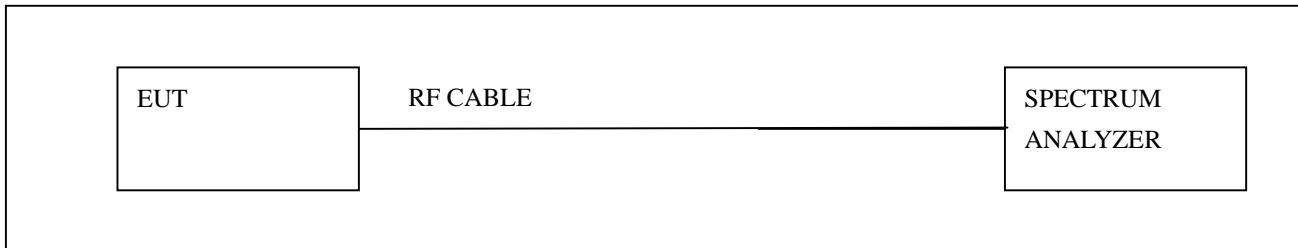
Note : All equipment upon which need to calibrated are with calibration period of 1 year.

◆ Limits

The maximum peak output power of the intentional radiator shall not exceed the following :

1. According to § 15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz : 1Watt.
2. According to § 15.247(b)(4), the conducted output power limit specified in paragraph(b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph(c) of this section, is transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs(b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi

◆ Test Setup



◆ Test Procedure

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.

Peak Power Test result

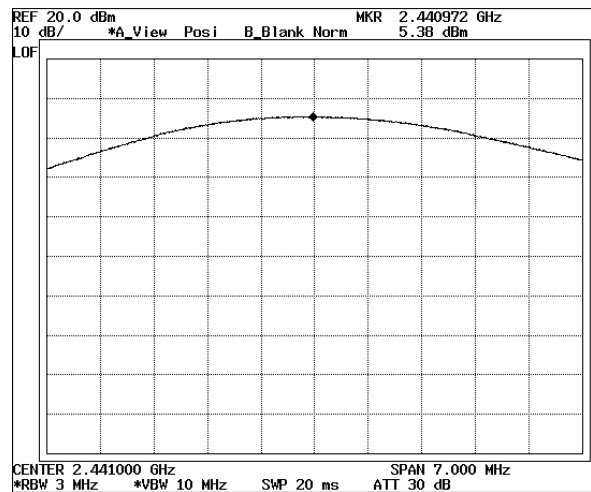
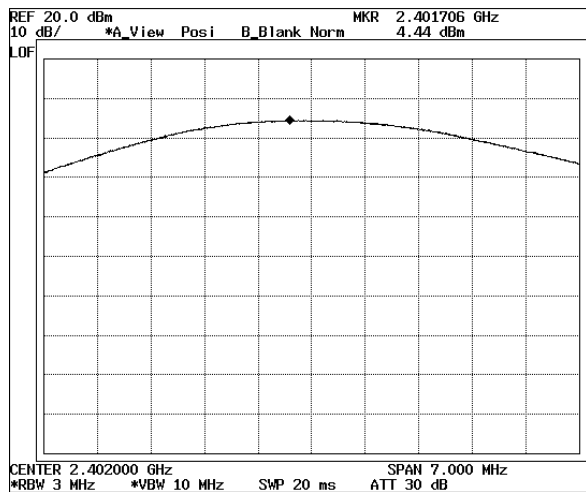
Product	AK120
Test Item	Peak Power Output
Test Mode	Tx / Channel 0, 39, 78
Test Site	RF Room
Measurement Method	Conducted

DH5

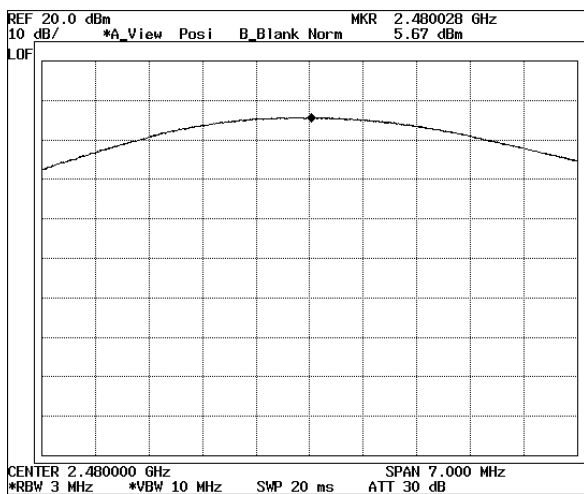
Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
0	2402	4.44	1Watt=30dBm	Pass
39	2441	5.38	1Watt=30dBm	Pass
78	2480	5.67	1Watt=30dBm	Pass

Channel 0

Channel 39



Channel 78



Peak Power Test result

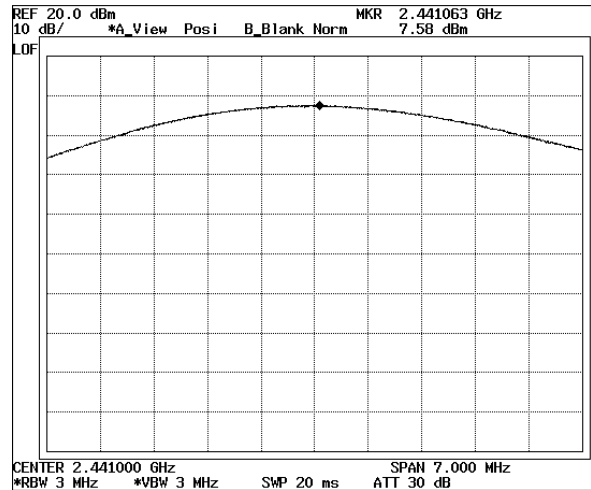
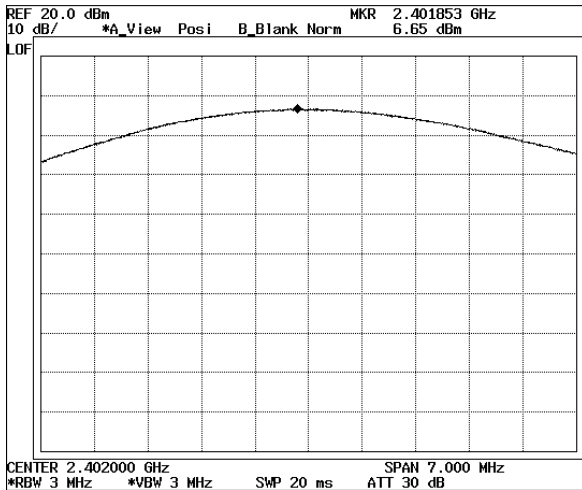
Product	AK120
Test Item	Peak Power Output
Test Mode	Tx / Channel 0, 39, 78
Test Site	RF Room
Measurement Method	Conducted

3DH5

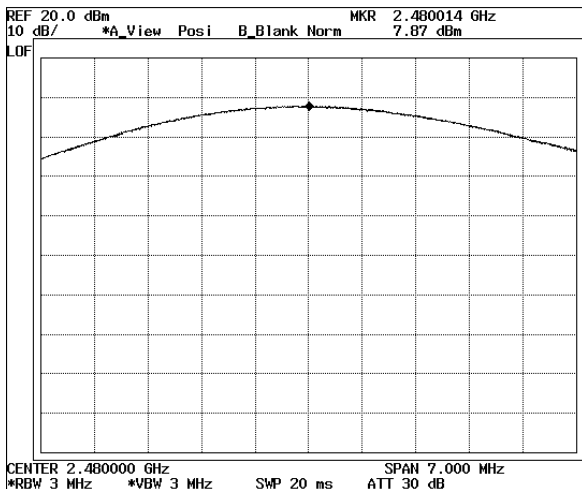
Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
0	2402	6.65	1Watt=30dBm	Pass
39	2441	7.58	1Watt=30dBm	Pass
78	2480	7.87	1Watt=30dBm	Pass

Channel 0

Channel 39



Channel 78



Note : Measurement level = reading level + correct factor

Conducted Spurious Emissions &

Band Edge

◆ **TEST Equipment**

The following test equipment are used during the test:

Name	Type	Manufacturer	Calibration. Date	Serial Number
ESCS30	EMI Receiver	Rohde & Schwarz	May 10, 2012	100171
SPECTRUM ANALYZER	R3273	ADVANTEST	Oct. 10, 2012	95095431
HORN-Antenna	3115	EMCO	Nov. 21, 2011	9012-3602
HORN-Antenna	HF906	Rohde & Schwarz	Nov. 21, 2011	100530
PRE AMPLIFIER	8449B OPT H02	Rohde & Schwarz	Oct. 11, 2012	3008A0530

Note : 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to RRL, KRISS, KTL and HCT.

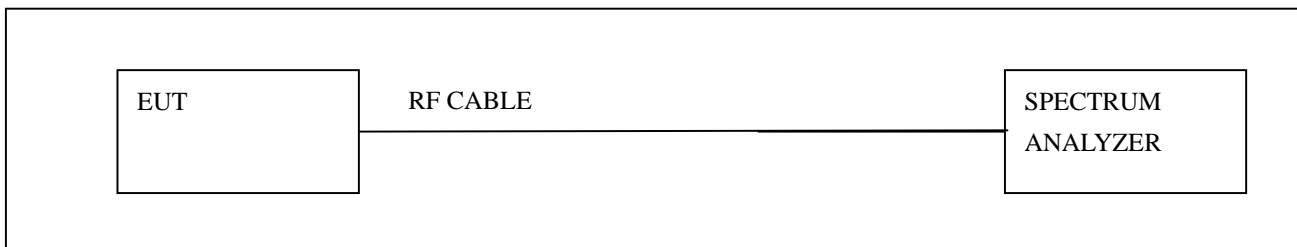
2. The calibration interval of horn ant. and loop ant. is 24 months

◆ **Limits**

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 emission 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)).

◆ **Test Setup**



◆ **Test Procedure**

The transmitter output is connected to the Spectrum analyzer.

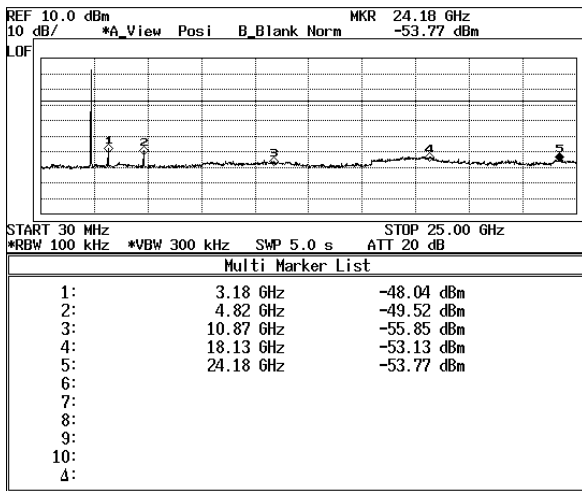
According to FCC CFR Title 47 Part 15 Subpart C Section 15.247

Conducted Spurious Emissions Test result

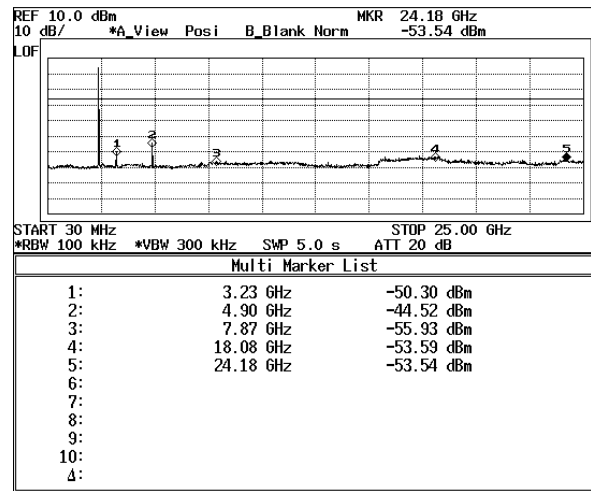
Product	AK120
Test Item	Spurious Emissions
Test Mode	Tx / Channel 0, 39, 78, Hopping
Test Site	RF Room
Measurement Method	Conducted

DH5

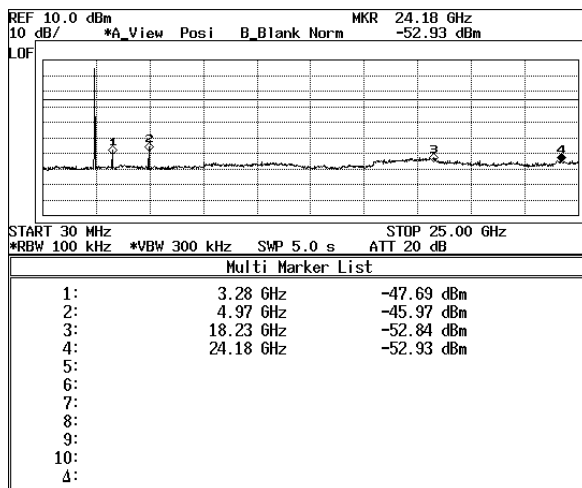
Channel 0 (2402 MHz)



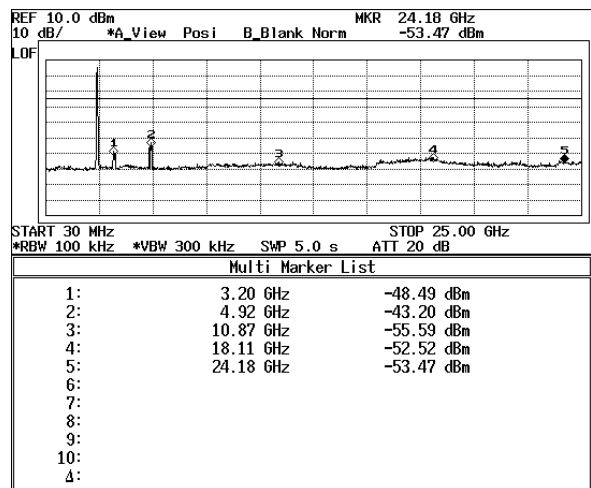
Channel 39 (2441 MHz)



Channel 78 (2480 MHz)



Hopping mode

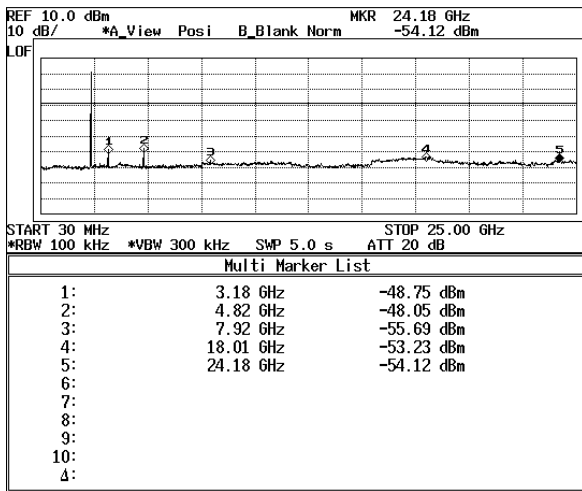


Conducted Spurious Emissions Test result

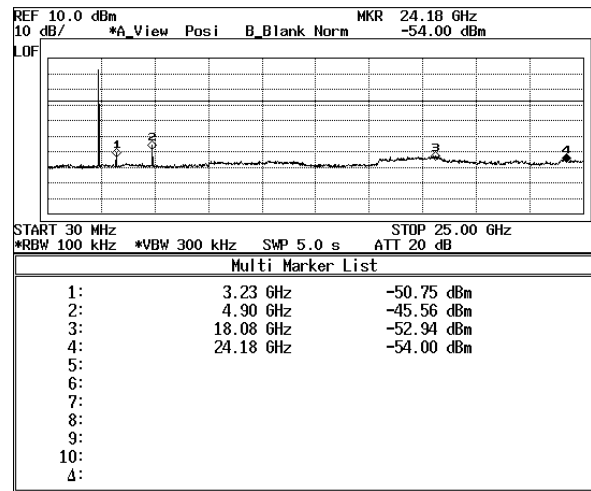
Product	AK120
Test Item	Spurious Emissions
Test Mode	Tx / Channel 0, 39, 78, Hopping
Test Site	RF Room
Measurement Method	Conducted

3DH5

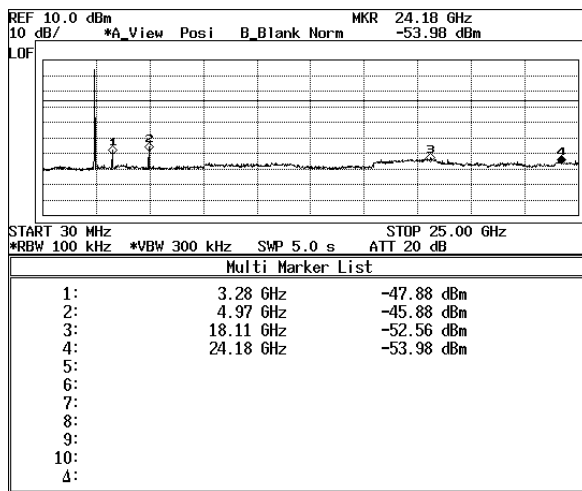
Channel 0 (2402 MHz)



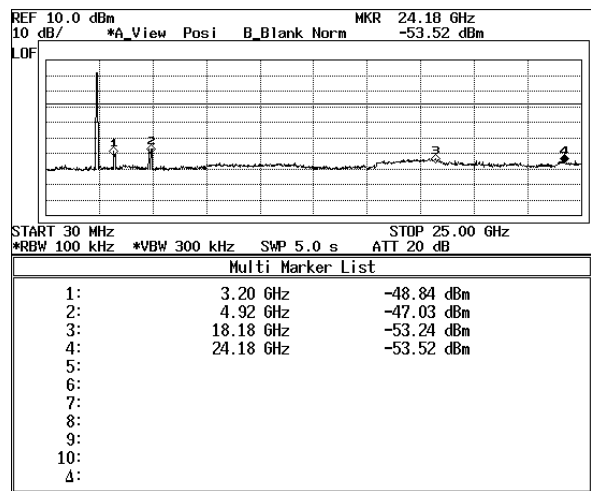
Channel 39 (2441 MHz)



Channel 78 (2480 MHz)



Hopping mode



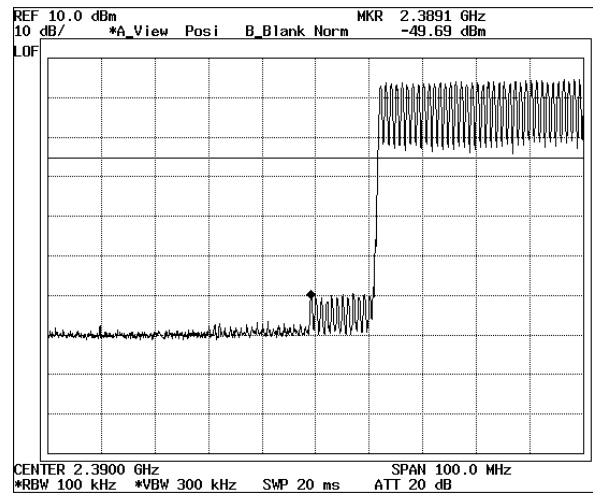
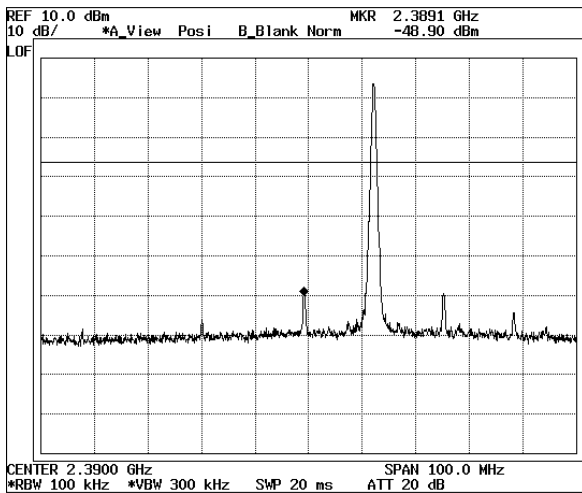
Band Edge Test result

Product	AK120
Test Item	Band Edge
Test Mode	Tx / Channel 0, 78, Hopping
Test Site	RF Room
Measurement Method	Conducted

DH5

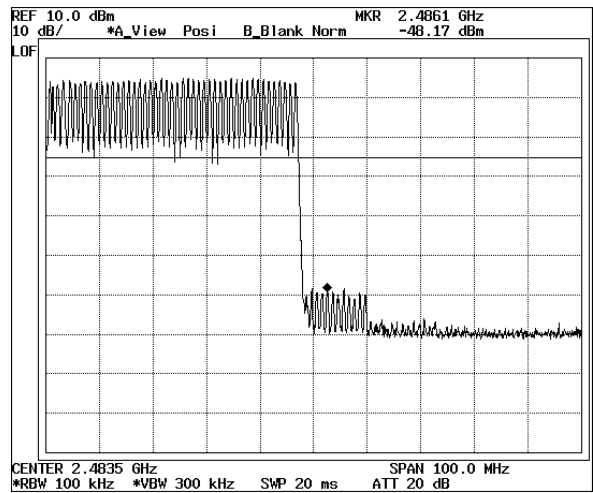
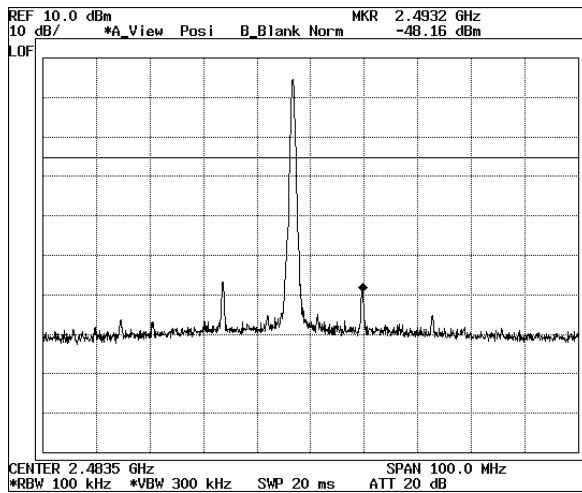
Channel : 0 CH(2402 MHz)

Hopping mode



Channel : 78 CH(2480 MHz)

Hopping mode



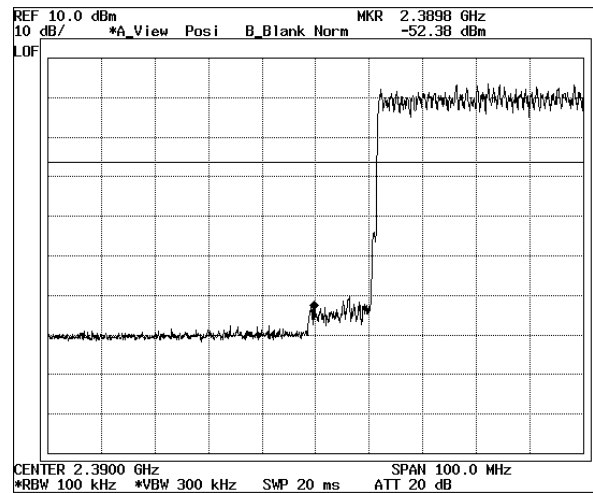
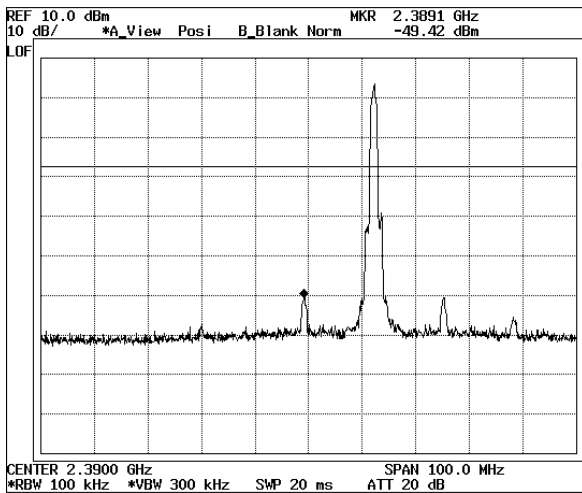
Band Edge Test result

Product	AK120
Test Item	Band Edge
Test Mode	Tx / Channel 0, 78, Hopping
Test Site	RF Room
Measurement Method	Conducted

3DH5

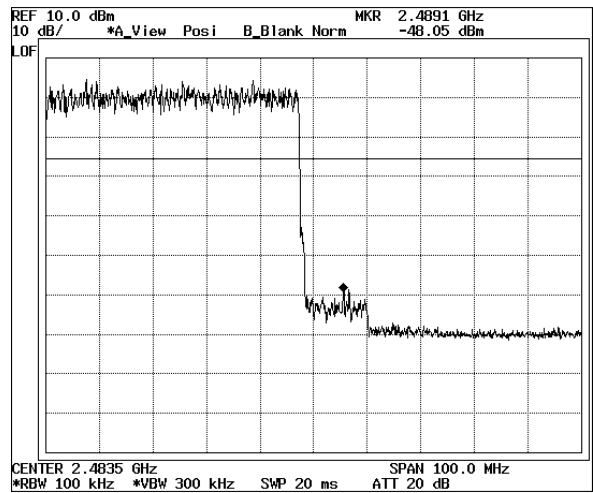
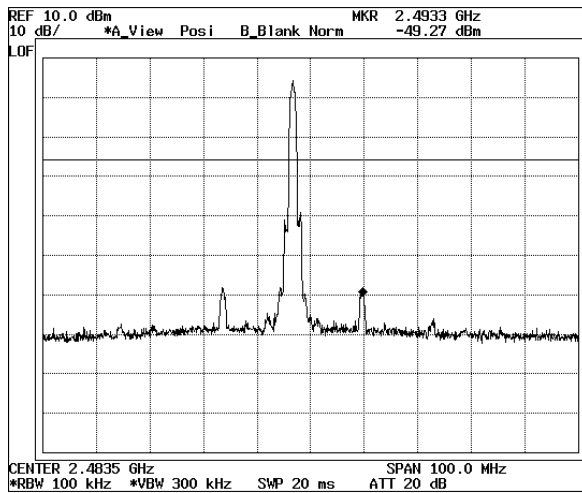
Channel : 0 CH(2402 MHz)

Hopping mode



Channel : 78 CH(2480 MHz)

Hopping mode



Frequency Separation &

20dB Bandwidth/Occupied Bandwidth

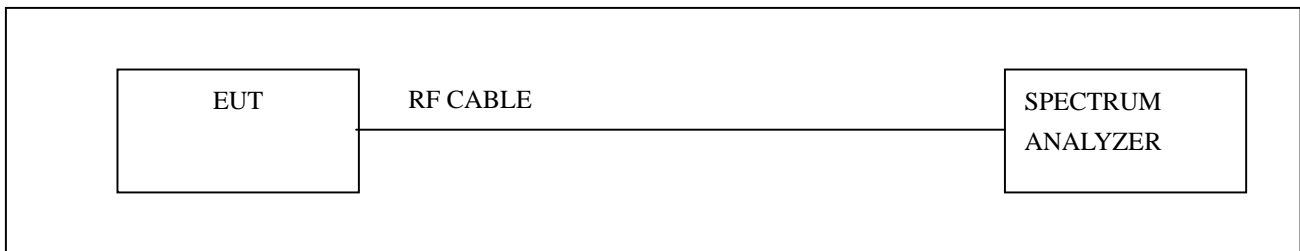
◆ Test Equipment

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model no/Serial No.	Last Cal.
1	Spectrum Analyzer	ADVANTEST	R3273 / 95090431	Oct.10, 2012
2	RF ROOM			

Note : All equipment upon which need to calibrated are with calibration period of 1 year.

◆ Test Setup



◆ Limits

According to 15.247(a)(1), Frequency hopping systems operation in the 2400-2483.5 MHz band may have hopping carrier frequencies that are separated by 25 KHz or two-third of 20 dB band width of hopping channel, is greater.

◆ Test Procedure

The transmitter output is connected to the Spectrum analyzer.

According to FCC CFR Title 47 Part 15 Subpart C Section 15.247

20dB BandWidth Test result

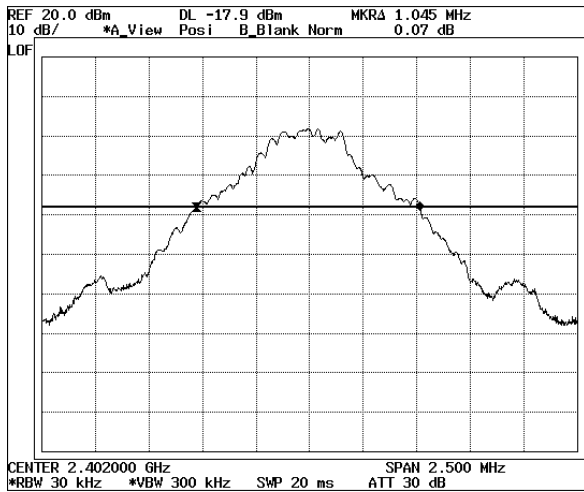
Product	AK120
Test Item	20dB Bandwidth
Test Mode	Transmit
Test Site	RF Room
Measurement Method	Conducted

20dB Band width

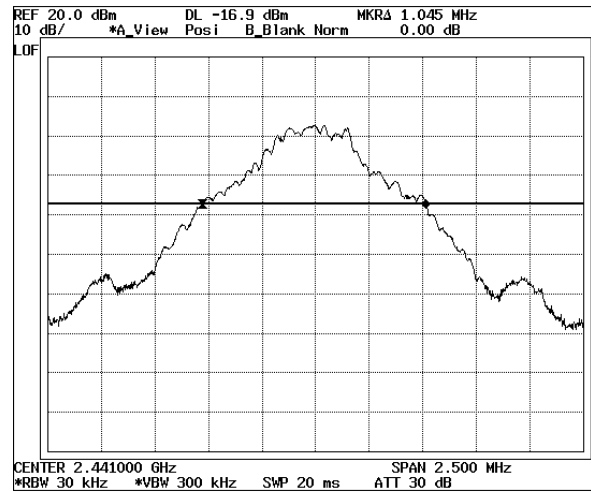
DH5

Channel	20dB Band width (KHz)	Result
Low CH	1045	Pass
Middle CH	1045	
High CH	1045	

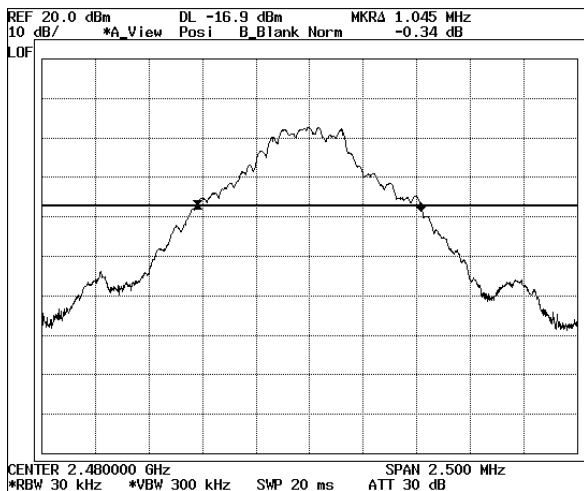
Low Channel



Mid Channel



High Channel



20dB BandWidth Test result

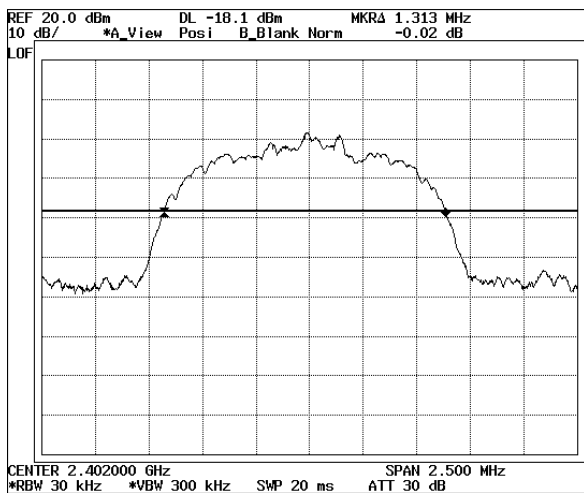
Product	AK120
Test Item	20dB Bandwidth
Test Mode	Transmit
Test Site	RF Room
Measurement Method	Conducted

20dB Band width

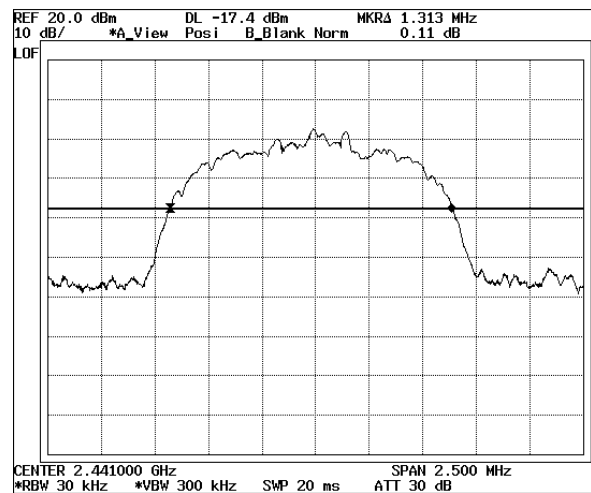
3DH5

Channel	20dB Band width (KHz)	Result
Low CH	1313	Pass
Middle CH	1313	
High CH	1313	

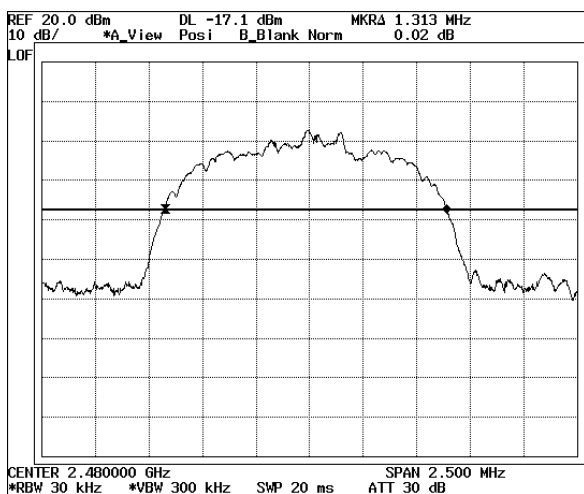
Low Channel



Mid Channel



High Channel



Channel Separation Test result

Product	AK120
Test Item	Channel Separation
Test Mode	Transmit
Test Site	RF Room
Measurement Method	Conducted

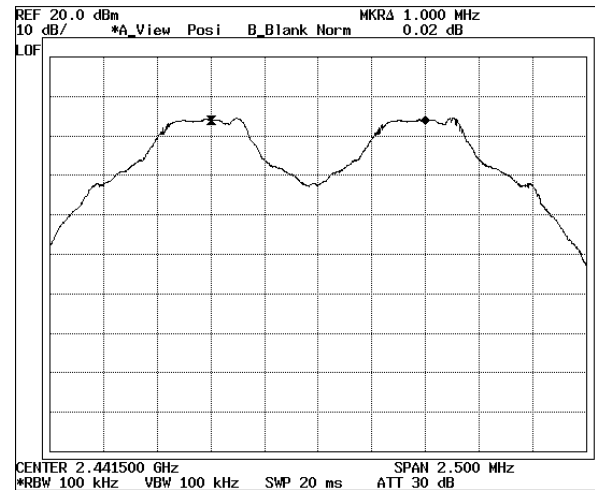
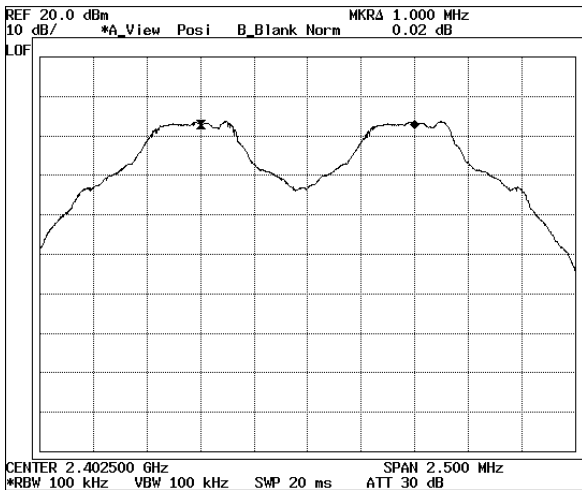
Channel Separation

DH5

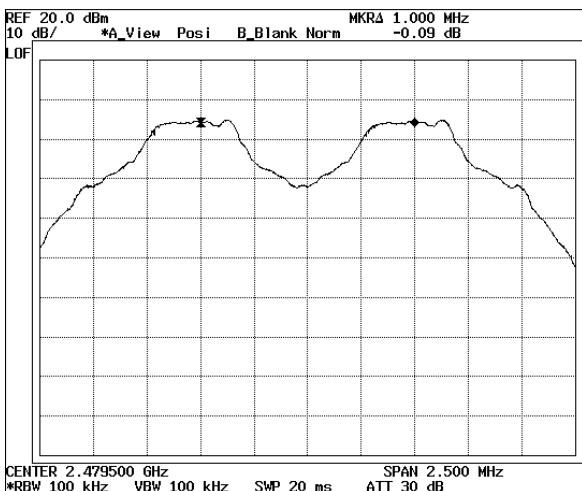
Channel	Channel Separation (KHz)	20dB bandwidth (KHz)	Limit (KHz)	Result
Low CH	1000	1045	>25 or >2/3 of the 20dB BW	Pass
Middle CH	1000	1045		
High CH	1000	1045		

Low Channel

Mid Channel



High Channel



Channel Separation Test result

Product	AK120
Test Item	Channel Separation
Test Mode	Transmit
Test Site	RF Room
Measurement Method	Conducted

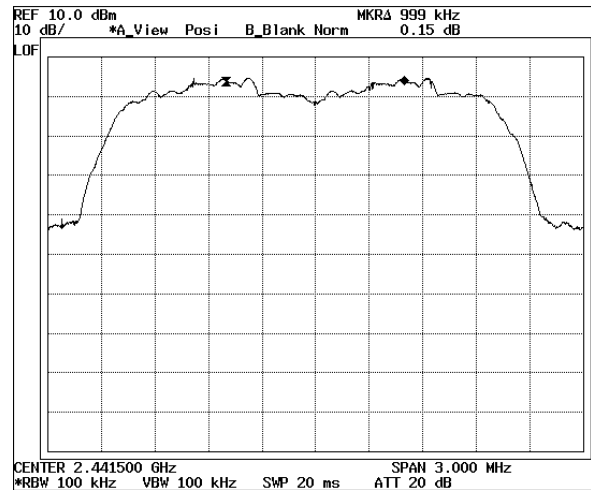
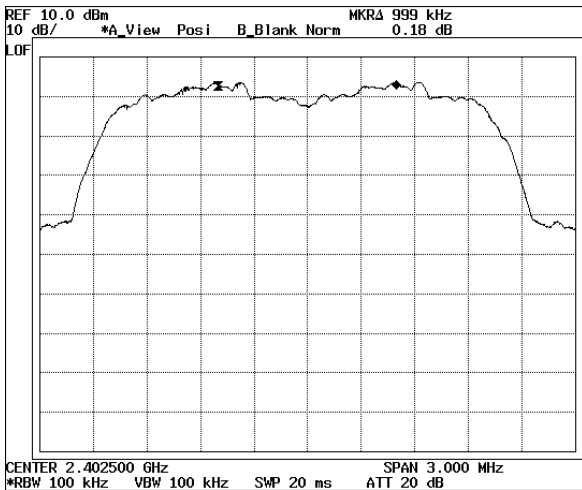
Channel Separation

3DH5

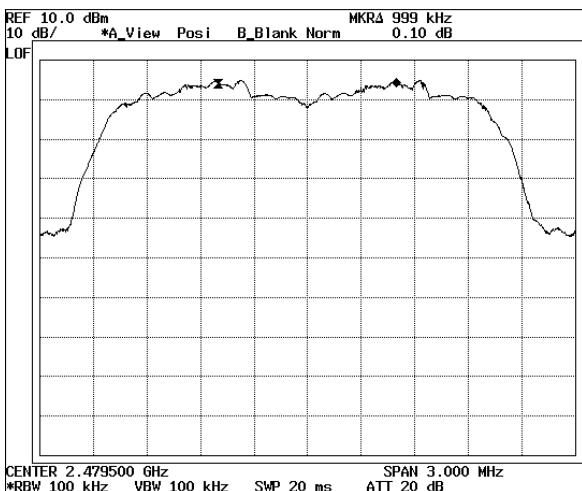
Channel	Channel Separation (KHz)	20dB bandwidth (KHz)	Limit (KHz)	Result
Low CH	999	1313	>25 or >2/3 of the 20dB BW	Pass
Middle CH	999	1313		
High CH	999	1313		

Low Channel

Mid Channel



High Channel



Occupied Bandwidth Test result

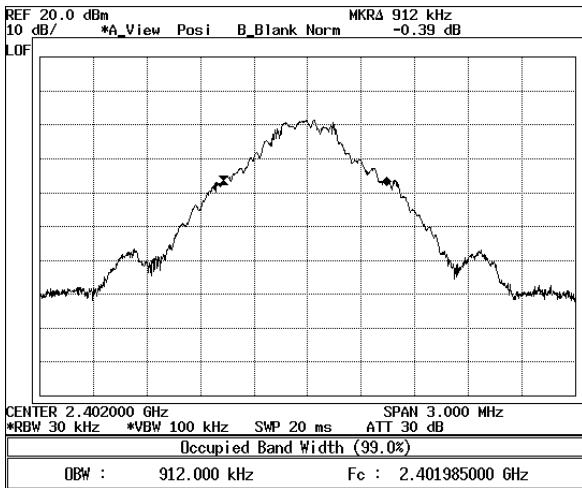
Product	AK120
Test Item	Occupied Bandwidth
Test Mode	Transmit
Test Site	RF Room
Measurement Method	Conducted

Occupied BandWidth(99%)

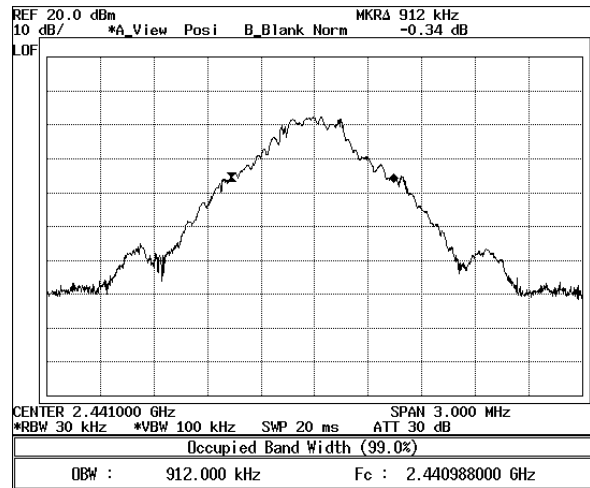
DH5

Channel	99% BW(KHz)	Result
Low CH	912	Pass
Middle CH	912	
High CH	912	

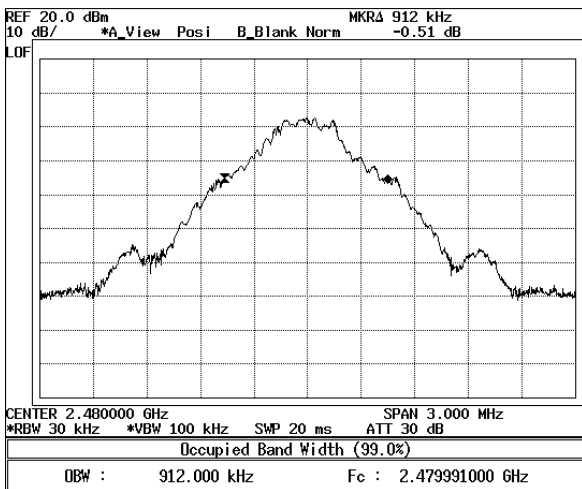
Low Channel



Mid Channel



High Channel



Occupied Bandwidth Test result

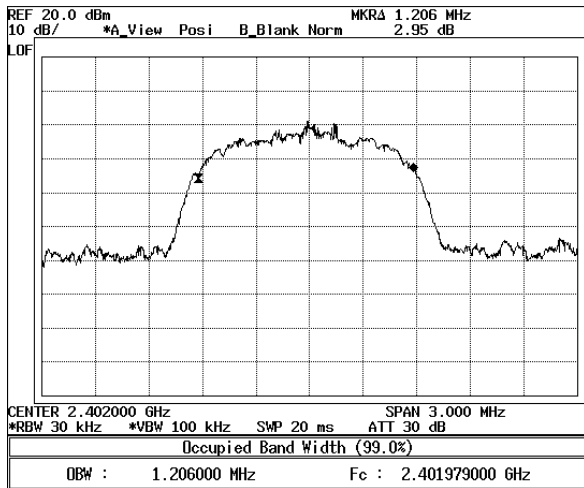
Product	AK120
Test Item	Occupied Bandwidth
Test Mode	Transmit
Test Site	RF Room
Measurement Method	Conducted

Occupied BandWidth(99%)

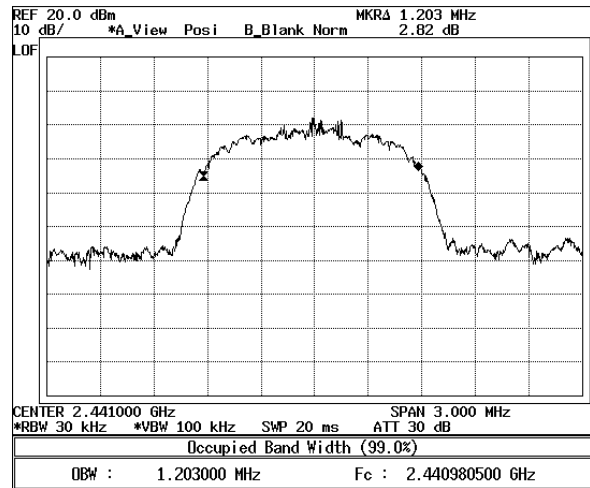
3DH5

Channel	99% BW(KHz)	Result
Low CH	1206	Pass
Middle CH	1203	
High CH	1203	

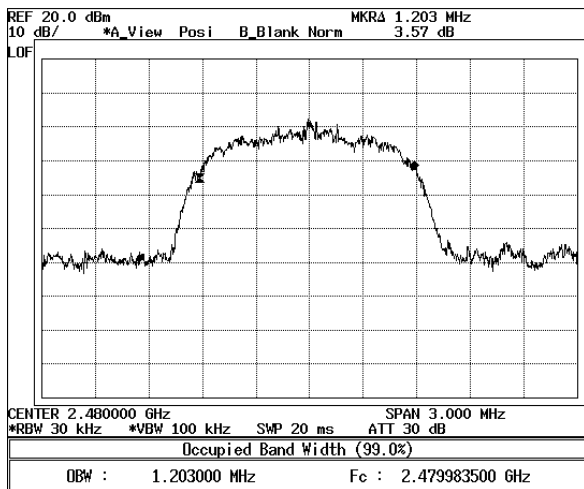
Low Channel



Mid Channel



High Channel



Number of Hopping Frequency

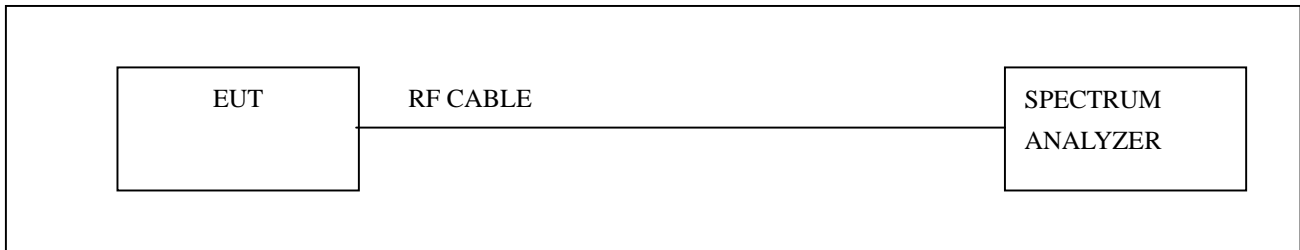
◆ Test Equipment

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model no/Serial No.	Last Cal.
1	Spectrum Analyzer	ADVANTEST	R3273 / 95090431	Oct.10, 2012
2	RF ROOM			

Note : All equipment upon which need to calibrated are with calibration period of 1 year.

◆ Test Setup



◆ Limits

According to 15.247(a)(1)(ii), Frequency hopping systems operation in the 2400-2483.5 MHz bands shall use at least 15 hopping frequencies.

◆ Test Procedure

The transmitter output is connected to the Spectrum analyzer.

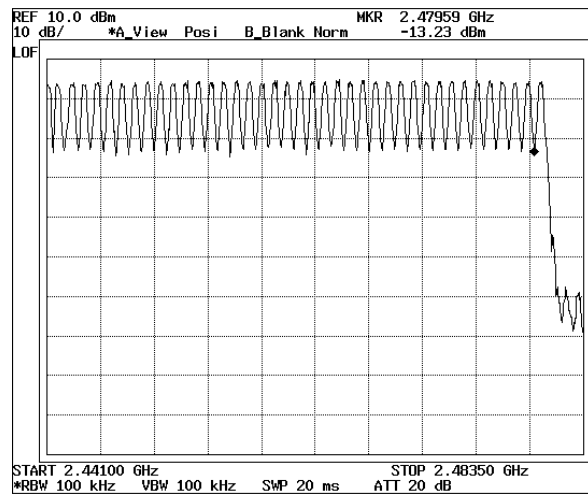
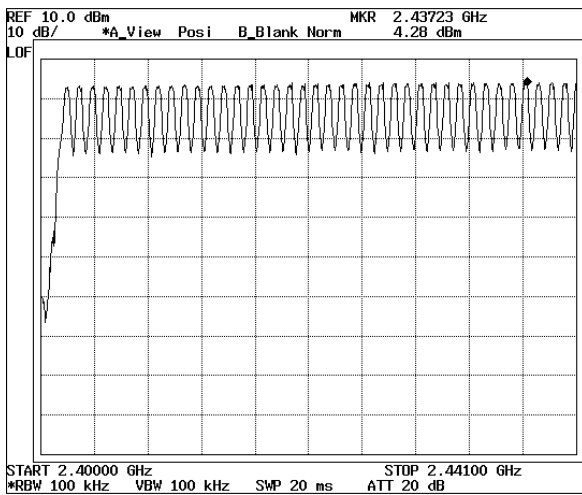
According to FCC CFR Title 47 Part 15 Subpart C Section 15.247

Test result

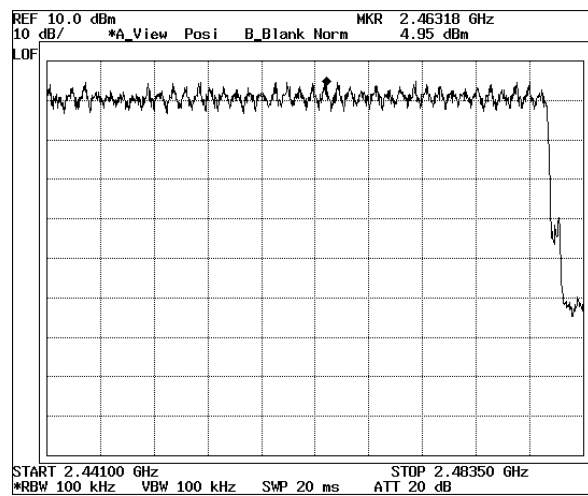
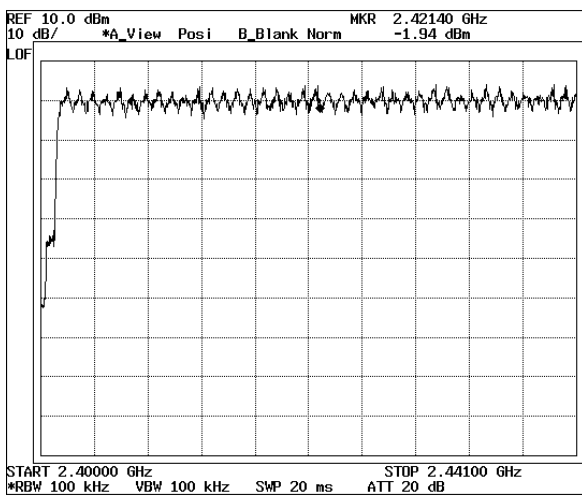
Product	AK120
Test Item	Number of hopping frequency
Test Mode	Transmit
Test Site	RF Room
Measurement Method	Conducted

Channel (No. of channel)	Limit (No. of channel)	Result
79	>15	Pass

DH5



3DH5



Time of Occupancy(Dwell Time)

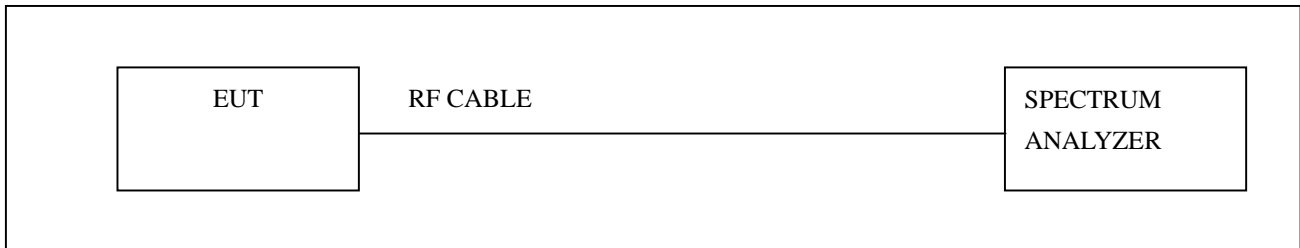
◆ Test Equipment

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model no/Serial No.	Last Cal.
1	Spectrum Analyzer	ADVANTEST	R3273 / 95090431	Oct. 10, 2012
2	RF ROOM			

Note : All equipment upon which need to calibrated are with calibration period of 1 year.

◆ Test Setup



◆ Limits

According to 15.247(a)(1)(iii), Frequency hopping systems operating in the 2400-2483.5 MHz bands. The average time of occupancy on any channels shall not greater than 0.4s within a period 0.4s multiplied by the number of hopping channels employed.

◆ Test Procedure

The transmitter output is connected to the Spectrum analyzer.

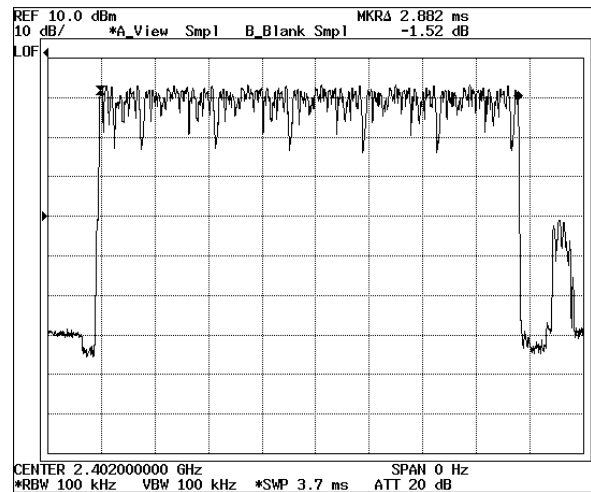
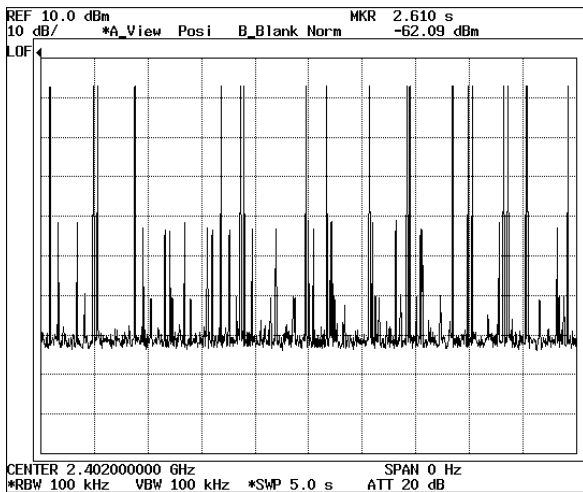
According to FCC CFR Title 47 Part 15 Subpart C Section 15.247

Dwell time Test result

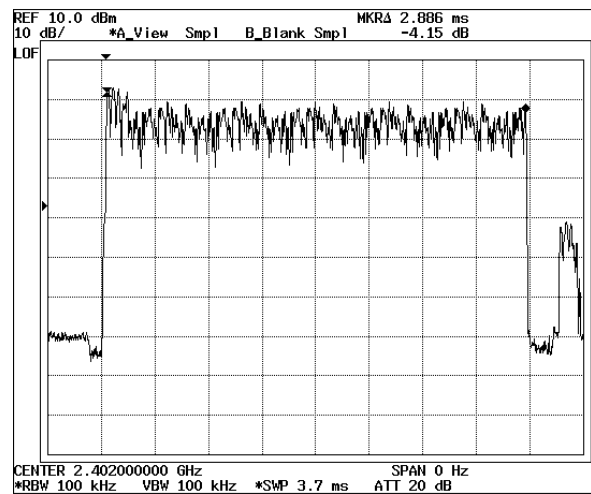
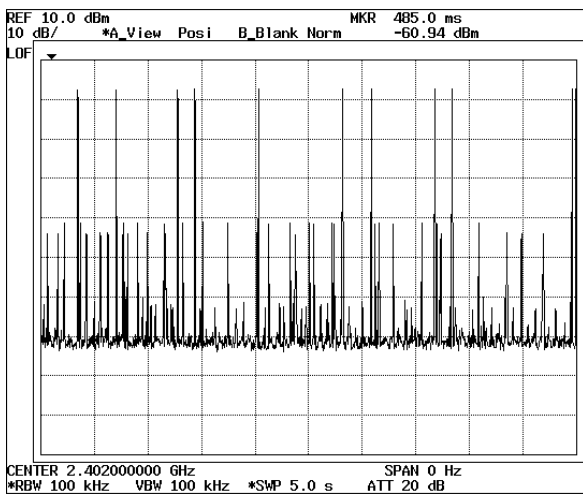
Test Item	Dwell Time
Test Mode	Transmit
Test Site	RF Room
Measurement Method	Conducted

Mode	Number of transmission in a 31.6	Length of transmission time(ms)	Result (ms)	Limit (ms)	Result
DH5	19(times/5s) *6.32 = 120.08times	2.882	346.070	400	Pass
3DH5	11(times/5s) *6.32 = 126.40times	2.886	200.634		Pass

DH5



3DH5



Note : High, Low and mid channels have same length of transmission time.

Antenna requirements

According to FCC 47 CFR 15.203

“an intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached or an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section”

- * the antenna of this EUT are permanently attached.

- * the EUT complies with the requirement of 15.203