FCC ID TEST REPORT

Prepared for.....:	Shenzhen Almart Electronics Co.,Ltd
Address.....:	Block 7,Fu Zhong industrial area, Xia Shi Wei Road, Fu Yong Town, Baoan District, Shenzhen, PRC
Equipment Under Test(E.U.T.):	Small cylindrical bluetooth speakers
Model.....:	AEMT-001
FCC ID.....:	2AC6DAEMT-001
Applicable Standards.....:	FCC CFR Title 47 Part 15 Subpart C Section 15.247:2013 FCC Public Notice DA 00-705-Filing and Measurement Guidelines for Frequency Hopping SpreadSpectrum Systems
Test Date.....:	01 September 2014 to 11 September 2014
Issued Date.....:	11 September 2014
Report Number.....:	POCE14090634ERF
Test Engineer.....:	Bill Jing
Reviewed By.....:	Machael Mo
Prepared By.....:	**Shenzhen POCE Technology Co., Ltd.** H Building, Hongfa Science and Technology Park, Tangtou, Shiyan, Bao'an District, Shenzhen, China Tel: 86-755-2911 3252 Fax: 86-755-2911 3135

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1.0 General Information

1.1 Client details

Applicant:	Shenzhen Almart Electronics Co.,Ltd
Address:	Block 7, Fu Zhong industrial area, Xia Shi Wei Road, Fu Yong Town, Baoan District, ShenZhen, PRC
Manufacturer:	Shenzhen Almart Electronics Co.,Ltd
Address:	Block 7, Fu Zhong industrial area, Xia Shi Wei Road, Fu Yong Town, Baoan District, ShenZhen, PRC

1.2 Test lab details

Name :	Shenzhen POCE Technology Co.,Ltd.
Address:	Room 502, Bldg. 1, Xinghua Garden, Baoan Road Xixiang, Baoan District, Shenzhen, China
Telephone:	86-755-29113252
Fax:	86-755-29113135

Site Listed with Federal Communication Commission
Registration Number: 222278
For 3m chamber

1.3 Description of E.U.T.

Product:	Small cylindrical bluetooth speakers
Model No.:	AEMT-001
Additional Model No.:	N.A.
Brand Name	N.A.
BT Version	2.0+EDR
Operation Frequency:	2402~2480MHz
Modulation Type:	GFSK, Pi/4QDPSK, 8DPSK
Transfer Data Rate	1/2/3 Mbps
Channel number:	79
Channel spacing:	1 MHz
Antenna Designation:	An integral antenna and the maximum antenna gain is 0dBi.
Rating:	DC 3.7V via Battery or DC 5V via USB line

Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2402	21	2422	41	2442	61	2462
2	2403	22	2423	42	2443	62	2463
3	2404	23	2424	43	2444	63	2464
4	2405	24	2425	44	2445	64	2465
5	2406	25	2426	45	2446	65	2466
6	2407	26	2427	46	2447	66	2467
7	2408	27	2428	47	2448	67	2468
8	2409	28	2429	48	2449	68	2469
9	2410	29	2430	49	2450	69	2470
10	2411	30	2431	50	2451	70	2471
11	2412	31	2432	51	2452	71	2472
12	2413	32	2433	52	2453	72	2473
13	2414	33	2434	53	2454	73	2474
14	2415	34	2435	54	2455	74	2475
15	2416	35	2436	55	2456	75	2476
16	2417	36	2437	56	2457	76	2477
17	2418	37	2438	57	2458	77	2478
18	2419	38	2439	58	2459	78	2479
19	2420	39	2440	59	2460	79	2480
20	2421	40	2441	60	2461		

Remark: All tests were conducted in three channels: Low channel: 2402MHz, Middle channel: 2441MHz, High channel: 2480MHz

1.4 AE used during the test

Equipment type	Model	Manufacturer	FCC Approval
Notebook	PP18L	DELL	DoC
N.A.			
N.A.			

2.0 Test summary

Section in CFR 47	Test Item	Result
15.203,15.247(c)	Antenna Requirement	Complies
15.207(a)	AC Power Line Conducted Emission	Complies
15.247(b)(3)	Maximum Peak Output Power	Complies
15.247 (a)(1), 15.215(c)	20dB Channel Bandwidth	Complies
15.247 (a)(1)	Carrier Frequency Separation	Complies
15.247(a)(iii)	Number of Hopping Channels	Complies
15.247(a)(iii)	Time of Occupancy (Dwell Time)	Complies
15.247 (d), 15.205 (a), 15.209 (a)	Band age Measurement	Complies
15.209	Radiated Emission	Complies

3.0 E.U.T. modification

No modification by Shenzhen POCE Technology Co., Ltd

4.0 Measurement Uncertainty

（95% confidence levels, k=2)

No.	Item	MU
1.	Radio Frequency	$\pm 1\times 10^{-9}$
2.	Temperature	±0.1℃
3.	Humidity	±1.0%
4.	RF power, conducted	±0.34dB
5.	Spurious emissions, conducted	±2.72dB
6.	All emissions, radiated	±3.84dB

5.0 Antenna Requirement

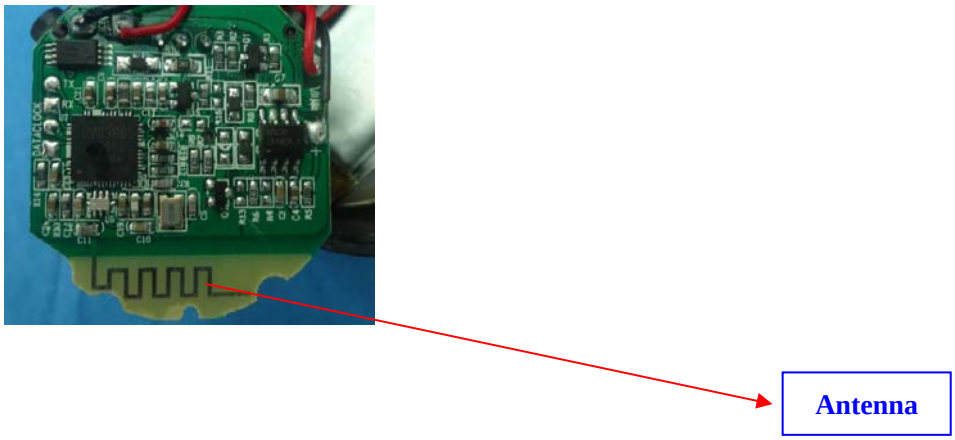
5.1 Standard applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitter antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the mount in dB that the directional gain of the antenna exceeds 6 dBi.

5.2 Antenna specification

According to the manufacturer declared, the E.U.T. has an integral antenna; and no consideration of replacement. Therefore the E.U.T. is considered sufficient to comply with the provision.



6.0 Power Line Conducted Emission Test

6.1 Test equipment

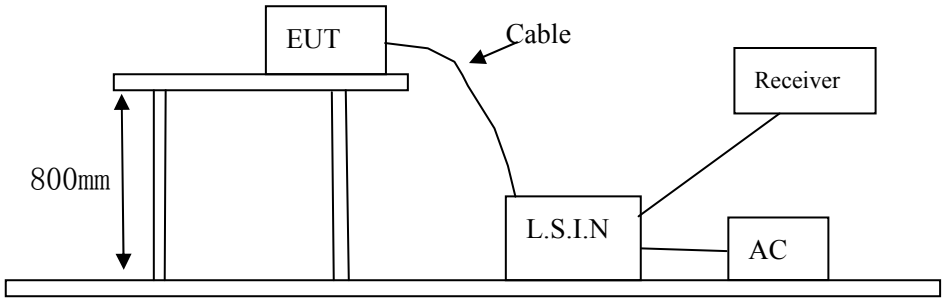
Instrument Type	Model	Serial No.	Manufacturer	Date of Cal.	Due Date
EMI Test Receiver	ESCS30	100139	R&S	Nov. 20, 2013	Nov. 19, 2014
LISN	LS16C	16010222119	AFJ	Nov. 20, 2013	Nov. 19, 2014

6.2 Test method and test procedure

The E.U.T. was tested according to ANSI C63.10-2009.The Frequency spectrum From 0.15MHz to 30MHz was investigated.

Test Voltage: 120V~, 60Hz

6.3 Block diagram of test setup



6.4 E.U.T. operating condition

Operating condition is according to ANSI C63.10 -2009

1) Setup the E.U.T. and simulators as shown on the following

2) Enable AF signal and confirm E.U.T. active to normal condition

6.5 Power line conducted emission limit according to paragraph 15.207

Frequency(MHz)	Class A Limits (dB μ V)		Class B Limits (dB μ V)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ～ 0.50	79.0	66.0	66.0～56.0*	56.0～46.0*
0.50 ～ 5.00	73.0	60.0	56.0	46.0
5.00 ～ 30.00	73.0	60.0	60.0	50.0

Notes: 1) *Decreasing linearly with logarithm of frequency.

2) The tighter limit shall apply at the transition frequencies

6.6 Test specification

Environmental conditions: Temperature: 25° C Humidity: 50% Atmospheric pressure: 103kPa

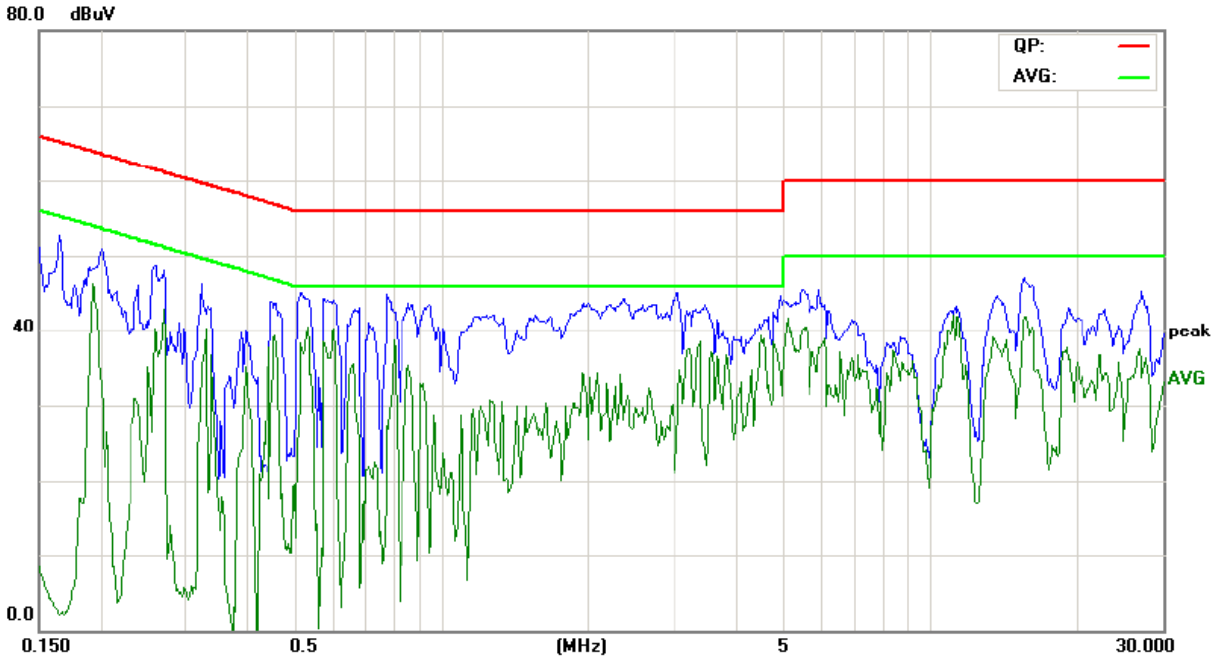
6.7 Test result

Pass.

Conducted Emission on Line Terminal of the power line (150kHz to 30MHz)

E.U.T. Description:	Small cylindrical bluetooth speakers
Operation Mode:	Tx mode
Tested By:	Bill
Test date:	Sept. 05, 2014

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s

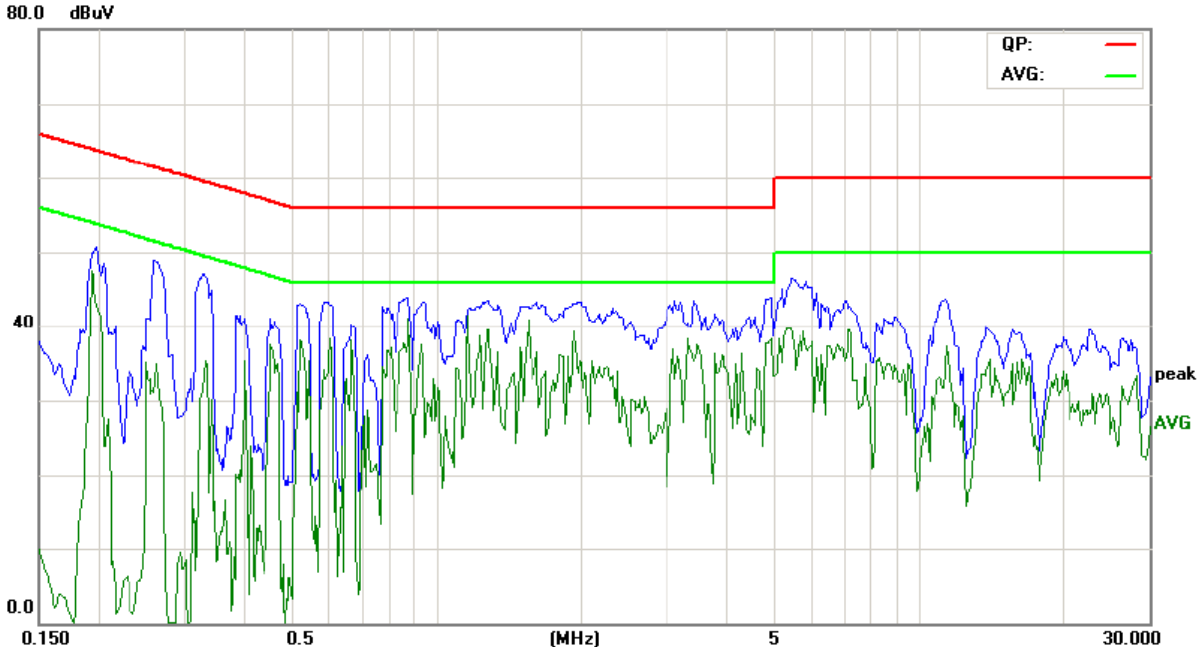


Frequency (MHz)	Reading(dB μ V)				Limit (dB μ V)	
	Live		Neutral			
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
			--	--		
			--	--		
			--	--		
			--	--		
			--	--		
			--	--		

Conducted Emission on Neutral Terminal of the power line (150kHz to 30MHz)

E.U.T. Description:	Small cylindrical bluetooth speakers
Operation Mode:	Tx mode
Tested By:	Bill
Test Data:	Sept. 05, 2014

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s



Frequency (MHz)	Reading(dB μ V)				Limit (dB μ V)	
	Live		Neutral			
	Quasi-peak	Average	Quasi-peak	Average	Quasi-peak	Average
	--	--				
	--	--				
	--	--				
	--	--				
	--	--				
	--	--				

7.0 Maximum Peak Output Power

7.1 Test equipment

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	Nov. 20, 2013	Nov. 19, 2014

7.2 Test specification

Environmental conditions: Temperature 24° C Humidity: 50% Atmospheric pressure: 103kPa

7.3 Test procedure

1) Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
2) Set the spectrum analyzer as follows: Span = approximately 5 times the 20 dB bandwidth, centred on a hopping channel; RBW > the 20 dB bandwidth of the emission being measured; VBW ≥ RBW; Sweep =auto; Detector function = peak; Trace = max hold
3) Measure the highest amplitude appearing on spectral display and record the level to calculate results.
4) Repeat above procedures until all frequencies measured were complete.

7.4 Limits

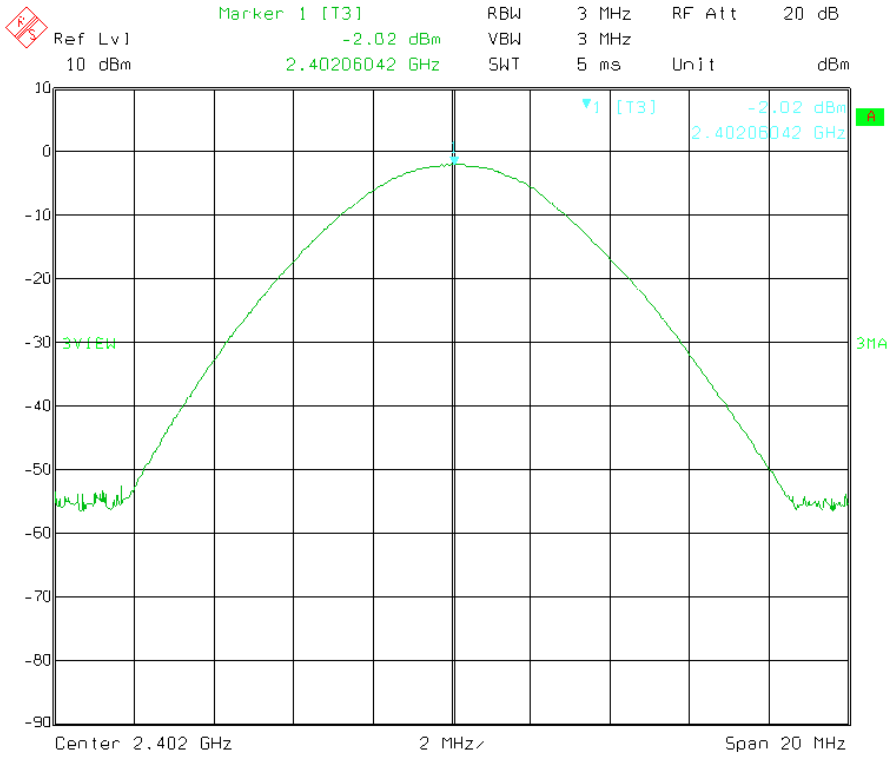
According to §15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5MHz band: 0.125 watts. 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, if 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.

7.5 Test result

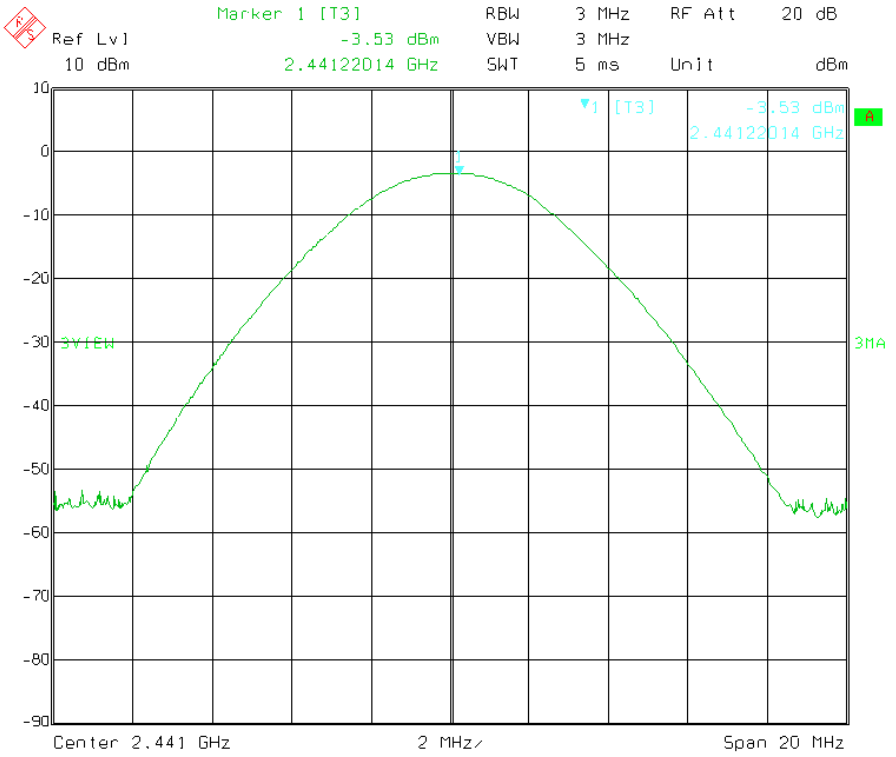
Modulation Type	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (mW)	Peak Power Limit (dBm)	Pass/ Fail
GFSK	2402	-2.02	125	20.97	Pass
	2441	-3.53	125	20.97	Pass
	2480	-4.45	125	20.97	Pass
Pi/4 QDPSK	2402	-3.71	125	20.97	Pass
	2441	-5.15	125	20.97	Pass
	2480	-6.55	125	20.97	Pass
8 DPSK	2402	-3.63	125	20.97	Pass
	2441	-4.84	125	20.97	Pass
	2480	-5.52	125	20.97	Pass

Modulation: GFSK

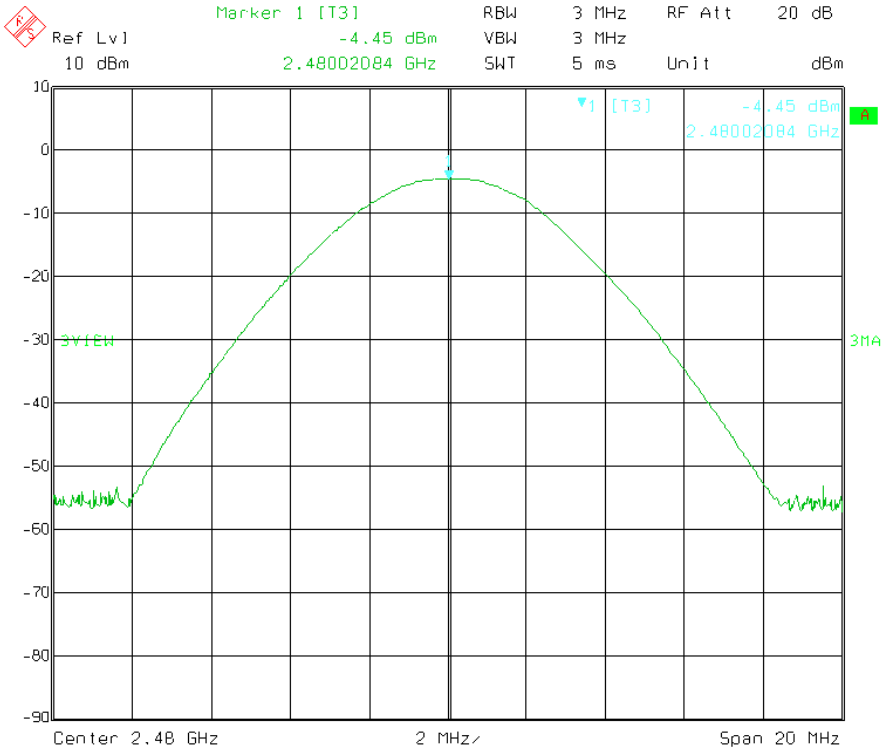
Low channel



Middle channel

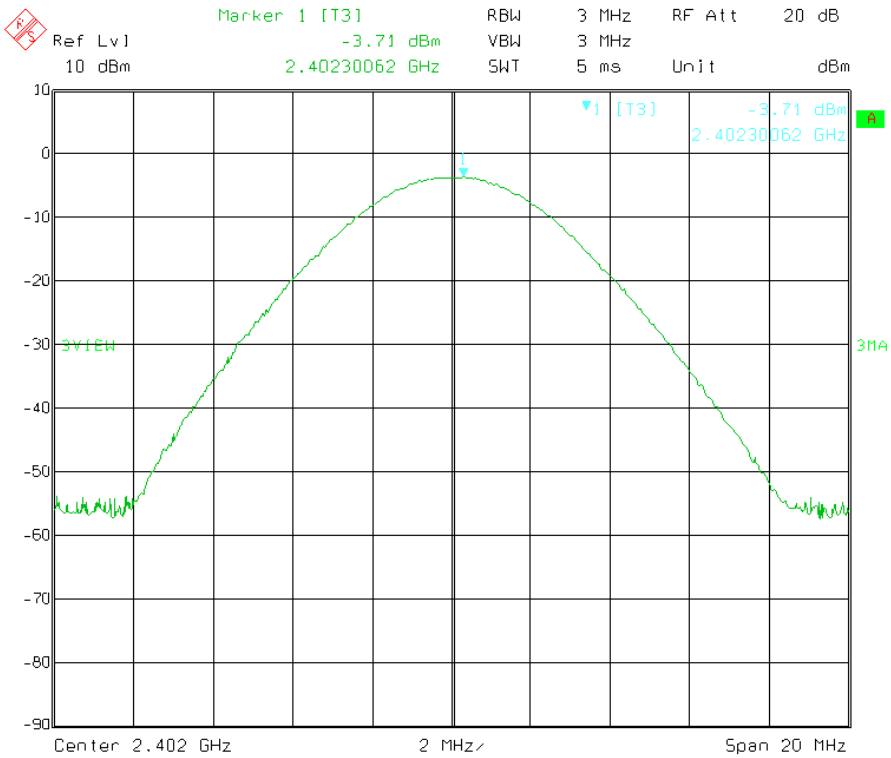


High channel

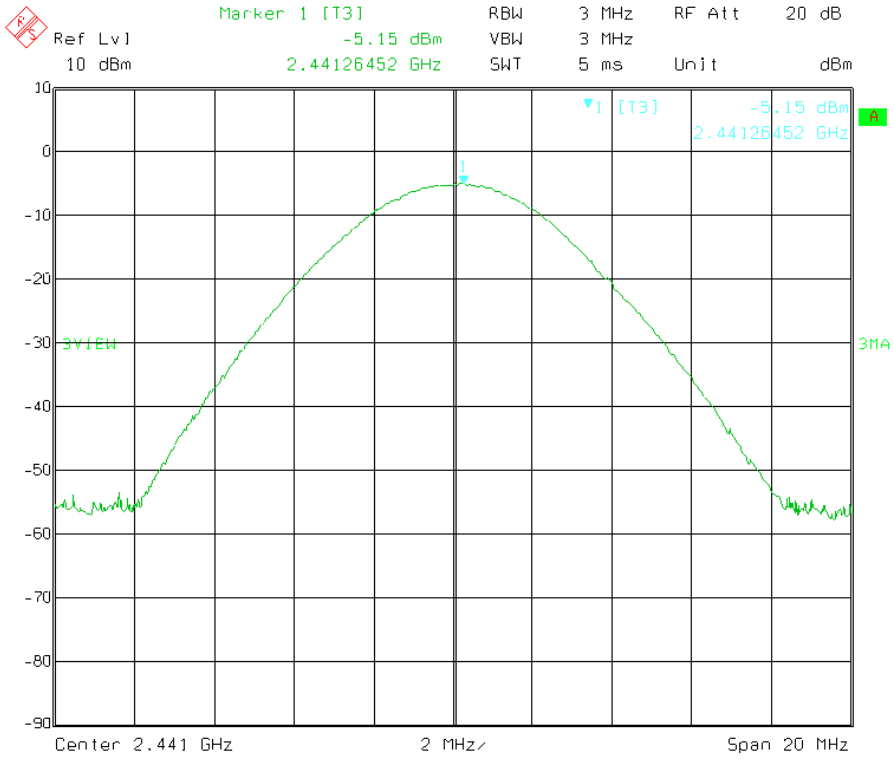


Modulation: Pi/4 DQPSK

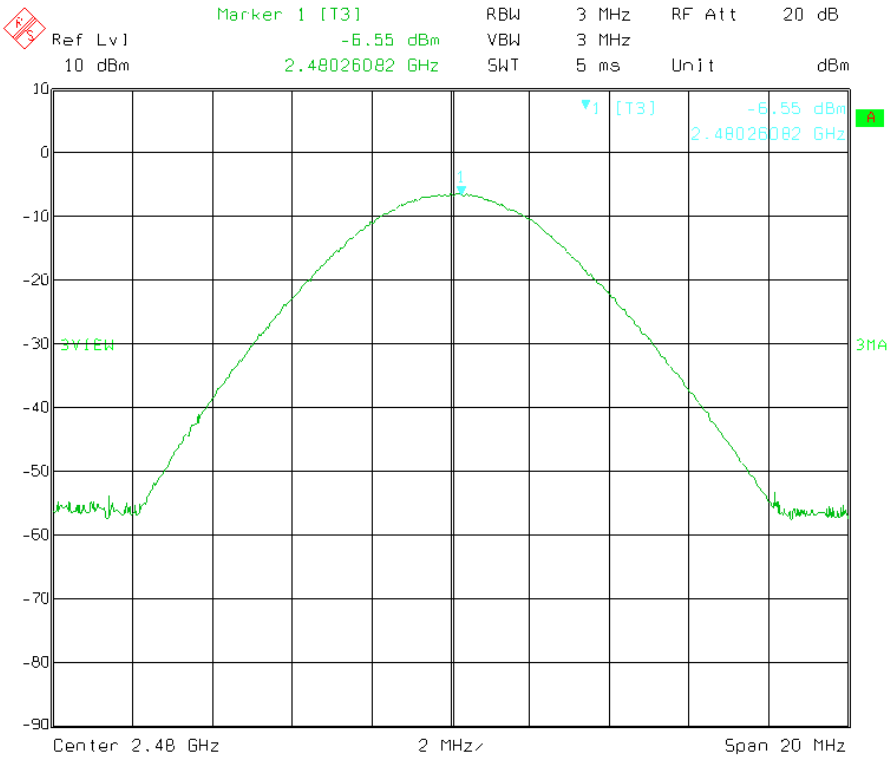
Low channel



Middle channel

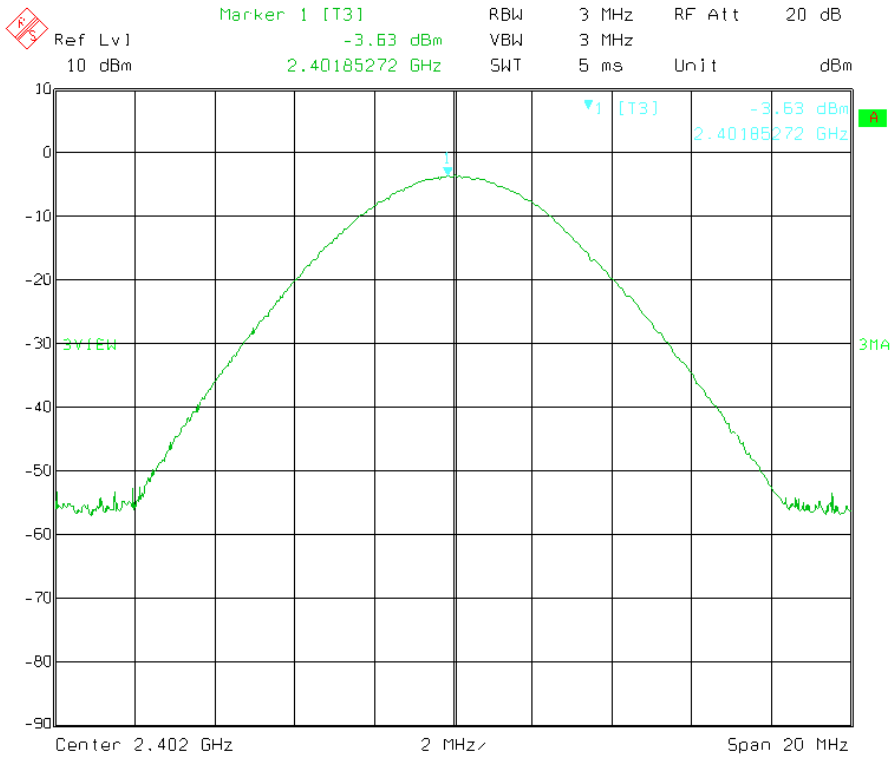


High channel

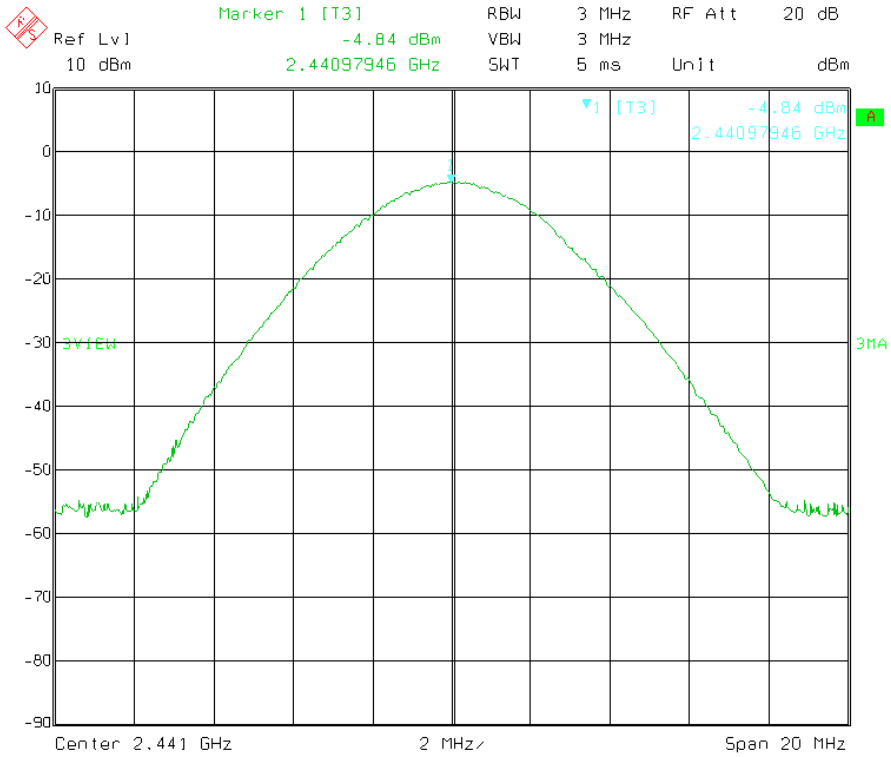


Modulation: 8DPSK

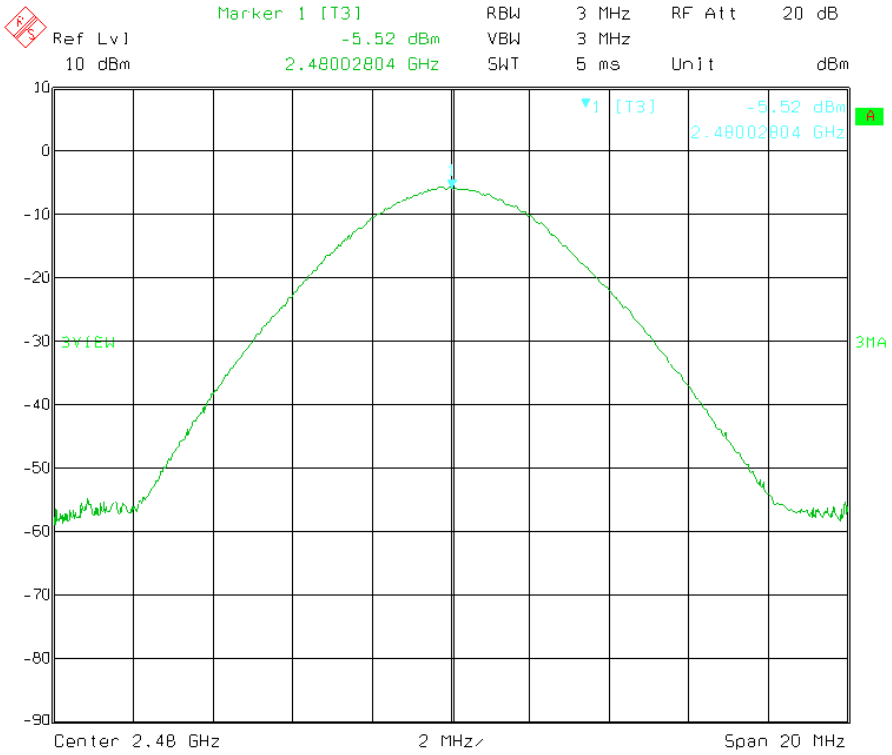
Low channel



Middle channel



High channel



8.0 20dB Bandwidth Measurement

8.1 Test equipment

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	Nov. 20, 2013	Nov. 19, 2014

8.2 Test specification

Environmental conditions: Temperature 23° C Humidity: 51% Atmospheric pressure: 103kPa

8.3 Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

8.4 Test status

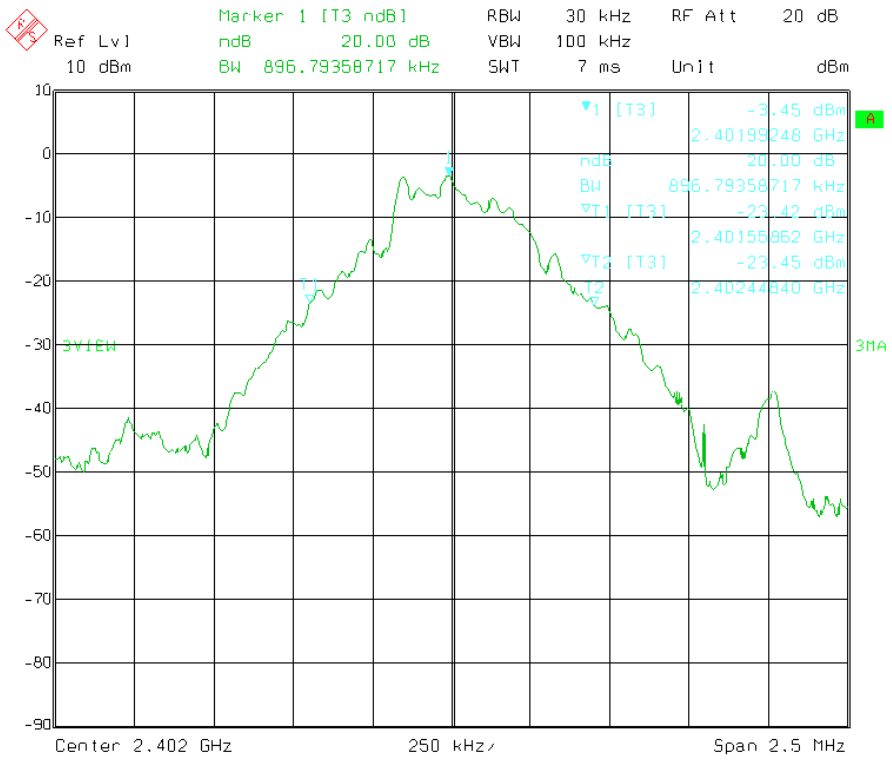
Pre-tests were made in continuous transmitting mode at lowest (2402 MHz), middle (2441 MHz) and highest (2480MHz) channel with GFSK, Pi/4 QDPSK and 8DPSK mode, which indicates that the worst case is 8DPSK mode, so it is reported GFSK and 8DPSK mode only.

8.5 Test result

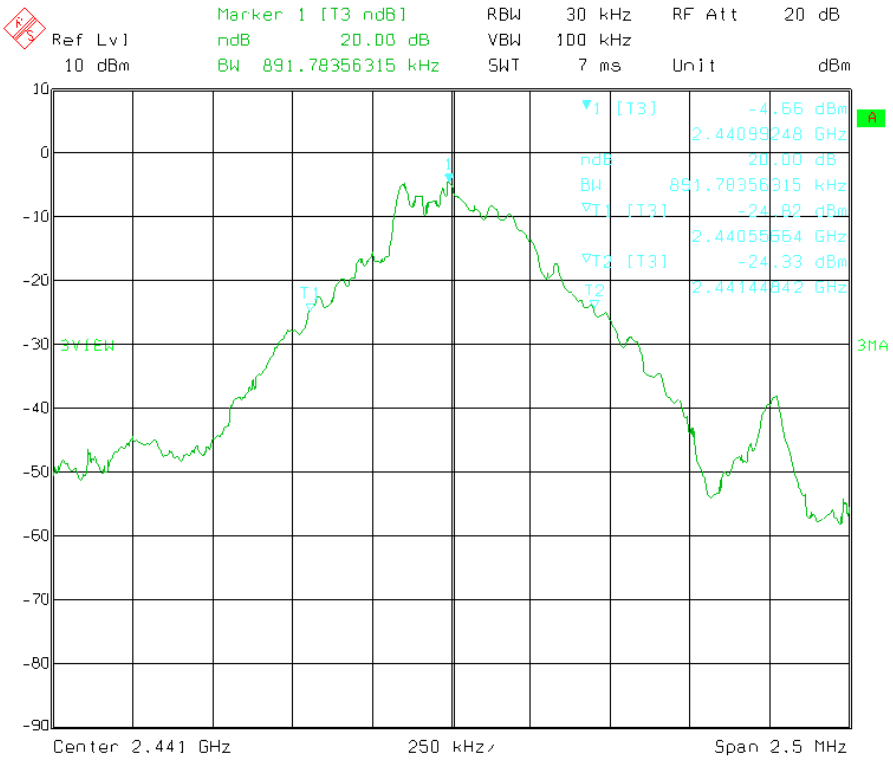
Modulation Type	Channel number	20dB Bandwidth (kHz)	Limit (kHz)	Conclusion
GFSK	Low	896.8	---	PASS
	Middle	891.8	---	PASS
	High	891.8	---	PASS
8DPSK	Low	1217.4	---	PASS
	Middle	1212.4	---	PASS
	High	1212.4	---	PASS

Modulation: GFSK

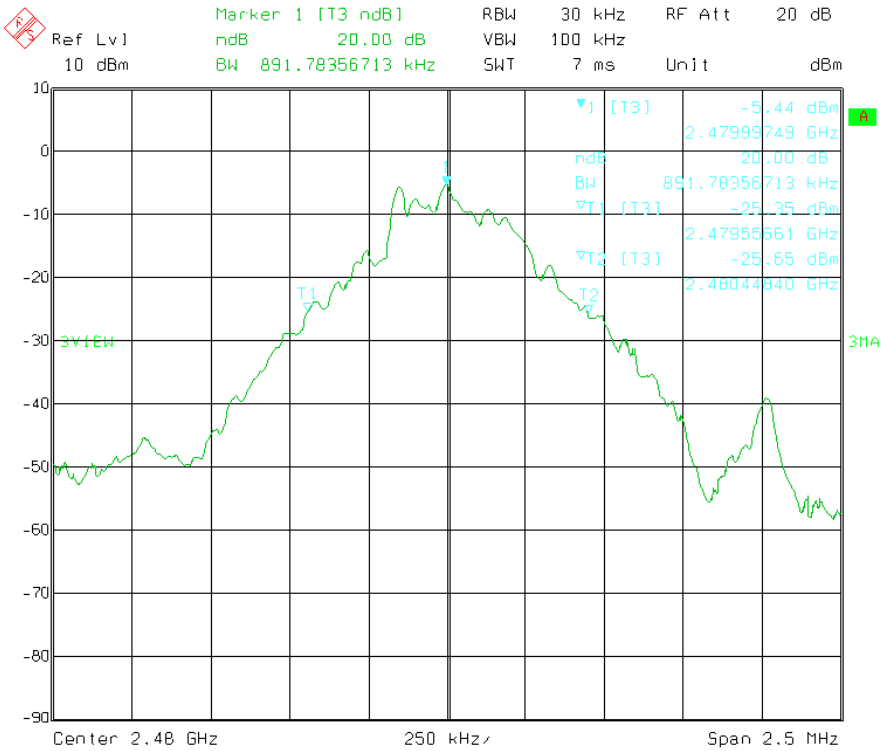
Low channel



Middle channel

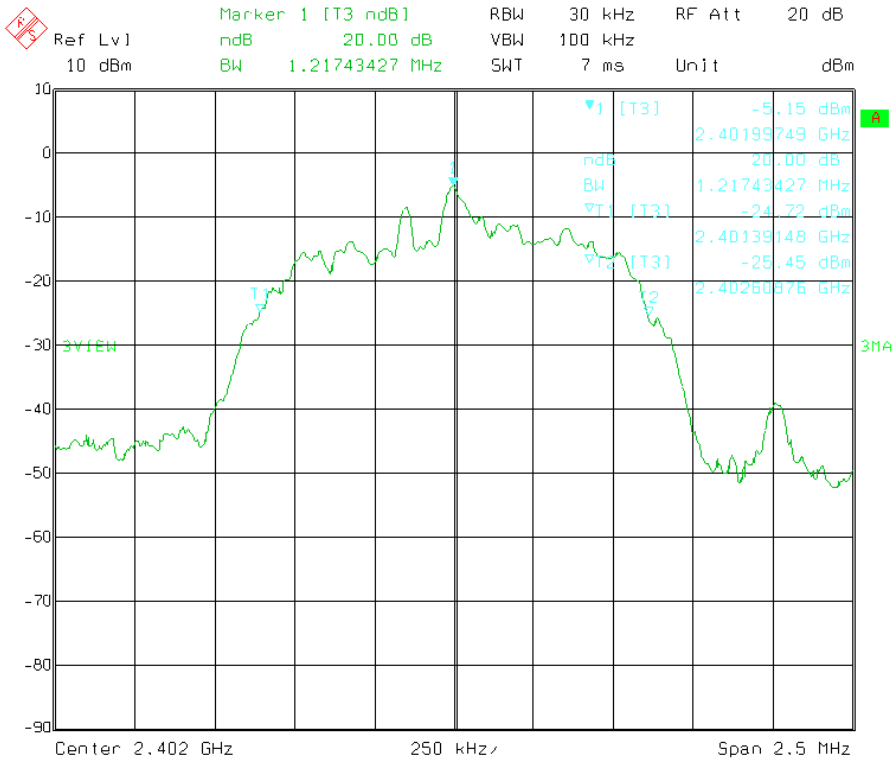


High channel

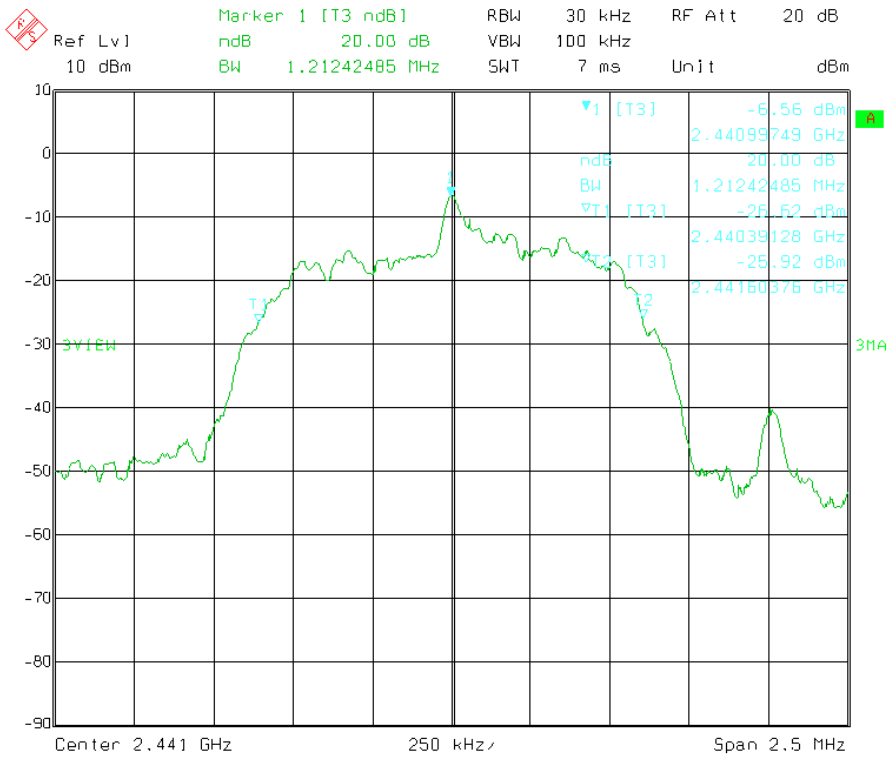


Modulation: 8DPSK

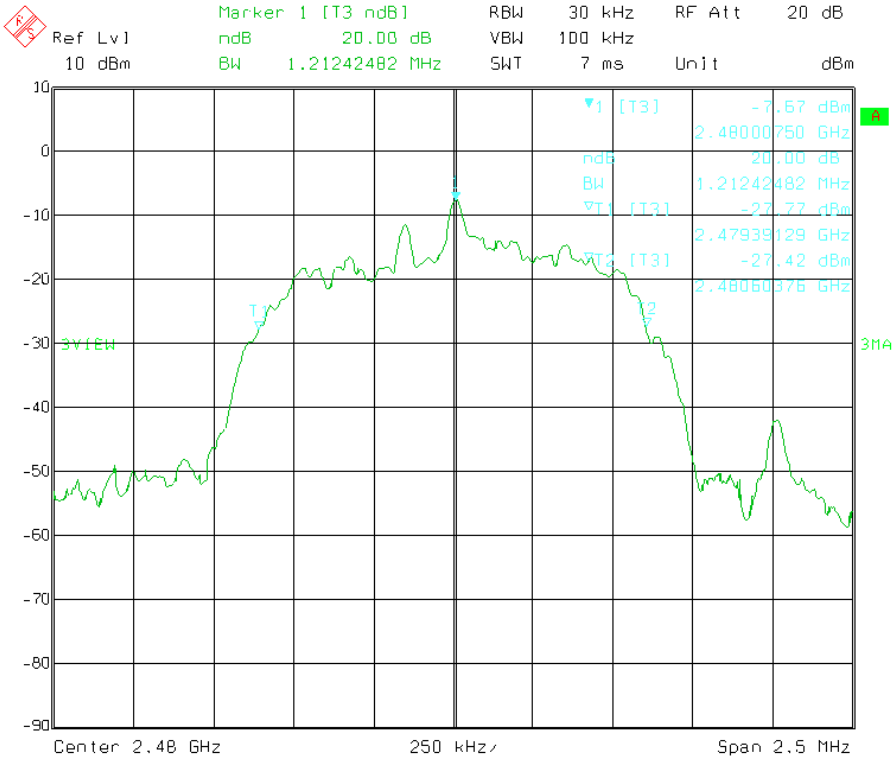
Low channel



Middle channel



High channel



9.0 Carrier Frequency Separation

9.1 Test equipment

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	Nov. 20, 2013	Nov. 19, 2014

9.2 Test specification

Environmental conditions: Temperature 25° C Humidity: 50% Atmospheric pressure: 103kPa

9.3 Test procedure

1. Set the spectrum analyzer as follows: Span = wide enough to capture the peaks of two adjacent channels: Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span; Video (or Average) Bandwidth (VBW) ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold
2. Measure the separation between the peaks of the adjacent channels using the marker-delta function.
3. Repeat above procedures until all frequencies measured were complete.

9.4 Limits

According to §15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

9.5 Test status

Pre-tests were made in continuous transmitting mode at lowest (2402 MHz), middle (2441 MHz) and highest (2480MHz) channel with GFSK, Pi/4 QDPSK and 8DPSK mode, which indicates that the worst case is 8DPSK mode, so it is reported GFSK and 8DPSK mode only.

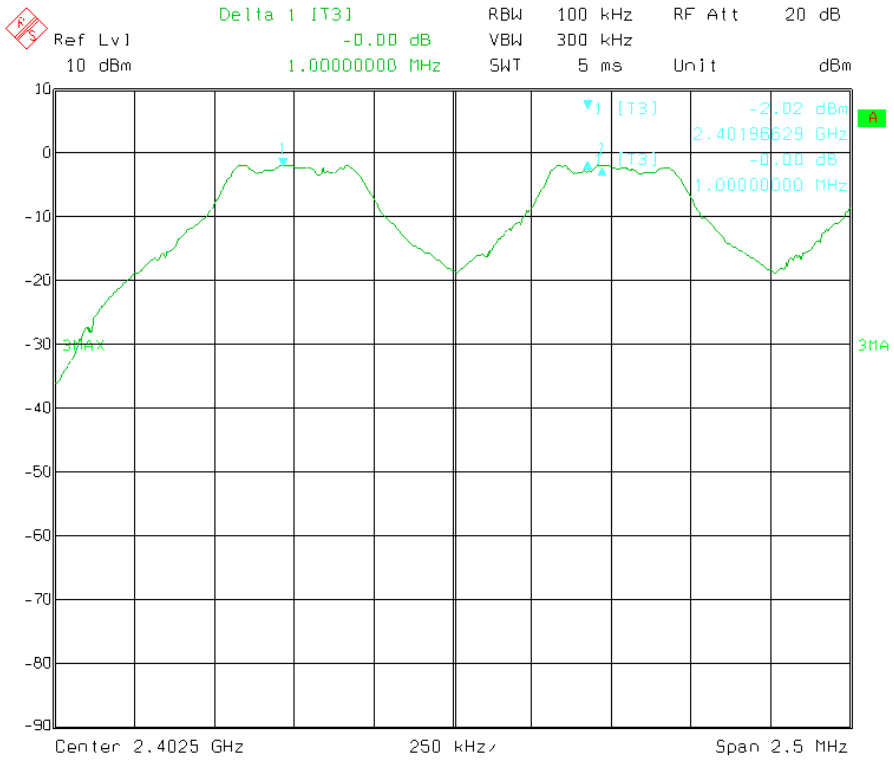
9.6 Test result

Modulation Type	Channel number	Carrier Frequency Separation	Limit	Pass/ Fail
GFSK	Low	1.000MHz	≥ 25 kHz or two-thirds 20 dB bandwidth	Pass
	Middle	1.000MHz		Pass
	High	1.000MHz		Pass
8DPSK	Low	1.000MHz	≥ 25 kHz or two-thirds 20 dB bandwidth	Pass
	Middle	1.000MHz		Pass
	High	1.000MHz		Pass

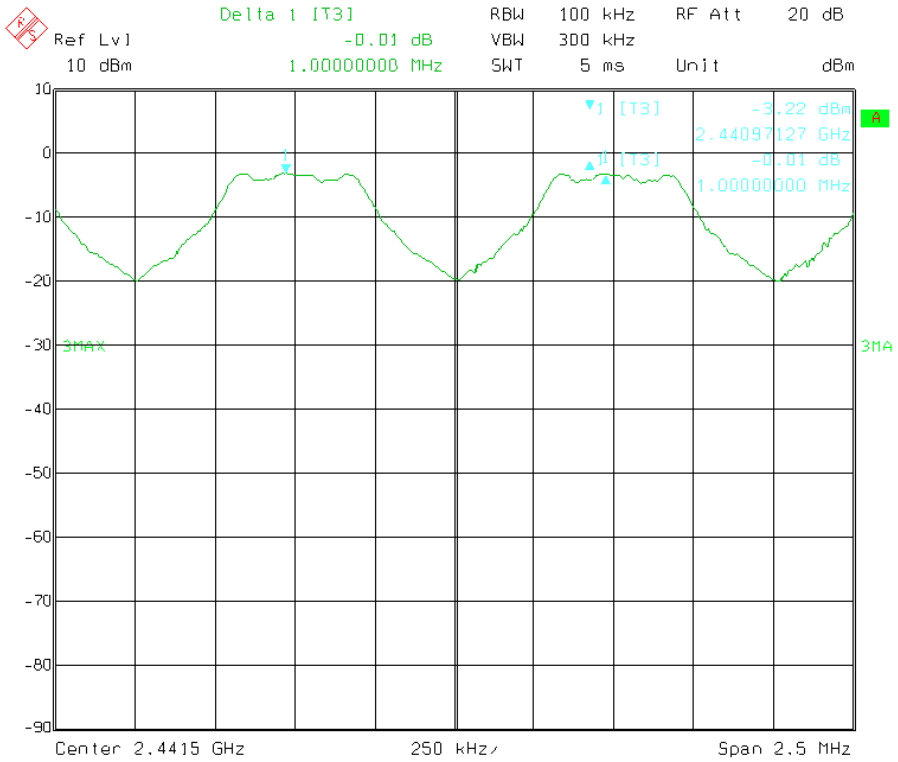
Note: Two-thirds 20 dB bandwidth: GFSK: 597.9 kHz; 8DPSK: 811.6 kHz

Modulation: GFSK

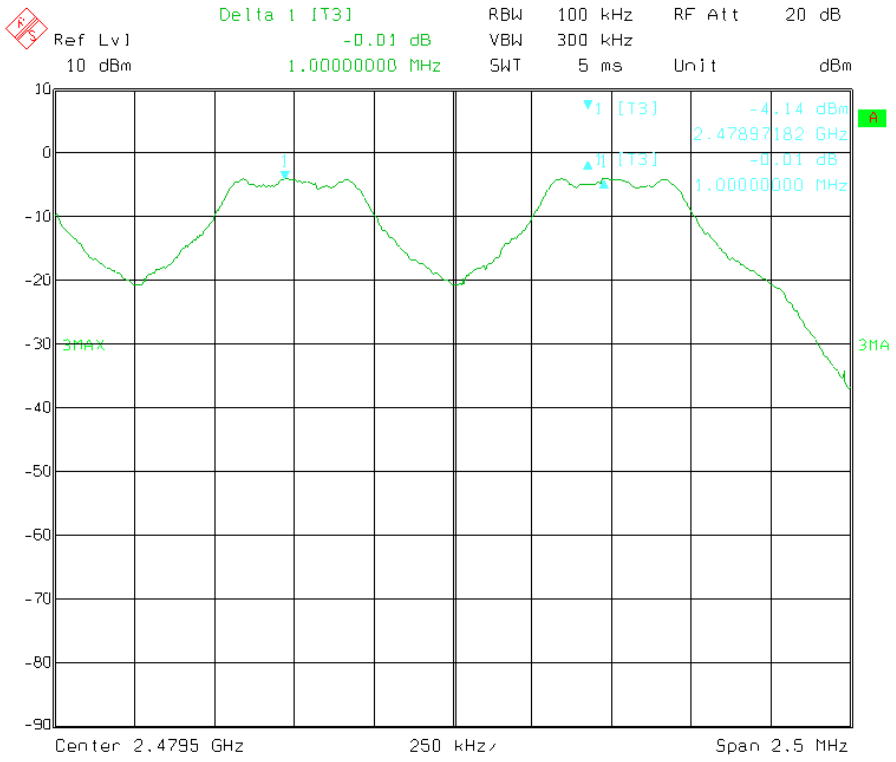
Low channel



Middle channel

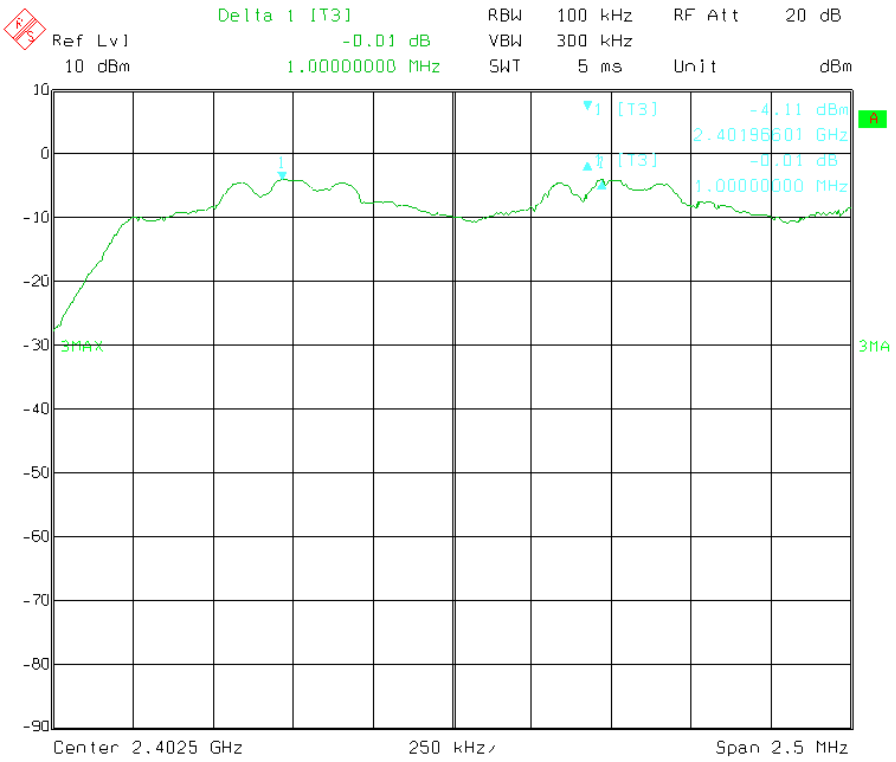


High channel

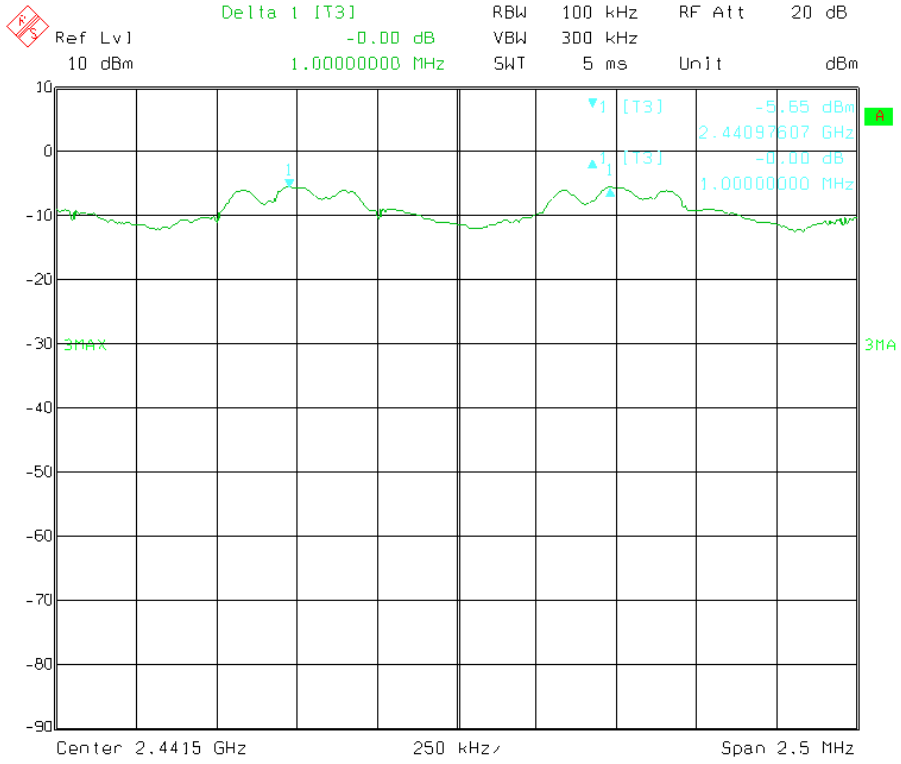


Modulation: 8DPSK

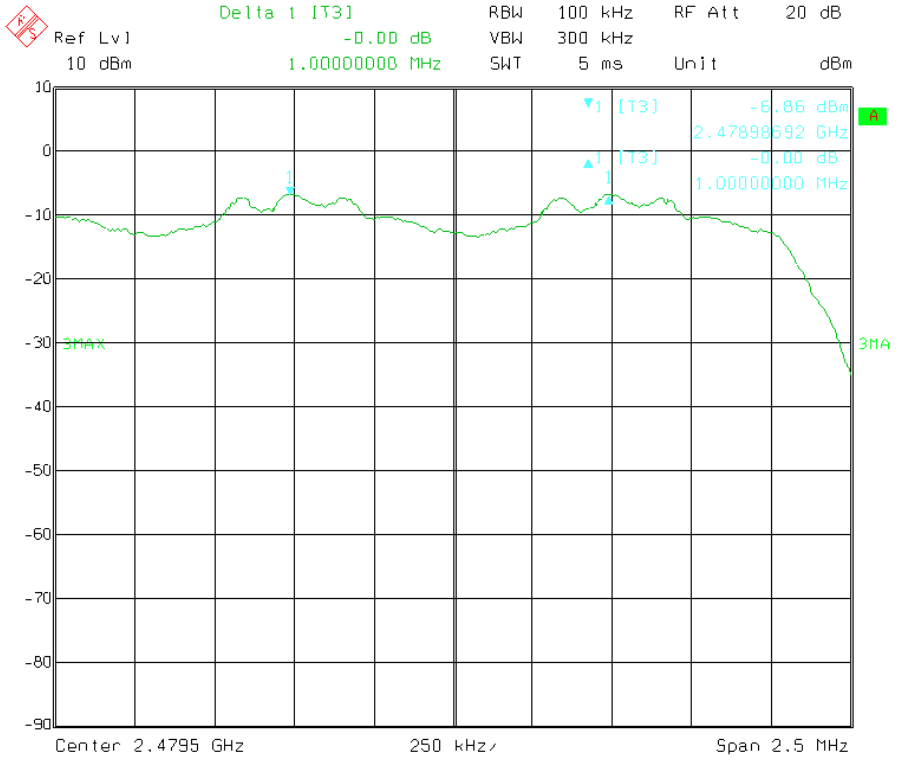
Low channel



Middle channel



High channel



10.0 Number of Hopping Channels

10.1 Test equipment

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	Nov. 20, 2013	Nov. 19, 2014

10.2 Test specification

Environmental conditions: Temperature 25° C Humidity: 50% Atmospheric pressure: 103kPa

10.3 Test procedure

Set the spectrum analyzer as follows: Span = the frequency band of operation; RBW ≥ 1% of the span; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold

10.4 Limits

According to §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

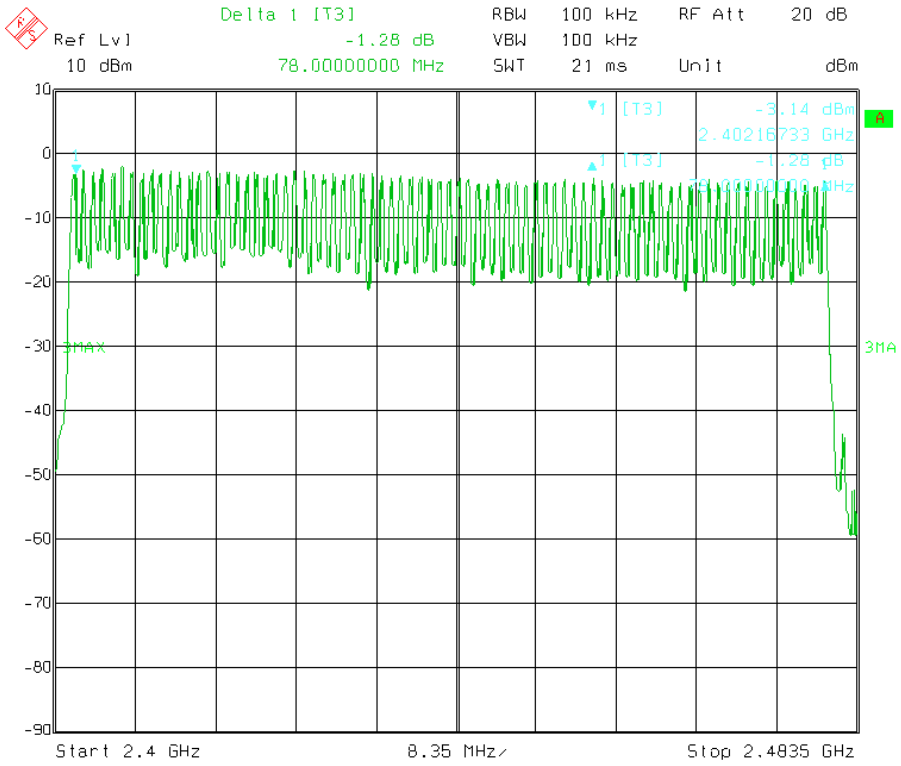
10.5 Test status

Pre-tests were made in continuous transmitting mode at lowest (2402 MHz), middle (2441 MHz) and highest (2480MHz) channel with GFSK, Pi/4 QDPSK and 8DPSK mode, which indicates that the worst case is 8DPSK mode, so it is reported GFSK and 8DPSK mode only.

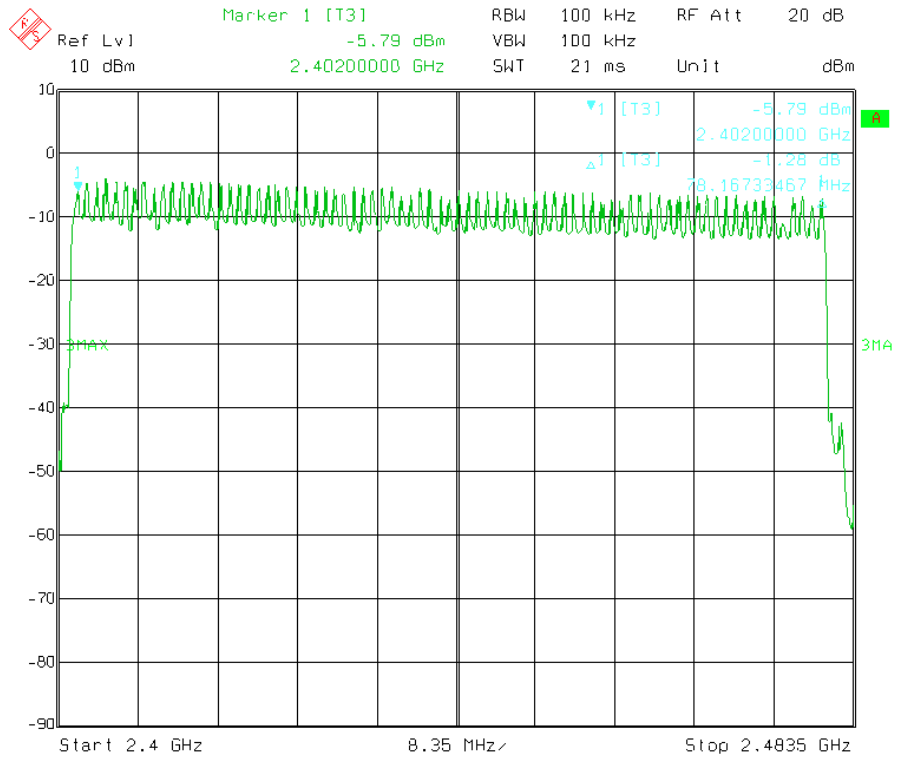
10.6 Test result

Modulation Type	Operating Frequency	Number of hopping channels	Limit	Pass/ Fail
GFSK	2402-2480MHz	79	≥ 15	Pass
8DPSK	2402-2480MHz	79	≥ 15	Pass

Modulation Type: GFSK



Modulation Type: 8DPSK



11.0 Time of Occupancy (Dwell Time)

11.1 Test equipment

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	Nov. 20, 2013	Nov. 19, 2014

11.2 Test specification

Environmental conditions: Temperature 22° C Humidity: 52% Atmospheric pressure: 103kPa

11.3 Test procedure

Span = zero span, centred on a hopping channel; RBW = 1 MHz; VBW ≥ RBW; Detector function = peak;
Sweep = as necessary to capture the entire dwell time per hopping channel; Trace = max hold
Measure the dwell time using the marker-delta function.
Repeat this test for different modes of operation (e.g., data rate, modulation format, etc.), if applicable.

11.4 Limits

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed

11.5 Test status

Pre-tests were made in continuous transmitting mode at lowest (2402 MHz), middle (2441 MHz) and highest (2480MHz) channel with GFSK, Pi/4 QDPSK and 8DPSK mode, which indicates that the worst case is 8DPSK mode, so it is reported GFSK and 8DPSK mode only.

11.6 Test result

Modulation Type	Packet	Reading (ms)	Hoping Rate	Actual (s)	Limit (s)
GFSK	DH1	0.555	800hop/s	0.178	0.4
	DH3	1.810	400hop/s	0.290	0.4
	DH5	3.122	266.667hop/s	0.333	0.4
8DPSK	DH1	0.540	800hop/s	0.173	0.4
	DH3	1.810	400hop/s	0.290	0.4
	DH5	3.107	266.667hop/s	0.331	0.4

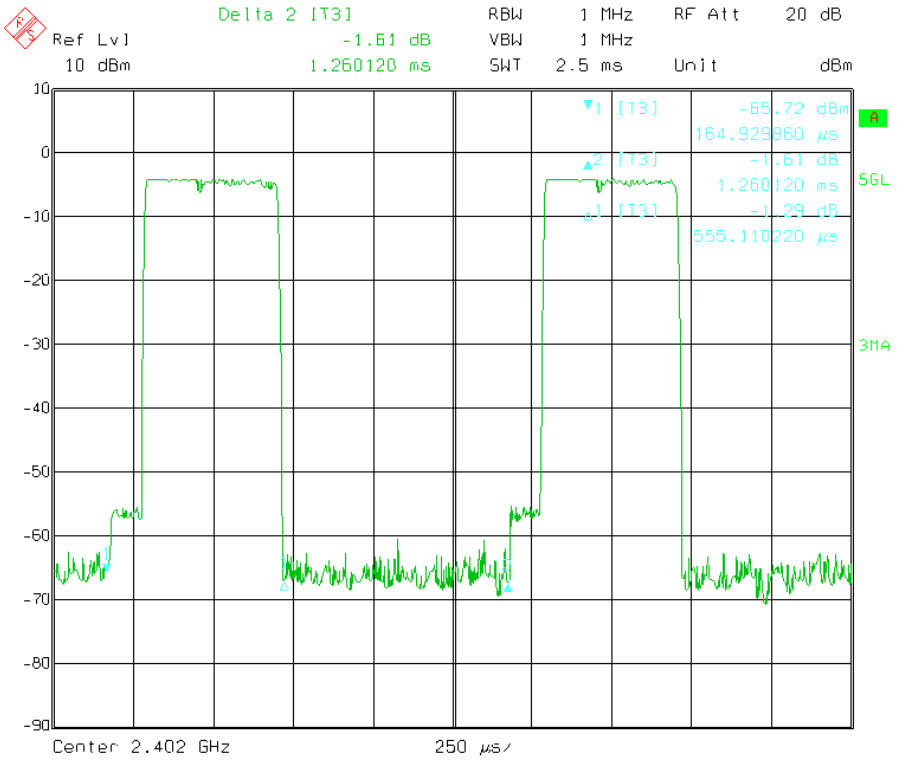
Note: 1) The measurements were conducted in High, Middle, Low channel. The Low channel could represent the character of the other channels, so the low channel measurement was submitted in the report only.

2) Actual = Reading × (Hopping rate / Number of channels) × Test period

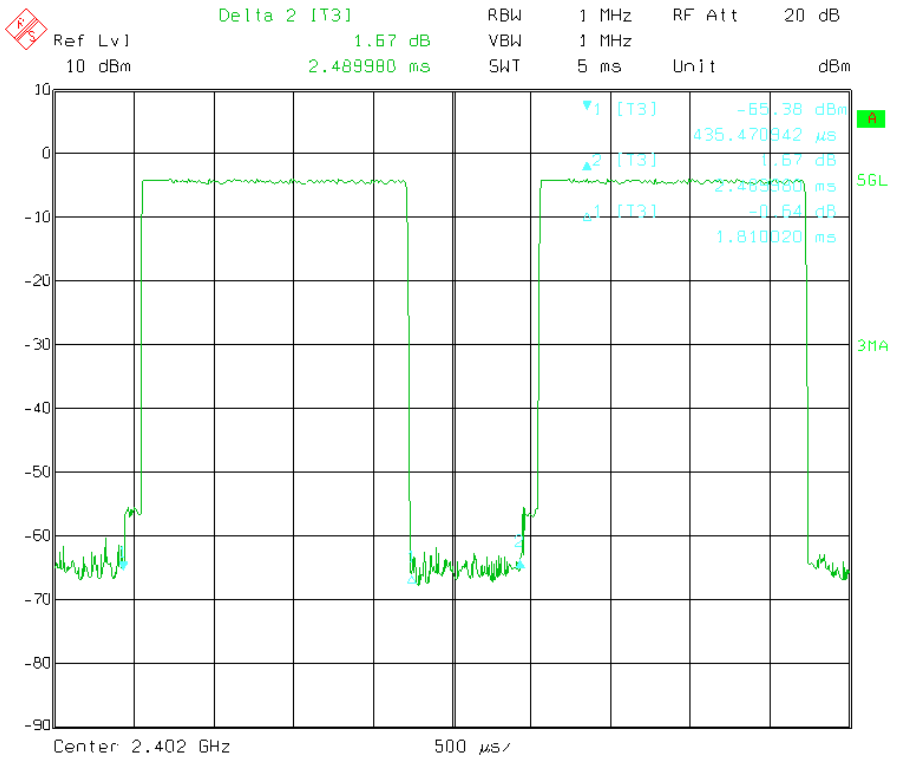
3) The E.U.T. makes worst case 1600 hops per second or 1 time slot has a length of 625μs with 79 channels. A DH5 Packet needs 5 time slot for transmitting and 1 time slot for receiving. So the E.U.T. makes worst case 266.667 hops per second with 79 channels, and the DH5 is the worst case.

Modulation Type: GFSK

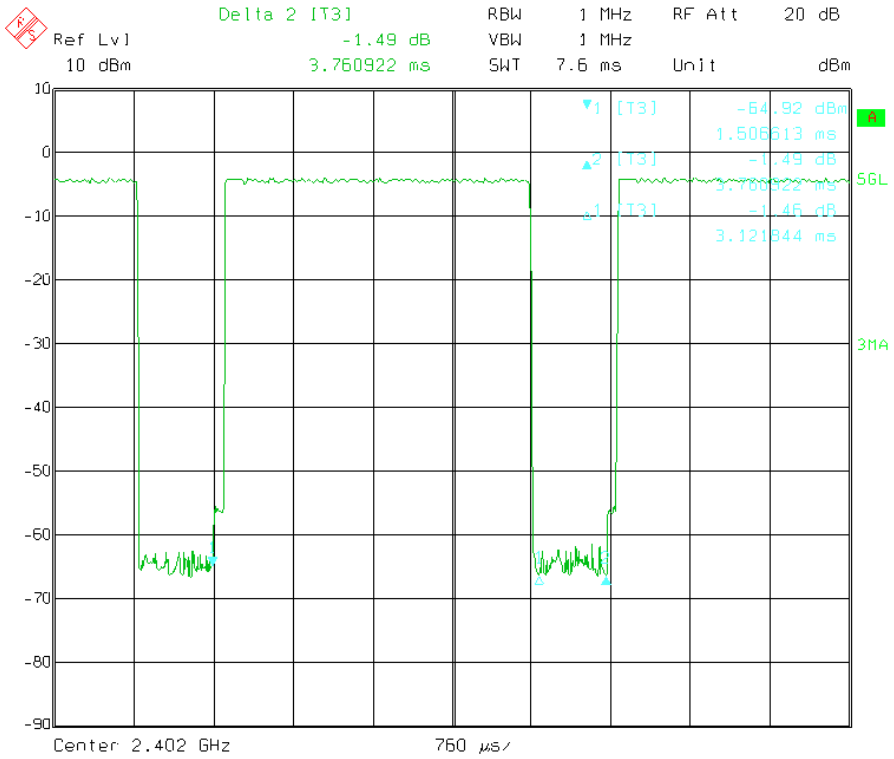
Packet Type: DH1



Packet Type: DH3

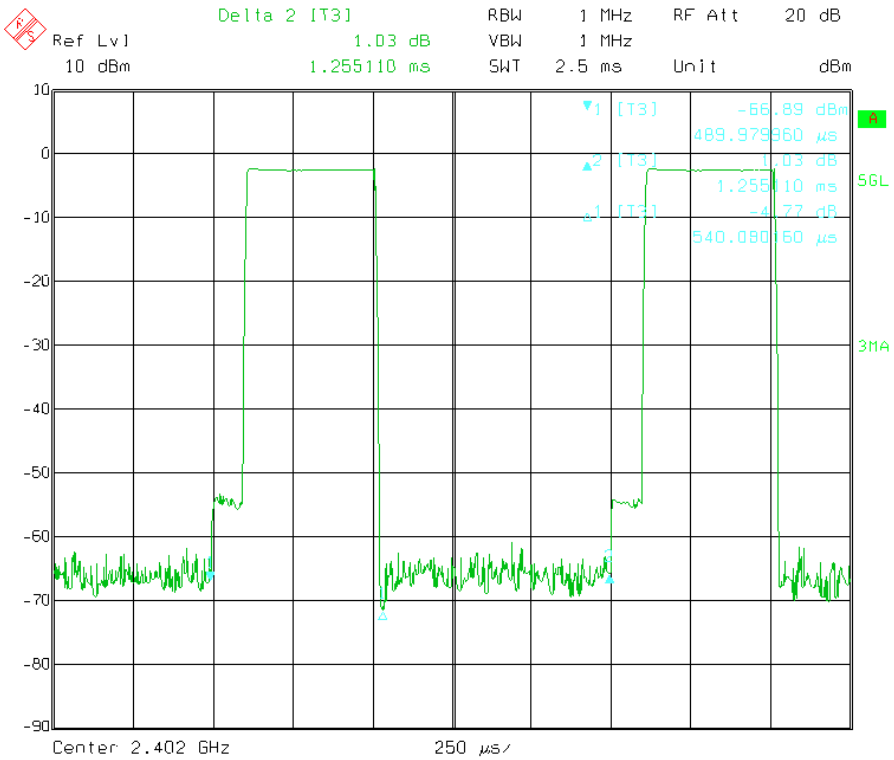


Packet Type: DH5

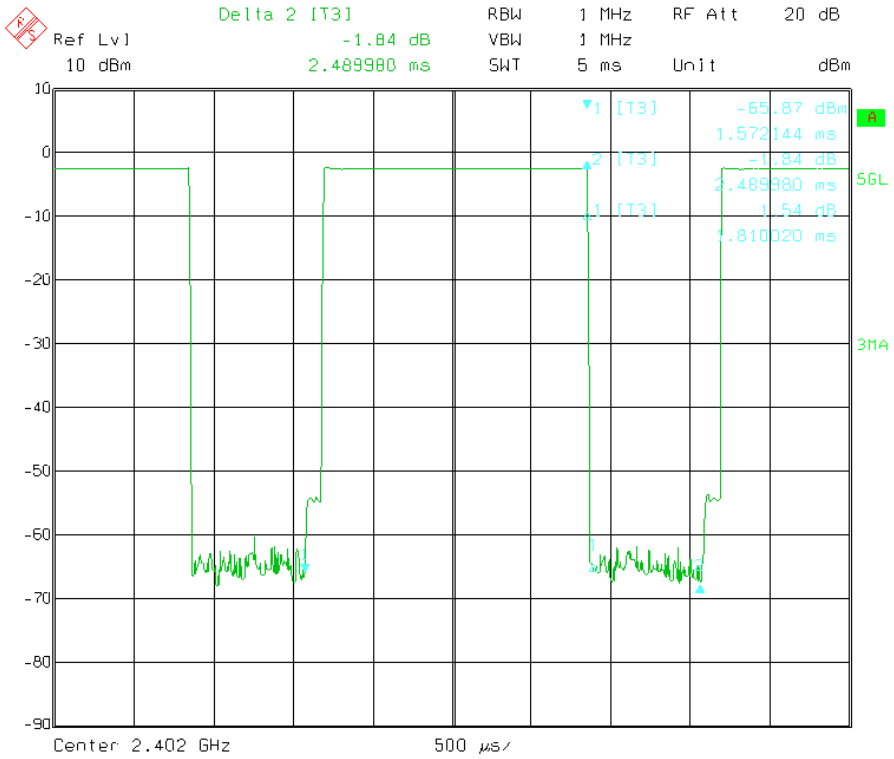


Modulation Type: 8DPSK

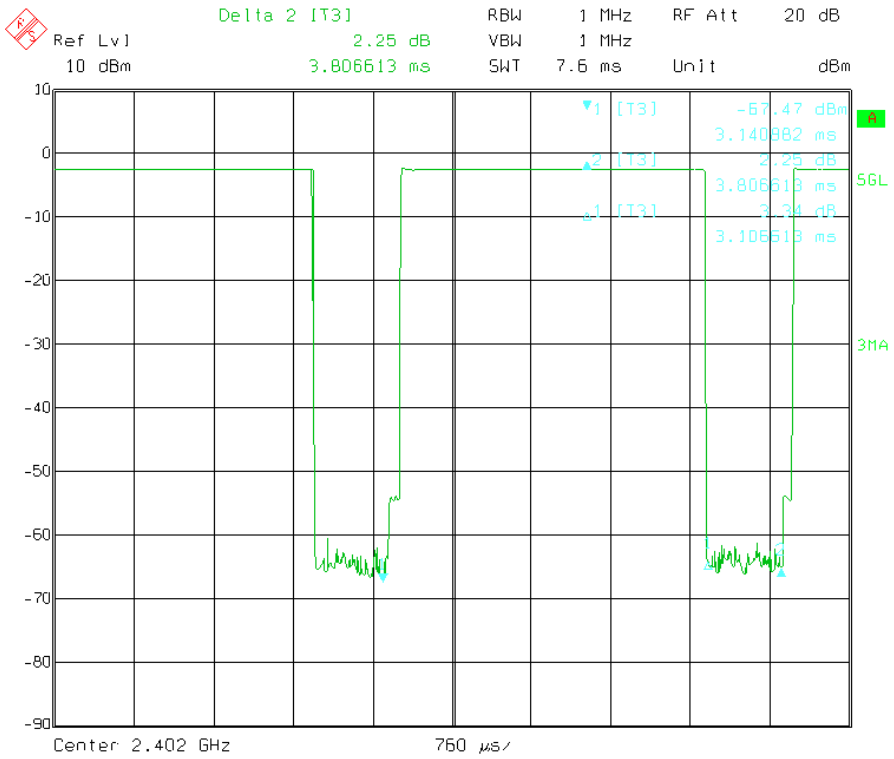
Packet Type: 3-DH1



Packet Type: 3-DH3



Packet Type: 3-DH5



12.0 Band edge Measurement

12.1 Test equipment

Instrument Type	Model	Serial No.	Manufacturer	Date of Cal.	Due Date
Spectrum Analyzer	FSEM	848597/001	ROHDE&SCHWARZ	Nov. 20, 2013	Nov. 19, 2014
Pre-amplifier	8449B	3008A01738	Agilent	Nov. 21, 2013	Nov. 20, 2014
Horn Antenna	3117	--	ETS LINDGREN	Nov. 21, 2013	Nov. 20, 2014

12.2 Limit

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 15.209(a)

12.3 Test specification

Environmental conditions: Temperature 22° C Humidity: 52% Atmospheric pressure: 103kPa

12.4 Test procedure

For band edge test, the spectrum set as follows: RBW=VBW=100 kHz. A conducted measure method is used
For signals allocated in the restricted bands above and below the 2.4-2.483GHz, a radiated measurement is made (Peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector)

12.5 Test status

Pre-tests were made in continuous transmitting mode at lowest (2402 MHz), middle (2441 MHz) and highest (2480MHz) channel with GFSK, Pi/4 QDPSK and 8DPSK mode, which indicates that the worst case is 8DPSK mode, so it is reported GFSK and 8DPSK mode only.

12.6 Test result

Pass

Modulation: GFSK

Low channel: 2402 MHz							
Frequency (MHz)	Peak Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Peak Final Level (dBuV/m)	Average Limits (dBuV/m)	Antenna Polarity
2310	42.56	27.34	2.32	32.14	40.08	54.00	Horizontal
2387.68	45.82	28.29	2.45	32.33	44.23	54.00	Horizontal
2390	52.57	28.29	2.45	32.33	50.98	54.00	Horizontal
2310	40.29	27.34	2.32	32.14	37.81	54.00	Vertical
2387.68	45.01	28.29	2.45	32.33	43.42	54.00	Vertical
2390	49.16	28.29	2.45	32.33	47.57	54.00	Vertical
High channel: 2480 MHz							
Frequency (MHz)	Peak Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Peak Final Level (dBuV/m)	Average Limits (dBuV/m)	Antenna Polarity
2483.5	55.24	28.29	2.67	32.33	53.87	54.00	Horizontal
2491.27	48.81	28.29	2.67	32.33	47.44	54.00	Horizontal
2500	44.61	28.29	2.67	32.33	43.24	54.00	Horizontal
2483.5	53.46	28.29	2.67	32.33	52.09	54.00	Vertical
2491.27	46.15	28.29	2.67	32.33	44.78	54.00	Vertical
2500	41.69	28.29	2.67	32.33	40.32	54.00	Vertical

Modulation: 8DPSK

Low channel: 2402 MHz							
Frequency (MHz)	Peak Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Peak Final Level (dBuV/m)	Average Limits (dBuV/m)	Antenna Polarity
2310	42.24	27.34	2.32	32.14	39.76	54.00	Horizontal
2387.68	45.19	28.29	2.45	32.33	43.60	54.00	Horizontal
2390	52.82	28.29	2.45	32.33	51.23	54.00	Horizontal
2310	40.64	27.34	2.32	32.14	38.16	54.00	Vertical
2387.68	45.34	28.29	2.45	32.33	43.75	54.00	Vertical
2390	48.84	28.29	2.45	32.33	47.25	54.00	Vertical
High channel: 2480 MHz							
Frequency (MHz)	Peak Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Peak Final Level (dBuV/m)	Average Limits (dBuV/m)	Antenna Polarity
2483.5	54.78	28.29	2.67	32.33	53.41	54.00	Horizontal
2491.27	48.34	28.29	2.67	32.33	46.97	54.00	Horizontal
2500	44.38	28.29	2.67	32.33	43.01	54.00	Horizontal
2483.5	52.49	28.29	2.67	32.33	51.12	54.00	Vertical
2491.27	45.76	28.29	2.67	32.33	44.39	54.00	Vertical
2500	41.33	28.29	2.67	32.33	39.96	54.00	Vertical

Modulation: GFSK

Keep hopping							
Frequency (MHz)	Peak Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Peak Final Level (dBuV/m)	Average Limits (dBuV/m)	Antenna Polarity
2310	43.18	27.34	2.32	32.14	40.70	54.00	Horizontal
2387.68	44.64	28.29	2.45	32.33	43.05	54.00	Horizontal
2390	51.58	28.29	2.45	32.33	49.99	54.00	Horizontal
2310	41.94	27.34	2.32	32.14	39.46	54.00	Vertical
2387.68	45.38	28.29	2.45	32.33	43.79	54.00	Vertical
2390	48.67	28.29	2.45	32.33	47.08	54.00	Vertical
Keep hopping							
Frequency (MHz)	Peak Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Peak Final Level (dBuV/m)	Average Limits (dBuV/m)	Antenna Polarity
2483.5	53.47	28.29	2.67	32.33	52.10	54.00	Horizontal
2491.27	47.85	28.29	2.67	32.33	46.48	54.00	Horizontal
2500	45.49	28.29	2.67	32.33	44.12	54.00	Horizontal
2483.5	53.19	28.29	2.67	32.33	51.82	54.00	Vertical
2491.27	45.46	28.29	2.67	32.33	44.09	54.00	Vertical
2500	41.28	28.29	2.67	32.33	39.91	54.00	Vertical

Modulation: 8DPSK

Keep hopping							
Frequency (MHz)	Peak Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Peak Final Level (dBuV/m)	Average Limits (dBuV/m)	Antenna Polarity
2310	43.29	27.34	2.32	32.14	40.81	54.00	Horizontal
2387.68	45.61	28.29	2.45	32.33	44.02	54.00	Horizontal
2390	53.87	28.29	2.45	32.33	52.28	54.00	Horizontal
2310	41.26	27.34	2.32	32.14	38.78	54.00	Vertical
2387.68	46.29	28.29	2.45	32.33	44.70	54.00	Vertical
2390	48.83	28.29	2.45	32.33	47.24	54.00	Vertical
Keep hopping							
Frequency (MHz)	Peak Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Peak Final Level (dBuV/m)	Average Limits (dBuV/m)	Antenna Polarity
2483.5	52.46	28.29	2.67	32.33	51.09	54.00	Horizontal
2491.27	48.62	28.29	2.67	32.33	47.25	54.00	Horizontal
2500	45.17	28.29	2.67	32.33	43.80	54.00	Horizontal
2483.5	52.68	28.29	2.67	32.33	51.31	54.00	Vertical
2491.27	45.37	28.29	2.67	32.33	44.00	54.00	Vertical
2500	41.65	28.29	2.67	32.33	40.28	54.00	Vertical

Remark:

1) According to section 15.35(b), the peak limit is 20dB higher than the average limit

2) If the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.

3) The emission levels of other frequencies are very lower than the limit and not shown in the report.

13.0 Spurious Emission Test

13.1 Test equipment

Instrument Type	Model	Serial No.	Manufacturer	Date of Cal.	Due Date
ESPI Test Receiver	ESPI 3	100379	ROHDE&SCHWARZ	Nov. 20, 2013	Nov. 19, 2014
Spectrum Analyzer	FSEM	848597/001	ROHDE&SCHWARZ	Nov. 20, 2013	Nov. 19, 2014
Pre-amplifier	LNA6900	--	Teseq	Nov. 21, 2013	Nov. 20, 2014
Pre-amplifier	8447D	83153007374	Agilent	Nov. 21, 2013	Nov. 20, 2014
Pre-amplifier	8449B	3008A01738	Agilent	Nov. 21, 2013	Nov. 20, 2014
Loop antenna	PLA-1030/B	1029	A.R.A.	Nov. 21, 2013	Nov. 20, 2014
Ultra Broadband ANT	HL562	100157	ROHDE&SCHWARZ	Nov. 21, 2013	Nov. 20, 2014
Horn Antenna	3117	--	ETS LINDGREN	Nov. 21, 2013	Nov. 20, 2014
Horn Antenna	3160	--	ETS LINDGREN	Nov. 21, 2013	Nov. 20, 2014

13.2 Radiated emission limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

Frequencies in restricted band are complied to limit on Paragraph 15.209.

Frequency Range (MHz)	Distance (m)	Field strength (dB μ V/m)
0.009-0.490	3	20log 2400/F (kHz) + 80
0.490-1.705	3	20log 24000/F (kHz) + 40
1.705-30	3	20log 30 + 40
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note: 1) RF Voltage (dBuV) = 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 E.U.T.

4) This is a handhold device. The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.

5) All scanning using PK detector. And the final emission level was get using QP detector for frequency range from 30-1000MHz. As to 1G-25G, the final emission level got using PK and AV detector.

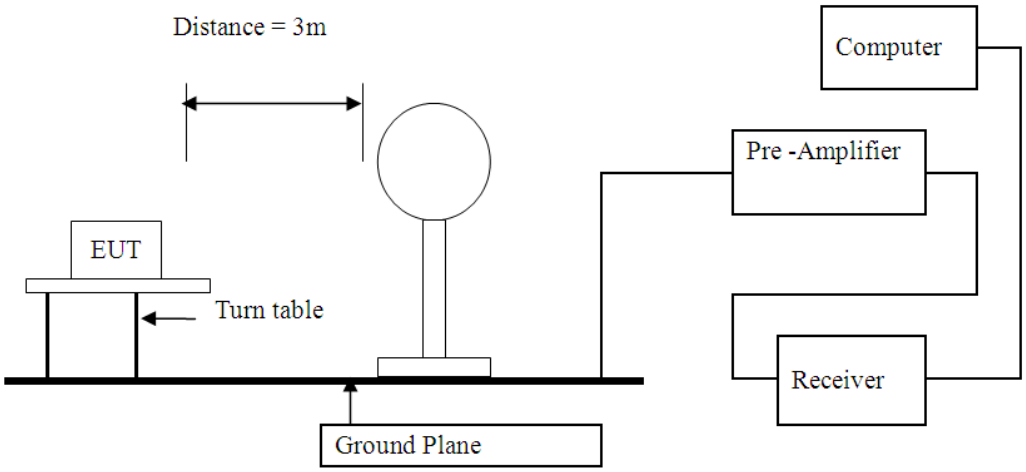
6) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula Ld1 = Ld2 * (d2/d1)

13.3 E.U.T. operating condition

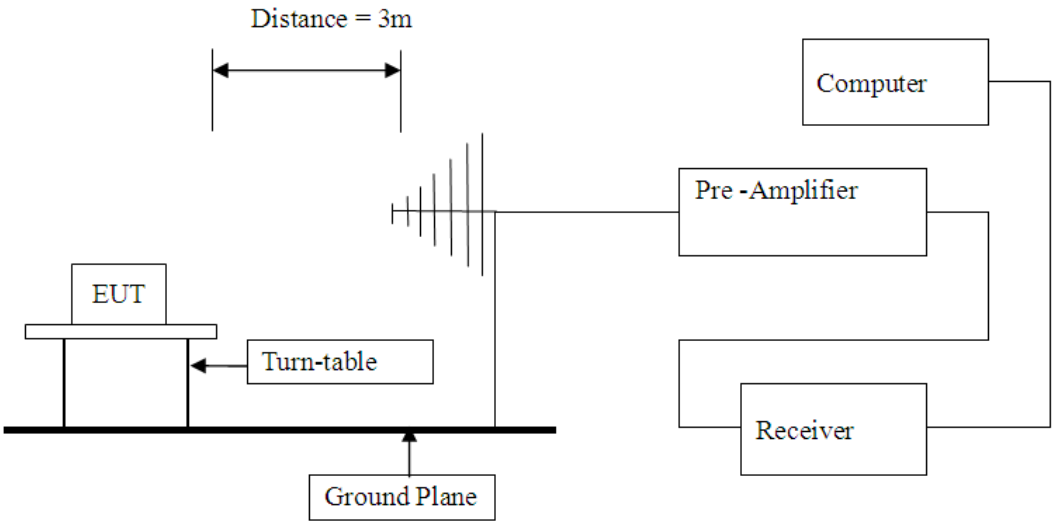
Operating condition is according to ANSI C63.10 -2009

13.4 Block diagram of test setup

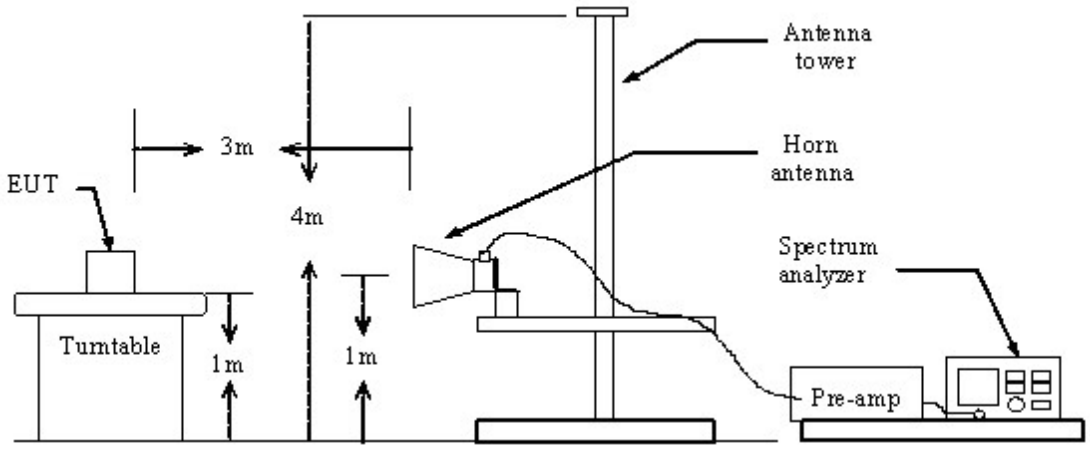
Below 30 MHz



30 MHz to 1000 MHz



Above 1000 MHz



13.5 Test method and test procedure

1) The E.U.T. was tested according to ANSI C63.10 –2009 and ANSI C63.4-2003.

2) The E.U.T., peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. For each suspected emissions, the antenna tower was scan from 1 m to 4 m and then the turntable was rotated from 0 degree to 360 degrees to find the maximum reading.

3) The frequency spectrum from 9 kHz to 25 GHz was investigated. All readings from 9 kHz to 30 MHz are quasi-peak values with a resolution bandwidth of 9 kHz. All readings from 30 MHz to1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz . Measurements were made at 3 meters.

4) Radiated emissions measured in frequencies above 1GHz were made (Peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector).

5) The antenna polarization: Vertical polarization and Horizontal polarization.

13.6 Test specification

Environmental conditions: Temperature 25° C Humidity: 50% Atmospheric pressure: 103kPa

13.7 Test result

Pass

Radiated Emission (9 kHz-30 MHz)

Frequency (MHz)	Level@3m (dB μ V/m)	Limit@3m (dB μ V/m)
--	--	--
--	--	--
--	--	--
--	--	--

Note: 1) Emission Level=Reading+ Cable loss+ Antenna factor-Amp factor

2) The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

Radiated Emission (30MHz-1000MHz)

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp (dB)	Final Level (dBuV/m)	Limit (dBuV/m)	Antenna Polarity
45.2671	34.58	13.22	0.35	26.68	21.47	40.00	Horizontal
66.3349	29.27	14.52	0.46	26.84	17.41	40.00	Horizontal
96.6245	26.88	14.86	0.51	26.72	15.53	43.50	Horizontal
108.3415	29.28	15.24	0.58	26.81	18.29	43.50	Horizontal
256.2485	26.16	16.82	0.84	26.91	16.91	46.00	Horizontal
879.2659	39.82	19.67	1.76	26.75	34.50	46.00	Horizontal
39.2651	33.67	13.52	0.33	26.54	20.98	40.00	Vertical
44.1856	30.27	13.94	0.42	26.82	17.81	40.00	Vertical
104.5176	29.49	14.86	0.59	26.91	18.03	43.50	Vertical
240.2267	28.17	16.64	0.78	26.34	19.25	46.00	Vertical
642.6473	35.62	18.53	0.92	26.75	28.32	46.00	Vertical
884.2586	41.55	19.81	1.76	26.88	36.24	46.00	Vertical

Remark: Final Level= Read Level+Antenna Factor+Cable Loss-Preamp

Harmonics Radiated Emission Data (1000MHz-25000MHz)

GFSK modulation, Low channel							
Frequency (MHz)	Peak Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Peak Final Level (dBuV/m)	Average Limits (dBuV/m)	Antenna Polarity
4804	48.67	30.56	5.60	33.53	51.30	54.00	Horizontal
7206	33.26	35.41	7.24	33.82	42.09	54.00	Horizontal
9608					--	54.00	Horizontal
12010					--	54.00	Horizontal
14412					--	54.00	Horizontal
16814					--	54.00	Horizontal
19216					--	54.00	Horizontal
21618					--	54.00	Horizontal
24020					--	54.00	Horizontal
4804	44.37	30.56	5.60	33.53	47.00	54.00	Vertical
7206	31.26	35.41	7.24	33.82	40.09	54.00	Vertical
9608					--	54.00	Vertical
12010					--	54.00	Vertical
14412					--	54.00	Vertical
16814					--	54.00	Vertical
19216					--	54.00	Vertical
21618					--	54.00	Vertical
24020					--	54.00	Vertical
GFSK modulation, Middle channel							
Frequency (MHz)	Peak Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Peak Final Level (dBuV/m)	Average Limits (dBuV/m)	Antenna Polarity
4882	47.86	30.56	5.60	33.53	50.49	54.00	Horizontal
7323	34.26	35.41	7.24	33.82	43.09	54.00	Horizontal
9764					--	54.00	Horizontal
12205					--	54.00	Horizontal
14646					--	54.00	Horizontal
17087					--	54.00	Horizontal
19528					--	54.00	Horizontal
21969					--	54.00	Horizontal
24410					--	54.00	Horizontal
4882	43.47	30.56	5.60	33.53	46.10	54.00	Vertical
7323	32.42	35.41	7.24	33.82	41.25	54.00	Vertical
9764					--	54.00	Vertical
12205					--	54.00	Vertical
14646					--	54.00	Vertical
17087					--	54.00	Vertical
19528					--	54.00	Vertical
21969					--	54.00	Vertical
24410					--	54.00	Vertical

GFSK modulation, High channel							
Frequency (MHz)	Peak Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Peak Final Level (dBuV/m)	Average Limits (dBuV/m)	Antenna Polarity
4960	46.32	30.56	5.60	33.53	48.95	54.00	Horizontal
7440	35.19	35.41	7.24	33.82	44.02	54.00	Horizontal
9920					--	54.00	Horizontal
12400					--	54.00	Horizontal
14880					--	54.00	Horizontal
17360					--	54.00	Horizontal
19840					--	54.00	Horizontal
22320					--	54.00	Horizontal
24800					--	54.00	Horizontal
4960	42.49	30.56	5.60	33.53	45.12	54.00	Vertical
7440	31.68	35.41	7.24	33.82	40.51	54.00	Vertical
9920					--	54.00	Vertical
12400					--	54.00	Vertical
14880					--	54.00	Vertical
17360					--	54.00	Vertical
19840					--	54.00	Vertical
22320					--	54.00	Vertical
24800					--	54.00	Vertical
8DPSK modulation, Low channel							
Frequency (MHz)	Peak Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Peak Final Level (dBuV/m)	Average Limits (dBuV/m)	Antenna Polarity
4804	46.84	30.56	5.60	33.53	49.47	54.00	Horizontal
7206	34.59	35.41	7.24	33.82	43.42	54.00	Horizontal
9608					--	54.00	Horizontal
12010					--	54.00	Horizontal
14412					--	54.00	Horizontal
16814					--	54.00	Horizontal
19216					--	54.00	Horizontal
21618					--	54.00	Horizontal
24020					--	54.00	Horizontal
4804	44.27	30.56	5.60	33.53	46.90	54.00	Vertical
7206	32.14	35.41	7.24	33.82	40.97	54.00	Vertical
9608					--	54.00	Vertical
12010					--	54.00	Vertical
14412					--	54.00	Vertical
16814					--	54.00	Vertical
19216					--	54.00	Vertical
21618					--	54.00	Vertical
24020					--	54.00	Vertical

8DPSK modulation, Middle channel							
Frequency (MHz)	Peak Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Peak Final Level (dBuV/m)	Average Limits (dBuV/m)	Antenna Polarity
4882	46.29	30.56	5.60	33.53	48.92	54.00	Horizontal
7323	34.75	35.41	7.24	33.82	43.58	54.00	Horizontal
9764					--	54.00	Horizontal
12205					--	54.00	Horizontal
14646					--	54.00	Horizontal
17087					--	54.00	Horizontal
19528					--	54.00	Horizontal
21969					--	54.00	Horizontal
24410					--	54.00	Horizontal
4882	43.18	30.56	5.60	33.53	45.81	54.00	Vertical
7323	32.61	35.41	7.24	33.82	41.44	54.00	Vertical
9764					--	54.00	Vertical
12205					--	54.00	Vertical
14646					--	54.00	Vertical
17087					--	54.00	Vertical
19528					--	54.00	Vertical
21969					--	54.00	Vertical
24410					--	54.00	Vertical
8DPSK modulation, High channel							
Frequency (MHz)	Peak Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Peak Final Level (dBuV/m)	Average Limits (dBuV/m)	Antenna Polarity
4804	45.78	30.56	5.60	33.53	48.41	54.00	Horizontal
7206	33.16	35.41	7.24	33.82	41.99	54.00	Horizontal
9608					--	54.00	Horizontal
12010					--	54.00	Horizontal
14412					--	54.00	Horizontal
16814					--	54.00	Horizontal
19216					--	54.00	Horizontal
21618					--	54.00	Horizontal
24020					--	54.00	Horizontal
4804	43.82	30.56	5.60	33.53	46.45	54.00	Vertical
7206	32.29	35.41	7.24	33.82	41.12	54.00	Vertical
9608					--	54.00	Vertical
12010					--	54.00	Vertical
14412					--	54.00	Vertical
16814					--	54.00	Vertical
19216					--	54.00	Vertical
21618					--	54.00	Vertical
24020					--	54.00	Vertical

Remark:
1) According to section 15.35(b), the peak limit is 20dB higher than the average limit
2) If the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.
3) "--" means this data is too weak to be able to test.
4) The emission levels of other frequencies are very lower than the limit and not shown in the report.
5) Pre-tests were made in continuous transmitting mode at lowest, middle and highest channel with GFSK, Pi/4 QDPSK and 8DPSK mode, which indicates that the worst case is 8DPSK mode, so it is reported GFSK and 8DPSK mode only.

**********END OF REPORT**********