Hong Kong

FCC - TEST REPORT

Report Number	: **60/790.13.011.01 (Version 2.0)**	Date of Issue:	16th May 2013
Model	: **ID618**		
Product Type	: **Waterproof Bluetooth Stereo Speaker with Microphone**		
Applicant	: Diffany Development Co., Ltd.		
Address	: G1, 13/F, World Tech Centre, 95 How Ming St, Kwun Tong, Kowloon, Hong Kong		
Test Result	: ■ **Positive** ☐ **Negative**		
Total pages including Appendices	: 50		

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1. Table of Contents

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2. Details about the Test Laboratory

Details about the Test Laboratory

Test site 1:

Company name: TÜV SÜD HONG KONG LTD.
3/F, West Wing, Lakeside 2,
10 Science Park West Avenue,
Science Park, Shatin
HK.

Telephone: 852 2776 1323
Fax: 852 2776 1372

Test site 2:

Company name: TMC-Telecommunication Metrology Center of M.I.I.T
No. 52 Hua Yuanbei Road, Haidian District, Beijing, P.R.China

3. Description of the Equipment Under Test

Description of the Equipment Under Test

Product:	Waterproof Bluetooth Stereo Speaker with Microphone
Model no.:	ID618
Serial number:	NIL
Options and accessories:	1 x USB DC-in cable 1 x Line-in cable
Rated Voltage:	4 x 1.5V AA size batteries DC-in 5V
Rated Current:	NIL
Rated Power:	NIL
Frequency:	NIL
Modulation type:	GFSK, π/4-DQPSK and 8DPSK
Antenna gain:	0 dBi
RF Transmission Frequency:	2402MHz-2480MHz

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
AC/DC adaptor	--	GQ07-050100-CG	--

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4. Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C, Intentional Radiators, 10-1-12 Edition	PART 15 – RADIO FREQUENCY DEVICES Subpart C – Intentional Radiators

All the test methods were according to Public Notice DA 00-705 -Frequency Hopper Spread Spectrum Test Procedure released by FCC on March 30, 2000.

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5. Summary of Test Results

Technical Requirements					
FCC Part 15 Subpart C					
Test Condition	Pages	Test site	Test Result		
			Pass	Fail	N/A
15.207 Conducted Emission AC Power Port	8	Site 2	☒	☐	☐
15.247 (b) (1) Conducted peak output power	11	Site 2	☒	☐	☐
15.247(d) band edge compliance of RF radiated emission	14	Site 2	☒	☐	☐
15.247(d) Spurious RF conducted emissions	24	Site 2	☒	☐	☐
15.247(d) 15.209 Spurious radiated emissions	29	Site 2	☒	☐	☐
15.247(a)(1) 20dB bandwidth	34	Site 2	☒	☐	☐
15.247(a)(1) Carrier frequency separation	39	Site 2	☒	☐	☐
15.247(a)(1)(iii) Number of hopping frequencies	42	Site 2	☒	☐	☐
15.247(a)(1)(iii) Dwell Time	45	Site 2	☒	☐	☐

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6. General Remarks

Remarks
This submittal(s) (test report) intended for FCC ID: 2AABR-ID618 complies with Section 15.209, 15.247 of the FCC Part 15, Subpart C Rules.

All the configurations of the product were tested and only the worst test results listed in the report.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date: 27th March 2013

Testing Start Date: 27th March 2013

Testing End Date: 18th April 2013

- TÜV SÜD HONG KONG LTD. -

Reviewed by: Edmond FUNG

Prepared by: Sam WONG

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7. Technical Requirement

7.1 Conducted Emission Test 150kHz – 30MHz

Date of test : 17th April 2013

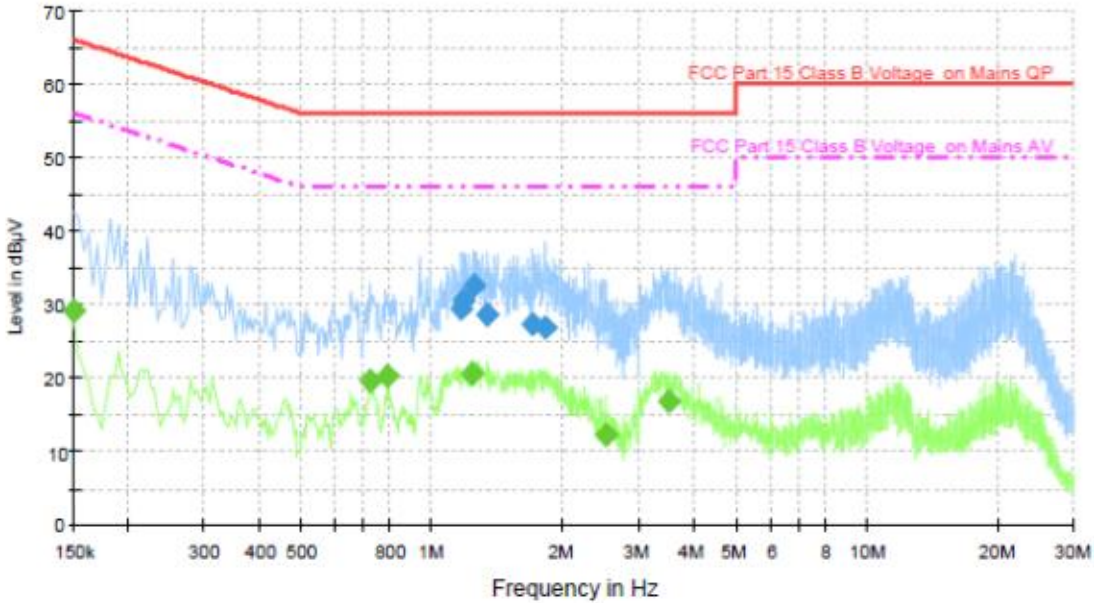
Test requirement : FCC 47CFR Part 15.207

Operating mode : Transmitter mode

Tested on : Adaptor AC Mains, Live

Remarks : NIL

Test Result
☒ Passed
☐ Not Passed



Frequency (MHz)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1.170000	29.5	56.0	-26.5	QP
1.186000	30.8	56.0	-25.2	QP
1.246000	32.3	56.0	-23.7	QP
1.346000	28.1	56.0	-27.9	QP
1.702000	27.2	56.0	-28.8	QP
1.818000	26.8	56.0	-29.2	QP

Frequency (MHz)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.150000	29.3	56.0	-26.7	AV
0.718000	19.5	46.0	-26.5	AV
0.794000	20.3	46.0	-25.7	AV
1.238000	20.6	46.0	-25.4	AV
2.510000	12.2	46.0	-33.8	AV
3.510000	16.8	46.0	-29.2	AV

Conducted Emission Test 150kHz – 30MHz

Date of test : 17th April 2013

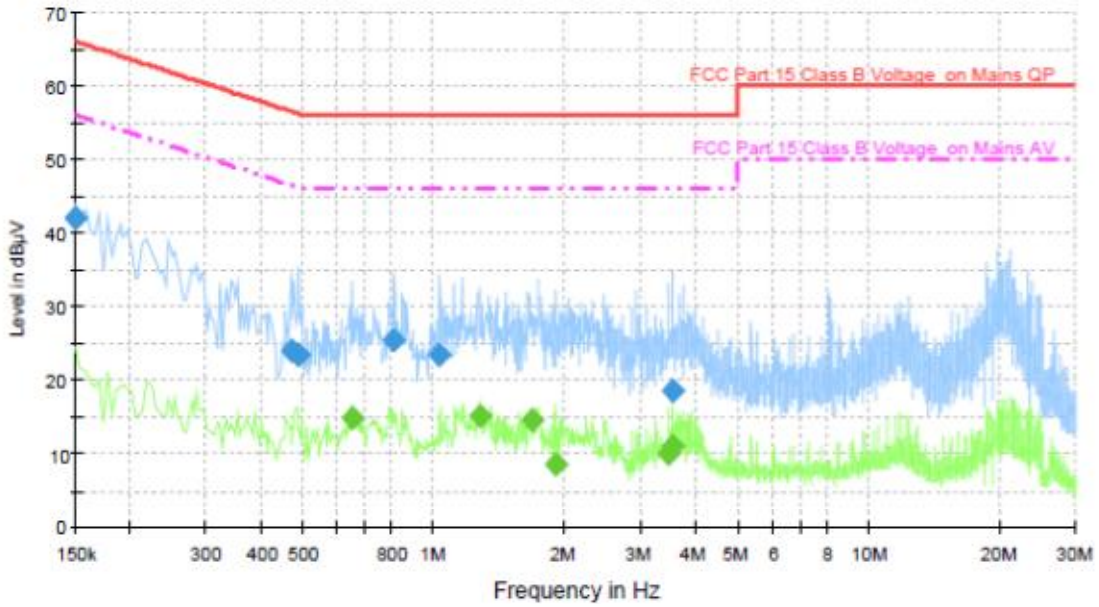
Test requirement : FCC 47CFR Part 15.207

Operating mode : Transmitter mode

Tested on : Adaptor AC Mains, Neutral

Remarks : NIL

Test Result
☒ Passed
☐ Not Passed



Frequency (MHz)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.150000	42.0	66.0	-24.0	QP
0.470000	24.1	56.5	-32.4	QP
0.490000	23.6	56.2	-32.6	QP
0.814000	25.5	56.0	-30.5	QP
1.034000	23.5	56.0	-32.5	QP
3.562000	18.7	56.0	-37.3	QP

Frequency (MHz)	Result (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.650000	14.9	46.0	-31.1	AV
1.274000	15.0	46.0	-31.0	AV
1.682000	14.6	46.0	-31.4	AV
1.910000	8.5	46.0	-37.5	AV
3.474000	10.3	46.0	-35.7	AV
3.550000	11.0	46.0	-35.0	AV

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Test Equipment List

Conducted Emission Test

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	LISN	R&S	ENV216	101112	Aug. 05, 2013
2	LISN	R&S	ENV216	101113	Aug. 05, 2013
4	50Ω Terminator	N/A	N/A	N/A	Jul. 01, 2013
5	Test Cable	N/A	C01	N/A	Jul. 01, 2013
6	EMI Test Receiver	R&S	ESCI	100920	Aug. 04, 2013

7.2 Conducted peak output power

Test Method

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

Limits for conducted peak output power measurements

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1.0	≤30.0

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Conducted peak output power

Date of test : 17th April 2013

Test requirement : FCC Part 15

Test method : ANSI C63.4:2009

Test Result
☒ Passed
☐ Not Passed

Remarks : All the configurations of the product were tested and only the worst test (AC/DC adaptor powered) results listed in the report.

Type	Channel		
	2402MHz	2441MHz	2480MHz
GFSK	4.14dBm	4.26dBm	3.57dBm
π/4-DQPSK	3.46dBm	3.64dBm	2.69dBm
8DPSK	3.59dBm	3.92dBm	2.97dBm

Conducted peak output power

Test Equipment

DESCRIPTION	Type No.	Serial No.	Calibrated until
Antenna	VULB9163	9163 330	2014.02.24
Antenna	3164-05	85724	2014.02.17
Loop Antenna	6512	29604	2013.09.24
Spectrum Analyzer	FSP 40	100378	2013.12.22
EMI Test Receiver	ESCI	100701	2013.08.03
Spectrum Analyzer	FSV40	100903	2014.01.26
Test Cable	SUCOFLEX 104	MY2320/4	2014.02.17
Amplifier	150A250	326446	2014.03.17

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7.3 Band edge Measurement

Test Method

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.4 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW and VBW to 1MHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength.
The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW and VBW to 100kHz, to measure the conducted peak band edge.

Limits

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

Frequency MHz	Limit Average dBuV/m	Limit Peak dBuV/m
Below 2390 Above 2483.5	54	74

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Band edge Measurement

Date of test : 17th April 2013

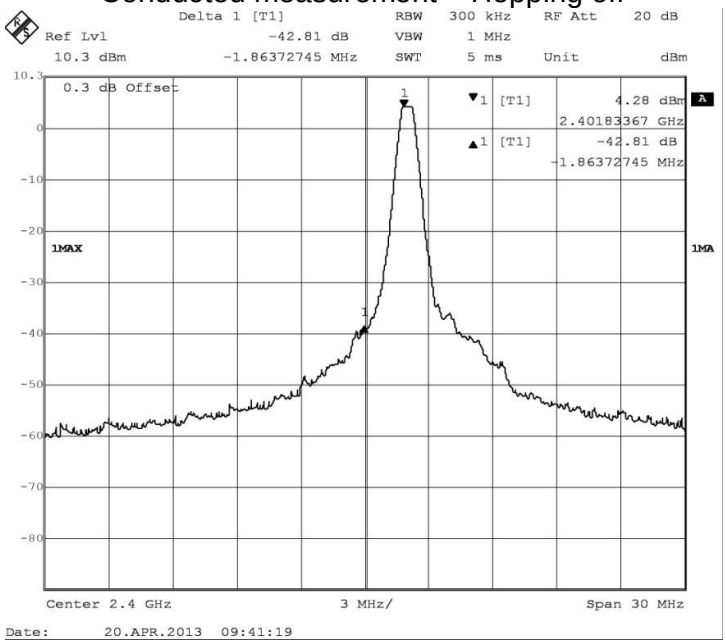
Test requirement : FCC Part 15

Test method : ANSI C63.4:2009

Test Result
☒ Passed
☐ Not Passed

Remarks : The EUT has been tested under all modulation modes, only the worst case (GFSK - AC/DC adaptor powered) modulation test result are listed in the report.

Conducted measurement – Hopping off



Frequency (MHz)	Reading (dBm)	Limit (-20dBc)	Margin (dB)
2400.000	-38.53	-24.28	-14.25
2401.833	4.28	-	-

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Band edge Measurement

Date of test : 17th April 2013

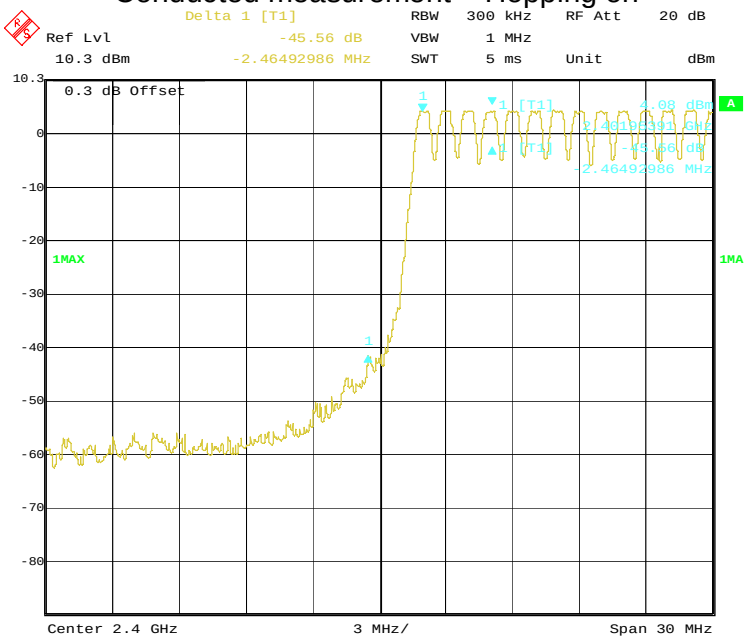
Test requirement : FCC Part 15

Test method : ANSI C63.4:2009

Test Result
☒ Passed
☐ Not Passed

Remarks : The EUT has been tested under all modulation modes, only the worst case (GFSK - AC/DC adaptor powered) modulation test result are listed in the report.

Conducted measurement – Hopping on



Frequency (MHz)	Reading (dBm)	Limit (-20dBc)	Margin (dB)
2400.000	-41.48	-24.08	-17.40
2401.953	4.08	-	-

Band edge Measurement

Date of test : 17th April 2013

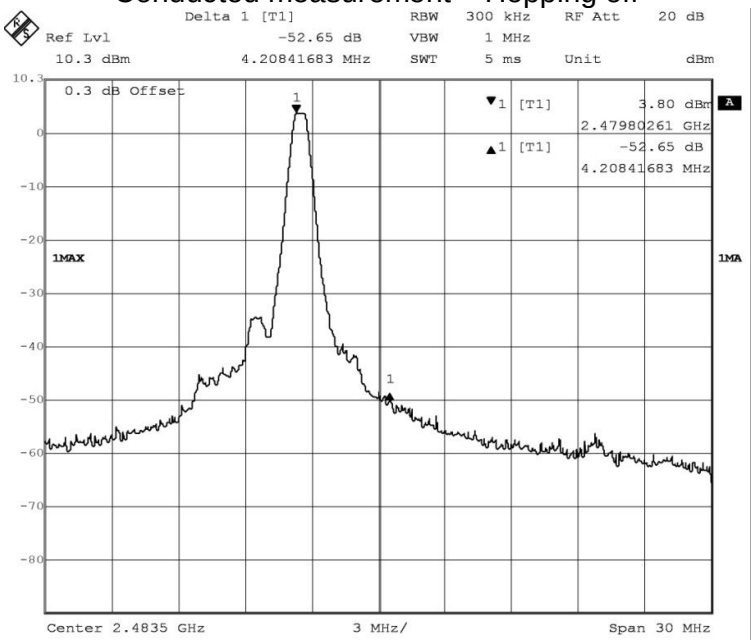
Test requirement : FCC Part 15

Test method : ANSI C63.4:2009

Test Result
☒ Passed
☐ Not Passed

Remarks : The EUT has been tested under all modulation modes, only the worst case (GFSK - AC/DC adaptor powered) modulation test result are listed in the report.

Conducted measurement – Hopping off



Frequency (MHz)	Reading (dBm)	Limit (-20dBc)	Margin (dB)
2479.802	3.80	-	-
2483.500	-48.85	-23.80	-25.05

Band edge Measurement

Date of test : 17th April 2013

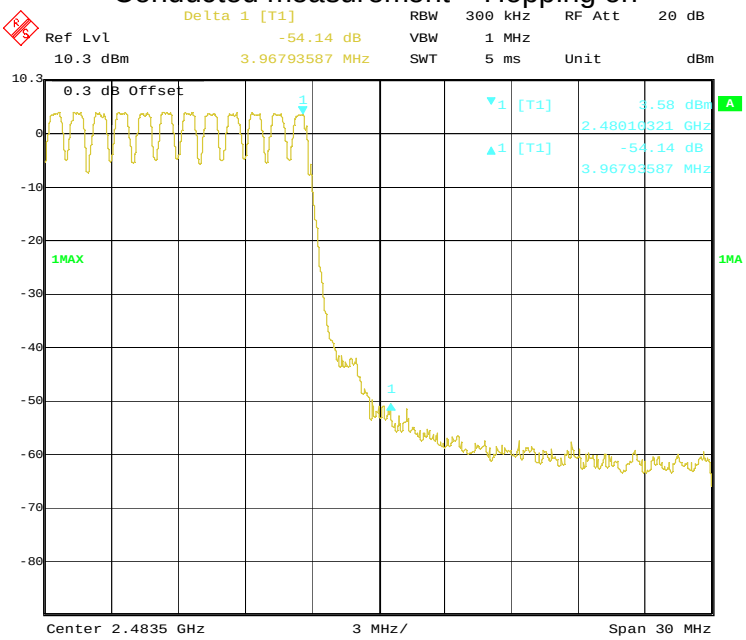
Test requirement : FCC Part 15

Test method : ANSI C63.4:2009

Test Result
☒ Passed
☐ Not Passed

Remarks : The EUT has been tested under all modulation modes, only the worst case (GFSK - AC/DC adaptor powered) modulation test result are listed in the report.

Conducted measurement – Hopping on



Frequency (MHz)	Reading (dBm)	Limit (-20dBc)	Margin (dB)
2480.103	3.58	-	-
2483.500	-50.56	-23.58	-26.98

Band edge Measurement

Date of test : 17th April 2013

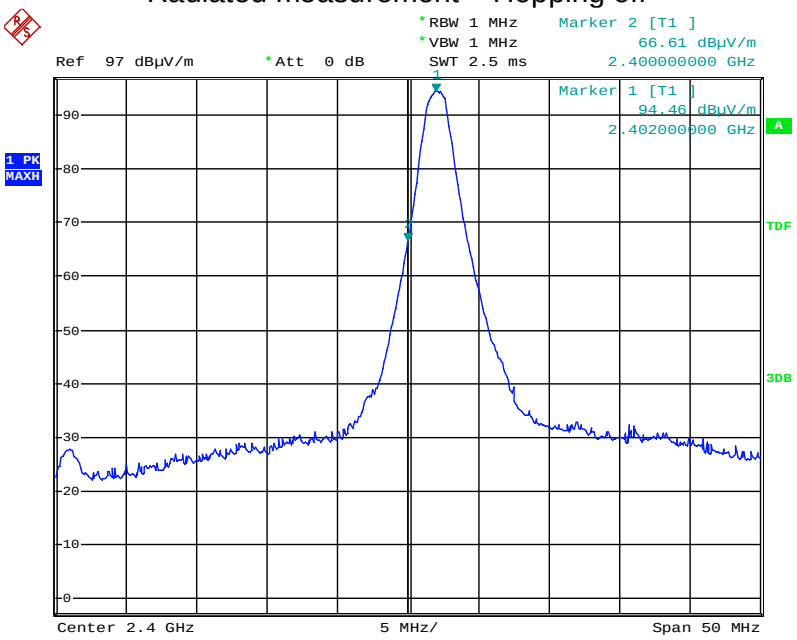
Test requirement : FCC Part 15

Test method : ANSI C63.4:2009

Test Result
☒ Passed
☐ Not Passed

Remarks : The EUT has been tested under all modulation modes, only the worst case (GFSK - AC/DC adaptor powered) modulation test result are listed in the report.

Radiated measurement – Hopping off



Frequency (MHz)	Reading (dBµV)	Corr. (dB/m)	Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
2400.000	64.75	1.86	66.61	74.0	-7.39	Peak
2400.000	49.10	1.86	50.96	54.0	-3.04	Average

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Band edge Measurement

Date of test : 17th April 2013

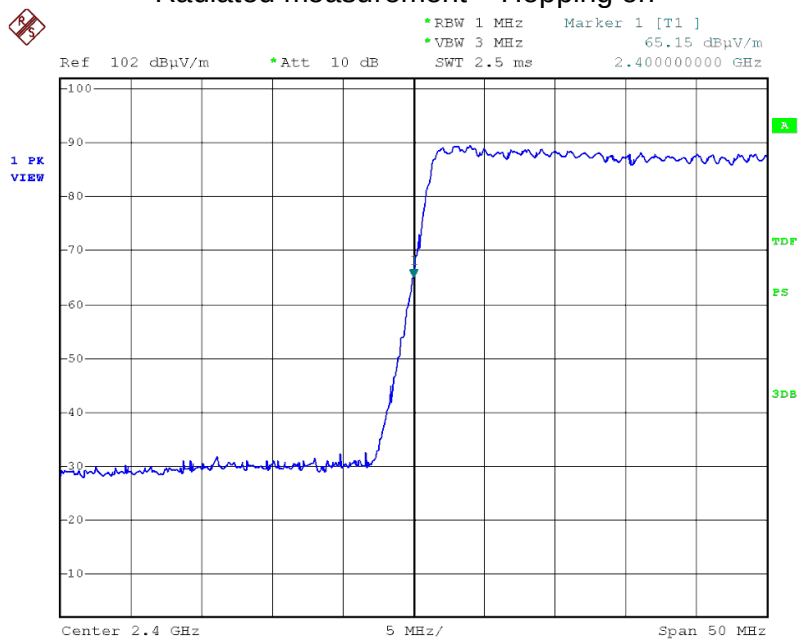
Test requirement : FCC Part 15

Test method : ANSI C63.4:2009

Test Result
☒ Passed
☐ Not Passed

Remarks : The EUT has been tested under all modulation modes, only the worst case (GFSK - AC/DC adaptor powered) modulation test result are listed in the report.

Radiated measurement – Hopping on



Frequency (MHz)	Reading (dBµV)	Corr. (dB/m)	Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
2400.000	63.29	1.86	65.15	74.0	-8.85	Peak
2400.000	46.28	1.86	48.14	54.0	-5.86	Average

Band edge Measurement

Date of test : 17th April 2013

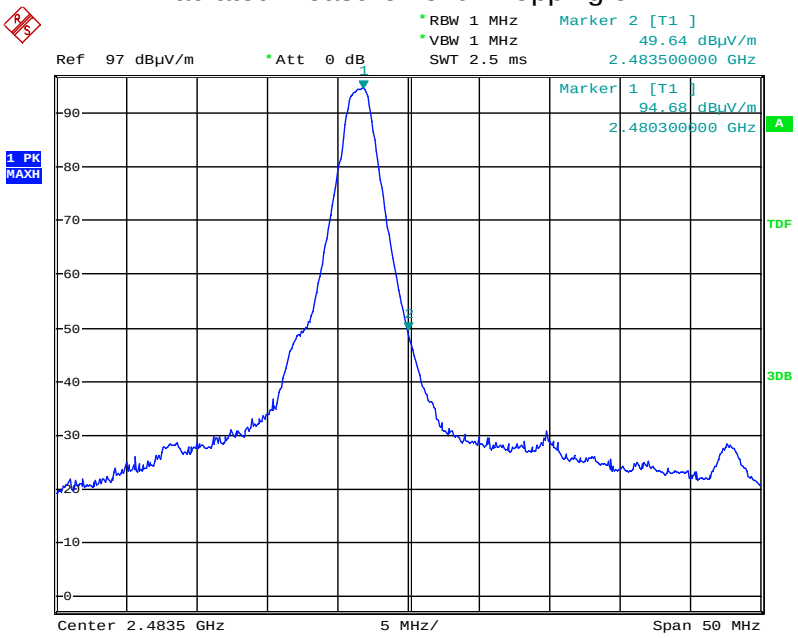
Test requirement : FCC Part 15

Test method : ANSI C63.4:2009

Test Result
☒ Passed
☐ Not Passed

Remarks : The EUT has been tested under all modulation modes, only the worst case (GFSK - AC/DC adaptor powered) modulation test result are listed in the report.

Radiated measurement - Hopping off



Frequency (MHz)	Reading (dBµV)	Corr. (dB/m)	Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
2483.500	53.68	-4.04	49.64	74.0	-24.36	Peak
2483.500	40.47	-4.04	36.43	54.0	-17.57	Average

Band edge Measurement

Date of test : 17th April 2013

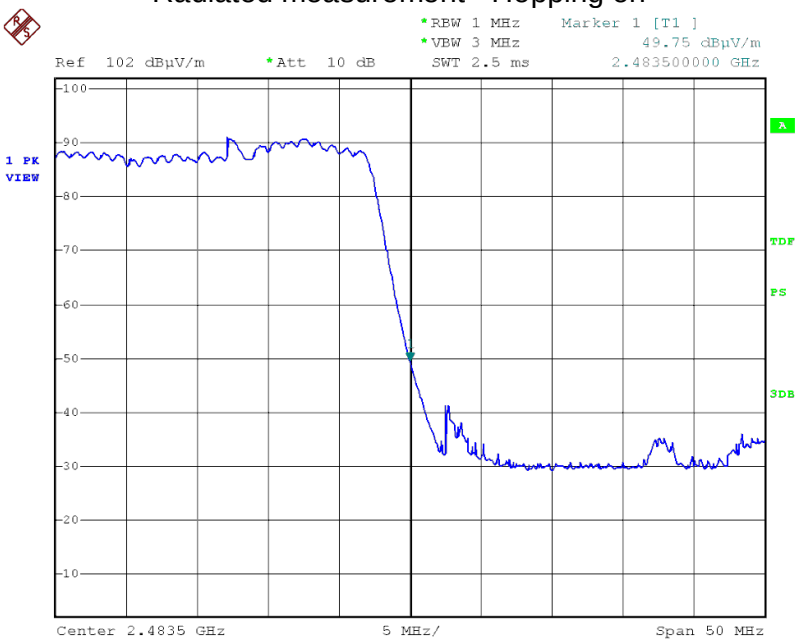
Test requirement : FCC Part 15

Test method : ANSI C63.4:2009

Test Result
☒ Passed
☐ Not Passed

Remarks : The EUT has been tested under all modulation modes, only the worst case (GFSK - AC/DC adaptor powered) modulation test result are listed in the report.

Radiated measurement - Hopping on



Frequency (MHz)	Reading (dBµV)	Corr. (dB/m)	Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
2483.500	53.79	-4.04	49.75	74.0	-24.25	Peak
2483.500	44.17	-4.04	40.13	54.0	-13.87	Average

Band edge Measurement

Test Equipment List

DESCRIPTION	Type No.	Serial No.	Calibrated until
Antenna	VULB9163	9163 330	2014.02.24
Antenna	3164-05	85724	2014.02.17
Loop Antenna	6512	29604	2013.09.24
Spectrum Analyzer	FSP 40	100378	2013.12.22
EMI Test Receiver	ESCI	100701	2013.08.03
Spectrum Analyzer	FSV40	100903	2014.01.26
Test Cable	SUCOFLEX 104	MY2320/4	2014.02.17
Amplifier	150A250	326446	2014.03.17

7.4 Spurious RF conducted emissions

Test Method

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.
Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The resolution bandwidth(RBW) and the video bandwidth (VBW) of the spectrum analyzer were respectively set to 100kHz and 100kHz.

Limit

Frequency Range MHz	Limit (dBc)
1000-25000	-20

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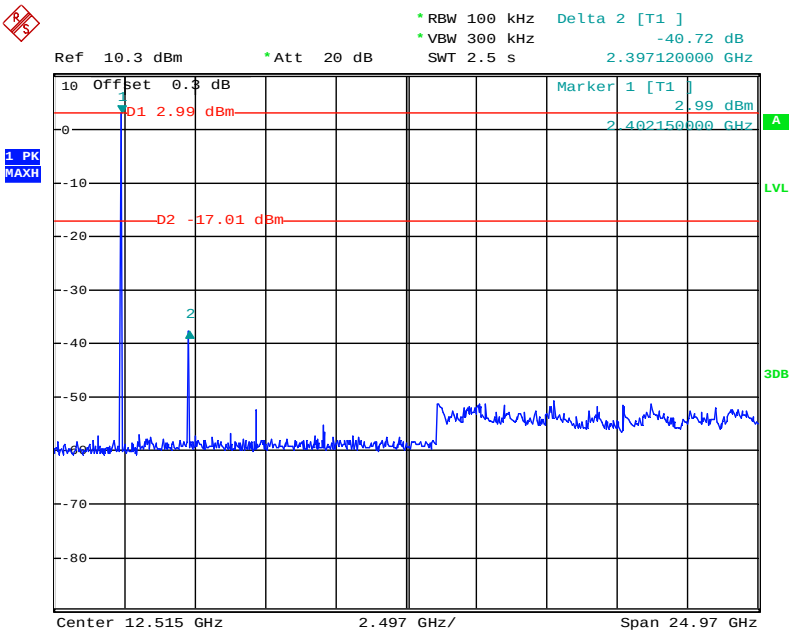
Spurious RF conducted emissions

Date of test	:	17th April 2013
Test requirement	:	FCC Part 15
Test method	:	ANSI C63.4:2009
Channel	:	2402MHz
Remark	:	All the configurations of the product were tested and only the worst test results (GFSK, Hopping off - AC/DC adaptor powered) listed in the report.

Test Result
☒ Passed
☐ Not Passed



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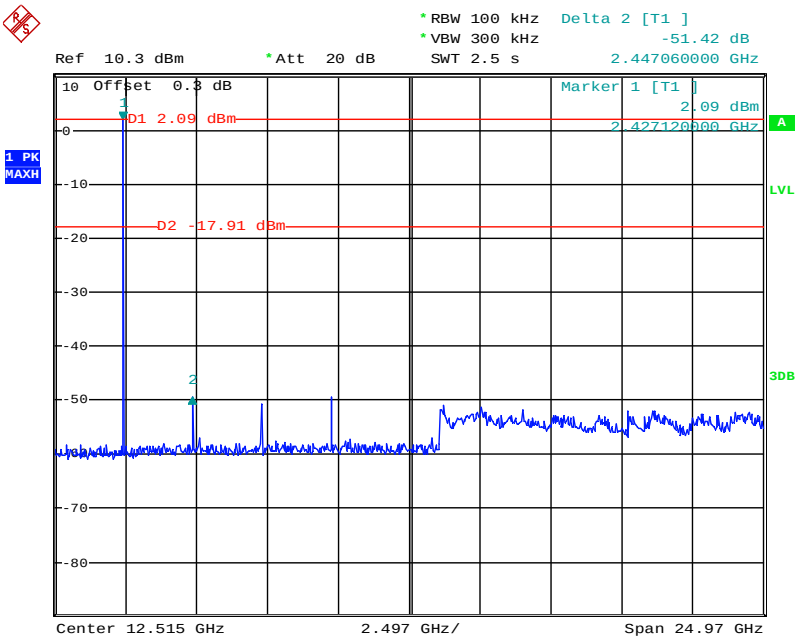
Spurious RF conducted emissions

Date of test	:	17th April 2013
Test requirement	:	FCC Part 15
Test method	:	ANSI C63.4:2009
Channel	:	2441MHz
Remark	:	All the configurations of the product were tested and only the worst test results (GFSK, Hopping off - AC/DC adaptor powered) listed in the report.

Test Result
☒ Passed
☐ Not Passed



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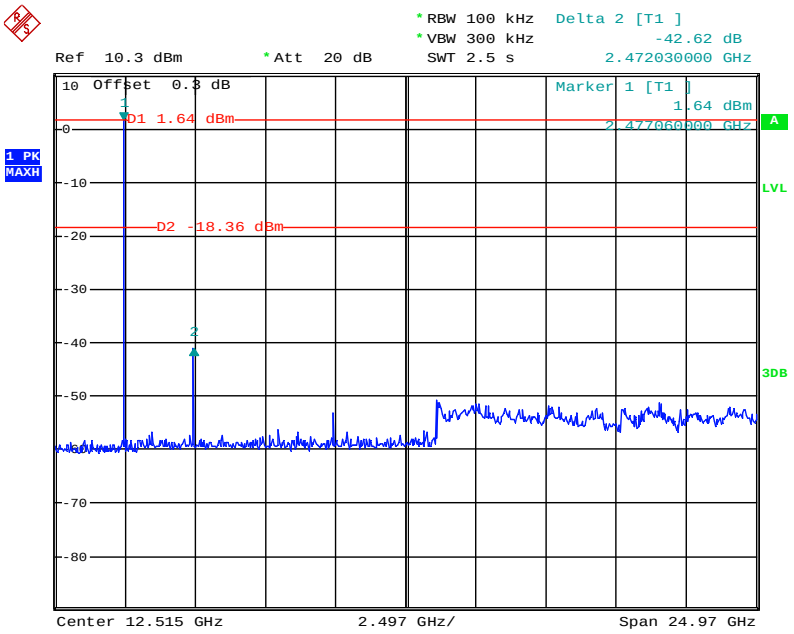
Spurious RF conducted emissions

Date of test	:	17th April 2013
Test requirement	:	FCC Part 15
Test method	:	ANSI C63.4:2009
Channel	:	2480MHz
Remark	:	All the configurations of the product were tested and only the worst test results (GFSK, Hopping off - AC/DC adaptor powered) listed in the report.

Test Result
☒ Passed
☐ Not Passed



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Test Equipment List

DESCRIPTION	Type No.	Serial No.	Calibrated until
Antenna	VULB9163	9163 330	2014.02.24
Antenna	3164-05	85724	2014.02.17
Loop Antenna	6512	29604	2013.09.24
Spectrum Analyzer	FSP 40	100378	2013.12.22
EMI Test Receiver	ESCI	100701	2013.08.03
Spectrum Analyzer	FSV40	100903	2014.01.26
Test Cable	SUCOFLEX 104	MY2320/4	2014.02.17
Amplifier	150A250	326446	2014.03.17

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7.5 Spurious radiated emissions

Test Method

1 The EUT is placed on a turntable, which is 0.8m above ground plane.
2 The turntable shall be rotated for 360 degrees to determine the position of maximum emission level
3 EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4 Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5 Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

Limit

Frequency MHz	Field Strength uV/m	Field Strength dBµV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

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Spurious radiated emissions

Date of test : 17th April 2013

Test requirement : FCC Part 15

Test method : ANSI C63.4:2009

Operating mode : Transmitter mode

Frequency : 2402MHz

Remark : All the configurations of the product were tested and only the worst test results (GFSK, Hopping off - AC/DC adaptor powered) listed in the report.

Test Result
☒ Passed
☐ Not Passed

Frequency (MHz)	Polarity (H/V)	Read Level (dBµV)	Corr. (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
34.900	V	38.54	-13.44	25.10	40.00	-14.90	QP
48.200	H	30.88	-13.52	17.36	40.00	-22.64	QP
*1186.000	V	64.94	-12.55	52.39	74.00	-21.61	PK
*1186.000	V	47.25	-12.55	34.70	54.00	-19.30	Ave.
2402.000	V	96.80	1.86	98.66	/	/	PK
2402.000	V	63.53	1.86	65.39	/	/	Ave.
2992.000	H	49.95	-6.04	43.91	74.00	-30.09	PK
2992.000	H	28.89	-6.04	22.85	54.00	-31.15	Ave.
*4804.000	H	59.52	0.19	59.71	74.00	-14.29	PK
*4804.000	H	41.82	0.19	42.01	54.00	-11.99	Ave.
7206.000	V	46.29	6.62	52.91	74.00	-21.09	PK
7206.000	V	34.29	6.62	40.91	54.00	-13.09	Ave.

"*" means the emission(s) appear within the restricted bands shall follow the requirement of section 15.205.

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Spurious radiated emissions

Date of test : 17th April 2013

Test requirement : FCC Part 15

Test method : ANSI C63.4:2009

Operating mode : Transmitter mode

Frequency : 2441MHz

Remark : All the configurations of the product were tested and only the worst test results (GFSK, Hopping off - AC/DC adaptor powered) listed in the report.

Test Result
☒ Passed
☐ Not Passed

Frequency (MHz)	Polarity (H/V)	Read Level (dBµV)	Corr. (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
*331.400	V	39.07	-12.76	26.31	46.00	-19.69	QP
*334.900	H	43.28	-12.63	30.65	46.00	-15.35	QP
*1180.000	H	62.86	-12.68	50.18	74.00	-23.82	PK
*1180.000	H	49.28	-12.68	36.60	54.00	-17.40	Ave.
2441.000	V	97.28	-1.75	95.53	/	/	PK
2441.000	V	63.83	-1.75	62.08	/	/	Ave.
2986.000	V	54.39	-6.04	48.35	74.00	-25.65	PK
2986.000	V	30.73	-6.04	24.69	54.00	-29.31	Ave.
*4882.000	V	59.63	0.41	60.04	74.00	-13.96	PK
*4882.000	V	42.85	0.41	43.26	54.00	-10.74	Ave.
*7323.000	H	45.33	7.83	53.16	74.00	-20.84	PK
*7323.000	H	33.96	7.83	41.79	54.00	-12.21	Ave.

"*" means the emission(s) appear within the restricted bands shall follow the requirement of section 15.205.

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Spurious radiated emissions

Date of test : 17th April 2013

Test requirement : FCC Part 15

Test method : ANSI C63.4:2009

Operating mode : Transmitter mode

Frequency : 2480MHz

Remark : All the configurations of the product were tested and only the worst test results (GFSK, Hopping off - AC/DC adaptor powered) listed in the report.

Test Result
☒ Passed
☐ Not Passed

Frequency (MHz)	Polarity (H/V)	Read Level (dBµV)	Corr. (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.500	V	36.44	-13.222	23.22	40.00	-16.78	QP
53.100	H	30.98	-14.16	16.82	40.00	-23.18	QP
*1372.000	H	59.86	-11.64	48.22	74.00	-25.78	PK
*1372.000	H	42.58	-11.64	30.94	54.00	-23.06	Ave.
1756.000	H	58.28	-11.39	46.89	74.00	-27.11	PK
1756.000	H	37.29	-11.39	25.90	54.00	-28.10	Ave.
2480.000	V	96.58	-4.04	92.54	/	/	PK
2480.000	V	62.86	-4.04	58.82	/	/	Ave.
*4960.000	V	58.85	0.74	59.59	74.00	-14.41	PK
*4960.000	V	41.27	0.74	42.01	54.00	-11.99	Ave.
*7440.000	V	45.89	8.38	54.27	74.00	-19.73	PK
*7440.000	V	34.04	8.38	42.42	54.00	-11.58	Ave.

"*" means the emission(s) appear within the restricted bands shall follow the requirement of section 15.205.

Test Equipment List

DESCRIPTION	Type No.	Serial No.	Calibrated until
Antenna	VULB9163	9163 330	2014.02.24
Antenna	3164-05	85724	2014.02.17
Loop Antenna	6512	29604	2013.09.24
Spectrum Analyzer	FSP 40	100378	2013.12.22
EMI Test Receiver	ESCI	100701	2013.08.03
Spectrum Analyzer	FSV40	100903	2014.01.26
Test Cable	SUCOFLEX 104	MY2320/4	2014.02.17
Amplifier	150A250	326446	2014.03.17

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7.6 20 dB bandwidth

Test Method

1 Place the EUT on the table and set it in the transmitting mode.
2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3 Mark the peak frequency and –20dB (upper and lower) frequency.

Limit

Limit [kHz]
N/A

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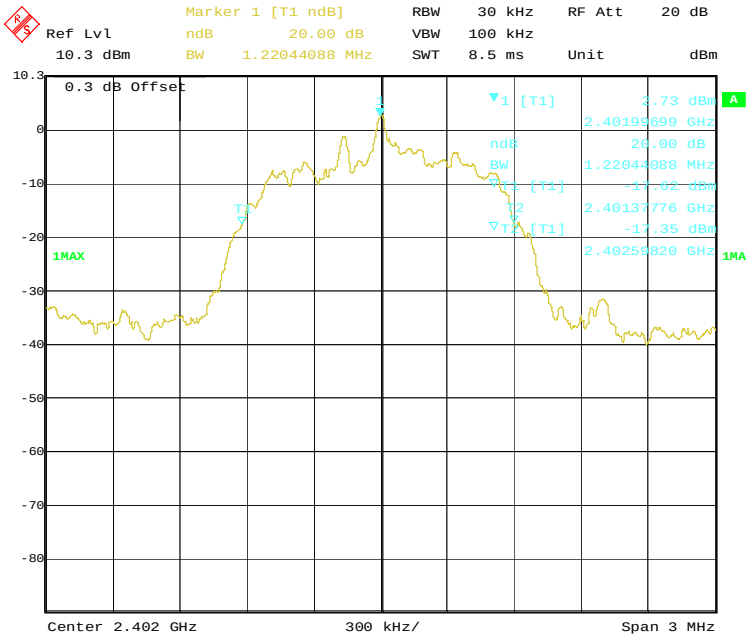
20 dB bandwidth

Test result
(π/4-DQPSK)

Bandwidth MHz	Result
1.220	Pass

Remark : All the configurations of the product were tested and only the worst test results (π/4-DQPSK - AC/DC adaptor powered) listed in the report.



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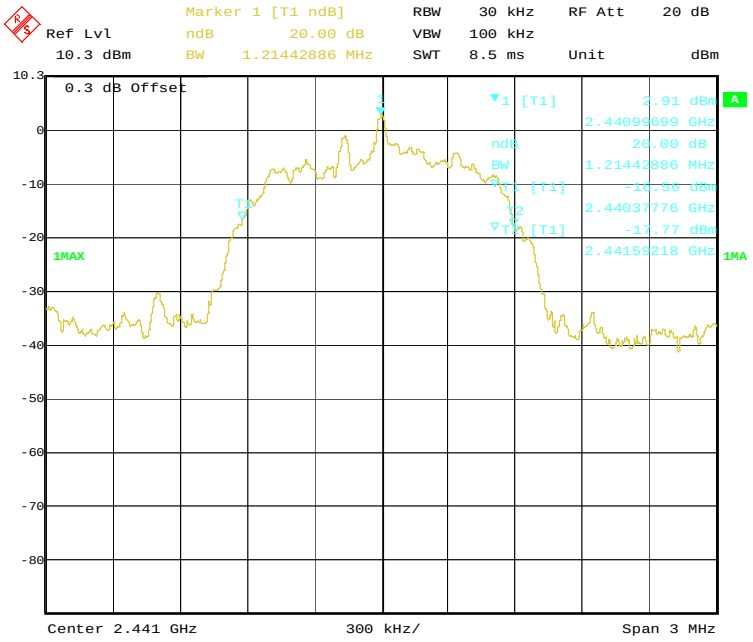
20 dB bandwidth

Test result
(π/4-DQPSK)

Bandwidth MHz	Result
1.21	Pass

Remark : All the configurations of the product were tested and only the worst test results (π/4-DQPSK - AC/DC adaptor powered) listed in the report.



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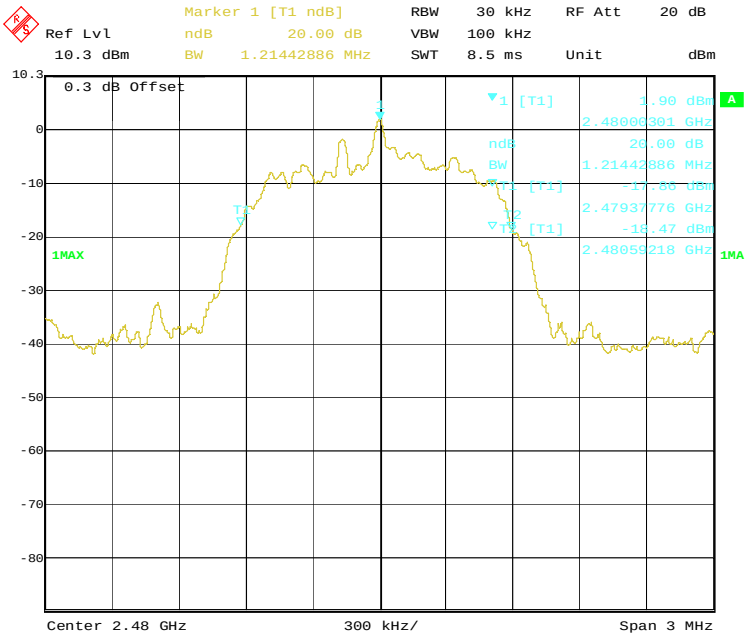
20 dB bandwidth

Test result
(π/4-DQPSK)

Bandwidth MHz	Result
1.21	Pass

Remark : All the configurations of the product were tested and only the worst test results (π/4-DQPSK - AC/DC adaptor powered) listed in the report.



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Test Equipment

20 dB bandwidth Test

DESCRIPTION	Type No.	Serial No.	Calibrated until
Antenna	VULB9163	9163 330	2014.02.24
Antenna	3164-05	85724	2014.02.17
Loop Antenna	6512	29604	2013.09.24
Spectrum Analyzer	FSP 40	100378	2013.12.22
EMI Test Receiver	ESCI	100701	2013.08.03
Spectrum Analyzer	FSV40	100903	2014.01.26
Test Cable	SUCOFLEX 104	MY2320/4	2014.02.17
Amplifier	150A250	326446	2014.03.17

7.7 Carrier Frequency Separation

Test Method

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
2. By using the Max-Hold function record the separation of two adjacent channels.
3. Measure the frequency difference of these two adjacent channels by spectrum analyzer Marker function.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Limit kHz
≥25kHz or 2/3 of the 20 dB bandwidth which is greater

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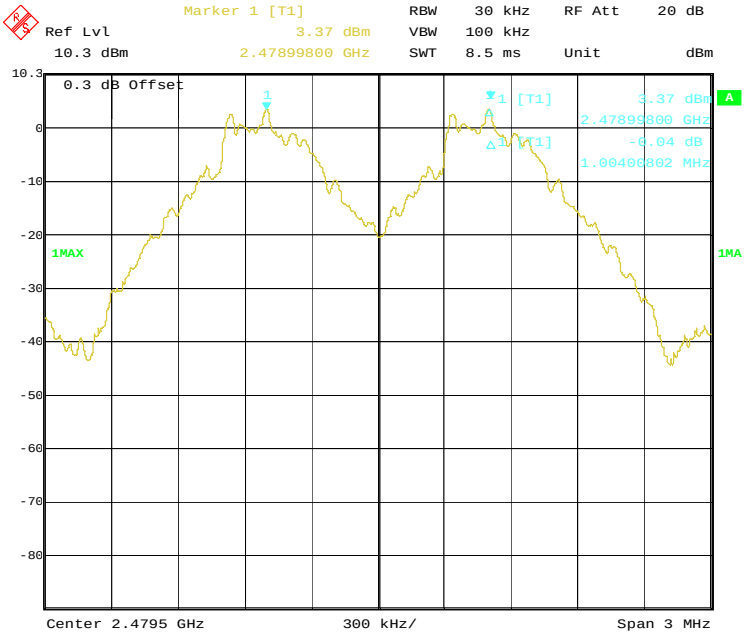
Carrier Frequency Separation

Test result
(GFSK)

Carrier Frequency Separation MHz	Result
1.004	Pass



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Test Equipment

Carrier Frequency Separation Test

DESCRIPTION	Type No.	Serial No.	Calibrated until
Antenna	VULB9163	9163 330	2014.02.24
Antenna	3164-05	85724	2014.02.17
Loop Antenna	6512	29604	2013.09.24
Spectrum Analyzer	FSP 40	100378	2013.12.22
EMI Test Receiver	ESCI	100701	2013.08.03
Spectrum Analyzer	FSV40	100903	2014.01.26
Test Cable	SUCOFLEX 104	MY2320/4	2014.02.17
Amplifier	150A250	326446	2014.03.17

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7.8 Number of hopping frequencies

Test Method

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
Equipment mode: Spectrum analyzer
RBW: 300KHz; VBW: 1MHz
2. Set the spectrum analyzer on Max-Hold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
3. Repeat above procedures until all frequencies measured were complete.

Limit

Limit number
≥ 15

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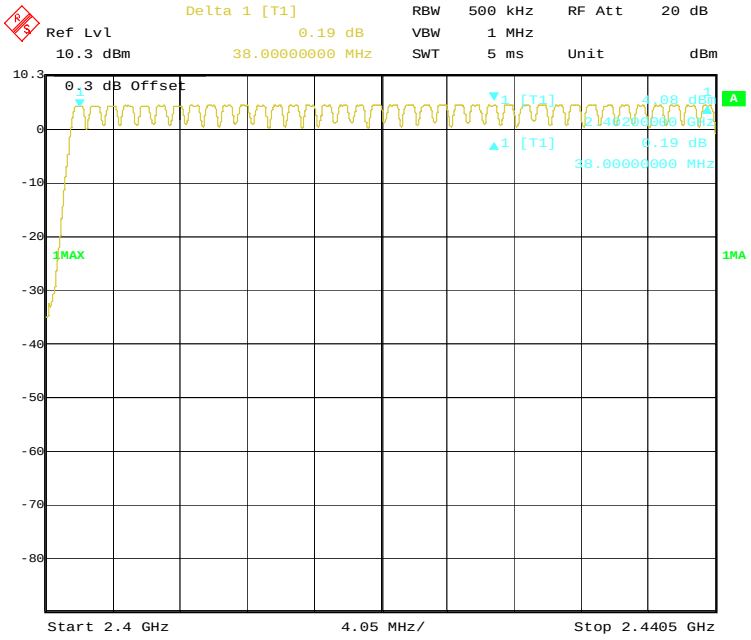
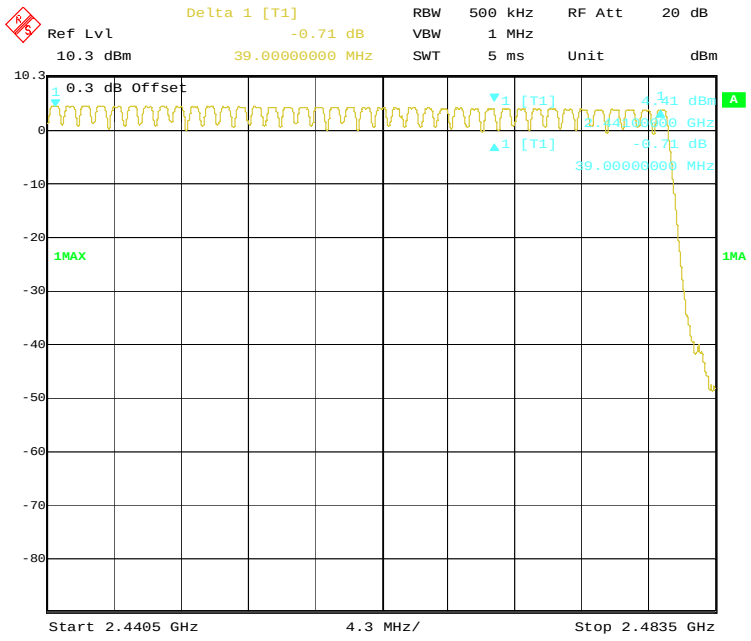
Number of hopping frequencies

Test result:

Number of hopping frequencies	Result
79	Pass





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Test Equipment

Number of hopping frequencies Test

DESCRIPTION	Type No.	Serial No.	Calibrated until
Antenna	VULB9163	9163 330	2014.02.24
Antenna	3164-05	85724	2014.02.17
Loop Antenna	6512	29604	2013.09.24
Spectrum Analyzer	FSP 40	100378	2013.12.22
EMI Test Receiver	ESCI	100701	2013.08.03
Spectrum Analyzer	FSV40	100903	2014.01.26
Test Cable	SUCOFLEX 104	MY2320/4	2014.02.17
Amplifier	150A250	326446	2014.03.17

7.9 Dwell Time

Test Method

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
2. Adjust the center frequency of spectrum analyzer on any frequency be measured.
3. Measure the Dwell Time by spectrum analyzer Marker function.
4. Repeat above procedures until all frequencies measured were complete.

Limit

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

Note:
A period time=79x0.4(s)=31.6(s)

Test Result (GFSK)

Frequency (MHz)	Packet	Dwell Time (ms)	Limit (ms)	Result
2441	DH1	139.52	< 400	Pass
2441	DH3	272.0	< 400	Pass
2441	DH5	324.5	< 400	Pass

DH1 time slot = 64(times)/6.32(s) *436(μs) *31.6(s)=139.52(ms)
DH3 time slot = 32(times)/6.32(s) *1.7(ms) *31.6(s)=272.0(ms)
DH5 time slot = 22(times)/6.32(s) *2.95(ms) *31.6(s)=324.5(ms)

Remark : All the configurations of the product were tested and only the worst test results (2441MHz, GFSK - AC/DC adaptor powered) listed in the report.

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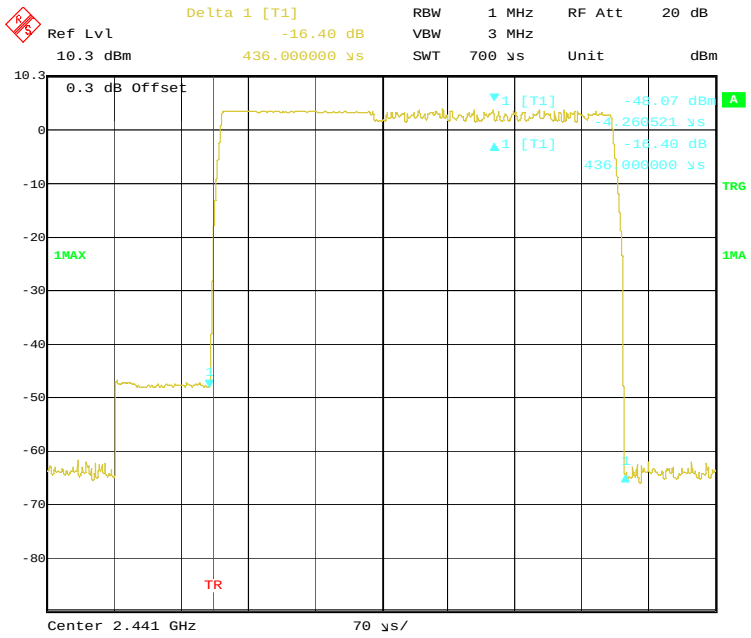
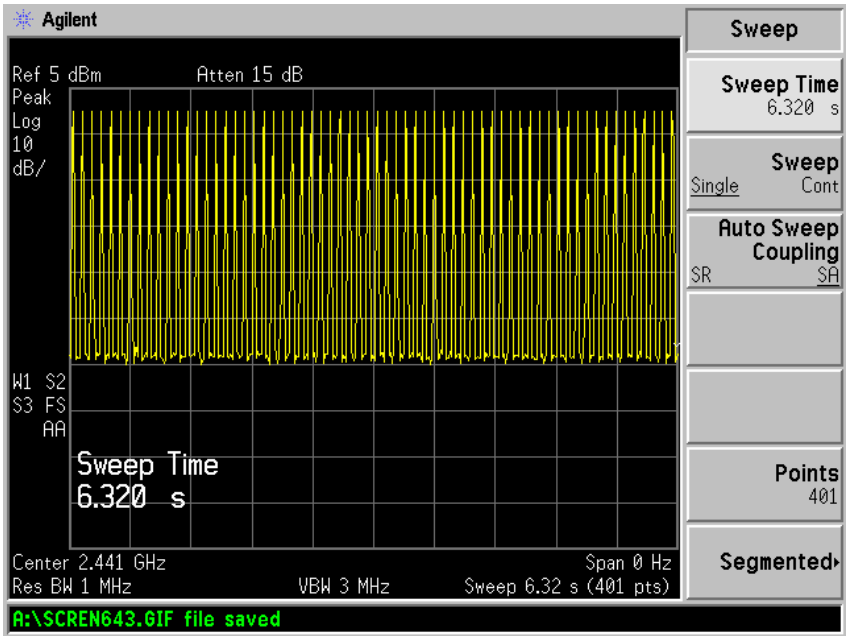
Dwell Time

DH1





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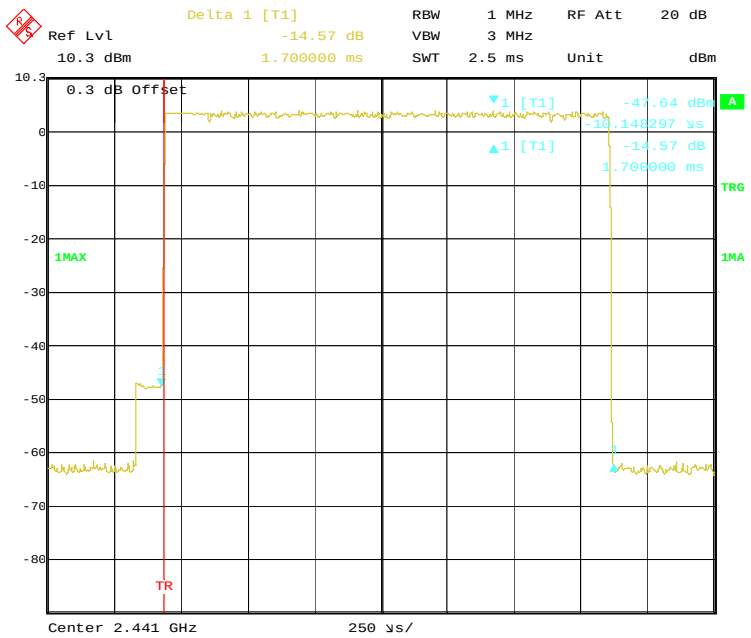
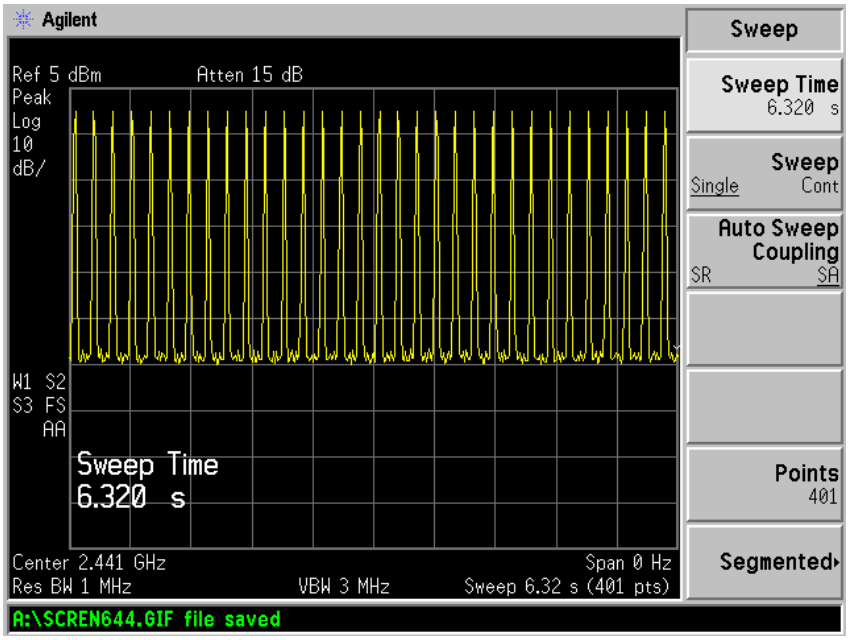
Dwell Time

DH3





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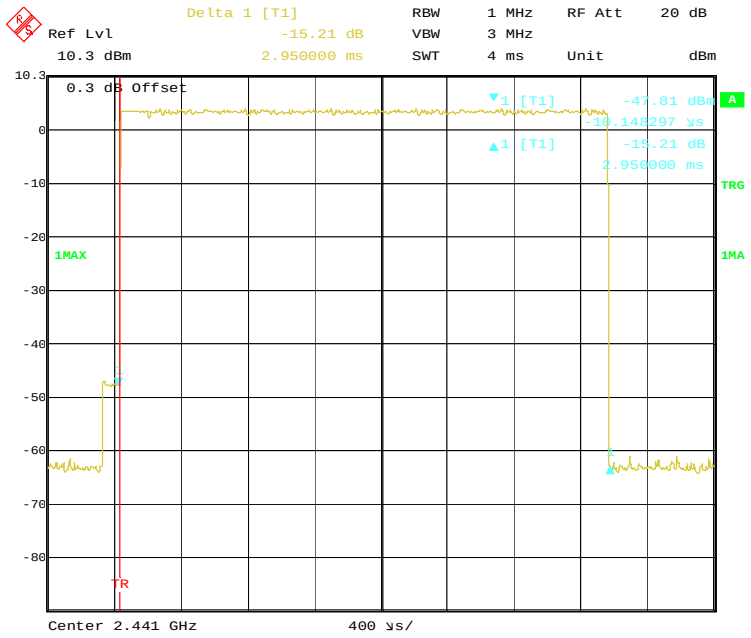
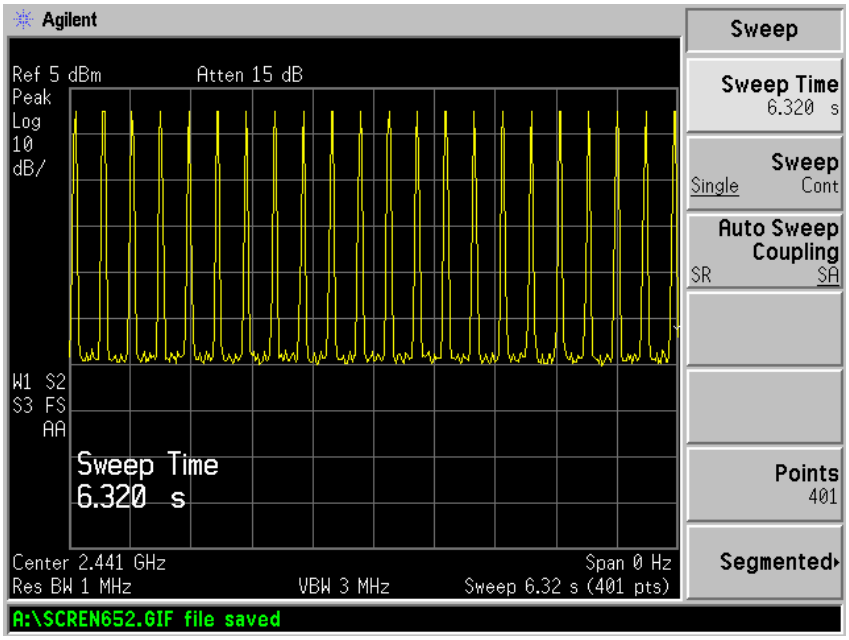
Dwell Time

DH5





Test Equipment

Dwell Time Test

DESCRIPTION	Type No.	Serial No.	Calibrated until
Antenna	VULB9163	9163 330	2014.02.24
Antenna	3164-05	85724	2014.02.17
Loop Antenna	6512	29604	2013.09.24
Spectrum Analyzer	FSP 40	100378	2013.12.22
EMI Test Receiver	ESCI	100701	2013.08.03
Spectrum Analyzer	FSV40	100903	2014.01.26
Test Cable	SUCOFLEX 104	MY2320/4	2014.02.17
Amplifier	150A250	326446	2014.03.17
Spectrum Analyzer	E4447A	MY48250208	2013.11.26

8. System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

Items		Extended Uncertainty
RE	Field strength (dBµV/m)	U=5.08dB (30MHz-1GHz) U=4.56dB (1GHz-6GHz)
CE	Disturbance Voltage (dBµV)	U=2.7dB

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