

Spurious RF conducted emissions

Date of test : 08th May 2013

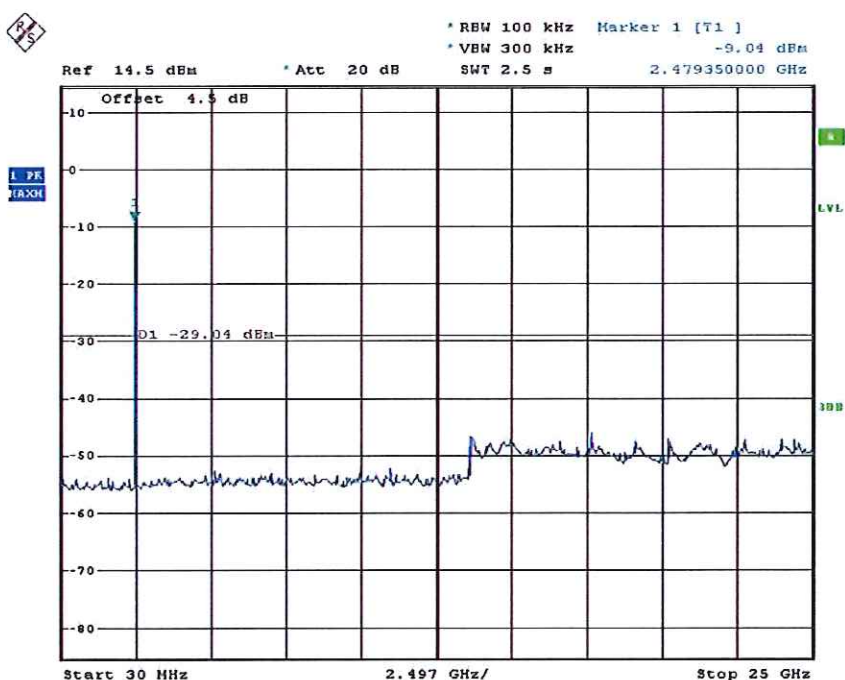
Test requirement : FCC Part 15

Test method : ANSI C63.10:2009

Channel : 2480MHz

Remark : NIL

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed



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 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

Spurious radiated emissions

Date of test : 08th May 2013

Test requirement : FCC Part 15

Test method : ANSI C63.10:2009

Operating mode : Transmitter mode

Frequency : 2402MHz

Remark : NIL

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Frequency (MHz)	Polarity (H/V)	Read Level (dB μ V)	Corr. (dB)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
39.162	H	49.8	-34.1	15.7	40.0	-24.3	QP
64.208	H	48.1	-35.5	12.6	40.0	-27.4	QP
99.528	H	48.1	-34.8	13.3	43.5	-30.2	QP
151.067	H	52.1	-39.8	12.3	43.5	-31.2	QP
228.490	H	54.3	-35.1	19.2	46.0	-26.8	QP
338.400	H	48.6	-31.7	16.9	46.0	-29.1	QP
*1126.000	H	44.9	-5.3	39.6	74.0	-34.4	PK
*1126.000	H	28.1	-5.3	22.8	54.0	-31.2	Ave.
*2389.000	H	54.4	1.8	56.2	74.0	-17.8	PK
*2389.000	H	42.9	1.8	44.7	54.0	-9.3	Ave.
2402.000	H	88.3	1.8	90.1	/	/	PK
2402.000	H	69.5	1.8	71.3	/	/	Ave.
*2491.000	H	38.6	1.9	40.5	74.0	-33.5	PK
*2491.000	H	22.8	1.9	24.7	54.0	-29.3	Ave.
2670.000	H	41.1	2.3	43.4	74.0	-30.6	PK
2670.000	H	19.8	2.3	22.1	54.0	-31.9	Ave.
*4804.000	H	46.6	5.8	52.4	74.0	-21.6	PK
*4804.000	H	27.8	5.8	33.6	54.0	-20.4	Ave.
7206.000	H	49.3	6.8	56.1	74.0	-17.9	PK
7206.000	H	31.2	6.8	38.0	54.0	-16.0	Ave.

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

Spurious radiated emissions

Date of test : 08th May 2013

Test requirement : FCC Part 15

Test method : ANSI C63.10:2009

Operating mode : Transmitter mode

Frequency : 2402MHz

Remark : NIL

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Frequency (MHz)	Polarity (H/V)	Read Level (dBμV)	Corr. (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
38.888	V	52.2	-35.3	16.9	40.0	-23.1	QP
106.013	V	51.9	-34.3	17.6	43.5	-25.9	QP
*117.733	V	52.8	-36.4	16.4	43.5	-27.1	QP
180.649	V	51.2	-37.7	13.5	43.5	-30.0	QP
234.168	V	48.6	-34.7	13.9	46.0	-32.1	QP
638.369	V	48.8	-27.0	21.8	46.0	-24.2	QP
*1126.000	V	40.8	-5.3	35.5	74.0	-38.5	PK
*1126.000	V	26.2	-5.3	20.9	54.0	-33.1	Ave.
*2389.000	V	54.0	1.8	55.8	74.0	-18.2	PK
*2389.000	V	42.5	1.8	44.3	54.0	-9.7	Ave.
2402.000	V	89.5	1.8	91.3	/	/	PK
2402.000	V	69.8	1.8	71.6	/	/	Ave.
*2491.000	V	36.7	1.9	38.6	74.0	-35.4	PK
*2491.000	V	19.7	1.9	21.6	54.0	-32.4	Ave.
2670.000	V	40.4	2.3	42.7	74.0	-31.3	PK
2670.000	V	19.0	2.3	21.3	54.0	-32.7	Ave.
*4804.000	V	45.8	5.8	51.6	74.0	-22.4	PK
*4804.000	V	27.6	5.8	33.4	54.0	-20.6	Ave.
7206.000	V	51.4	6.8	58.2	74.0	-15.8	PK
7206.000	V	29.6	6.8	36.4	54.0	-17.6	Ave.

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

Spurious radiated emissions

Date of test : 08th May 2013
 Test requirement : FCC Part 15
 Test method : ANSI C63.10:2009
 Operating mode : Transmitter mode
 Frequency : 2442MHz
 Remark : NIL

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Frequency (MHz)	Polarity (H/V)	Read Level (dBμV)	Corr. (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
39.162	H	50.2	-34.1	16.1	40.0	-23.9	QP
64.208	H	48.3	-35.5	12.8	40.0	-27.2	QP
99.528	H	48.3	-34.8	13.5	43.5	-30.0	QP
151.067	H	51.9	-39.8	12.1	43.5	-31.4	QP
228.490	H	54.7	-35.1	19.6	46.0	-26.4	QP
338.400	H	47.9	-31.7	16.2	46.0	-29.8	QP
*1438.000	H	42.0	-3.7	38.3	74.0	-35.7	PK
*1438.000	H	24.1	-3.7	20.4	54.0	-33.6	Ave.
*2377.000	H	37.5	1.7	39.2	74.0	-34.8	PK
*2377.000	H	21.8	1.7	23.5	54.0	-30.5	Ave.
2442.000	H	89.8	1.9	91.7	/	/	PK
2442.000	H	70.1	1.9	72.0	/	/	Ave.
*2486.000	H	32.8	1.9	34.7	74.0	-39.3	PK
*2486.000	H	19.5	1.9	21.4	54.0	-32.6	Ave.
3109.000	H	37.5	3.1	40.6	74.0	-33.4	PK
3109.000	H	19.6	3.1	22.7	54.0	-31.3	Ave.
*4884.000	H	45.5	5.9	51.4	74.0	-22.6	PK
*4884.000	H	27.7	5.9	33.6	54.0	-20.4	Ave.
*7326.000	H	51.0	6.8	57.8	74.0	-16.2	PK
*7326.000	H	31.4	6.8	38.2	54.0	-15.8	Ave.

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Spurious radiated emissions

Date of test : 08th May 2013
 Test requirement : FCC Part 15
 Test method : ANSI C63.10:2009
 Operating mode : Transmitter mode
 Frequency : 2442MHz
 Remark : NIL

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Frequency (MHz)	Polarity (H/V)	Read Level (dBμV)	Corr. (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
38.888	V	51.9	-35.3	16.6	40.0	-23.4	QP
106.013	V	52.1	-34.3	17.8	43.5	-25.7	QP
*117.733	V	52.9	-36.4	16.5	43.5	-27.0	QP
180.649	V	51.2	-37.7	13.5	43.5	-30.0	QP
234.168	V	48.4	-34.7	13.7	46.0	-32.3	QP
638.369	V	48.5	-27.0	21.5	46.0	-24.5	QP
*1438.000	V	30.0	6.8	36.8	74.0	-37.2	PK
*1438.000	V	13.8	6.8	20.6	54.0	-33.4	Ave.
*2377.000	V	40.2	-3.7	36.5	74.0	-37.5	PK
*2377.000	V	25.1	-3.7	21.4	54.0	-32.6	Ave.
2442.000	V	90.3	1.9	92.2	/	/	PK
2442.000	V	71.8	1.9	73.7	/	/	Ave.
*2486.000	V	31.0	1.7	32.7	74.0	-41.3	PK
*2486.000	V	19.0	1.7	20.7	54.0	-33.3	Ave.
3109.000	V	39.4	1.9	41.3	74.0	-32.7	PK
3109.000	V	21.2	1.9	23.1	54.0	-30.9	Ave.
*4884.000	V	48.6	1.9	50.5	74.0	-23.5	PK
*4884.000	V	30.8	1.9	32.7	54.0	-21.3	Ave.
*7326.000	V	53.1	5.9	59.0	74.0	-15.0	PK
*7326.000	V	30.6	5.9	36.5	54.0	-17.5	Ave.

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

Spurious radiated emissions

Date of test : 08th May 2013
 Test requirement : FCC Part 15
 Test method : ANSI C63.10:2009
 Operating mode : Transmitter mode
 Frequency : 2480MHz
 Remark : NIL

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Frequency (MHz)	Polarity (H/V)	Read Level (dBµV)	Corr. (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
39.162	H	50.1	-34.1	16.0	40.0	-24.0	QP
64.208	H	48.0	-35.5	12.5	40.0	-27.5	QP
99.528	H	48.4	-34.8	13.6	43.5	-29.9	QP
151.067	H	52.6	-39.8	12.8	43.5	-30.7	QP
228.490	H	54.6	-35.1	19.5	46.0	-26.5	QP
338.400	H	49.0	-31.7	17.3	46.0	-28.7	QP
*1125.000	H	40.3	-5.3	35.0	74.0	-39.0	PK
*1125.000	H	24.7	-5.3	19.4	54.0	-34.6	Ave.
*2382.000	H	31.7	1.7	33.4	74.0	-40.6	PK
*2382.000	H	18.9	1.7	20.6	54.0	-33.4	Ave.
2480.000	H	89.6	1.9	91.5	/	/	PK
2480.000	H	70.7	1.9	72.6	/	/	Ave.
*2484.000	H	51.7	1.9	53.6	74.0	-20.4	PK
*2484.000	H	40.9	1.9	42.8	54.0	-11.2	Ave.
2517.000	H	45.5	2.0	47.5	74.0	-26.5	PK
2517.000	H	36.8	2.0	38.8	54.0	-15.2	Ave.
*4960.000	H	46.6	5.9	52.5	74.0	-21.5	PK
*4960.000	H	27.5	5.9	33.4	54.0	-20.6	Ave.
*7440.000	H	52.0	6.8	58.8	74.0	-15.2	PK
*7440.000	H	29.9	6.8	36.7	54.0	-17.3	Ave.

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Spurious radiated emissions

Date of test : 08th May 2013

Test requirement : FCC Part 15

Test method : ANSI C63.10:2009

Operating mode : Transmitter mode

Frequency : 2480MHz

Remark : NIL

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Frequency (MHz)	Polarity (H/V)	Read Level (dBμV)	Corr. (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
38.888	V	52.5	-35.3	17.2	40.0	-22.8	QP
106.013	V	51.8	-34.3	17.5	43.5	-26.0	QP
*117.733	V	53.0	-36.4	16.6	43.5	-26.9	QP
180.649	V	51.5	-37.7	13.8	43.5	-29.7	QP
234.168	V	48.8	-34.7	14.1	46.0	-31.9	QP
638.369	V	48.7	-27.0	21.7	46.0	-24.3	QP
*1125.000	V	41.4	-5.3	36.1	74.0	-37.9	PK
*1125.000	V	25.6	-5.3	20.3	54.0	-33.7	Ave.
*2382.000	V	33.7	1.7	35.4	74.0	-38.6	PK
*2382.000	V	18.0	1.7	19.7	54.0	-34.3	Ave.
2480.000	V	90.6	1.9	92.5	/	/	PK
2480.000	V	71.5	1.9	73.4	/	/	Ave.
*2484.000	V	53.7	1.9	55.6	74.0	-18.4	PK
*2484.000	V	42.8	1.9	44.7	54.0	-9.3	Ave.
2517.000	V	45.3	2.0	47.3	74.0	-26.7	PK
2517.000	V	34.5	2.0	36.5	54.0	-17.5	Ave.
*4960.000	V	46.2	5.9	52.1	74.0	-21.9	PK
*4960.000	V	27.7	5.9	33.6	54.0	-20.4	Ave.
*7440.000	V	52.9	6.8	59.7	74.0	-14.3	PK
*7440.000	V	33.8	6.8	40.6	54.0	-13.4	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

7.5 6dB 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 6dB (upper and lower) frequency.

Limit

Limit [kHz]

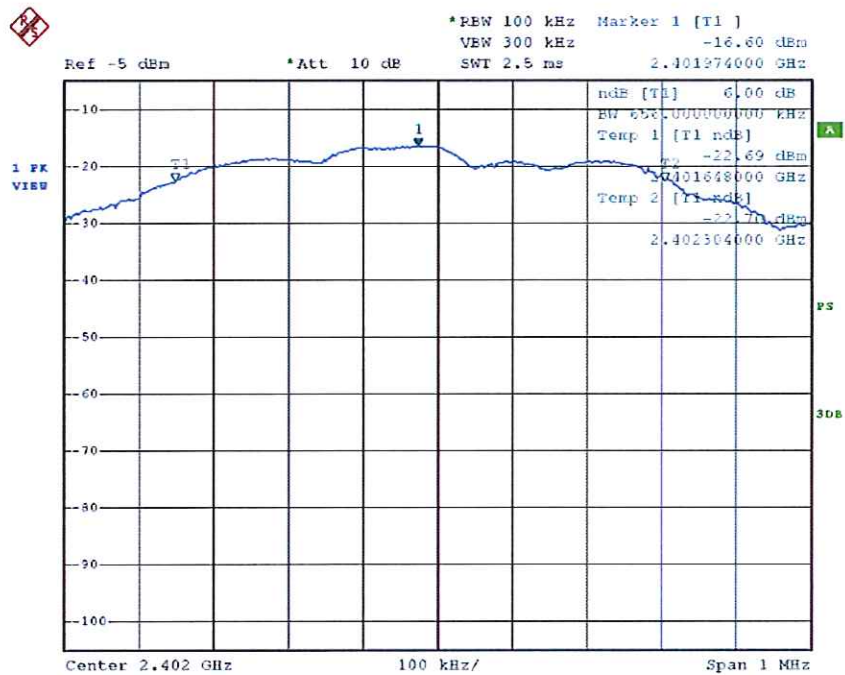
≥500

6dB bandwidth and 20dB bandwidth

6dB bandwidth test result
(GFSK)

Bandwidth kHz	Result
656.0	Pass

Remark : NIL

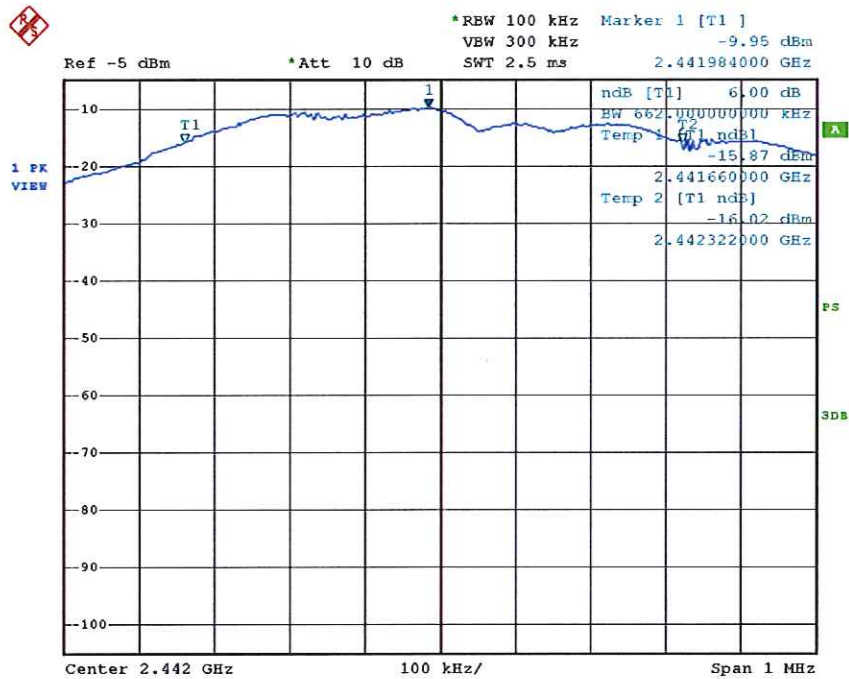


6dB bandwidth

6dB bandwidth test result
(GFSK)

Bandwidth kHz	Result
662.0	Pass

Remark : NIL

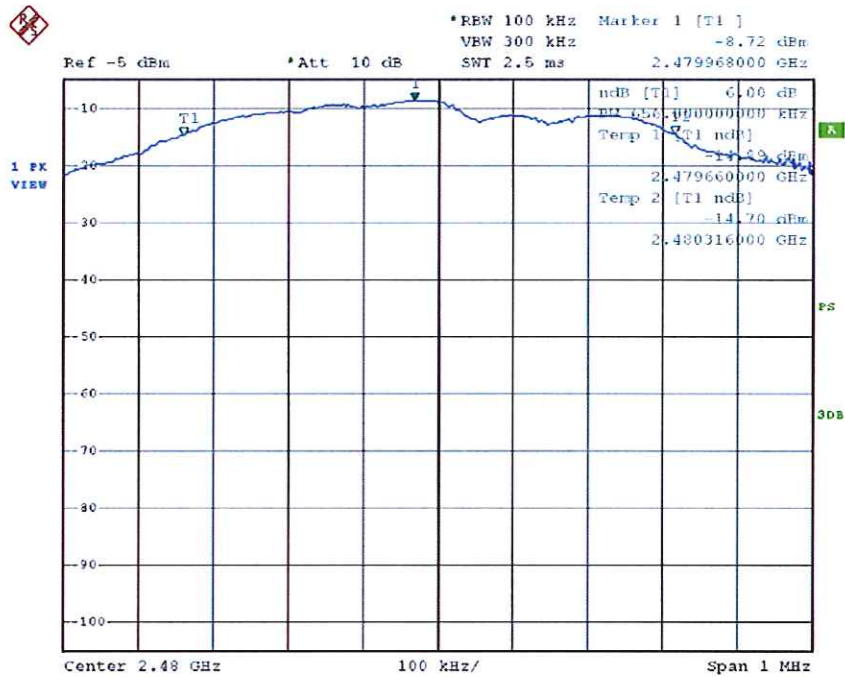


6dB bandwidth and 20dB bandwidth

6dB bandwidth test result
(GFSK)

Bandwidth MHz	Result
656.0	Pass

Remark : NIL



Test Equipment**6dB 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

7.6 Power spectral density

Test Method

- 1 Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 2 Set the spectrum analyzer as RBW = 3 kHz, VBW = 10 kHz, Span = 300 kHz, Sweep = 500s
- 3 Record the max reading.

Limit

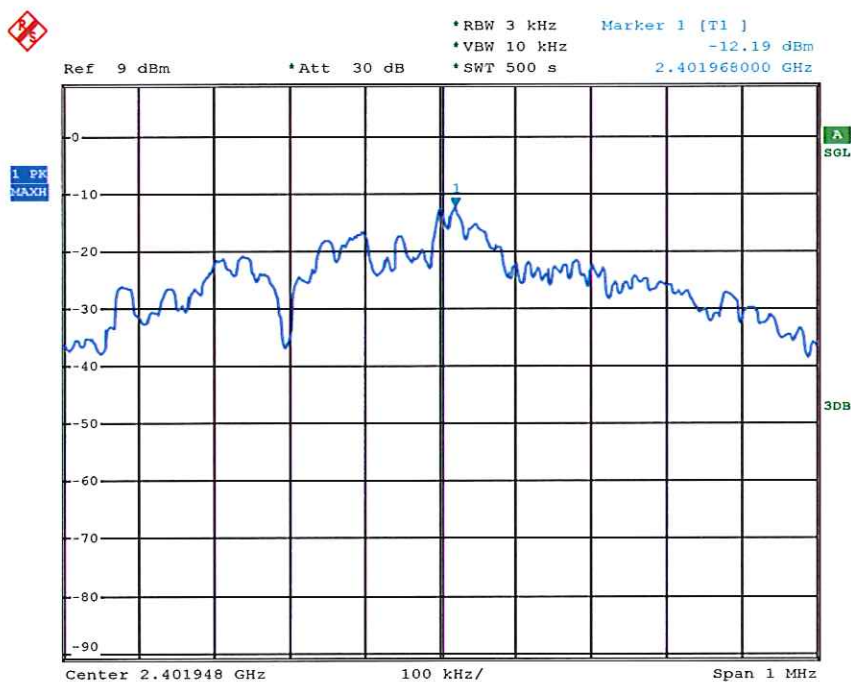
Limit
dBm / 3kHz

8

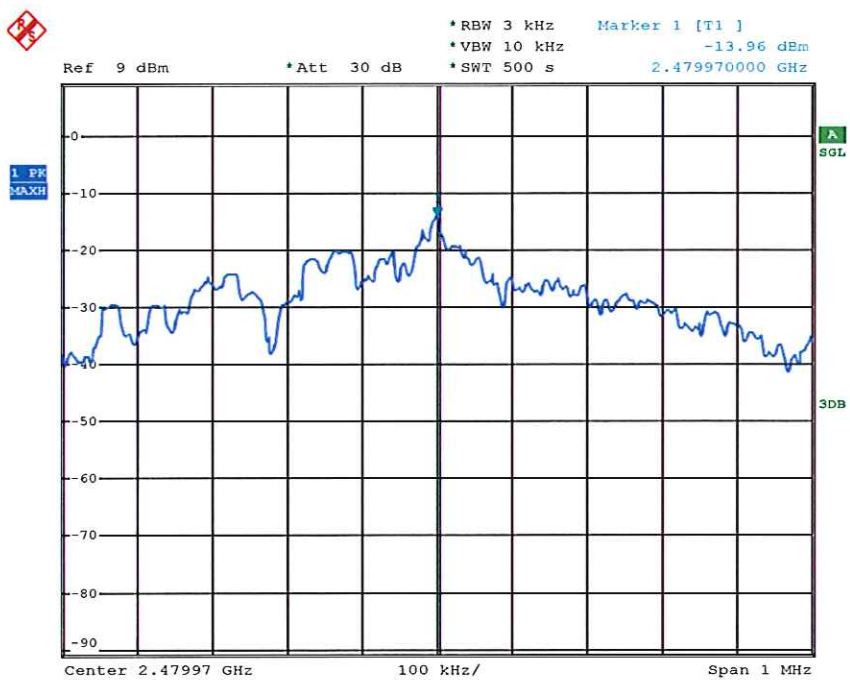
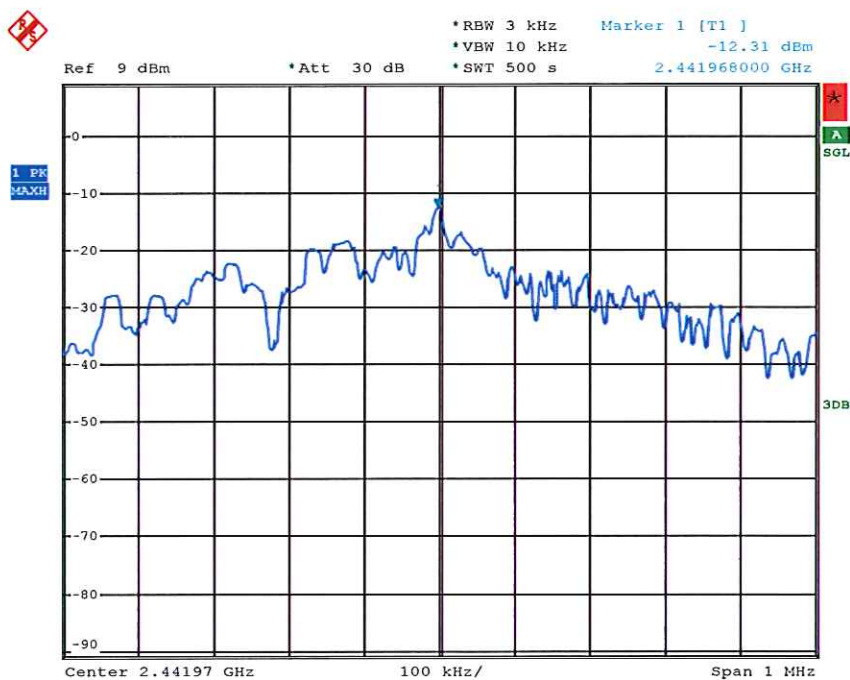
Power spectral density

Test result
(GFSK)

Frequency (MHz)	Power spectral density (dBm)	Result
2402	-12.19	Pass
2442	-12.31	Pass
2480	-13.96	Pass



Power spectral density



Test Equipment**Power spectral density 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

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 (dB μ V/m)	U=5.08dB (30MHz-1GHz) U=4.56dB (1GHz-6GHz)
CE	Disturbance Voltage (dB μ V)	U=2.7dB