

Spurious radiated emissions

Date of test : 08th May 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
99.600	H	40.80	-15.77	25.03	43.50	-18.47	QP
193.500	H	43.34	-16.46	26.88	43.50	-16.62	QP
*1335.000	H	62.90	-11.62	51.28	74.00	-22.72	PK
*1335.000	H	45.09	-11.62	33.47	54.00	-20.53	Ave.
1990.000	H	54.22	-9.97	44.25	74.00	-29.75	PK
1990.000	H	37.36	-9.97	27.39	54.00	-26.61	Ave.
2441.000	V	96.15	-1.75	94.40	/	/	PK
2441.000	V	71.48	-1.75	69.73	/	/	Ave.
*4884.000	H	65.68	0.41	66.09	74.00	-7.91	PK
*4884.000	H	45.42	0.41	45.83	54.00	-8.17	Ave.
*7323.000	V	54.39	7.83	62.22	74.00	-11.78	PK
*7323.000	V	40.05	7.83	47.88	54.00	-6.12	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 C63.4:2009

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
174.300	V	41.20	-15.96	25.24	43.50	18.26	QP
206.500	H	38.01	-15.15	22.86	43.50	20.64	QP
*1120.000	H	62.24	-13.07	49.17	74.00	24.83	PK
*1120.000	H	45.11	-13.07	32.04	54.00	21.96	Ave.
1930.000	V	55.52	-10.24	45.28	74.00	28.72	PK
1930.000	V	38.08	-10.24	27.84	54.00	26.16	Ave.
2480.000	V	96.25	-4.04	92.21	/	/	PK
2480.000	V	73.22	-4.04	69.18	/	/	Ave.
*4960.000	H	66.31	0.74	67.05	74.00	-6.95	PK
*4960.000	H	45.95	0.74	46.69	54.00	-7.31	Ave.
*7440.000	H	57.34	8.38	65.72	74.00	-8.28	PK
*7440.000	H	39.29	8.38	47.67	54.00	-6.33	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

7.6 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]

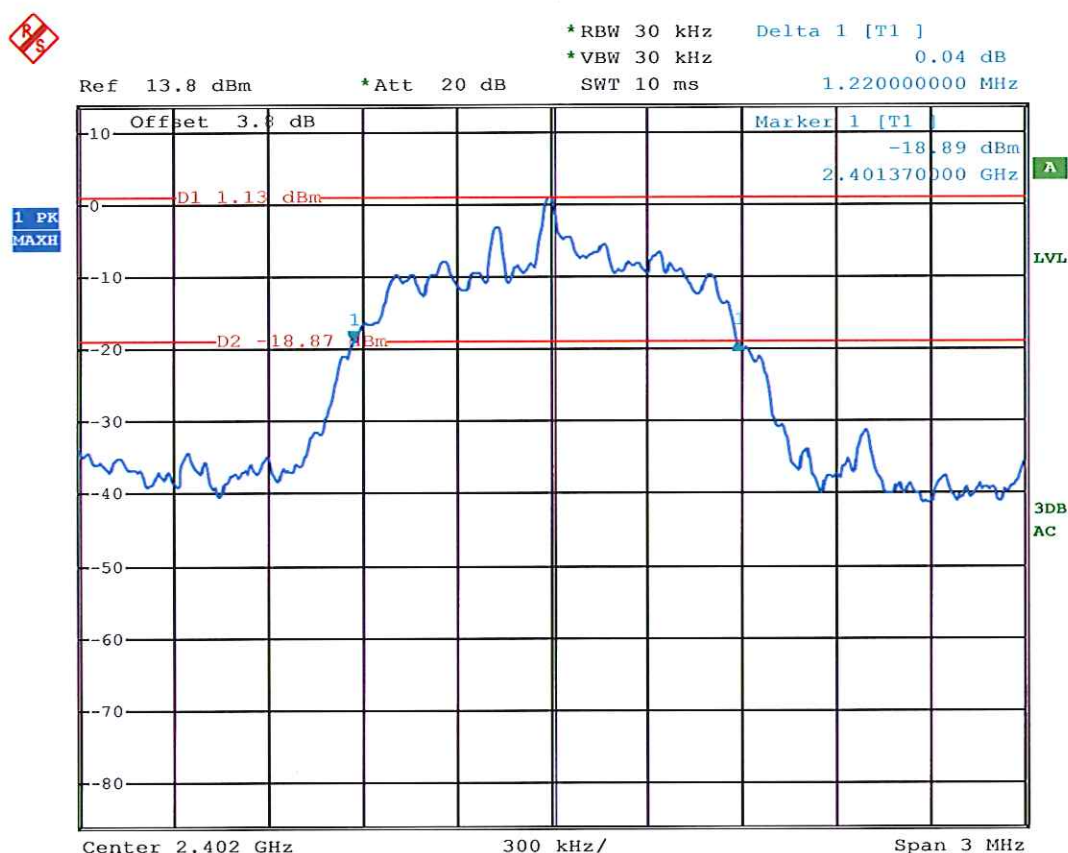
N/A

20 dB bandwidth

Test result
($\pi/4$ -DQPSK)

Bandwidth MHz	Result
1.220	Pass

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

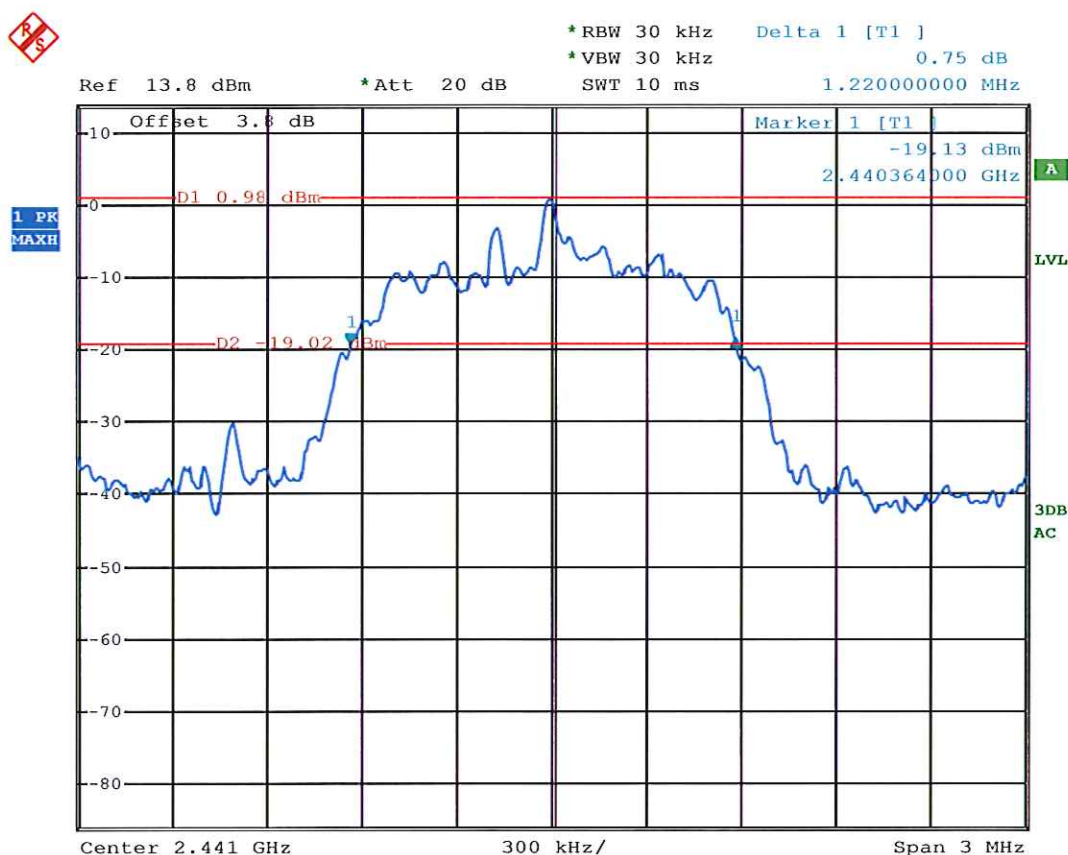


20 dB bandwidth

Test result
($\pi/4$ -DQPSK)

Bandwidth MHz	Result
1.220	Pass

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

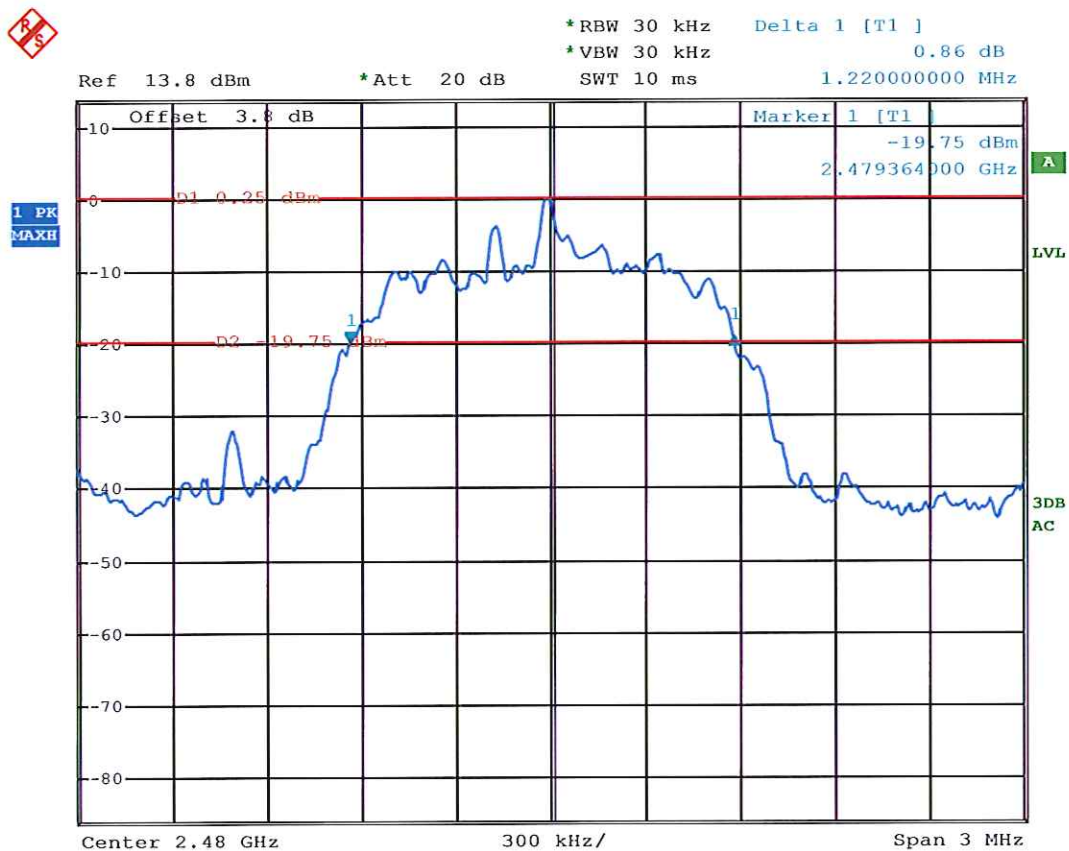


20 dB bandwidth

Test result
($\pi/4$ -DQPSK)

Bandwidth MHz	Result
1.220	Pass

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



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

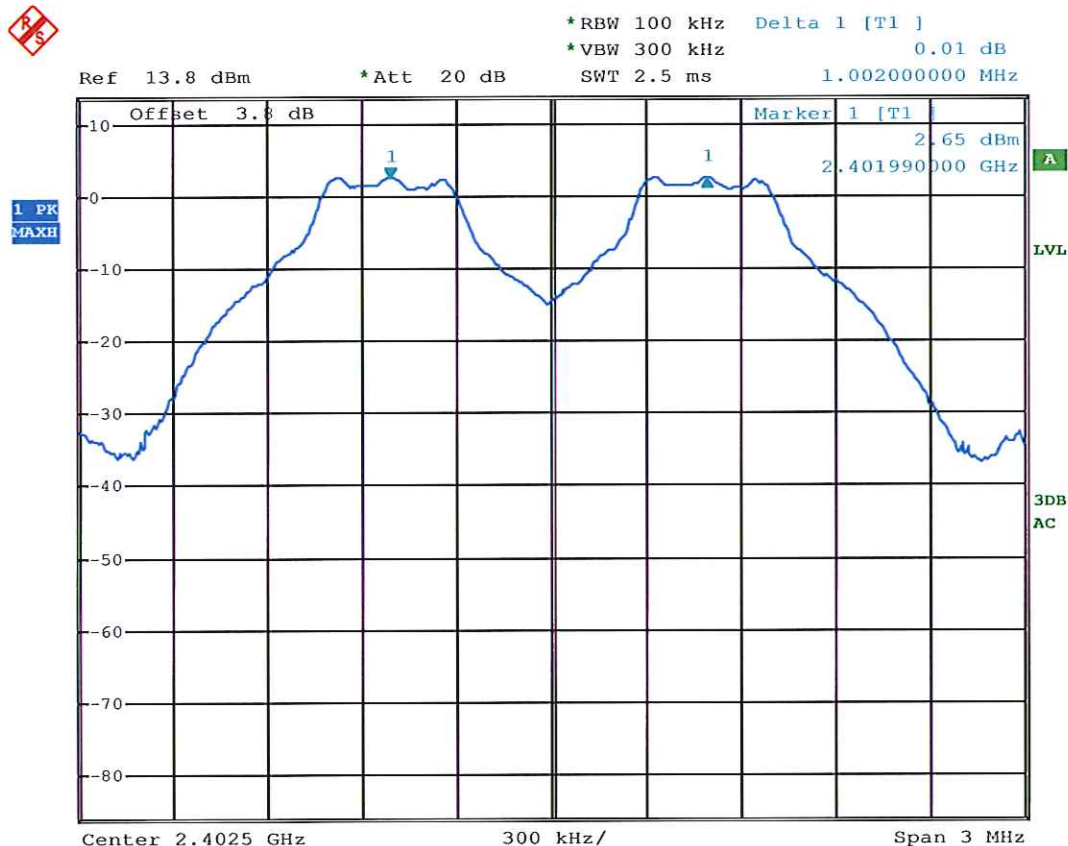
Limit
kHz

$\geq 25\text{kHz}$ or $2/3$ of the 20 dB bandwidth which is greater

Carrier Frequency Separation

Test result
(GFSK)

Carrier Frequency Separation MHz	Result
1.002	Pass



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

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

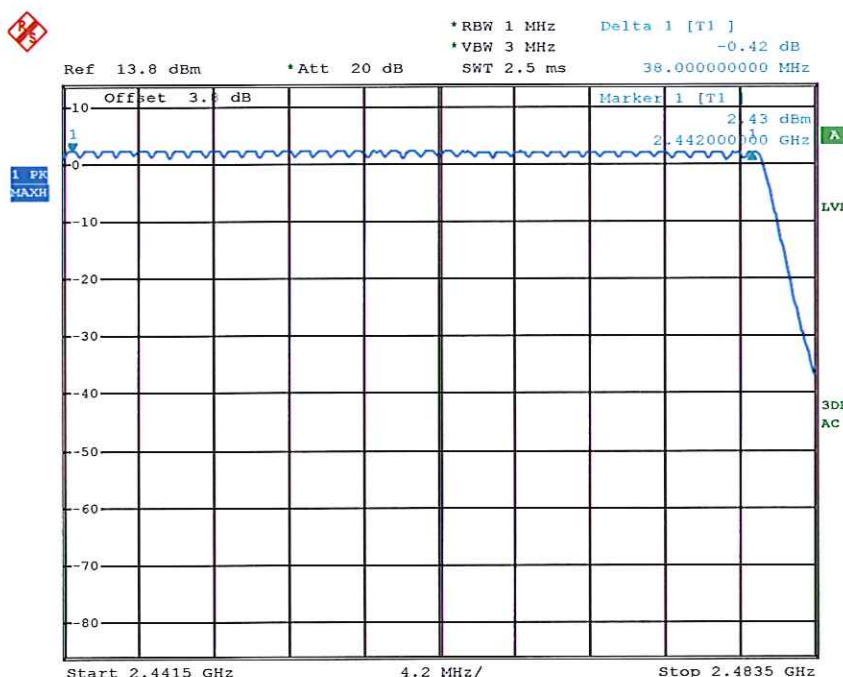
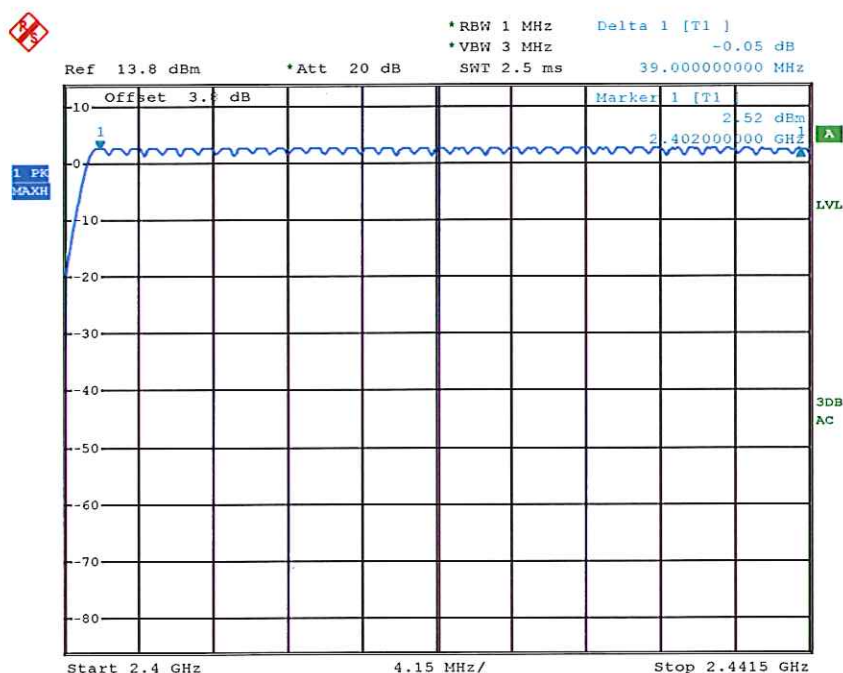
Limit
number

≥ 15

Number of hopping frequencies

Test result:

Number of hopping frequencies	Result
79	Pass



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.

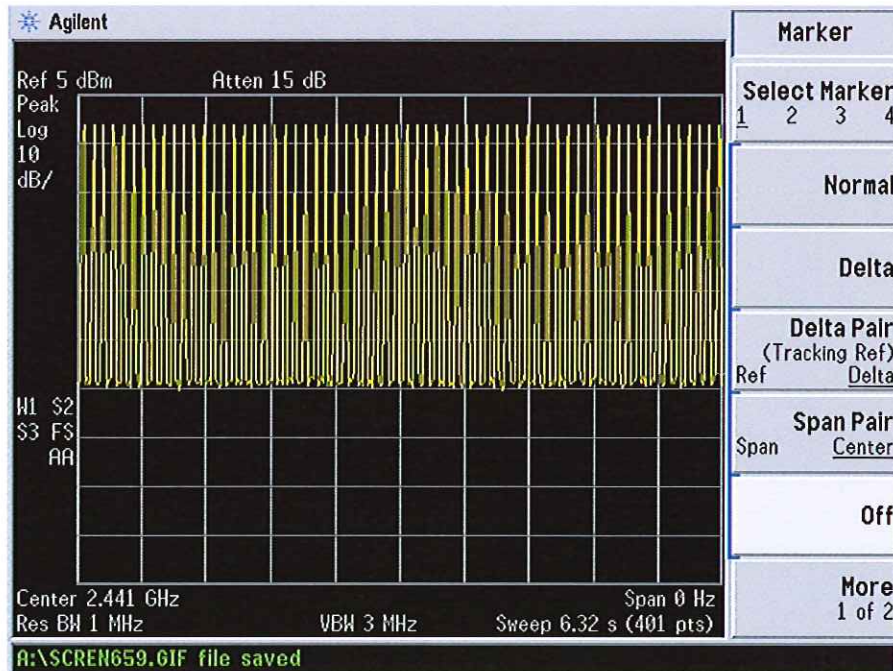
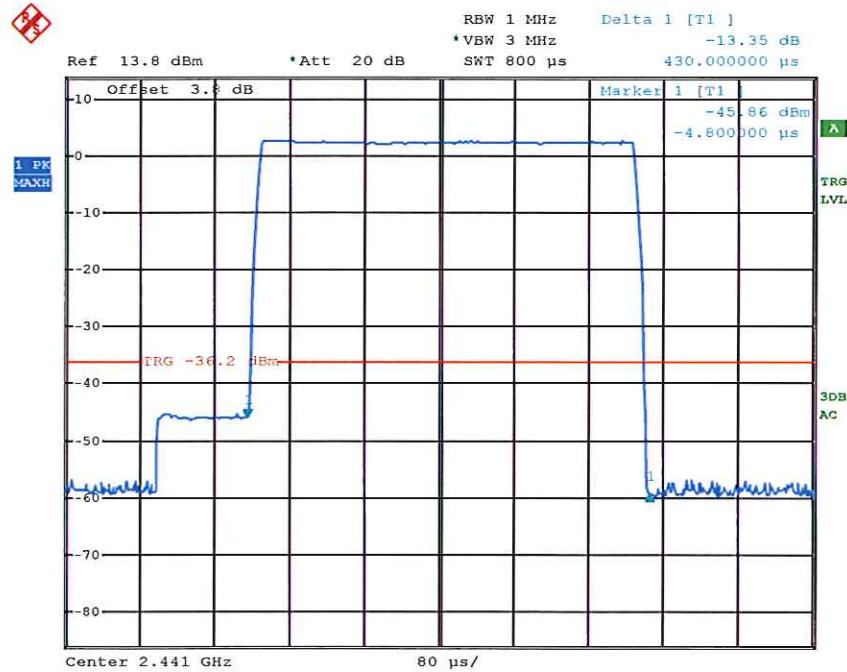
Test Result (GFSK)

Frequency (MHz)	Packet	Dwell Time (ms)	Limit (ms)	Result
2441	DH1	137.6	< 400	Pass
2441	DH3	271.68	< 400	Pass
2441	DH5	326.7	< 400	Pass

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.

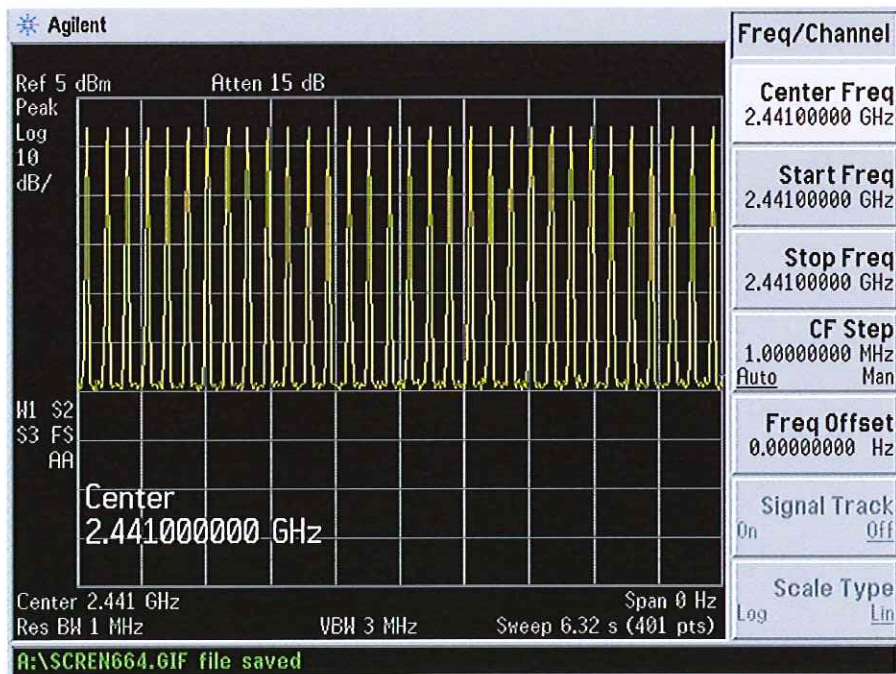
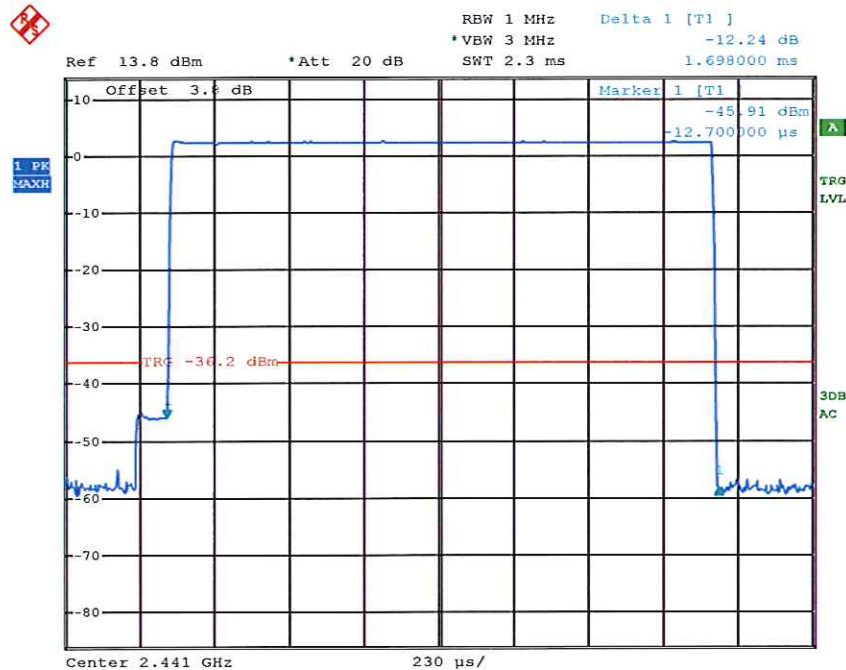
Dwell Time

DH1



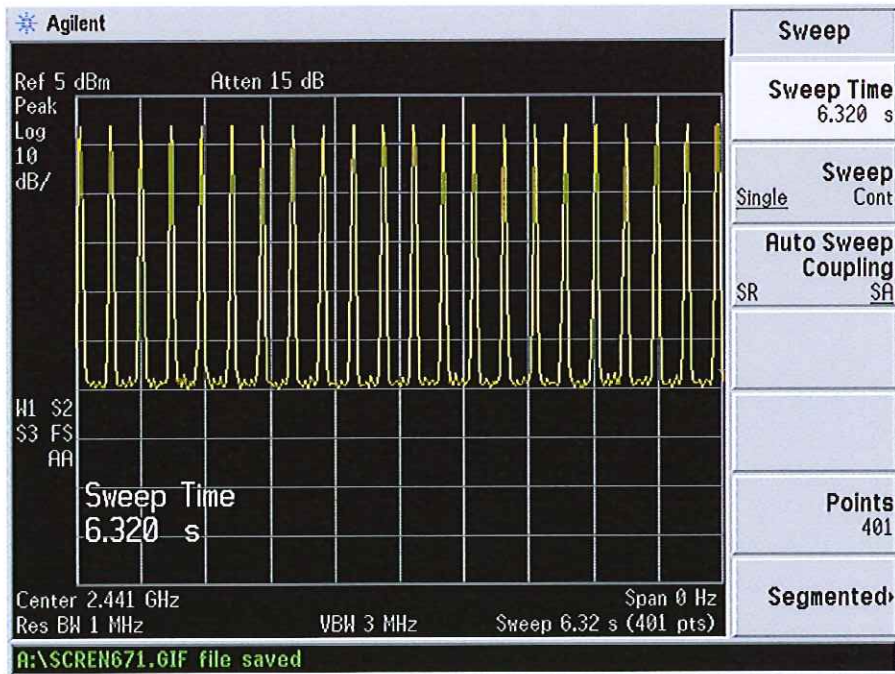
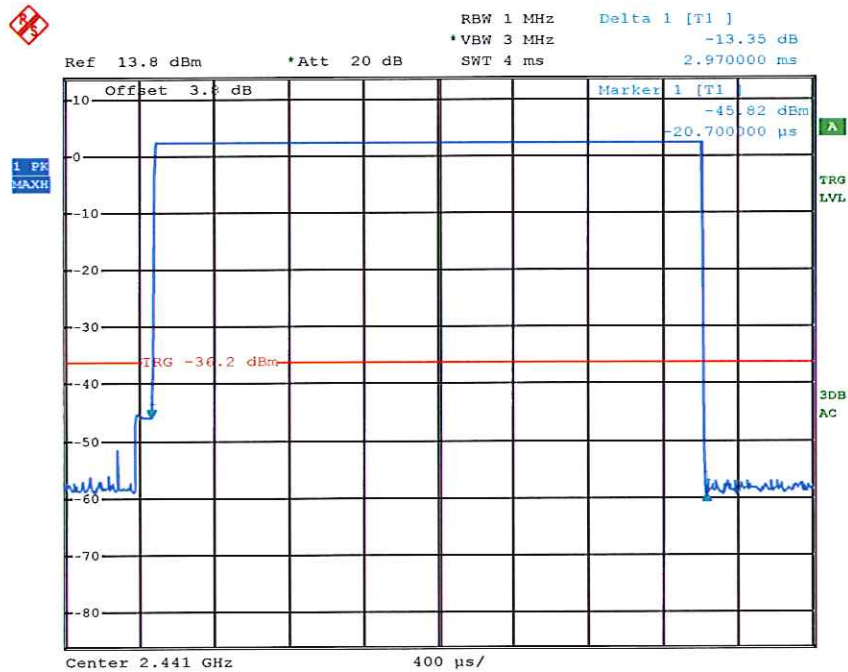
Dwell Time

DH3



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