Test Report

FINAS
Finnish Accreditation Service
T004 (EN ISO/IEC 17025)

INTENTIONAL RADIATOR TESTS ACCORDING TO FCC PART 15 C AND ISED CANADA REQUIREMENTS

Equipment Under Test:	Multi-Protocol Wireless Module
Model:	MGM13P02A MGM13P02E
Manufacturer:	Silicon Laboratories Finland Oy Bertel Jungin aukio 3 FI-02600 ESPOO FINLAND
Customer:	Silicon Laboratories Finland Oy Bertel Jungin aukio 3 FI-02600 ESPOO FINLAND
FCC Rule Part:	15.247: 2017
IC Rule Part:	RSS-247, Issue 2, 2017 RSS-GEN Issue 4, 2014
KDB:	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 (April 5, 2017)

Date: 2 November 2017
Issued by:
Emil Haverinen
Testing Engineer

Date: 2 November 2017
Checked by:
Rauno Repo
Testing Engineer

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Equipment Under Test (EUT)

Trade mark:	Silicon Labs
Model:	MGM13P02A, MGM13P02E
Type:	Multi-Protocol Wireless Module
Serial no:	-
FCC ID:	QOQMGM13P
IC:	5123A-MGM13P

Description of the EUT

MGM13P is a multi-protocol wireless module with two antenna variants. Variant A is equipped with chip antenna while the E variant has RF connector for the use of external antenna.

This test report contains test results for ZigBee.

Classification of the device

Fixed device	☐
Mobile Device (Human body distance > 20cm)	☒
Portable Device (Human body distance < 20cm)	☒

Modifications Incorporated in the EUT

-

Ratings and declarations

Operating Frequency Range (OFR):	2405 - 2480 MHz
Channels:	15
Channel separation:	5 MHz
Effective conducted power:	11.16 dBm (Peak)
Modulation:	GFSK
Integral Antenna gain:	A-variant: 1 dBi
External Antenna gain:	E-variant: 2.14 dBi

Power Supply

Operating voltage range: 2.0 - 3.8 VDC (tested with 3.3V regulated by the development board)

The EUT was powered from the development board which was powered by PC.

Mechanical Size of the EUT

Height: 2 mm Width: 20 mm Length: 15 mm

Samples

One sample was used in tests.

EUT	Description
1. MGM13P02E	Original E variant with RF connector for external antenna

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only. This document cannot be reproduced except in full, without prior approval of the Company.

SUMMARY OF TESTING

Test Specification	Description of Test	Result
§15.207(a) / RSS-GEN 8.8	Conducted Emissions on Power Supply Lines	**N/T**
§15.247(b)(3) / RSS-247 5.4(d)	Maximum Peak Conducted Output Power	**PASS**
§15.247(a)(2) / RSS-247 5.2(a)	6 dB Bandwidth	**N/T**
§15.247(e) / RSS-247 5.2(b)	Power Spectral Density	**N/T**
RSS-GEN 6.6	99% Occupied Bandwidth	**PASS**
§15.247(d) / RSS-247 5.5	100 kHz Bandwidth of Frequency Band Edges and Conducted Spurious Emissions	**N/T**
§15.209(a), §15.247(d) / RSS-247 5.5	Radiated Emissions Within the Restricted Bands	**N/T**

Possible test case verdicts:
EUT does meet the requirement: P (Pass)
EUT does not meet the requirement: F (Fail)
Test was not performed by SGS Fimko: N/T

EUT Test Conditions during Testing

The EUT was in continuous transmit mode during all the tests. The hopping was stopped and the EUT was configured into the wanted channel using software provided by the manufacturer.
During conducted measurements, the EUT was connected to WSTK development board.

Following channels and settings were used during the tests;

EUT 1. MGM13P02E

Channel	Frequency (MHz)	Power setting
11	2405	104
19	2445	104
26	2480	104

Test Facility

☐ Testing Location / address: FCC registration number: **90598**	SGS Fimko Ltd Särkiniementie 3 FI-00210, HELSINKI FINLAND
☒ Testing Location / address: FCC registration number: **178986** Industry Canada registration number: **8708A-2**	SGS Fimko Ltd Karakaarenkuja 4 FI-02610, ESPOO FINLAND

TEST RESULTS

Maximum Peak Conducted Output Power

Standard:	ANSI C63.10	(2013)
Tested by:	JAT	
Date:	23 October 2017	
Temperature:	23 ± 3 °C	
Humidity:	20 - 60 % RH	
Measurement uncertainty:	± 2.87dB	Level of confidence 95 % (k = 2)

FCC Rule: 15.247(b)(3)
RSS-247 5.4(d)

For systems using digital modulation in the 2400-2483.5 MHz bands the limit is 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power.

Measured values are peak values.

Results:

Table 1: Maximum conducted output power

Channel	Conducted Power [dBm]	Limit [dBm]	Margin [dBm]	Result
11 Low	11.16	30	18.84	PASS
19 Mid	10.48	30	19.52	PASS
26 High	10.73	30	19.27	PASS

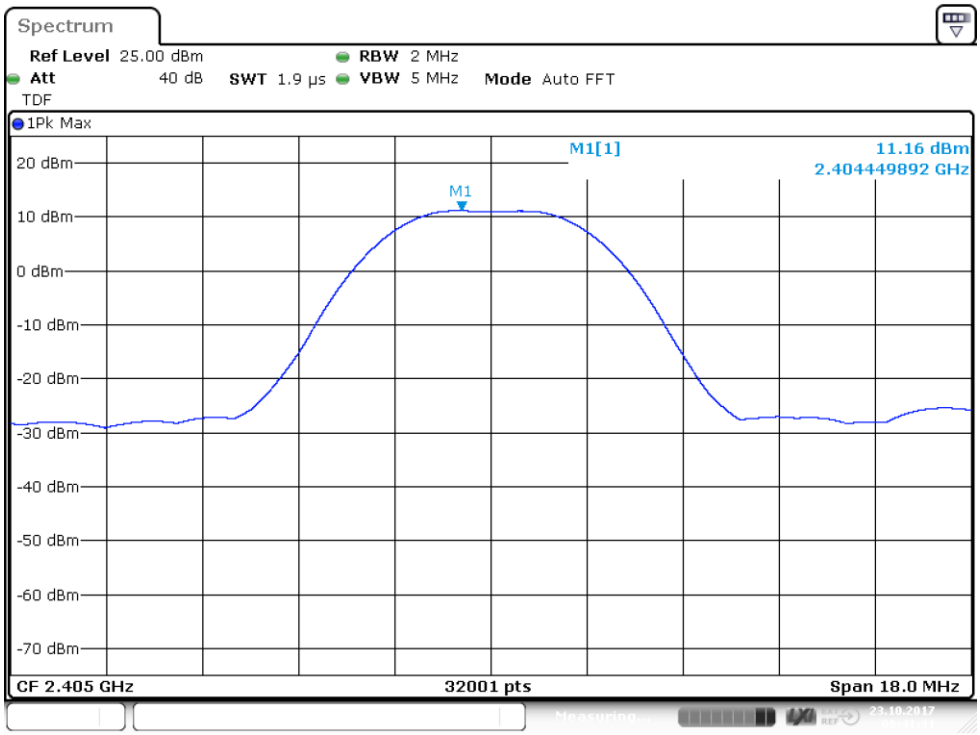

Figure 1: Conducted power, Channel 11 low

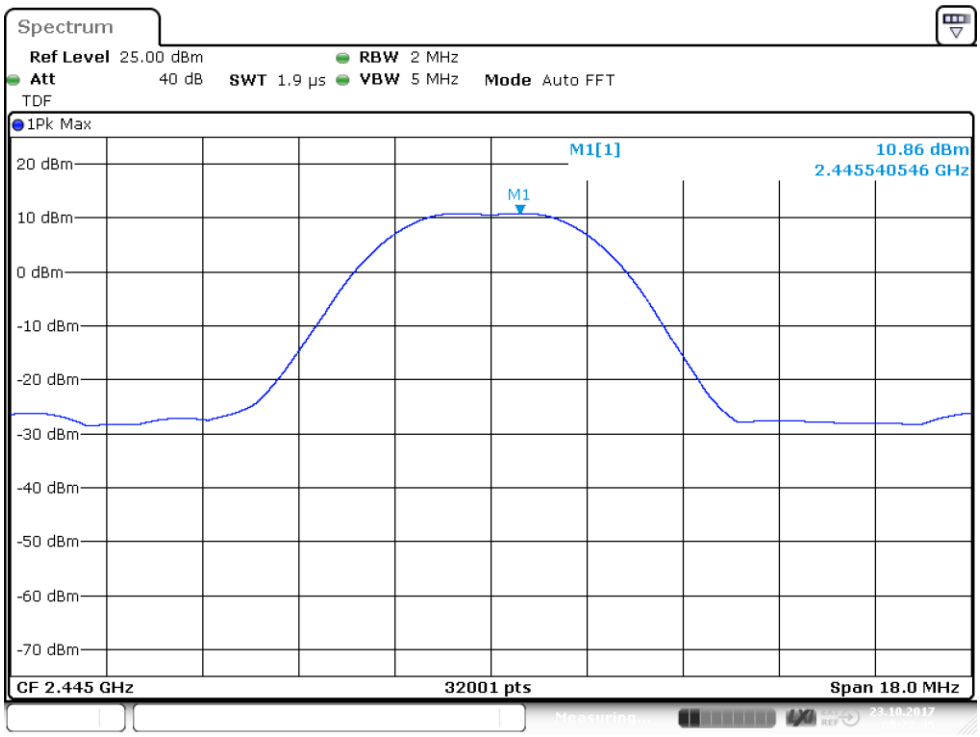

Figure 2: Conducted power, Channel 19 mid

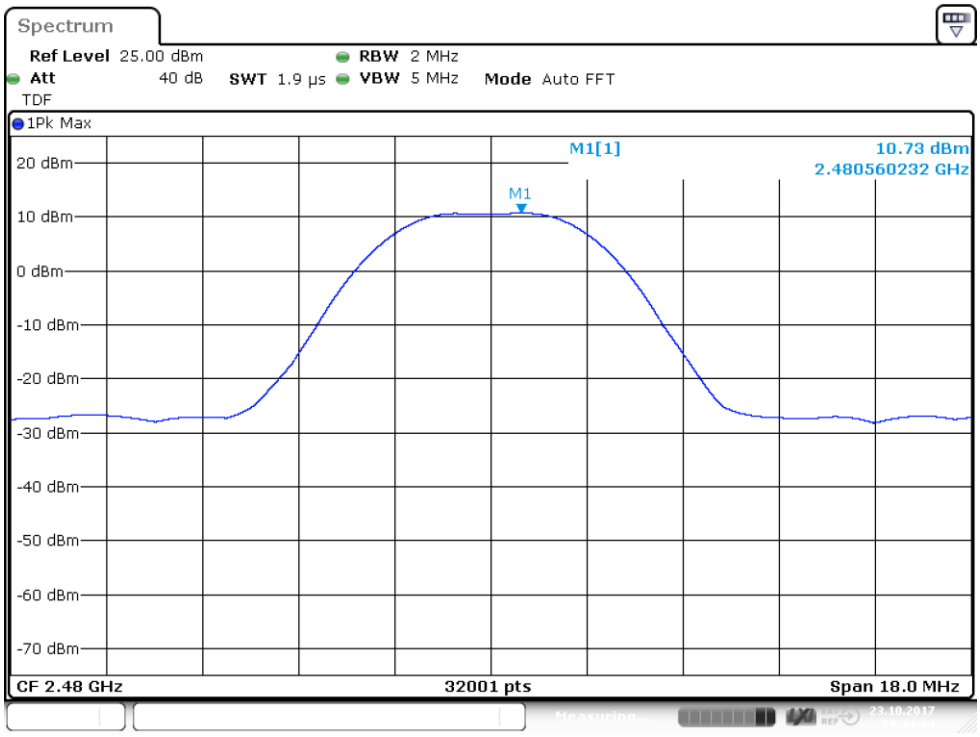

Figure 3: Conducted power, Channel 26 high

99% Occupied Bandwidth

Standard:	RSS-GEN	(2014)
Tested by:	JAT	
Date:	23 October 2017	
Temperature:	23 ± 3 °C	
Humidity:	20 - 60 % RH	

RSS-GEN 6.6

Results:

Table 2: 99% occupied bandwidth test results

Channel	Limit	99 % BW [MHz]	Result
11 Low	-	2.230555295	PASS
19 Mid	-	2.247429768	PASS
26 High	-	2.242742414	PASS

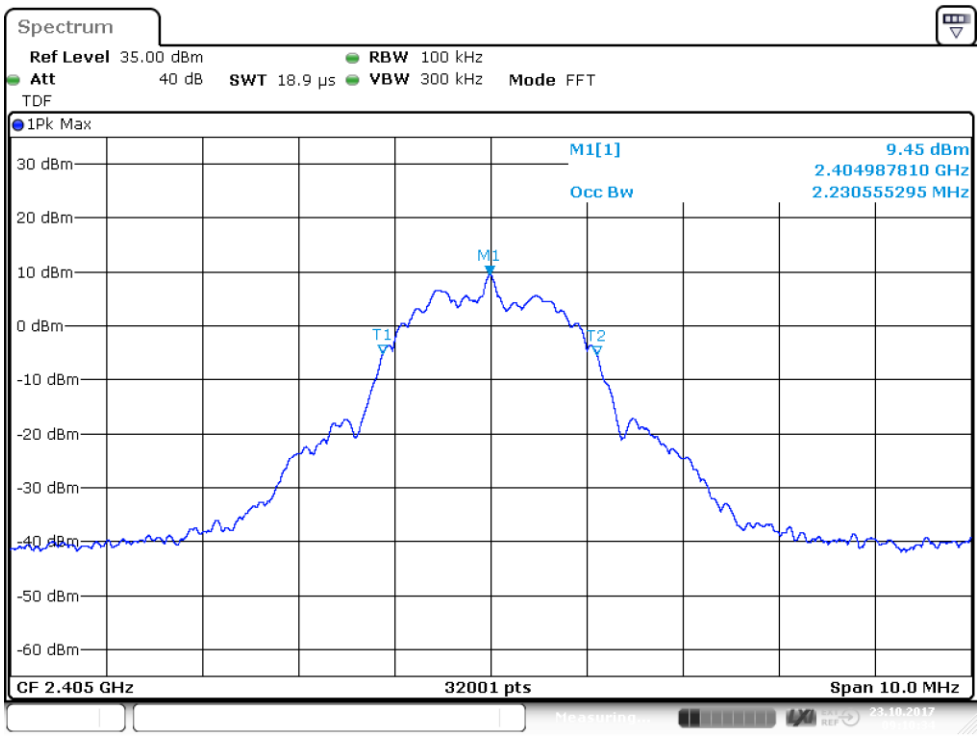

Figure 4: 99% OBW, Channel 11 low

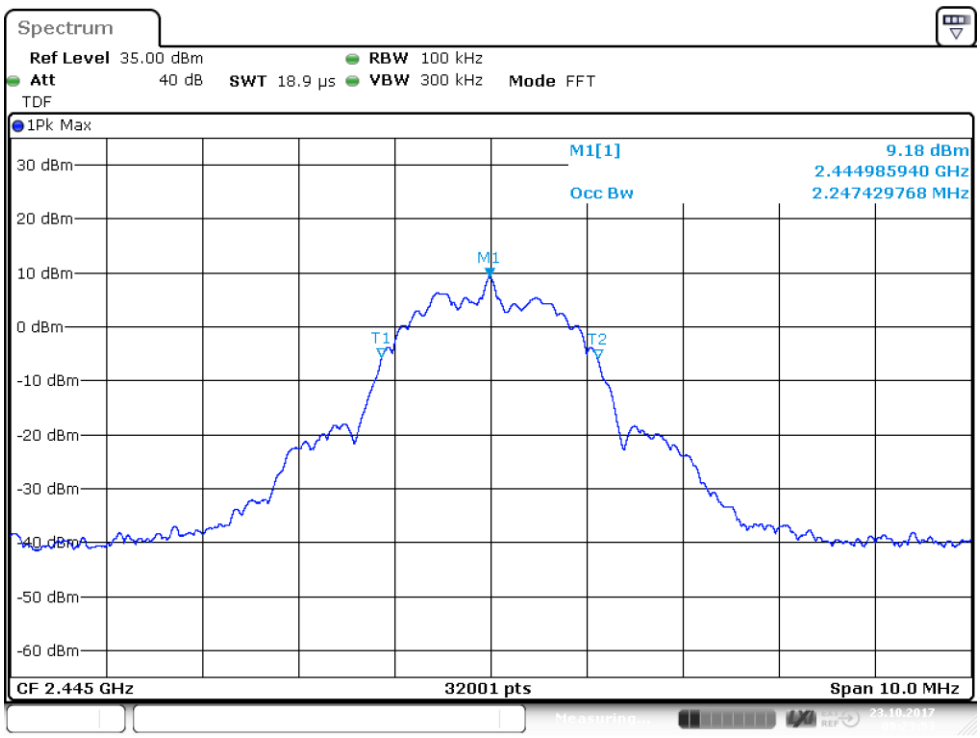

Figure 5: 99% OBW, Channel 19 mid

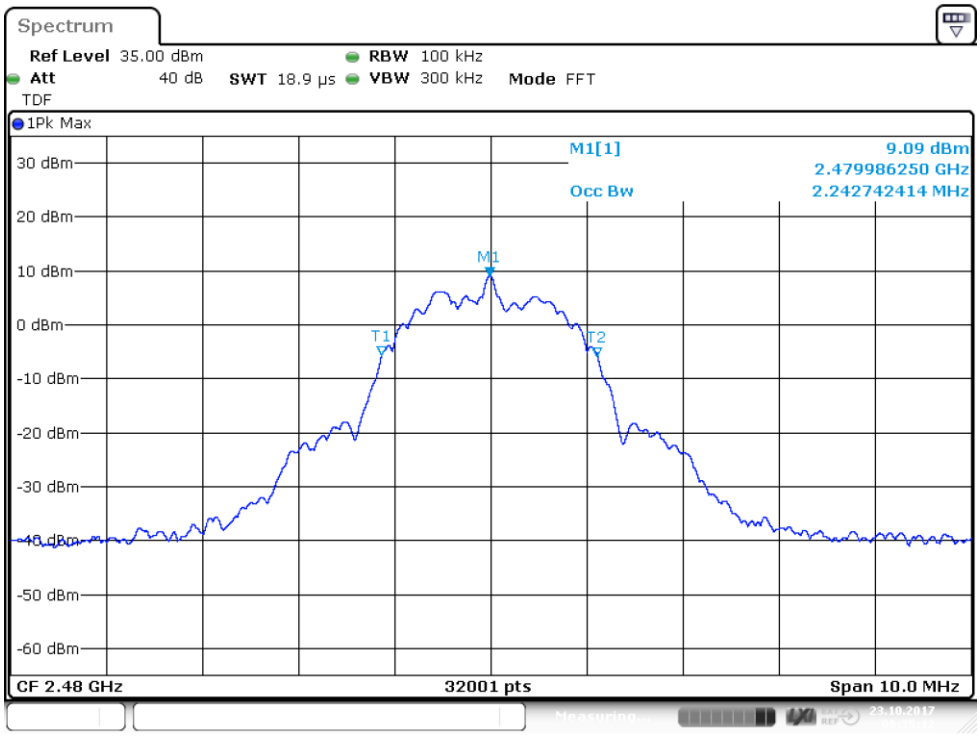

Figure 6: 99% OBW, Channel 26 high

TEST EQUIPMENT

RF-Test Equipment

Equipment	Manufacturer	Type	Inv or serial	Prev Calib	Next Calib
ATTENUATOR	PASTERNACK	10dB DC-40GHz	-	-	-
SIGNAL ANALYZER	ROHDE & SCHWARZ	FSV40	inv:9093	2017-07-07	2018-07-07