

EMC Test Report

Silicon Laboratories Finland Oy

Radio Module, Main Model: SiW917Y1GA
Series Model: SiW917Y1GN



In accordance with ETSI EN 301 489-1 and ETSI
EN 301 489-17
(2.4 GHz WLAN, 2.4 GHz Bluetooth Low Energy)

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COMMERCIAL-IN-CONFIDENCE

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SIGNATURE

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Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD document control rules.

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with ETSI EN 301 489-1: V2.2.3 (2019-11) and ETSI EN 301 489-17: V3.2.4 (2020-09) for the tests detailed in section 1.3.



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Contents

1	Report Summary	2
1.1	Report Modification Record.....	2
1.2	Introduction.....	2
1.3	Brief Summary of Results	3
1.4	Declaration of Build Status	4
1.5	Product Information	5
1.6	Deviations from the Standard.....	9
1.7	EUT Modification Record	9
1.8	Test Location	10
2	Test Details	11
2.1	Immunity to Radio Frequency Electromagnetic Field (Enclosure Port) - Small Products.....	11
2.2	Immunity to Electrostatic Discharge (Enclosure Port).....	18
3	Test Equipment Information	22
3.1	General Test Equipment Used	22
3.2	Customer Support Equipment.....	22
4	Incident Reports	23
5	Measurement Uncertainty	24



1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	10 June 2024

Table 1

1.2 Introduction

Applicant	Silicon Laboratories Finland Oy
Manufacturer	Silicon Laboratories Finland Oy
Model Number(s)	Main Model: SiW917Y1GA Series Model: SiW917Y1GN
Serial Number(s)	Not Serialised (FAR-815415-002)
Hardware Version(s)	1.0
Software Version(s)	Connectivity Firmware version 2.12.1.0.0.1 with tests involving BLE, otherwise Connectivity Firmware version 2.10.1.2.0.4
Number of Samples Tested	1
Test Specification/Issue/Date	ETSI EN 301 489-1: V2.2.3 (2019-11) ETSI EN 301 489-17: V3.2.4 (2020-09)
Order Number	PTP ~ 6000530772
Date	08-March-2024
Date of Receipt of EUT	04-March-2024 20-May-2024
Start of Test	12-March-2024
Finish of Test	24-May-2024
Name of Engineer(s)	Bryce Kitching, Ravi Kishore Darshanam, Subodh Karale Muhammad Enam
Related Document(s)	EN 61000-4-3: 2006 A1: 2008 A2: 2010 EN 61000-4-2: 2009



1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with ETSI EN 301 489-1 and ETSI EN 301 489-17 is shown below.

Section	Specification Clause	Test Description	Result	Comments/Base Standard
Configuration and Mode: DC Powered - Mode 1: Bluetooth Low Energy communication link				
2.1	9.2	Immunity to Radio Frequency Electromagnetic Field (Enclosure Port) - Small Products	Pass	EN 61000-4-3: 2006 A1: 2008 A2: 2010
2.2	9.3	Immunity to Electrostatic Discharge (Enclosure Port)	Pass	EN 61000-4-2: 2009
Configuration and Mode: DC Powered - Mode 2: 2.4 GHz Wi-Fi communication link				
2.1	9.2	Immunity to Radio Frequency Electromagnetic Field (Enclosure Port) - Small Products	Pass	EN 61000-4-3: 2006 A1: 2008 A2: 2010
2.2	9.3	Immunity to Electrostatic Discharge (Enclosure Port)	Pass	EN 61000-4-2: 2009
Configuration and Mode: DC Powered - Idle and checking for no un-intentional transmissions.				
2.1	9.2	Immunity to Radio Frequency Electromagnetic Field (Enclosure Port) - Small Products	Pass	EN 61000-4-3: 2006 A1: 2008 A2: 2010
2.2	9.3	Immunity to Electrostatic Discharge (Enclosure Port)	Pass	EN 61000-4-2: 2009

Table 2



1.4 Declaration of Build Status

MAIN EUT	
MANUFACTURING DESCRIPTION	Radio Module
MANUFACTURER	Silicon Laboratories Finland Oy
MODEL	Main Model: SiW917Y1GA (with integral antenna) Series Model: SiW917Y1GN (with no integral antenna but RF pin)
PART NUMBER	Not Applicable
HARDWARE VERSION	1.0
SOFTWARE VERSION	Connectivity Firmware version 2.12.1.0.0.1 with tests involving BLE, otherwise Connectivity Firmware version 2.10.1.2.0.4
PSU VOLTAGE/FREQUENCY/CURRENT	3.3 V, 400 mA
HIGHEST INTERNALLY GENERATED FREQUENCY	180 MHz (embedded MCU clock, for ARM® Cortex® M4 core) 40 MHz (module's on-board crystal, for radio portion)
TECHNICAL DESCRIPTION (a brief technical description of the intended use and operation)	Bluetooth Low Energy (LE), and Wi-Fi 802.11b/g/n/ax wireless radio module

Data in the table above is provided by the Manufacturer

1.5 Product Information

1.5.1 Technical Description

The Equipment under test (EUT) was a wireless combo PCB Radio Module, Main Model: SiW917Y1GA, Series Model: SiW917Y1GN

The primary function of the EUT is to operate as a Bluetooth Low Energy (LE), and Wi-Fi 802.11b/g/n/ax wireless radio module.

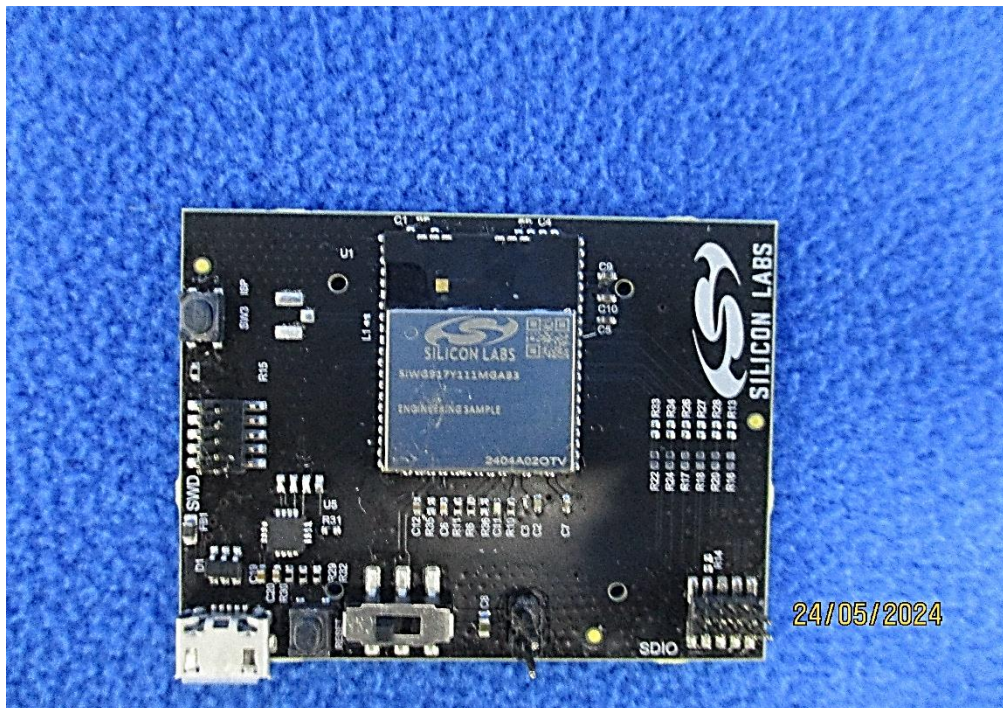


Figure 1 - EUT mounted on host certification board top view.

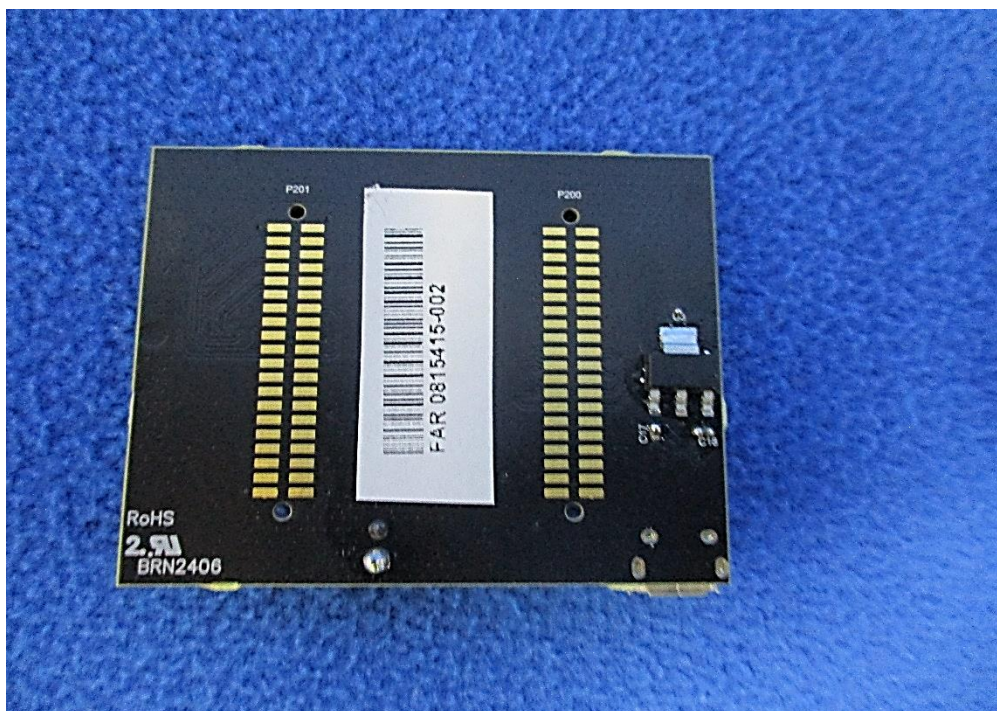


Figure 2 - host certification board rear view

1.5.2 Host Board Configuration

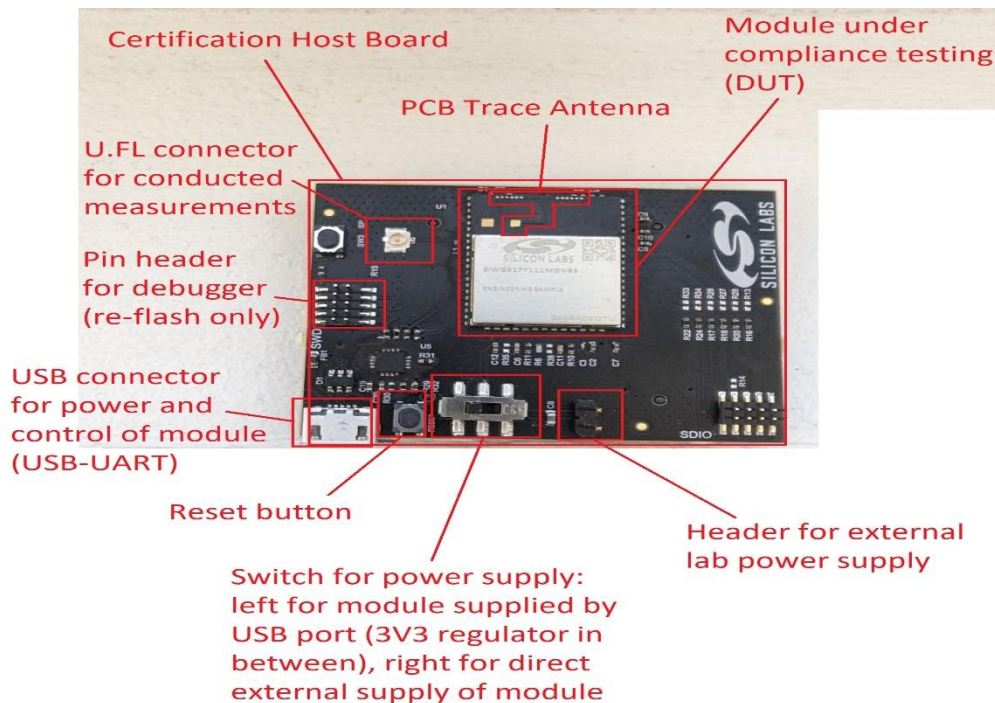


Figure 3 – Host certification board layout



1.5.3 EUT Port/Cable Identification

Port	Max Cable Length specified	Usage	Type	Screened
N/A	-	-	-	-

Table 3

1.5.4 Test Configuration

Configuration	Description
DC Powered (3.3 V)	The EUT was powered via a USB connection to the support laptop. A companion device was used for communication purposes.

Table 4

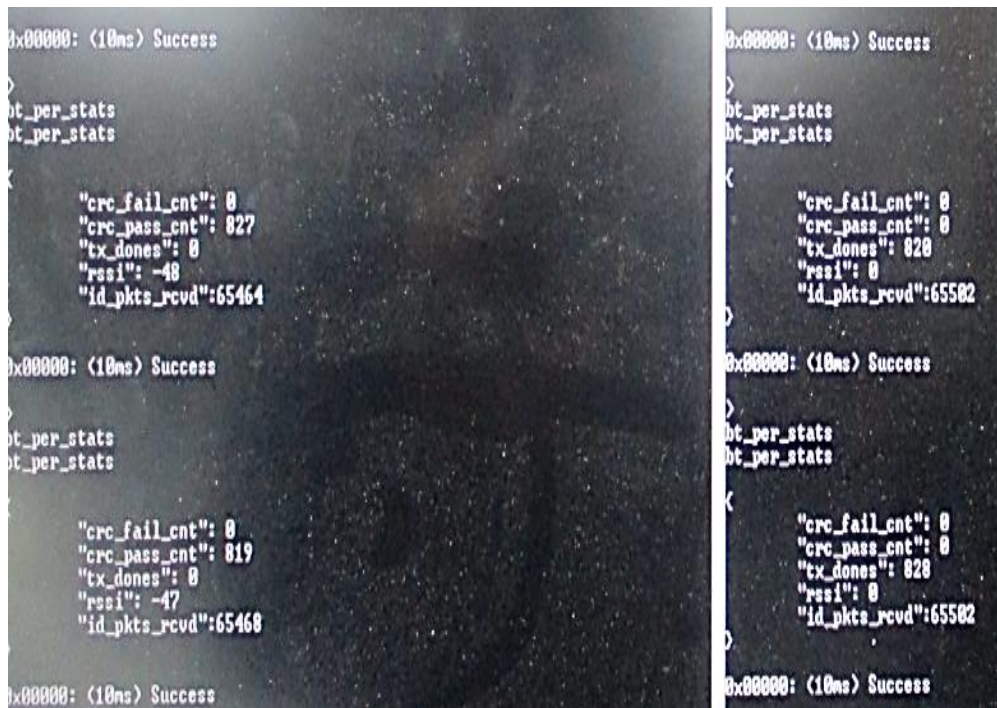
1.5.5 Modes of Operation

Mode	Description
Bluetooth Low Energy communication link	A Bluetooth communication link was established between the two units, and data traffic was actively exchanged with the assistance of a laptop
2.4 GHz Wi-Fi communication link	A Wi-Fi communication link was established between the two units, and data traffic was actively exchanged with the assistance of a laptop
Idle and checking for no un-intentional transmissions.	The Bluetooth and Wi-Fi modules were inactive

Table 5

1.5.6 Monitoring of Performance

Sending a known amount of data via a companion device, with the EUT reporting the received data. This was monitored for a performance level of less than 10% deviation.



Bluetooth PER link monitored using a laptop.

Wi-Fi PER link monitored using a laptop.

In idle mode, a spectrum analyzer was configured to monitor for unintentional transmissions.

1.5.7 Performance Criteria

Performance Criteria for ETSI EN 301 489-1 Clause 6.1 Continuous Phenomena (CP)

During the test, the equipment shall:

- continue to operate as intended.
- not unintentionally transmit.
- not unintentionally change its operating state.
- not unintentionally change critical stored data.



Performance Criteria for ETSI EN 301 489-1 Clause 6.2 Transient Phenomena (TP)

For all ports and transient phenomena with the exception described below, the following applies:

- The application of the transient phenomena shall not result in a change of the mode of operation (e.g. unintended transmission) or the loss of critical stored data.
- After application of the transient phenomena, the equipment shall operate as intended.

For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies:

- For products with only one symmetrical port intended for connection to outdoor lines, loss of function is allowed, provided the function is self-recoverable, or can be otherwise restored. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.
- For products with more than one symmetrical port intended for connection to outdoor lines, loss of function on the port under test is allowed, provided the function is self-recoverable. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

1.6 Deviations from the Standard

Radiated Immunity: The Bluetooth power was not adjustable at the companion device consequently, the Pmin threshold for the EUT could not be uniquely identified, meaning the level of the wanted signal at the input of the EUT's receiver could not be defined to be exactly 30 dB (± 6 dB) above the Pmin for the EUT.

1.7 EUT Modification Record

The table below details modifications made to the EUT during the test programme.

The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
Model: SiW917Y1GA, Serial Number: Not Serialised (FAR-815415-002)			
0	As supplied by the customer	Not Applicable	Not Applicable

Table 6



1.8 Test Location

TÜV SÜD conducted the following tests at our Octagon House Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: DC Powered - Mode 2: 2.4 GHz Wi-Fi communication link		
Immunity to Radio Frequency Electromagnetic Field (Enclosure Port) - Small Products	Muhammad Enam	UKAS
Configuration and Mode: DC Powered - Idle and checking for no un-intentional transmissions.		
Immunity to Radio Frequency Electromagnetic Field (Enclosure Port) - Small Products	Muhammad Enam	UKAS

Table 7

Office Address:

Octagon House
Concorde Way
Fareham
Hampshire
PO15 5RL
United Kingdom

TÜV SÜD conducted the following tests at our Bearley Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
Configuration and Mode: DC Powered - Mode 1: Bluetooth Low Energy communication link		
Immunity to Radio Frequency Electromagnetic Field (Enclosure Port) - Small Products	Bryce Kitching and Ravi Kishore Darshanam	UKAS
Immunity to Electrostatic Discharge (Enclosure Port)	Subodh Karale and Ravi Kishore Darshanam	UKAS
Configuration and Mode: DC Powered - Mode 2: 2.4 GHz Wi-Fi communication link		
Immunity to Electrostatic Discharge (Enclosure Port)	Subodh Karale and Ravi Kishore Darshanam	UKAS
Configuration and Mode: DC Powered - Idle and checking for no un-intentional transmissions.		
Immunity to Electrostatic Discharge (Enclosure Port)	Subodh Karale and Ravi Kishore Darshanam	UKAS

Table 8

Office Address:

Snitterfield Road
Bearley
Warwickshire
CV37 OEX
United Kingdom



2 Test Details

2.1 Immunity to Radio Frequency Electromagnetic Field (Enclosure Port) - Small Products

2.1.1 Specification Reference

ETSI EN 301 489-1, Clause 7.2
ETSI EN 301 489-17, Clause 9.2

2.1.2 Equipment Under Test and Modification State

SiW917Y1GA, S/N: Not Serialised (FAR-815415-002) - Modification State 0

2.1.3 Date of Test

12-March-2024 & 23-May-2024

2.1.4 Test Method

The equipment under test including associated cabling was configured on a 0.8 m non-conductive table within a pre-calibrated semi anechoic chamber.

Three sides (Due the small size of the unit, x, y, z faces were used) of the equipment under test were subjected to the required RF field strength, modulated as described and swept over the frequency range of test with the antenna positioned in both horizontal and vertical polarizations.

During this test, any anomalies in the equipment under tests performance were recorded.

2.1.5 Environmental Conditions

Ambient Temperature 18.1 - 18.9 °C
Relative Humidity 50.0 - 54.2 %
Atmospheric Pressure 998.0 - 1004.0 mbar

2.1.6 Specification Limits

Required Test Levels					Performance Criteria
Frequency Range (MHz)	Level (V/m)	Modulation	Step Size (%)	Dwell (s)	
80 to 6000	3	AM (80 %,1 kHz, sine wave)	1	1	CP
Supplementary information: Note 1. EUT powered at one of the nominal input voltages and frequencies. Note 2. If the wanted signal is modulated at 1000 Hz, then an audio signal of 400 Hz shall be used.					

Table 9



2.1.7 Test Results

Results for Configuration and Mode: DC Powered - Mode 1: Bluetooth Low Energy communication link.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Tabulated Results for RF Electromagnetic Field				
Step Size		1 %		
Dwell Time		1 s		
Modulation		1 kHz Sine 80 % AM		
Frequency Range (MHz)	Test Face	Antenna Polarisation	Test Level (V/m)	Result
80 to 6000	X, Y and Z	Horizontal and Vertical	3	Pass

Table 10

Results for Configuration and Mode: DC Powered - Mode 2: 2.4 GHz Wi-Fi communication link.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Tabulated Results for RF Electromagnetic Field				
Step Size		1 %		
Dwell Time		1 s		
Modulation		1 kHz Sine 80 % AM		
Frequency Range (MHz)	Test Face	Antenna Polarisation	Test Level (V/m)	Result
80 to 6000	X, Y and Z	Horizontal and Vertical	3	Pass

Table 11



Results for Configuration and Mode: DC Powered - Idle and checking for no un-intentional transmissions.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

Tabulated Results for RF Electromagnetic Field				
Step Size		1 %		
Dwell Time		1 s		
Modulation		1 kHz Sine 80 % AM		
Frequency Range (MHz)	Test Face	Antenna Polarisation	Test Level (V/m)	Result
80 to 6000	X, Y and Z	Horizontal and Vertical	3	Pass

Table 12



Figure 4 - Below 1 GHz



Figure 5 - Above 1 GHz

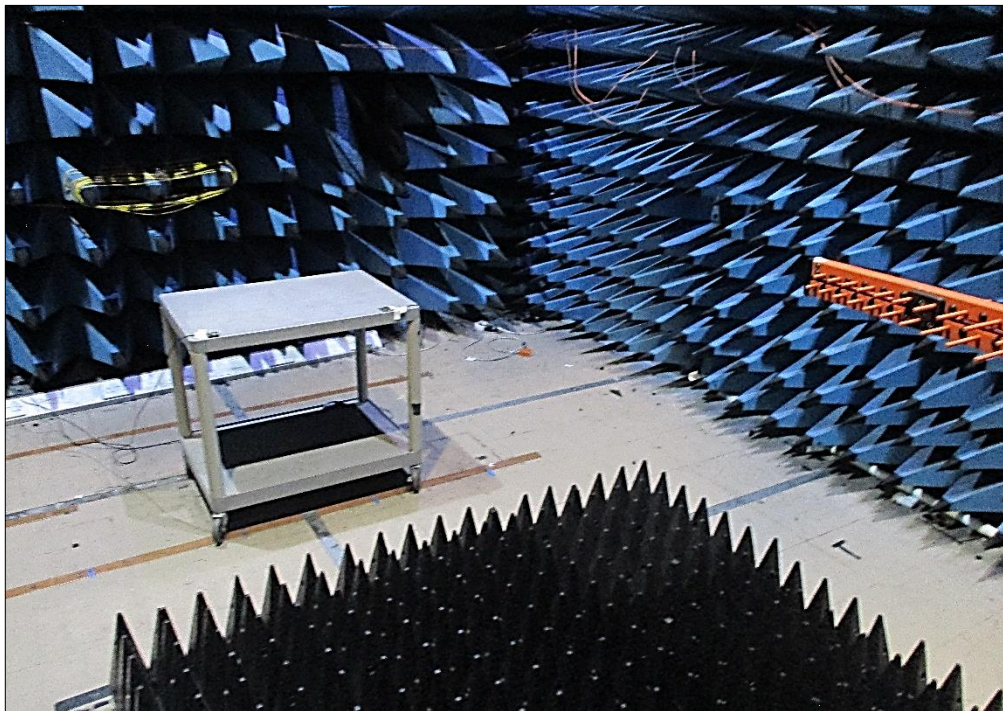


Figure 6 - Test Setup - Below 1 GHz

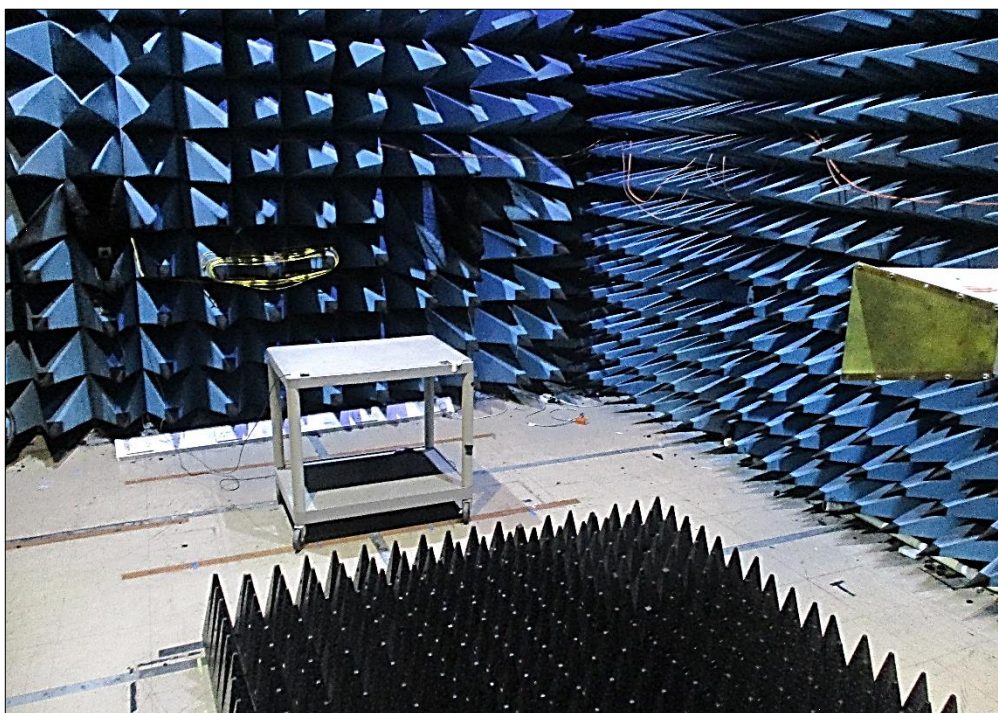


Figure 7 - Test Setup 1-2.7GHz

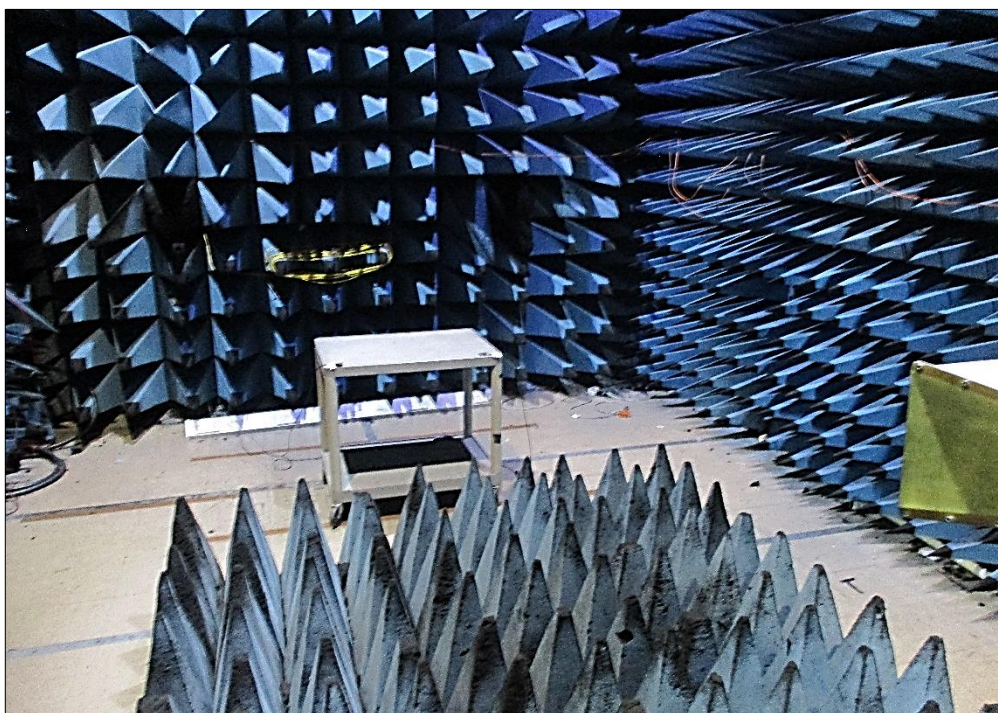


Figure 8 - Test Setup 2.7-6GHz



2.1.8 Test Location and Test Equipment Used

This test was carried out in Bearley EMC Chamber 2 and OH EMC Chamber 2.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	795	-	TU
Screened Room (2)	Rainford	Rainford	1542	12	26-Mar-2024
Screened Room (2)	Rayproof	1993	1675	-	TU
Antenna (Double Ridge Guide)	EMCO	3115	1711	-	TU
Antenna (Bilog)	Schaffner	CBL6143	2836	-	TU
RF Amplifier	Amp Research	500W1000	4119	-	TU
1m N-Type Cable	Teledyne Storm	SA90-195-1MTR	4169	12	10-Aug-2024
0.8-2.7GHz RF Amplifier	MILMEGA	AS0827-230	4421	-	O/P Mon
Cable (10 Hz to 1 GHz N(m)-N(m), 7m)	Scott Cables	9918-NMNM-7000	4618	6	21-Sep-2024
Field monitor and probe kit	Amp Research	FL7218 + FM7004A	4828	12	18-Sep-2024
Radiated Immunity Test Software	Amp Research	EMCWare V6.0	4899	-	Software
1.8-6.0GHz Single Band Amplifier	MILMEGA	AS1860-50	4976	-	O/P Mon
Teseq PMU 6006 Power Meter	Teseq	PM6006	5697	12	02-Feb-2025
Cable (N-Type to N-Type, 2 m)	Pasternack	PE343-200CM	6062	-	TU
Directional Coupler 80-1000 MHz, 50dB, 1500W	BONN Elektronik	BDC 0810-50/1500	6338	12	22-Mar-2025
Switch Control Platform	Amp Research	SCP20000M2	6459		TU
Cable (N-Type to N-Type, 1.5 m)	Pasternack	PE343-150CM	6460	-	TU
Cable (N-Type to N-Type, 1.5 m)	Pasternack	PE343-150CM	6461	-	TU
Cable (7/16 to 7/16, 5 m)	Amp Research	CC41313050	6462	-	TU
Cable (7/16 to 7/16, 5 m)	Amp Research	CC41313050	6463	-	TU
Cable (7/16 to 7/16, 2 m)	Amp Research	CC41313020	6464	-	TU
Cable (7/16 to 7/16, 2 m)	Amp Research	CC41313020	6465	-	TU
Spectrum Analyser	Keysight Technologies	N9322C	6466	-	TU
Signal Generator (9 kHz to 6 GHz)	Keysight Technologies	N5171B	6467	36	02-Oct-2025
Signal Generator (9 kHz to 6 GHz)	Keysight Technologies	N5171B	6468	36	04-Oct-2025
Signal Generator (9 kHz to 6 GHz)	Keysight Technologies	N5171B	6469	36	04-Oct-2025
Signal Generator	Rohde & Schwarz	SMB100B	6470	36	14-Apr-2026
Signal Generator (9 kHz to 6 GHz)	Keysight Technologies	N5171B	6471	36	09-Oct-2025
Amplifier (80 MHz to 1 GHz)	Amp Research	1000W1000GM33	6472	-	TU
Amplifier (1 GHz to 6 GHz)	Amp Research	250S1G6CM9	6473	-	TU
Field Monitor System	Amp Research	MP09000	6474	12	15-Feb-2025



Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Directional Coupler	Amp Research	DC680AM1	6475		TU
Directional Coupler	Amp Research	DC7210A	6476		TU
Antenna (Log-P, 80 MHz to 1 GHz)	Amp Research	ALT80M1GM1	6477	-	TU

Table 13

TU - Traceability Unscheduled
O/P Mon – Output Monitored using calibrated equipment.



2.2 Immunity to Electrostatic Discharge (Enclosure Port)

2.2.1 Specification Reference

ETSI EN 301 489-1, Clause 7.2
ETSI EN 301 489-17, Clause 9.3

2.2.2 Equipment Under Test and Modification State

SiW917Y1GA, S/N: Not Serialised (FAR-815415-002) - Modification State 0

2.2.3 Date of Test

24-May-2024

2.2.4 Test Method

The equipment under test including associated cabling was configured on a horizontal coupling plane fitted with a 0.5 mm insulated surface attached to the top of a 0.8 m non-conductive table for table-top equipment or on a 0.1 m insulated support for floor standing equipment, above a ground reference plane within a test laboratory.

Using the air discharge method for non-metallic parts, contact discharge method for metallic parts with both vertical and horizontal couple plane discharge methods for the sides of the equipment under test, The required electrostatic discharge voltage levels in both voltage polarities were applied at the detailed pulse repetition rate.

During this test, any anomalies in the equipment under tests performance were recorded.

2.2.5 Environmental Conditions

Ambient Temperature 17.4 °C
Relative Humidity 58.4 %
Atmospheric Pressure 995.0 mbar

2.2.6 Specification Limits

Required Test Levels			Performance Criteria
Discharge type	Discharge Level (±kV)	Number of discharges per location per polarity	
Air – Direct	2, 4 and 8	10	TP
Contact – Direct	4	10	TP
Contact – Indirect	4	10	TP
Supplementary information: None			

Table 14



2.2.7 Test Results

Results for Configuration and Mode: DC Powered - Mode 1: Bluetooth Low Energy communication link.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

 Contact  Air

Test Point	Discharge	Results									
		2 kV		4 kV		6 kV		8 kV		15 kV	
		+	-	+	-	+	-	+	-	+	-
Horizontal Coupling Plane	Contact	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
Vertical Coupling Plane	Contact	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
Contact Discharges	Contact	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A

Table 15

Results for Configuration and Mode: DC Powered - Mode 2: 2.4 GHz Wi-Fi communication link.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

 Contact  Air

Test Point	Discharge	Results									
		2 kV		4 kV		6 kV		8 kV		15 kV	
		+	-	+	-	+	-	+	-	+	-
Horizontal Coupling Plane	Contact	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
Vertical Coupling Plane	Contact	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
Contact Discharges	Contact	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A

Table 16



Results for Configuration and Mode: DC Powered - Idle and checking for no un-intentional transmissions.

Performance assessment of the EUT made during this test: Pass.

Detailed results are shown below.

○ Contact □ Air

Test Point	Discharge	Results									
		2 kV		4 kV		6 kV		8 kV		15 kV	
		+	-	+	-	+	-	+	-	+	-
Horizontal Coupling Plane	Contact	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
Vertical Coupling Plane	Contact	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
Contact Discharges	Contact	N/A	N/A	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A

Table 17

Key to Results	
✓	The EUT's performance was not impaired at this test point when the ESD pulse was applied.
✓*	No discharge occurred at this point when the ESD pulse was applied.
N/A	Not Applicable.

Table 18

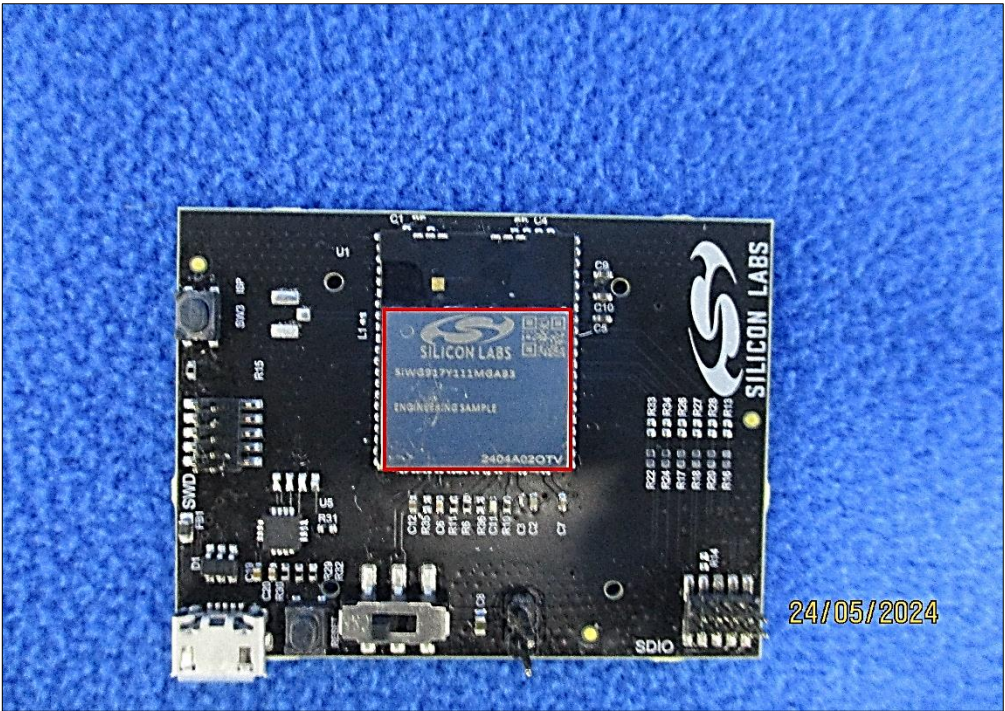


Figure 9 - ESD Test Positions

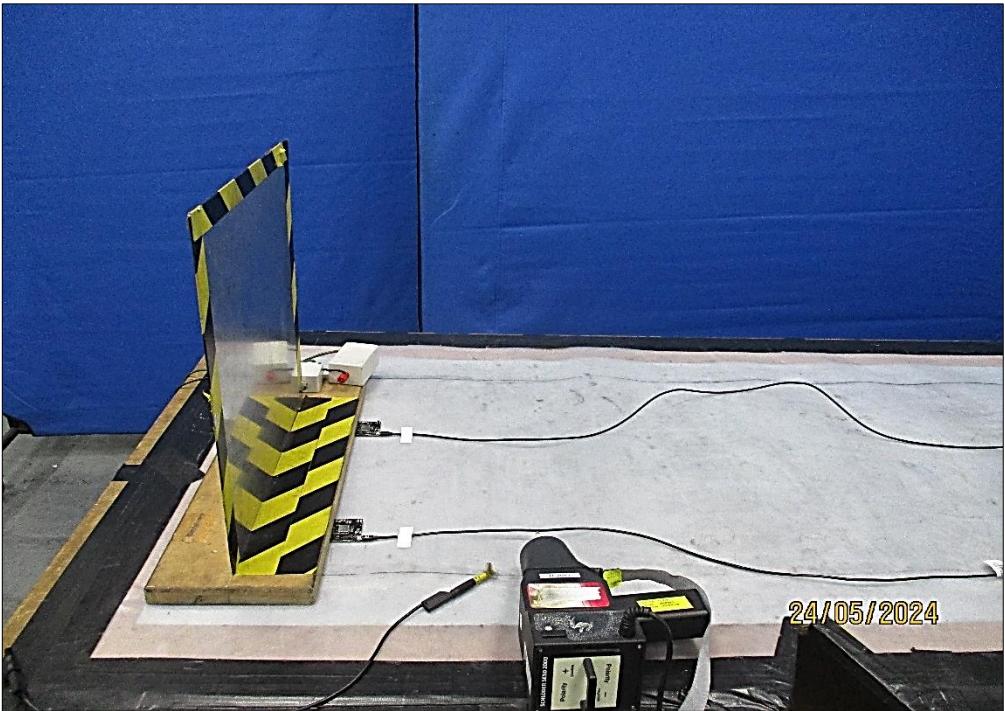


Figure 10 – Test Setup

2.2.8 Test Location and Test Equipment Used

This test was carried out in Bearley EMC Lab.

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
ESD Gun	Schloder	SESD2000	2883	12	27-Jul-2024

Table 19



3 Test Equipment Information

3.1 General Test Equipment Used

Instrument	Manufacturer	Type No	TE No	Calibration Period (months)	Calibration Expires
Hygrometer	Rotronic	A2	1698	12	02-Jan-2025
Laptop	Lenovo	T470S		-	-

Table 20

3.2 Customer Support Equipment

Instrument	Manufacturer	Model No	Serial Number
Radio Module	Silicon Laboratories	SiW917Y1GA/SiW917Y1GN	Not Serialised (FAR-815415-003)
USB - Type C Cable	Silicon Laboratories	-	-

Table 21



4 Incident Reports

No incidents reports were raised.



5 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Test Name	Measurement Uncertainty
Immunity to Radio Frequency Electromagnetic Field (Enclosure Port) - Small Products	10 MHz to 6 GHz Test Amplitude ± 2.0 dB
Immunity to Electrostatic Discharge (Enclosure Port)	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-2

Table 22

Worst case error for both Time and Frequency measurement 12 parts in 10^6 .

Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115:2021, Clause 4.4.3 (Procedure 2). The measurement results are directly compared with the test limit to determine conformance with the requirements of the standard.

Risk: The uncertainty of measurement about the measured result is negligible with regard to the final pass/fail decision. The measurement result can be directly compared with the test limit to determine conformance with the requirement (compare IEC Guide 115). The level of risk to falsely accept and falsely reject items is further described in ILAC-G8.