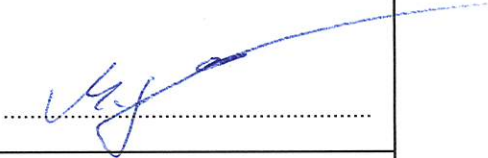


EMC TEST REPORT	
FCC Title 47 CFR Part 15B, ISED ICES-003 Issue 7	
Report Reference No	G0M-2111-1158-EF0115B-V01
Testing Laboratory	Eurofins Product Service GmbH
Address	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation	    A2LA - Registration number: 1983.01 (ISED) ISED wireless device testing laboratory: CN 3470A DAkkS - Registration number : D-PL-12092-01-04 (FCC) FCC Filed Test Laboratory, Reg.-No.: 96970
Applicant	BVK TEKNOLOJI ANONIM SIRKETI
Address	Resitpasa Mah., Katar Cad. ITU Teknokent ARI-6 No:2/49/103 Sariyer 34467 Istanbul TURKEY
Test Specification Standard(s)	Title 47 CFR Part 15 Subpart B ISED ICES-Gen Issue 1 ; Amendment 1 (February 2021) ISED ICES-003 Issue 7 ANSI C63.4:2014+A1:2017
Non-Standard Test Method	None
Equipment under Test (EUT):	
Product Description	Secure Deadbolt Lock
Model(s)	2SC-103A
Additional Model(s)	None
Brand Name(s)	None
Hardware Version(s)	v3
Software Version(s)	220122
FCC-ID	2A4FC2103
IC	-
Test Result	PASSED

Possible test case verdicts:		
required by standard but not tested	N/T	
not required by standard	N/R	
required by standard but not appl. to test object	N/A	
test object does meet the requirement	P(PASS)	
test object does not meet the requirement	F(FAIL)	
Testing:		
Date of receipt of test item	2022-04-12	
Report:		
Compiled by	Manuel Engel	
Tested by (+ signature) (Responsible for Test)	Manuel Engel	
Approved by (+ signature) (Deputy Head of Lab)	Jens Marquardt	
Date of Issue	2022-09-05	
Total number of pages	30	
General Remarks:		
The test results presented in this report relate only to the object tested. The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report. This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.		
Additional Comments:		

ABBREVIATIONS AND ACRONYMS

Acronyms	
Acronym	Description
EUT	Equipment Under Test
FCC	Federal Communications Commission
ISED	Innovation, Science and Economic Development Canada
T _{NOM}	Nominal operating temperature
V _{NOM}	Nominal supply voltage

VERSION HISTORY

Version History			
Version	Issue Date	Remarks	Revised By
01	2022-09-05	Initial Release	-

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1 Equipment (Test Item) Under Test

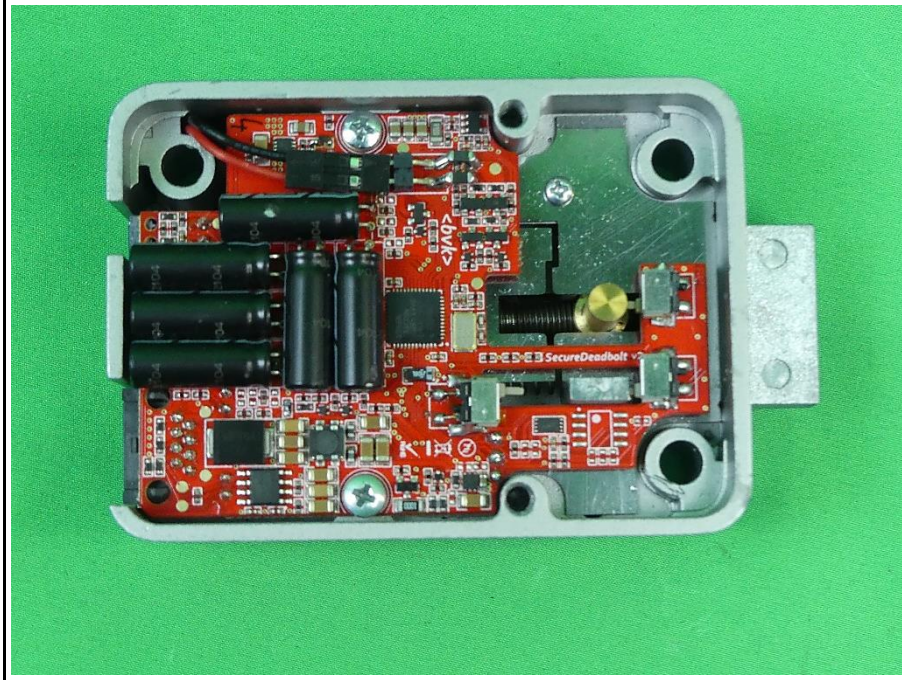
Description	Secure Deadbolt Lock		
Intended Use	Smart lock solution for keyless access		
Model	2SC-103A		
Additional Model(s)	None		
Brand Name(s)	None		
Hardware Version(s)	v3		
Software Version(s)	220122		
Number of tested samples	1		
Sample Identification	EUT #	Sample-ID	Serial Number
	EUT 1	39561	00004
EUT Dimensions [cm]	9.3x6.1x3		
FCC-ID	2A4FC2103		
IC	-		
Class	Class B		
Equipment type	Table top		
Highest internal frequency [MHz]	32		
Protective Earth	None		
Radio Module	None		
Supply Voltage	V _{NOM}	12 V DC	
AC/DC-Adaptor	None		
Manufacturer	BVK TEKNOLOJI ANONIM SIRKETI ISBI SUBE ISBI PLAZA NO:1/310 BAKIRKOY BAKIRKOY Istanbul TURKEY		

1.1 Equipment Ports

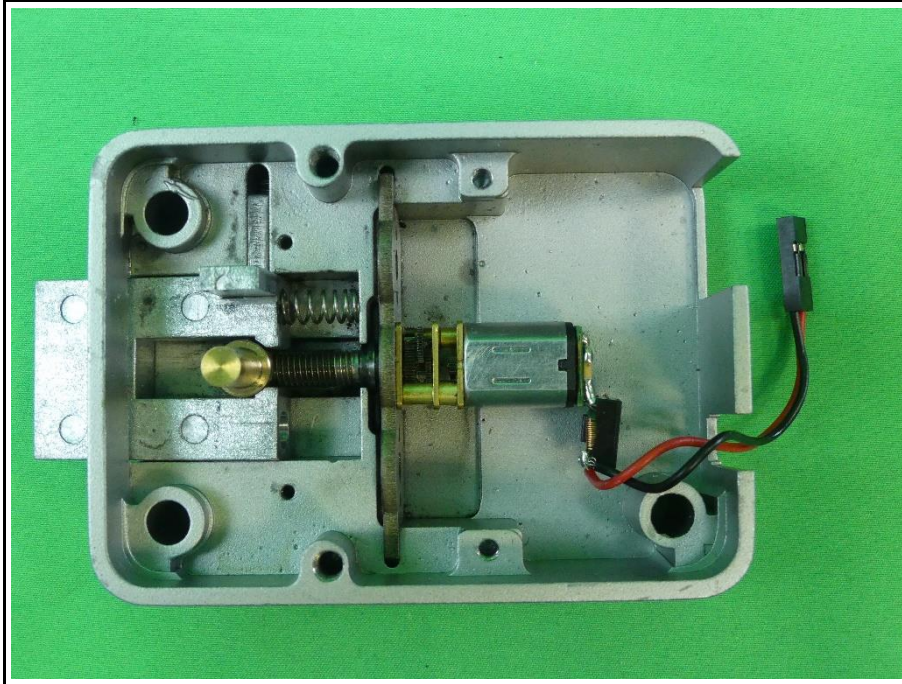
Name	Type	Attributes	Comment
RJ45 Modbus RTU port	DC, IO	Count: 1 Cable length [m]: 0.85 Direction: IN, IO Service only: No Shielded: No	Modbus with 12 V DC supply
Digital Input port	IO	Count: 1 Cable length [m]: 1 Direction: IN Service only: No Shielded: No	Senses if contacts shorted or not, use for magnetic contact
Description:			
AC	AC mains power input/output port		
DC	DC power input/output port		
BAT	DC power input port connected to external battery		
IO	Input/Output port		
TP	Telecommunication port		
NE	Non-electrical port		

1.2 Equipment Photos - Internal

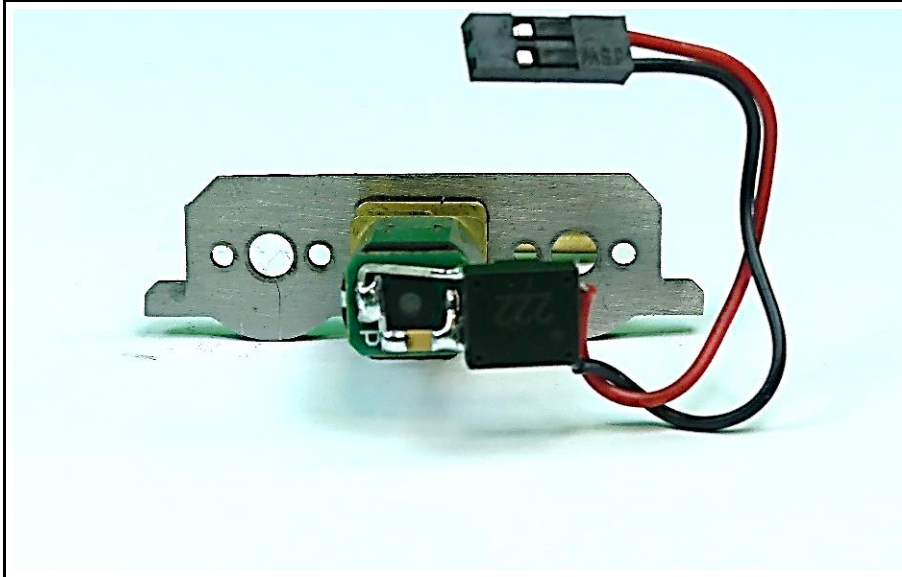
EUT with open housing view 1



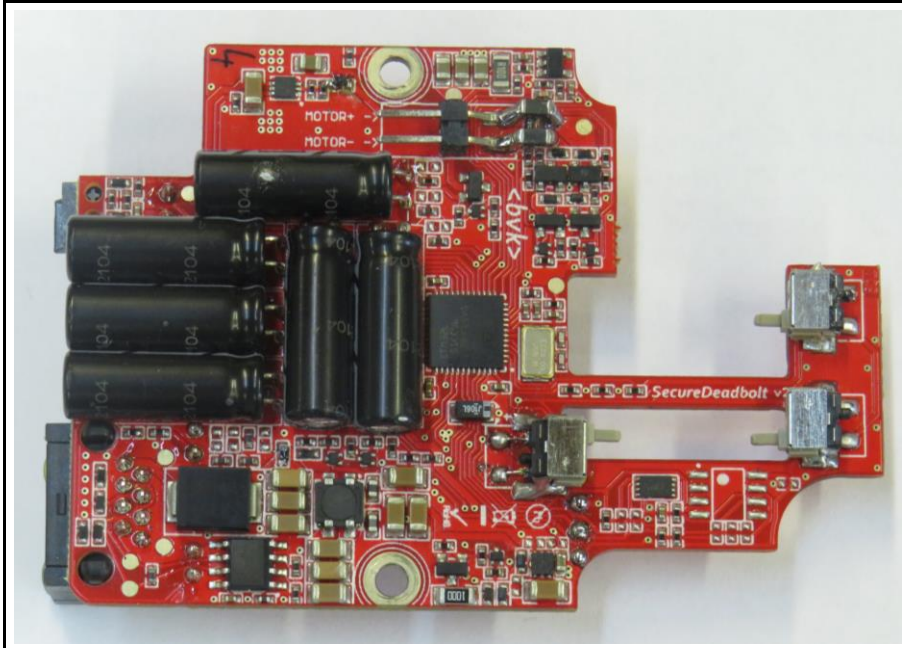
EUT with open housing view 2

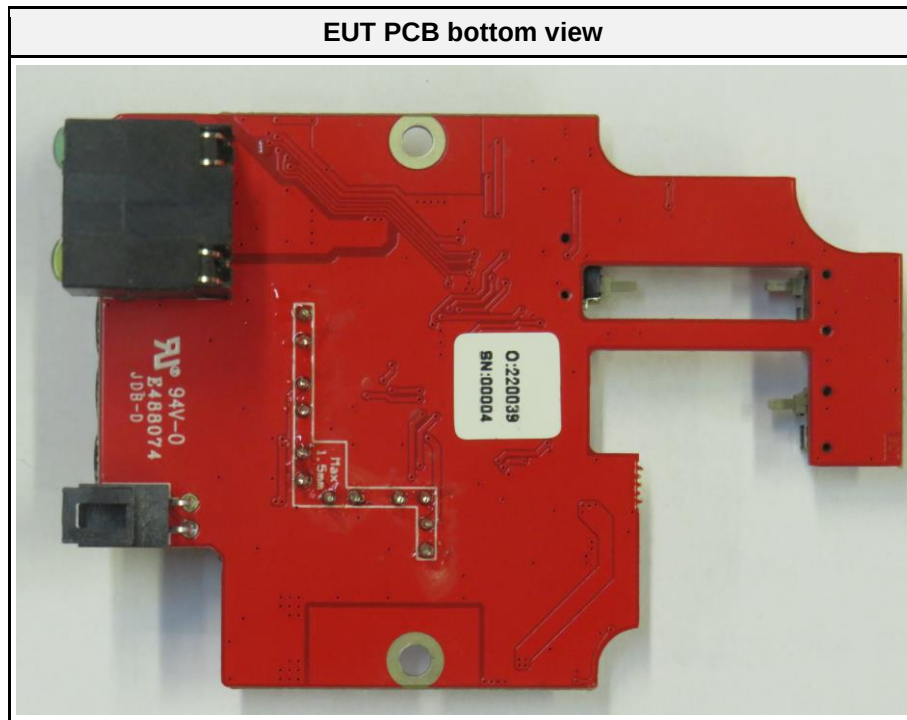


EUT motor

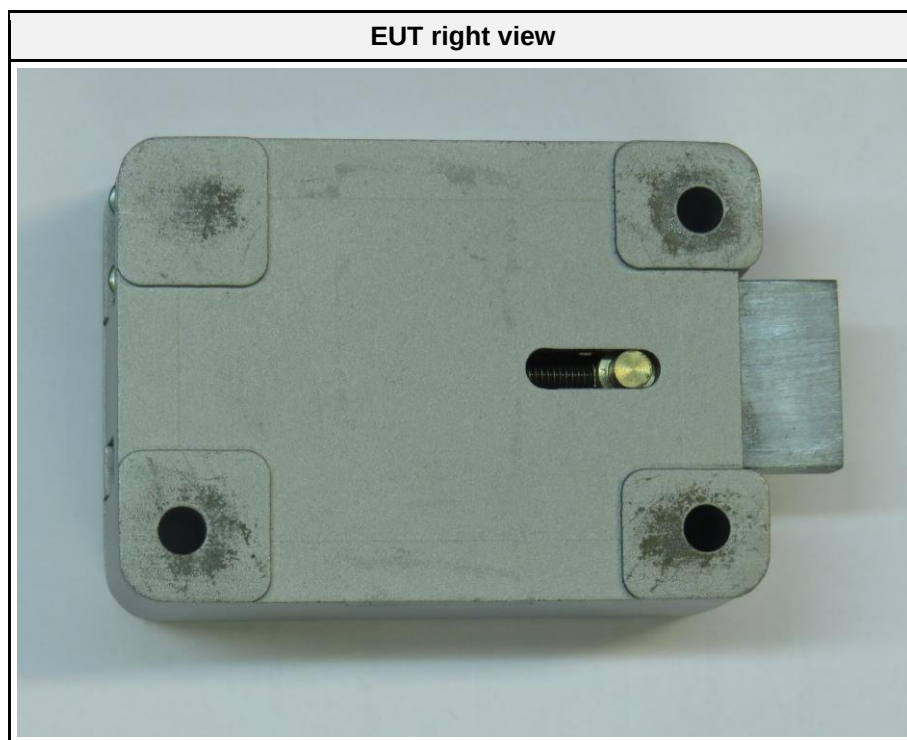
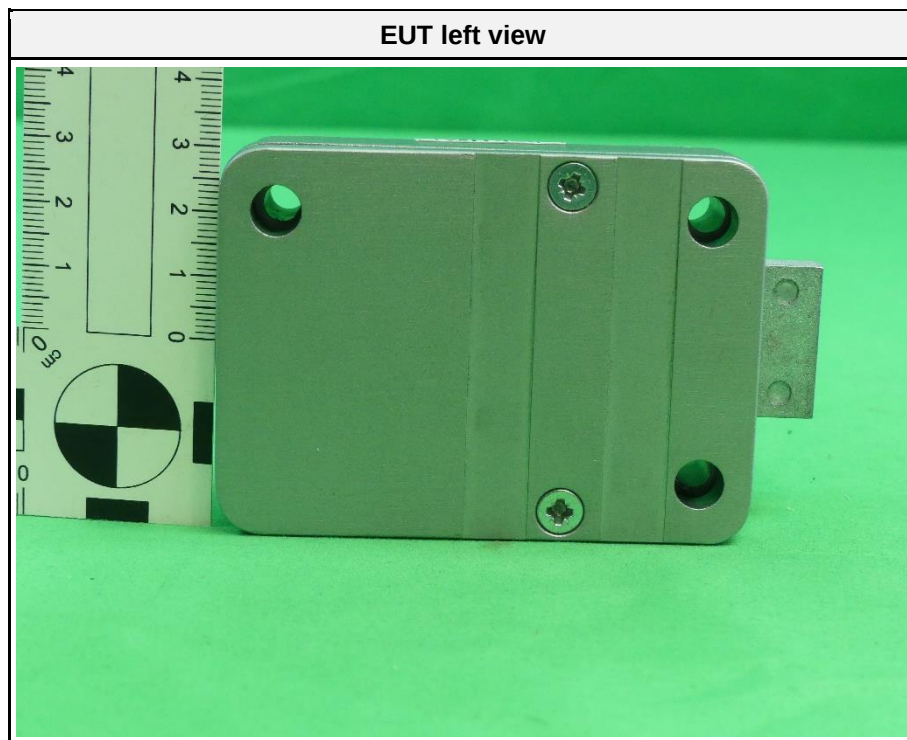


EUT PCB top view

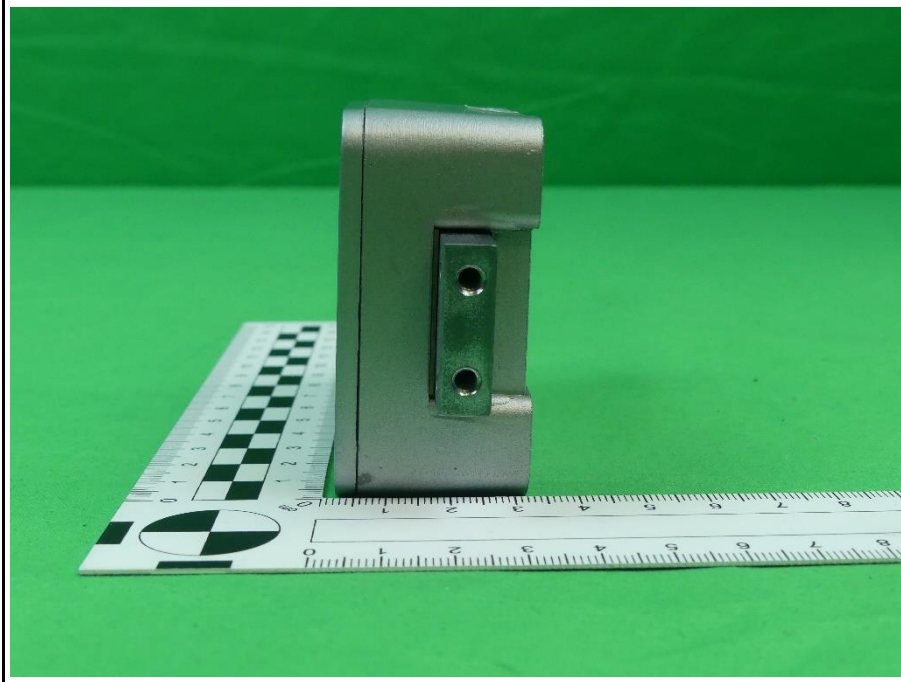




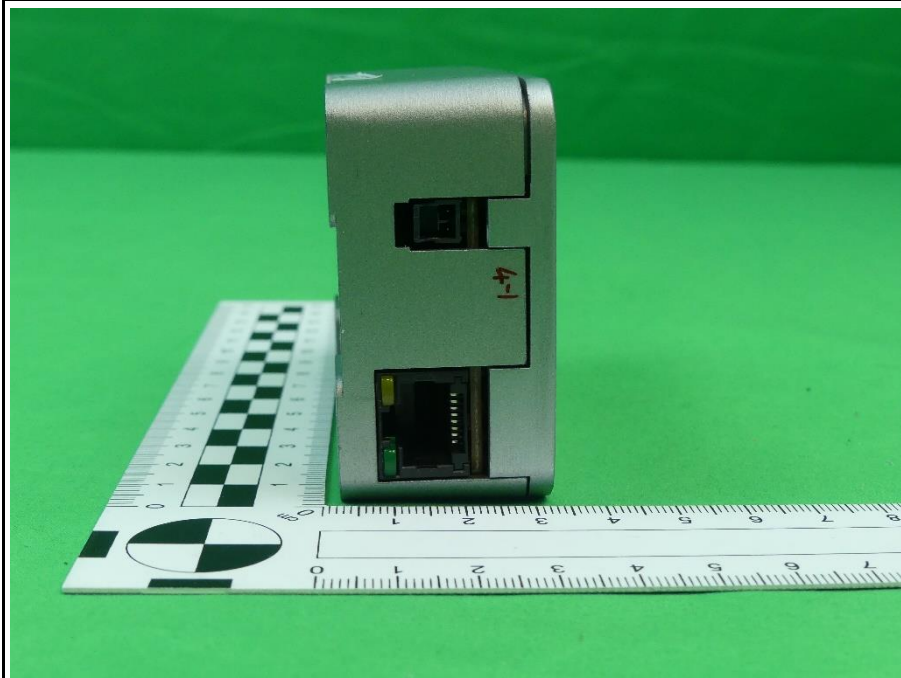
1.3 Equipment Photos - External



EUT front view



EUT back view



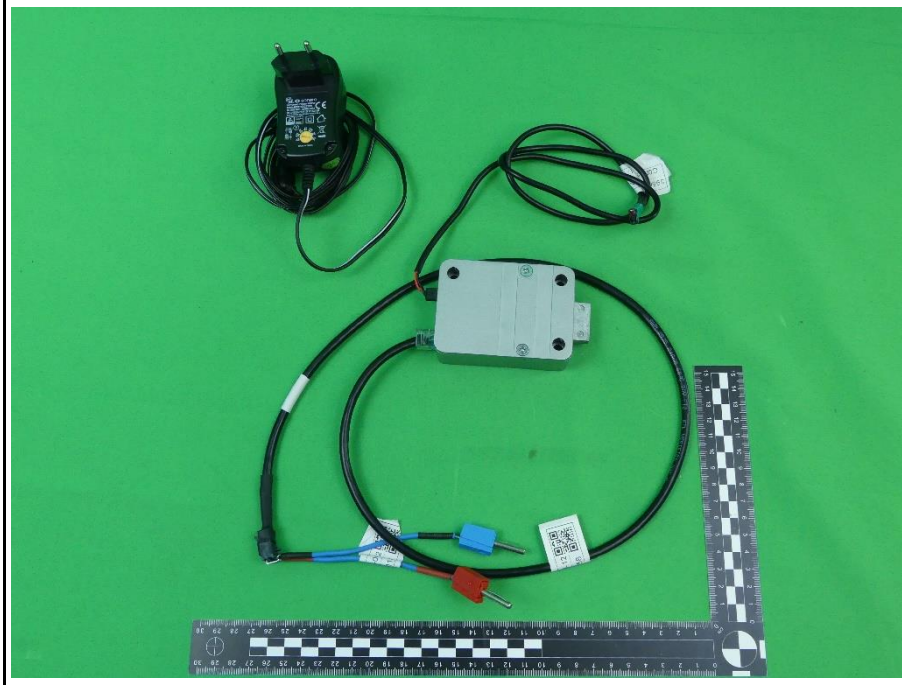
EUT top view



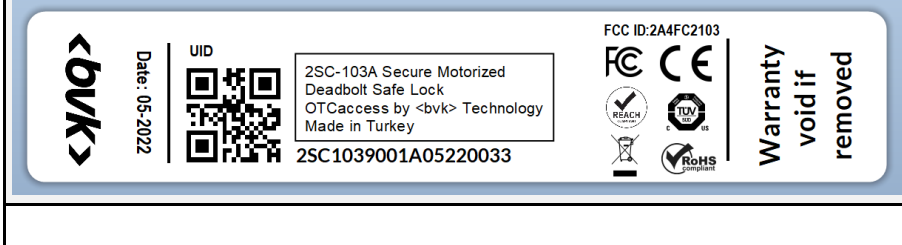
EUT bottom view



EUT with auxiliary equipment



EUT Label



1.4 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	AC/DC adaptor	sonero	MW3K10GS/X-PS020	Eurofins Lab equipment, used for measure conducted emission
CBL	Deadbolt cable	BVK	<bvk>otc19v2	Custom cable for power supply & Modbus communication
CBL	Test cable	BVK	Custom for test	Converter from plug to stripped wire + 120 Ohm Modbus termination resistor.
CBL	Input cable	BVK	Custom for test	Cable and switch for giving input to lock from input port.
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
MON	Monitoring Equipment			
CBL	Connecting Cable			
Comment:				

1.5 Operational Modes

Mode #	Description
1	Continuous cycle mode, bolt will move in and out, Modbus messages will be transmitted every 500ms.
Comment: -	

1.6 EUT Configuration

Configuration #	Description
1	RJ45 Modbus RTU port connected with deadbold cable which is plugged in the test cable and powered with 12 V DC. Digital input port connected with input cable. Switch in position test mode (EMC Self test).
2	RJ45 Modbus RTU port connected with deadbold cable which is plugged in the test cable and powered from AC/DC adaptor, AC/DC adaptor powered with 120 V 60 Hz. Digital input port connected with input cable. Switch in position test mode (EMC Self test)..
Comment: -	

1.7 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyser in dBµV. Any external preamplifiers used are taken into account through internal analyser settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyser. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

$$\text{Reading on Analyser (dB}\mu\text{V)} + \text{A.F. (dB/m)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of dBµV/m). The FCC limits are given in units of µV/m. The following formula is used to convert the units of µV/m to dBµV/m:

$$\text{Limit (dB}\mu\text{V/m)} = 20 \cdot \log(\mu\text{V/m})$$

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

Reading + AF	= Net Reading	:	Net reading - FCC limit	= Margin
+21.5 dBµV + 26 dB/m	= 47.5 dBµV/m	:	47.5 dBµV/m - 57.0 dBµV/m	= -9.5 dB

2 Result Summary

Title 47 CFR Part 15B, ISED ICES-003 Issue 7				
Reference	Requirement	Reference Method	Result	Remarks
Emission				
FCC 15.109 ICES-003, 3.2.2	Radiated emissions	ANSI C63.4:2014 +A1:2017	PASS	-
FCC 15.107 ICES-003, 3.2.1	AC power line conducted emissions	ANSI C63.4:2014 +A1:2017	PASS	-
Comment:				

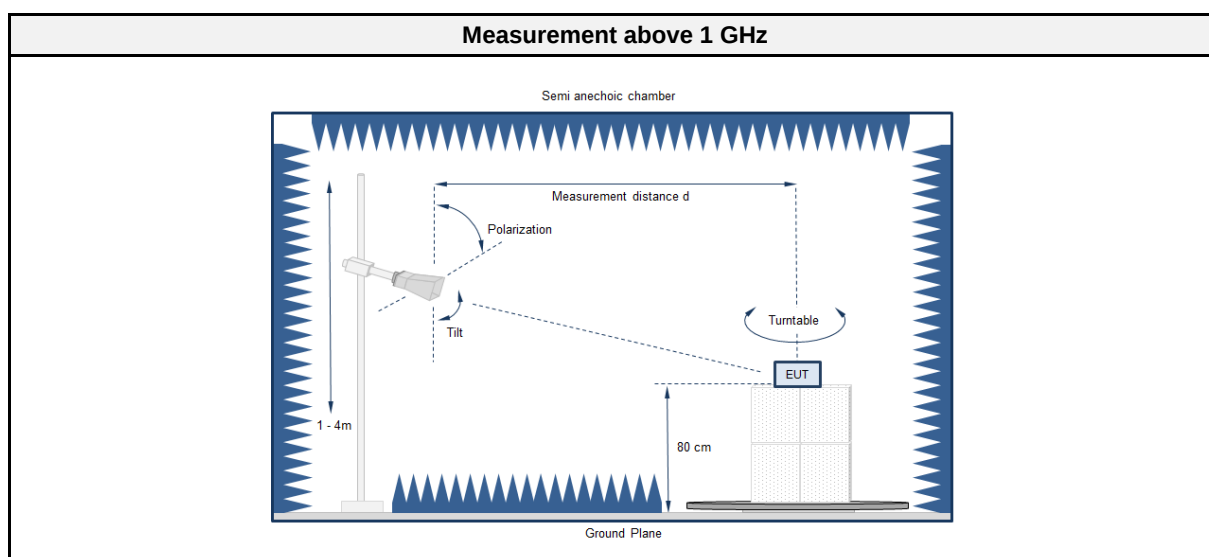
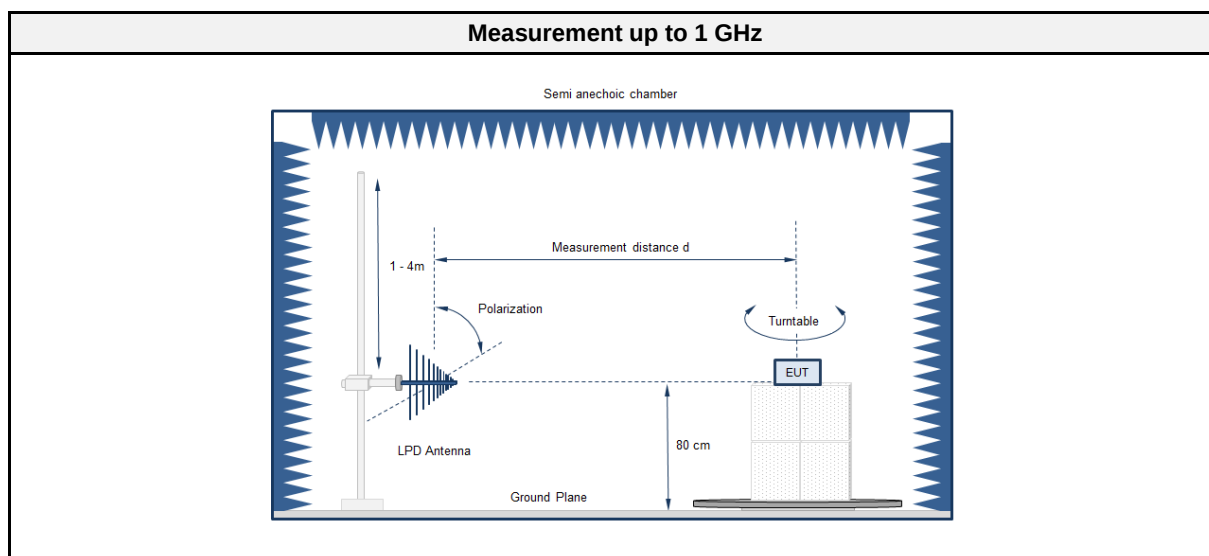
Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

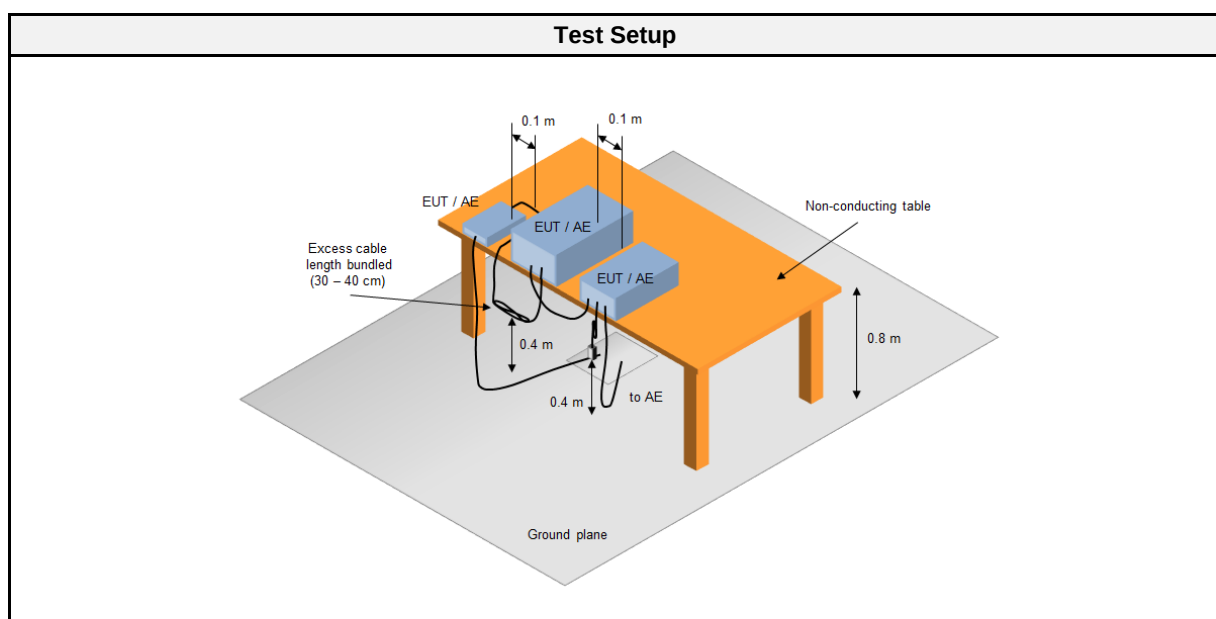
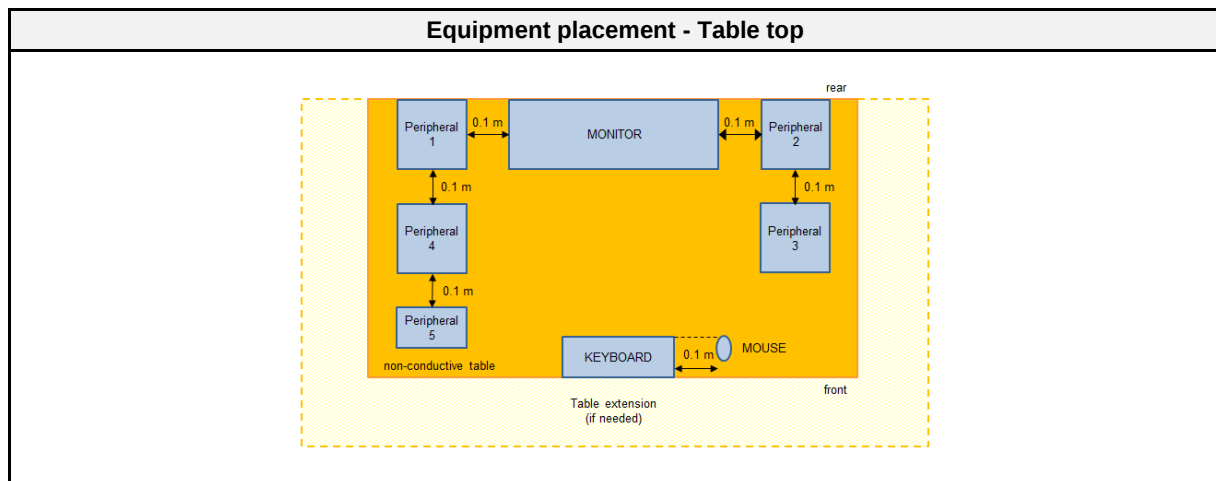
2.1 Test Conditions and Results - Radiated emissions acc. to ANSI C63.4

2.1.1 Information

Test Information	
Reference	FCC 15.109, ICES-003, 3.2.2
Reference method	ANSI C63.4:2014+A1:2017 Section 8
Equipment class	Class B
Equipment type	Table top
Highest internal frequency [MHz]	32
Measurement range	30 MHz to 1000 MHz
Temperature [°C]	23 ± 1
Humidity [%]	42 ± 2
Operator	Manuel Engel
Date	2022-05-06

2.1.2 Setup





2.1.3 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2020.1.8

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Anechoic chamber (NSA)	Frankonia	AC6	EF00910	2021-07	2024-07
EMI Test Receiver	R&S	ESU26	EF00887	2021-07	2022-07
TRILOG Broadband Antenna	Schwarzbeck	VULB 9162	EF00978	2019-10	2022-10
3-phase Electronic Voltage Source	EM Test GmbH (Switzerland)	NetWave 30-400	EF01514	2021-06	2022-06
Climatic Sensor	Embedded Data Systems, LLC.	9A00100000254 77E	EF01124	2021-03	2022-05

2.1.4 Procedure

Exploratory measurement	
1.	The EUT was placed on a non-conductive table at a height of 0.8m.
2.	The EUT and support equipment, if needed, were set up to simulate typical usage.
3.	Cables, of type and length specified by the manufacturer, were connected to at least one port of each type and were terminated by a device or simulating load of actual usage.
4.	The antenna was placed at a distance of 3 or 10 m.
5.	The received signal was monitored at the measurement receiver.
6.	This procedure has to be performed in both antenna polarizations, horizontal and vertical.
7.	The arrangement of the equipment with the maximum emission level is shown on the setup picture at item 2.1.2

Final measurement	
1.	The EUT was placed on a 0.8 m non-conductive table at a 10 m distance from the receive antenna. The antenna output was connected to the measurement receiver.
2.	A broadband hybrid antenna was used for the frequency range 30 – 1000 MHz. the antenna was placed on an adjustable height antenna mast.
3.	The EUT and cable arrangement were based on the exploratory measurement results.
4.	Emissions were maximized at each frequency by rotating the EUT and adjusting the receive antenna height and polarization. The maximum values were recorded.
5.	The test data of the worst-case conditions were recorded and shown on the next pages.

2.1.5 Limits

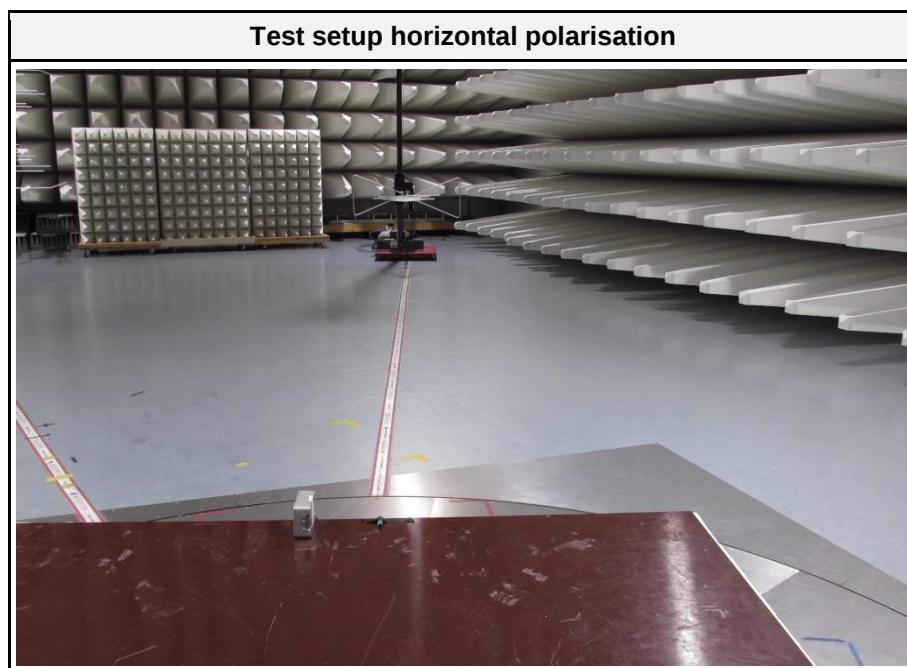
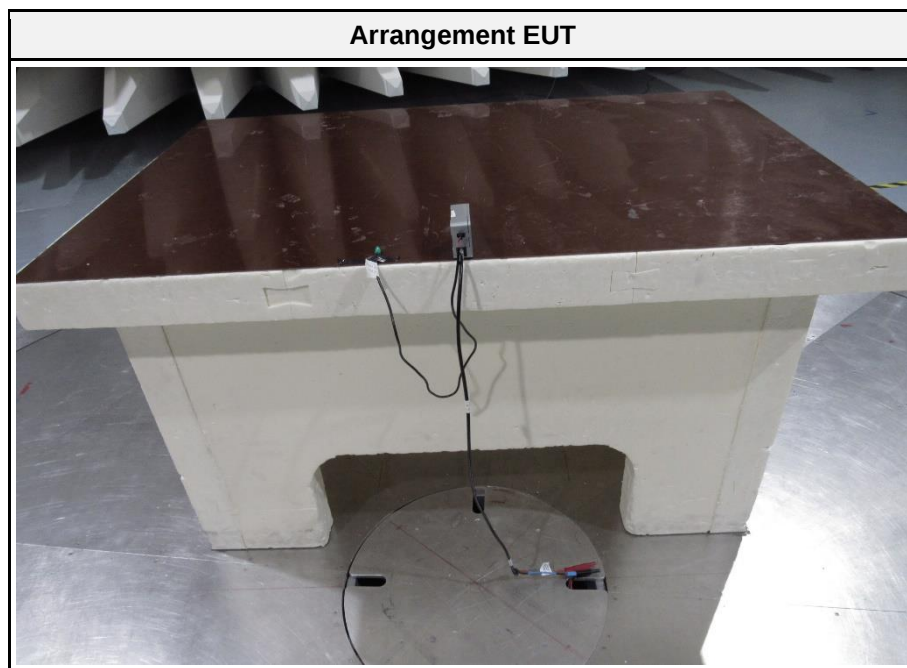
Class B @ 3 m		
Frequency [MHz]	Detector	Limit [dBμV/m]
30 - 88	Quasi-peak	40
88 - 216	Quasi-peak	43.5
216 - 960	Quasi-peak	46
960 - 1000	Quasi-peak	54
> 1000	Peak	74
	Average	54

Class A @ 10 m		
Frequency [MHz]	Detector	Limit [dBμV/m]
30 - 88	Quasi-peak	39
88 - 216	Quasi-peak	43.5
216 - 960	Quasi-peak	46.5
960 - 1000	Quasi-peak	49.5
> 1000	Peak	69.5
	Average	49.5

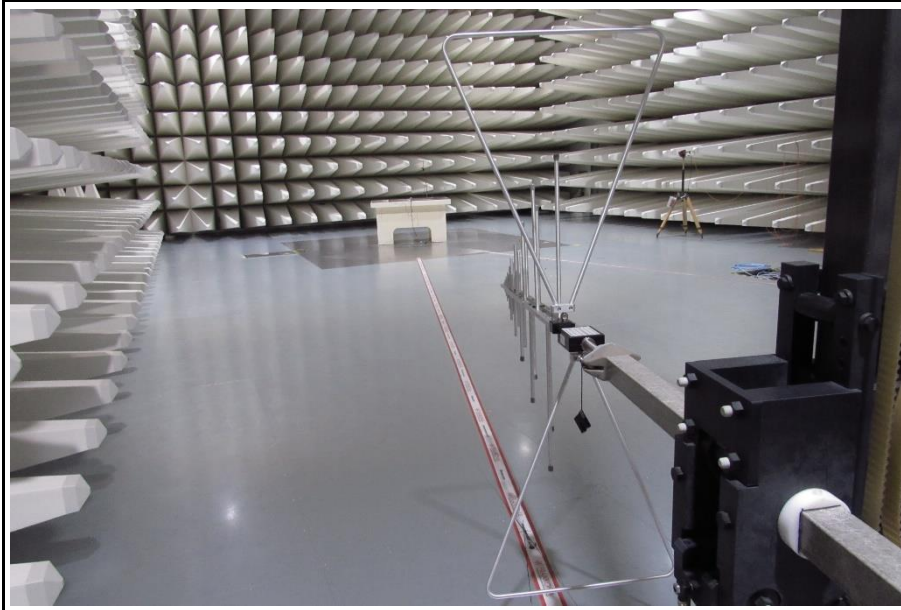
2.1.6 Results

Test Results			
Operational mode	EUT Configuration	Verdict	Remark
1	1	PASS	-

2.1.7 Setup Photos



Test setup vertical polarisation



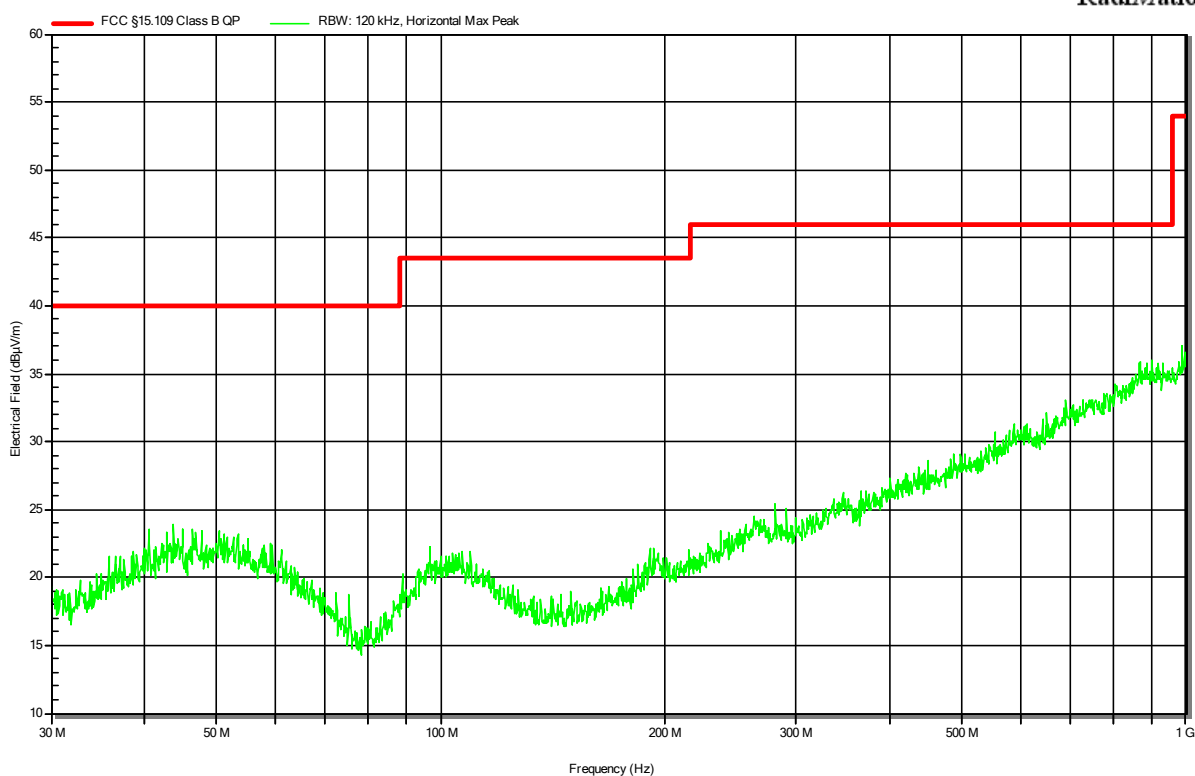
2.1.8 Records

**Radiated emissions
according to FCC 15B**

Project Number: G0M-2111-1158
 Applicant: BVK TEKNOLOJİ ANONİM ŞİRKETİ
 Model Description: Secure Deadbolt Lock
 Model: 2SC-103A
 Test Sample ID: 39561
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Engel
 Test Date: 2022-05-06
 Operating Conditions: ambient temperature: 23 °Celsius
 power input: 12 V DC
 Antenna: Schwarzbeck VULB 9162, Horizontal
 Measurement Distance: 10 m, converted to 3 m
 Operational Mode: Mode 1
 EUT Configuration: Configuration 1
 Note 1: Height 1 m, angle 0°

Index 3

RadiMation

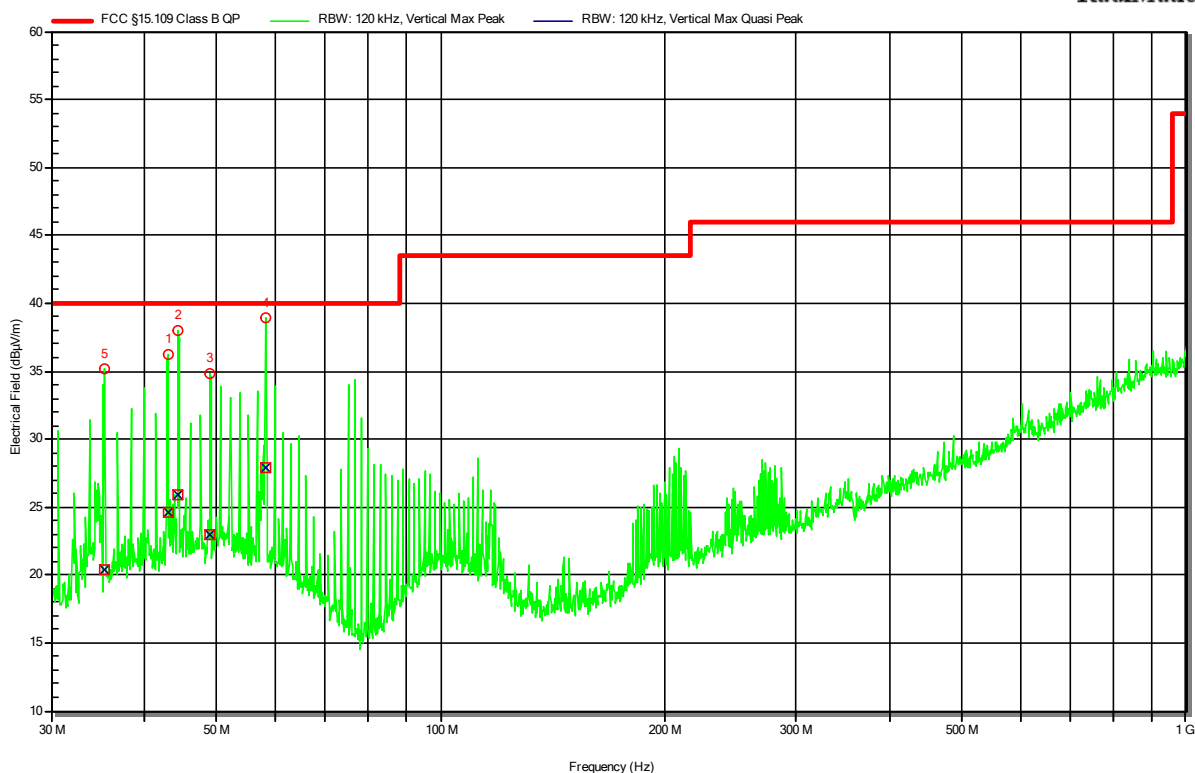


Radiated emissions according to FCC 15B

Project Number: G0M-2111-1158
Applicant: BVK TEKNOLOJI ANONIM SIRKETI
Model Description: Secure Deadbolt Lock
Model: 2SC-103A
Test Sample ID: 39561
Test Site: Eurofins Product Service GmbH
Operator: Mr. Engel
Test Date: 2022-05-06
Operating Conditions: ambient temperature: 23 °Celsius
power input: 12 V DC
Antenna: Schwarzbeck VULB 9162, Vertical
Measurement Distance: 10 m, converted to 3 m
Operational Mode: Mode 1
EUT Configuration: Configuration 1

Index 4

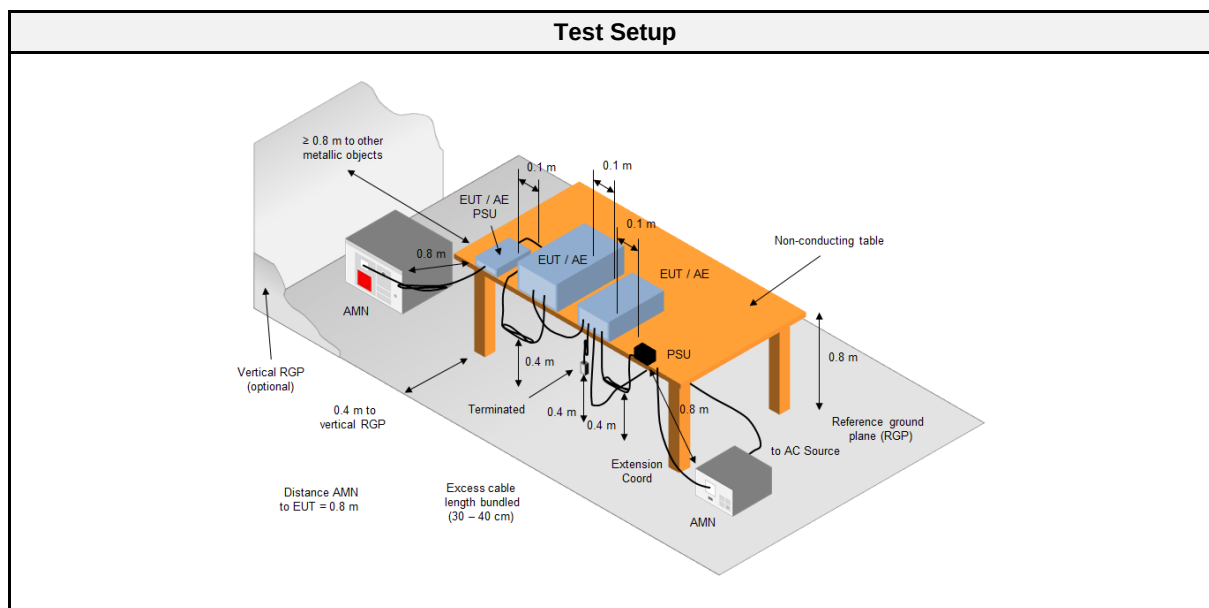
RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	Angle	Height
1	43,056 MHz	24,6 dBμV/m	40 dBμV/m	-15,4 dB	Pass	0 degrees	1 m
2	44,418 MHz	25,9 dBμV/m	40 dBμV/m	-14,1 dB	Pass	0 degrees	1 m
3	48,96 MHz	22,9 dBμV/m	40 dBμV/m	-17,1 dB	Pass	0 degrees	1 m
4	58,296 MHz	27,9 dBμV/m	40 dBμV/m	-12,1 dB	Pass	0 degrees	1 m
5	35,382 MHz	20,4 dBμV/m	40 dBμV/m	-19,6 dB	Pass	0 degrees	1 m

2.2.1 Information

2.2.2 Setup



2.2.3 Equipment

Test Software			
Description	Manufacturer	Name	Version
EMC Software	DARE Instruments	Radimation	2020.1.8

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
AMN	Schwarzbeck	NSLK 8128	EF00975	2021-07	2023-07
AMN	R&S	ESH2-Z5	EF00182	2021-07	2023-07
Pulse Limiter	R&S	ESH3-Z2	EF01063	2021-07	2022-07
EMI Test Receiver	R&S	ESU26	EF00887	2021-07	2022-07
Climatic Sensor	Embedded Data Systems, LLC.	9A0010000025477E	EF01124	2021-03	2022-05

2.2.4 Procedure

Exploratory measurement	
1.	The EUT was placed on a non conductive table 0.8 m above the reference ground plane and 0.4 m away from the vertical conducting plane (ANSI C63.4: 2014 item 7.3.1)
2.	The power cord that is normally supplied or recommended by the manufacturer was connected to the LISN.
3.	The distance between the outer edge of the EUT and the LISN shall be set to 0.8 m. A longer power cord shall be bundled to this length (bundling shall not exceed 40 cm in length).
4.	The LISN measurement port was connected to a measurement receiver
5.	I/O cables were bundled not longer than 0.4 m
6.	Measurement was performed in the frequency range 0.15 – 30MHz on each current-carrying conductor
7.	To maximize the emissions the cable positions were manipulated
8.	The worst configuration of EUT and cables is shown on a test setup picture at item 2.2.2

Final measurement	
1.	The EUT was placed on a non conductive table 0.8 m above the reference ground plane and 0.4 m away from the vertical conducting plane (ANSI C63.4: 2014 item 7.3.1)
2.	The power cord that is normally supplied or recommended by the manufacturer was connected to the LISN.
3.	The distance between the outer edge of the EUT and the LISN shall be set to 0.8 m. A longer power cord shall be bundled to this length (bundling shall not exceed 40 cm in length).
4.	The LISN measurement port was connected to a measurement receiver
5.	The EUT and cable arrangement were based on the exploratory measurement results
6.	The test data of the worst-case conditions were recorded and shown on the next pages

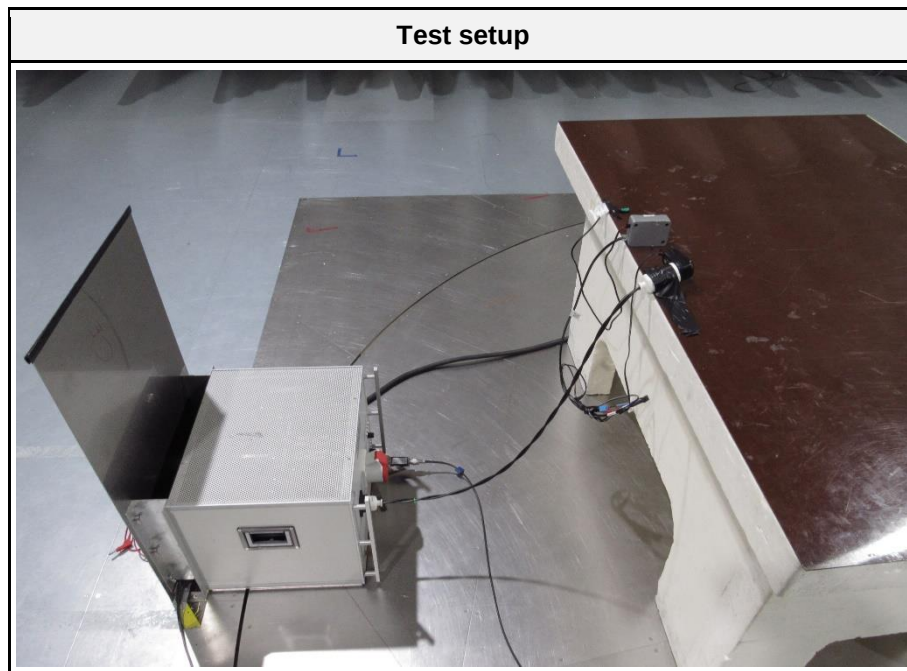
2.2.5 Limits

Class B		
Frequency [MHz]	Quasi-peak Limit [dBμV]	Average Limit [dBμV]
0.15 - 0.5	66 - 56 *	56 - 46 *
0.5 - 5	56	46
5 - 30	60	50
* Decreases with the logarithm of the frequency		

2.2.6 Results

AC power line conducted emissions					
Port	Coupling	Operational mode	EUT Configuration	Verdict	Remark
Power	AMN	1	2	PASS	-

2.2.7 Setup Photos



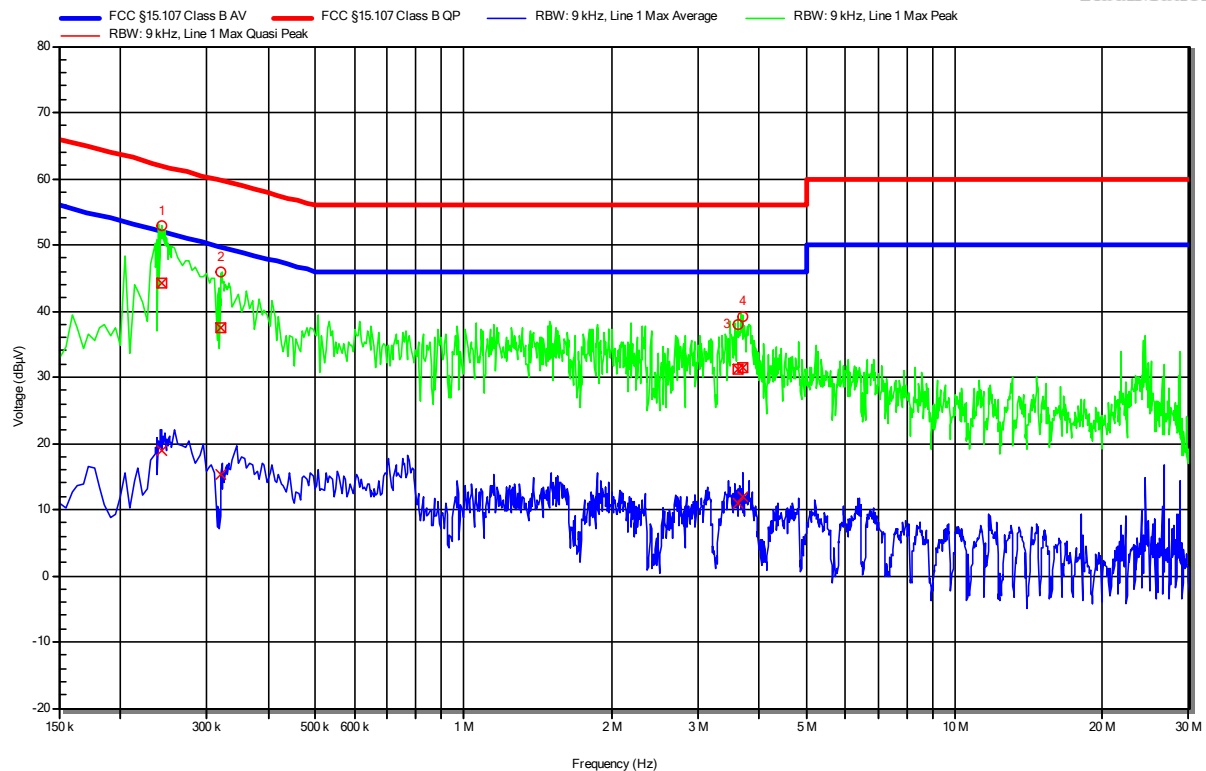
2.2.8 Records

Conducted emissions at the mains power port according to FCC 15B

Project Number: G0M-2111-1158
 Applicant: BVK TEKNOLOJI ANONIM SIRKETI
 Model Description: Secure Deadbolt Lock
 Model: 2SC-103A
 Test Sample ID: 39561
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Engel
 Test Date: 2022-05-06
 Operating Conditions: ambient temperature: 23 °Celsius
 power input: 120 V 60 Hz
 LISN: Schwarzbeck NSLK 8128 (L)
 Operational Mode: Mode 1
 EUT Configuration: Configuration 1
 Applied to Port: AC Mains

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RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	243,15 kHz	44,1 dBμV	62 dBμV	-17,9 dB	Pass	Line 1
2	321,45 kHz	37,4 dBμV	59,7 dBμV	-22,2 dB	Pass	Line 1
3	3,627 MHz	31,3 dBμV	56 dBμV	-24,7 dB	Pass	Line 1
4	3,697 MHz	31,3 dBμV	56 dBμV	-24,7 dB	Pass	Line 1
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	243,15 kHz	18,9 dBμV	52 dBμV	-33,0 dB	Pass	Line 1
2	321,45 kHz	15,2 dBμV	49,7 dBμV	-34,5 dB	Pass	Line 1
3	3,627 MHz	11 dBμV	46 dBμV	-35,0 dB	Pass	Line 1
4	3,697 MHz	12 dBμV	46 dBμV	-34,0 dB	Pass	Line 1

Test Report No.: G0M-2111-1158-EF0115B-V01

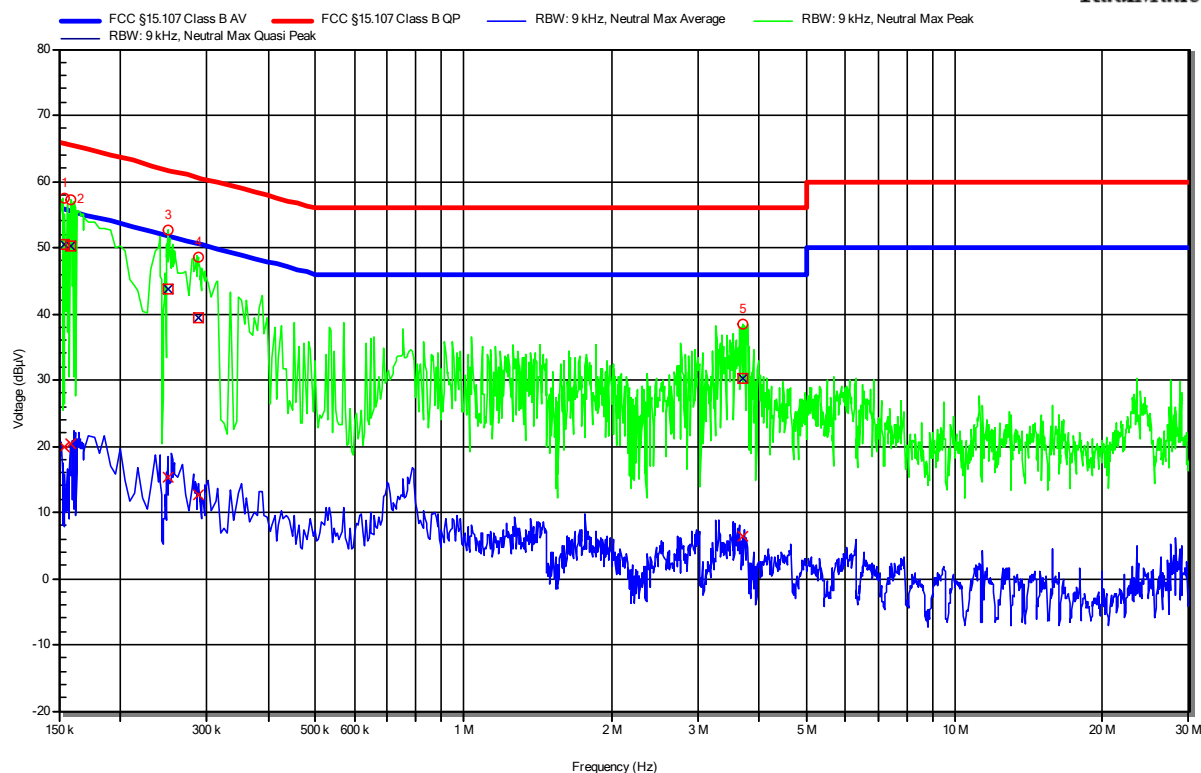
Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

Conducted emissions at the mains power port according to FCC 15B

Project Number: G0M-2111-1158
 Applicant: BVK TEKNOLOJI ANONIM SIRKETI
 Model Description: Secure Deadbolt Lock
 Model: 2SC-103A
 Test Sample ID: 39561
 Test Site: Eurofins Product Service GmbH
 Operator: Mr. Engel
 Test Date: 2022-05-06
 Operating Conditions: ambient temperature: 23 °Celsius
 power input: 120 V 60 Hz
 LISN: Schwarzbeck NSLK 8128 (N)
 Operational Mode: Mode 1
 EUT Configuration: Configuration 1
 Applied to Port: AC Mains

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RadiMation



Peak Number	Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Quasi-Peak Status	LISN
1	154,5 kHz	50,4 dBμV	65,8 dBμV	-15,4 dB	Pass	Neutral
2	158,202 kHz	50,3 dBμV	65,6 dBμV	-15,3 dB	Pass	Neutral
3	250,35 kHz	43,7 dBμV	61,7 dBμV	-18,1 dB	Pass	Neutral
4	287,7 kHz	39,4 dBμV	60,6 dBμV	-21,2 dB	Pass	Neutral
5	3,692 MHz	30,2 dBμV	56 dBμV	-25,8 dB	Pass	Neutral
Peak Number	Frequency	Average	Average Limit	Average Difference	Average Status	LISN
1	154,5 kHz	19,9 dBμV	55,8 dBμV	-35,9 dB	Pass	Neutral
2	158,202 kHz	20,3 dBμV	55,6 dBμV	-35,3 dB	Pass	Neutral
3	250,35 kHz	15,3 dBμV	51,7 dBμV	-36,4 dB	Pass	Neutral
4	287,7 kHz	12,6 dBμV	50,6 dBμV	-38,0 dB	Pass	Neutral
5	3,692 MHz	6,3 dBμV	46 dBμV	-39,7 dB	Pass	Neutral

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Eurofins Product Service GmbH
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

3 Measurement Uncertainty

All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2.

Test Name	Measurement Uncertainty
Radiated Emission	30 MHz to 1 GHz @ 10 m, 6.25 dB
Conducted emissions at the mains power port	150 kHz to 30 MHz, 3.36 dB