

# Report on the EMC Testing of:

## RFID PROXIMITY SWITCH – safeIDS

### Model(s):

1. SE1-ST1A20 (Sensor)
2. SE1-SS1A20 (Sensor)
3. SE1-AM02 (Actuator)

In accordance with  
FCC 47 CFR Part 15B

Prepared for:  
SICK AG  
Erwin-Sick-Str. 1  
79183 Waldkirch  
Germany



PSB Singapore

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## COMMERCIAL-IN-CONFIDENCE

Document Number: 7191331641-EEC24/01 | Issue: 01  
FCC ID: 2AHDRSE1

| RESPONSIBLE FOR | NAME           | DATE        | SIGNATURE |
|-----------------|----------------|-------------|-----------|
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Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD PSB document control rules.

### EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with the mentioned standard(s).



LA-2007-0380-A  
LA-2007-0381-F  
LA-2007-0382-B  
LA-2007-0383-G  
LA-2007-0384-G  
LA-2007-0385-E  
LA-2007-0386-C  
LA-2010-0464-D  
LA-2018-0702-B  
LA-2018-0703-G  
LA-2020-0747-L

The results reported herein have been performed in accordance with the terms of accreditation under the Singapore Accreditation Council. Inspections/Calibrations/Tests marked "Not SAC-SINGLAS Accredited" in this Report are not included in the SAC-SINGLAS Accreditation Schedule for our inspection body/laboratory.

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Page 1 of 23



Contents

1 Report Summary .....3

1.1 Report Modification Record.....3

1.2 Introduction.....4

1.3 Brief Summary of Results .....5

1.4 Product Information .....8

1.5 Deviations from the Standard.....9

1.6 EUT Modification Record .....9

1.7 Test Location(s)..... 10

1.8 Test Facilities Registrations ..... 10

1.9 Supporting Equipment..... 11

2 Test Details ..... 12

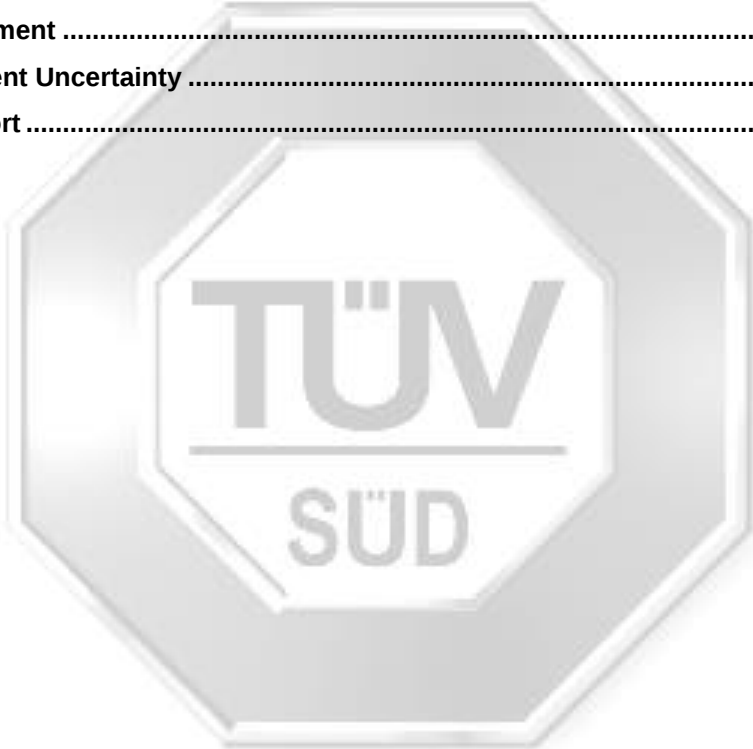
2.1 Conducted Emissions at Mains Terminals ..... 12

2.2 Radiated Emissions..... 16

3 Test Equipment ..... 20

4 Measurement Uncertainty ..... 21

End of the Test Report ..... 23





# 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           | 24 Apr 2024   |
|       |                       |               |





## 1.2 Introduction

|                               |   |                                                                                                                                             |
|-------------------------------|---|---------------------------------------------------------------------------------------------------------------------------------------------|
| Applicant                     | : | SICK AG<br>Erwin-Sick-Str. 1<br>79183 Waldkirch<br>Germany                                                                                  |
| Manufacturer                  | : | Sick Product Center Asia Pte. Ltd.<br>1 North Coast Avenue #08-01<br>Singapore 737663                                                       |
| Factory                       | : | SICK Sdn. Bhd.<br>No. 16, Jalan Indah Gemilang 5<br>Taman Perindustrian Gemilang<br>81800, Ulu Tiram, Johor,<br>Malaysia                    |
| Model Number(s)               | : | 1. SE1-ST1A20 - Sensors<br>2. SE1-SS1A20 – Sensors<br>3. SE1-AM02 - Actuators                                                               |
| Serial Number(s)              | : | 1. 23320012 (Part Number 1132196) - Sensors<br>2. 23330027 (Part Number 1132197) – Sensors<br>3. 23340004 (Part Number 1132272) - Actuators |
| Number of Samples Tested      | : | 2                                                                                                                                           |
| Test Sample(s) Condition      | : | Good                                                                                                                                        |
| Quotation Reference           | : | 5824642 & 5993428                                                                                                                           |
| Test Specification/Issue/Date | : | FCC 47 CFR 15B                                                                                                                              |
| Test Sample(s) Received Date  | : | 29 Sep 2023                                                                                                                                 |
| Start of Test                 | : | 29 Sep 2023                                                                                                                                 |
| Finish of Test                | : | 03 Oct 2023                                                                                                                                 |

### 1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with the specifications as shown below.

| Specification Clause  | Test Description                                 | Result | Comments/Base Standard |
|-----------------------|--------------------------------------------------|--------|------------------------|
| <i>FCC 47 CFR 15B</i> |                                                  |        |                        |
| 15.107                | Conducted Emissions at Mains Terminals (Class B) | Pass   | ANSI C63.4: 2014       |
| 15.109                | Radiated Emissions (Class A / B)                 | Pass   | ANSI C63.4: 2014       |

### Notes

- The software library stacks firmware used in the product during testing is R01.06.00. Sick Product Center Asia Pte. Ltd. has since updated their firmware to R01.06.00 → R01.07.00. Sick Product Center Asia Pte. Ltd. declares that the firmware update will not impact the RF performance and Sick Product Center Asia Pte. Ltd. had performed detailed analysis of the impact of this firmware update to the testing results. Please refer to Sick Product Center Asia Pte. Ltd. for more information.
- The difference between variant SE1-SS1A20 and SE1-ST1A20 is the number of inductor coils (antenna) and capacitors used for impedance matching due to different sensing direction. Please refer to the following illustrations for more details.
- Sick Product Center Asia Pte. Ltd. declares that safeIDS System comprises of a Device (Sensor) & Actuator.

Device (Sensor)  
a. SE1-ST1A20 (Tested)  
b. SE1-SS1A20 (Tested)

Actuator  
a. SE1-AM01 (Declared)  
b. SE1-AM02 (Tested)  
c. SE1-AM03 to SE1-AM16 Declared)



Notes (Continued)

|                                                                                   |                                                                                                                       |                                                                                                                                                   |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
|  |  <b>SISTRAID</b><br>IP-0204-PD20-801 |  SE1 Variant 1 and 2 comparisons<br>E372141 Rev. 01 (2023-11-29) |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|

| Variant No | safelDS Description                                                 | Product iden. Number P/N | TYPE of Device | Sensing Direction | Antenna placement at PCB   | Hardware (RFID chipset, MCU, power supply, digital circuits) | Firmware  |
|------------|---------------------------------------------------------------------|--------------------------|----------------|-------------------|----------------------------|--------------------------------------------------------------|-----------|
| 1          | Front/TOP sensing via IO-Link Safety – refer to Figure 1 (a) to (c) | 1132196                  | SE1-ST1A20     | TOP (Figure 1b)   | Two ferrite inductor coils | IDENTICAL                                                    | IDENTICAL |
| 2          | SIDE sensing via IO-Link Safety – refer to Figure 1 (d) to (f)      | 1132197                  | SE1-SS1A20     | SIDE (Figure 1e)  | One ferrite inductor coil  |                                                              |           |



#### Notes (Continued)

4. Sick Product Center Asia Pte. Ltd. declares that the actuators have identical electrical characteristics, material and physical dimensions.

| SE1 Actuator |                |                                |                    |
|--------------|----------------|--------------------------------|--------------------|
| no.          | Type of Device | Identification Number (1 mio#) | ShortID (Variants) |
| 1            | SE1-AM01       | 1132271                        | 01                 |
| 2            | SE1-AM02       | 1132272                        | 02                 |
| 3            | SE1-AM03       | 1132273                        | 03                 |
| 4            | SE1-AM04       | 1132274                        | 04                 |
| 5            | SE1-AM05       | 1132275                        | 05                 |
| 6            | SE1-AM06       | 1132276                        | 06                 |
| 7            | SE1-AM07       | 1132277                        | 07                 |
| 8            | SE1-AM08       | 1132278                        | 08                 |
| 9            | SE1-AM09       | 1132279                        | 09                 |
| 10           | SE1-AM10       | 1132280                        | 10                 |
| 11           | SE1-AM11       | 1132281                        | 11                 |
| 12           | SE1-AM12       | 1132282                        | 12                 |
| 13           | SE1-AM13       | 1132283                        | 13                 |
| 14           | SE1-AM14       | 1132284                        | 14                 |
| 15           | SE1-AM15       | 1132285                        | 15                 |
| 16           | SE1-AM16       | 1132286                        | 16                 |

The only difference between each actuator is the digital data programmed in ShortID. Sick Product Center Asia Pte. Ltd. declares that the difference in ShortID value will not cause any interference to RF/electromagnetic or EMC. SE1-AM02 was selected as a representative model for the family.

5. This report 7191331641-EEC24/01 | Issue: 01 was reproduced from TÜV SÜD PSB issued test report 7191315763-EEC23/01 | Issue: 01 dated 17 Oct 2023 to amend Applicant to SICK AG.

## 1.4 Product Information

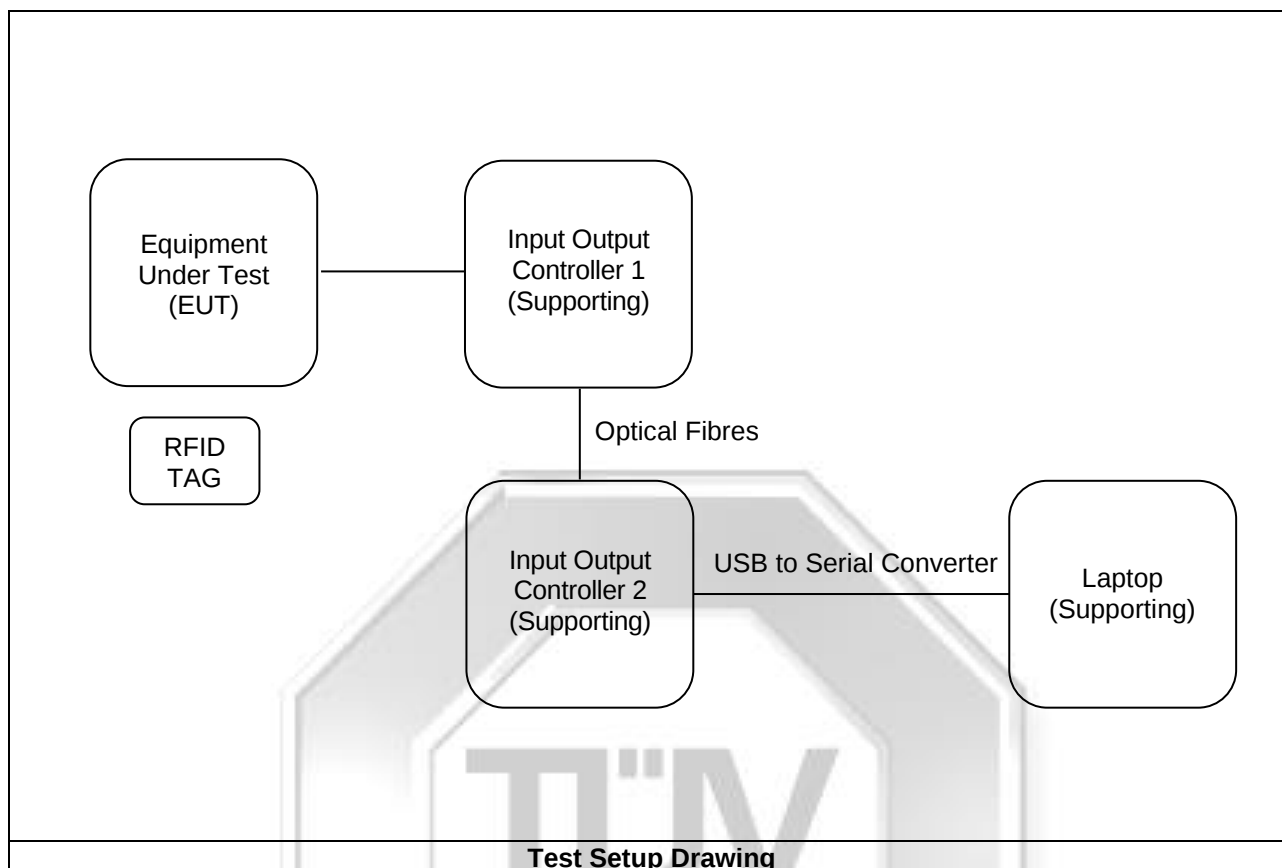
### 1.4.1 Technical Description

|                              |   |                                                                         |
|------------------------------|---|-------------------------------------------------------------------------|
| Description                  | : | The Equipment Under Test(s) (EUT(s)) is a <b>RFID PROXIMITY SWITCH.</b> |
|                              |   |                                                                         |
| Microprocessor               | : | STMicroelectronics STM32F303VEH6                                        |
|                              |   |                                                                         |
| Operating Frequency          | : | 125KHz (RFID)                                                           |
|                              |   |                                                                         |
| Clock / Oscillator Frequency | : | 16MHz (crystal for MCU)                                                 |
|                              |   |                                                                         |
| Modulation                   | : | Amplitude Modulation (AM)                                               |
|                              |   |                                                                         |
| Antenna Gain                 | : | Not Applicable                                                          |
|                              |   |                                                                         |
| Port / Connectors            | : | M12 A-coded 4-pin Male connector                                        |
|                              |   |                                                                         |
| Rated Power                  | : | DC Supply Voltage<br>Nominal 24Vdc<br>Maximum 30Vdc<br>Minimum 18Vdc    |
|                              |   |                                                                         |
| Accessories                  | : | Nil                                                                     |

### 1.4.2 Test Configuration and Modes of Operation

| Mode(s)           | Description                                                    |
|-------------------|----------------------------------------------------------------|
| RFID Polling Mode | The EUT was transmitting and receiving continuously at 125kHz. |

### 1.4.3 Test Setup Drawings



### 1.4.4 Performance Criteria and Monitoring Methods

Not Applicable.

### 1.5 Deviations from the Standard

Nil.

### 1.6 EUT Modification Record

No modifications were made.



## 1.7 Test Location(s)

TÜV SÜD PSB Pte Ltd  
Electrical & Electronics Centre (EEC), Product Services,  
15 International Business Park  
TÜV SÜD @ IBP  
Singapore 609937

## 1.8 Test Facilities Registrations

| Requirements | Registration Numbers                                                                                                                                                                                                                                                           |
|--------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FCC          | 994109 (Test Firm Registration Number)<br>SG0002 (Designation Number)                                                                                                                                                                                                          |
| ISED         | SGAP01 (CAB Identifier)<br>2932N-1 (10m Semi-Anechoic Chamber)                                                                                                                                                                                                                 |
| VCCI         | R-13324 (10m ANC), G-10203 (10mANC)<br>R-20151 (3m RF Chamber - Lab 7), G-20149 (3m RF Chamber - Lab 7)<br>C-14933 (C.E @ CEIBP)<br>T-12403 (Telecom Ports @ CEIBP)                                                                                                            |
| BSMI         | SL2-IS-E-6001R [CNS-13803 (ISM Equipment)]<br>SL2-IN-E-6001R [CNS-13438, CNS-15936 (IT Equipment)]<br>SL2-R1/R2-E-6001R [CNS-13439, CNS-15936 (Broadcast Receivers)]<br>SL2-A1-E-6001R [CNS-13783-1 (Household Appliances)]<br>SL2-L1-E-6001R [CNS-14115 (Lighting Equipment)] |
| SABS         | SABS/A-LAB/0030/2018                                                                                                                                                                                                                                                           |
| ASCA         | TL-86                                                                                                                                                                                                                                                                          |



### 1.9 Supporting Equipment

| Equipment Description<br>(Including Brand Name)             | Model, Serial & FCC ID Number                                       | Cable Description<br>(List Length, Type & Purpose) |
|-------------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------|
| Dell Latitude 7280 Laptop                                   | M/N: P28S001<br>S/N: JQPRBH2<br>FCC ID: DoC                         |                                                    |
| Dell AC Adapter                                             | M/N: LA130PM121<br>S/N: CN-0VJCH5-72438-4AS-2F47-A01<br>FCC ID: DoC | 1.80m unshielded power cable                       |
| PowerPax AC Adapter                                         | M/N: SW4309B<br>S/N: AM-77717<br>FCC ID: DoC                        | 1.50m unshielded power cable                       |
| PowerPax AC Adapter                                         | M/N: SW4309B<br>S/N: AM-77718<br>FCC ID: DoC                        | 1.50m unshielded power cable                       |
| TEConcept GmbH                                              | M/N: IO-Link Master 03<br>S/N: EMVT006A<br>FCC ID: DoC              |                                                    |
| TEConcept GmbH                                              | M/N: IO-Link Master 03<br>S/N: EMVT006B<br>FCC ID: DoC              |                                                    |
| LINDY Electronics Limited Serial<br>USB to Serial Converter | M/N: Nil<br>S/N: Nil<br>FCC ID: DoC                                 | 1.50m unshielded signal cable                      |



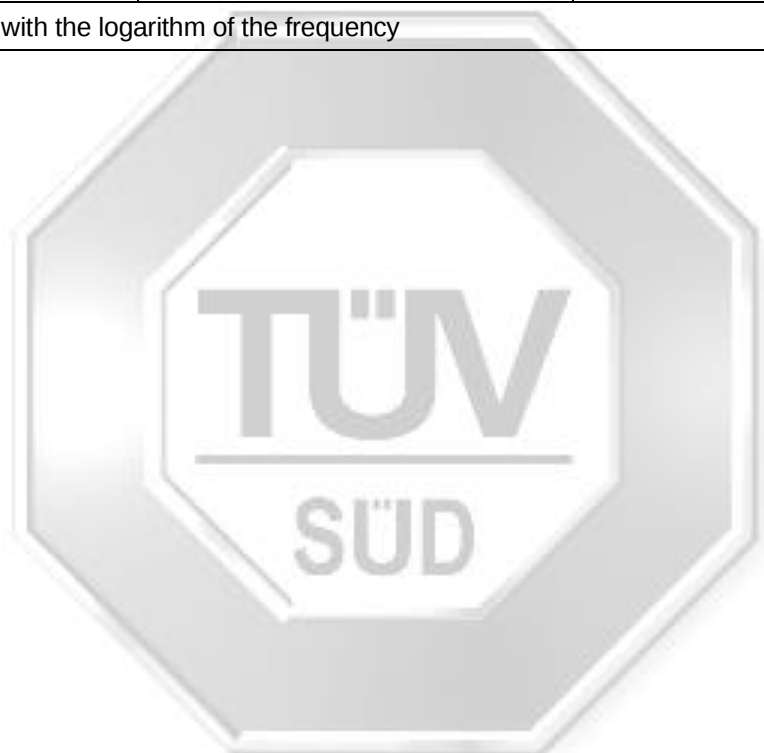
## 2 Test Details

### 2.1 Conducted Emissions at Mains Terminals

#### 2.1.1 Test Limits

##### AC Mains Port (Class B)

| Frequency Range<br>(MHz)                                  | Limits (dB $\mu$ V) |              |
|-----------------------------------------------------------|---------------------|--------------|
|                                                           | Quasi-peak (Q-P)    | Average (AV) |
| 0.15 - 0.5                                                | 66 – 56 *           | 56 – 46 *    |
| 0.5 - 5.0                                                 | 56                  | 46           |
| 5.0 - 30.0                                                | 60                  | 50           |
| * Decreasing linearly with the logarithm of the frequency |                     |              |



## 2.1.2 Test Setup

- 2.1.2.1 The EUT and supporting equipment were set up in accordance with the requirements of the standard as shown in the setup photos.
- 2.1.2.2 The power supply for the EUT was fed through a  $50\Omega/50\mu\text{H}$  EUT LISN, connected to filtered mains.
- 2.1.2.3 The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.
- 2.1.2.4 All other supporting equipment were powered separately from another LISN.

## 2.1.3 Test Method

- 2.1.3.1 The EUT was switched on and allowed to warm up to its normal operating condition.
- 2.1.3.2 A scan was made on the NEUTRAL line over the required frequency range using an EMI test receiver.
- 2.1.3.3 High peaks, relative to the limit line, were then selected.
- 2.1.3.4 The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 9kHz. Both Quasi-peak and Average measurements were made.
- 2.1.3.5 The measurements were then repeated for the LIVE line.

### Sample Calculation Example

At 20 MHz

Q-P limit (Class B) =  $60.0\text{ dB}\mu\text{V}$

Transducer factor of LISN, pulse limiter & cable loss at 20 MHz = 11.2 dB

Q-P reading obtained directly from EMI Receiver =  $40.0\text{ dB}\mu\text{V}$   
(Calibrated for system losses)

Therefore, Q-P margin =  $60.0 - 40.0 = 20.0$

i.e. 20.0 dB below Q-P limit

#### 2.1.4 Test Results

The detailed of the test results are shown below.

|                  |              |                      |              |
|------------------|--------------|----------------------|--------------|
| Operating Mode   | Polling Mode | Temperature          | 24°C         |
| Test Input Power | 120V 60Hz    | Relative Humidity    | 60%          |
| Line Under Test  | AC Mains     | Atmospheric Pressure | 1030mbar     |
| Class            | B            | Tested By            | Kelvin Cheng |
| Model            | SE1-SS1A20   | Test Date            | 29 Sep 2023  |

| Frequency (MHz) | Q-P Value (dBμV) | Q-P Limit (dBμV) | Q-P Margin (dB) | AV Value (dBμV) | AV Limit (dBμV) | AV Margin (dB) | Line    |
|-----------------|------------------|------------------|-----------------|-----------------|-----------------|----------------|---------|
| 0.1682          | 45.1             | 65.0             | 19.9            | 28.0            | 55.0            | 27.0           | Live    |
| 0.3444          | 38.1             | 59.1             | 21.0            | 32.6            | 49.1            | 16.5           | Live    |
| 3.3093          | 36.0             | 56.0             | 20.0            | 28.7            | 46.0            | 17.3           | Neutral |
| 3.9579          | 36.6             | 56.0             | 19.4            | 28.9            | 46.0            | 17.1           | Neutral |
| 4.3766          | 35.7             | 56.0             | 20.3            | 27.1            | 46.0            | 18.9           | Neutral |
| 4.8380          | 35.3             | 56.0             | 20.7            | 26.9            | 46.0            | 19.1           | Neutral |

|                  |              |                      |              |
|------------------|--------------|----------------------|--------------|
| Operating Mode   | Polling Mode | Temperature          | 24°C         |
| Test Input Power | 120V 60Hz    | Relative Humidity    | 60%          |
| Line Under Test  | AC Mains     | Atmospheric Pressure | 1030mbar     |
| Class            | B            | Tested By            | Kelvin Cheng |
| Model            | SE1-ST1A20   | Test Date            | 29 Sep 2023  |

| Frequency (MHz) | Q-P Value (dBμV) | Q-P Limit (dBμV) | Q-P Margin (dB) | AV Value (dBμV) | AV Limit (dBμV) | AV Margin (dB) | Line    |
|-----------------|------------------|------------------|-----------------|-----------------|-----------------|----------------|---------|
| 0.1691          | 46.0             | 65.0             | 19.0            | 29.8            | 55.0            | 25.2           | Live    |
| 0.3440          | 38.3             | 59.1             | 20.8            | 32.6            | 49.1            | 16.5           | Live    |
| 2.9888          | 35.1             | 56.0             | 20.9            | 27.9            | 46.0            | 18.1           | Neutral |
| 3.5700          | 36.8             | 56.0             | 19.2            | 29.2            | 46.0            | 16.8           | Neutral |
| 3.9509          | 36.4             | 56.0             | 19.6            | 28.7            | 46.0            | 17.3           | Neutral |
| 4.3395          | 35.7             | 56.0             | 20.3            | 27.2            | 46.0            | 18.8           | Neutral |

#### Notes

|    |                                                                                                                                                                                                                     |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. | All possible modes of operation were investigated from 150kHz to 30MHz. Only the worst-case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant. |
| 2. | A "positive margin" indicates a PASS as it refers to the margin present below the limit line at the particular frequency. Conversely, a "negative margin" indicates a FAIL.                                         |
| 3. | EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:<br><u>150kHz - 30MHz</u><br>RBW: 9kHz      VBW: 30kHz                                                                                   |





## 2.2 Radiated Emissions

### 2.2.1 Test Limits

#### Class B

| Frequency Range (MHz)                                                                             | Quasi-Peak Limits (dB $\mu$ V/m) @ 3m |
|---------------------------------------------------------------------------------------------------|---------------------------------------|
| 30 - 88                                                                                           | 40.0                                  |
| 88 - 216                                                                                          | 43.5                                  |
| 216 - 960                                                                                         | 46.0                                  |
| Above 960                                                                                         | 54.0*                                 |
| * Above 1GHz, average detector was used. A peak limit of 20dB above the average limit does apply. |                                       |



## 2.2.2 Test Setup

- 2.2.2.1 The EUT and supporting equipment were set up in accordance with the requirements of the standard as shown in the setup photos.
- 2.2.2.2 The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.
- 2.2.2.3 The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.

## 2.2.3 Test Method

- 2.2.3.1 The EUT was switched on and allowed to warm up to its normal operating condition.
- 2.2.3.2 A pre-scan was carried out to pick the worst emission frequencies from the EUT. For EUT which is a portable device, the pre-scan was carried out by rotating the EUT through three orthogonal axes to determine which altitude and equipment arrangement produces such emissions.
- 2.2.3.3 The test was carried out at the selected frequency points obtained from the pre-scan. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
  - a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
  - b. The EUT was then rotated to the direction that gave the maximum emission.
  - c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
- 2.2.3.4 A Quasi-peak measurement was made for that frequency point if it was less than or equal to 1GHz. For frequency point that above 1GHz, both Peak and Average measurements were carried out.
- 2.2.3.5 The measurements were repeated for the next frequency point, until all selected frequency points were measured.

## Sample Calculation Example

At 300 MHz

Q-P limit (Class B) = 37.0 dB $\mu$ V/m

Log-periodic antenna factor & cable loss at 300 MHz = 18.5 dB

Q-P reading obtained directly from EMI Receiver = 31.0 dB $\mu$ V/m

(Calibrated level including antenna factors & cable losses)

Therefore, Q-P margin = 37.0 - 31.0 = 6.0

i.e. 6.0 dB below Q-P limit

## 2.2.4 Test Results

The detailed of the test results are shown below.

|                  |                   |                      |             |
|------------------|-------------------|----------------------|-------------|
| Operating Mode   | Polling Mode      | Temperature          | 24°C        |
| Test Input Power | 120V 60Hz         | Relative Humidity    | 60%         |
| Test Distance    | 3m (30MHz – 1GHz) | Atmospheric Pressure | 1030mbar    |
| Class            | B                 | Tested By            | Derrick Ng  |
| Model            | SE1-SS1A20        | Test Date            | 03 Oct 2023 |

| Frequency (MHz) | Q-P Value (dBμV/m) | Q-P Limit (dBμV/m) | Q-P Margin (dB) | Height (cm) | Azimuth (Degrees) | Polarization (H/V) |
|-----------------|--------------------|--------------------|-----------------|-------------|-------------------|--------------------|
| 47.6150         | 30.1               | 40.0               | 9.9             | 100         | 227               | V                  |
| 88.0190         | 23.0               | 43.5               | 20.5            | 133         | 140               | V                  |
| 90.1790         | 15.8               | 43.5               | 27.7            | 160         | 101               | H                  |
| 168.0800        | 23.8               | 43.5               | 19.7            | 107         | 88                | V                  |
| 354.9790        | 22.7               | 46.0               | 23.3            | 120         | 123               | V                  |
| 532.3350        | 23.6               | 46.0               | 22.4            | 100         | 149               | V                  |

|                  |                   |                      |             |
|------------------|-------------------|----------------------|-------------|
| Operating Mode   | Polling Mode      | Temperature          | 24°C        |
| Test Input Power | 120V 60Hz         | Relative Humidity    | 60%         |
| Test Distance    | 3m (30MHz – 1GHz) | Atmospheric Pressure | 1030mbar    |
| Class            | B                 | Tested By            | Derrick Ng  |
| Model            | SE1-ST1A20        | Test Date            | 03 Oct 2023 |

| Frequency (MHz) | Q-P Value (dBμV/m) | Q-P Limit (dBμV/m) | Q-P Margin (dB) | Height (cm) | Azimuth (Degrees) | Polarization (H/V) |
|-----------------|--------------------|--------------------|-----------------|-------------|-------------------|--------------------|
| 47.9850         | 21.4               | 40.0               | 18.6            | 101         | 226               | V                  |
| 87.7910         | 23.0               | 40.0               | 17.0            | 140         | 111               | V                  |
| 87.9910         | 17.0               | 40.0               | 23.0            | 159         | 171               | H                  |
| 168.1940        | 22.8               | 43.5               | 20.7            | 105         | 356               | V                  |
| 362.8120        | 22.4               | 46.0               | 23.6            | 101         | 128               | V                  |
| 711.8260        | 20.8               | 46.0               | 25.2            | 137         | 199               | V                  |



#### Notes

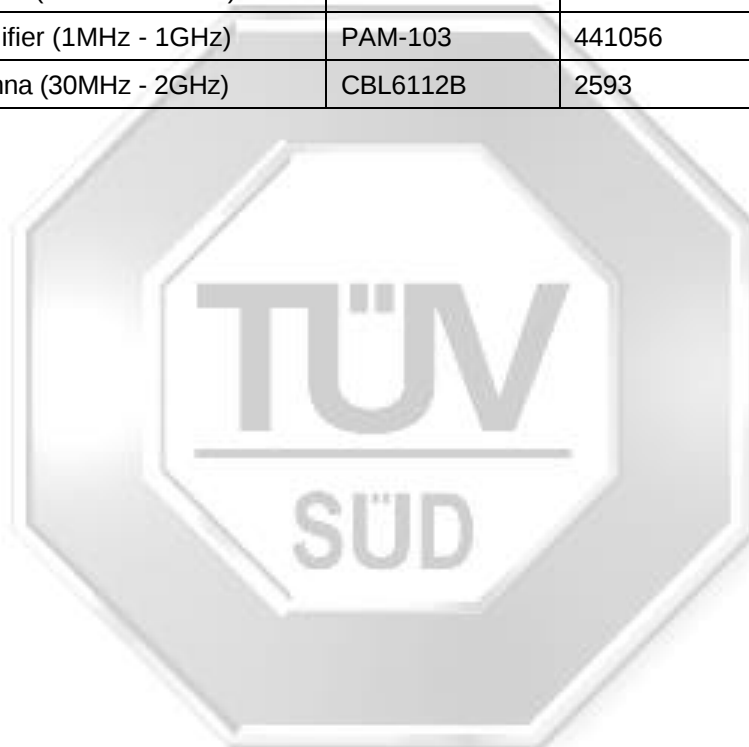
|    |                                                                                                                                                                                                             |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. | All possible modes of operation were investigated. Only the worst-case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.              |
| 2. | A "positive margin" indicates a PASS as it refers to the margin present below the limit line at the particular frequency. Conversely, a "negative margin" indicates a FAIL.                                 |
| 3. | EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:<br><u>30MHz - 1GHz</u><br>RBW: 120kHz                  VBW: 1MHz<br><u>1GHz – 40GHz</u><br>RBW: 1MHz                  VBW: 3MHz |
| 4. | The highest frequency of internal sources of the EUT is less than 108MHz, as such the measurement was made up to 1GHz.                                                                                      |





### 3 Test Equipment

| Instrument                             | Model        | S/No        | Cal Due Date |
|----------------------------------------|--------------|-------------|--------------|
| Conducted Emissions at Mains Terminals |              |             |              |
| R&S EMI Test Receiver (9kHz - 3GHz)    | ESPI3        | 100349      | 09 May 2024  |
| AFJ LISN                               | AFJ LT32C/10 | 32031929295 | 13 Apr 2024  |
| Schaffner LISN                         | NNB42        | 04/10055    | 08 Aug 2024  |
| EMCO LISN (supporting)                 | 3825/2       | 9309-2127   | 08 Aug 2024  |
| Radiated Emissions                     |              |             |              |
| R&S EMI Test Receiver (9kHz - 26.5GHz) | ESR26        | 101714      | 14 Sep 2024  |
| Com-Power Preamplifier (1MHz - 1GHz)   | PAM-103      | 441056      | 11 Sep 2024  |
| Schaffner Bilog Antenna (30MHz - 2GHz) | CBL6112B     | 2593        | 11 Dec 2023  |

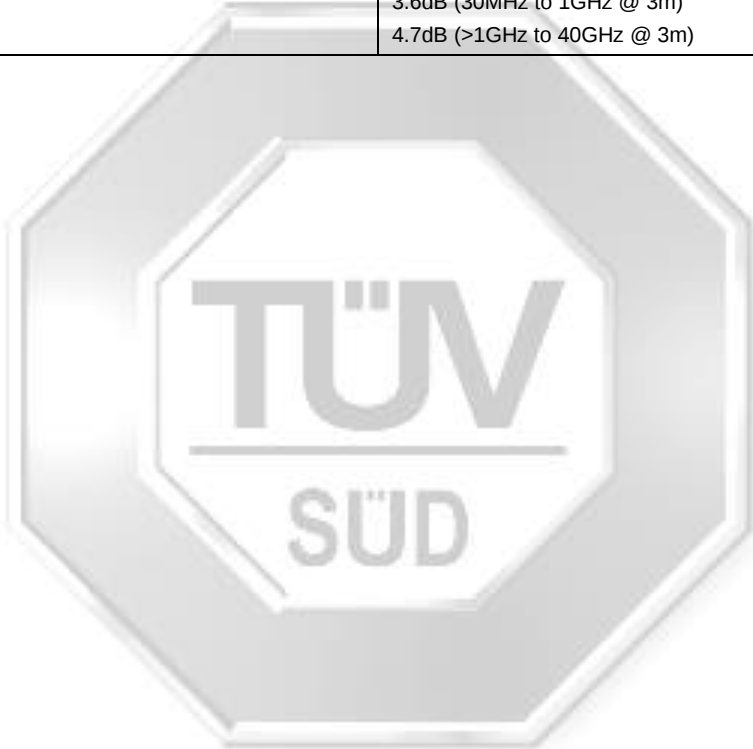




## 4 Measurement Uncertainty

All measured results are traceable to the SI units. The uncertainty of the measurement is at a confidence level of approximately 95%, with a coverage factor of 2.

| Test Name                              | Measurement Uncertainty                                                                                                                                                                                                                                        |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Conducted Emissions at Mains Terminals | 1.1dB (9kHz to 30MHz)                                                                                                                                                                                                                                          |
| Radiated Emissions                     | <u>10m Anechoic Chamber (Lab 4)</u><br>2.2dB (9kHz to 30MHz @ 10m)<br>3.1dB (30MHz to 1GHz @ 10m)<br>3.7dB (30MHz to 1GHz @ 3m)<br>4.7dB (>1GHz to 40GHz @ 3m)<br><br><u>3m RF Chamber (Lab7)</u><br>3.6dB (30MHz to 1GHz @ 3m)<br>4.7dB (>1GHz to 40GHz @ 3m) |





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Effective 27 March 2024

