# EMC Test Report

# for

# GPS Antenna Module

# Model No.: AM-25

of

Applicant: Unictron Technologies Corporation
Address: No. 83, Kewang Rd., Longtan Dist., Taoyuan City 325, Taiwan

Tested and Prepared

by

**Worldwide Testing Services (Taiwan) Co., Ltd.**

**A2LA Accredited No.: 2732.01**

**Report No.: W6M22106-20986-E-16**

6F, NO. 58, LANE 188, RUEY-KUANG RD., NEIHU TAIPEI 114, TAIWAN, R.O.C.
TEL: 886-2-66068877 FAX: 886-2-66068879 E-mail: wts@wts-lab.com

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# 1 General Information

## 1.1 Notes

The purpose of conformity testing is to increase the probability of adherence to the essential requirements or conformity specifications, as appropriate.
The complexity of the technical specifications, however, means that full and thorough testing is impractical for both technical and economic reasons.
Futhermore, there is no guarantee that a test sample which has passed all the relevant tests conforms to a specification (only telecommunication products).
Neither is there any guarantee that such a test sample will interwork with other genuinely open systems.
The existence of the tests nevertheless provides the confidence that the test sample posseses the qualities as maintained and that its performance generally conforms to representative cases of communications equipment.

The test results of this test report relate exclusively to the item tested as specified in 1.6.
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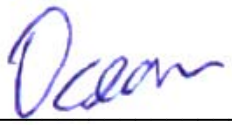
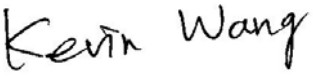
## 1.2 Tester

| | | | |
|---|---|---|---|
| July 02, 2021 | | Ocean Gu |  |
| Date | WTS-Lab. | Test engineer | Signature |

Technical responsibility for area of testing:

| | | | |
|---|---|---|---|
| July 02, 2021 | | Kevin Wang |  |
| Date | WTS | Name | Signature |

## 1.3 Testing laboratory

### 1.3.1 Location

OATS
No.5-1, Lishui, Shuang Sing Village,
Wanli Dist., New Taipei City 207,
Taiwan (R.O.C.)
3 meter semi-anechoic chamber
No.35, Aly. 21, Ln. 228, Ankang Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)
TEL:886-2-6613-0228
FAX:886-2-2791-5046
Company
Worldwide Testing Services (Taiwan) Co., Ltd.
6F, NO. 58, LANE 188, RUEY-KUANG RD.
NEIHU, TAIPEI 114, TAIWAN R.O.C.
Tel : 886-2-66068877
Fax : 886-2-66068879

### 1.3.2 Details of accreditation status

Accredited testing laboratory
A2LA accredited number: 2732.01

### 1.3.3 Test location, where different from Worldwide Testing Services (Taiwan) Co., Ltd.

| | |
|---|---|
| Name: | ./. |
| Accredited number: | ./. |
| Street: | ./. |
| Town: | ./. |
| Country: | ./. |
| Telephone: | ./. |
| Fax: | ./. |
| Teletex: | ./. |

## 1.4 Details of approval holder

| | |
|---|---|
| Name: | Unictron Technologies Corporation |
| Street: | No. 83, Kewang Rd., Longtan Dist., |
| Town: | Taoyuan City 325, |
| Country: | Taiwan |
| Telephone: | ./. |
| Fax: | ./. |

## 1.5 Application details

| | |
|---|---|
| Date of receipt of test item: | June 15, 2021 |
| Date of test: | From June 15, 2021 to June 22, 2021 |

## 1.6 Test item

### 1.6.1 Description of test item

| | |
|---|---|
| Type of product: | GPS Antenna Module |
| Type identification: | AM-25 |
| Multi-listing model number: | ./. |
| Photos: | Please find in Appendix. |

### 1.6.2 Technical data

| | |
|---|---|
| Frequency range: | 1575.42 MHz |
| Antenna type: | Patch Antenna |
| Operation mode: | Simplex |
| Voltage supply: | |

### 1.6.3 **Manufacturer** (if different from applicate)

| | |
|---|---|
| Name: | Unictron Technologies Corporation |
| Street: | 11F., No.2, Sec. 4, Jhongyang Rd., Tucheng Dist., |
| Town: | New Taipei City 23678 |
| Country: | Taiwan |

## 1.7 Test standards

**EN 301 489 – 1：V2.2.3 (2019-11)**

**EN 301 489 –19：V2.1.1 (2019-04)**

## 1.8 Test configuration

The EUT is connected jig, receives GPS simulator signal, and keeps working until test finished.

# 2 Technical test

## 2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed. ☒

**or**

The deviations were ascertained in the course of the tests performed. ☐

## 2.2 Test environment

Temperature: 18…25 °C

Relative humidity content: 20…75 %

Air pressure: 860…1030 hPa

Details of power supply: DC 2.5~5.5V, 7.5mA@5V(DC)

Other parameters: ./.

| Test item Name | Measurement Uncertainty |
|---|---|
| Estimation Result of Uncertainty of Conducted Emission | Expanded Uncertainty:<br>AMN: 1.05 dB<br>Voltage probe: 1.05 dB |
| Estimation Result of Uncertainty of Radiated Emission (3M) | Expanded Uncertainty:<br>0.009-30 MHz: 2.13 dB<br>30-1000 MHz: 3.53 dB<br>1-18 GHz: 4.19 dB<br>18-40 GHz: 4.09 dB |
| Estimation Result of Uncertainty of Telecommunication Ports Conducted Emission | Expanded Uncertainty: 1.95 dB |

The decision rule is: Measurement uncertainty is not included in the calculation of test results.

## 2.3 Test equipment utilized

| No. | Test equipment | Type | Serial No. | Manufacturer | Cal. Date | Next Cal. Date |
|---|---|---|---|---|---|---|
| ETSTW-CE 001 | EMI TEST RECEIVER | ESHS10 | 842121/013 | R&S | 2021/6/4 | 2022/6/3 |
| ETSTW-CE 003 | AC POWER SOURCE | APS-9102 | D161137 | GW | Function Test | |
| ETSTW-CE 004 | ZWEILEITER-V-NETZNACHBILDUNG TWO-LINE V-NETWORK | ESH3-Z5 | 840731/011 | R&S | 2020/11/6 | 2021/11/5 |
| ETSTW-CE 005 | Line-Impedance Stabilisation Network | NNBM 8126D | 137 | Schwarzbeck | 2021/4/20 | 2022/4/19 |
| ETSTW-CE 006 | IMPULSBEGRENZER PULSE LIMITER | ESH3-Z2 | 100226 | R&S | 2020/9/22 | 2021/9/21 |
| ETSTW-CE 008 | HF-EICHLEITUNG RF STEP ATTENUATOR 139dB DPSP | 334.6010.02 | 844581/024 | R&S | Function Test | |
| ETSTW-CE 009 | TEMP.&HUMIDITY CHAMBER | GTH-225-40-1P-U | MAA0305-009 | GIANT FORCE | 2020/7/22 | 2021/7/21 |
| ETSTW-CE 016 | TWO-LINE V-NETWORK | ENV216 | 100050 | R&S | 2020/10/26 | 2021/10/25 |
| ETSTW-CE 024 | IMPEDANCE STABILIZATION NETWORK | ISN T800 | 29454 | TESEQ | 2020/7/13 | 2021/7/12 |
| ETSTW-CE 027 | COUPLING AND DECOUPLING NETWORK | CDN ST08AS | 38087 | TESEQ | Function Test | |
| ETSTW-CE 028 | MXE EMI Receiver | N9038A | MY53220110 | Agilent | 2020/7/29 | 2021/7/28 |
| ETSTW-CE 030 | CISPR Passive probe | PMM SHC-1-1000 | 1021X30803 | Narda S.T.S/PMM | 2021/3/24 | 2022/3/23 |
| ETSTW-CS 004 | COUPLING AND DECOUPLING NETWORK | CDN M016 | 20053 | SCHAFFNER | 2020/8/27 | 2021/8/26 |
| ETSTW-CS 005 | RF Power Amplifier | 100A250A | 306547 | AR | Function Test | |
| ETSTW-CS 010 | 6 dB Attenuator | SA3N1007-06 | None | AISI | Function test | |
| ETSTW-CS 011 | ESG Analog Signal Generator | E4428C | MY45280875 | AGILENT | 2020/7/27 | 2021/7/26 |
| ETSTW-RE 003 | EMI TEST RECEIVER | ESI 26 | 831438/001 | R&S | 2021/6/4 | 2022/6/3 |
| ETSTW-RE 004 | EMI TEST RECEIVER | ESI 40 | 832427/004 | R&S | 2020/9/14 | 2021/9/13 |
| ETSTW-RE 010 | ABSORBING CLAMP | MDS 21 | 03469 | Schwarzbeck | 2020/10/20 | 2021/10/19 |
| ETSTW-RE 012 | TUNABLE BANDREJECT FILTER | D.C 0309 | 146 | K&L | Function Test | |
| ETSTW-RE 013 | TUNABLE BANDREJECT FILTER | D.C 0336 | 397 | K&L | Function Test | |
| ETSTW-RE 019 | MICROWAVE HORN ANTENNA | 22240-25 | 121074 | FM | 2021/5/31 | 2022/5/30 |
| ETSTW-RE 027 | Passive Loop Antenna | 6512 | 00034563 | ETS-Lindgren | 2020/7/8 | 2021/7/7 |
| ETSTW-RE 030 | Double-Ridged Guide Horn Antenna | 3117 | 00035224 | ETS-Lindgren | 2021/5/5 | 2022/5/4 |
| ETSTW-RE 032 | Millivoltmeter | URV 55 | 849086/013 | R&S | 2020/9/29 | 2021/9/28 |
| ETSTW-RE 033 | WaveRunner 6000A Serise Oscilloscope | WAVERUNNER 6100A | LCRY0604P14508 | LeCroy | 2020/7/27 | 2021/7/26 |
| ETSTW-RE 034 | Power Sensor | URV5-Z4 | 839313/006 | R&S | 2020/9/8 | 2021/9/7 |
| ETSTW-RE 042 | Biconical Antenna | HK116 | 100172 | R&S | 2021/3/18 | 2022/3/17 |
| ETSTW-RE 043 | Log-Periodic Dipole Antenna | HL223 | 100166 | R&S | 2021/5/21 | 2022/5/20 |
| ETSTW-RE 044 | Log-Periodic Antenna | HL050 | 100094 | R&S | 2020/8/3 | 2021/8/2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ETSTW-RE 045 | ESA-E SERIES SPECTRUM ANALYZER | E4404B | MY45111242 | Agilent | Pre-test Use | |
| ETSTW-RE 048 | Triple Loop Antenna | HXYZ 9170 | HXYZ 9170-134 | Schwarzbeck | 2021/1/25 | 2022/1/24 |
| ETSTW-RE 050 | Attenuator 10dB | 50HF-010-1 | None | JFW | 2021/2/19 | 2022/2/18 |
| ETSTW-RE 051 | Attenuator 6dB | 50HF-006-1 | None | JFW | 2021/2/19 | 2022/2/18 |
| ETSTW-RE 053 | Attenuator 3dB | 50HF-003-1 | None | JFW | 2021/2/19 | 2022/2/18 |
| ETSTW-RE 055 | SPECTRUM ANALYZER | FSU 26 | 200074 | R&S | 2021/3/16 | 2022/3/15 |
| ETSTW-RE 060 | Attenuator 30dB | 5015-30 | F651012z-01 | ATM | 2021/2/19 | 2022/2/18 |
| ETSTW-RE 061 | Amplifier Module | CHC 1 | None | ETS | 2021/5/5 | 2022/5/4 |
| ETSTW-RE 062 | Amplifier Module | CHC 2 | None | KMIC | 2021/5/5 | 2022/5/4 |
| ETSTW-RE 064 | Bluetooth Test Set | MT8852B-042 | 6K00005709 | Anritsu | Function Test | |
| ETSTW-RE 065 | Amplifier | AMF-6F-18002650-25-10P | 941608 | MITEQ | 2021/3/24 | 2022/3/23 |
| ETSTW-RE 069 | Double-Ridged Guide Horn Antenna | 3117 | 00069377 | ETS-Lindgren | Function Test | |
| ETSTW-RE 072 | CELL SITE TEST SET | 8921A | 3339A00375 | HP | 2020/10/15 | 2021/10/14 |
| ETSTW-RE 073 | Power Meter | N1911A | MY45100769 | Agilent | 2021/2/20 | 2022/2/19 |
| ETSTW-RE 074 | Power Sensor | N1921A | MY45241198 | Agilent | 2021/2/20 | 2022/2/19 |
| ETSTW-RE 091 | Match Pad | MDCS1500 | None | WOKEN | 2021/5/27 | 2022/5/26 |
| ETSTW-RE 099 | DC Block | 50DB-007-1 | None | JFW | 2021/2/19 | 2022/2/18 |
| ETSTW-RE 112 | AC POWER SOURCE | TFC-1005 | T-0A023536 | T-Power | Function test | |
| ETSTW-RE 105 | 2.4GHz Notch Filter | N0124411 | 39555 | MICROWAVE CIRCUITS | 2021/1/6 | 2022/1/5 |
| ETSTW-RE 120 | RF Player | MP9200 | MP9210-111022 | ADIVIC | 2020/12/25 | 2021/12/24 |
| ETSTW-RE 122 | SIGNAL GENERATOR | SMF100A | 102149 | R&S | 2021/6/4 | 2022/6/3 |
| ETSTW-RE 125 | 5GHz Notch filter | 5NSL11-5200/E221.3-O/O | 1 | K&L Microwave | 2020/8/7 | 2021/8/6 |
| ETSTW-RE 126 | 5GHz Notch filter | 5NSL12-5800/E221.3-O/O | 1 | K&L Microwave | 2020/8/7 | 2021/8/6 |
| ETSTW-RE 127 | RF Switch Box | RFS-01 | None | WTS | 2021/2/19 | 2022/2/18 |
| ETSTW-RE 128 | 5.3GHz Notch filter | N0153001 | SN487233 | Microwave Circuits | 2020/8/7 | 2021/8/6 |
| ETSTW-RE 129 | 5.5GHz Notch filter | N0555984 | SN487234 | Microwave Circuits | 2020/8/7 | 2021/8/6 |
| ETSTW-RE 130 | Handheld RF Spectrum Analyzer | N9340A | CN0147000204 | Agilent | Pre-test Use | |
| ETSTW-RE 133 | EXA Signal Analyzer | N9010A | MY53470566 | Agilent | 2021/5/7 | 2022/5/6 |
| ETSTW-RE 134 | MXG Vector Signal Generator | N5182B | MY53050664 | Agilent | 2021/5/7 | 2022/5/6 |
| ETSTW-RE 135 | EXG Analog Signal Generator | N5171B | MY53050476 | Agilent | 2021/5/7 | 2022/5/6 |
| ETSTW-RE 136 | USB Wideband Power Sensor | U2021XA | MY54070006 | Agilent | 2021/5/7 | 2022/5/6 |
| ETSTW-RE 137 | USB Wideband Power Sensor | U2021XA | MY54020004 | Agilent | 2021/5/7 | 2022/5/6 |
| ETSTW-RE 138 | USB Wideband Power Sensor | U2021XA | MY54110003 | Agilent | 2021/5/7 | 2022/5/6 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ETSTW-RE 139 | USB Wideband Power Sensor | U2021XA | MY54110004 | Agilent | 2021/5/7 | 2022/5/6 |
| ETSTW-RE 140 | Simultaneous sampling DAQ | U2531A | TW56143501 | Agilent | Function Test | |
| ETSTW-RE 142 | Amplifier | 8447D | 2805A03378 | Agilent | 2021/5/5 | 2022/5/4 |
| ETSTW-RE 146 | Preamplifier | JPA-10M1G | 15090004 | JPT | 2021/6/4 | 2022/6/3 |
| ETSTW-RE 147 | Bi-log Hybrid Antenna | MCTD 2786B | BLB16M04005 | ETC | 2021/4/7 | 2022/4/6 |
| ETSTW-RE 148 | Bi-log Hybrid Antenna | MCTD 2786B | BLB16M04006 | ETC | 2020/7/9 | 2021/7/8 |
| ETSTW-RE 150 | Blocking Test System | AD211 | TW5451133 | Keysight | Function Test | |
| ETSTW-RE 153 | Signal Analyzer | FSV40 | 101929 | R&S | 2020/10/1 | 2021/9/30 |
| ETSTW-EMI 001 | HARMONICS 1000 | HAR1000-1P | 093 | EMC-PARTNER | 2021/6/17 | 2022/6/16 |
| ETSTW-EMI 010 | AC Power Source | PS3 | 0219 | EMC PARTNER | 2021/6/17 | 2022/6/16 |
| ETSTW-EMI 011 | USB Compact Modulator | SFC-U | 101689 | R&S | 2021/6/2 | 2022/6/1 |
| ETSTW-EMS 001 | BASELSTRASSE 160 CH-4242 LAUFEN | CN-EFT1000 | 354 | EMC-PARTNER | Function Test | |
| ETSTW-EMS 002 | Frequency Converter | YF-6020 | 0308014 | None | Function Test | |
| ETSTW-EMS 009 | Magnetic Field Antenna | MF1000-1 | 104 | EMC-PARTNER | Function Test | |
| ETSTW-EMS 010 | Coupling De-coupling Network | CDN-UTP8 | 014 | EMC-PARTNER | 2020/9/29 | 2021/9/28 |
| ETSTW-EMS 012 | EM Injection Clamp | F-203I-23MM | 476 | FCC | 2020/7/9 | 2021/7/8 |
| ETSTW-EMS 013 | Audio Analyzer | UPA 3 | 843458/029 | R&S | 2021/1/27 | 2022/1/26 |
| ETSTW-EMS 016 | EMF Tester | 1390 | 071208732 | TES | 2020/10/14 | 2021/10/13 |
| ETSTW-EMS 017 | Multimeter | DM-1220 | 518614 | HILA | 2020/8/31 | 2021/8/30 |
| ETSTW-EMS 019 | Electrostatic Discharge Simulator | ESS-2002 | ESS06Y6300 | NoiseKen | 2020/9/17 | 2021/9/16 |
| ETSTW-EMS 023 | Electrostatic Discharge Simulator | NSG 435 | 6984 | TESEQ | 2021/6/16 | 2022/6/15 |
| ETSTW-EMS 024 | Humidity Temperature Meter | TES-1260 | 160304437 | TES | 2020/9/23 | 2021/9/22 |
| ETSTW-EMS 025 | 10/700 Surge Generator | SG-728G | EC0631106 | 3Ctest | 2020/10/19 | 2021/10/18 |
| ETSTW-EMS 026 | Multifunction Generator | NSG 3040A | P1950236136 | TESEQ | 2021/1/11 | 2022/1/10 |
| ETSTW-EMS 027 | Single-phase toroidal transformer with autowinding | TVT 1-250-16 | P1948235209 | AMETEK | 2021/1/11 | 2022/1/10 |
| ETSTW-EMS 028 | 1/2" Free-field Microphone | 4192 | 3204706 | B&K | 2021/1/27 | 2022/1/26 |
| ETSTW-EMS 029 | 1/2" Free-field Microphone | 4191 | 3024723 | B&K | 2021/1/26 | 2022/1/25 |
| ETSTW-EMS 030 | Two channel microphone conditioning amplifier | 2690 | 3256070 | B&K | Function Test | |
| ETSTW-EMS 031 | Sound calibrator | 4231 | 3024803 | B&K | 2021/1/27 | 2022/1/26 |
| ETSTW-RS 007 | 14" COLOR VIDEO MONITOR | HS-CM145A | 0512011548 | None | Function Test | |
| ETSTW-RS 009 | SIGNAL GENERATOR | 8648C | 3642U01656 | HP | 2021/2/20 | 2022/2/19 |
| ETSTW-RS 010 | Broadband Field Meter | NBM-520 | C-0195 | Narda | 2021/5/20 | 2022/5/19 |
| ETSTW-RS 011 | RF Power Amplifier | 150W1000 | 0464490 | AR | Function Test | |

| | | | | | | |
|---|---|---|---|---|---|---|
| ETSTW-RS 012 | Log-Periodic Antenna | ATL80M1G | 0348244 | AR | Function Test | |
| ETSTW-RS 013 | Stacked Log Periodic Antenna | STLP9149 | 473 | RS | Function Test | |
| ETSTW-RS 014 | Power Amplifier | AS0860B | 1078553 | MILMEGA | Function Test | |
| ETSTW-RS 015 | SIGNAL GENERATOR | ITS6006B | 37669 | TESEQ | 2021/4/9 | 2022/4/8 |
| ETSTW-RS 016 | Power sensor | PMR6006 | 75617 | TESEQ | 2021/4/9 | 2022/4/8 |
| ETSTW-RS 017 | Power sensor | PMR6006 | 75618 | TESEQ | 2021/4/9 | 2022/4/8 |
| ETSTW-RS 018 | Directional coupler | C5982-10 | 111833 | WERLATONE | Function Test | |
| ETSTW-GSM 002 | Universal Radio Communication Tester | CMU 200 | 109439 | R&S | 2021/3/16 | 2022/3/15 |
| ETSTW-GSM 003 | Radio Communication Analyzer | MT8820C | 6201342073 | Anritsu | 2021/4/27 | 2022/4/26 |
| ETSTW-GSM 004 | Wideband Radio Communication Tester | CMW500 | 128092 | R&S | 2020/11/10 | 2021/11/9 |
| ETSTW-GSM 019 | Band Reject Filter | WRCTF824/849-822/851-40/12+9SS | 3 | WI | 2021/1/6 | 2022/1/5 |
| ETSTW-GSM 020 | Band Reject Filter | WRCD1747/1748-1743/1752-32/5SS | 1 | WI | 2021/1/6 | 2022/1/5 |
| ETSTW-GSM 021 | Band Reject Filter | WRCD1879.5/1880.5-1875.5/1884.5-32/5SS | 3 | WI | 2021/1/6 | 2022/1/5 |
| ETSTW-GSM 022 | Band Reject Filter | WRCT901.9/903.1-904.25-50/8SS | 1 | WI | 2021/1/6 | 2022/1/5 |
| ETSTW-GSM 023 | Power Divider | 4901.19.A | None | SUHNER | 2020/9/8 | 2021/9/7 |
| ETSTW-GSM 024 | Radio Communication Analyzer | MT8821C | None | Anritsu | 2021/4/1 | 2022/3/31 |
| ETSTW-Cable 002 | Microwave Cable | SUCOFLEX 104（S_Cable 7） | 238093 | HUBER+SUHNER | 2021/5/5 | 2022/5/4 |
| ETSTW-Cable 003 | Microwave Cable | SUCOFLEX 104（S_Cable 11） | 209953 | HUBER+SUHNER | 2021/5/5 | 2022/5/4 |
| ETSTW-Cable 016 | BNC Cable | Switch Box | B Cable 1 | Schwarz beck | 2021/2/19 | 2022/2/18 |
| ETSTW-Cable 017 | BNC Cable | X Cable | B Cable 2 | Schwarz beck | 2021/2/19 | 2022/2/18 |
| ETSTW-Cable 018 | BNC Cable | Y Cable | B Cable 3 | Schwarz beck | 2021/2/19 | 2022/2/18 |
| ETSTW-Cable 019 | BNC Cable | Z Cable | B Cable 4 | Schwarz beck | 2021/2/19 | 2022/2/18 |
| ETSTW-Cable 020 | N TYPE Cable | OATS Cable 1 | N30N30-L335-15M | JYE BAO CO.,LTD. | 2021/6/22 | 2022/6/21 |
| ETSTW-Cable 023 | BNC Cable | BNC Cable 3 | None | JYE BAO CO.,LTD. | Function Test | |
| ETSTW-Cable 024 | BNC Cable | BNC Cable 4 | None | JYE BAO CO.,LTD. | Function Test | |
| ETSTW-Cable 025 | BNC Cable | BNC Cable 5 | None | JYE BAO CO.,LTD. | Function Test | |
| ETSTW-Cable 027 | Microwave Cable | SUCOFLEX 104 | 279083 | HUBER+SUHNER | 2021/5/5 | 2022/5/4 |
| ETSTW-Cable 030 | Microwave Cable | SUCOFLEX 104（S_Cable 9） | 279067 | HUBER+SUHNER | 2021/2/19 | 2022/2/18 |
| ETSTW-Cable 039 | Microwave Cable | SUCOFLEX 104 | 316739 | HUBER+SUHNER | 2021/5/5 | 2022/5/4 |
| ETSTW-Cable 042 | Microwave Cable | SUCOFLEX 104（S_Cable 22） | 279847 | HUBER+SUHNER | Function Test | |
| ETSTW-Cable 047 | Microwave Cable | SUCOFLEX 104 | 325518 | HUBER+SUHNER | 2020/7/3 | 2021/7/2 |
| ETSTW-Cable 043 | Microwave Cable | SUCOFLEX 104 | 317576 | HUBER+SUHNER | 2021/5/5 | 2022/5/4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| ETSTW-Cable 051 | BNC Cable | BNC Cable 6 | None | JYE BAO | 2021/3/1 | 2022/2/28 |
| ETSTW-Cable 052 | BNC Cable | Clamp Cable | None | Schwarz beck | 2021/3/1 | 2022/2/28 |
| ETSTW-Cable 058 | Microwave Cable | SUCOFLEX 104 | none | HUBER+SUHNER | 2021/6/4 | 2022/6/3 |
| ETSTW-Cable 071 | N TYPE CABLE | EMCCFD400-NM-NM-25000 | 170239 | EMCI | 2021/6/4 | 2022/6/3 |
| ETSTW-Cable 072 | SMA type cable (8m) | SUCOFLEX 104 | 805800/4 | HUBER+SUHNER | 2021/5/5 | 2022/5/4 |
| ETSTW-Cable 074 | SMA type cable (2m) | SUCOFLEX 104 | 802563/4 | HUBER+SUHNER | 2021/5/5 | 2022/5/4 |
| WTSTW-SW 001 | EMI TEST SOFTWARE | Harmonics-1000 | None | EMC PARTNER | HARCS Version 4.20<br>Firmware Version 2.20 | |
| WTSTW-SW 002 | EMI TEST SOFTWARE | EZ_EMC | None | Farad | Version ETS-03A1 | |
| WTSTW-SW 003 | EMS TEST SOFTWARE | i2 | None | AUDIX | Version 3.2007-8-17b | |
| WTSTW-SW 005 | GSM Fading Level Correction | GSMFadLevCor | None | R&S | Version 1.66 | |
| WTSTW-SW 006 | EMI TEST SOFTWARE | e3 | None | AUDIX | Version 9.161014 | |
| WTSTW-SW 007 | Keysight.EN300328.V191.Test | Keysight | None | Keysight | Version 1.0.0.0 | |
| WTSTW-SW 008 | Signal studio | Agilent | None | AUDIX | Version 2.0.0.1 | |
| ETSTW-TH 002 | Thermohygrometer | 608-H1 | 45204317 | Testo | 2020/9/23 | 2021/9/22 |
| ETSTW-TH 003 | Wireless weather station | GAIA | N/A | TFA | 2020/12/3 | 2021/12/2 |

## 2.4 Testresults acc. EN 301 489 - 1

☒ 1st test ☐ test after modification ☐ production test

| Test case | Subclause | Required | Test passed | Test failed |
|---|---|---|---|---|
| Emission radiated | 8.2 | ☒ | ☒ | ☐ |
| Emission cond. DC | 8.3 | ☐ | ☐ | ☐ |
| Emission cond. AC | 8.4 | ☐ | ☐ | ☐ |
| Harmonic current | 8.5 | ☐ | ☐ | ☐ |
| Voltage Fluctuations | 8.6 | ☐ | ☐ | ☐ |
| RF Immunity | 9.2 | ☒ | ☒ | ☐ |
| Electrostatic Discharge | 9.3 | ☒ | ☒ | ☐ |
| Fast transient com. Mode | 9.4 | ☐ | ☐ | ☐ |
| Radio frequ. com. mode | 9.5 | ☐ | ☐ | ☐ |
| Transient a. Surge in Vehicular environment | 9.6 | ☐ | ☐ | ☐ |
| Voltage Dips and Interr. | 9.7 | ☐ | ☐ | ☐ |
| Surges com. & diff. Mode | 9.8 | ☐ | ☐ | ☐ |

### 2.4.1 Implemented emission tests

This test is only applicable to ancillary equipment not incorporated in the radio equipment and intended to be measured on a stand alone basis, as declared by the manufacturer. This test shall be performend on a representative configuration of the ancillary equipment.
This test is in accordance to subclause 8.2 of EN 301 489-1

#### 2.4.1.1 Spurious Emission (EN 55032)

##### 2.4.1.1.1 Test Equipment

a) EMI TEST RECEIVER (ESI 40)
For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-RE 004
b) Double-Ridged Guide Horn Antenna (3117)
For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-RE 030
c) Amplifier Module (CHC 2)
For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-RE 062
d) Amplifier (8447D)
For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-RE 142
e) Bi-log Hybrid Antenna (MCTD 2786B)
For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-RE 147

##### 2.4.1.1.2 Test Procedures

- Test configuration

The test configuration corresponds to the standard EN 55032. The equipment under test is placed on a non metallic table with 0.8m height. The power supply and the RF connection points are close to the equipment under test at the floor inside a connection box. The cables to this connection box are shielded and below the double floor. The receiving antenna is placed in a height at 1.0 to 4.0m, in a distance of and 3m. The measurement receiver is placed in a special room.

- Test parameters and marginal conditions

The test is carried out with horizontal and vertical polarisation of the antenna in a frequency range of 30 MHz to 6000 MHz . Further information please find in the test protocol.

### 2.4.1.2 Conducted Emission (EN 55032)

This test is applicable for base station and ancillary equipment for fixed use that may have DC cables longer than 3m and also applicable for basestation and / or ancillary equipment for fixed use powered by AC mains.
This test is in accordance to subclause 8.3 and 8.4 of EN 301 489-1

#### 2.4.1.2.1 Test Equipment

a) EMI TEST RECEIVER (ESHS10)
   For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-CE 001
b) TWO-LINE V-NETWORK (ENV216)
   For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-CE 016
c) ESA-E SERIES SPECTRUM ANALYZER (E4404B)
   For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-RE 045

#### 2.4.1.2.2 Test Procedures

- Test configuration

The test configuration is contained inside of a shielded chamber and corresponds to the standard EN 55032. The equipment under test is placed in the facility on a wooden table 0.8m height. The equipment under test is connected with the artificial mains network (AMN) in a distance of 0.8m and also 0.8m from other subassembly and metallic area.

- Test parameters and marginal conditions

The tests are carried out with nominal impedance by 50Ω / 50μH of the AMN in a frequency range 150 kHz to 30 MHz. Further information please find in test report.

### 2.4.1.3 Harmonic Current Emission /Voltage Fluctuations and Flicker (IEC 61000-3-2/-3)

This test is in accordance to subclause 8.5 and 8.6 of EN 301 489-1

#### 2.4.1.3.1 Test Equipment

a) HARMONICS 1000 (HAR 1000-1P)
   For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-EMI 001
b) AC Power Source (PS3)
   For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-EMI 010

#### 2.4.1.3.2 Test Procedures

- Test configuration

The test configuration is correspondence to the standard IEC 61000-3-2/-3. The equipment under test is placed on a wooden table with a height of 0.8m in the EMC lab.

- Test parameters and marginal conditions

The harmonic test are carried out in according the classification A, B, C, D of the standard IEC 61000-3-2. The flicker test is carried out in according the time interval of the standard IEC 61000-3-3. Both tests are carried out with above mentioned equipments with 230V and 50 Hz. Further information please find in test protocol.

### 2.4.2 Carried out immunity tests

#### 2.4.2.1 RF Electromagnetic Field (80 MHz~6000 MHz)

This test is applicable for base station, portable and ancillary equipment
This test is in accordance to subclause 9.2 of EN 301 489-1

##### 2.4.2.1.1 Test Equipment

a) Broadband Field Meter (NBM-520)
For your reference please find it in our test equipment list at page 8 to 12 as number: ETSTW-RS 010
b) RF Power Amplifier (150W1000)
For your reference please find it in our test equipment list at page 8 to 12 as number: ETSTW-RS 011
c) Log-Periodic Antenna (ATL80M1G)
For your reference please find it in our test equipment list at page 8 to 12 as number: ETSTW-RS 012
d) Stacked Log Periodic Antenna (STLP9149)
For your reference please find it in our test equipment list at page 8 to 12 as number: ETSTW-RS 013
e) Power Amplifier (AS0860B)
For your reference please find it in our test equipment list at page 8 to 12 as number: ETSTW-RS 014
f) SIGNAL GENERATOR (ITS6006B)
For your reference please find it in our test equipment list at page 8 to 12 as number: ETSTW-RS 015
g) Power sensor (PMR6006)
For your reference please find it in our test equipment list at page 8 to 12 as number: ETSTW-RS 016
h) Power sensor (PMR6006)
For your reference please find it in our test equipment list at page 8 to 12 as number: ETSTW-RS 017
i) Directional coupler (C5982-10)
For your reference please find it in our test equipment list at page 8 to 12 as number: ETSTW-RS 018

##### 2.4.2.1.2 Test Procedures

- Test configuration

The test configuration is contained inside of a shielded chamber and corresponds to the standard IEC 61000-4-3. The equipment under test is placed in the facility on a wooden table 0.8m height on the centre axis of the chamber. The power supply and the RF connection points are close to the equipment under test at the floor of the chamber inside a connection box. The cables to this connection box are shielded and below the double floor. The transmitting antenna is placed in a height of 1.5m, in a distance of 3.0m. The RF-generators are placed in a special room adjacent to the chamber.

- Test parameters and marginal conditions

The test level shall be 3 V/m (measured un-modulated). The test signal shall be amplitude modulated to a depth of 80 % by a sinusoidal audio signal of 1000 Hz. If the wanted signal is modulated at 1000 Hz, then an audio signal of 400 Hz shall be used. The logarithmic step was 1% and the remaining time was 1s.

The function receiver was realized with the help of mechanical adaptors.

- Observation of the equipment under test

It was used a complete system (transmitter and receiver). The equipment under test was tested as a receiver.

- Spot frequency test

A spot frequency test shall additionally be performed at:
80 MHz; 104 MHz; 136 MHz; 165 MHz; 200 MHz; 260 MHz; 330 MHz; 430 MHz; 560 MHz; 715 MHz ± 1 MHz
A spot frequency tets shall be performed at 920 MHz ± 1 MHz using a test level of 3 V/m (measured unmodulated) 100% modulated by 200 Hz pulses og equal mark to space ratio.

#### 2.4.2.1.3 Test Result

☒ The receiver passed with the performance criteria CR acc. to /1/ subclause 6.

☐ The receiver did not pass with the performance criteria CR acc. to /1/ subclause 6.

☐ Ancillary equipment passed with the performance criteria CT acc. to /1/ subclause 6.4

☐ Ancillary equipment did not pass with the performance criteria CR acc. to /1/ subclause 6.4

*The equipment under test fulfils the requirement in accordance with the criteria of the standard.*

### 2.4.2.2 Electrostatic discharge

This test is applicable for base station, mobile, portable and ancillary equipment.
This test is in accordance to subclause 9.3 of EN 301 489-1.

#### 2.4.2.2.1 Test Equipment

a) Electrostatic Discharge Simulator (ESS-2002)
   For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-EMS 019
b) Electrostatic Discharge Simulator (NSG 435)
   For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-EMS 023

#### 2.4.2.2.2 Test Procedures

- Test configuration

The test configuration is in correspondence to the standard IEC 61000-4-2. The equipment under test is placed on a wooden table with one metal plate on its top and one metal plate under the table, which is grounded. Both plates are connected with two 470 kΩ resistor in series.

- Test parameters and marginal conditions

The test is carried out with ±2kV and ±4kV contact discharge and ±2kV, ±4kV and ±8kV air discharge. The tested points please find in the test protocol.

The function receiver was realized with the help of mechanical adaptors.

- Observation of the equipment under test

It was used a complete system (transmitter and receiver). The equipment under test was tested as a receiver.

#### 2.4.2.2.3 Test Result

☒ The receiver passed with the performance criteria TR acc. to /1/ subclause 6.

☐ The receiver did not pass with the performance criteria TR acc. to /1/ subclause 6.

☐ Ancillary equipment passed with the performance criteria TT acc. to /1/ subclause 6.4

☐ Ancillary equipment did not pass with the performance criteria TR acc. to /1/ subclause 6.4

*The equipment under test fulfils the requirement in accordance with the criteria of the standard.*

### 2.4.2.3 Fast Transients common mode

This test is applicable for base station and ancillary equipment.
This test is in accordance to subclause 9.4 of EN 301 489-1

#### 2.4.2.3.1 Test Equipment

a) Multifunction Generator (NSG 3040A)
For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-EMS 026

#### 2.4.2.3.2 Test Procedures

- Test configuration

The test configuration is in correspondence to the standard IEC 61000-4-4. The equipment under test is placed on a wooden table with a height of 0.8m ±0.08m. The table stands on metal plate which is grounded.

- Test parameters and marginal conditions

The tests are carried out with 1 kV open circuit voltage on signal, control and DC power ports and with 2 kV open circuit voltage on AC mains power input ports. The applied voltage please find in the test protocol.

The function receiver was realized with the help of mechanical adaptors.

- Observation of the equipment under test

It was used a complete system (transmitter and receiver). The equipment under test was tested as a receiver.

#### 2.4.2.3.3 Test Result

☐ The receiver passed with the performance criteria TR acc. to /1/ subclause 6.

☐ The receiver did not pass with the performance criteria TR acc. to /1/ subclause 6.

☐ Ancillary equipment passed with the performance criteria TT acc. to /1/ subclause 6.4

☐ Ancillary equipment did not pass with the performance criteria TR acc. to /1/ subclause 6.4

*The equipment under test fulfils the requirement in accordance with the criteria of the standard.*

### 2.4.2.4 Radio frequency common mode

This test is applicable for base station, mobile, and ancillary equipment.
This test is in accordance to subclause 9.5 of EN 301 489-1.

#### 2.4.2.4.1 Test Equipment

a) COUPLING AND DECOUPLING NETWORK (CDN M016)
   For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-CS 004
b) RF Power Amplifier (100A250A)
   For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-CS 005
c) 6 dB Attenuator (SA3N1007-06)
   For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-CS 010
d) ESG Analog Signal Generator (E4428C)
   For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-CS 011

#### 2.4.2.4.2 Test Procedures

• Test configuration

The test configuration is in correspondence to the standard IEC 61000-4-6. The test was carried out on a wooden table with a grounded metal plate on its top. The equipment under test was placed on an insulating support of 0.1m height above this metal plate ,and all cables exiting the EUT was supported at a height of between 30mm and 50mm.Where coupling and/or decoupling devices are required, they was located between 0.1m and 0.3m from the EUT.

• Test parameters and marginal conditions

The test are carried out with a Voltage of 3Vrms (measured un-modulated) with amplitude modulated signal by a depth of 80 % by a sinusoidal audio signal of 1000 Hz. If the wanted signal is modulated at 1000 Hz, then the test signal of 400 Hz shall be used. The frequency steps in the frequency range 150 kHz – 5 MHz are 50 kHz and in the frequency range 5 MHz – 80 MHz the frequency increments with 1 % of the actual frequency. The remaining time is 0.5s. The tested ports please find in the test protocol.

The function receiver was realized with the help of mechanical adaptors.

• Observation of the equipment under test

It was used a complete system (transmitter and receiver). The equipment under test was tested as a receiver.

#### 2.4.2.4.3 Test Result

☐ The receiver passed with the performance criteria CR acc. to /1/ subclause 6.

☐ The receiver did not pass with the performance criteria CR acc. to /1/ subclause 6.

☐ Ancillary equipment passed with the performance criteria CT acc. to /1/ subclause 6.4

☐ Ancillary equipment did not pass with the performance criteria CR acc. to /1/ subclause 6.4

*The equipment under test fulfils the requirement in accordance with the criteria of the standard.*

### 2.4.2.5 Transient and Surges in vehicular environment

These tests are applicable to mobile radio and ancillary equipment intended for use in vehicular environment.
This test is in accordance to subclause 9.6 of EN 301 489-1.

#### 2.4.2.5.1 Test Equipment

a) EMC Immunity Test System (TRA2000IN6)
   For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-EMS 003
b) Frequency Converter (YF-6020)
   For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-EMS 002

#### 2.4.2.5.2 Test Procedures

• Test configuration

The test configuration is in correspondence to the standard ISO 7637–2. The test is carried out on a wooden table with a grounded metal plate on its top. The equipment under test is placed on an insulating support of 100 mm height above this metal plate.

• Test parameters and marginal conditions

The tests are carried out are the pulses according to subclause 9.6.2.1 of EN 301 489- 1.
The overview please find in the test protocol.

The function receiver was realized with the help of mechanical adaptors.

- Observation of the equipment under test

It was used a complete system (transmitter and receiver). The equipment under test was tested as a receiver.

#### 2.4.2.5.3 Test Result

☐ EUT operate as intended with no loss of primary and secondary user functions or stored data, as declared by the manufacturer, and the communication link have been maintained during the test.
☐ The communication link was lost during the test. But primary and secondary functions, which were lost during the test, were recoverable by operating the user control or reset functions.

*The equipment under test fulfils the requirement in accordance with the criteria of the standard.*

### 2.4.2.6 Voltage dips and interruptions

This test is applicable for base station and fixed ancillary equipment, powered by AC mains.
This test is in accordance to subclause 9.7 of EN 301 489-1.

#### 2.4.2.6.1 Test Equipment

a) Multifunction Generator (NSG 3040A)
   For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-EMS 026
b) Single-phase toroidal transformer with autowinding (TVT 1-250-16)
   For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-EMS 027

#### 2.4.2.6.2 Test Procedures

• Test configuration

The test configuration is in correspondence to the standard IEC 61000-4-11. The equipment under test is placed on a wooden table with a height of 0.8 metre.

• Test parameters and marginal conditions

The test levels shall be: voltage dip: 0 % residual voltage for 0.5 cycle; voltage dip: 0 % residual voltage for 1 cycle; voltage dip: 70 % residual voltage for 25 cycles (at 50 Hz); voltage interruption: 0 % residual voltage for 250 cycles (at 50 Hz).

The function transmitter or receiver was realized with the help of mechanical adapters.

• Observation of the equipment under test

It was used a complete system (transmitter and receiver). The equipment under test was tested as a receiver.

#### 2.4.2.6.3 Test Result

For a voltage dip: 0 % residual voltage for 0.5 cycle :

☐ The receiver passed with the performance criteria CR acc. to /1/ subclause 6.

☐ The receiver did not pass with the performance criteria CR acc. to /1/ subclause 6.

For a voltage dip: 0 % residual voltage for 1 cycle:

☐ The receiver passed with the performance criteria CR acc. to /1/ subclause 6.

☐ The receiver did not pass with the performance criteria CR acc. to /1/ subclause 6.

For a voltage dip: 70 % residual voltage for 25 cycles (at 50 Hz):

☐ The receiver passed with the performance criteria CR acc. to /1/ subclause 6.

☐ The receiver did not pass with the performance criteria CR acc. to /1/ subclause 6.

For a voltage interruption: 0 % residual voltage for 250 cycles (at 50 Hz):

☐ The equipment was battery back-up powered and pass with the performance criteria TT acc. to /1/ subclause 6.5 or TR acc. to /1/ subclause 6.

☐ The equipment was not battery back-up powered but it did not lose user data.

☐ The equipment was not battery back-up powered and it lost user data.

☐ Ancillary equipment passed with the performance criteria CT acc. to /1/ subclause 6.4

☐ Ancillary equipment did not pass with the performance criteria CR acc. to /1/ subclause 6.4

*The equipment under test fulfils the requirement in accordance with the criteria of the standard.*

### 2.4.2.7 Transients surge common and differential mode

This test is applicable for base station and fixed ancillary equipment.
This test is in accordance to subclause 9.8 of EN 301 489-1.

#### 2.4.2.7.1 Test Equipment

a) Multifunction Generator (NSG 3040A)
For your reference please find it in our test equipment list at page 8 to 12 as number : ETSTW-EMS 026

#### 2.4.2.7.2 Test Procedures

• Test configuration

The test configuration is in correspondence to the standard IEC 61000-4-5, The equipment under test is placed on a wooden table with a height of 0.8 metre.The table stands on metal plate which is grounded.

• Test parameters and marginal conditions

The tests are carried out with 1 kV open circuit voltage for common mode and with 0.5 kV open circuit voltage for differential mode. Further information please find in the test protocol.
The function transmitter or receiver was realized with the help of mechanical adapters.

• Observation of the equipment under test

It was used a complete system (transmitter and receiver). The equipment under test was tested as a receiver.

☐ The receiver passed with the performance criteria TR acc. to /1/ subclause 6.

☐ The receiver did not pass with the performance criteria TR acc. to /1/ subclause 6.

☐ Ancillary equipment passed with the performance criteria TT acc. to /1/ subclause 6.4

☐ Ancillary equipment did not pass with the performance criteria TR acc. to /1/ subclause 6.4

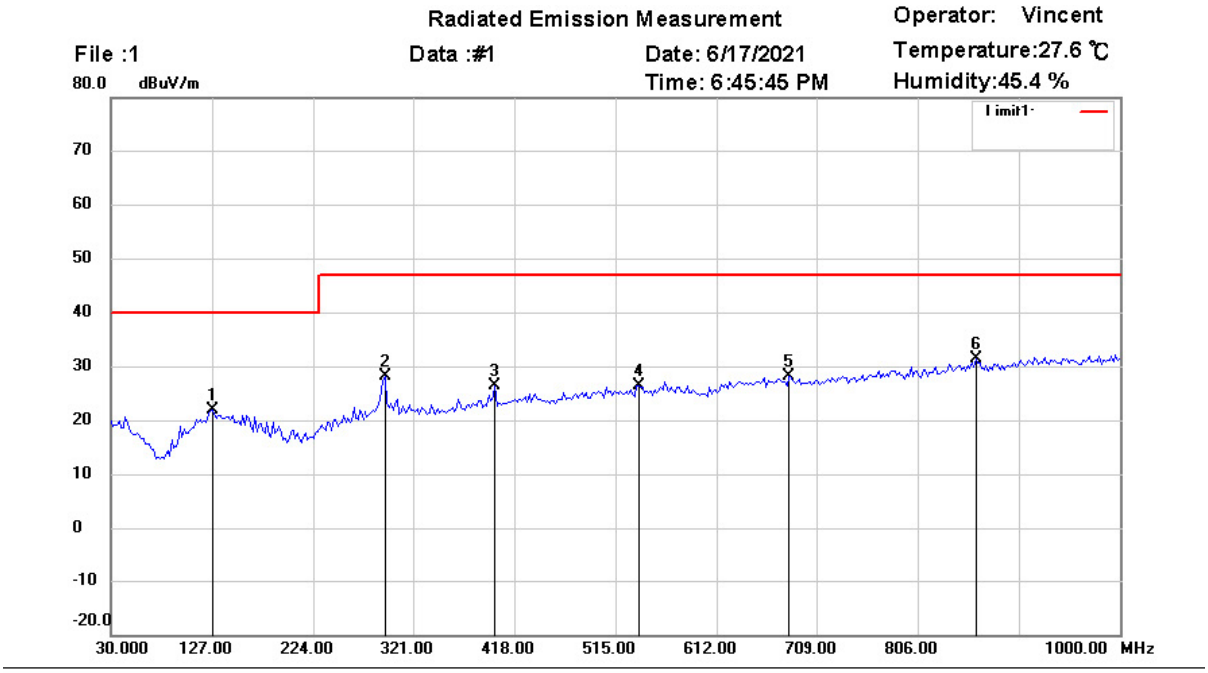
*The equipment under test fulfils the requirement in accordance with the criteria of the standard.*

## 2.4.3 Test protocols

**2.4.3.1**

## Radio Noise Field Strength

# Emission




Site : 966 Chamber
Condition : EN55032 RE-Class B (3M)
EUT : W6M22106-20986
M/N:
Test Mode :
Note :

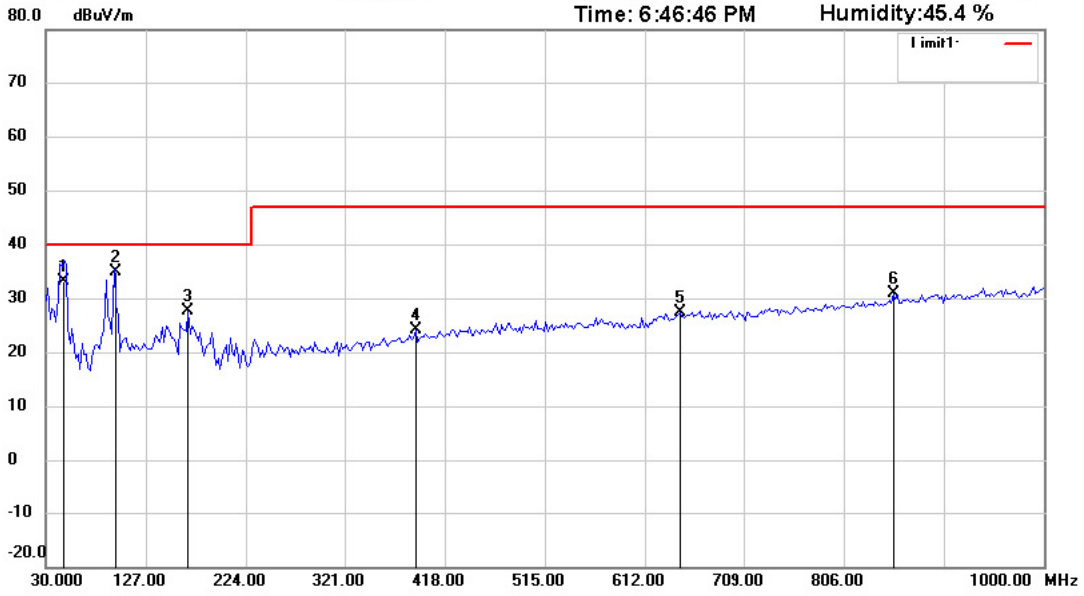
Polarization: *Horizontal*
Power : u-blox
Distance: 3m

| Mk. | Frequency (MHz) | Reading (dBuV) | Detector | Corr. factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Ant.Pos (cm) | Tab.Pos (deg.) | Margin (dB) | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| | 127.1944 | 28.81 | QP | -6.96 | 21.85 | 40.00 | 100 | 265 | -18.15 | |
| | 294.3686 | 34.26 | QP | -6.10 | 28.16 | 47.00 | 118 | 114 | -18.84 | |
| | 399.3387 | 29.96 | QP | -3.67 | 26.29 | 47.00 | 100 | 70 | -20.71 | |
| | 537.3546 | 28.35 | QP | -2.06 | 26.29 | 47.00 | 100 | 216 | -20.71 | |
| | 681.2024 | 28.19 | QP | -0.17 | 28.02 | 47.00 | 100 | 48 | -18.98 | |
| * | 861.9840 | 28.48 | QP | 3.02 | 31.50 | 47.00 | 100 | 290 | -15.50 | |

Radiated Emission Measurement

Operator: Vincent
Temperature:27.6 ℃
Humidity:45.4 %

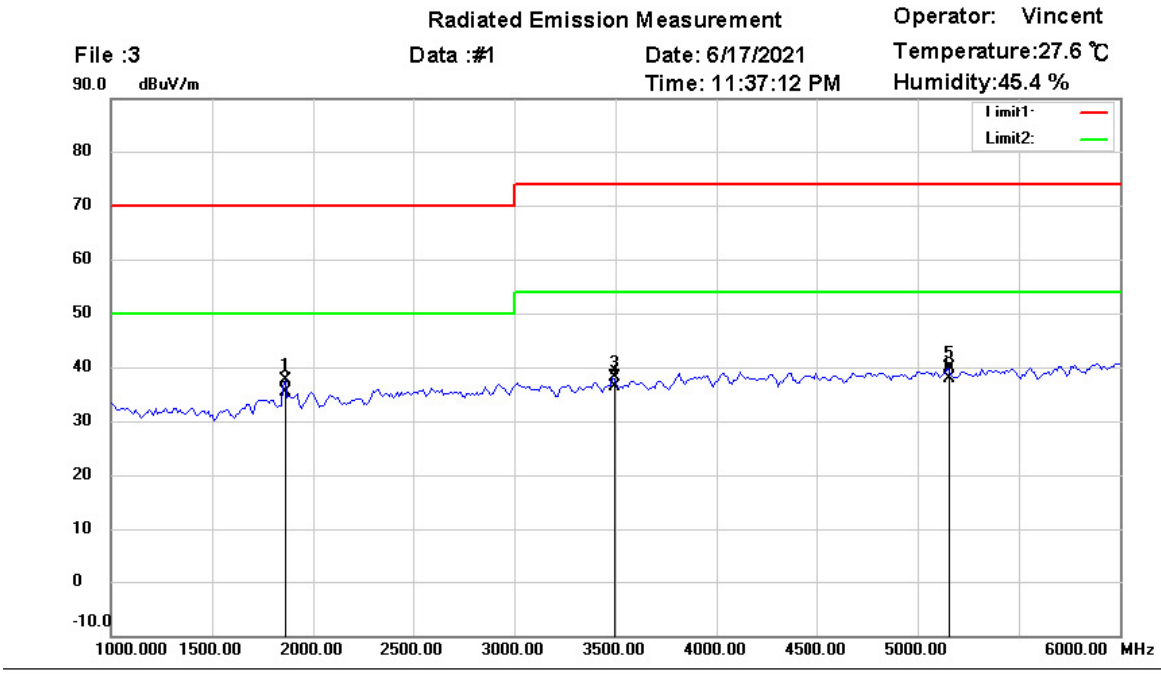
File :1 Data :#2 Date: 6/17/2021 Time: 6:46:46 PM




Site : 966 Chamber
Condition : EN55032 RE-Class B (3M)
EUT : W6M22106-20986
M/N:
Test Mode :
Note :

Polarization: *Vertical*
Power : u-blox
Distance: 3m

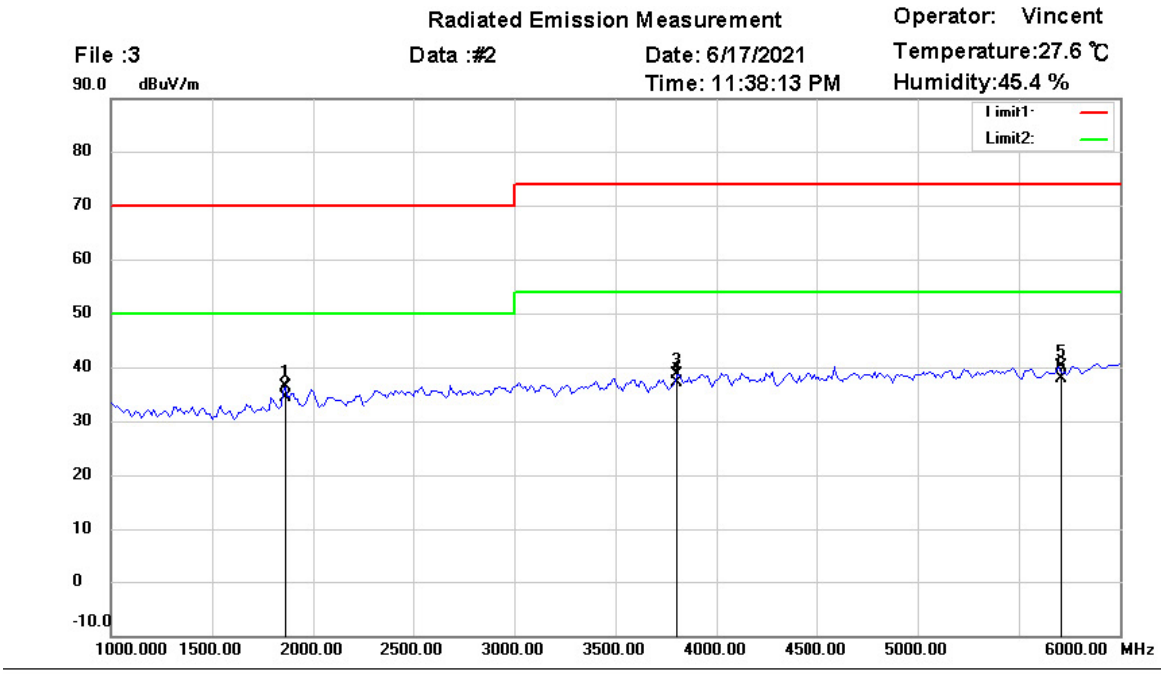
| Mk. | Frequency (MHz) | Reading (dBuV) | Detector | Corr. factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Ant.Pos (cm) | Tab.Pos (deg.) | Margin (dB) | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| | 45.6712 | 43.22 | QP | -9.98 | 33.24 | 40.00 | 135 | 18 | -6.76 | |
| * | 96.9138 | 46.12 | QP | -11.31 | 34.81 | 40.00 | 122 | 0 | -5.19 | |
| | 168.0160 | 37.36 | QP | -9.72 | 27.64 | 40.00 | 100 | 125 | -12.36 | |
| | 389.6191 | 28.15 | QP | -3.93 | 24.22 | 47.00 | 100 | 90 | -22.78 | |
| | 646.2124 | 27.75 | QP | -0.40 | 27.35 | 47.00 | 100 | 322 | -19.65 | |
| | 854.2083 | 27.88 | QP | 2.90 | 30.78 | 47.00 | 100 | 174 | -16.22 | |




Site : 966 Chamber
Condition : EN55032 RE-Class B Above 1G PK
EUT : W6M22106-20986
M/N:
Test Mode :
Note :

Polarization: *Horizontal*
Power : u-blox
Distance: 3m

| Mk. | Frequency (MHz) | Reading (dBuV) | Detector | Corr. factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Ant.Pos (cm) | Tab.Pos (deg.) | Margin (dB) | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1861.723 | 44.80 | peak | -7.16 | 37.64 | 70.00 | 100 | 144 | -32.36 | |
| * | 1861.723 | 42.62 | AVG | -7.16 | 35.46 | 50.00 | 100 | 144 | -14.54 | |
| | 3484.970 | 41.28 | peak | -3.26 | 38.02 | 74.00 | 100 | 299 | -35.98 | |
| | 3484.970 | 39.67 | AVG | -3.26 | 36.41 | 54.00 | 100 | 299 | -17.59 | |
| | 5148.297 | 40.60 | peak | -0.78 | 39.82 | 74.00 | 100 | 65 | -34.18 | |
| | 5148.297 | 38.55 | AVG | -0.78 | 37.77 | 54.00 | 100 | 65 | -16.23 | |




Site : 966 Chamber
Condition : EN55032 RE-Class B Above 1G PK
EUT : W6M22106-20986
M/N:
Test Mode :
Note :

Polarization: *Vertical*
Power : u-blox
Distance: 3m

| Mk. | Frequency (MHz) | Reading (dBuV) | Detector | Corr. factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Ant.Pos (cm) | Tab.Pos (deg.) | Margin (dB) | Comment |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1861.723 | 43.49 | peak | -7.16 | 36.33 | 70.00 | 100 | 116 | -33.67 | |
| * | 1861.723 | 41.65 | AVG | -7.16 | 34.49 | 50.00 | 100 | 116 | -15.51 | |
| | 3805.611 | 41.32 | peak | -2.58 | 38.74 | 74.00 | 100 | 248 | -35.26 | |
| | 3805.611 | 39.70 | AVG | -2.58 | 37.12 | 54.00 | 100 | 248 | -16.88 | |
| | 5699.399 | 39.91 | peak | 0.23 | 40.14 | 74.00 | 100 | 194 | -33.86 | |
| | 5699.399 | 37.55 | AVG | 0.23 | 37.78 | 54.00 | 100 | 194 | -16.22 | |

**Note: 1. Correction Factor = Antenna factor + Cable loss - Preamplifier**
**2. The formula of measured value as: Test Result = Reading + Correction Factor**
**3. Detector function in the form: PK = Peak, QP = Quasi Peak, AV = Average**
**4. All not in the table noted test results are more than 20 dB below the relevant limits.**
**5. Up Line: PK Limit Line, Down Line: Ave Limit Line.**

**2.4.3.2**

## Conducted Emission

# Emission

Model: AM-25 Date: --
Mode: -- Temperature: -- °C Engineer: --
Polarization: -- Humidity: -- %

| Frequency (MHz) | Reading (dBuV) QP | Reading (dBuV) Ave. | Factor (dB) Corr. | Result (dBuV) QP | Result (dBuV) Ave. | Limit (dBuV) QP | Limit (dBuV) Ave. | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| -- | -- | -- | -- | -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- | -- | -- | -- | -- |

Polarization: --

| Frequency (MHz) | Reading (dBuV) QP | Reading (dBuV) Ave. | Factor (dB) Corr. | Result (dBuV) QP | Result (dBuV) Ave. | Limit (dBuV) QP | Limit (dBuV) Ave. | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| -- | -- | -- | -- | -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- | -- | -- | -- | -- |
| -- | -- | -- | -- | -- | -- | -- | -- | -- |

**Note:**
1. **The formula of measured value as: Test Result = Reading + Correction Factor**
2. **The Correction Factor = Cable Loss + LISN Insertion Loss + Pulse Limit Loss**
3. **Detector function in the form : PK = Peak, QP = Quasi Peak, AV = Average**
4. **All not in the table noted test results are more than 20 dB below the relevant limits.**
5. **The test is not required because the EUT is powered by DC.**

**2.4.3.3**

## Harmonics current

# Harmonics

Standard : EN 301 489-1 subclause 8.5

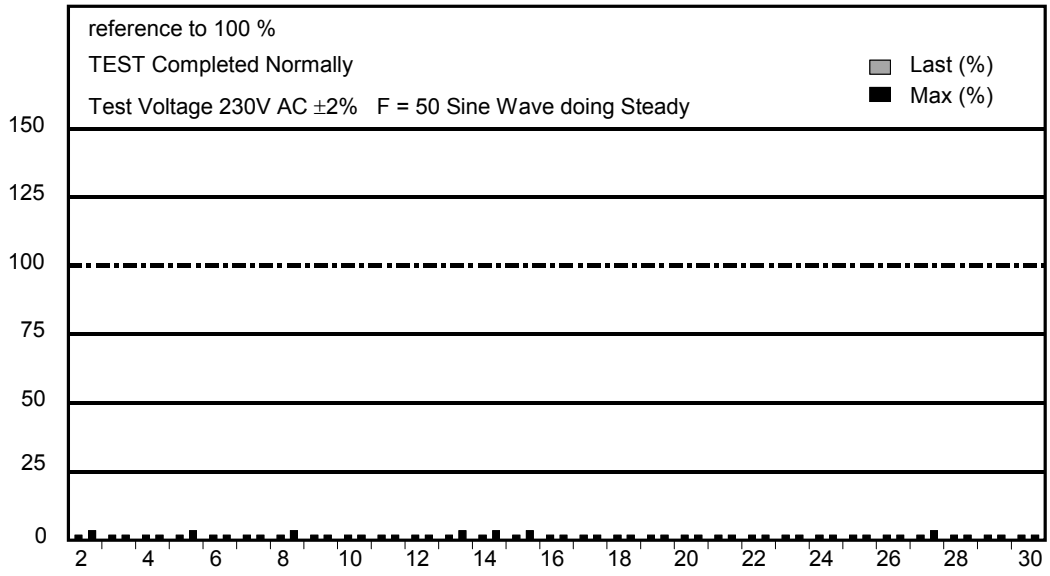
Device : AM-25

Date : --

Class : --

Operator : --

| | | |
|---|---|---|
| Temperature | : -- | °C |
| Pressure | : -- | hPa |
| Rel. humidity | : -- | % |




Passed : yes / no

Explanation: This test is not required because there is no AC power line or signal line for this EUT.

**2.4.3.4**

## Voltage Fluctuations

# Flicker

Standard : EN 301 489-1 subclause 8.6

Device : AM-25

Date : --

Operator : --

| | | |
|---|---|---|
| Temperature | : -- | °C |
| Pressure | : -- | hPa |
| Rel. humidity | : -- | % |

| | |
|---|---|
| $P_{st}$ | -- |
| $P_{lt}$ | -- |
| dt (%) | -- |
| d (max) | -- |
| dc (%) | -- |

Passed : yes / no

Explanation: This test is not required because there is no AC power line or signal line for this EUT.

**2.4.3.5**

## Radiofrequency elektromagneticfield Immunity (80 MHz to 6000 MHz)

# RF Field

Standard : EN 301 489-1 subclause 9.2

Device : AM-25

Date : June 18, 2021

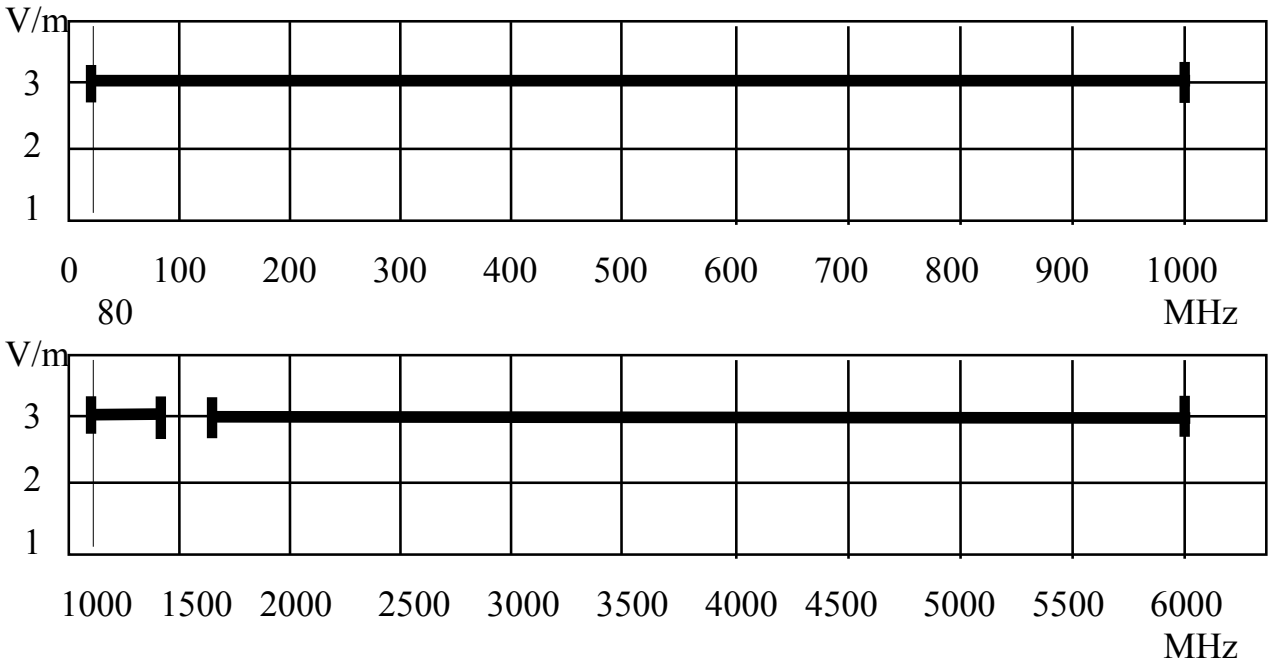
Operator : Vincent

Exclusion band: 1496.649~1654.191 MHz

Test equipment : Anechoic Chamber

Severity Level : 2 ( 3 V/m )

| | | |
|---|---|---|
| Temperature | : | 28.3 °C |
| Pressure | : | 1006 hPa |
| Rel. humidity | : | 49.5 % |




| | | |
|---|---|---|
| The equipment meets the requirements | yes ☒ | no ☐ |

**2.4.3.6**

## Electrostatic Discharge

# ESD

Standard : EN 301 489-1 subclause 9.3

Device : AM-25

Date : June 15, 2021

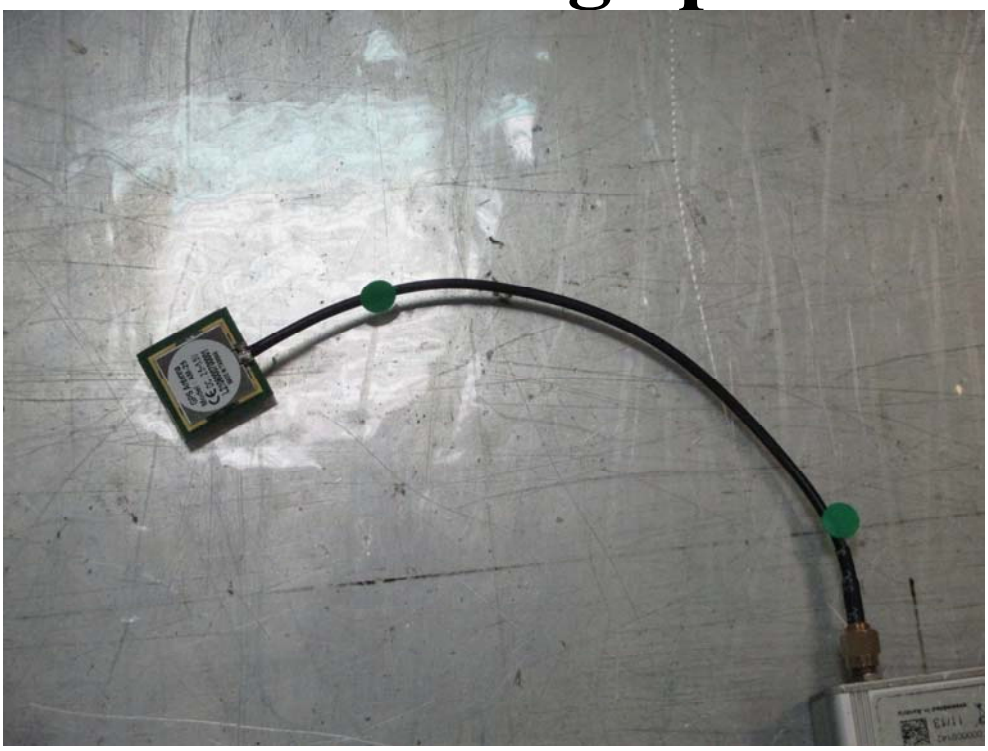
Operator : Ocean

| | |
|---|---|
| Temperature | : 25.4 °C |
| Pressure | : 997 hPa |
| Rel. humidity | : 45.0 % |

| Test point | Table (T) Floor (F) | Contact (C) Air (A) | Voltage (kV) | Polarity ( + / - ) | Performance criteria |
|---|---|---|---|---|---|
| Housing | T | A | 2, 4, 8 | + / - | A |
| Indirect | T | C | 2, 4 | + / - | A |

| | yes | no |
|---|---|---|
| The equipment meets the requirements | ☒ | ☐ |

# ESD discharge points



**Performance criteria**:

- A: Normal performance within the specification.
- B: Temporary degradation or less of function or performance which is self recoverable
- C: Temporary degradation or loss of function or performance which requires operating intervention or system reset

NA: Not Applicable

Explanation: ./.

**2.4.3.7**

## Fast transients, common mode

# Burst

Standard : EN 301 489-1 subclause 9.4

Device : AM-25

Date : --

Operator : --

| | | |
|---|---|---|
| Temperature | : -- | °C |
| Pressure | : -- | hPa |
| Rel. humidity | : -- | % |

| Test port | Voltage (kV) | Polarity ( + / - ) | Waveform $T_r$ / $T_h$ | Repetiton Frequency (kHz) | Performance criteria |
|---|---|---|---|---|---|
| DC-Power line | 1 | +/- | 5/50 ns | 5 | -- |

Explanation: This test is not required because there is no AC power line or signal line for this EUT.

---

**Performance criteria** :

A: No loss of performance or function

B : Temporary loss of function or performance which is self recoverable

C : Temporary loss of function or performance which requires operating intervention or system reset

D : Loss of function which is not recoverable

**2.4.3.8**

## Voltage dips and interruption

# V - Dips

Standard : EN 301 489-1 subclause 9.7

Device : AM-25

Date : --

Operator : --

| | | |
|---|---|---|
| Temperature | -- | °C |
| Pressure | -- | hPa |
| Rel. humidity | -- | % |

| Reduction of supply voltage of | Voltage in % (in V) | Duration in parts of period (in ms) | Performance criteria |
|---|---|---|---|
| Dips (100 %) | 0% (0 V) | 0.5 (10 ms) | -- |
| Dips (100 %) | 0% (0 V) | 1 (20 ms) | -- |
| Dips (30 %) | 70 % (161 V) | 25 (500 ms) | -- |
| Interruption (100 %) | 0% (0 V) | 250 (5000 ms) | -- |

Explanation: This test is not required because there is no AC power line or signal line for this EUT.

---

**Performance criteria** :

A: No loss of performance or function

B : Temporary loss of function or performance which is self recoverable

C : Temporary loss of function or performance which requires operating intervention or system reset

D : Loss of function which is not recoverable

**2.4.3.9**

## Surges common & different mode

# Surges

Standard : EN 301 489-1 subclause 9.8

Device : AM-25

Date : --

Operator : --

| | | |
|---|---|---|
| Temperature | -- | °C |
| Pressure | -- | hPa |
| Rel. humidity | -- | % |

| Test mode | Voltage ( kV ) | Waveform $T_r$ / $T_h$ | Performance criteria |
|---|---|---|---|
| DC-Power line | 1 | 1.2/50 µs | -- |

Explanation: This test is not required because there is no AC power line or signal line for this EUT.

---

**Performance criteria** :

A: No loss of performance or function

B : Temporary loss of function or performance which is self recoverable

C : Temporary loss of function or performance which requires operating intervention or system reset

D : Loss of function which is not recoverable

**2.4.3.10**

## Conducted Immunity

# RF - common mode

Standard : EN 301 489-1 subclause 9.5

Device : AM-25

Date : --

Operator : --

| | | |
|---|---|---|
| Temperature | : -- | °C |
| Pressure | : -- | hPa |
| Rel. humidity | : -- | % |

| Test port | Voltage (Vrms) | Modulation Frequenz | Frequency Range | Performance criteria |
|---|---|---|---|---|
| DC-Power line | 3 | 400 Hz | 150 kHz - 80 MHz | -- |

Explanation: This test is not required because there is no AC power line or signal line for this EUT.

---

**Performance criteria**

A: No loss of performance or function

B : Temporary loss of function or performance which is self recoverable

C : Temporary loss of function or performance which requires operating intervention or system reset

D : Loss of function which is not recoverable

# 3 Normative references

/1/ EN 301 489 - 19: V2.1.1 (2019)
ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 19: Specific conditions for Receive Only Mobile Earth Stations (ROMES) operating in the 1,5 GHz band providing data communications and GNSS receivers operating in the RNSS band (ROGNSS) providing positioning, navigation, and timing data; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

/2/ EN 55032 (2015)
Electromagnetic compatibility of multimedia equipment - Emission Requirements.

/3/ IEC 61000 - 4 - 2 Ed.2.0 (2008)
Electromagnetic Compatibility (EMC); Part 4-2: Testing and measurements techniques - Electrostatic discharge immunity test

/4/ IEC 61000 - 4 - 3 Ed.4.0 (2020)
Electromagnetic Compatibility (EMC)- Part 4-3: Testing and measurement techniques - Radiated, radio-frequency electromagnetic field immunity test

/5/ IEC 61000 - 4 - 4 Ed.3.0 (2012)
Electromagnetic Compatibility (EMC); Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test

/6/ IEC 61000 - 4 - 5 Ed.3.1 (2014+A1:2017)
Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test

/7/ IEC 61000 - 4 - 6 Ed.4.0 (2013)
Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields

/8/ IEC 61000 - 4 - 11 Ed.3.0 (2020)
Electromagnetic Compatibility (EMC) – Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase

/9/ IEC 61000 - 3 - 2 Ed.5.1 (2018+A1:2020)
Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤16 A per phase)

/10/ IEC 61000 - 3 - 3 Ed.3.1 (2013+A1:2017)
Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

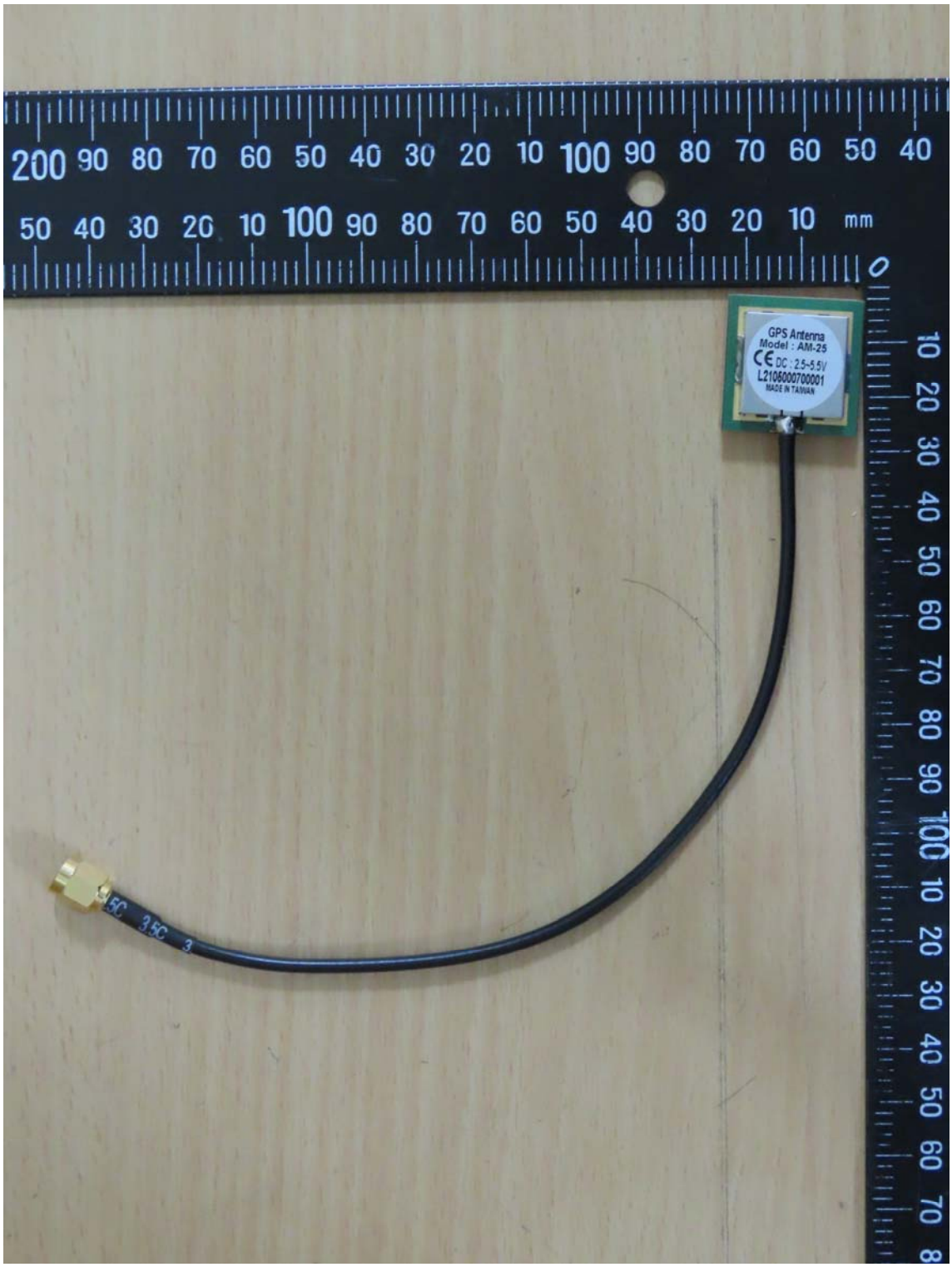
/11/ EN 301 489 – 1 V2.2.3 (2019)
ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements;Harmonised Standard for ElectroMagnetic Compatibility

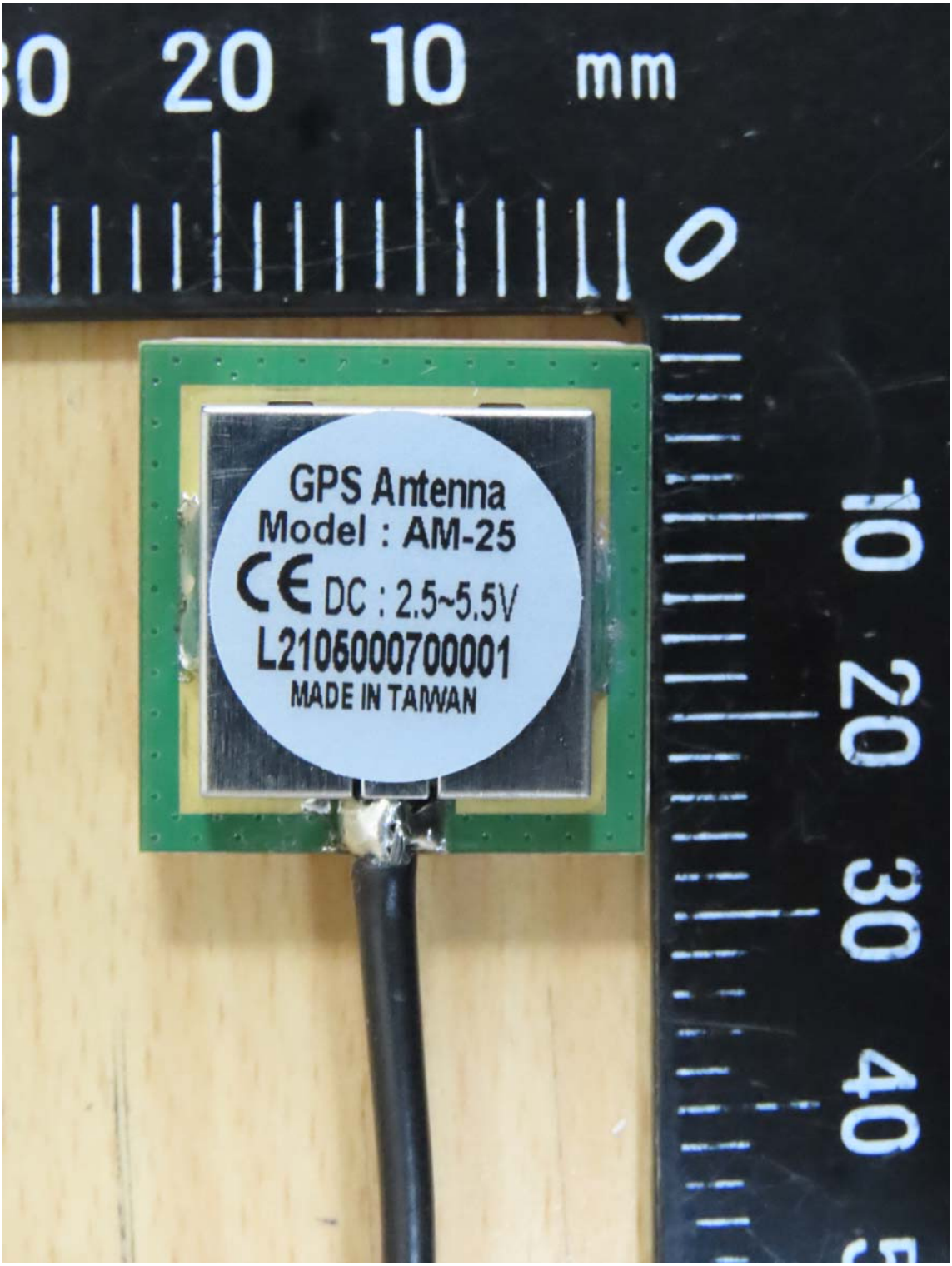
# Appendix

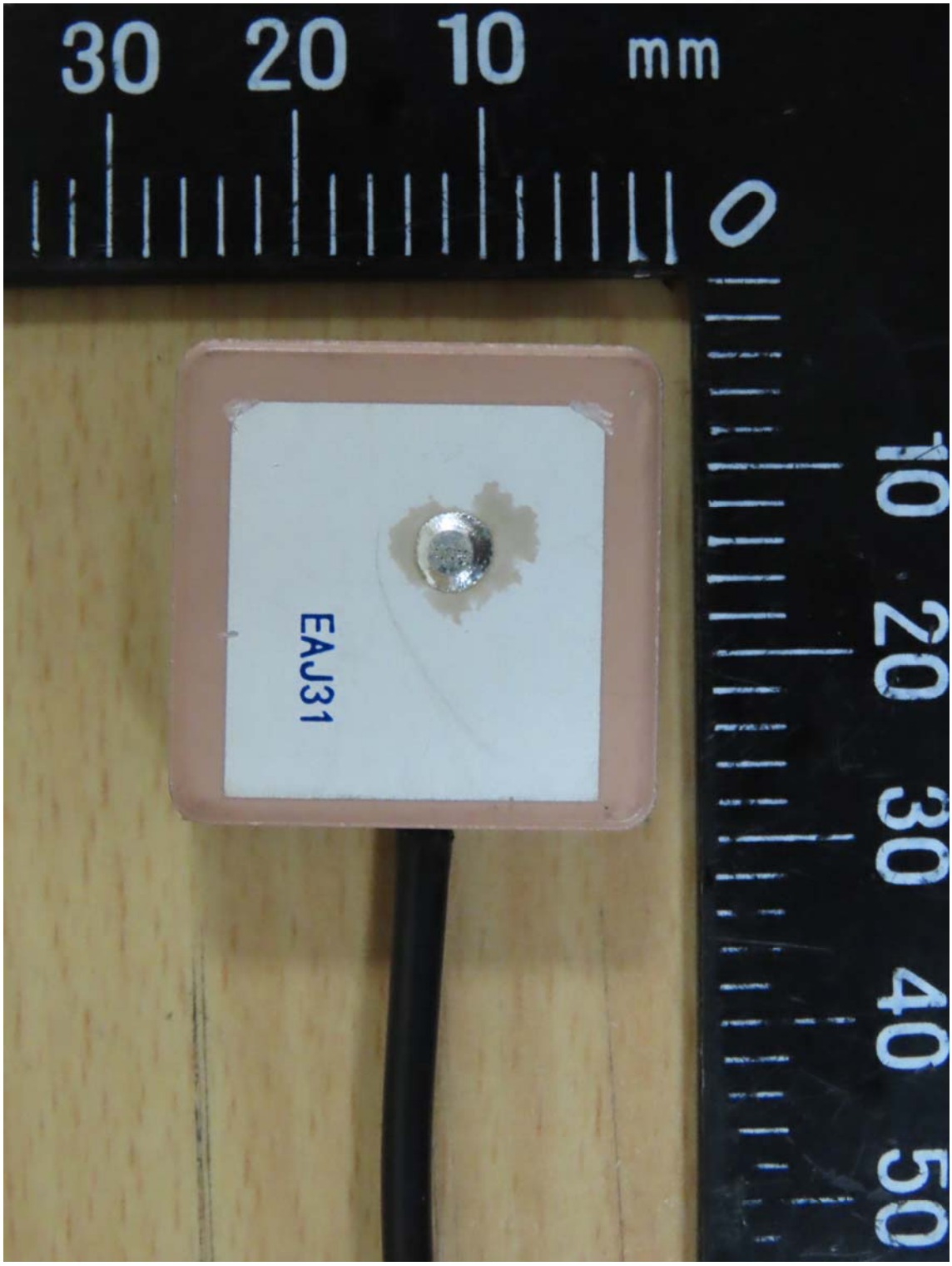
**Photos**

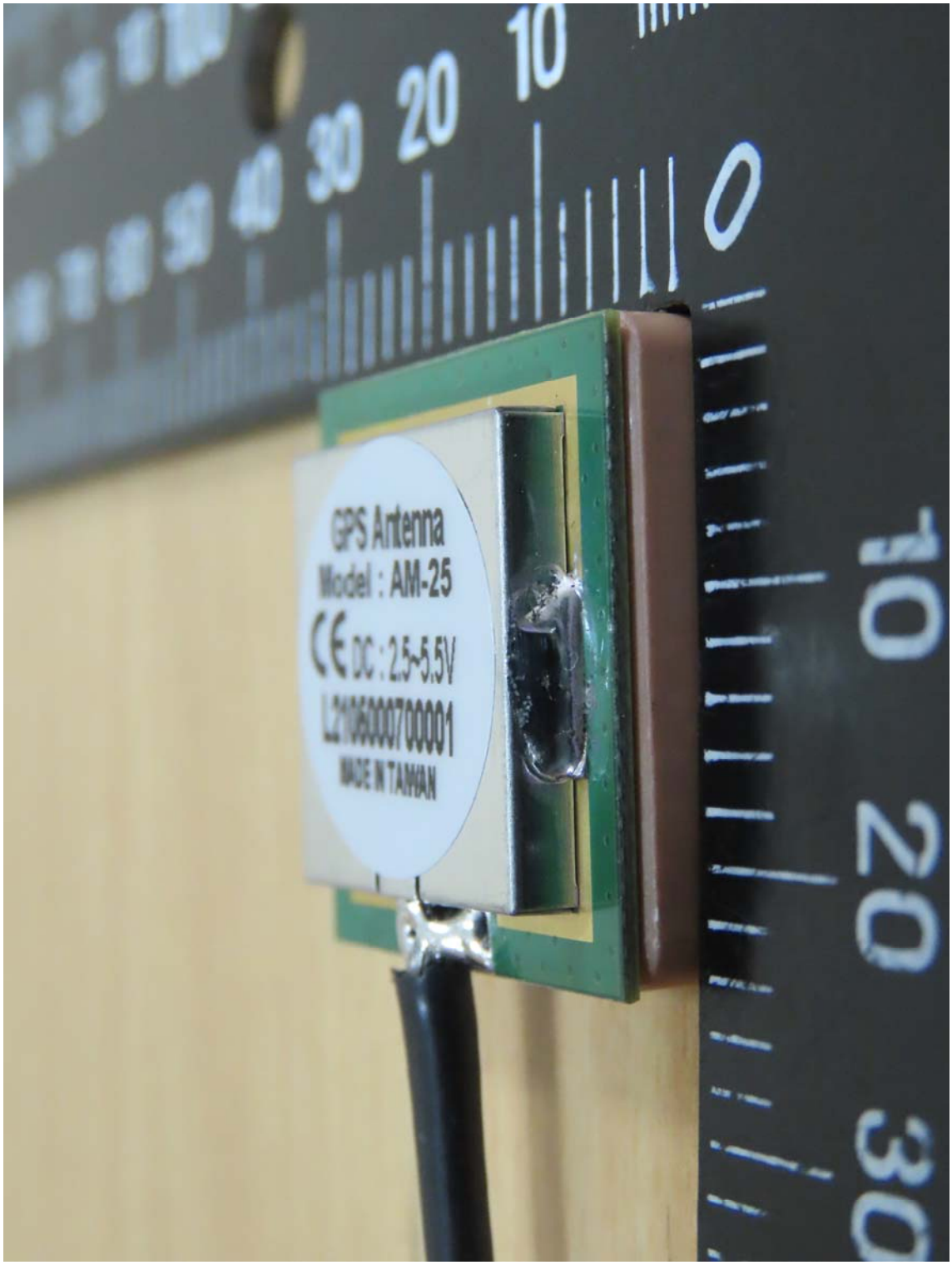
1. External Photos
2. Internal Photos
3. Set Up Photo of Radiated Emission
4. Set Up Photo of ESD
5. Set Up Photo of RF-Field

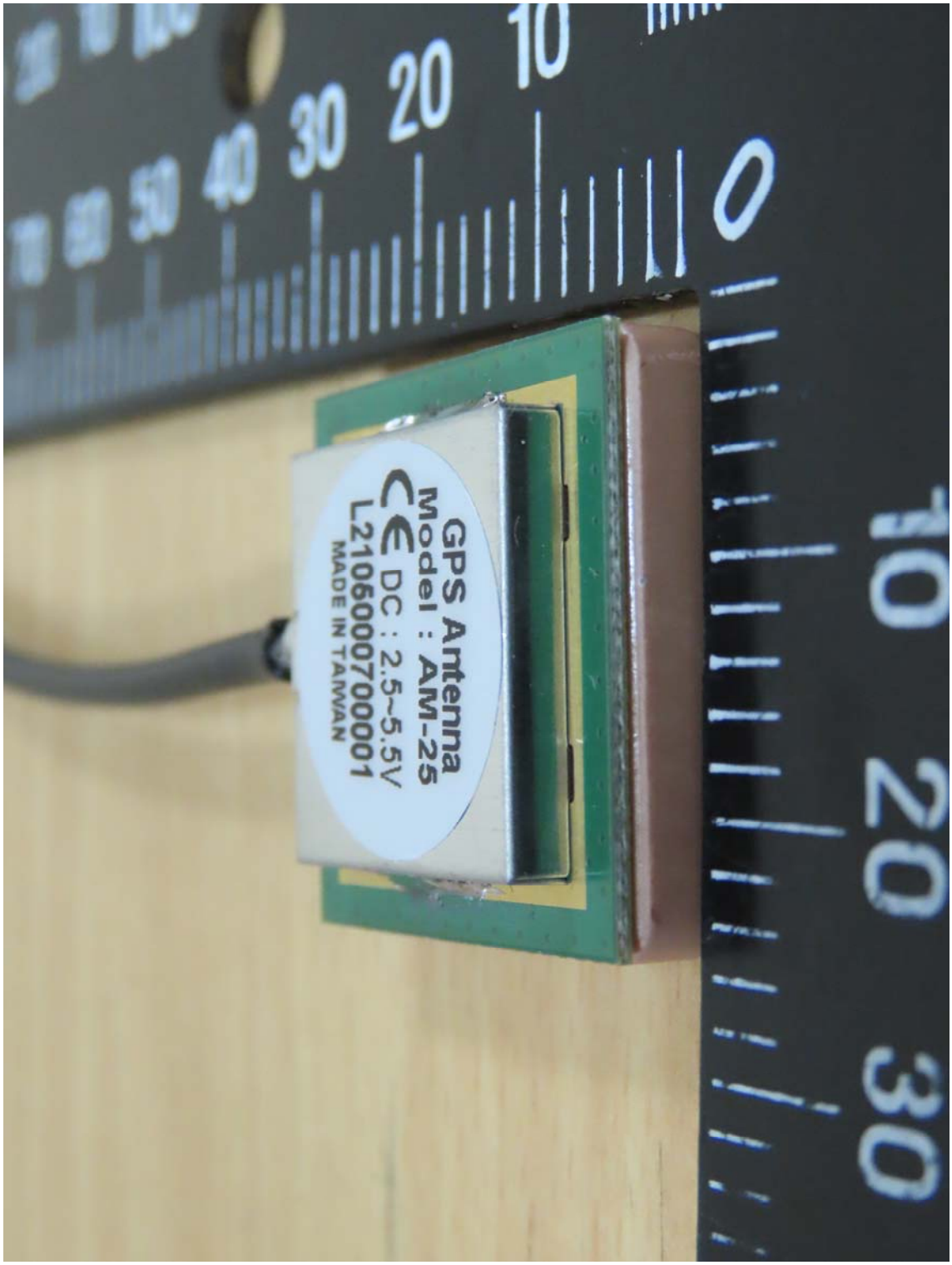
External Photos

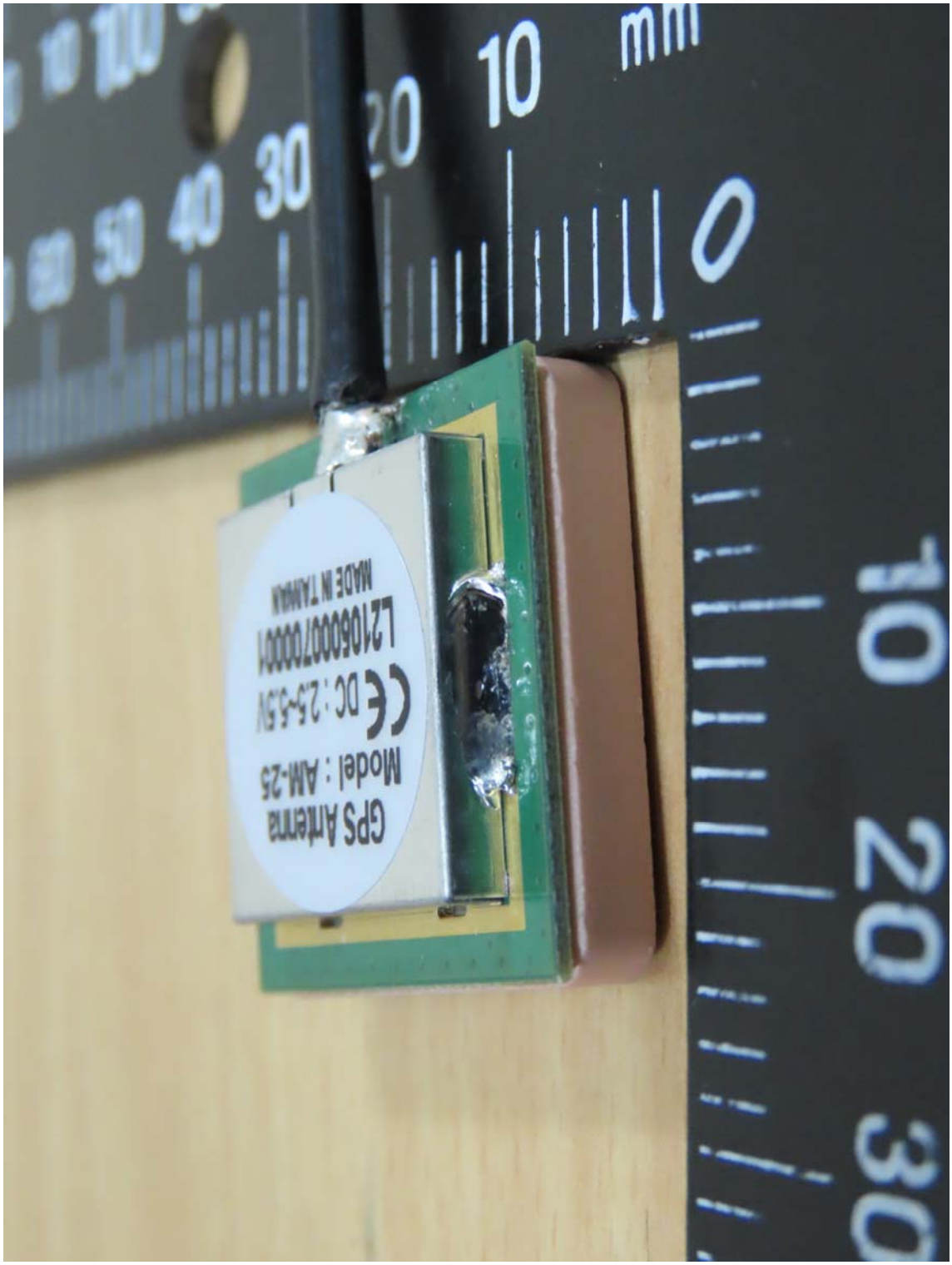


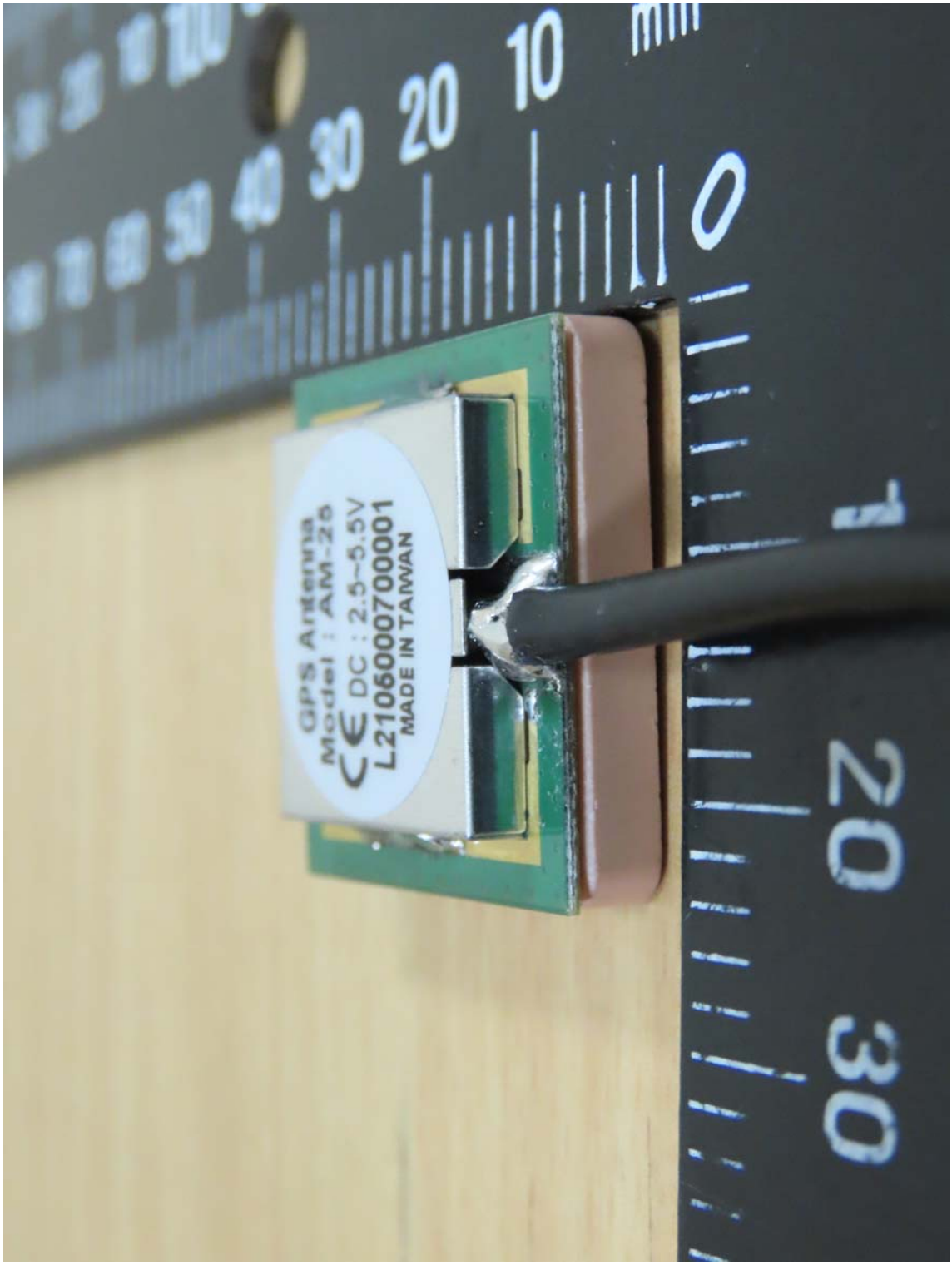

0 20 10 mm
GPS Antenna
Model : AM-25
CE DC : 2.5~5.5V
L2106000700001
MADE IN TAIWAN
10 20 30 40


30 20 10 mm
0
10 20 30 40 50
EAJ31

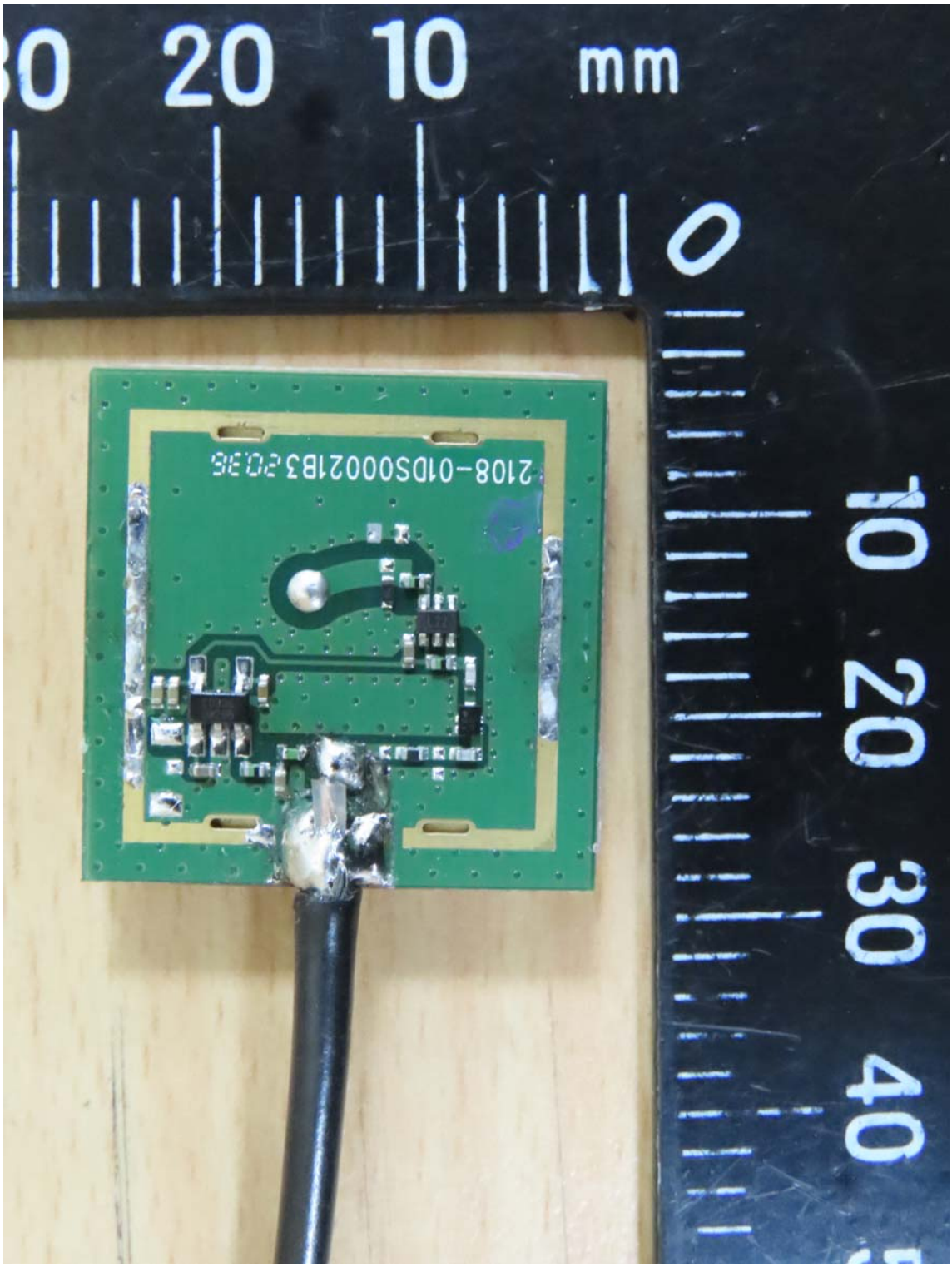

GPS Antenna
Model : AM-25
DC : 2.5~5.5V
MADE IN TAIWAN


GPS Antenna
Model : AM-25
DC : 2.5~5.5V
L2106000700001
MADE IN TAIWAN


GPS Antenna
Model : AM-25
DC : 2.5~5.5V
L2106007000001
MADE IN TAIWAN


GPS Antenna
Model : AM-26
DC : 2.5~5.5V
L2106000700001
MADE IN TAIWAN

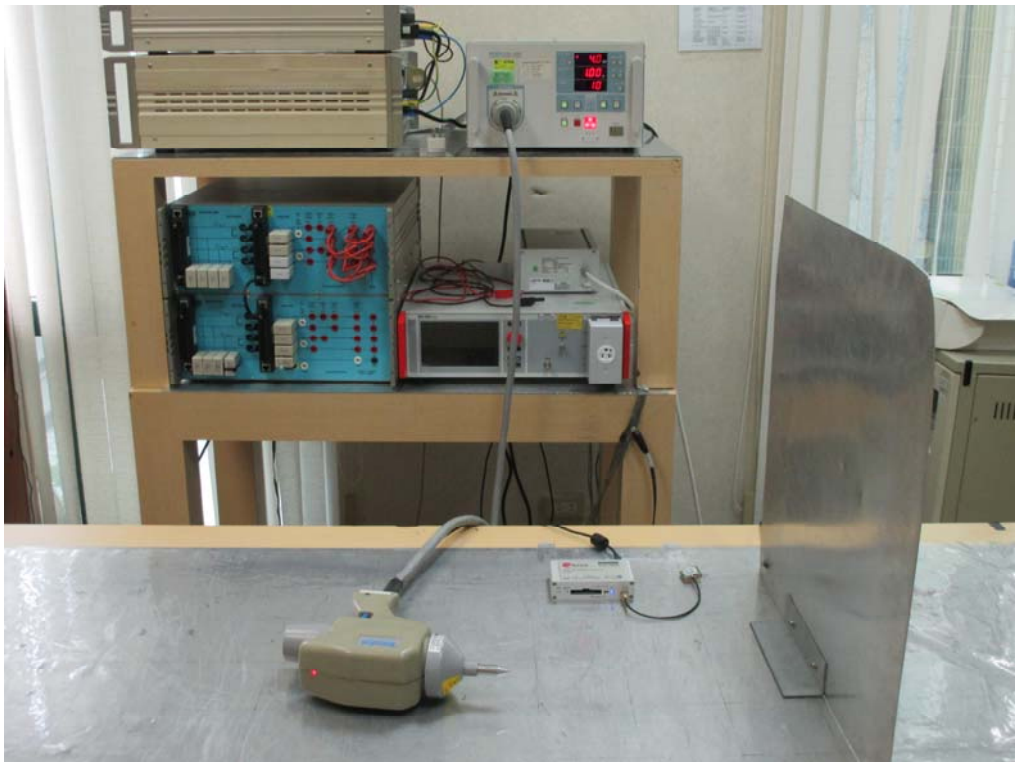
Internal Photos



Set Up Photo of Radiated Emission
Below 1 GHz

Above 1 GHz

Set Up Photo of ESD



Set Up Photo of RF-Field