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TEST REPORT

**Invenco A2-05 (G6-500) Outdoor Payment Terminal
Invenco I2-05 (G6-500 IPT) Indoor Payment Terminal**

tested to the specification

47 Code of Federal Regulations

Part 15 - Radio Frequency Devices

Subpart C – Intentional Radiators

Section 15.225

Operation within the band 13.110 -14.010 MHz

for

Invenco Group Ltd

A handwritten signature in black ink, appearing to read "Andrew Cutler".

This test report is issued with the authority of:

Andrew Cutler - General Manager



All tests reported herein
have been performed in
accordance with the
laboratory's scope of
accreditation

Table of Contents

1. STATEMENT OF COMPLIANCE	3
2. RESULTS SUMMARY	3
3. INTRODUCTION	4
4. CLIENT INFORMATION	4
5. DESCRIPTION OF TEST SAMPLE	5
6. SETUPS AND PROCEDURES	6
7. TEST EQUIPMENT USED	19
8. ACCREDITATIONS	19
9. PHOTOGRAPHS	20

1. STATEMENT OF COMPLIANCE

The **Invenco A2-05 (G6-500) Outdoor Payment Terminal and the Invenco I2-05 (G6-500 IPT) Indoor Payment Terminal** comply with FCC Part 15 Subpart C Section 15.225 as an Intentional Radiator when the methods as described in ANSI C63.10 –2020 are applied.

2. RESULTS SUMMARY

The results from testing carried out in November 2024 are detailed in the following table:

Clause	Parameter	Result
15.201	Equipment authorisation requirement	Certification required
15.203	Antenna requirement	Complies. Antenna internal to the device
15.204	External PA and antenna modifications	Not applicable. No external devices
15.205	Restricted bands of operation	Complies. Device transmits on a nominal frequency of 13.560 MHz
15.207	Conducted limits	Complies
15.209	Radiated emission limits - Emissions < 30 MHz	Complies
15.209	Radiated emission limits – Emissions > 30 MHz	Complies
15.225	Radiated emission limits - Fundamental	Complies
15.225	Frequency stability	Complies

3. INTRODUCTION

This report describes the tests and measurements performed for the purpose of determining compliance with the specification.

The client selected the test sample.

This report relates only to the sample tested.

This report contains no corrections or erasures.

Measurement uncertainties with statistical confidence intervals of 95% are shown below test results. Both Class A and Class B uncertainties have been accounted for, as well as influence uncertainties where appropriate.

All compliance statements have been made with respect of the specification limit with no reference to the measurement uncertainty.

All testing was carried out as per the standard in the worst-case configuration with no deviations being applied.

Version	Change Made	Date
240910.2	Initial Issue	16 Dec 2024

4. CLIENT INFORMATION

Company Name Invenco Group Ltd

Address 7-11 Kawana Street, Northcote, 0627

City Auckland

Country New Zealand

Contact Mr Chris Henry

5. DESCRIPTION OF TEST SAMPLE

Brand Name	Invenco
Model Tested	A2-05 (G6-500) I2-05 (G6-500 IPT)
Product	Outdoor Payment Terminal Indoor Payment Terminal
Manufacturer	Invenco Group Ltd
Country of Origin	New Zealand
Serial Number	UBME00BU
FCC ID	2AC7B-G6500

This device was originally tested in 2023 using job number 230902.2

Retesting has been carried out as a result of components in the Electrostatic Discharge Filter needing to be replaced as it goes end of line (EOL).

Testing was carried out as an Outdoor Payment Terminal with an external display where the Payment Terminal was attached to a G7-100 SDC-15 15" Secure Display Module.

Testing was also carried out as an Indoor Payment terminal on its own when powered using a representative power supply.

When configured as an Indoor Terminal a physical cradle to support desktop operations is added along with a cable assembly.

The Outdoor and Indoor payment terminals contain the same NFC card reader that operates on 13.560 MHz.

A FCC Class 2 permissive change certification will be required

The client has indicated that no changes have been made to the NFC card reader module.

6. SETUPS AND PROCEDURES

Standard

The sample was tested in accordance with 47 CFR Part 15 Subpart C.

Methods and Procedures

The measurement methods and procedures as described in ANSI C63.10 –2020 were used.

Section 15.201: Equipment authorisation requirement

Certification as detailed in Subpart J of Part 2 is required for this device.

Section 15.203: Antenna requirement

The device has a permanently attached internal 13.560 MHz antenna.

Result: Complies.

Section 15.204: External radio frequency power amplifiers and antenna modifications

It is NOT possible to attach an external power amplifier to this transmitter.

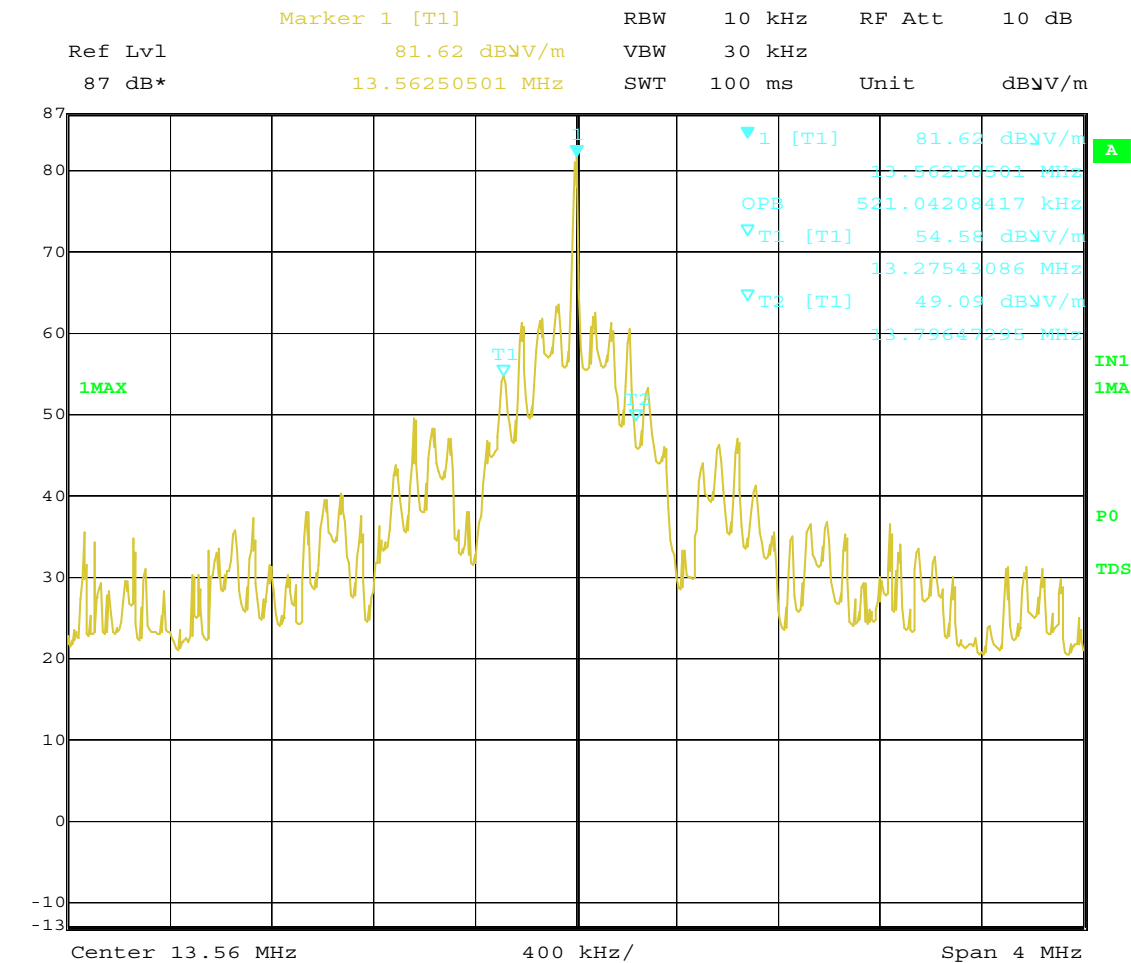
Result: Complies.

Section 15.205: Restricted bands of operation

The device transmits on a nominal frequency of 13.560 MHz.

13.560 MHz transmissions would fall into the 13.110 – 14.010 MHz band that is covered by Section 15.225.

Below is a plot of the device transmitting on 13.560 MHz with a 99% occupied power bandwidth of 521.0421 kHz.



Result: Complies.

Conducted emissions testing

Conducted Emissions testing was carried out over the frequency range of 150 kHz to 30 MHz which was carried out at the laboratory's MacKelvie Street premises in a 2.4 m x 2.4 m x 2.4 m screened room

As it is possible for this device to be directly or indirectly connected to the Public AC mains supply testing was carried out using representative AC power supplies that was powered at 120 Vac 60 Hz which supplied DC to the device under test.

Testing was carried out when configured as an Outdoor Payment terminal and as an Indoor Payment terminal.

The NFC Card Reader operates at 13.560 MHz.

Initial testing was carried out when the NFC Card Reader was operating normally with the internal antenna connected.

A second test was then carried out with the NFC Card Reader was de-activated.

The device is deemed to comply providing if the deactivated test complies and the overall emission signature for the product remains similar in both test configurations with no additional emissions being detected.

The device was placed on top of the emissions table, which is 0.8 m x 0.8 m, 80 cm above the screened room floor which acts as the horizontal ground plane.

In addition the device was positioned 40 cm away from the screened room wall which acts as the vertical ground plane.

The artificial mains network was bonded to the screened room floor.

At all times the device was kept more than 80 cm from the artificial mains network.

The supplied plot is combined plot showing the worst case quasi peak and average results of both the phase and neutral lines to the representative AC power supply.

Quasi peak and average detectors have been used with resolution bandwidths of 9 kHz.

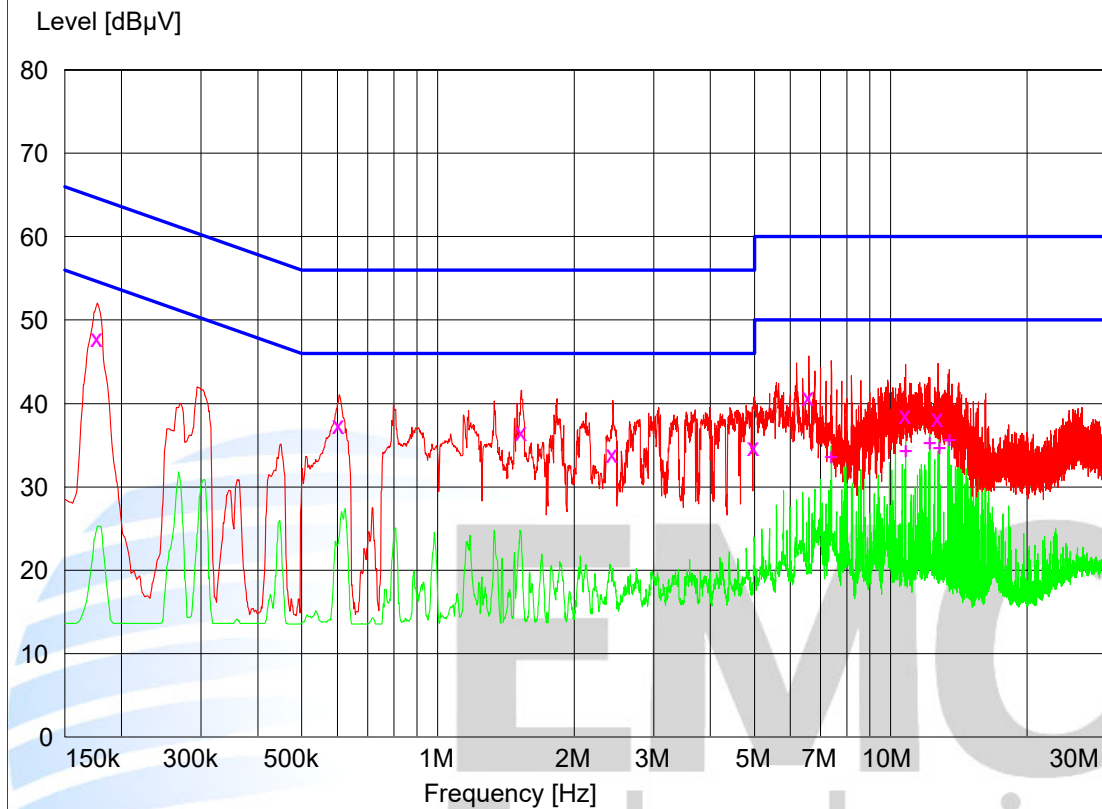
Measurement uncertainty with a confidence interval of 95% is:

- AC Mains port (0.15-30 MHz) ± 2.8 dB

Conducted Emissions – AC Input Power Port

Setup: Outdoor payment terminal tested when powered at 120 VAC 60 Hz with all functions active except the NFC operating on 13.560 MHz that was disabled.

Peak --- Average -- Quasi Peak X Average +



Final Quasi-Peak Measurements

Frequency MHz	Level dBμV	Limit dBμV	Margin dB	Phase	Rechecks dBμV
0.177000	47.80	64.6	16.8	N	
0.606000	37.40	56.0	18.6	L1	
1.530000	36.60	56.0	19.4	N	
2.436500	34.00	56.0	22.0	N	
4.988000	34.80	56.0	21.2	L1	
6.599000	40.80	60.0	19.2	L1	
10.793000	38.60	60.0	21.4	L1	
12.746000	38.30	60.0	21.7	L1	

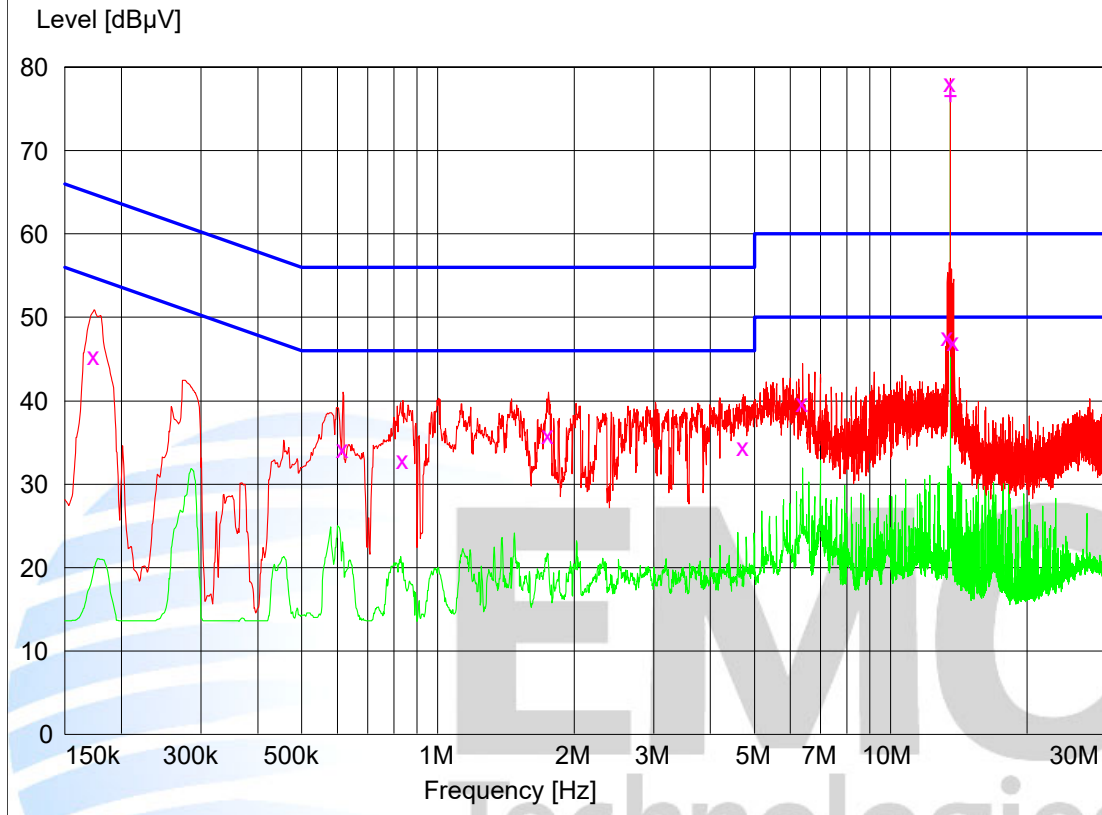
Final Average Measurements

Frequency MHz	Level dBμV	Limit dBμV	Margin dB	Phase	Rechecks dBμV
7.400000	33.50	50.0	16.5	L1	
10.793000	34.30	50.0	15.8	L1	
12.197000	35.30	50.0	14.7	L1	
12.809000	34.60	50.0	15.4	L1	
13.479500	35.70	50.0	14.3	L1	

Conducted Emissions – AC Input Power Port

Setup: Outdoor payment terminal tested when powered at 120 VAC 60 Hz with all functions active including the NFC which was operating on 13.560 MHz

Peak --- Average -- Quasi Peak X Average +



Final Quasi-Peak Measurements

Frequency MHz	Level dBμV	Limit dBμV	Margin dB	Phase	Rechecks dBμV
0.174000	45.40	64.8	19.4	L1	Fundamental
0.618000	34.20	56.0	21.8	L1	
0.837000	32.90	56.0	23.1	L1	
1.755000	35.90	56.0	20.2	N	
4.731500	34.50	56.0	21.5	N	
6.396500	39.70	60.0	20.3	L1	
13.349000	47.60	60.0	12.4	N	
13.560500	78.10	60.0	-18.1	L1	
13.772000	47.10	60.0	13.0	L1	

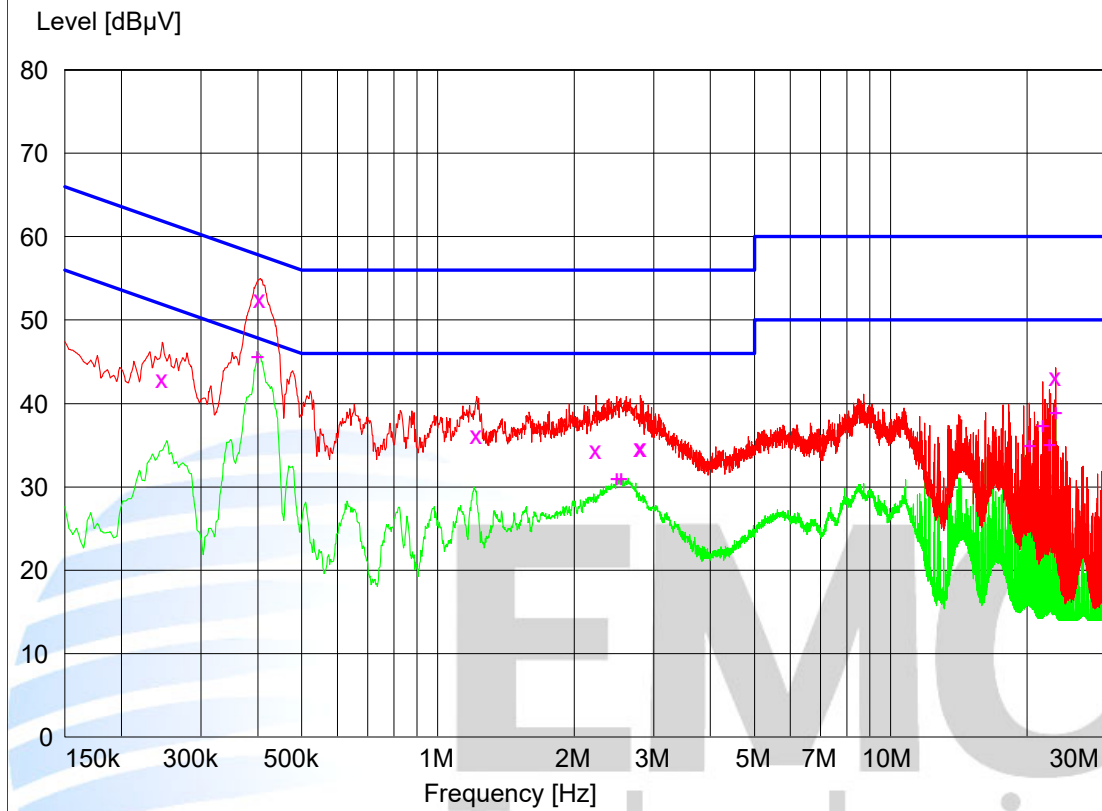
Final Average Measurements

Frequency MHz	Level dBμV	Limit dBμV	Margin dB	Phase	Rechecks dBμV
13.560500	76.50	50.0	-26.5	L1	Fundamental

Conducted Emissions – AC Input Power Port

Setup: Indoor payment terminal tested when powered at 120 VAC 60 Hz with all functions active except the NFC operating on 13.560 MHz that was disabled..

Peak --- Average -- Quasi Peak X Average +



Final Quasi-Peak Measurements

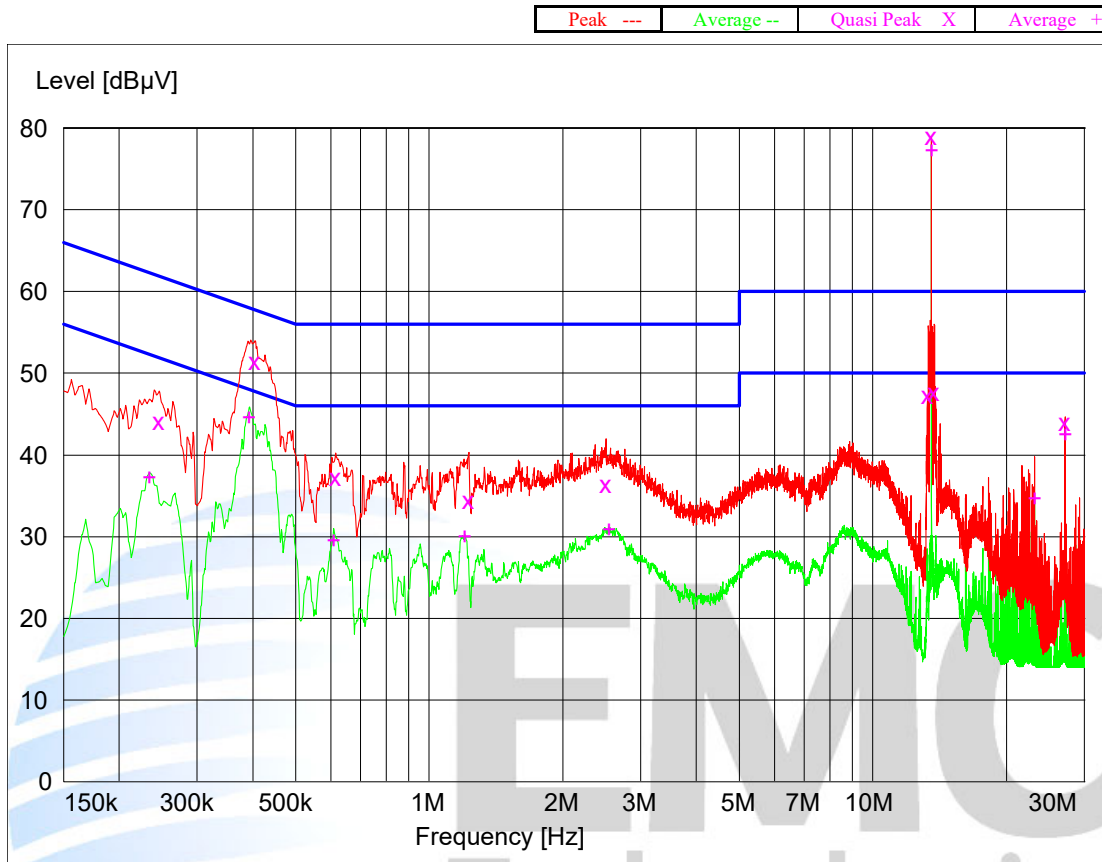
Frequency MHz	Level dBμV	Limit dBμV	Margin dB	Phase	Rechecks dBμV
0.246000	43.00	61.9	18.9	L1	
0.405000	52.60	57.8	5.2	L1	
1.218000	36.20	56.0	19.8	L1	
2.234000	34.40	56.0	21.6	L1	
2.801000	34.60	56.0	21.4	L1	
2.814500	34.60	56.0	21.4	N	
23.127500	43.10	60.0	16.9	L1	

Final Average Measurements

Frequency MHz	Level dBμV	Limit dBμV	Margin dB	Phase	Rechecks dBμV
0.399000	45.50	47.9	2.4	L1	
2.486000	31.00	46.0	15.0	N	
2.544500	31.00	46.0	15.0	N	
20.256500	34.90	50.0	15.1	N	
21.660500	37.30	50.0	12.7	N	
22.457000	35.10	50.0	14.9	N	
23.127500	38.90	50.0	11.1	L1	

Conducted Emissions – AC Input Power Port

Setup: Indoor payment terminal tested when powered at 120 VAC 60 Hz with all functions active including the NFC which was operating on 13.560 MHz



Final Quasi-Peak Measurements

Frequency MHz	Level dBμV	Limit dBμV	Margin dB	Phase	Rechecks dBμV
0.246000	44.10	61.9	17.8	L1	Fundamental Fundamental Fundamental 2 nd Harmonic
0.405000	51.40	57.7	6.3	L1	
0.615000	37.30	56.0	18.7	L1	
1.230000	34.50	56.0	21.5	L1	
2.504000	36.40	56.0	19.6	L1	
13.344500	47.30	60.0	12.7	L1	
13.556000	79.00	60.0	-19.0	L1	
13.767500	47.60	60.0	12.4	N	
27.119000	44.00	60.0	16.0	L1	

Final Average Measurements

Frequency MHz	Level dBμV	Limit dBμV	Margin dB	Phase	Rechecks dBμV
0.234000	37.30	52.3	15.0	N	Fundamental 2 nd Harmonic
0.393000	44.60	48.0	3.4	N	
0.609000	29.50	46.0	16.5	N	
1.203000	30.00	46.0	16.0	N	
2.540000	30.90	46.0	15.1	N	
13.556000	77.30	50.0	-27.3	L1	
23.127500	34.70	50.0	15.3	N	
27.119000	42.50	50.0	7.5	N	

Section 15.209: Radiated emission limits, general requirements

Radiated emission testing was carried out over the frequency range of 150 kHz to 6000 MHz.

Testing was carried out at the laboratory's open area test site - located at 670 Kawakawa-Orere Road, RD5, Papakura, New Zealand.

Before testing was carried out a receiver self-calibration was undertaken along with a check of all cables and programmed antenna factors were carried out.

Testing was carried out using a representative AC power supply at 120 VAC 60 Hz that powered the device under test.

The device tested when placed in the centre of the test table flat 0.8 m above the test site ground plane.

All interconnecting cables were bundled in 40 cm long bundles.

Testing was carried out when the NFC device was transmitting continuously on 13.560 MHz.

When an emission is located, it is positively identified and its maximum level is found by rotating the automated turntable, and by varying the antenna height, where appropriate, with an automated antenna tower.

Below 30 MHz a magnetic loop is used with the centre of the loop being 1 metre above the ground with measurements being made using a Quasi Peak detector at a distance of 10 metres.

Above 30 MHz the emission is measured in both vertical and horizontal antenna polarisations at a distance of 3 metres.

Below 1000 MHz a Quasi Peak detector with a 120 kHz bandwidth is used.

Above 1000 MHz an Average detector and a Peak detector with bandwidths of 1 MHz are used.

The emission level was determined in field strength by taking the following into consideration:

Level (dB μ V/m) = Receiver Reading (dB μ V) + Antenna Factor (dB/m) + Coax Loss (dB)

For example, if an emission of 30 dB μ V was observed at 30 MHz.

$$45.5 \text{ dB}\mu\text{V/m} = 30.0 \text{ dB}\mu\text{V} + 14 \text{ dB/m} + 1.5 \text{ dB}$$

Section 15.209: 13.560 MHz transmitter below 30 MHz spurious emission measurements

Outdoor Payment Terminal

Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
27.120	15.1	48.6	33.5	Pass

Indoor Payment Terminal

Frequency (MHz)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
27.120	29.3	48.6	19.3	Pass

The NFC device was transmitting continuously on 13.560 MHz.

Magnetic loop measurements were made at a distance of 10 metres.

Measurement receiver with a quasi-peak detector with a 9 kHz bandwidth was used.

The 30 metre limit has been scaled by a factor of 40 dB per decade, as per section 15.31 (f) (2).

The limit at 27.120 MHz when measured at 30 metres is 30 μ V/m or 29.54 dB μ V/m.

Therefore the scaled limit at 10 metres will be 48.6 dB μ V/m.

The spurious emission observed does not exceed the level of the fundamental emission.

No other low frequency spurious emissions were detected from the device when measurements were attempted from 10 kHz - 30.0 MHz

Result: Complies.

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (10 kHz – 30 MHz) $\pm$ 4.8 dB

Section 15.209: Spurious Emissions (30 – 6000 MHz)

Measurements between 30 – 6000 MHz have been made at a distance of 3 metres.

The limits as described in Section 15.209 have been applied.

Outdoor Payment Terminal. NFC specific emissions.

Frequency (MHz)	Vertical (dBuV/m)	Horizontal (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna	Detector
40.680	33.3		40.0	6.7	Vertical	Quasi Peak
54.240	37.1		40.0	2.9	Vertical	Quasi Peak
67.800	29.8		40.0	10.2	Vertical	Quasi Peak
81.360	28.7		40.0	11.3	Vertical	Quasi Peak
216.960	25.4		46.0	20.6	Vertical	Quasi Peak
271.200	26.9		46.0	19.1	Vertical	Quasi Peak
298.320	25.4		46.0	20.6	Vertical	Quasi Peak
325.440	41.6		46.0	4.4	Vertical	Quasi Peak
352.560	39.1		46.0	6.9	Vertical	Quasi Peak
379.680	36.7		46.0	9.3	Vertical	Quasi Peak
393.240	40.2	38.9	46.0	5.8	Vertical	Quasi Peak
406.800	42.2		46.0	3.8	Vertical	Quasi Peak

Indoor Payment Terminal. NFC specific emissions.

Frequency (MHz)	Vertical (dBuV/m)	Horizontal (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna	Detector
40.680	34.0	29.8	40.0	6.0	Vertical	Quasi Peak
54.240	37.8	30.3	40.0	2.2	Vertical	Quasi Peak
67.800	31.1	27.9	40.0	8.9	Vertical	Quasi Peak
81.360	30.9	26.8	40.0	9.1	Vertical	Quasi Peak
108.480	29.7	31.5	43.5	12.0	Horizontal	Quasi Peak
325.440	30.1	36.6	46.0	9.4	Horizontal	Quasi Peak
352.560		40.6	46.0	5.4	Horizontal	Quasi Peak
379.680	42.1	41.8	46.0	3.9	Vertical	Quasi Peak
393.240	37.5		46.0	8.5	Vertical	Quasi Peak
406.800	40.3	45.6	46.0	0.4	Horizontal	Quasi Peak
433.920	34.4	36.7	46.0	9.3	Horizontal	Quasi Peak
569.520	38.1	38.2	46.0	7.8	Horizontal	Quasi Peak
650.880	34.1		46.0	11.9	Vertical	Quasi Peak

All other emissions detected had a margin to the limit that exceeded at least 15 dB when measurements were made between 30 - 6000 MHz using both vertical and horizontal polarisations.

Result: Complies

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (30 – 6000 MHz) ± 4.1 dB

Section 15.225: Fundamental emission:

Measurements were made using a magnetic loop antenna and a receiver with a Quasi Peak detector using a 9 kHz bandwidth.

Measurements were made at a distance of 10 metres with the limit being determined by using the extrapolation factor of 40 dB per decade limit, as detailed in section 15.31 f (2).

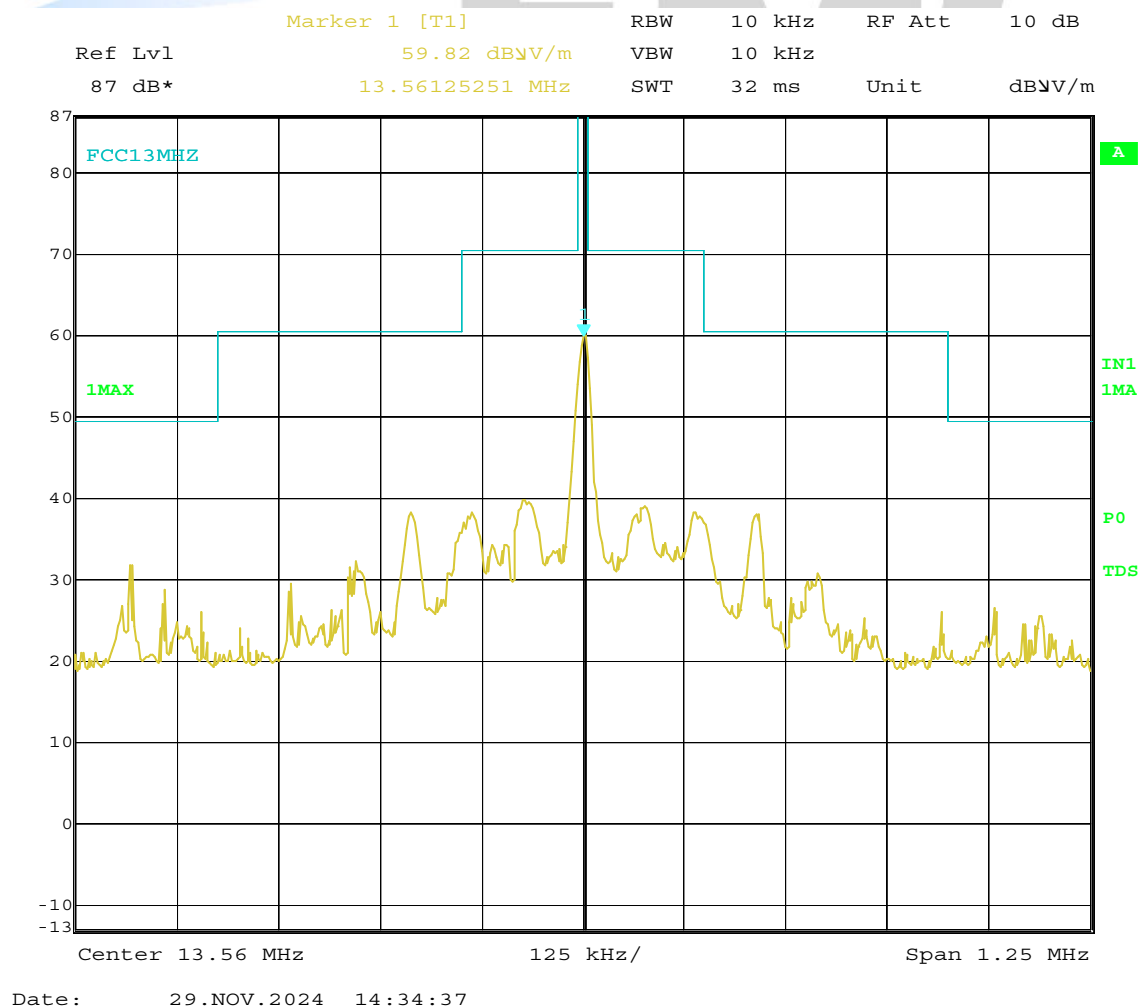
The limit at 30 m at 13.560 MHz is 15,848 uV/m or 84.0 dBuV/m.

Applying the extrapolation factor of 40 dB/ per decade, the limit at 10 m is 103.1 dBuV/m.

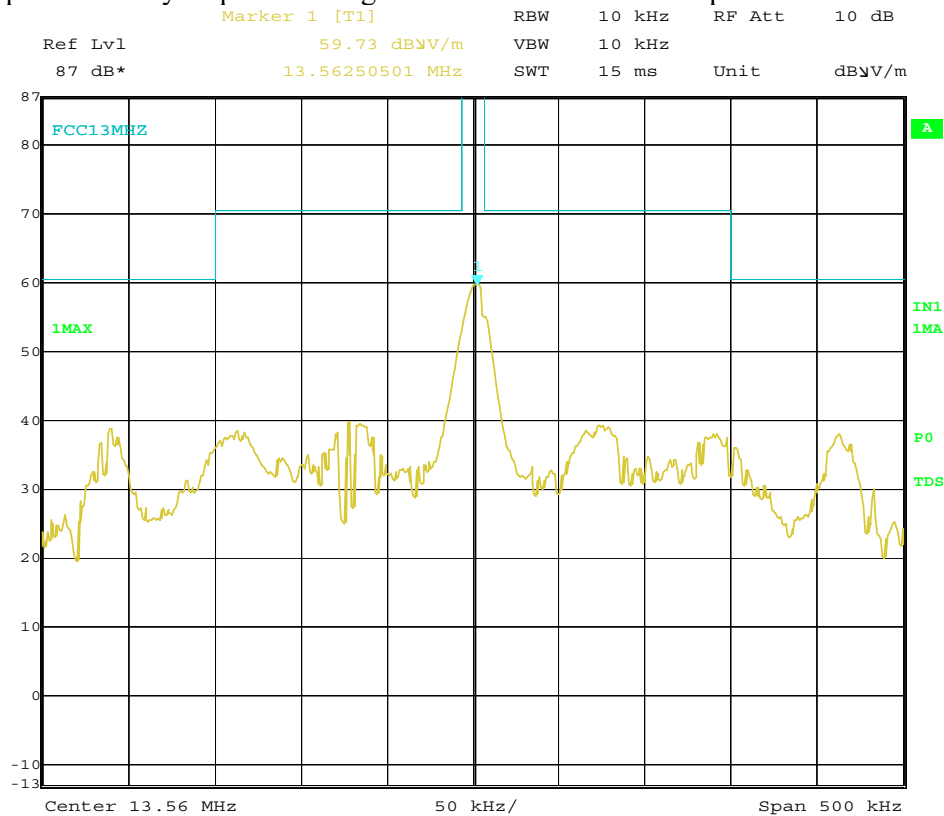
The 24 Vdc supply to the device was varied by +/- 15% to determine whether a change in field strength would occur.

Voltage (Vdc)	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
20.4	13.560	59.4	103.1	43.7
24.0	13.560	59.4	103.1	43.7
27.6	13.560	59.4	103.1	43.7

Spectrum analyser plot showing the carrier and modulation peaks within +/- 625 kHz.

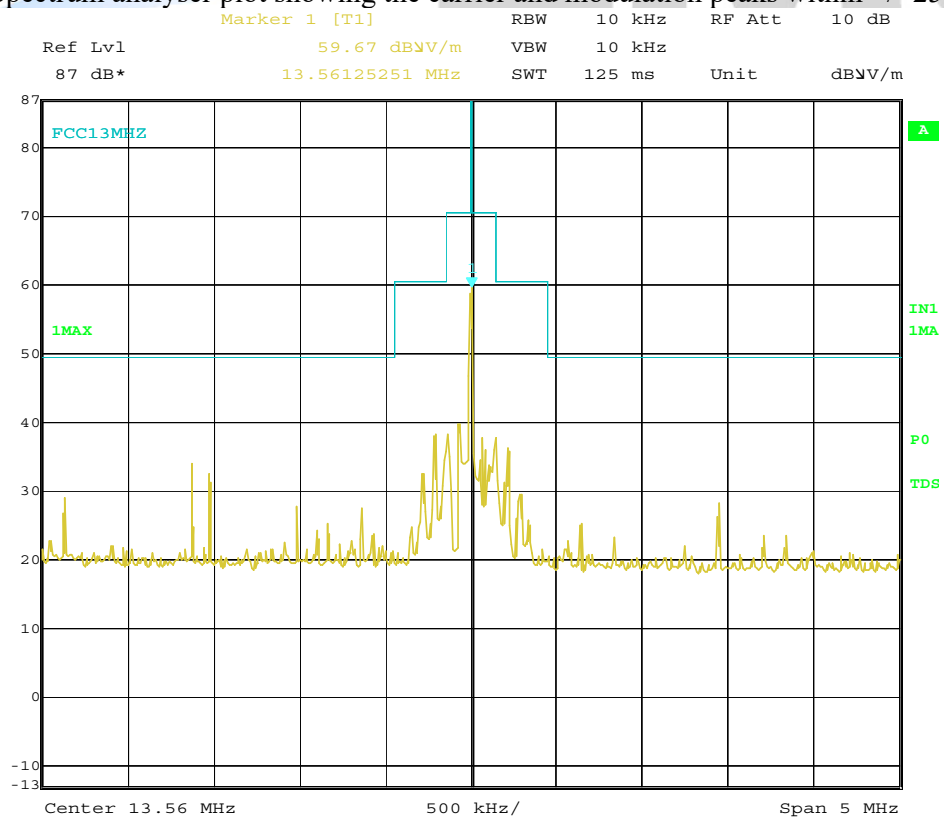


Spectrum analyser plot showing the carrier and modulation peaks within +/- 250 kHz



Date: 29.NOV.2024 14:36:52

Spectrum analyser plot showing the carrier and modulation peaks within +/- 2500 kHz



Date: 29.NOV.2024 14:35:20

Result: Complies.

Section 15.225: Frequency tolerance:

The frequency tolerance of the carrier is required to be $\pm 0.01\%$ of operating frequency when the temperature is varied between -20 degrees C and $+50$ degrees C.

The device operates nominally on 13.560 MHz which gives a frequency tolerance of $\pm 1,356.0$ Hz.

Temperature (°C)	Frequency (MHz)	Difference (Hz)
50.0	13.559 452	-548
40.0	13.559 452	-548
30.0	13.559 482	-518
20.0	13.559 510	-490
10.0	13.559 515	-485
0.0	13.559 585	-415
-10.0	13.559 640	-360
-20.0	13.559 653	-347

As a worst case scenario the 24 Vdc supply to the device was varied by $\pm 15\%$ at 20 degrees C (ambient).

Voltage (Vdc)	Frequency (MHz)	Difference (Hz)
20.4	13.559 482	-453
24.0	13.559 486	-448
27.6	13.559 484	-457

The frequency tolerance above has been calculated by subtracting the Measured Frequency from the Nominal Frequency (13.560 MHz).

Result: Complies.

Measurement uncertainty with a confidence interval of 95% is:

Frequency tolerance ± 50 Hz

7. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial No	Asset Ref	Cal Due	Period
Aerial Controller	EMCO	1090	9112-1062	RFS 3710	N/A	N/A
Aerial Mast	EMCO	1070-1	9203-1661	RFS 3708	N/A	N/A
Biconical Antenna	Schwarzbeck	BBA 9106	11042021A	3698	22 Nov 2025	3 years
Heliac cable	Andrews	L6PNM-RPD	22869	Oats Cable	22 Dec 2024	1 year
Log Periodic	Schwarzbeck	VUSLP 9111	9111-112	EMC4025	15 Nov 2025	3 years
Mains Network	Rohde & Schwarz	ESH2-Z5	881362/034	3628	02 Jun 2025	3 years
Receiver	Rohde & Schwarz	ESIB-40	100295	EMC4030	30 May 2026	3 years
Receiver	Rohde & Schwarz	ESHS 10	828404/005	3728	04 Dec 2024	3 years
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100363	EMC4032	05 Dec 2025	2 years
Turntable	EMCO	1080-1-2.1	9109-1578	RFS 3709	N/A	N/A
VHF Balun	Schwarzbeck	VHA 9103	9594	3697	22 Nov 2025	3 years
Loop Antenna	EMCO	6502	9003-2485	3798	12 Feb 2025	3 years
Power Supply	APT	7008	4170003	-	N/A	N/A
Thermal chamber	Contherm	M180F	86025	N/a	N/A	N/A
Thermometer	DSIR	RT200	35	EMC4029	9 April 2025	1 year

All test equipment was within calibration at the time of testing.

8. ACCREDITATIONS

Testing was carried out in accordance with EMC Technologies NZ Ltd designation as a FCC Accredited Laboratory by International Accreditation New Zealand, designation number: NZ0002 under the APEC TEL MRA.

All testing was carried out in accordance with the terms of EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025.

All measurement equipment has been calibrated in accordance with the terms of the EMC Technologies (NZ) Ltd International Accreditation New Zealand (IANZ) Accreditation to NZS/ISO/IEC 17025.

International Accreditation New Zealand has International Laboratory Accreditation Council (ILAC) Mutual Recognition Arrangements for testing and calibration with various accreditation bodies in a number of economies.

This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden).

Further details can be supplied on request.

9. PHOTOGRAPHS

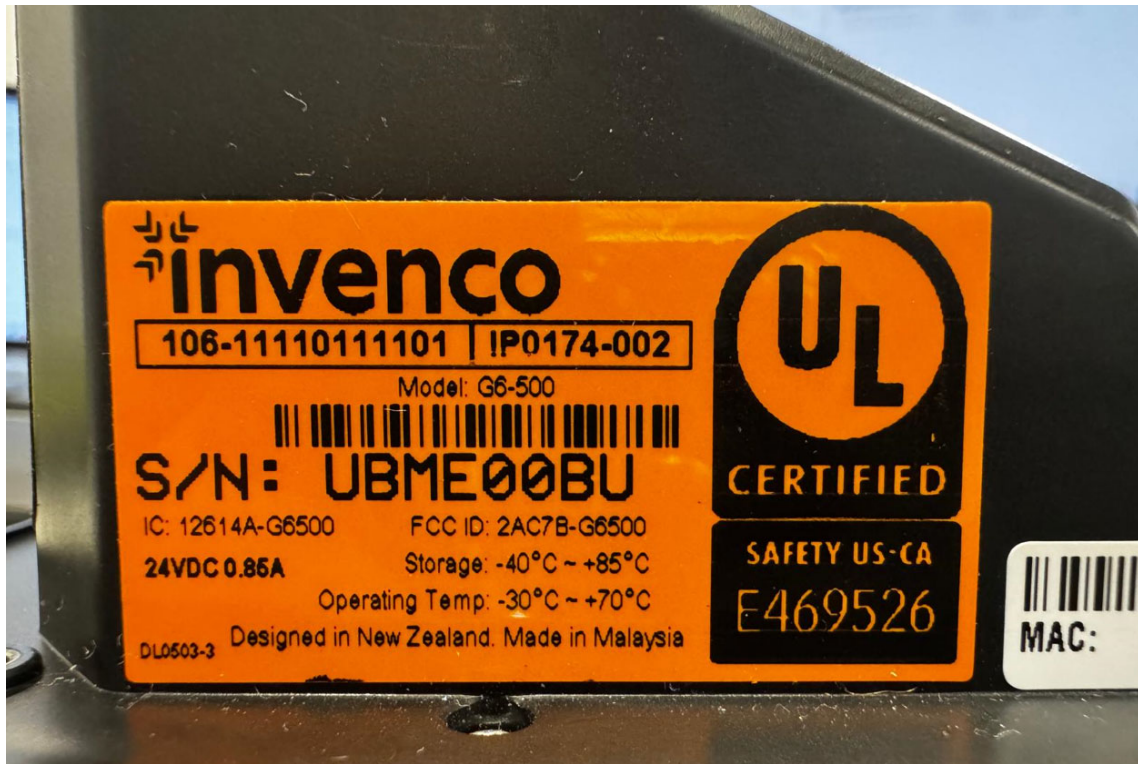
Outdoor Payment Terminal – Front



Outdoor Payment Terminal - Rear



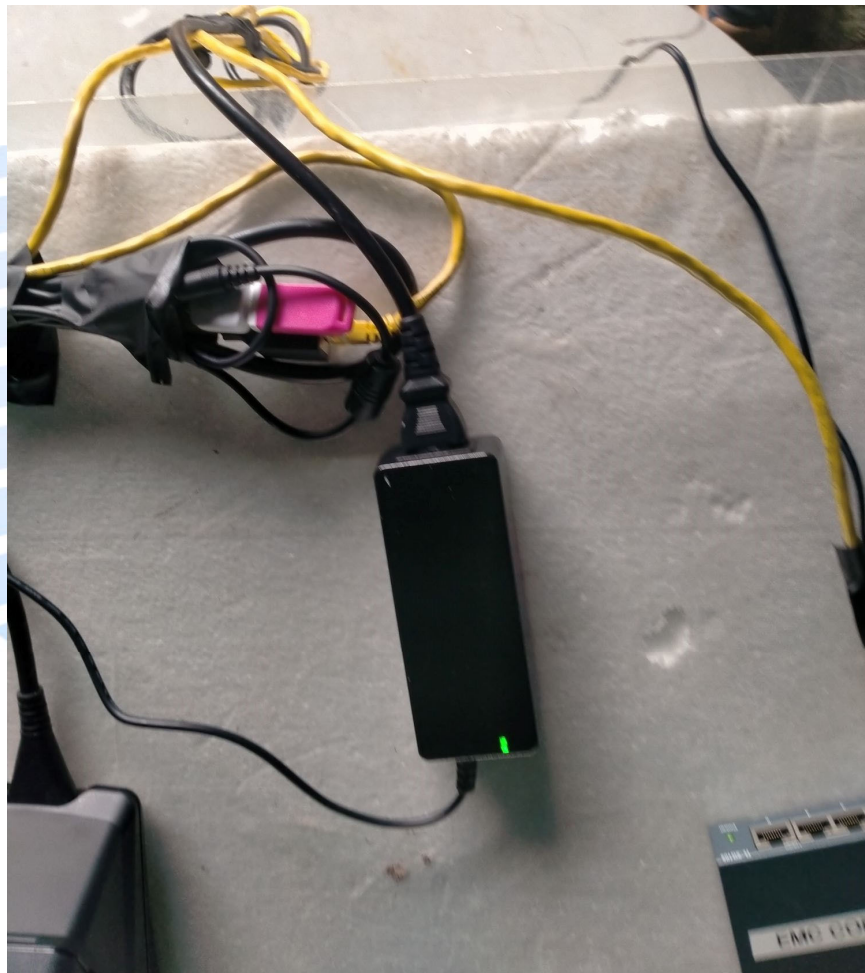
Labels



Outdoor Payment Power Supply



Indoor Payment Terminal Power Supply



Outdoor Payment Terminal - Conducted Emissions Test Setup





Indoor Payment Terminal – Conducted Emissions Test Set Up



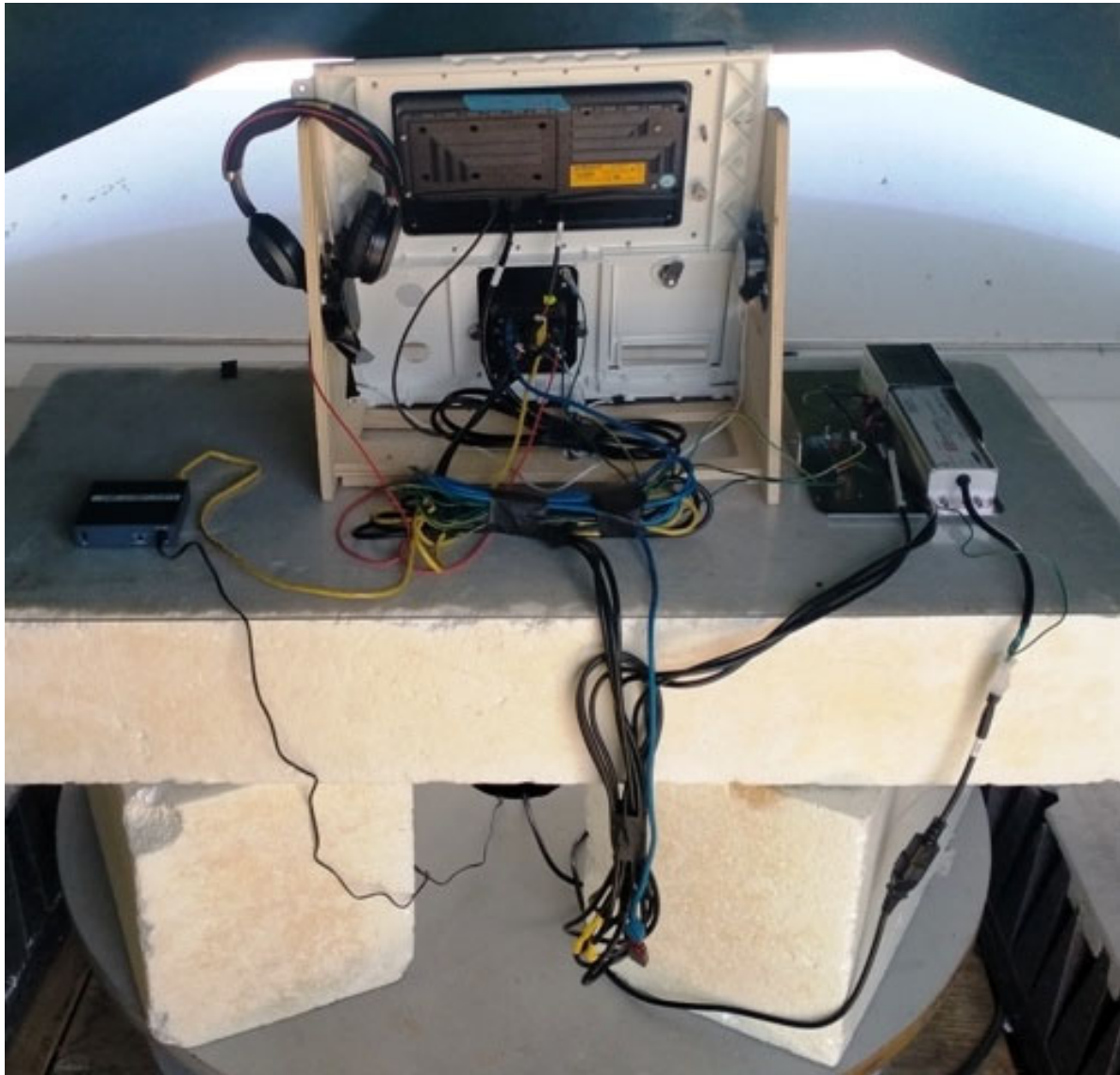


Outdoor Payment Terminal - Radiated Emissions Test Setup

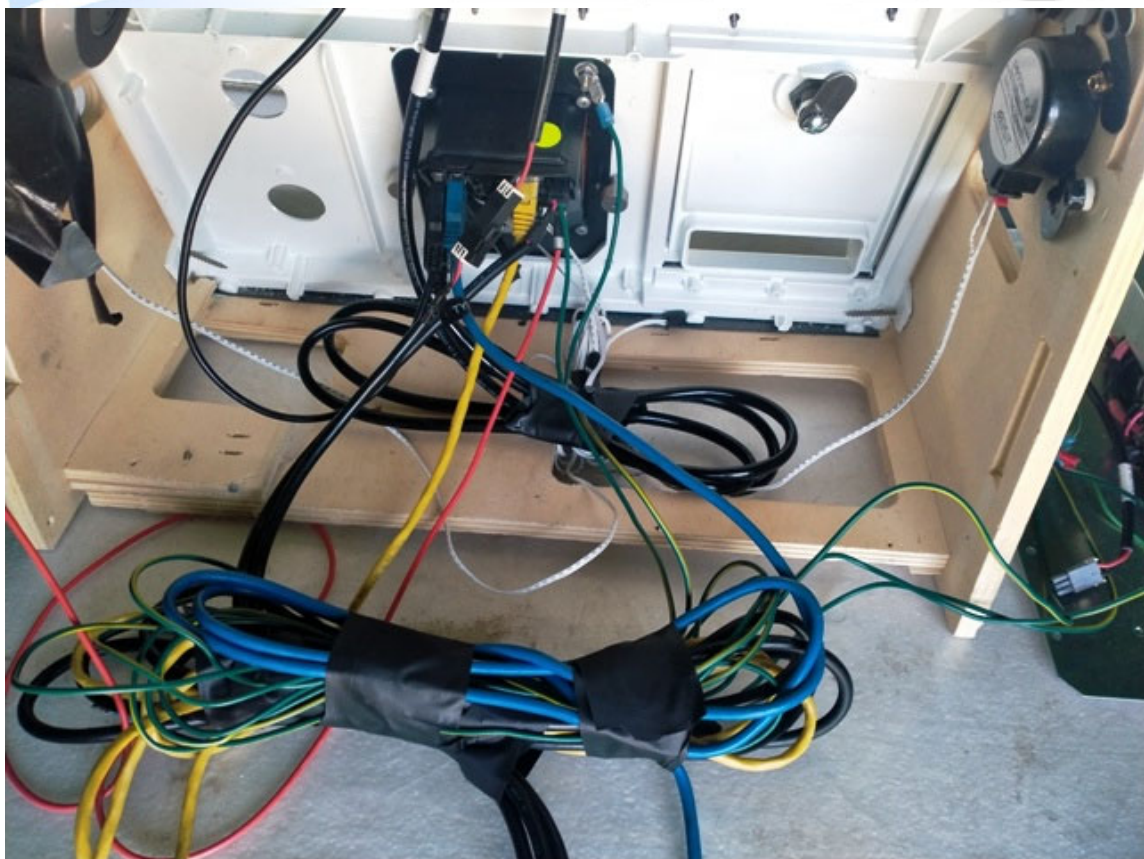




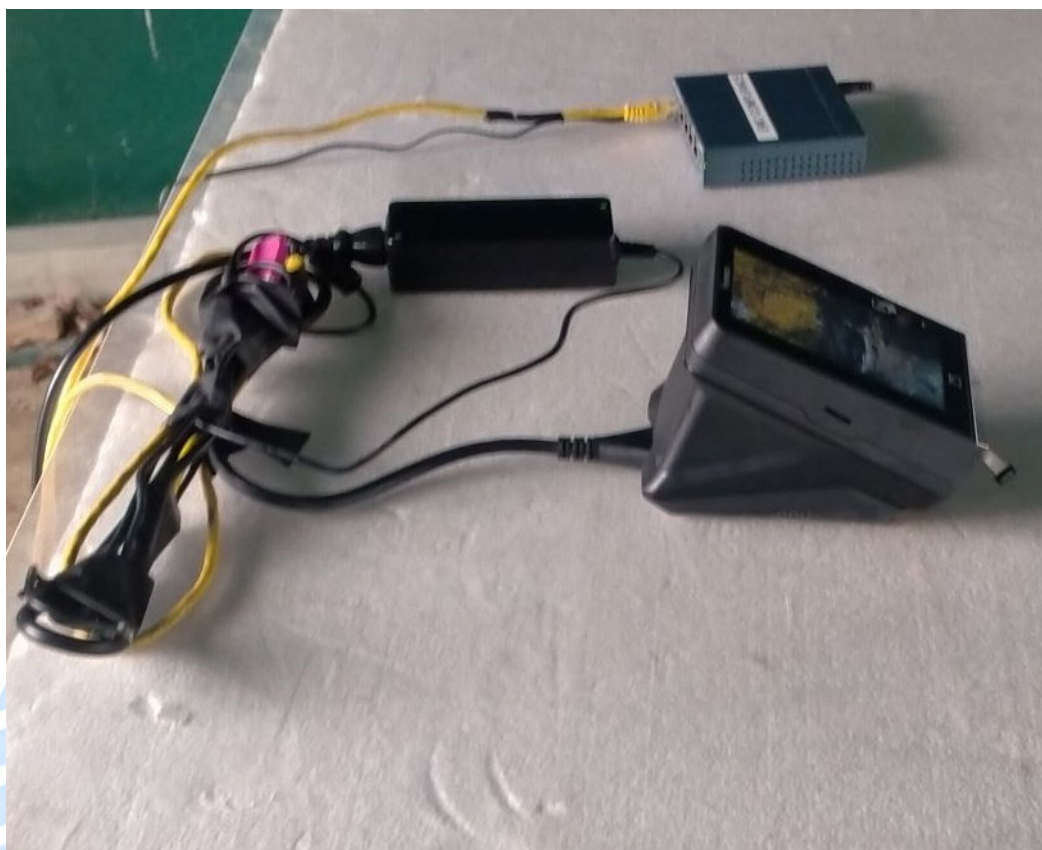


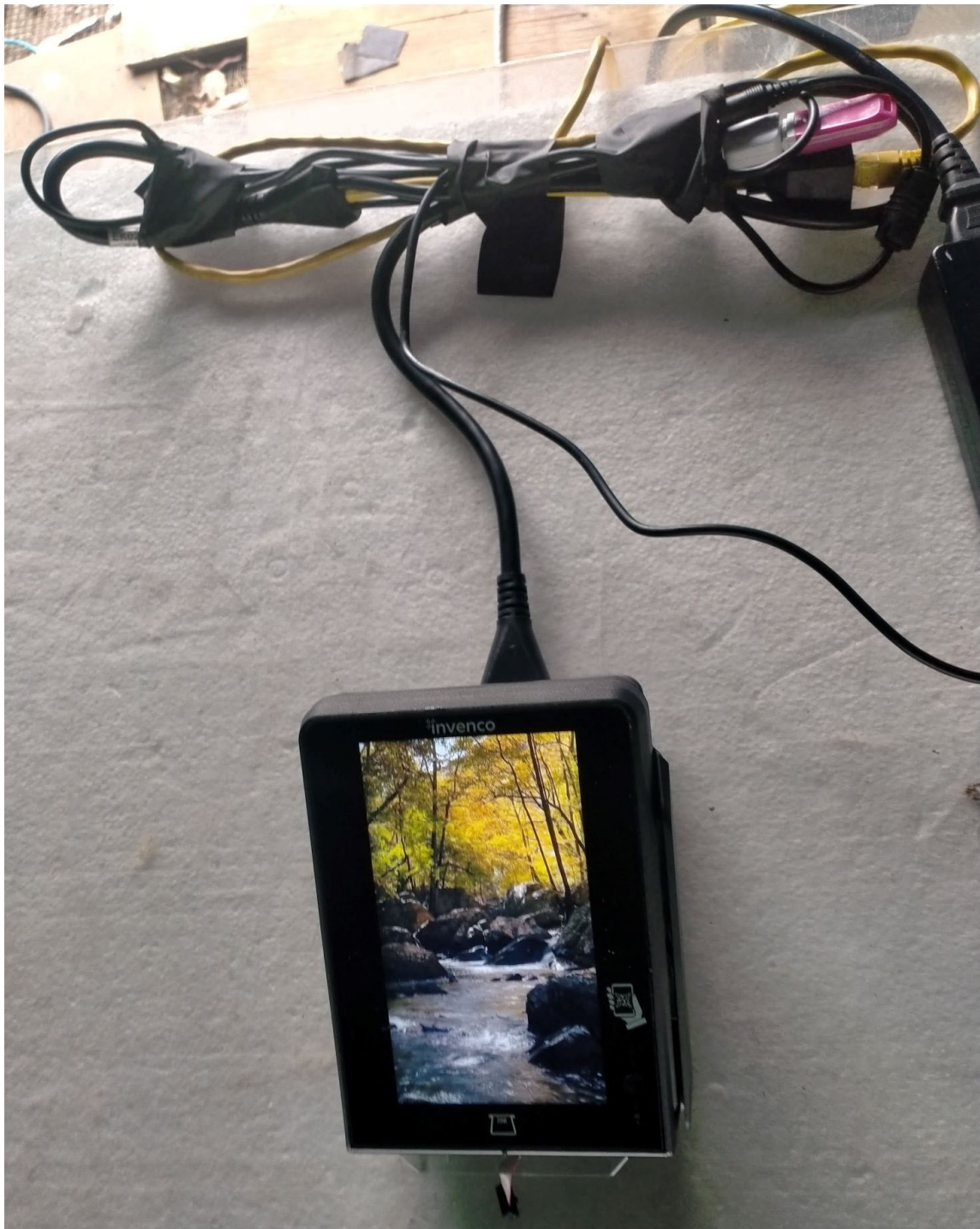


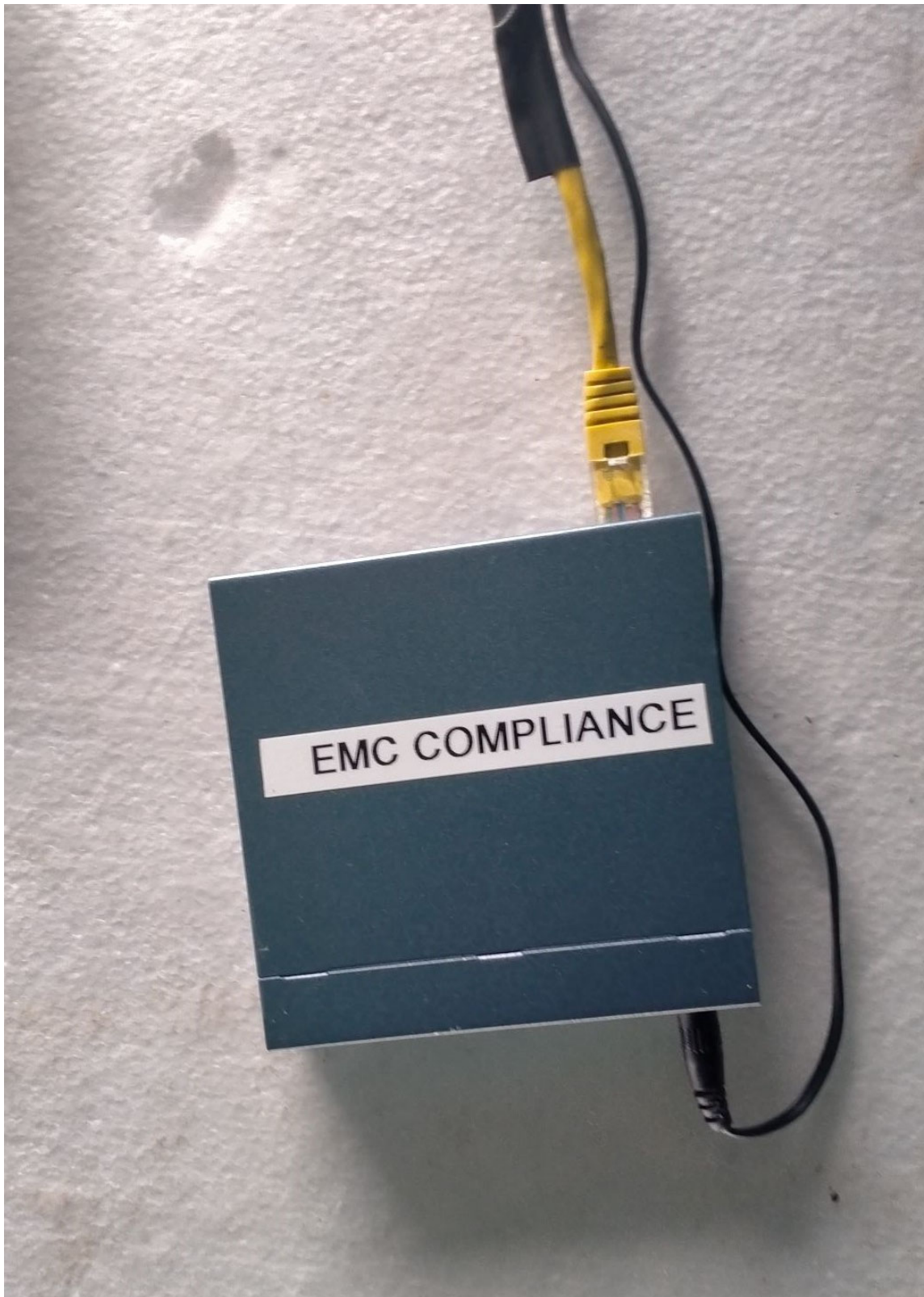




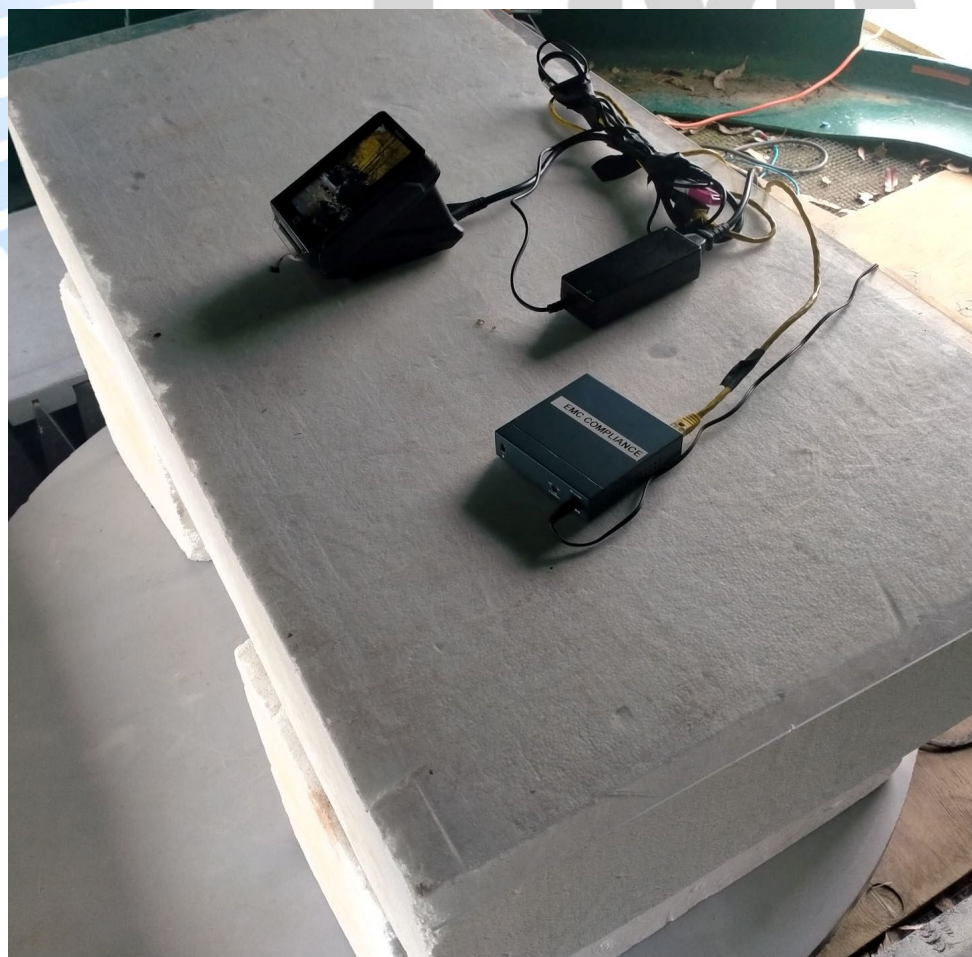
Indoor Payment Terminal Radiated Emission Test Set Up











Schwarzbeck Biconnical Antenna (30 – 300 MHz)





Schwarzbeck log periodic antenna (300 – 1000 MHz)





EMCO 3115 Horn Antenna (1 – 18 GHz)







Test shed showing a loop antenna in use.



