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TEST REPORT

SmarterCover-Waste RevK IoT Radar Sensor with Sigfox Module

tested to

AS/NZS 4268: 2017
Radio equipment and systems – Short Range Devices – Limits and methods of measurements

and

AS/NZS CISPR-32:2015

Electromagnetic compatability of multimedia equipment -Emission requirements

for

Flexware Limited

This Test Report is issued with the authority of:

Andrew Cutler- General Manager

ACCREDITED
IANZ
TESTING LABORATORY

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

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1. STATEMENT OF COMPLIANCE

The **SmarterCover-Waste RevK IoT Radar Sensor with Sigfox Module** complies with AS/NZS 4268: 2017 and AS/NZS CISPR 32: 2015 when the New Zealand regulatory requirements are applied.

2. RESULTS SUMMARY

The results from testing carried out on October 14th 2021 are summarised below:

AS/NZS 4268

Clause	Test Performed	Result
6.3	Maximum EIRP	Complies
6.4	Transmitter spurious emissions	Complies.
6.5	Emission bandwidth	Not Applicable.
6.6	Operating frequency	Complies. Device observed operating in the 915 – 928 MHz band.
7.0	Receiver emissions	Not applicable
NZ GURL Special condition 23	NZ GURL Band Edge measurements 915-928 MHz	Complies.

AS/NZS CISPR 22

Table	Parameter	Result
A4.2	Radiated Emissions. Class B. 30 – 6000 MHz	Complies. No emissions detected.
A10.1 A10.2	Conducted emissions – AC Mains Port. Class B. 0.15 - 30 MHz	Not Applicable. Internal battery powered device.

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.

4. CLIENT INFORMATION

Company Name	Flexware Limited
Street Address	Suite 2-3 93 Dominion Road Mount Eden
City	Auckland 1024
Country	New Zealand.
Contact	Mr Luke Spencer

5. DESCRIPTION OF TEST SAMPLE

Brand Name	SmarterCover - Waste
Model Number	RevK
Product	IoT Radar Sensor with Sigfox Module
Primary Function	Distance Measuring
Manufacturer	ENTECH Ltd
Country of Origin	New Zealand / Australia
Serial Number	Not serialised
Modules Installed	Sigfox WSSFM10R4AT 900 MHz IoT Radio Module Radar A111 Radar Module
Frequencies Used	MCU Internal Oscillator: 6 MHz Radar Crystal Oscillator: 24 MHz CPU Speed: 64 MHz

The device that was tested was an IOT radar sensor with a Sigfox Radio Module and is used to measure distances.

The radio module was configured to operate on 920.8 MHz with a rated power output of +22.5 dBm.

Testing showed that the device initially transmitted once every 60 seconds for the first 8 minutes and then it operated once every 15 minutes.

The device was tested when powered using a 3.7 Vdc internal battery.

6. SETUPS AND PROCEDURES

Standard and Methods used

AS/NZS 4268, 2017 with reference to FCC Part 15 section 15.209 and 15.247

AS/NZS CISPR 32

Limits

Those prescribed in:

NZ Radiocommunications Regulations (General User Radio Licence for Short Range Devices) 2017

FCC Part 15 section 15.209 and 15.247

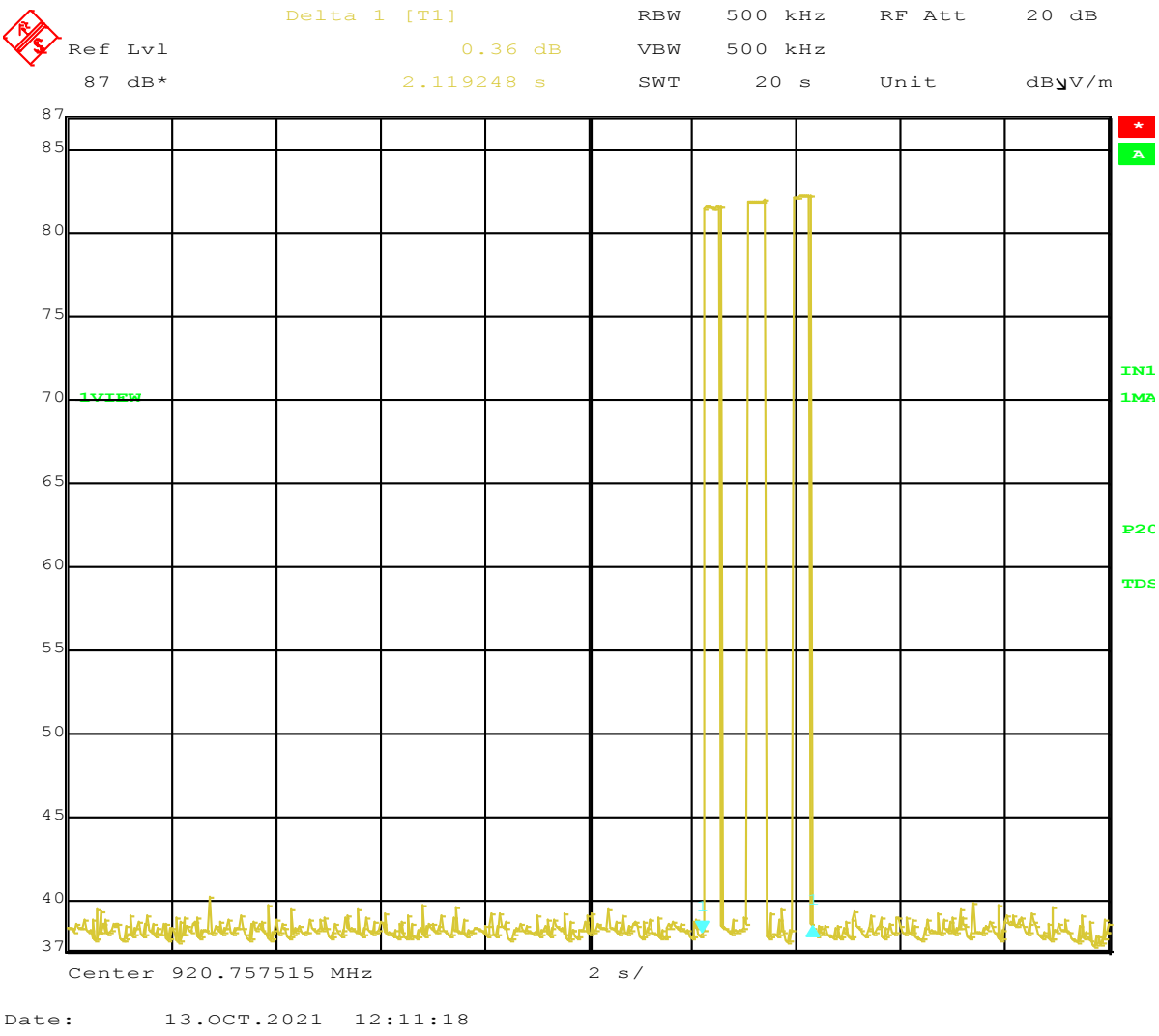
AS/NZS CISPR 32

7. RESULTS

Maximum EIRP for New Zealand

Testing was carried out when the device transmitted periodically on 920.800 MHz.

Three transmissions were observed in a period of 2 seconds every 60 seconds for the first 8 minutes and then the device was observed to operate 3 times in a 2 second period every 15 minutes.



The device was powered using an internal battery and was placed on top of the test table along with the device under test with the test table being 80 cm above the test site ground plane.

The device has an antenna port that was attached to the supplied black antenna that was in turn placed on top of the white device using the supplied cable.

Measurements being made using both vertical and horizontal polarisations using a test distance of 3 metres with the device being rotated and height scanned.

Measurements were made using a Peak detector with a bandwidth of 100 kHz to verify that the NZ GURL power limit was not being exceeded.

Due to the intermittent nature of the transmissions the device emissions were maximised as much as possible.

The NZ GURL Limit of 0 dBW (+30.0 dBm) has been applied to this device

Results

Frequency (MHz)	Level (dBuV/m)	Level (dBm)	Limit (dBm)	Antenna Polarity	Margin (dB)	Result
920.7600	98.0	2.8	30.0	Horizontal	27.2	Pass
920.7600	102.0	6.8	30.0	Vertical	23.2	Pass

Result: Complies.
Measurement Uncertainty: ± 4.1 dB

Transmitter spurious emissions

Testing was carried out when the device transmitted periodically 920.800 MHz as previously described over the frequency range of 30 MHz to 10 GHz.

The device was powered using an internal battery and it was placed on top of the test table which is 80 cm above the test site ground plane.

The device has an antenna port that was attached to the supplied black antenna that was in turn placed on top of the white device using the supplied cable

Measurements being made using both vertical and horizontal polarisations using a test distance of 3 metres with the device being rotated and height scanned

Testing was carried out as using the methods and limits as defined in FCC Part 15 sections 15.209 and 15.247 and also AS/NZS CISPR 32 at the same time.

Below 1000 MHz measurements were made using a Peak detector and Qusai Peak detector with a bandwidth of 120 kHz.

Above 1000 MHz measurements mere made using a Peak detector and where appropriate an Average detector which both had a bandwidth of 1 MHz

During the test, a number of ambient emissions are identified (list of which can be provided upon request).

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

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

For example, if an emission of 30 dBµV was observed at 30 MHz.

45.5 dBµV/m = 30.0 dBµV + 14 dB/m + 1.5 dB

Result: Complies.
Measurement uncertainty: ± 4.1 dB

Results: AS/NZS CISPR 32

No emissions were detected from the device when tested between 30 – 6000 MHz when measurements were made using both vertical and horizontal polarisations.

Results: AS/NZS 4268

Transmitting on: 920.800 MHz

Frequency (MHz)	Vertical (dBuV/m)	Hort (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Result	Antenna	Detector
1841.600	52.5	49.4	74.0	21.5	Pass	Vertical	Peak
	43.2	40.1	54.0	10.8	Pass	Vertical	Average
2762.360	-	-	74.0	-	Pass	Vert/Hort	Peak
	-	-	54.0	-	Pass	Vert/Hort	Average
3683.120	-	-	74.0	-	Pass	Vert/Hort	Peak
	-	-	54.0	-	Pass	Vert/Hort	Average
4603.880	-	-	74.0	-	Pass	Vert/Hort	Peak
	-	-	54.0	-	Pass	Vert/Hort	Average
5524.640	-	-	74.0	-	Pass	Vert/Hort	Peak
	-	-	54.0	-	Pass	Vert/Hort	Average
6445.400	-	-	74.0	-	Pass	Vert/Hort	Peak
	-	-	54.0	-	Pass	Vert/Hort	Average
7366.160	-	-	74.0	-	Pass	Vert/Hort	Peak
	-	-	54.0	-	Pass	Vert/Hort	Average
8286.920	-	-	74.0	-	Pass	Vert/Hort	Peak
	-	-	54.0	-	Pass	Vert/Hort	Average
9207.680	-	-	74.0	-	Pass	Vert/Hort	Peak
	-	-	54.0	-	Pass	Vert/Hort	Average

No other emissions were detected from the device when measurements were carried out between 30 – 10000 MHz using both vertical and horizontal polarisations.

Band edge measurements as per New Zealand GURL:

Special condition 23 of the NZ General User Radio Licence for Short Range Devices states that transmissions must not exceed the following unwanted emission limits:

-79 dBw (-49 dBm) EiRP between 800 – 915 MHz and

-63 dBW (-33 dBm) EiRP between 928 MHz - 1 GHz.

The above limits have been converted to dBuV/m and the plots included below to show compliance.

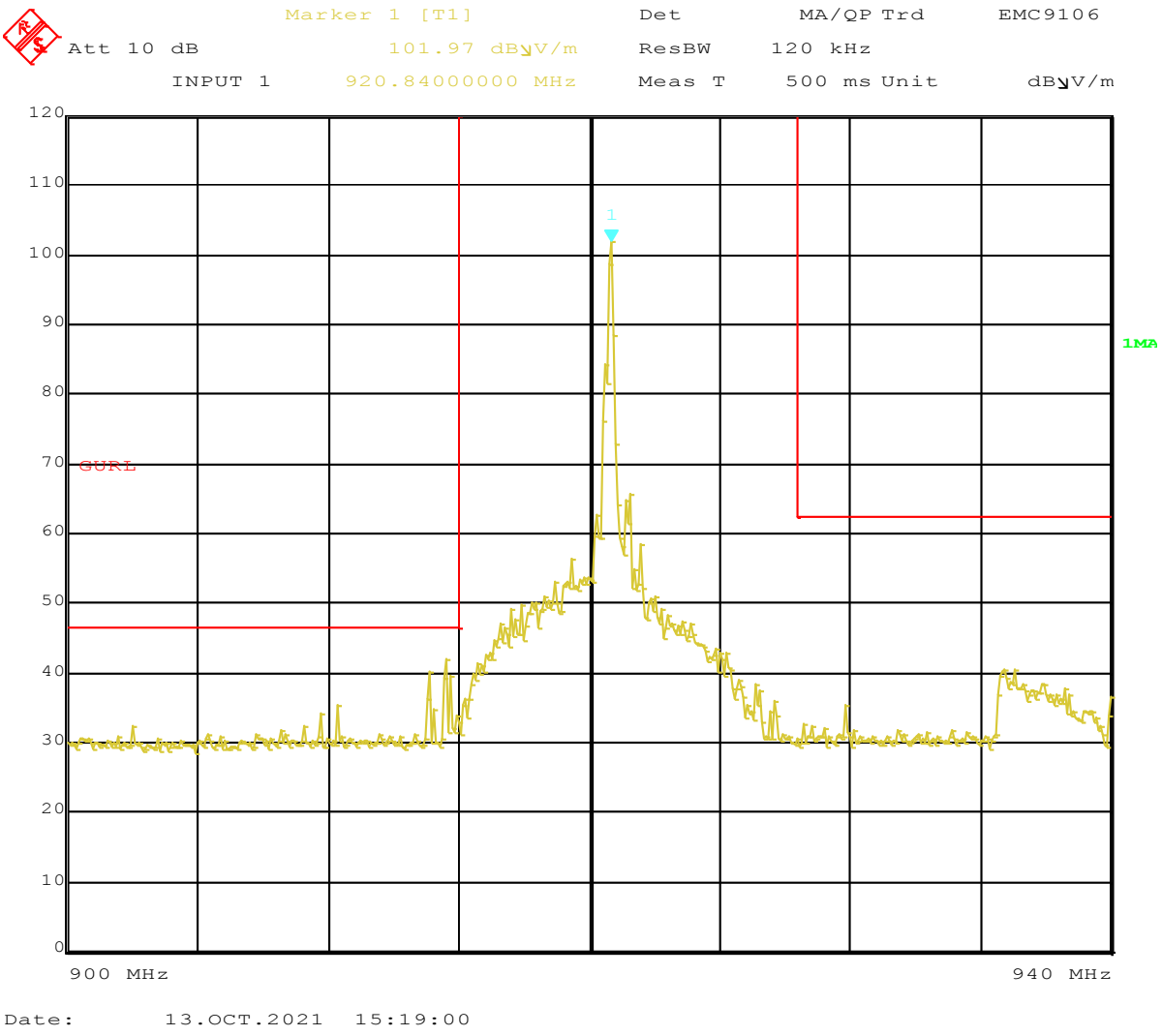
The yellow trace in the plots shows the measurement with a Peak detector.

The blue trace in the plot shows the measurement with an Average detector which is provided for information purposes.

Between 920 - 922 MHz, the instrument attenuation was increased by 20 dB to avoid overloading due to the transmit signal from the product.

Result: Complies.
Measurement Uncertainty: ± 4.1 dB

Transmitting on 920.800 MHz – Vertical Polarisation



Horizontal plot not shown as the vertical plot was the worst case.

Ambient cellular base station observed at approximately 938 MHz.

8. TEST EQUIPMENT USED

Instrument	Manufacturer	Model	Serial No	Asset Ref	Cal Due	Period
Aerial Controller	EMCO	1090	9112-1062	RFS 3710	Not applic	Not applic
Aerial Mast	EMCO	1070-1	9203-1661	RFS 3708	Not applic	Not applic
Turntable	EMCO	1080-1-2.1	9109-1578	RFS 3709	Not applic	Not applic
Log Periodic	Schwarzbeck	VUSLP 9111	9111-112	EMC4025	24 Sept 2022	3 years
Horn Antenna	Electrometrics	RGA-60	6234	E1494	25 March 2022	3 years
Receiver	R & S	ESIB 40	100295	EMC4030	11 Sept 2022	3 year

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

9. ACCREDITATIONS

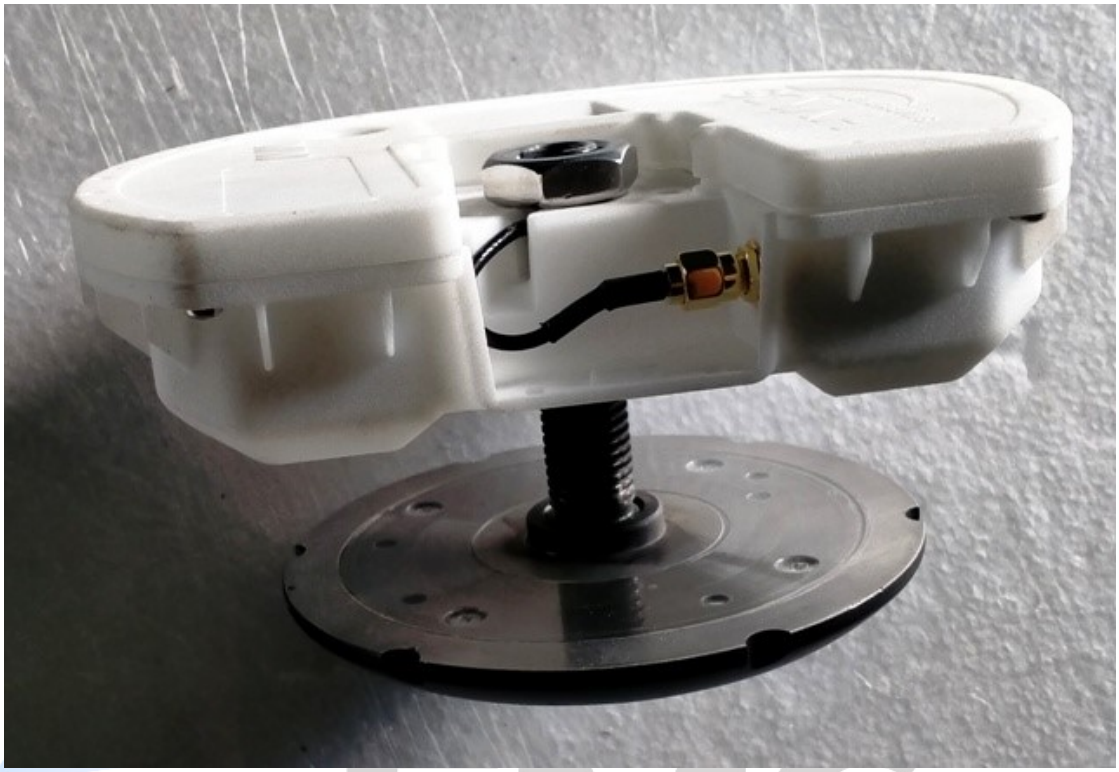
The tests were carried out in accordance with the terms of EMC Technologies (NZ) Ltd's International Accreditation New Zealand (IANZ) Accreditation to NZS/IEC/ISO 17025.

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

International Accreditation New Zealand has Mutual Recognition Arrangements for testing and calibration with a number of accreditation bodies in various economies. This includes NATA (Australia), UKAS (UK), SANAS (South Africa), NVLAP (USA), A2LA (USA), SWEDAC (Sweden). Further details can be supplied on request.

10. PHOTOGRAPHS

Device test photos



Test Set Up Photos