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EMC-EMF Safety Approvals

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## RADIO TEST REPORT

**REPORT NUMBER: M2105018-12**

**TEST STANDARD: FCC PART 15 SUBPART C SECTION 15.247**

**ISED RSS-247 SECTION 5.0**

**CLIENT: FLEET SPACE TECHNOLOGIES**

**DEVICE: FLEET PORTAL**

**MODEL: FSPOR0201-2**

**FCC ID: 2AZ55-FSPOR0201**

**IC: 27397-FSPOR0201**

**DATE OF ISSUE: 27 JULY 2021**

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Version	Sec/Para Changed	Change Made	Date
1		Initial issue of document	27/07/2021

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## RADIO TEST REPORT

### CERTIFICATE OF COMPLIANCE

Device: Fleet Portal  
Model: FSPOR0201-2  
Variant Model: FSPOR0201-3  
Manufacturer: Fleet Space Technologies

Radio Module: Semtech SX1250 LoRa Transceiver  
FCC ID: 2AZ55-FSPOR0201  
IC ID: 27397-FSPOR0201

Tested for: Fleet Space Technologies  
Address: 8A, Myer Court, Beverly, SA 5009  
Phone Number: +61 418823218  
Contact: Flavia Tata Nardini  
Email: flavia@fleetspace.com

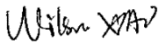

Standard: FCC Part 15, Subpart C, Section 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

ISED RSS-247, Issue 2, Section 5 Standard specifications for frequency hopping systems and digital transmission systems operating in the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz


Result: The Fleet Portal complied with the applicable requirements of the above standards. Refer to Report M2105018-12 for full details.

Test Dates: 9 – 11 June, 2021

Issue Date: 27 July 2021

Test Engineers:   
Wilson Xiao   
Ian Paul Ng

Attestation: *I hereby certify that the device(s) described herein were tested as described in this report and that the data included is that which was obtained during such testing.*

Authorised Signatory:   
Shabbir Ahmed, PhD  
Lead Engineer – Radio

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## RADIO REPORT FOR CERTIFICATION

### 1 TEST SUMMARY

Section	Description	FCC	ISED	Result(s)
6.1	Antenna Requirement	§15.203	RSS-Gen 6.8	Complied
6.2	Restricted Bands of Operation	§15.205	RSS-Gen 8.10	Complied
6.3	Radiated emission limits; general requirements	§15.209	RSS-Gen 8.9	Complied
6.4	Conducted Limits	§15.207	RSS-Gen 8.8	Complied
6.5	6 dB Bandwidth	§15.247(a)(2)	RSS-247 5.2(a)	Complied
6.6	Peak Output Power	§15.247(b)(3)	RSS-247 5.4(d)	Complied
6.7	Out-of-Band/Spurious Emissions	§15.247(d)	RSS-247 5.5	Complied
6.8	Band-Edge Emission Measurements	§15.247(d)	RSS-247 5.5	Complied
6.9	Power spectral density	§15.247(e)	RSS-247 5.2(b)	Complied
6.10	Maximum Permissible Exposure	§15.247(i)	RSS-102	Complied
6.11	Occupied Bandwidth – 99% power	§15.215	RSS-Gen 6.7	Complied

### 2 TEST FACILITY

#### 2.1 General

EMC Technologies Pty Ltd is accredited by the FCC as a test laboratory able to perform compliance testing for the public. EMC Technologies Pty Ltd has also been designated as a Conformity Assessment Body (CAB) by Australian Communications and Media Authority (ACMA) under the APECTEL MRA and is designated to perform compliance testing on equipment subject to Declaration of Conformity (DoC) and Certification under Parts 15 and 18 of the FCC Commission’s rules – **Registration Number 494713 & Designation number AU0001.**

EMC Technologies Pty Ltd is also an ISED Canada recognized testing laboratory – **ISED company number: 3569B and CAB identifier number: AU0001.**

#### 2.2 Test Laboratory/Accreditations

NATA is the Australian National laboratory accreditation body and has accredited EMC Technologies to operate to the IEC/ISO17025 requirements. A major requirement for accreditation is the assessment of the company and its personnel as being technically competent in testing to the standards. This requires fully documented test procedures, continued calibration of all equipment to the National Standard at the National Measurements Institute (NMI) and an internal quality system similar to ISO 9002. NATA has mutual recognition agreements with the National Voluntary Laboratory Accreditation Program (NVLAP) and the American Association for Laboratory Accreditation (A<sup>2</sup>LA).

All testing in this report has been conducted in accordance with EMC Technologies’ scope of NATA accreditation to ISO 17025 for both testing and calibration and ISO 17020 for Inspection – **Accreditation Number 5292.**

The current full scope of accreditation can be found on the NATA website: [www.nata.com.au](http://www.nata.com.au)

### 3 TEST EQUIPMENT CALIBRATION

Measurement instrumentation and transducers were calibrated in accordance with the applicable standards by an independent NATA registered laboratory such as Keysight Technologies (Australia) Pty Ltd or the National Measurement Institute (NMI) or in-house. All equipment calibration is traceable to Australian national standards at the National Measurements Institute.

Equipment Type	Make/Model/Serial Number	Last Cal. dd/mm/yyyy	Due Date dd/mm/yyyy	Cal. Interval
Chamber	Frankonia SAC-3-2 (R-144)	10/08/2020	10/08/2023	3 Year <sup>*1</sup>
EMI Receiver	R&S ESU40 Sn: 100392 (R-140)	03/05/2021	03/05/2022	1 Year <sup>*2</sup>
Antennas	EMCO 6507 Active Loop Antenna Sn: 9001-1194 (A-238)	09/04/2021	09/04/2023	2 Year <sup>*2</sup>
	SUNOL JB1 Sn. A061917 (A-425)	04/09/2019	04/09/2021	2 Year <sup>*2</sup>
	EMCO 3115 Horn Antenna Sn: 8908-3282 (A-004)	16/01/2019	16/01/2022	3 Year <sup>*1</sup>
Cables <sup>*3</sup>	Huber & Suhner Sucoflex 104A Sn: 503055 (C-457)	05/01/2021	05/01/2022	1 Year <sup>*1</sup>
	Huber & Suhner Sucoflex 104A Sn: 800448 (C-520)	05/01/2021	05/01/2022	1 Year <sup>*1</sup>

Note \*1. Internal NATA calibration.

Note \*2. External NATA / A2LA calibration.

Note \*3. Cables are verified before measurements are taken.

### 4 MEASUREMENT UNCERTAINTY

EMC Technologies has evaluated the equipment and the methods used to perform the emissions testing. The estimated measurement uncertainties for emissions tests shown within this report are as follows:

<b>Radiated Emissions:</b>	9 kHz to 30 MHz	±4.1 dB
	30 MHz to 300 MHz	±5.1 dB
	300 MHz to 1000 MHz	±4.7 dB
	1 GHz to 18 GHz	±4.6 dB
	18 GHz to 40 GHz	±4.6 dB
<b>Peak Output Power:</b>		±1.5 dB

The above expanded uncertainties are based on standard uncertainties multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

#### Application of measurement uncertainty for this report:

The referenced uncertainty standard specifies that determination of compliance shall be based on measurements without taking into account measurement instrumentation uncertainty. However, the measurement uncertainty shall appear in the test report.



## 5 Device Details

(Information supplied by the Client)

The device is a network system that performs the collection and storage of data from the LoRa IoT deployment, as well as forwarding of this data to the satellite constellation.

### 5.1 EUT (Transmitter) Details

<b>Radio:</b>	Semtech SX1250 LoRa Transceiver
<b>Number of Channels:</b>	8
<b>Frequency Band:</b>	902 – 928 MHz
<b>Operating Frequency:</b>	Low Channel: 923.3 MHz
	Mid Channel: 925.7 MHz
	High Channel: 927.5 MHz
<b>Modulation:</b>	LoRa*
<b>Nominal Bandwidth:</b>	500 kHz (declared by client)
<b>Antenna:</b>	External - Blackhawk BH-OM-204 Omni Antenna
<b>Antenna Peak Gain:</b>	6 dBi

Note: LoRa is Semtech's proprietary spread-spectrum modulation technique derived from existing Chirp Spread Spectrum (CSS) technology.

### 5.2 EUT (Host) Details

<b>Test Sample:</b>	Fleet Portal
<b>Model:</b>	FSPOR0201-2
<b>Variant Model:</b>	FSPOR0201-3
<b>Supply Plug:</b>	Meanwell AC/DC Switching Adaptor Model No: GST60A12 Input: 100-240VAC, 50/60Hz Output: 12VDC, 5.0A, 60W Max

### 5.3 Test Configuration

Testing was performed with the transceiver set to transmit continuously at Low, Mid and High Channels with the following commands during the test.

#### Low channel – 923.3 MHz

```
cd /usr/bin/ap1 && ./reset lqw.sh reset && /opt/libloragw-sx1302/gateway-  
utils/test loragw hal tx -k 0 -c 0 -r 1250 -f 923.3 -m LORA -s 7 -b 500 -n 100000 -t 1000 -j -e  
/dev/spidev2.0 -p 23 --mix 5 --pa 1 --pwid 6
```

#### Mid channel – 925.7 MHz

```
cd /usr/bin/ap1 && ./reset lqw.sh reset && /opt/libloragw-sx1302/gateway-  
utils/test loragw hal tx -k 0 -c 0 -r 1250 -f 925.7 -m LORA -s 7 -b 500 -n 100000 -t 1000 -j -e  
/dev/spidev2.0 -p 23 --mix 5 --pa 1 --pwid 6
```

#### High channel – 927.5 MHz

```
cd /usr/bin/ap1 && ./reset lqw.sh reset && /opt/libloragw-sx1302/gateway-  
utils/test loragw hal tx -k 0 -c 0 -r 1250 -f 927.5 -m LORA -s 7 -b 500 -n 100000 -t 1000 -j -e  
/dev/spidev2.0 -p 23 --mix 5 --pa 1 --pwid 6
```

### 5.4 Modifications

No modifications were required to achieve compliance.

### 5.5 Deviations from the Standard

No deviations from the Standard.

## 6 RESULTS

### 6.1 §15.203 / RSS-Gen 6.8 Antenna Requirement

The device has a SMA Female Connector and incorporates the following external antenna only:

**RF Cable 1:** SMA Male to N-Type Female

**RF Cable 2:** N-Type Male to N-Type Male

**Antenna:** Blackhawk BH-OM-204 Omni Antenna

**Antenna gain:** 6 dBi

**Antenna Connector:** N-Type Female

The above antenna will be installed by professional installers who have been trained by Fleet Space Technologies. Such installation shall be accomplished using only antennas and installation materials provided by Fleet Space Technologies. Fleet Space Technologies Said installation will preclude any unauthorized switching of antennas.

### 6.2 §15.205 / RSS-Gen 8.10 / RSS-247 3.3 Restricted Bands of Operation

The provisions of the §15.205/ RSS-Gen 8.10/ RSS-247 3.3 restricted bands of operation and §15.209 radiated emissions limits have been met, refer to section 6.7

### 6.3 §15.209 / RSS-Gen 8.9 Radiated emission limits; general requirements

The provisions of the §15.205/ RSS-Gen 8.10/ RSS-247 3.3 restricted bands of operation and §15.209/ RSS-Gen 8.9 radiated emissions limits have been met, refer to section 6.7

### 6.4 §15.207 / RSS-Gen 8.8 Conducted Limits

#### 6.4.1 Test Procedure

The arrangement specified in ANSI C63.10: 2013 was adhered to for the conducted EMI measurements. The EUT was placed in the RF screened enclosure and a CISPR EMI Receiver as defined in ANSI C63.2: 2009 was used to perform the measurements.

The specified 0.15 MHz to 30 MHz frequency range was sub-divided into sub-ranges to ensure that all short duration peaks were captured. For each of the sub-ranges, the EMI receiver was set to continuous scan with the Peak detector set to Max-Hold mode. The Quasi-Peak detector and the Average detector were then invoked to measure the actual Quasi-Peak and Average level of the most significant peaks, which were detected.

#### 6.4.2 Limits

The limit applied was in accordance to the conducted limits defined in §15.207 / RSS-Gen 8.8.

### 6.4.3 Results

Fleet Space Technologies  
 Portal & Modem System  
 LoRa - single channel board  
 Low channel 923.3 MHz - 120V/60Hz

Limit1: FCC207\_QP FCC Part 15.207 Conducted Quasi-Peak Limit  
 Limit2: FCC207\_AV FCC Part 15.207 Conducted Average Limit

Trace 2: Active Line  
 Trace 3: Neutral Line

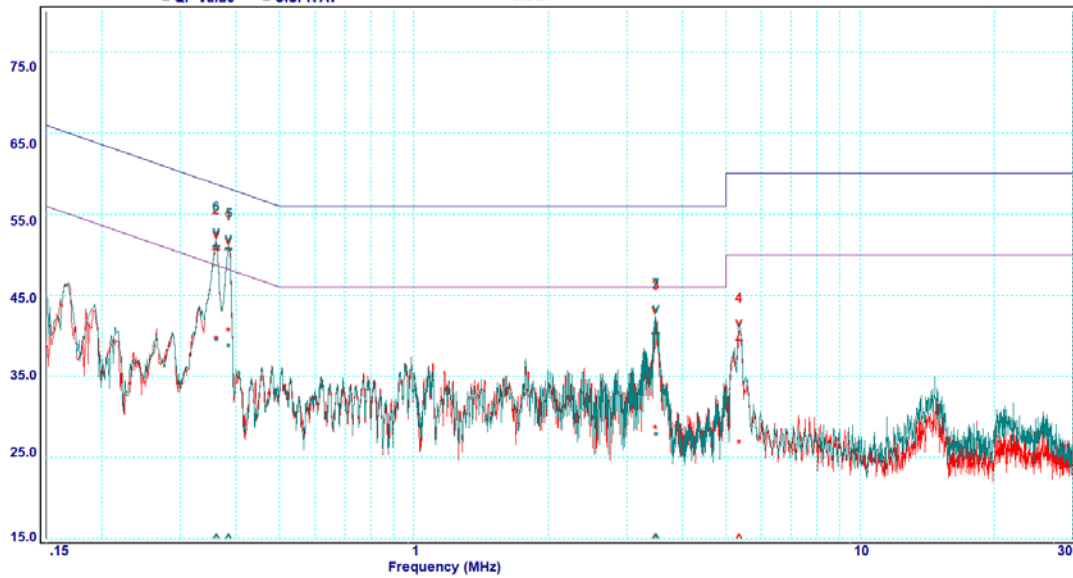
Job No: M2105018

Test Date:  
 Test Officer: Ian Ng-Plot date: 06-23-2021 12:07:55  
 t:L0771121 c1:C4450222 c2:p:NONE a:L0170222  
 Site ID:

WintstRS:32.8-Wplt:164.25-Rx:R&S\_ESCI-3,100011/00

Conducted Emissions (dBuV)  
 ~ = QP Value \* = CISPR Av

Graph No. 3



Graph 6-1: AC Conducted Emission, Low channel, 923.3 MHz

Table 6-1: AC Conducted Emission, Low channel, 923.3 MHz

Peak	Frequency [MHz]	Line	Quasi-Peak			Average		
			Level [dBμV]	Limit [dBμV]	Margin [dB]	Level [dBμV]	Limit [dBμV]	Margin [dB]
1	0.385	Active	50.7	58.2	-7.5	40.4	48.2	-7.8
2	0.361	Active	50.6	58.7	-8.1	39.4	48.7	-9.3
3	3.485	Active	40.2	56.0	-15.8	28.4	46.0	-17.6
4	5.361	Active	39.4	60.0	-20.6	26.6	50.0	-23.4
5	0.385	Neutral	50.5	58.2	-7.7	38.4	48.2	-9.8
6	0.361	Neutral	50.9	58.7	-7.8	39.2	48.7	-9.5
7	3.490	Neutral	40.2	56.0	-15.8	27.5	46.0	-18.5

Fleet Space Technologies  
 Portal & Modem System  
 LoRa - single channel board - 6dBI  
 Mid channel 925.7 MHz - 120V/60Hz

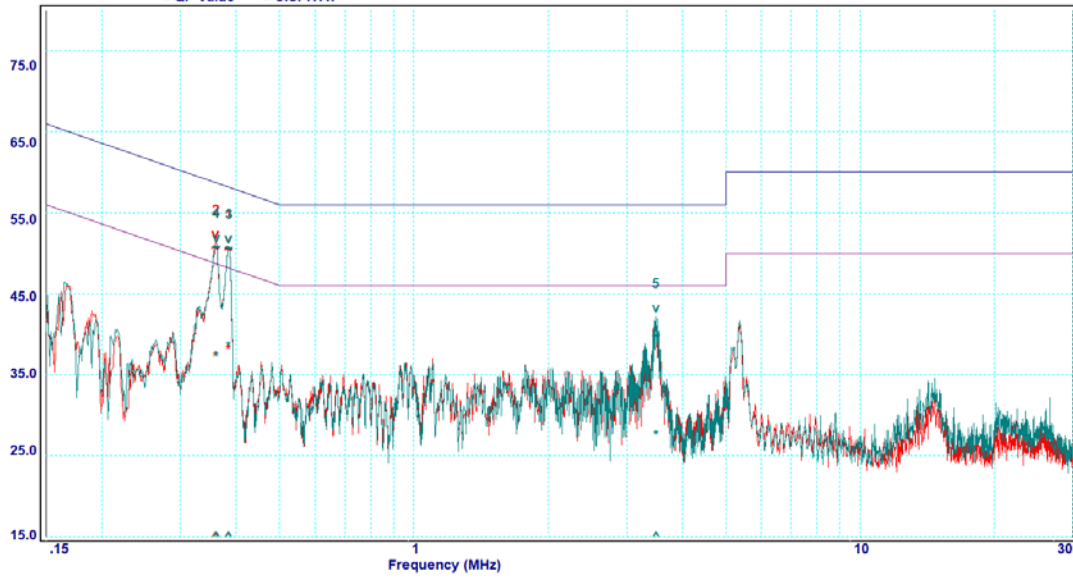
Limit1: FCC207\_QP FCC Part 15.207 Conducted Quasi-Peak Limit  
 Limit2: FCC207\_AV FCC Part 15.207 Conducted Average Limit  
 Trace 2: Active Line  
 Trace 3: Neutral Line

Conducted Emissions (dBuV)  
 ~ = QP Value \* = CISPR Av

Job No: M2105018  
 Test Date:

Test Officer: Ian Ng, Plot date: 06-23-2021 12:08:28  
 t:L0771121 c1:C4450222 c2:p:NONE s:L0170222  
 Site ID:

WinstorS:32.8-Wplt:164.25-Rx:R&S,ESCI-3,100011/00  
 Graph No. 4



Graph 6-2: AC Conducted Emission, Mid channel, 925.7 MHz

Table 6-2: AC Conducted Emission, Mid channel, 925.7 MHz

Peak	Frequency [MHz]	Line	Quasi-Peak			Average		
			Level [dBμV]	Limit [dBμV]	Margin [dB]	Level [dBμV]	Limit [dBμV]	Margin [dB]
1	0.385	Active	50.4	58.2	-7.8	38.1	48.2	-10.1
2	0.360	Active	50.6	58.7	-8.1	37.2	48.7	-11.5
3	0.385	Neutral	50.5	58.2	-7.7	38.4	48.2	-9.8
4	0.361	Neutral	50.6	58.7	-8.1	37.2	48.7	-11.5
5	3.486	Neutral	39.8	56.0	-16.2	27.5	46.0	-18.5

Fleet Space Technologies  
 Portal & Modem System  
 LoRa - single channel board - 6dBI  
 High channel 927.5 MHz - 120V/60Hz

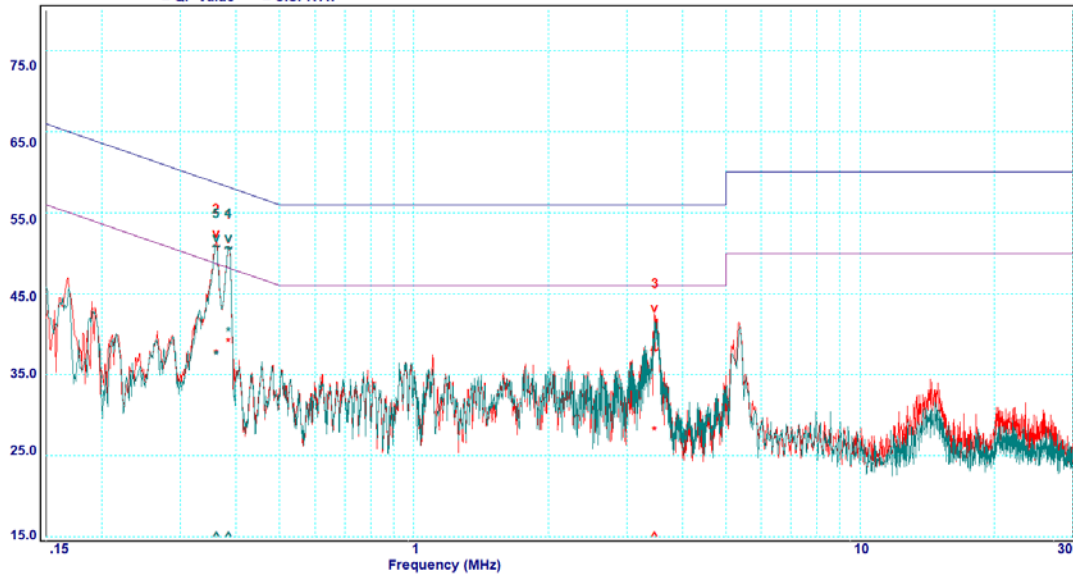
Limit1: FCC207\_QP FCC Part 15.207 Conducted Quasi-Peak Limit  
 Limit2: FCC207\_AV FCC Part 15.207 Conducted Average Limit  
 Trace 2: Active Line  
 Trace 3: Neutral Line

Conducted Emissions (dBuV)  
 ~ = QP Value \* = CISPR Av

Job No: M2105018  
 Test Date:

Test Officer: Ian Ng, Plot date: 06-23-2021 12:09:30  
 t:L0771121 c1:C4450222 c2:p:NONE a:L0170222  
 Site ID:

WinstorS:32.8-WpIt:164.25-Rx:R&S,ESCI-3,100011/00  
 Graph No. 5



Graph 6-3: AC Conducted Emission, High channel, 927.5 MHz

Table 6-3: AC Conducted Emission, High channel, 927.5 MHz

Peak	Frequency [MHz]	Line	Quasi-Peak			Average		
			Level [dBμV]	Limit [dBμV]	Margin [dB]	Level [dBμV]	Limit [dBμV]	Margin [dB]
1	0.384	Active	50.6	58.2	-7.6	38.9	48.2	-9.3
2	0.361	Active	50.8	58.7	-7.9	37.5	48.7	-11.2
3	3.466	Active	37.9	56.0	-18.1	28.0	46.0	-18.0
4	0.385	Neutral	50.6	58.2	-7.6	40.2	48.2	-8.0
5	0.361	Neutral	50.7	58.7	-8.0	37.3	48.7	-11.4

## 6.5 §15.247(a)(2) / RSS-247 5.2(a) 6 dB bandwidth

### 6.5.1 Test Procedure

The tests were performed in accordance with ANSI C63.10: 2013 Clause 11.8 DTS bandwidth. The 6 dB bandwidth was measured while the device was transmitting with typical modulation applied. The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were utilised when measuring the bandwidth.

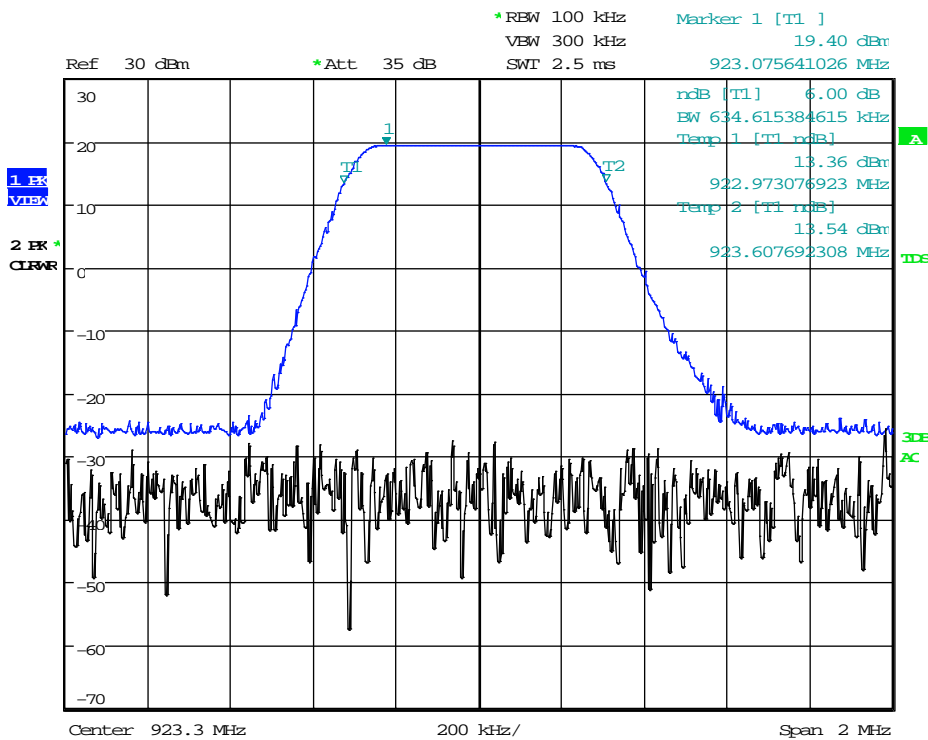
### 6.5.2 Limits

In the band 902 - 928 MHz, the minimum 6 dB bandwidth is to be at least 500 kHz.

### 6.5.3 Results

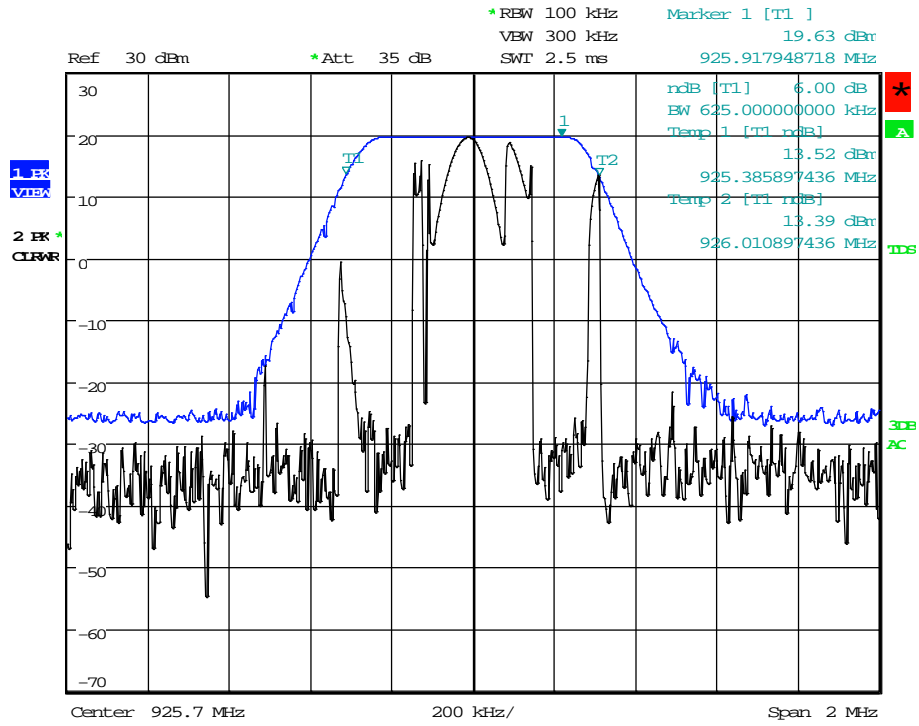
Table 6-4: 6 dB Bandwidth

Freq. [MHz]	6 dB Bandwidth [kHz]	Limit [kHz]
923.3	634.61	>= 500
925.7	625.00	>= 500
9275.	615.38	>= 500



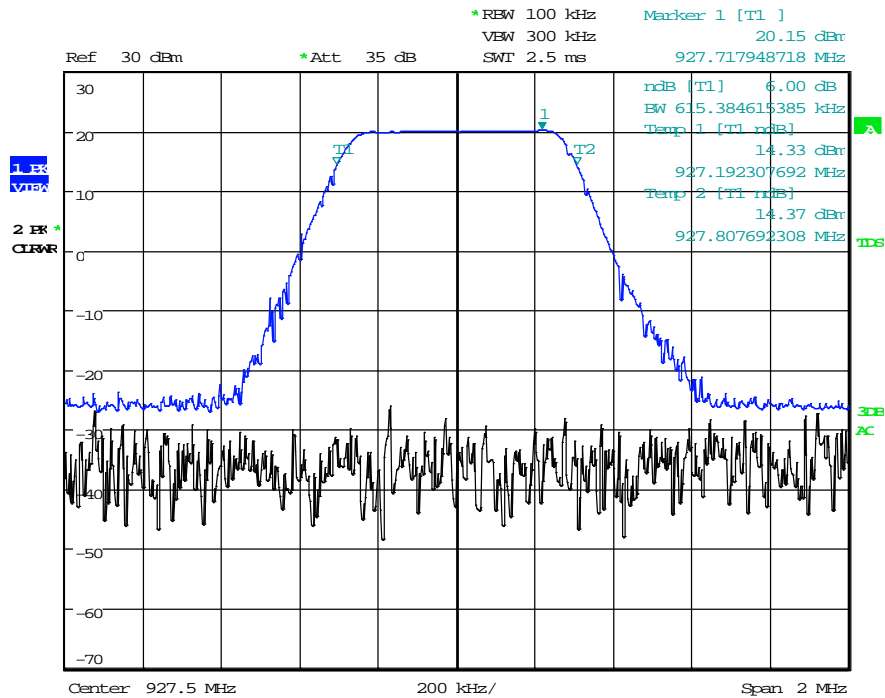
Date: 9.JUN.2021 10:31:07

Graph 6-4: 6 dB Bandwidth, 923.3 MHz



Date: 9.JUN.2021 10:26:48

Graph 6-5: 6 dB Bandwidth, 925.7 MHz



Date: 9.JUN.2021 10:22:40

Graph 6-6: 6 dB Bandwidth, 927.5 MHz

## 6.6 §15.247(b)(3) / RSS-247 5.4(d) Peak Output Power

### 6.6.1 Test Procedure

The Peak Power of fundamental transmitted frequency was measured with conducted method in accordance to ANSI C63.10: 2013 clause 11.9.1.1.

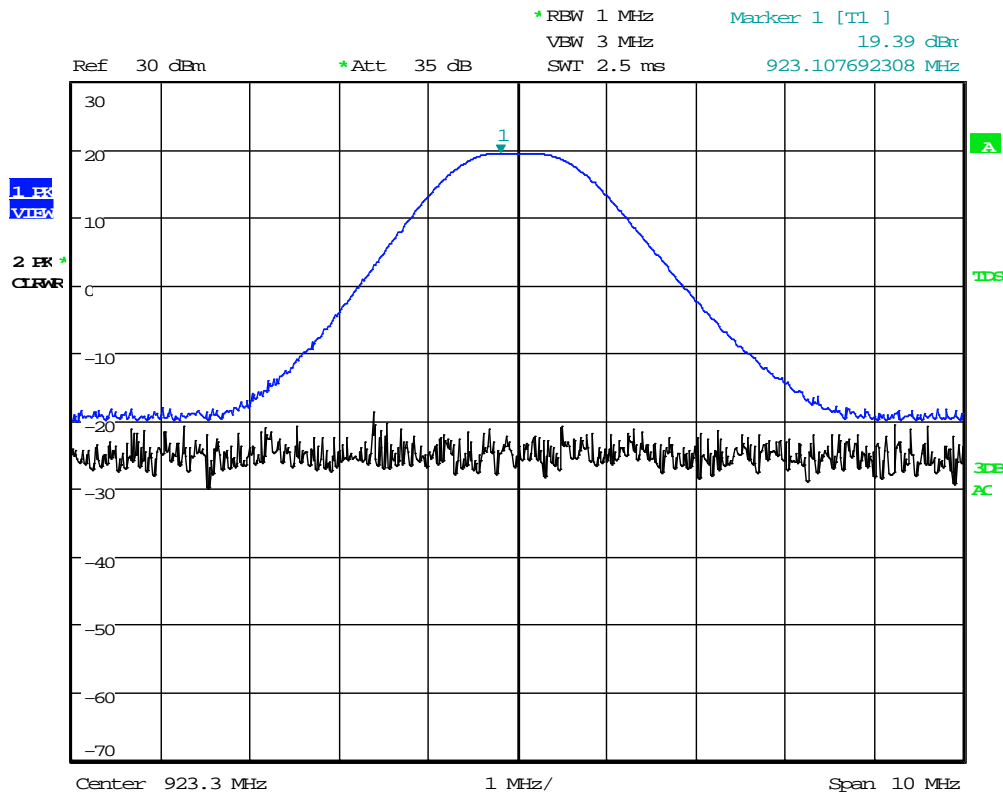
### 6.6.2 Limits

The maximum conducted output power at 902 - 928 MHz is 1W or 30 dBm.

### 6.6.3 Results

Table 6-5: Maximum Conducted Output Power

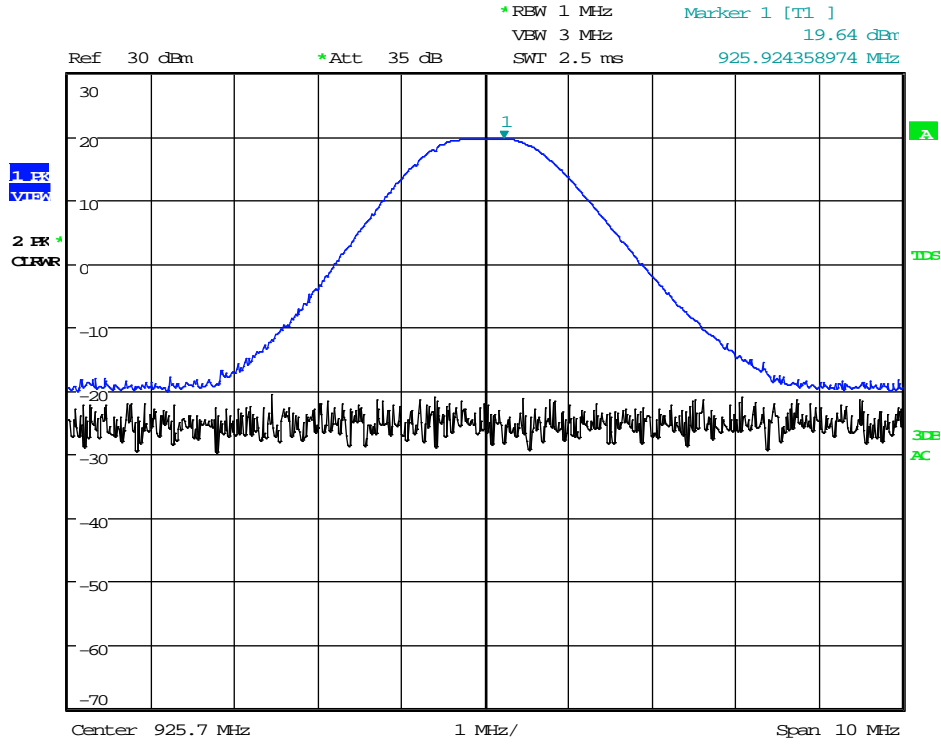
Freq. [MHz]	Conducted Output Power (dBm)	Limit (dBm)	Results
923.3	19.39	30	Complied
925.7	19.64	30	Complied
927.5	20.20	30	Complied



Date: 9.JUN.2021 11:02:22

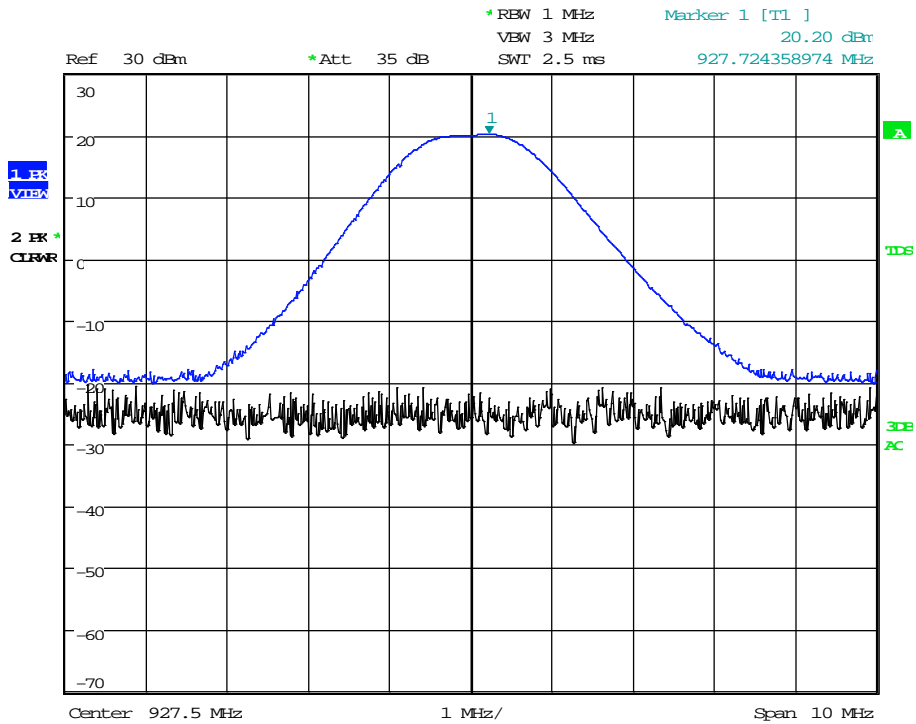
Graph 6-7: Maximum Conducted Output Power, 923.3 MHz





Date: 9.JUN.2021 11:00:18

Graph 6-8: Maximum Conducted Output Power, 925.7 MHz



Date: 9.JUN.2021 10:56:56

Graph 6-9: Maximum Conducted Output Power, 927.5 MHz

## 6.7 §15.247(d) / RSS-247 5.5 Out-of-Band/Spurious Emissions

### 6.7.1 Test procedure

Radiated out-of-band/spurious emissions measurements were performed in a semi-anechoic chamber compliant with ANSI C63.4: 2014.

The test frequency range was sub-divided into smaller bands with the defined resolution bandwidths to permit reliable display and identification of emissions.

Frequency range [MHz]	Measurement Bandwidth [kHz]	Measurement Distance [m]	Antenna
0.009 to 0.150	0.2	3	0.6 metre loop antenna
0.150 to 30	9	3	
30 to 1000	120	3	Biconilog hybrid
1000 to 18 000	1000	3	Standard gain or broadband horn
18 000 to 40 000	1000	1	

EUT was set at a height of 0.8 m for measurements below 1000 MHz and set at a height of 1.5 m for measurements above 1000 MHz.

The sample was slowly rotated with the spectrum analyser set to Max-Hold. This was performed for at least two antenna heights. When an emission was located, it was positively identified and its maximum level found by rotating the automated turntable and by varying the antenna height. For below 1000 MHz the emissions were measured with a Quasi-Peak detector, and for above 1000 MHz the emissions were measured with Peak and Average detectors.

The measurement data for each frequency range was corrected for cable losses, antenna factors and preamplifier gain. This process was performed for both horizontal and vertical polarisations of the measurement antenna.

Measurements on the worst EUT orientation axis are presented below.

### 6.7.2 Limits

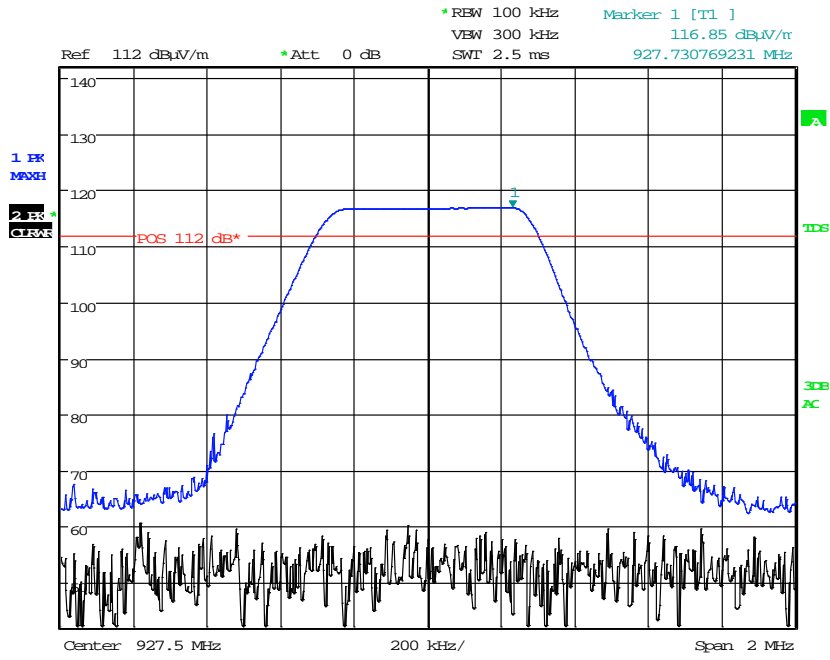
The limit applied is in accordance with the out-of-band/spurious emissions limit defined in §15.247(d).

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

The in-band peak PSD in 100 kHz bandwidth were measured on all channels according to ANSI C63.10-2013 clause 11.11.2. The maximum PSD level was used to establish the limit for nonrestricted frequency bands. However, the general limits of §15.209 apply for the restricted bands of operation defined in §15.205.

Table 6-6: 100 kHz reference level measurement

Freq. (MHz)	Peak at 3 m (dBµV/m)	Established Limit @ 3 m (dBµV/m)
927.5	116.85	96.85



Date: 9.JUN.2021 14:15:59

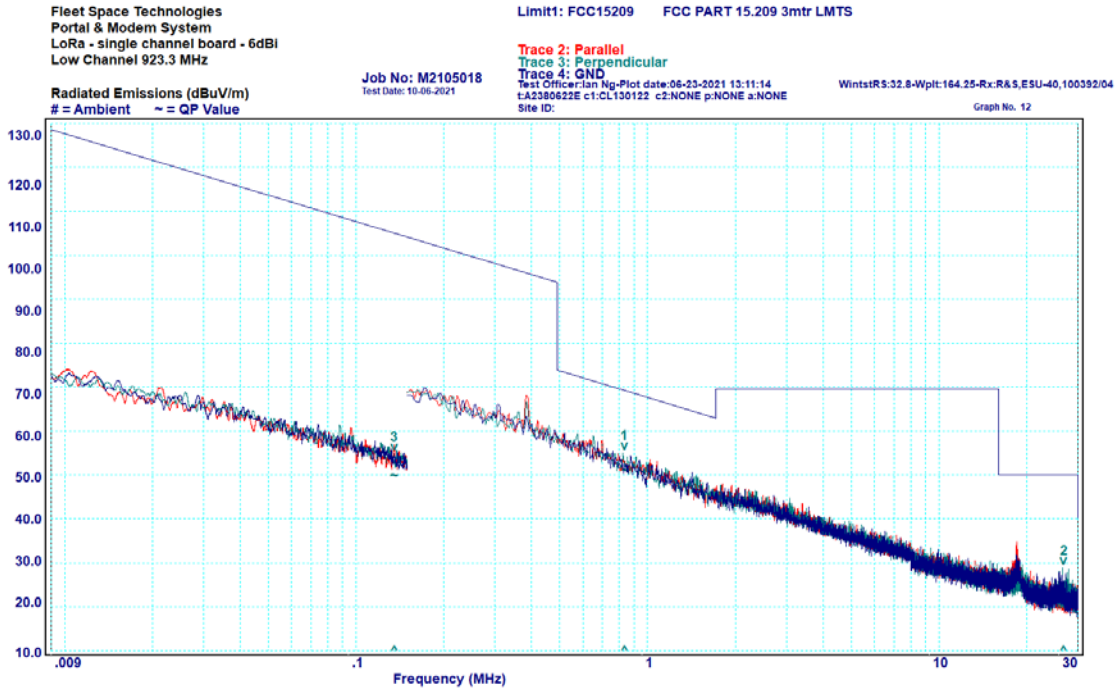
Graph 6-10: 100 kHz reference level measurement



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### 6.7.3 Transmitter Spurious Emissions: 9 kHz to 30 MHz

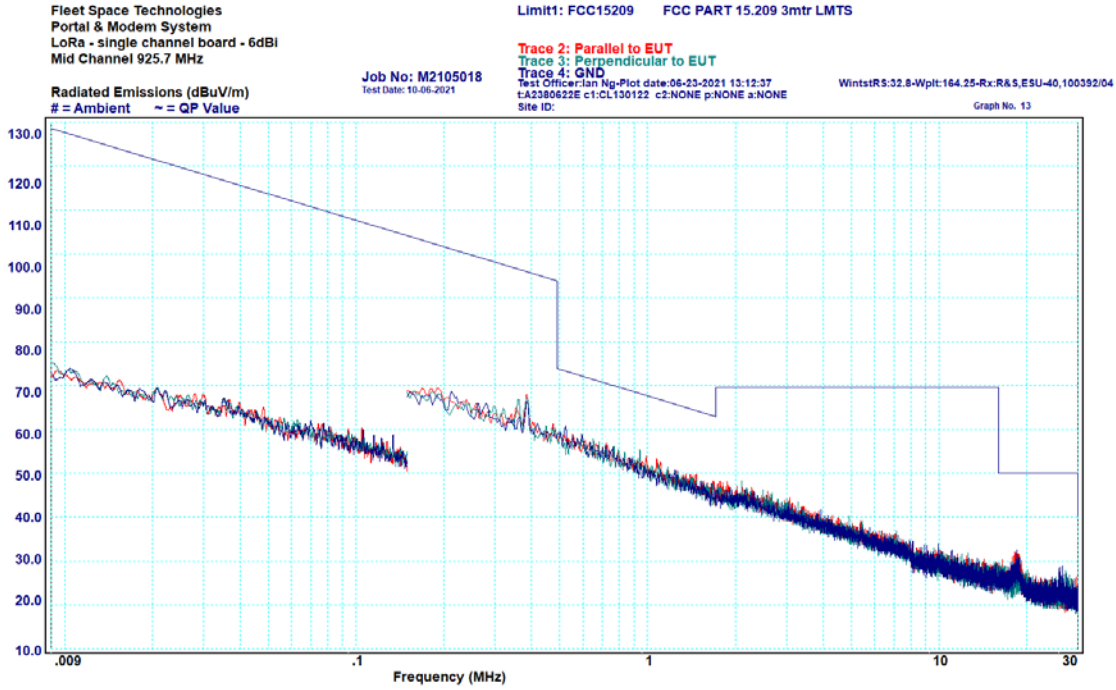
All emissions measured in the frequency band 9kHz - 30MHz complied with the requirements of the standard.



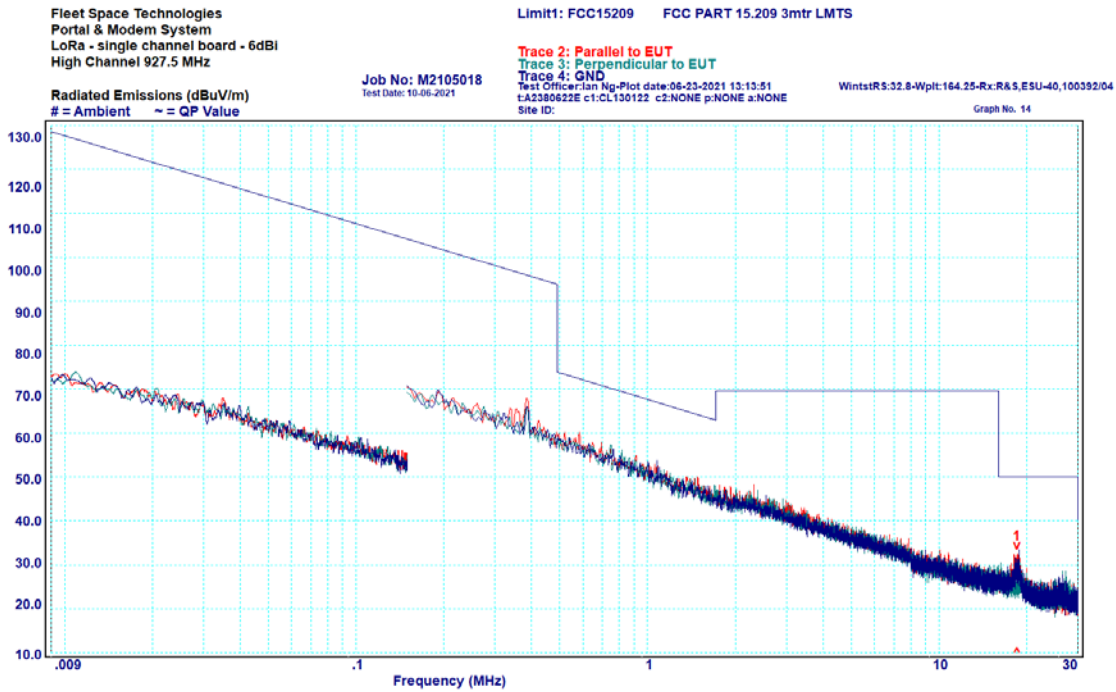
Graph 6-11: Transmitter Spurious Emissions, 9 kHz – 30 MHz, 923.3 MHz

Table 6-7: Transmitter Spurious Emissions, 9 kHz – 30 MHz, 923.3 MHz

Peak	Frequency [MHz]	Polarisation	Quasi peak		
			Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]
1	0.833	Perpendicular	51	69.2	-18.2
2	26.85	Perpendicular	24.2	50	-25.8
3	0.135	Perpendicular	49.9	105	-55.1



Graph 6-12: Transmitter Spurious Emissions, 9 kHz – 30 MHz, 925.7 MHz



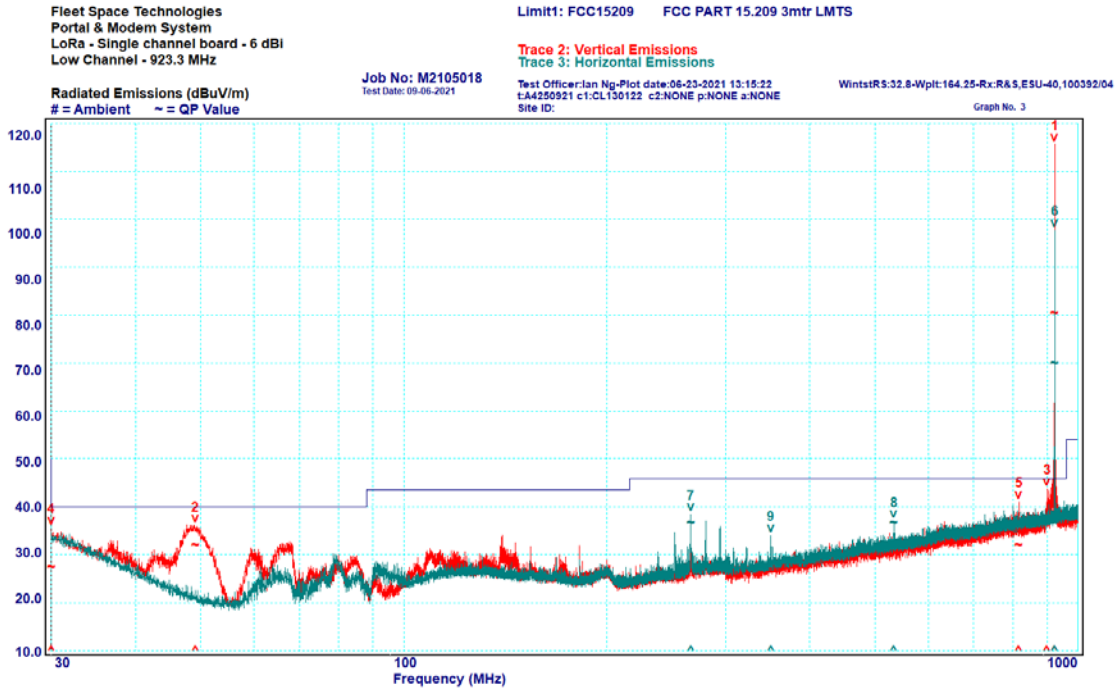
Graph 6-13: Transmitter Spurious Emissions, 9 kHz – 30 MHz, 927.5 MHz

Table 6-8: Transmitter Spurious Emissions, 9 kHz – 30 MHz, 927.5 MHz

Peak	Frequency [MHz]	Polarisation	Quasi peak		
			Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]
1	18.54	Parallel	28.6	50	-21.4

### 6.7.4 Transmitter Spurious Emissions: 30 - 1000 MHz

All emissions measured in the frequency band 30 – 1000 MHz complied with the requirements of the standard.

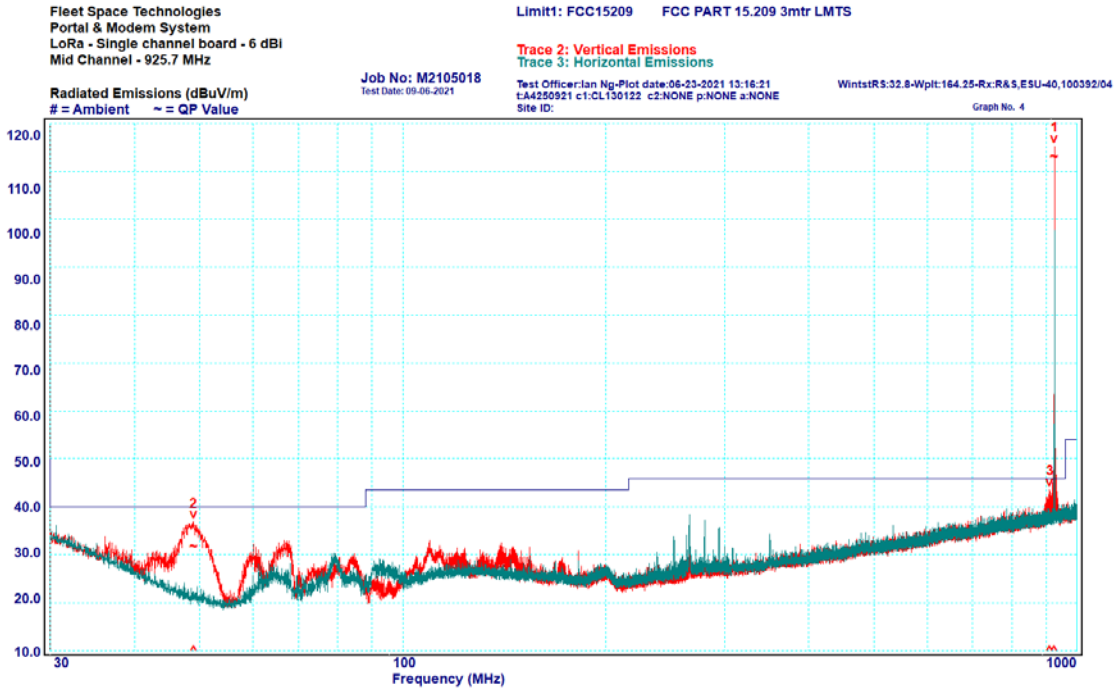


Graph 6-14: Transmitter Spurious Emissions, 30 – 1000 MHz, 923.3 MHz

Table 6-9: Transmitter Spurious Emissions, 30 – 1000 MHz, 923.3 MHz

Peak	Frequency [MHz]	Polarisation	Quasi peak		
			Level [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]
1*	923.08	Vertical	N/A	N/A	N/A
2	49.09	Vertical	32	40	-8
3	899.42	Vertical	37.8	46	-8.2
4	30	Vertical	27.3	40	-12.7
5	816.93	Vertical	32	46	-14
6*	923.51	Horizontal	N/A	N/A	N/A
7	266.33	Horizontal	36.6	46	-9.4
8	533.09	Horizontal	36.6	46	-9.4
9	350.26	Horizontal	28.6	46	-17.4

Note, Peaks 1 and 6 are the fundamental transmission and are not subject the spurious limit of the standard.

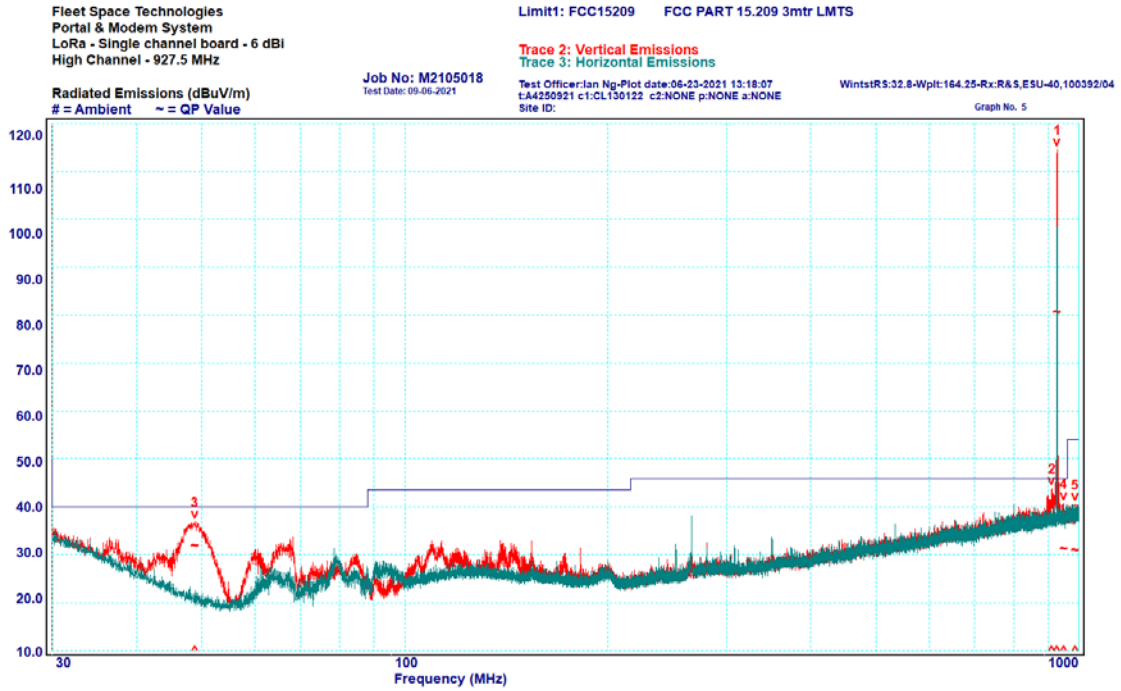


Graph 6-15: Transmitter Spurious Emissions, 30 – 1000 MHz, 925.7 MHz

Table 6-10: Transmitter Spurious Emissions, 30 – 1000 MHz, 925.7 MHz

Peak	Frequency [MHz]	Polarisation	Quasi peak		
			Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]
1*	925.93	Vertical	N/A	N/A	N/A
2	48.94	Vertical	31.7	40	-8.3
3	911.26	Vertical	37.6	46	-8.4

Note, Peaks 1 is the fundamental transmission and is not subject the spurious limit of the standard.



Graph 6-16: Transmitter Spurious Emissions, 30 – 1000 MHz, 927.5 MHz

Table 6-11: Transmitter Spurious Emissions, 30 – 1000 MHz, 927.5 MHz

Peak	Frequency [MHz]	Polarisation	Quasi peak		
			Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]
1*	927.73	Vertical	N/A	N/A	N/A
2	912.01	Vertical	37.9	46	-8.1
3	48.84	Vertical	31.8	40	-8.2
4	948.72	Vertical	31.2	46	-14.8
5	986.31	Vertical	30.9	54	-23.1

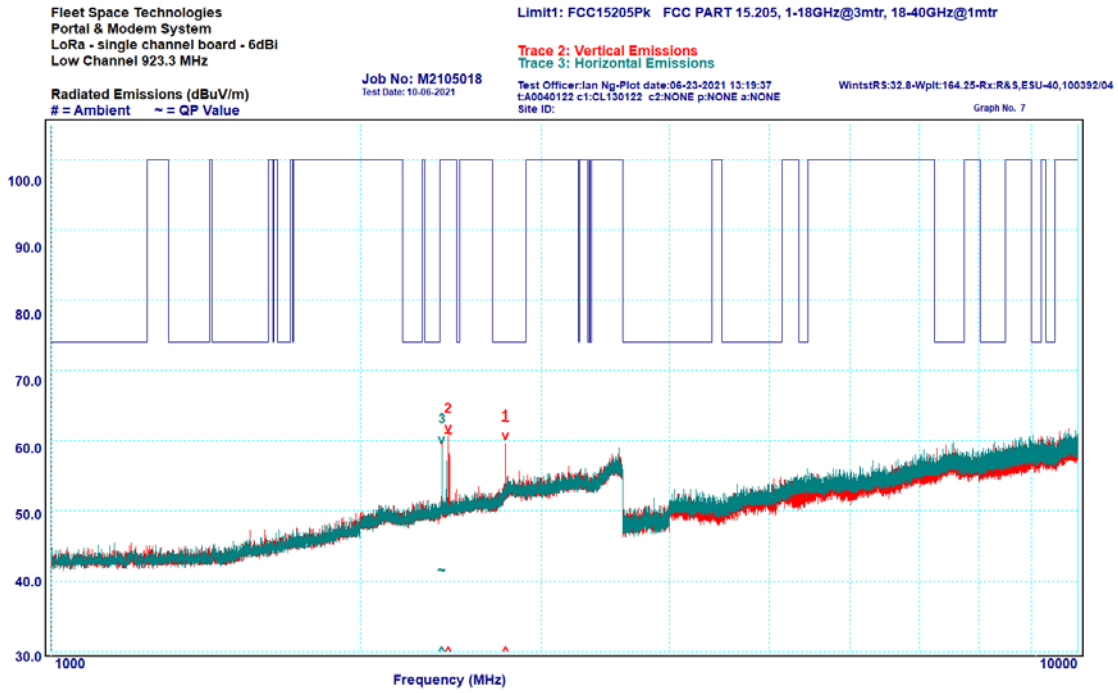
Note, Peaks 1 is the fundamental transmission and is not subject the spurious limit of the standard.



### 6.7.5 Transmitter Spurious Emissions: 1 - 10 GHz

All emissions measured in the frequency band 1 – 10 GHz complied with the requirements of the standard.

#### Peak Measurements:



Graph 6-17: Transmitter Spurious Emissions, 1 – 10 GHz, Peak, 923.3 MHz

Table 6-12: Transmitter Spurious Emissions, 1 – 10 GHz, Peak, 923.3 MHz

Peak	Frequency [MHz]	Polarisation	Peak		
			Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]
1	2770.36	Vertical	62.7	74	-11.3
2	2436.1	Vertical	61	96.85	-35.85
3	2401.81	Horizontal	41.6	96.85	-55.25

Fleet Space Technologies  
 Portal & Modem System  
 LoRa - single channel board - 6dBi  
 Mid Channel 925.7 MHz

Limit1: FCC15205Pk FCC PART 15.205, 1-18GHz@3mtr, 18-40GHz@1mtr

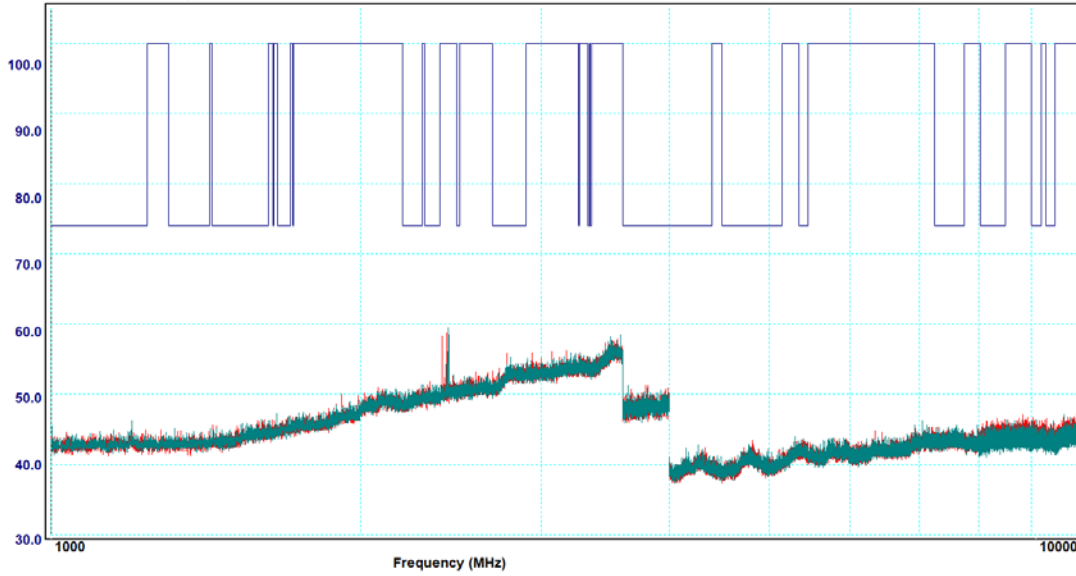
Trace 2: Vertical Emissions  
 Trace 3: Horizontal Emissions

Radiated Emissions (dBuV/m)  
 # = Ambient ~ = QP Value

Job No: M2105018  
 Test Date: 10-06-2021

Test Officer: Ian Ng-Plot date: 06-23-2021 13:23:12  
 LA0040122 c1:CL130122 c2:NONE p:A2881221 a:F0250122  
 Site ID:

WinstR:32.8-Wplit:164.25-Rx:R&S,ESU-40,100392/04  
 Graph No. 9



Graph 6-18: Transmitter Spurious Emissions, 1 – 10 GHz, Peak, 925.7 MHz

Fleet Space Technologies  
 Portal & Modem System  
 LoRa - single channel board - 6dBi  
 High Channel 927.5 MHz

Limit1: FCC15205Pk FCC PART 15.205, 1-18GHz@3mtr, 18-40GHz@1mtr

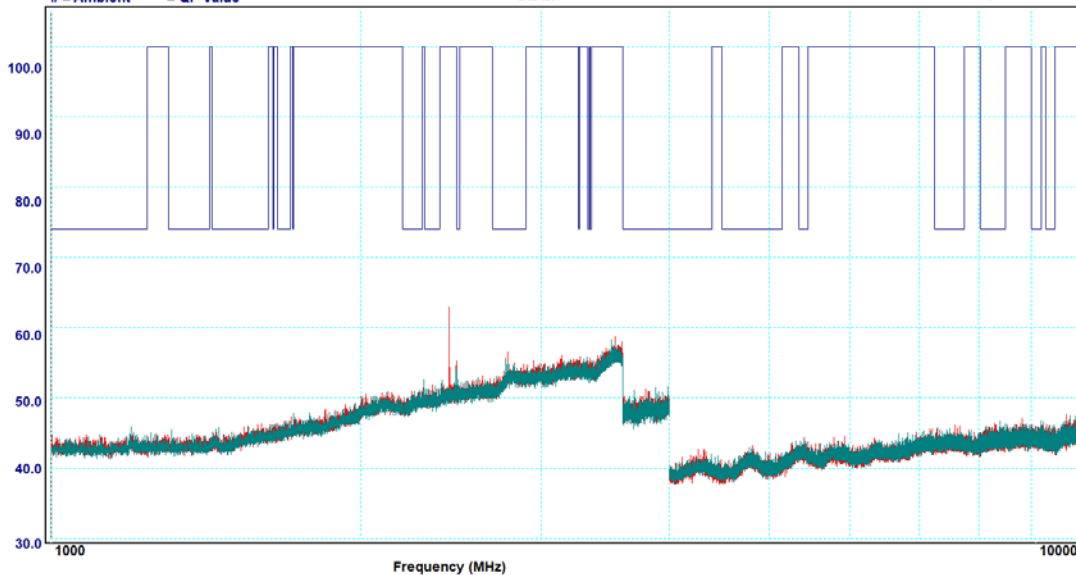
Trace 2: Vertical Emissions  
 Trace 3: Horizontal Emissions

Radiated Emissions (dBuV/m)  
 # = Ambient ~ = QP Value

Job No: M2105018  
 Test Date: 10-06-2021

Test Officer: Ian Ng-Plot date: 06-23-2021 13:24:06  
 LA0040122 c1:CL130122 c2:NONE p:A2881221 a:F0250122  
 Site ID:

WinstR:32.8-Wplit:164.25-Rx:R&S,ESU-40,100392/04  
 Graph No. 11



Graph 6-19: Transmitter Spurious Emissions, 1 – 10 GHz, Peak, 927.5 MHz



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**Average Measurements:**

Fleet Space Technologies  
 Portal & Modem System  
 LoRa - single channel board - 6dBI  
 Low Channel 923.3 MHz

Limit1: FCC15205Av FCC PART 15.205, 1-18GHz@3mtr, 18-40GHz@1mtr

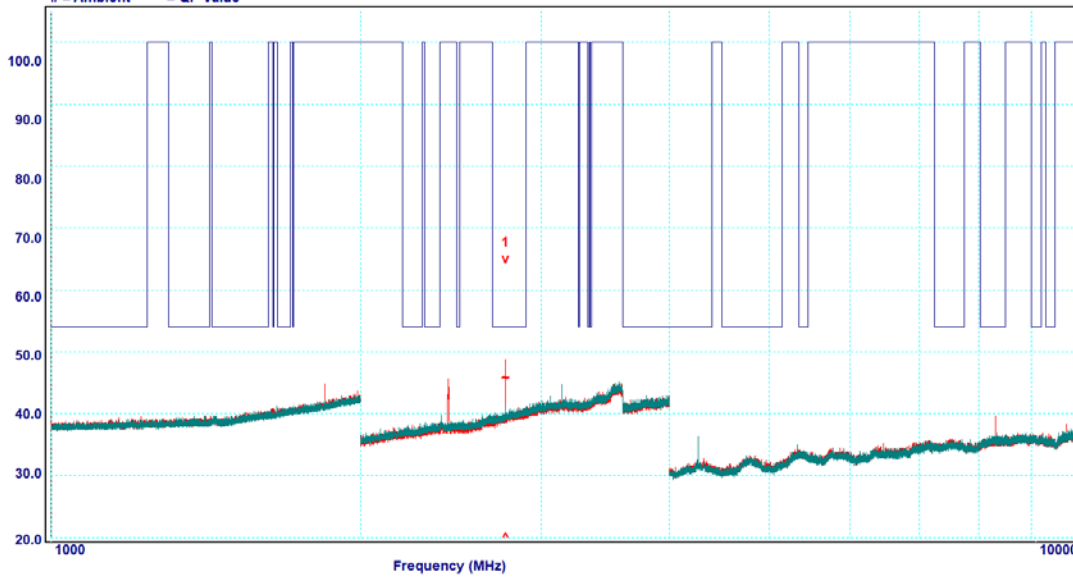
Job No: M2105018  
 Test Date: 10-06-2021

Trace 2: Vertical Emissions  
 Trace 3: Horizontal Emissions

Test Officer: Ian Ng-Plot date: 06-23-2021 13:25:37  
 c1: A0640122 c1: CL130122 c2: NONE p: A2881221 a: F0250122  
 Site ID:

WintstR5: 32.8-WpIt: 164.25-Rx: R&S, ESU-40, 100392/04  
 Graph No. 6

Radiated Emissions (dBuV/m)  
 # = Ambient ~ = QP Value



Graph 6-20: Transmitter Spurious Emissions, 1 – 10 GHz, Average, 923.3 MHz

Table 6-13: Transmitter Spurious Emissions, 1 – 10 GHz, Average, 923.3 MHz

Peak	Frequency [MHz]	Polarisation	Avg		
			Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]
1	2769.37	Vertical	45.8	54	-8.2

Fleet Space Technologies  
 Portal & Modem System  
 LoRa - single channel board - 6dBi  
 Mid Channel 925.7 MHz

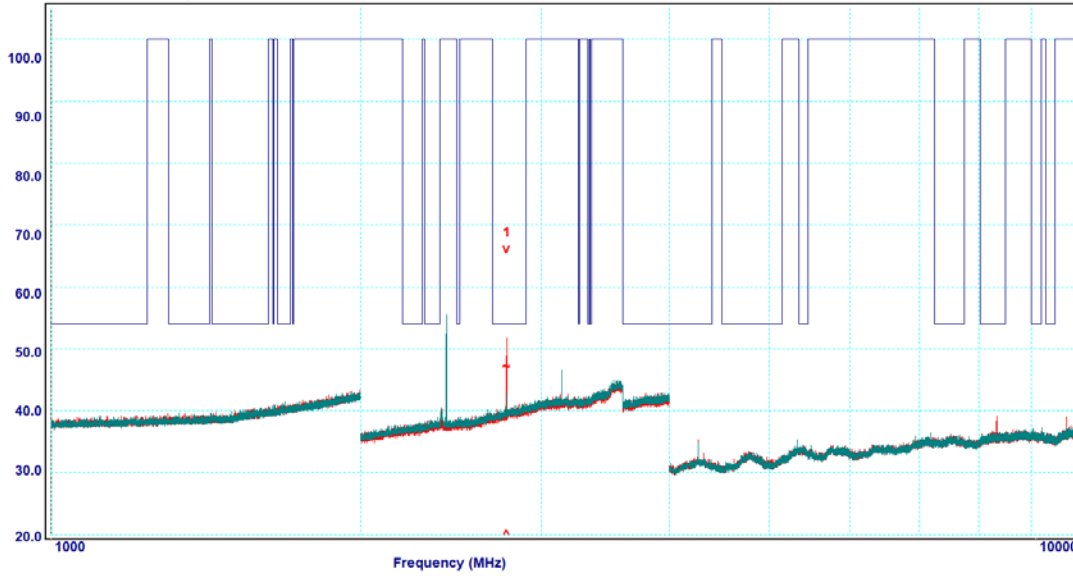
Limit1: FCC15205Av FCC PART 15.205, 1-18GHz@3mtr, 18-40GHz@1mtr

Trace 2: Vertical Emissions  
 Trace 3: Horizontal Emissions

Radiated Emissions (dBuV/m)  
 # = Ambient ~ = QP Value

Job No: M2105018  
 Test Date: 10-06-2021

Test Officer: Ian Ng-Plot date:06-03-2021 13:26:28 WinstR:32.8-Wpit:164.25-Rx:R&S,ESU-40,100392/04  
 LA0040122 c1:CL130122 c2:NONE p:A2881221 a:F0250122  
 Site ID: Graph No. 0



Graph 6-21: Transmitter Spurious Emissions, 1 – 10 GHz, Average, 925.7 MHz

Table 6-14: Transmitter Spurious Emissions, 1 – 10 GHz, Average, 925.7 MHz

Peak	Frequency [MHz]	Polarisation	Avg		
			Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]
1	2776.83	Vertical	47	54	-7.0

Fleet Space Technologies  
 Portal & Modem System  
 LoRa - single channel board - 6dBi  
 High Channel 927.5 MHz

Limit1: FCC15205Av FCC PART 15.205, 1-18GHz@3mtr, 18-40GHz@1mtr

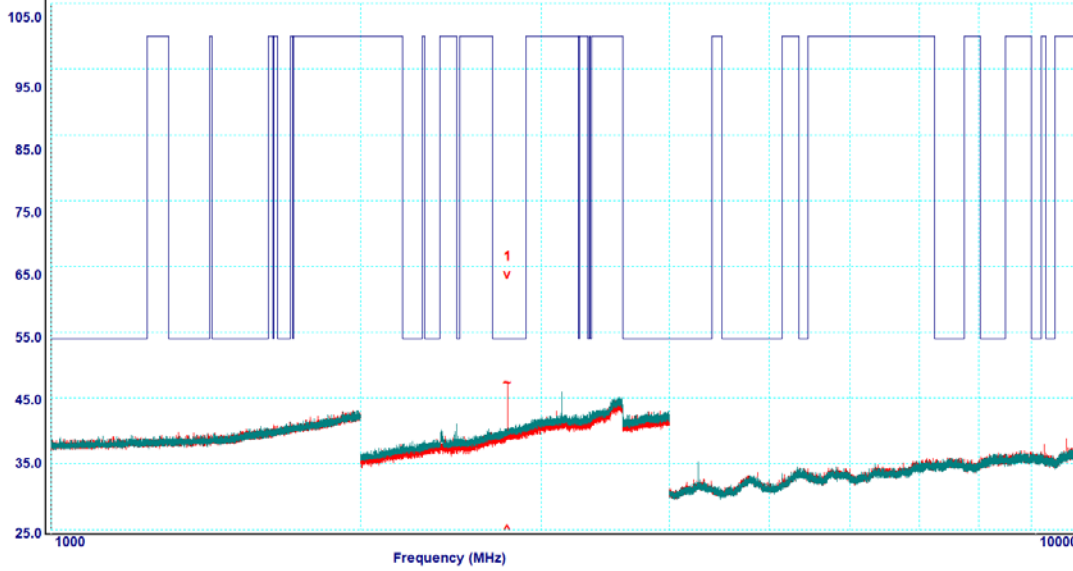
Trace 2: Vertical Emissions  
 Trace 3: Horizontal Emissions

Radiated Emissions (dBuV/m)  
 # = Ambient ~ = QP Value

Job No: M2105018  
 Test Date: 10-06-2021

Test Officer: Ian Ng-Plot date:06-03-2021 13:28:14  
 LA0040122 c1:CL130122 c2:NONE p:A2881221 a:F0250122  
 Site ID:

WinstorS:32.8-Wpit:164.25-Rx:R&S,ESU-40,100392/04  
 Graph No. 10

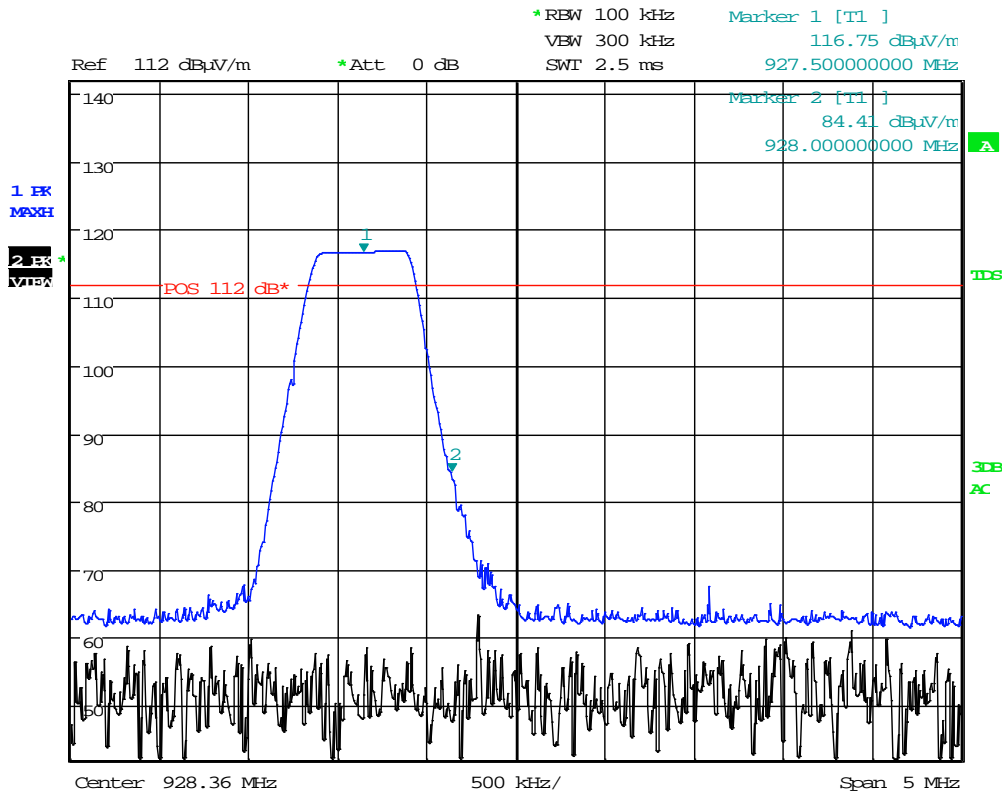


Graph 6-22: Transmitter Spurious Emissions, 1 – 10 GHz, Average, 927.5 MHz

Table 6-15: Transmitter Spurious Emissions, 1 – 10 GHz, Average, 927.5 MHz

Peak	Frequency [MHz]	Polarisation	Avg		
			Level [dBµV/m]	Limit [dBµV/m]	Margin [dB]
1	2782.2	Vertical	47.2	54	-6.8





Date: 9.JUN.2021 14:10:58

Graph 6-24: Upper Band edge 928 MHz

## 6.9 §15.247(e) / RSS-247 5.2(b) Power Spectral Density

### 6.9.1 Test procedure

The tests were performed in accordance with ANSI C63.10: 2013 Clause 11.10 Maximum power spectral density level in the fundamental emissions.

Power Spectral Density measurements were made at conducted method. The measurement resolution bandwidth was 3 kHz.

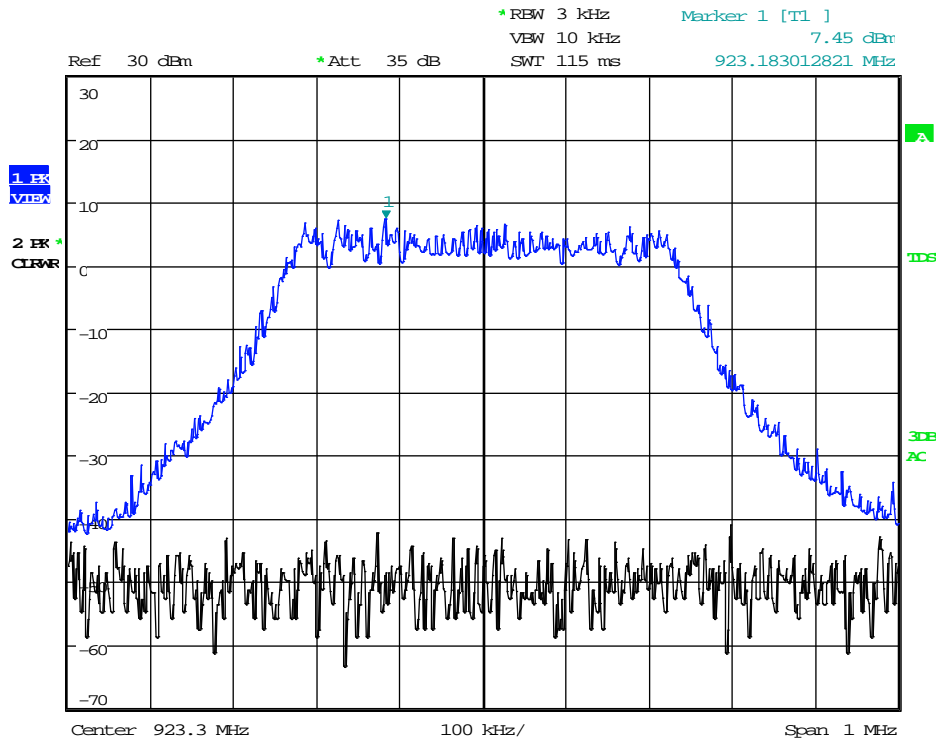
### 6.9.2 Limits

The maximum conducted power spectral density (PSD) is 8 dBm per 3 kHz.

### 6.9.3 Results

Table 6-17: Power spectral density

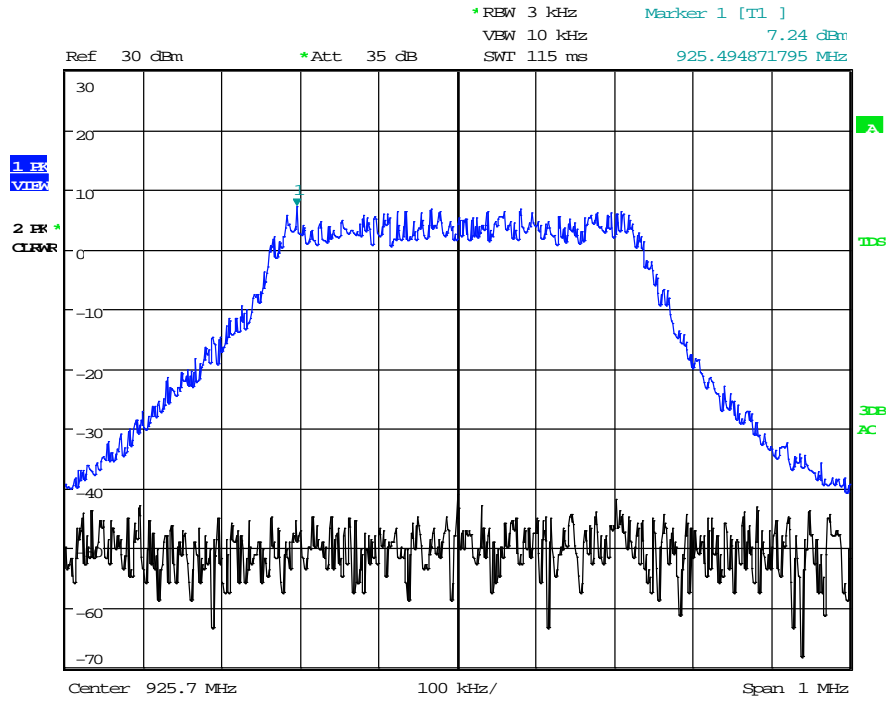
Freq. [MHz]	Conducted Output PSD (dBm)	Limit (dBm)	Results
923.3	7.45	8	Complied
925.7	7.24	8	Complied
927.5	7.65	8	Complied



Date: 9.JUN.2021 11:24:34

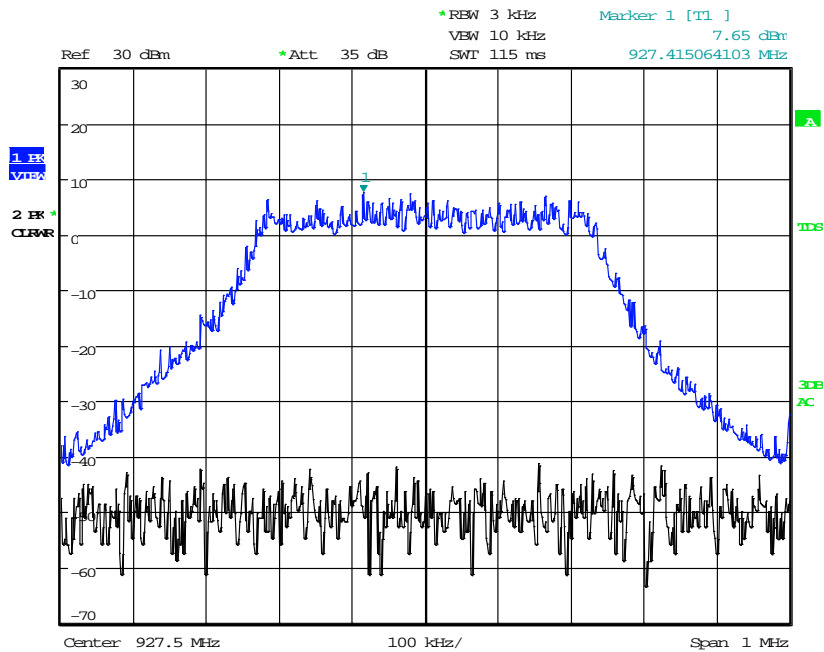
Graph 6-25: Power Spectral Density, 923.3 MHz





Date: 9 JUN.2021 11:21:03

Graph 6-26: Power Spectral Density, 925.7 MHz



Date: 9 JUN.2021 11:15:08

Graph 6-27: Power Spectral Density, 927.5 MHz

### 6.10 §15.247(i) / RSS-102 Maximum Permissible Exposure

The EUT complied with the applicable maximum permissible exposure levels. Refer to EMC Technologies report M2105018-5 and M2105018-6.

### 6.11 §15.215 / RSS-Gen 6.7 Occupied Bandwidth – 99% power

#### 6.11.1 Test procedure

The bandwidth containing 99% power of the transmitted signal was measured using the procedure from ANSI C63.10 section 6.9.

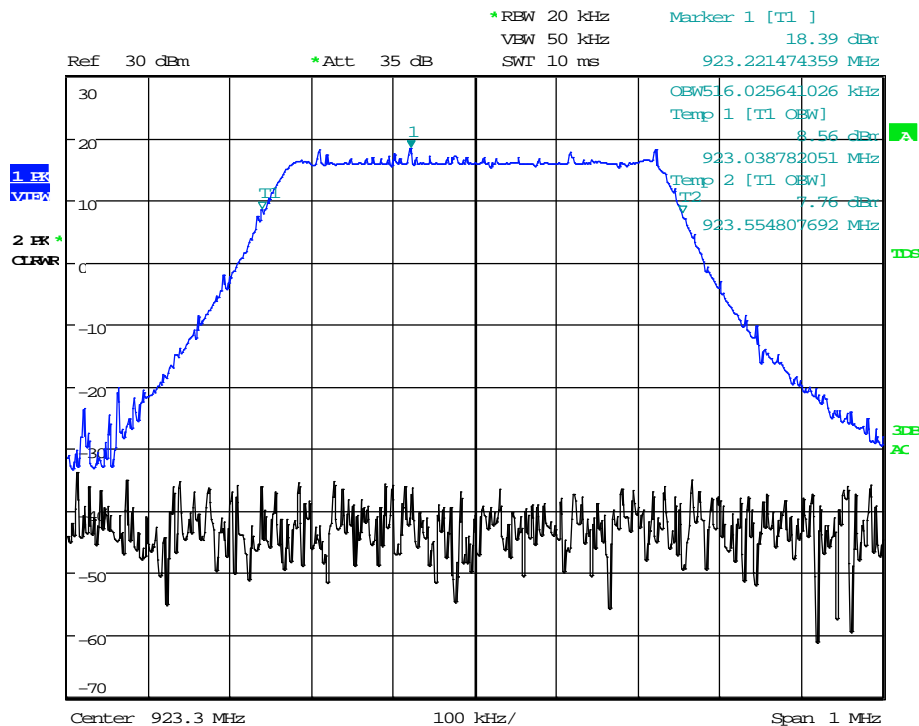
#### 6.11.2 Limits

The 99% power should be contained within the frequency band 902- 928 MHz.

#### 6.11.3 Results

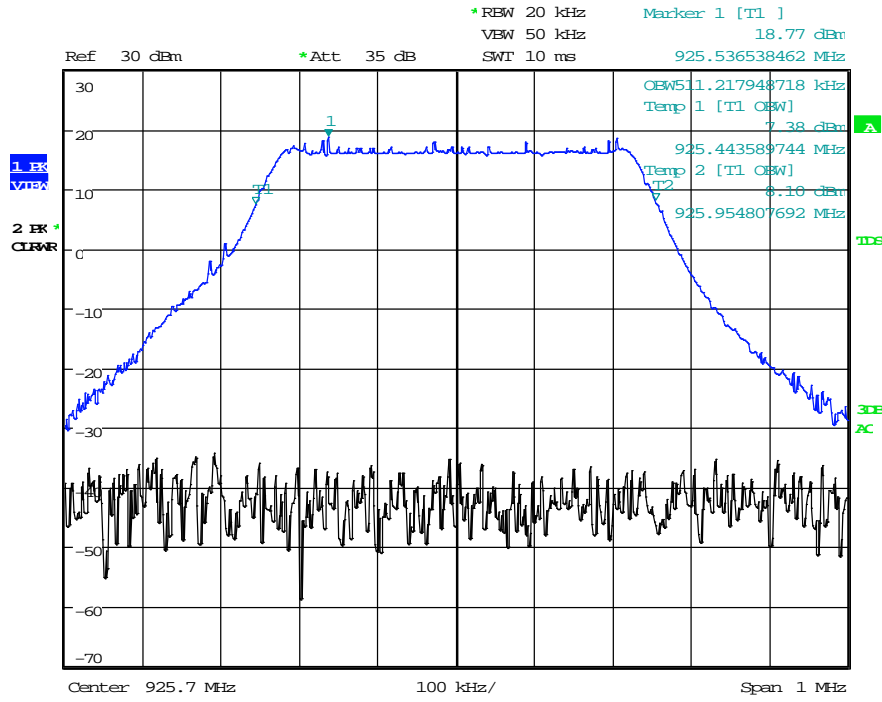
Table 6-18: Occupied Bandwidth

Freq. [MHz]	99% Bandwidth [MHz]	Low Frequency [MHz]	High Frequency [MHz]	Result
923.3	516.02	923.03	923.55	Complied
925.7	511.21	925.44	925.95	Complied
927.5	511.21	927.24	927.75	Complied



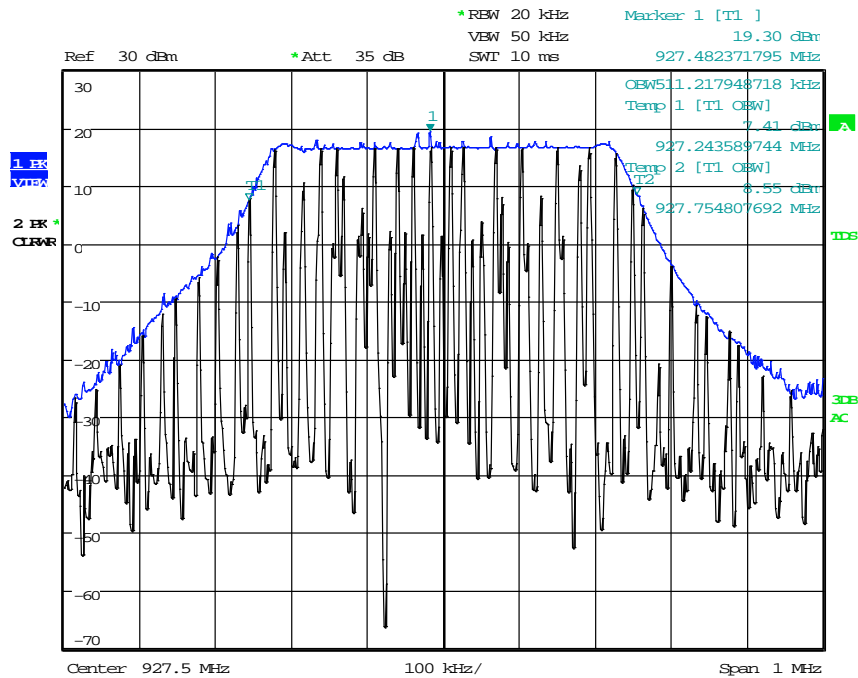
Date: 9 JUN 2021 10:43:38

Graph 6-28: Occupied Bandwidth, 923.3 MHz



Date: 9.JUN.2021 10:46:28

Graph 6-29: Occupied Bandwidth, 925.7 MHz



Date: 9.JUN.2021 10:49:49

Graph 6-30: Occupied Bandwidth, 927.5 MHz

**END OF REPORT**