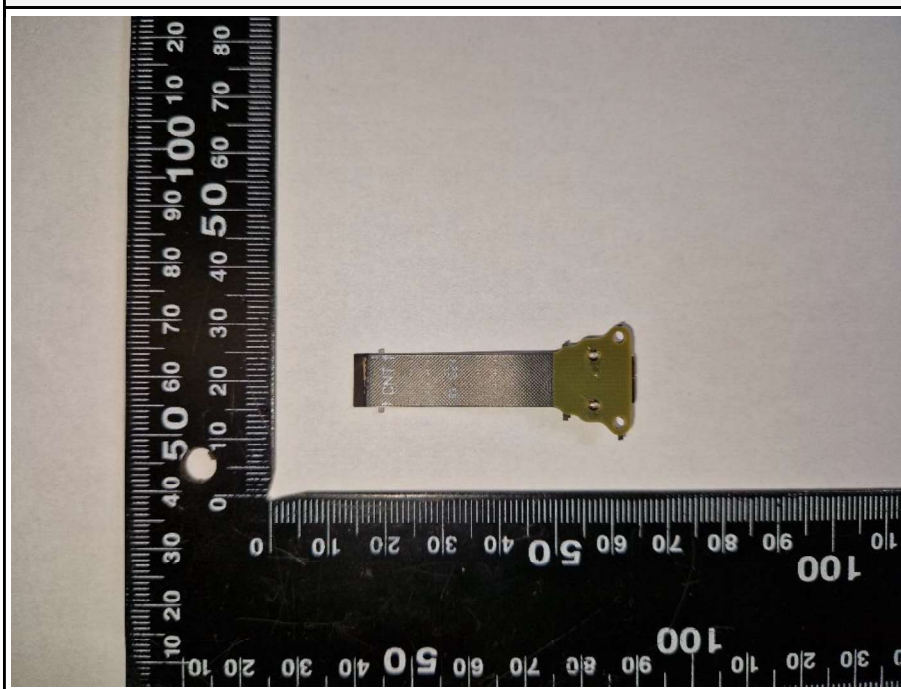
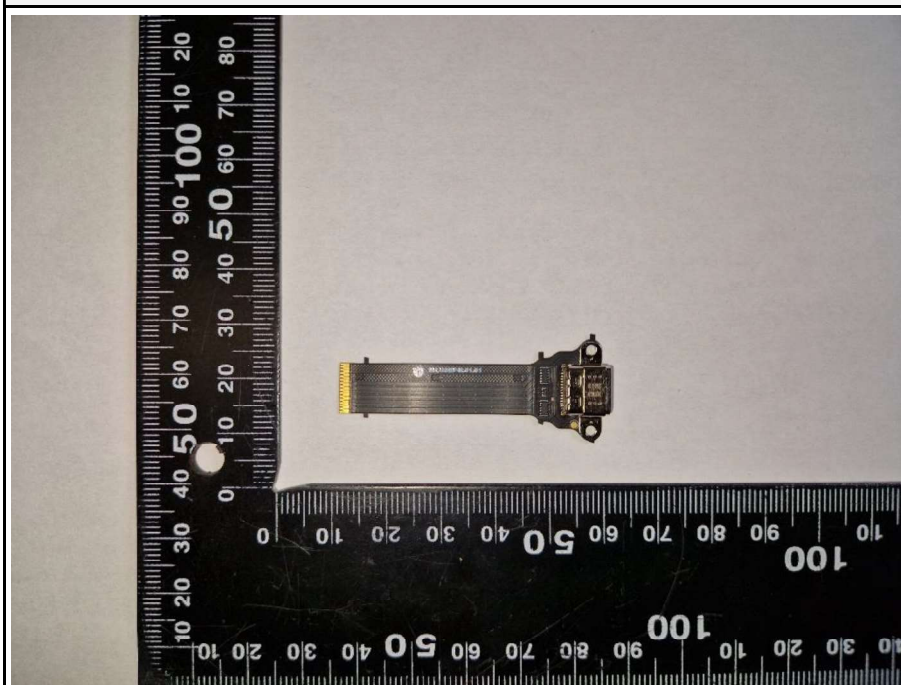




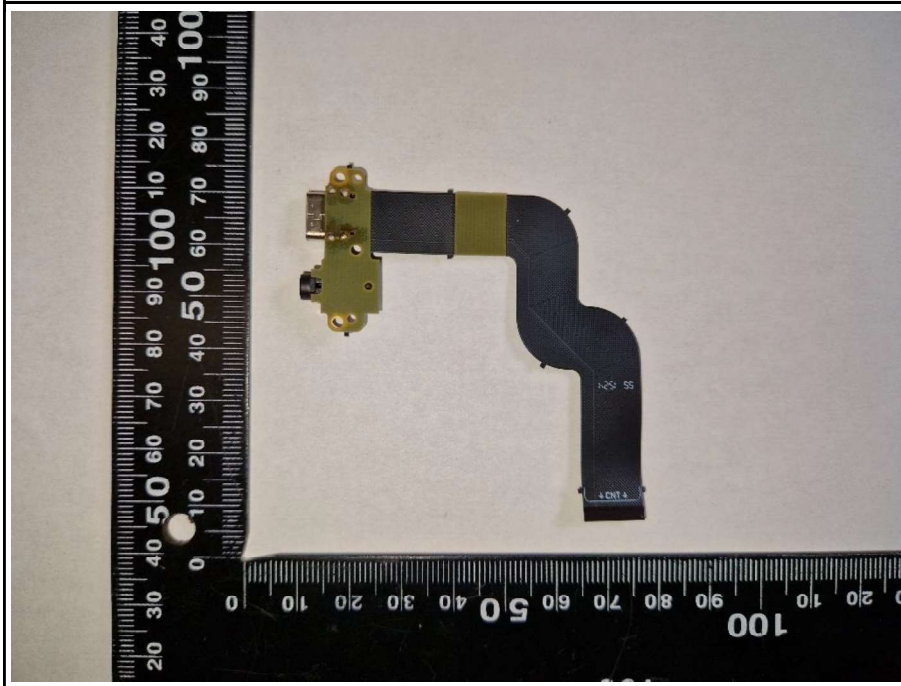
SH.USBF-B.01.01 (bot)



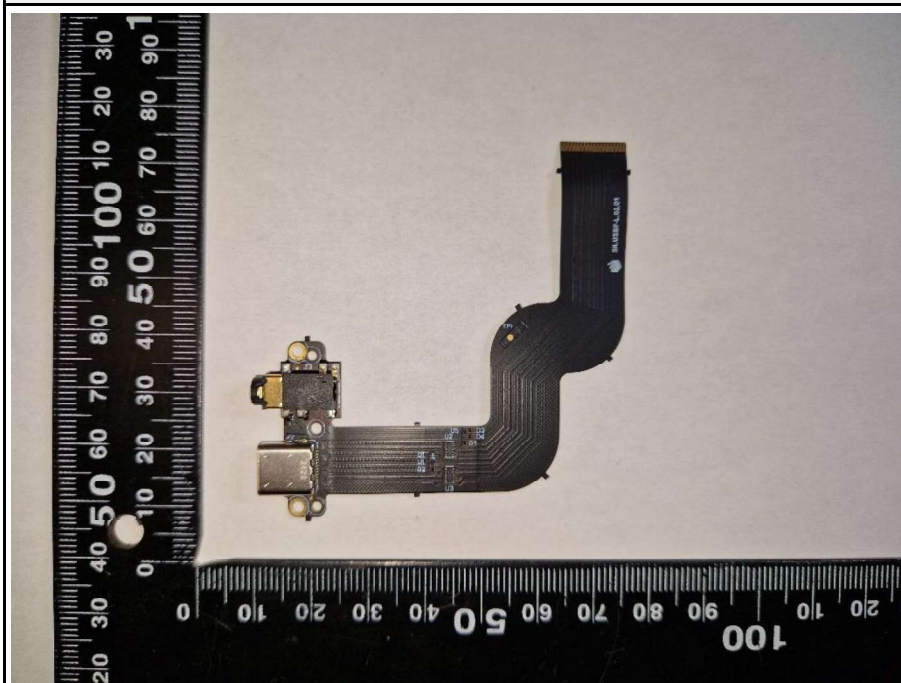
SH.USBF-B.01.01 (top)



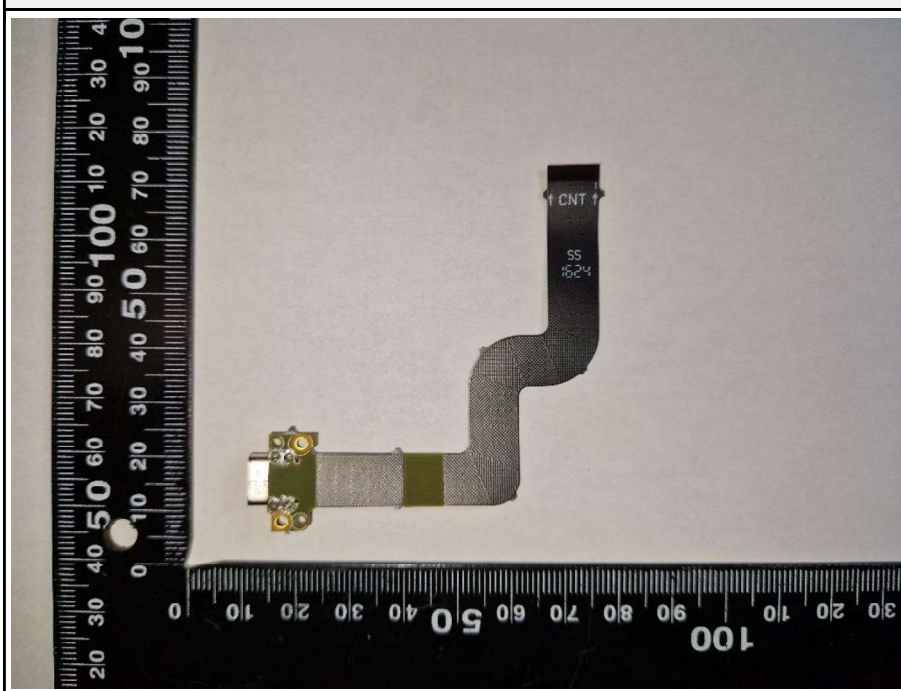
SH.USBF-L.02.01 (bot)



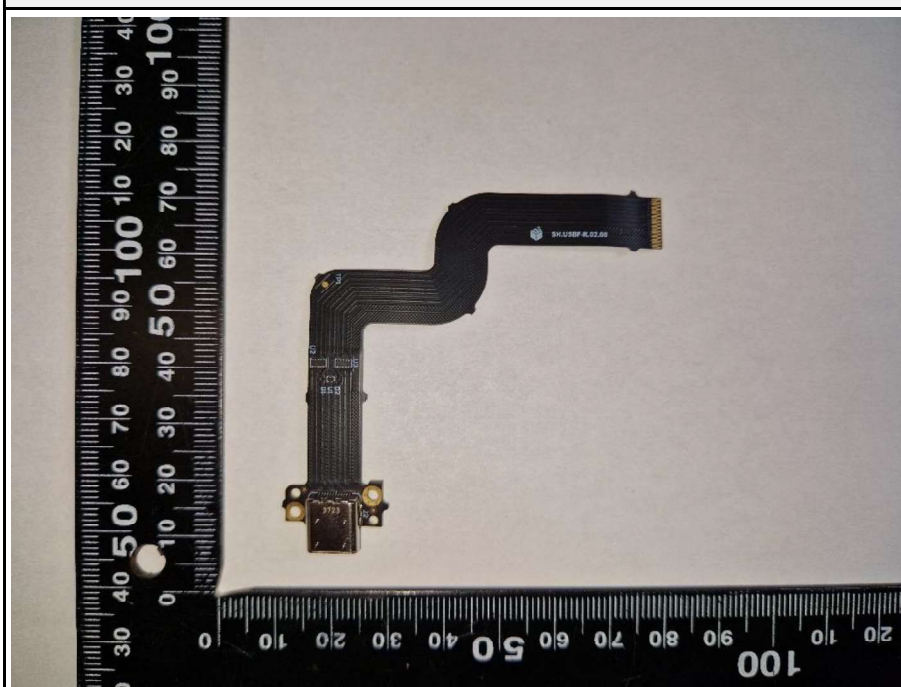
SH.USBF-L.02.01 (top)



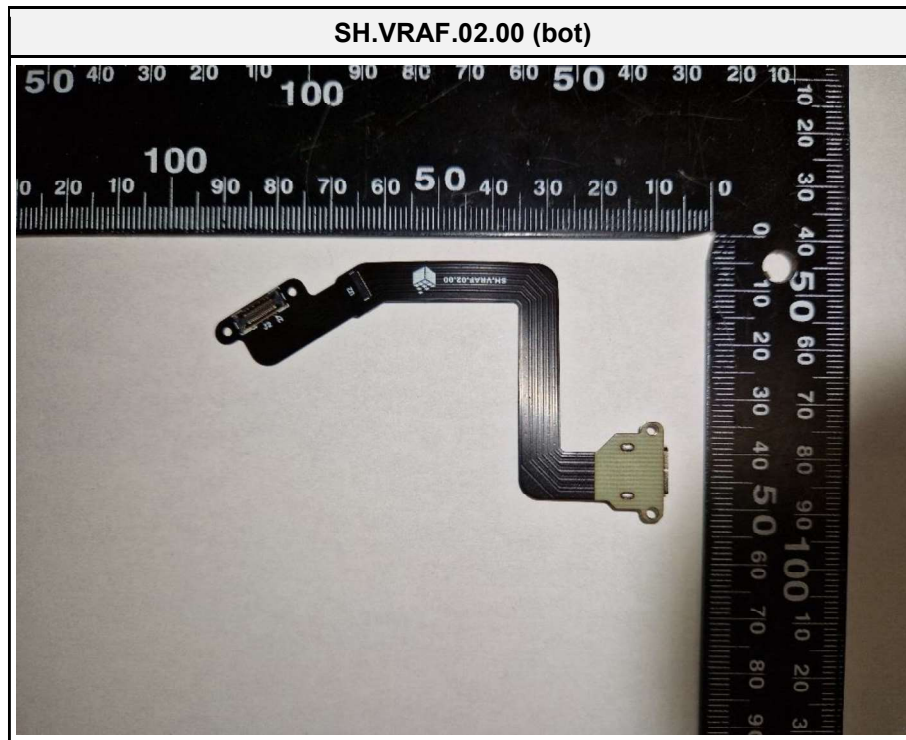
SH.USBF-R.02.00 (bot)

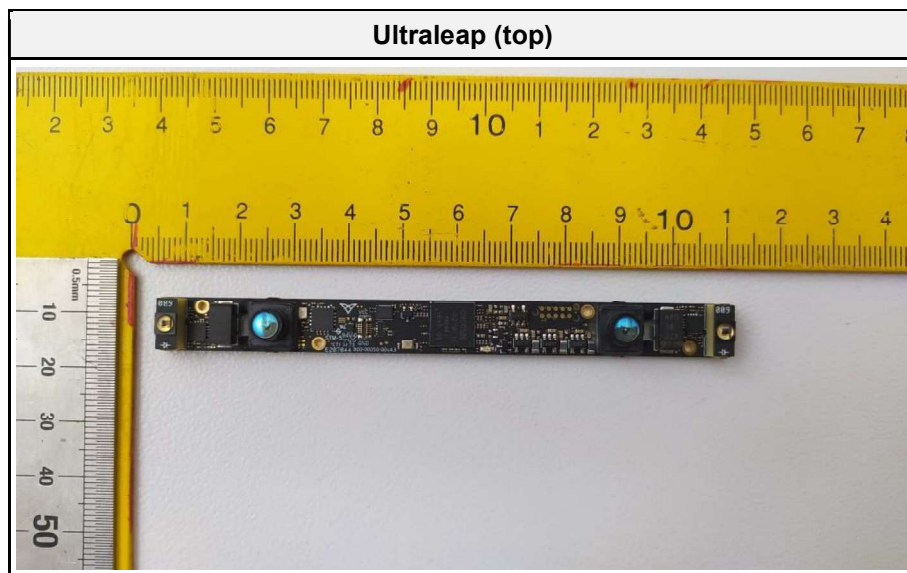
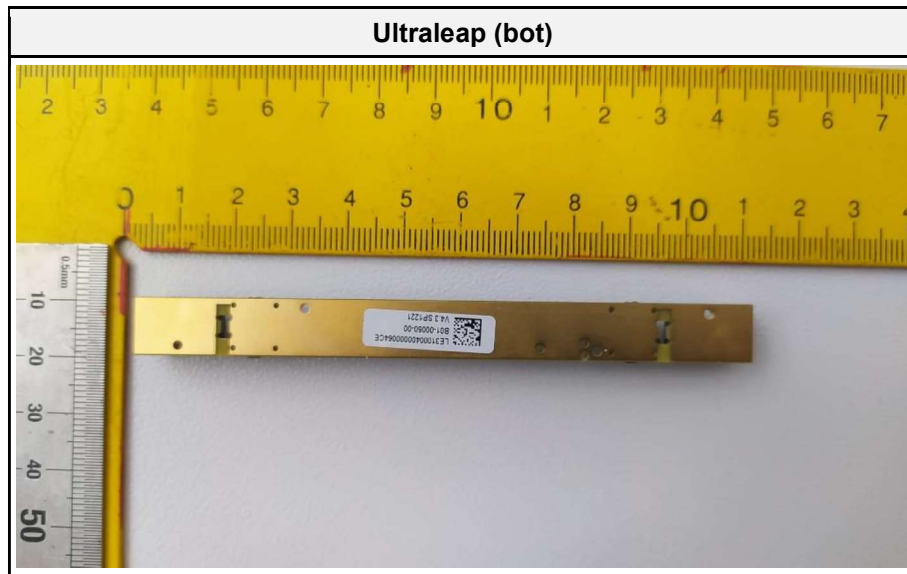


SH.USBF-R.02.00 (top)











### 1.3 Support Equipment

Product Type	Device	Manufacturer	Model	Comment
AE	Laptop	Lenovo	Legion 5	Customer Support Equipment
AE	Laptop AC/DC Adapter	Delta Electronics	ADL300SDC3A	Customer Support Equipment
AE	SteamVR Tracker	Tundra Labs	Tundra Tracker	Companion device for testing production radio firmware
CBL	USB conversion A to C (2pcs)	AlzaPower	--	--
CBL	Display port to USB-c conversion	AlzaPower	--	--
AE	Headphones	Koss	Porta Pro	--
AE	USB Flash Drive	SanDisc	BM2305006322Z SDDC3	--
Description:				
AE	Auxiliary Equipment			
SIM	Simulator			
CBL	Connecting Cable			
SFT	Software			
Comment: --				

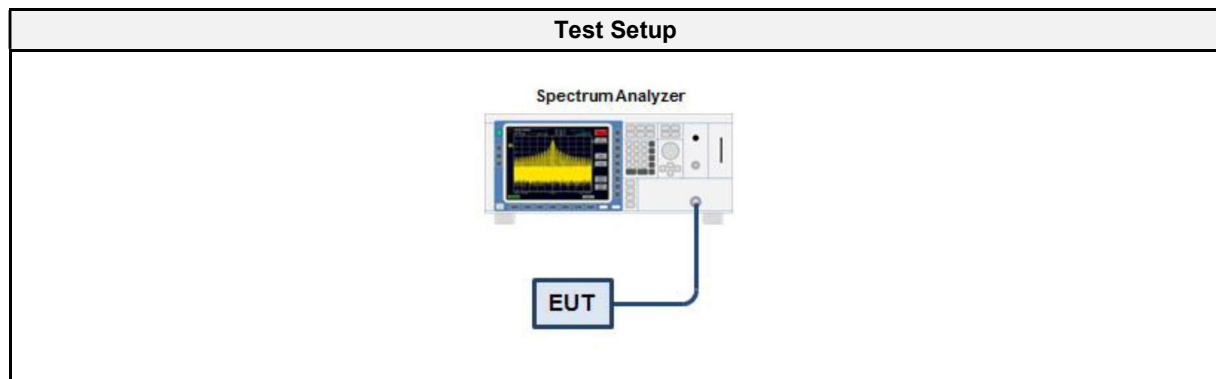
## 1.4 Test Modes

Mode	Description
Transmit Radio 1	Mode = Transmit Modulation = 2-GFSK Data rate = 1 Mbps Duty cycle = 87 % Power setting = 4 dBm (software setting)
Transmit Radio 2	Mode = Transmit Modulation = 2-GFSK Data rate = 1 Mbps Duty cycle = 87 % Power setting = 4 dBm (software setting)
Transmit LowDC Radio 1	Mode = Transmit Modulation = 2-GFSK Data rate = 1 Mbps Duty cycle = 3 % Power setting = 4 dBm (software setting)
Transmit LowDC Radio 2	Mode = Transmit Modulation = 2-GFSK Data rate = 1 Mbps Duty cycle = 3 % Power setting = 4 dBm (software setting)
Production-FW TX	Mode = Transmit / Channel hopping Duty cycle = up to 100 % (worst case assumption, no data)
Receive Radio 1	Mode = Receive
Receive Radio 2	Mode = Receive
Comment:	

## 1.5 Comparison of the radio test firmware with production firmware (Occupied Bandwidth)

Test Information	
Reference	None
Reference Method	ANSI C63.10:2013, Section 6.9.3
Measurement Method	Conducted
Measurement uncertainty	$\pm 1.3 \%$
Operator	Florian Voigt
Date	2024-07-08
Comment: Testing is for comparison of the 2 different firmware only. Cable loss and loss of attenuator is not compensated for comparison measurement. Tested is Radio 2.	

### 1.5.1 Setup



### 1.5.2 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSU 43	EF01631	2023-08	2024-08
Attenuator 10 dB	Inmet	18AH-10dB	--	--	--

### 1.5.3 Procedure

Test Procedure
<ol style="list-style-type: none"> <li>1. EUT set to test mode</li> <li>2. The spectrum analyser span is set large enough to capture the complete envelope of the emission spectrum (2 times the occupied channel bandwidth)</li> <li>3. The RBW is set to 2% of the OBW and the VBW is set to 5 times the RBW</li> <li>4. The spectrum is captured with Peak detector and max hold</li> <li>5. The 99% occupied bandwidth is measured using the spectrum analyzer measurement function</li> <li>6. Steps are repeated with the production firmware</li> </ol>

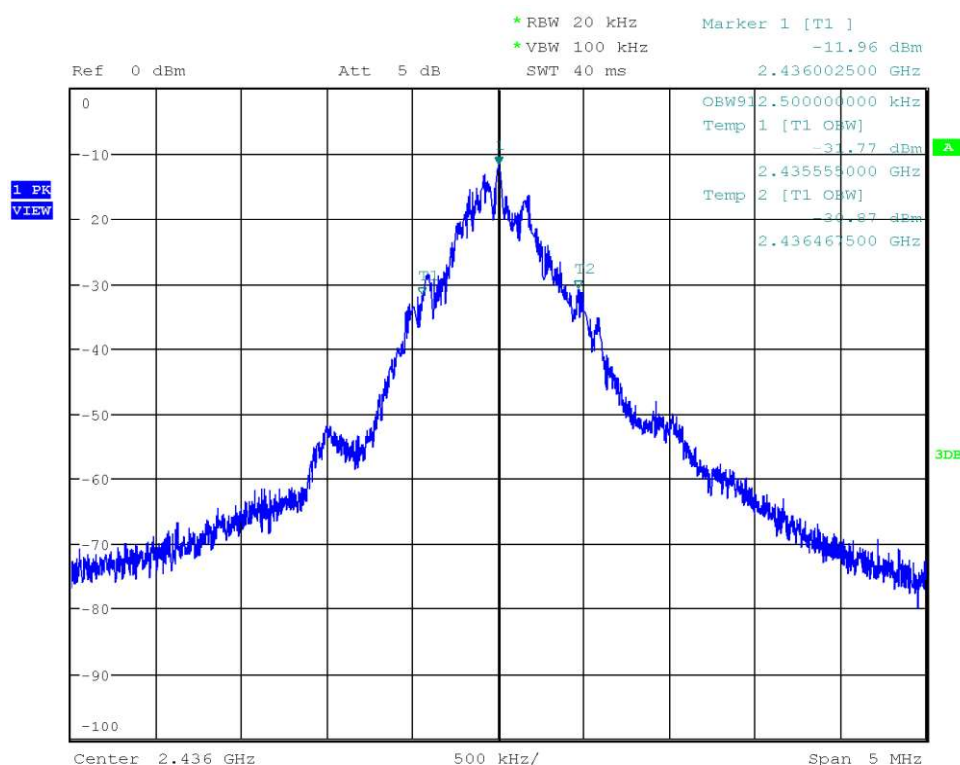
### 1.5.4 Results

Test Results		
Mode	Channel [MHz]	Bandwidth [MHz]
Production-FW TX	2436	0.912
Transmit Radio 2	2436	0.929



## Occupied Bandwidth

Project Number: G0M-2406-2604  
 Applicant: Somnium Space LTD.  
 Model Description: Head-Mounted Display / VR headset  
 Model: VR1  
 Test Sample ID: 49299  
 Reference Standards: None  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: Production-FW TX, Channel: 2436.0 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Florian Voigt  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-07-08  
 Note: With production firmware  
 Occupied Bandwidth [MHz]: 0.912



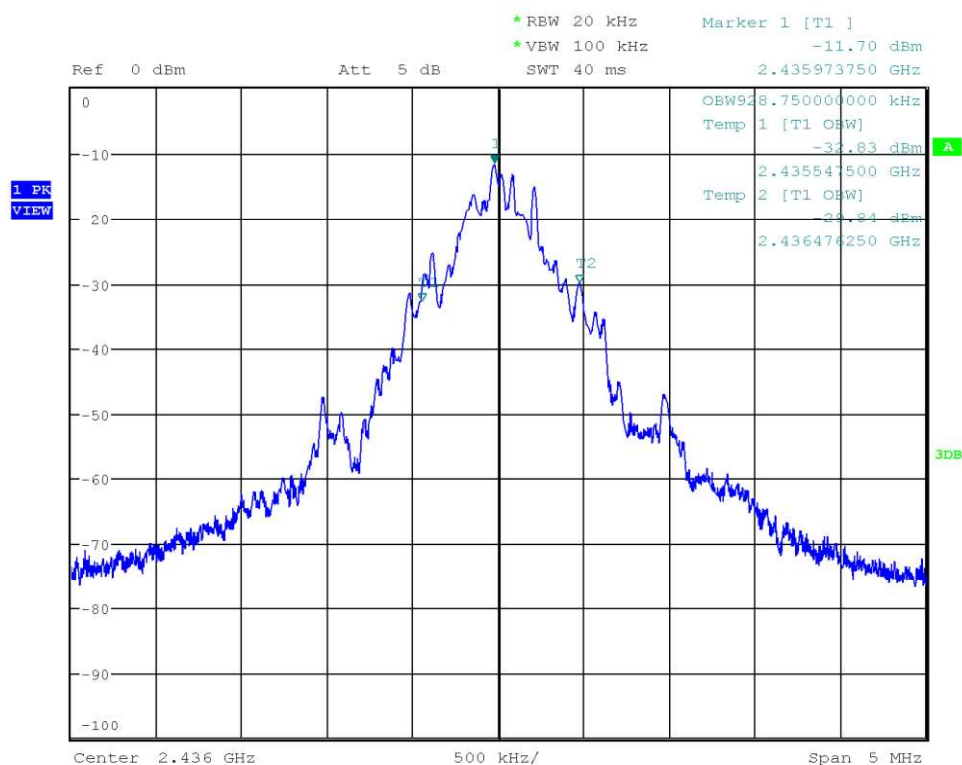
Date: 8.JUL.2024 15:14:57

Test Report No.: G0M-2406-2604-TFC247DT-V03

Eurofins Product Service GmbH  
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

## Occupied Bandwidth

Project Number: G0M-2406-2604  
 Applicant: Somnium Space LTD.  
 Model Description: Head-Mounted Display / VR headset  
 Model: VR1  
 Test Sample ID: 49299  
 Reference Standards: None  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: Transmit Radio 1, Channel: 2436.0 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Florian Voigt  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-07-08  
 Note: With radio test firmware  
 Occupied Bandwidth [MHz]: 0.929



Date: 8.JUL.2024 14:54:12

Test Report No.: G0M-2406-2604-TFC247DT-V03

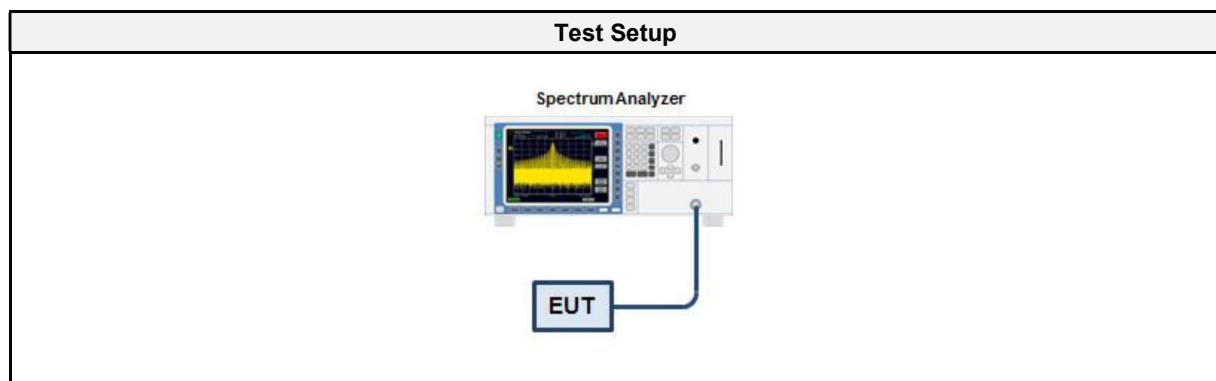
Eurofins Product Service GmbH  
 Storkower Str. 38c, D-15526 Reichenwalde, Germany

## 1.6 Comparison of the radio test firmware with production firmware (Peak output power)

### 1.6.1 Information

Test Information	
Reference	None
Reference Method	None
Measurement Method	Conducted
Measurement uncertainty	$\pm 0.63$ dB
Operator	Florian Voigt
Date	2024-12-03
Comment: Testing is for comparison of the 2 different firmware only. Tested is Radio 1.	

### 1.6.2 Setup



### 1.6.3 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSU 43	EF01631	2024-07	2025-07
Cable	Gigalane	1536	EF00779 CAABJ	2024-04	2025-04

### 1.6.4 Procedure

Test Procedure
<ol style="list-style-type: none"> <li>1. EUT transmitter is activated in normal operation mode (production firmware)</li> <li>2. A spectrum analyzer is connected antenna port</li> <li>3. Spectrum analyzer is set to a span to cover the full band, max hold, detector is set to peak, RBW is set to 2 times OBW</li> <li>4. Peak power is measured from all channels, lowest, middle and highest channel is evaluated</li> <li>5. Measurement is repeated with the radio test firmware</li> </ol>

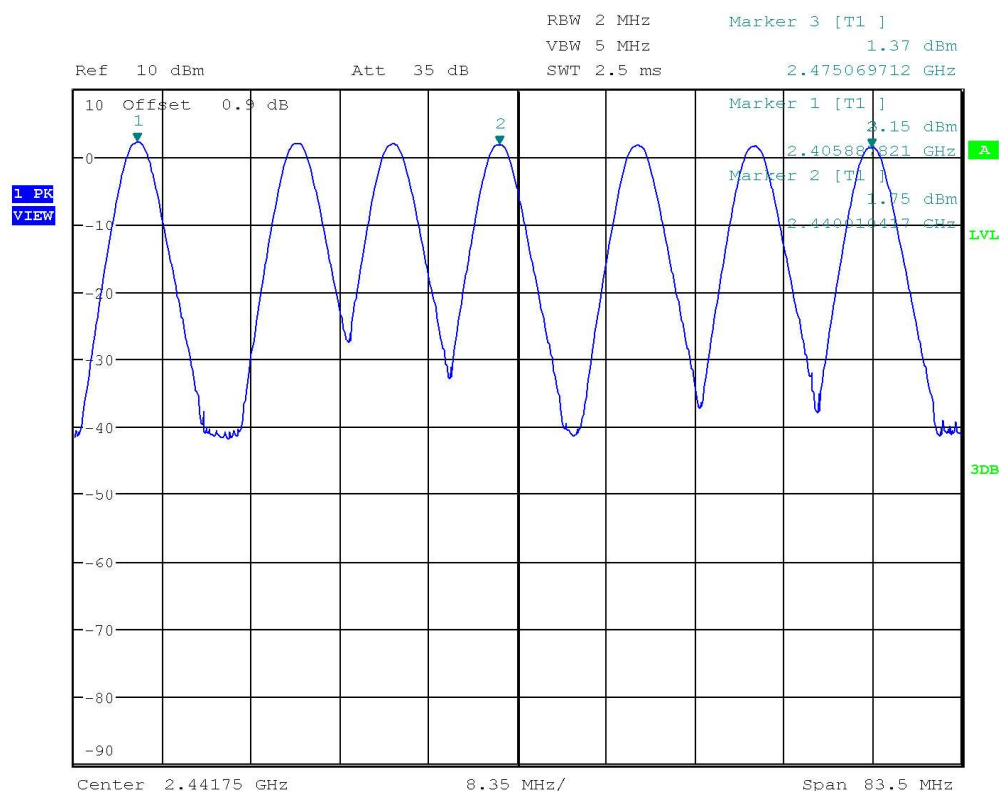


## 1.6.5 Results

Test Results			
Mode	Frequency [MHz]	Temperature [°C]	Power [dBm]
Production-FW TX	2406	20	2.15
Production-FW TX	2440	20	1.75
Production-FW TX	2475	20	1.37
Transmit Radio 2	2406	20	1.95
Transmit Radio 2	2440	20	1.69
Transmit Radio 2	2475	20	1.39
<p>Comment: Channels as shown in plots are automatically selected by proprietary firmware/protocol according to an unknown algorithm. There is some frequency hopping in use, but not according to § 15.247 (a) (1) (iii). From the active transmit frequencies, the lowest frequency, a frequency near middle and the highest frequency is chosen for evaluation.</p>			

## Recording of output power with proprietary operating firmware

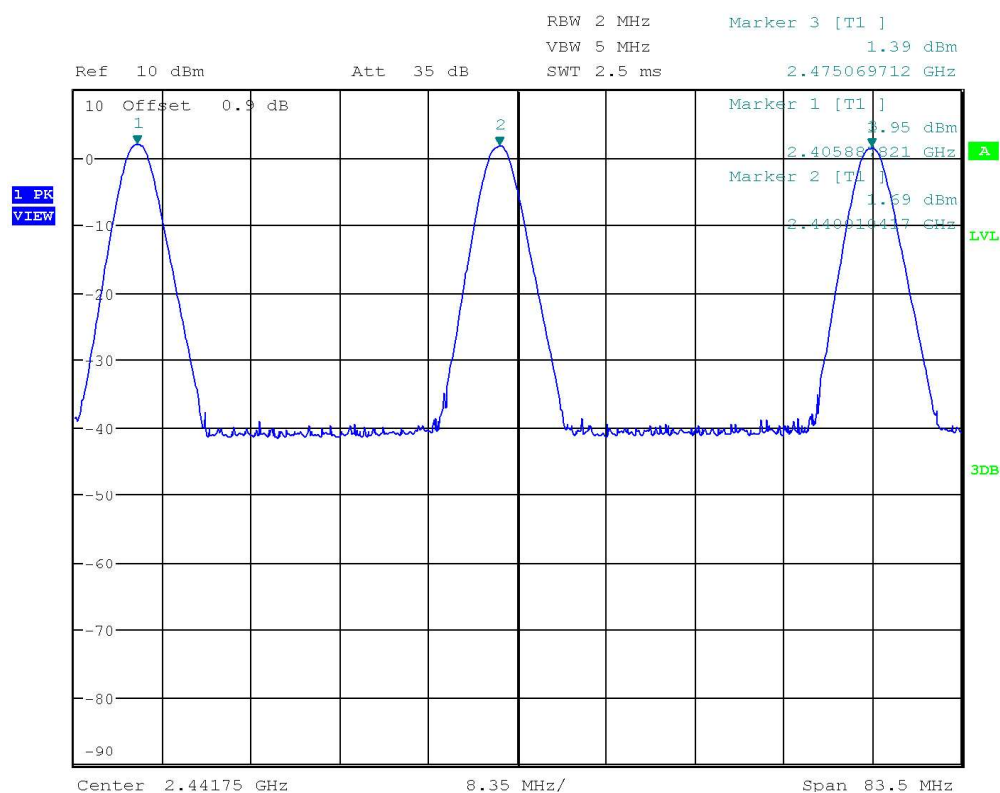
Project Number: G0M-2406-2604  
 Applicant: Somnium Space LTD.  
 Model Description: Head-Mounted Display / VR headset  
 Model: VR1  
 Test Sample ID: 50374  
 Operator: Florian Voigt  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-12-03  
 Operating Conditions: Tnom/Vnom  
 Mode: Production-FW TX



Date: 3.DEC.2024 15:09:52

## Recording of output power with radio test firmware

Project Number: G0M-2406-2604  
 Applicant: Somnium Space LTD.  
 Model Description: Head-Mounted Display / VR headset  
 Model: VR1  
 Test Sample ID: 50374  
 Operator: Florian Voigt  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-12-03  
 Operating Conditions: Tnom/Vnom  
 Mode: Transmit Radio 1



Date: 3.DEC.2024 15:16:04



## 1.7 Test mode duty cycle

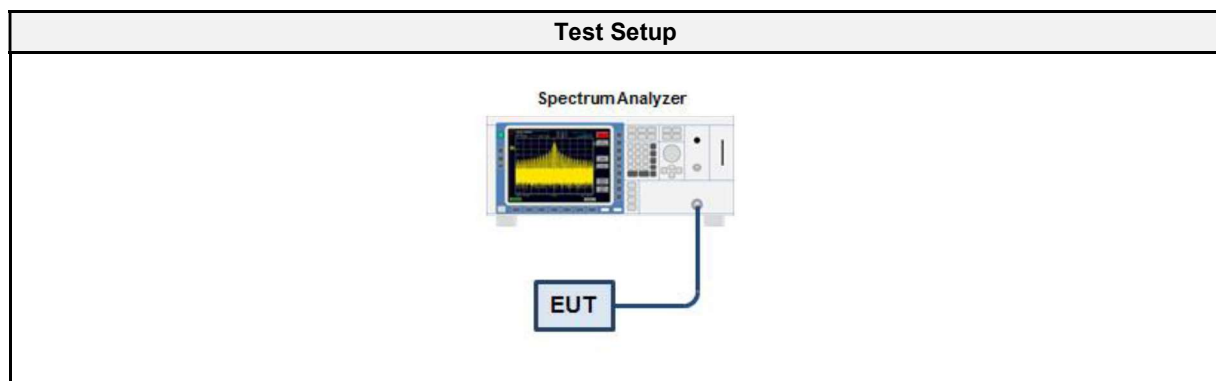
### 1.7.1 Information

Test Information	
Measurement Method	ANSI C63.10 11.6

### 1.7.2 Requirements

Requirements	
Duty cycle	Duty cycle correction
≥ 98 %	No correction required
< 98 %	Correction required ( $10 \times \log_{10}(1/DC)$ )

### 1.7.3 Setup



### 1.7.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Test Receiver	R&S	ESW44	EF01856	2024-04	2025-04
Semi-Anechoic chamber	Frankonia	AC 1	EF01011	2024-07	2027-07
Horn antenna	Schwarzbeck	BBHA 9120D	EF00019	2023-12	2026-12

### 1.7.5 Procedure

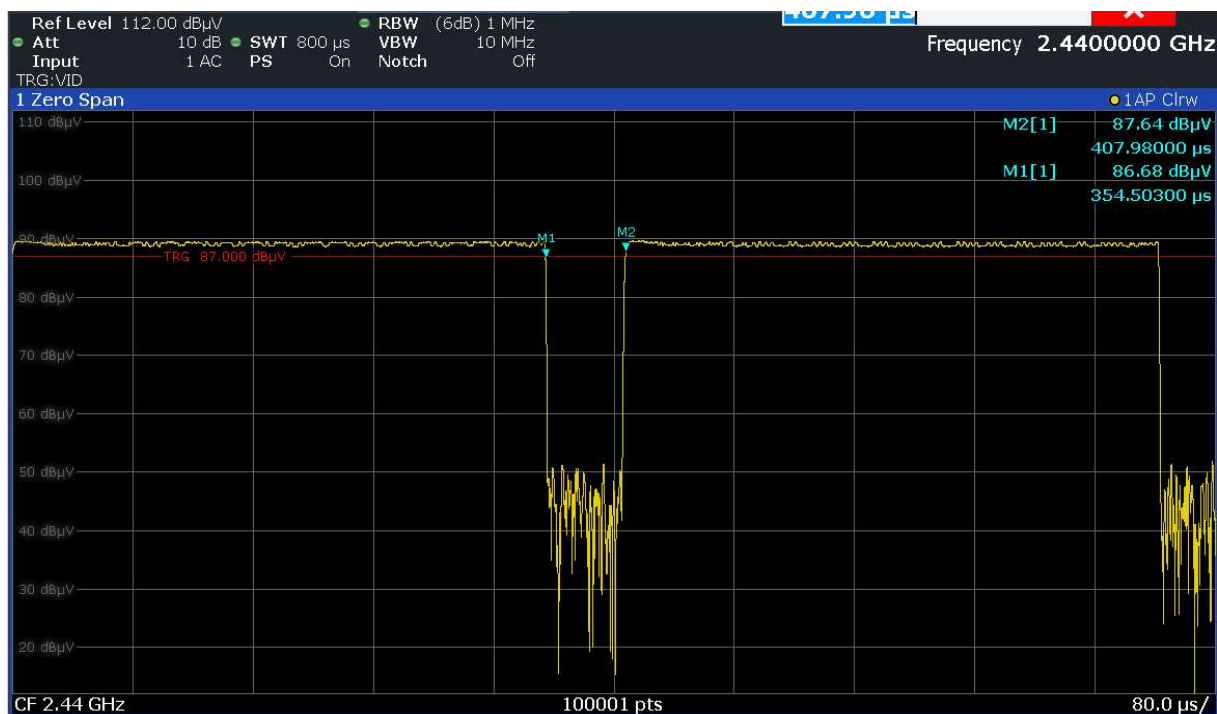
Test Procedure
<ol style="list-style-type: none"> <li>EUT set to test mode</li> <li>Span is set to zero span</li> <li>Detector set to peak</li> <li>Sweep time is set long enough to capture at least 1 burst</li> <li>Envelope peak value of emission spectrum is selected</li> <li>The burst duration <math>T_{ON}</math> is measured using two markers set to the start and the end of the burst</li> <li>The idle duration <math>T_{OFF}</math> is measured using two markers set to the start and the end of the idle period</li> <li>The duty cycle is calculated by <math>DC = T_{ON} / (T_{ON} + T_{OFF})</math></li> <li>The duty cycle correction for linear voltage averaging detector is calculated by <math>DCCF = 20 \times \log_{10}(T_{ON} / (T_{ON} + T_{OFF}))</math></li> </ol>

#### 1.7.6 Results

Duty Cycle Results		
Mode	Duty Cycle	Correction Factor [dB]
Transmit Radio 1	86.9%	1.21
Transmit LowDC Radio 1	3.4%	N/A

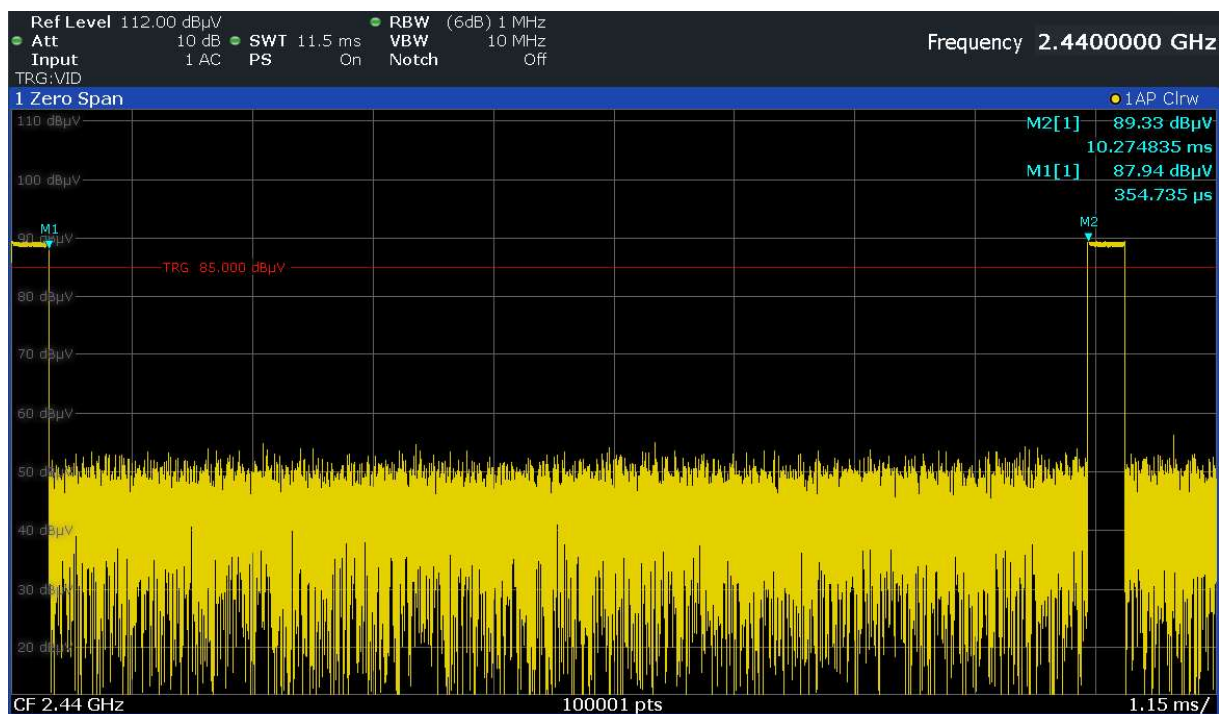
## Test mode duty cycle

Project Number: G0M-2406-2604  
 Applicant: Somnium Space LTD.  
 Model Description: Head-Mounted Display / VR headset  
 Model: VR1  
 Test Sample ID: 50373  
 Operator: Florian Voigt  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-12-03  
 Operating Conditions: Tnom/Vnom  
 Mode: Transmit Radio 1



## Test mode duty cycle

Project Number:	G0M-2406-2604
Applicant:	Somnium Space LTD.
Model Description:	Head-Mounted Display / VR headset
Model:	VR1
Test Sample ID:	50373
Operator:	Florian Voigt
Test Site:	Eurofins Product Service GmbH
Test Date:	2024-12-03
Operating Conditions:	Tnom/Vnom
Mode:	Transmit LowDC Radio 1





## 1.8 Test Frequencies

Designator	Mode	Channel	Frequency [MHz]
F1	Tx / Rx	0	2402
F2	Tx / Rx	38	2440
F3	Tx / Rx	78	2480

## 1.9 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in dB $\mu$ V. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

$$\text{Reading on Analyzer (dB}\mu\text{V)} + \text{A.F. (dB/m)} = \text{Net field strength (dB}\mu\text{V/m)}$$

Net:

This is the net field strength measurement (as shown above).

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Field strength limit:

This is the FCC Class B radiated emission limit (in units of dB $\mu$ V/m). The FCC limits are given in units of  $\mu$ V/m. The following formula is used to convert the units of  $\mu$ V/m to dB $\mu$ V/m:

$$\text{Field strength limit (dB}\mu\text{V/m)} = 20 \cdot \log (\mu\text{V/m})$$

Example only for radiated field strength:

Reading + AF	= Net Reading	:	Net reading	- Field strength limit	= Margin
+21.5 dB $\mu$ V	+ 26 dB/m	:	47.5 dB $\mu$ V/m	- 57.0 dB $\mu$ V/m	= -9.5

## 2 Result Summary

FCC 47 CFR Part 15C, ISED RSS-247				
Product Standard Reference	Requirement	Reference Method	Result	Remarks
ISED RSS-Gen, Issue 5 A2 (section 6.7)	Occupied Bandwidth	ANSI C63.10-2013	N/R	Informational only
FCC § 15.247(a)(2) ISED RSS-247, Issue 3 (section 5.2)	6 dB Bandwidth	ANSI C63.10-2013	PASS	--
FCC § 15.247(b) ISED RSS-247, Issue 3 (section 5.4)	Maximum peak conducted power	ANSI C63.10-2013	PASS	--
FCC § 15.247(e) ISED RSS-247, Issue 3 (section 5.2)	Power spectral density	ANSI C63.10-2013	PASS	--
FCC § 15.207 ISED RSS-247, Issue 3 (section 3.1)	AC power line conducted emissions	ANSI C63.10-2013	PASS	--
FCC § 15.247(d) ISED RSS-247, Issue 3 (section 5.5)	Band edge compliance	ANSI C63.10-2013	PASS	--
FCC § 15.247(d) ISED RSS-247, Issue 3 (section 5.5)	Conducted spurious emissions	ANSI C63.10-2013	PASS	--
FCC § 15.247(d) FCC § 15.209 ISED RSS-Gen, Issue 5 A2 (section 6.13)	Transmitter radiated spurious emissions	ANSI C63.10-2013	PASS	--
ISED RSS-247, Issue 3 (section 3.1)	Receiver radiated spurious emissions	ANSI C63.4-2014	PASS	--
<p>Comment: The Decision Rule is applied on the basis of ETSI TR 102 273 and ETSI TR 100 028. These standards provide guidance on how to calculate and apply measurement uncertainty whilst providing maximum uncertainties allowance. In all cases due consideration will be given to ILAC-G8:09/2019. Where a result is considered conditional in respect of its proximity to the limit line, the customer would be made aware of situation so that they can make an informed decision on how to proceed.</p>				

Possible Test Case Verdicts	
PASS	Test object does meet the requirements
FAIL	Test object does not meet the requirements
N/T	Required by standard but not tested
N/R	Not required by standard for the test object

### 3 Test Conditions and Results

#### 3.1 Test Conditions and Results - Occupied bandwidth

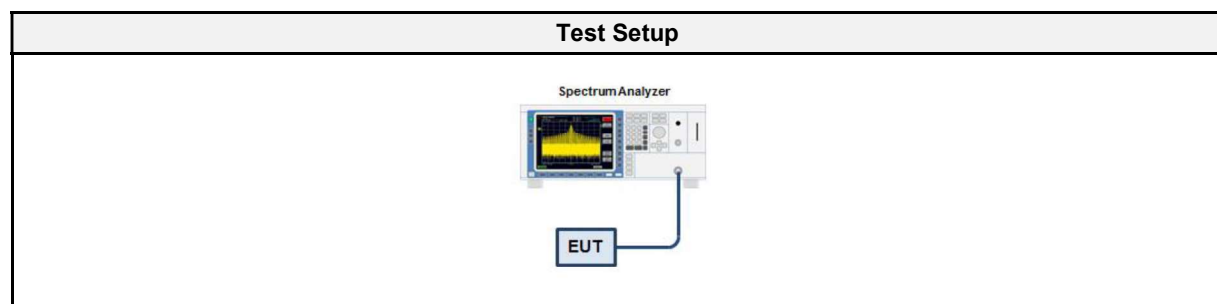
##### 3.1.1 Information

Test Information	
Reference	ISED RSS-Gen, Issue 5 A2 (section 6.7)
Measurement Method	ANSI C63.10 6.9.3
Measurement Uncertainty	$\pm 1.26 \%$
Test Sample ID	49299
Operator	Florian Voigt
Date	2024-09-11

##### 3.1.2 Limits

Limits
None (Informational only)

##### 3.1.3 Setup



##### 3.1.4 Equipment

Test Equipment					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyser	R&S	FSU 26	EF01407	2024-07	2025-07
Cable	Gigalane	SMS111B-GL200sC-SMS111B-1M	EF00779 CAABD	2024-04	2025-04

##### 3.1.5 Procedure

Test Procedure
<ol style="list-style-type: none"> <li>EUT transmitter is activated in test mode under normal conditions</li> <li>The spectrum analyzer is set to peak detection and maximum hold with a span twice the emission spectrum</li> <li>The resolution bandwidth is set to the range of 1 % to 5 % of the occupied bandwidth</li> <li>The occupied bandwidth is measured with the build-in analyzer function</li> </ol>

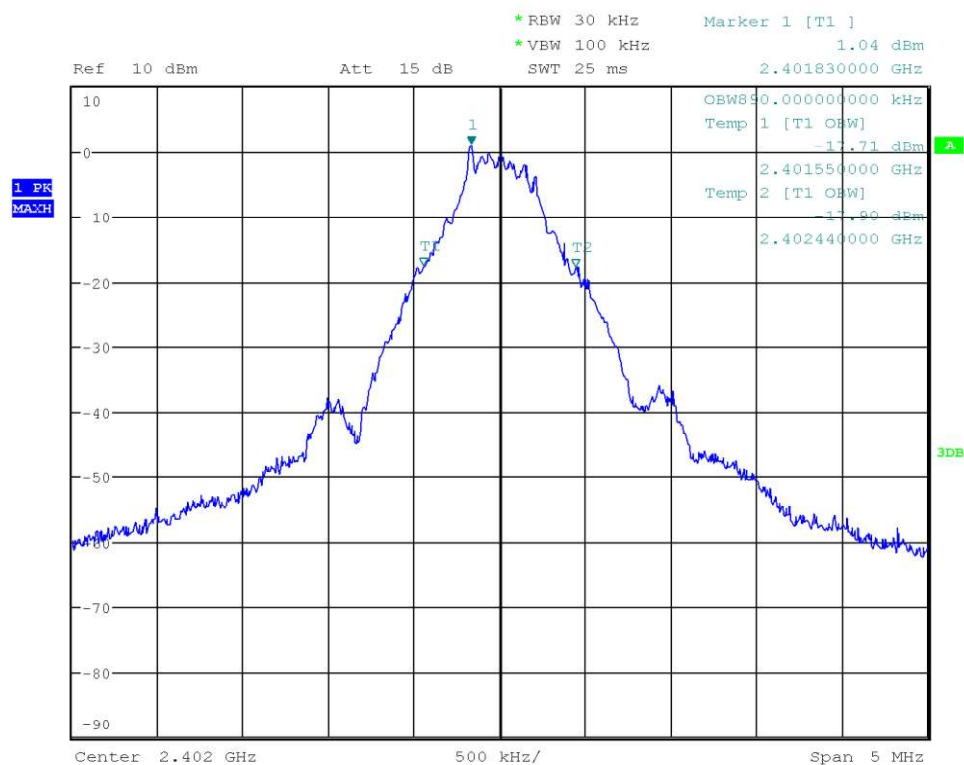


### 3.1.6 Results

Test Results		
Mode	Frequency [MHz]	Bandwidth [MHz]
Transmit Radio 1	2402	0.890
Transmit Radio 1	2440	0.895
Transmit Radio 1	2480	0.900
Transmit Radio 2	2402	0.900
Transmit Radio 2	2440	0.915
Transmit Radio 2	2480	0.900

## Occupied Bandwidth

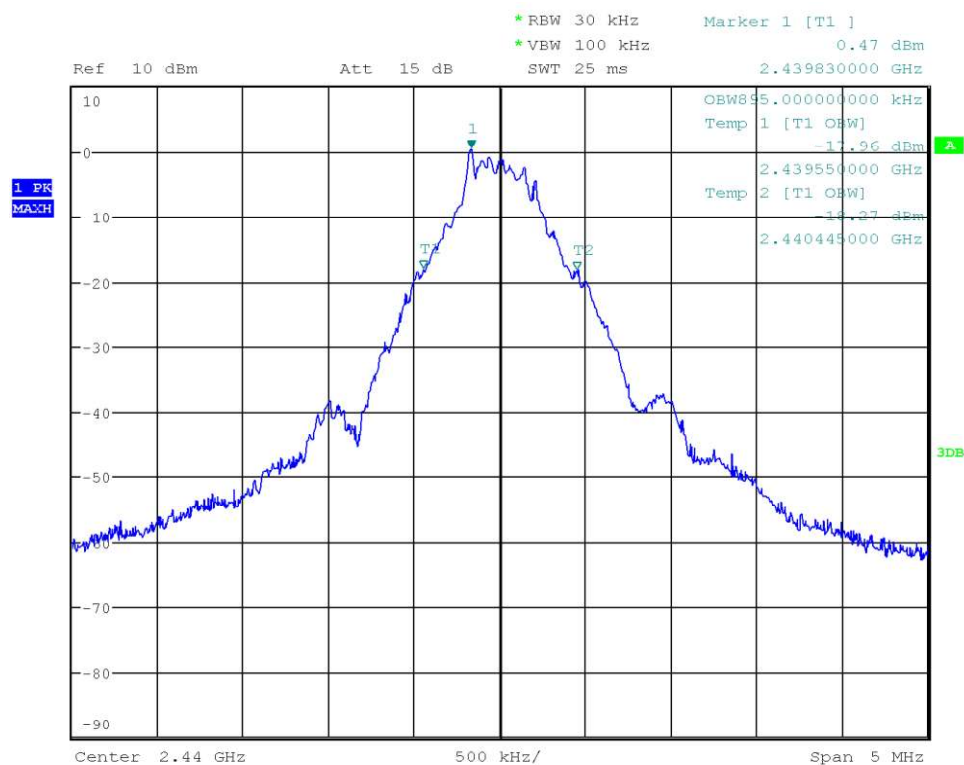
Project Number: G0M-2406-2604  
 Applicant: Somnium Space LTD.  
 Model Description: Head-Mounted Display / VR headset  
 Model: VR1  
 Test Sample ID: 49299  
 Reference Standards: FCC 15.247, RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: Transmit Radio 1, Channel: 0, 2402 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Florian Voigt  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-09-11  
 Occupied Bandwidth [MHz]: 0.890



Date: 11.SEP.2024 10:28:23

## Occupied Bandwidth

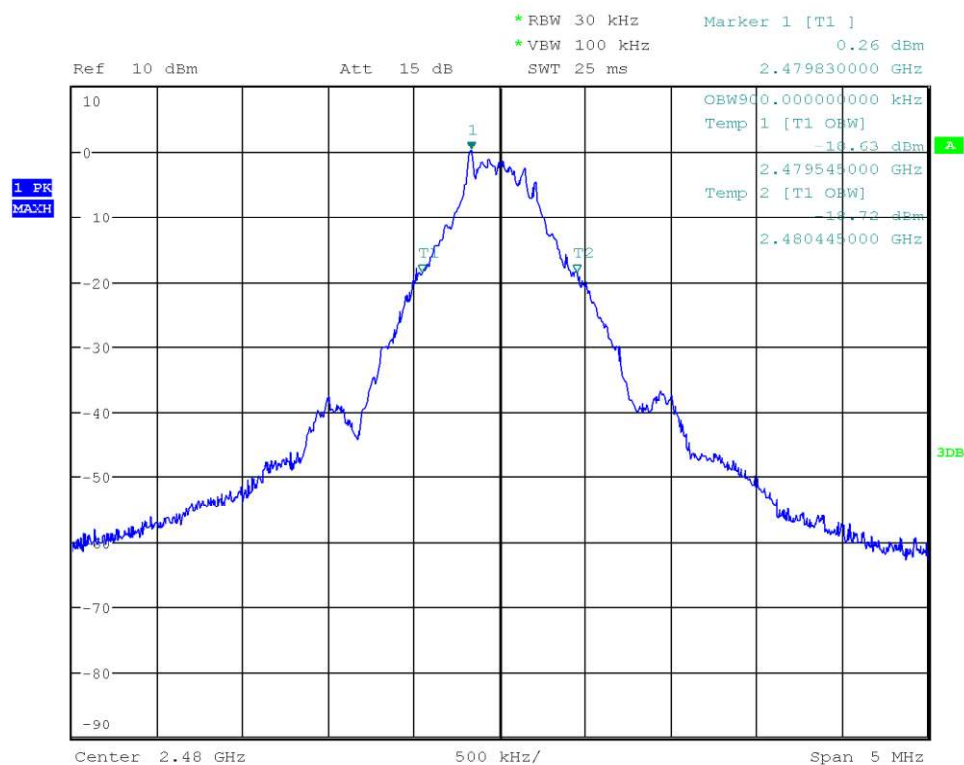
Project Number: G0M-2406-2604  
 Applicant: Somnium Space LTD.  
 Model Description: Head-Mounted Display / VR headset  
 Model: VR1  
 Test Sample ID: 49299  
 Reference Standards: FCC 15.247, RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: Transmit Radio 1, Channel: 38, 2440 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Florian Voigt  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-09-11  
 Occupied Bandwidth [MHz]: 0.895



Date: 11.SEP.2024 10:29:38

## Occupied Bandwidth

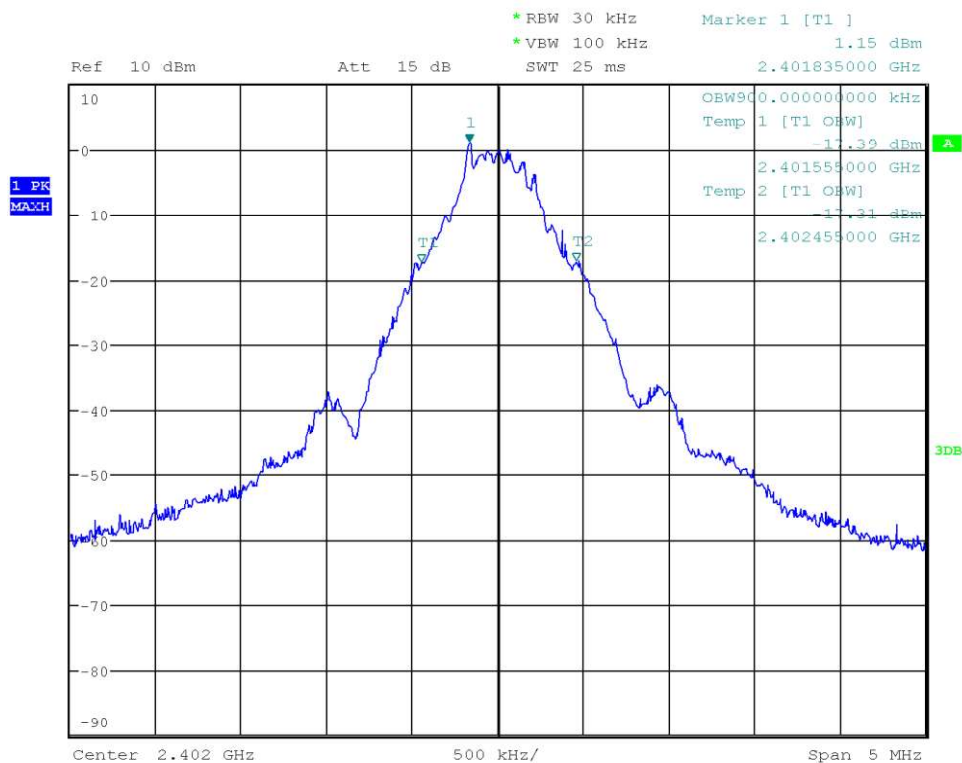
Project Number: G0M-2406-2604  
 Applicant: Somnium Space LTD.  
 Model Description: Head-Mounted Display / VR headset  
 Model: VR1  
 Test Sample ID: 49299  
 Reference Standards: FCC 15.247, RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: Transmit Radio 1, Channel: 78, 2480 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Florian Voigt  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-09-11  
 Occupied Bandwidth [MHz]: 0.900



Date: 11.SEP.2024 10:32:05

## Occupied Bandwidth

Project Number: G0M-2406-2604  
 Applicant: Somnium Space LTD.  
 Model Description: Head-Mounted Display / VR headset  
 Model: VR1  
 Test Sample ID: 49299  
 Reference Standards: FCC 15.247, RSS-247  
 Reference Method: ANSI C63.10:2013, Section 6.9.3  
 Operational Mode: Transmit Radio 2, Channel: 0, 2402 MHz  
 Operating Conditions: Tnom/Vnom  
 Operator: Florian Voigt  
 Test Site: Eurofins Product Service GmbH  
 Test Date: 2024-09-11  
 Occupied Bandwidth [MHz]: 0.900



Date: 11.SEP.2024 10:35:45