

Testing data Out-of-band/out-of-block emissions conducted measurements 935210 D05 Indus Booster Basic Meas v01r04 (3.6.2)

Test data, continued

1 Frequency Sweep							o1Rm Ava
Limit Check		PASS				M1[1]	-38.26 dBm
Line WLMT-FCC27-G	GEN-MIMO	PASS				8	362.000 00 MHz
30 dBm							
20 dBm							
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10 dBm						$ \rightarrow $	
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-10 dBm-							
WLMT-FCC27-GEN-MIMO							
-20 dBm							
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-30 dBm							
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-40 dBm							ha
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-50 dBm		$\sim$					
-su upm							
	$\sim$						
-60 dBm							
CE 862.0 MHz		 3900 pts	1	2 MHz /			Span 12.0 MHz

Figure 8.5-11: Antenna port 1 single carrier lower block edge with input signal at AGC threshold



Testing data Out-of-band/out-of-block emissions conducted measurements 935210 D05 Indus Booster Basic Meas v01r04 (3.6.2)

Test data, continued

1 Frequen	icv Sweep								o1Rm Ava
Limit	t Check		PA	SS				M1[1]	-37.20 dBm
Line	WLMT-FCC27-GEN-M	тмо	PA	SS					62.000 00 MHz
30 dBm									
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-60 dBm									
CE 862.01			3000 ptr		1	2 MHz /			Spap 12.0 M⊔⇒

Figure 8.5-12: Antenna port 1 single carrier lower block edge with input signal at AGC threshold +3 dB



Testing data Out-of-band/out-of-block emissions conducted measurements 935210 D05 Indus Booster Basic Meas v01r04 (3.6.2)

Test data, continued



Figure 8.5-13: Antenna port 2 single carrier upper block edge with input signal at AGC threshold



Testing data Out-of-band/out-of-block emissions conducted measurements 935210 D05 Indus Booster Basic Meas v01r04 (3.6.2)

Test data, continued



Figure 8.5-14: Antenna port 2 single carrier upper block edge with input signal at AGC threshold +3 dB



Testing data Out-of-band/out-of-block emissions conducted measurements 935210 D05 Indus Booster Basic Meas v01r04 (3.6.2)

Test data, continued



Figure 8.5-15: Antenna port 2 single carrier lower block edge with input signal at AGC threshold



Testing data Out-of-band/out-of-block emissions conducted measurements 935210 D05 Indus Booster Basic Meas v01r04 (3.6.2)

Test data, continued

1 Frequency Sw	veep								<b>0</b> 1Rm Ava
Limit Chec	k		PA	SS				M1[1]	-38.95 dBm
Line WLMI	FFCC27-GEN-M	МО	PA	SS				8	362.000 00 MHz
30 dBm									
20 dBm									
					$\sim$	$eq:label_$	$\sim\sim\sim$	$\sim\sim$	
10 dBm									
0 dBm					_				
-10 dBm									
WLMT-FCC27-GEN-M	1IMO								
-20 dBm									
-30 dBm									
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50 dBm									
-50 dBm		$\sim$	~~~~~~						
	~~~~	- 1							
$\sim\sim\sim$									
-60 dBm									
CE 862.0 MHz			3900 pts	L	1	.2 MHz/		I	Span 12.0 MHz

Figure 8.5-16: Antenna port 2 single carrier lower block edge with input signal at AGC threshold +3 dB

## 8.6 Spurious emissions conducted measurements

### 8.6.1 References, definitions and limits

### FCC §90.210(g)(2)

On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

### 8.6.2 Test summary

Verdict	Pass		
Tested by	P. Barbieri	Test date	January 28, 2022

## 8.6.3 Observations, settings and special notes

The spectrum was searched from 9 kHz to the 10<sup>th</sup> harmonic.

All measurements were performed using peak detector according to note 4 of 935210 D05 Indus Booster Basic Meas v01r04 paragraph 3.6.3. Limit line (43 + 10  $\log_{10}$  (P) or -13 dBm) was adjusted for MIMO operation by 3 dB\*: -13 dBm - 3 dB = -16 dBm \*MIMO correction factor for 2 antenna ports: 10 ×  $\log_{10}(2)$  = 3.01 dB

#### Spectrum analyser settings:

Resolution bandwidth:	Reference bandwidth in the applicable rule section for the supported frequency band
Video bandwidth:	VBW ≥ 3 × RBW
Detector mode:	Peak
Trace mode:	Max Hold
Input signal frequency	
Low channel	864.5 MHz
High channel	866.5 MHz

### 8.6.4 Test equipment used

Equipment	Manufacturer	Model no.	Asset no.
Spectrum Analyzer	Rohde & Schwarz	FSW43	101767
<b>RF Vector Signal Generator</b>	Rohde & Schwarz	SMBV100A	263254
<b>RF Vector Signal Generator</b>	Rohde & Schwarz	SMBV100A	263397

Notes: NCR - no calibration required, VOU - verify on use



Testing data Spurious emissions conducted measurements 935210 D05 Indus Booster Basic Meas v01r04 (3.6.3)

## 8.6.5 Test data

1 Spurious Emission	ns								o1 Max
Limit Check			PA	SS					
Line _SPURIO	US_LINE_A	BS_002	PA	SS					
20 dBm									
10 dBm									
0 dBm									
-10 dBm									
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	-								
-20 dBm									
-30 dBm									
-40 dBm									
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9.0 kHz	I	1	16000 pt	s	80	0.0 MHz/			8.0 GHz

2 Result Summary					
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 kHz	150.000 kHz	1.000 kHz	9.070 50 kHz	-65.82 dBm	-49.82 dB
150.000 kHz	30.000 MHz	10.000 kHz	702.225 00 kHz	-38.83 dBm	-22.83 dB
30.000 MHz	862.000 MHz	100.000 kHz	861.792 00 MHz	-44.23 dBm	-28.23 dB
862.000 MHz	869.000 MHz	100.000 kHz	864.224 25 MHz	15.55 dBm	-34.45 dB
869.000 MHz	1.000 GHz	100.000 kHz	872.96275 MHz	-41.89 dBm	-25.89 dB
1.000 GHz	8.000 GHz	1.000 MHz	7.995 19 GHz	-40.39 dBm	-24.39 dB

Figure 8.6-1: Conducted spurious emissions of low channel, antenna port 1



Testing data Spurious emissions conducted measurements 935210 D05 Indus Booster Basic Meas v01r04 (3.6.3)

Test data, continued

1 Spurious Emi	issions								o1 Max
Limit Che			PA	55					0.1.1.0/
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		002							
20 dBm									
10 dBm									
0 dBm									
-10 dBm									
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-20 dBm									
-30 dBm									
-40 dBm									
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a detailed of									
	we have a second se								
-60 dBm;	16								
A state of the									
9.0 kHz			16000 pt	s	80	0.0 MHz/			8.0 GHz

2 Result Summary					
Range Low	Range Up	RBW	Frequency	Power Abs	∆Limit
9.000 kHz	150.000 kHz	1.000 kHz	13.018 50 kHz	-66.25 dBm	-50.25 dB
150.000 kHz	30.000 MHz	10.000 kHz	702.22500 kHz	-39.04 dBm	-23.04 dB
30.000 MHz	862.000 MHz	100.000 kHz	861.792 00 MHz	-44.95 dBm	-28.95 dB
862.000 MHz	869.000 MHz	100.000 kHz	866.22275 MHz	15.62 dBm	-34.38 dB
869.000 MHz	1.000 GHz	100.000 kHz	872.96275 MHz	-39.77 dBm	-23.77 dB
1.000 GHz	8.000 GHz	1.000 MHz	7.985 56 GHz	-40.85 dBm	-24.85 dB

Figure 8.6-2: Conducted spurious emissions of high channel, antenna port 1



Testing data Spurious emissions conducted measurements 935210 D05 Indus Booster Basic Meas v01r04 (3.6.3)

## 8.6.1 Test data

1 Spurious Emis	sions								o1 Max
Limit Chec	k		PA	SS					
Line SPU	FIOUS LINE A	BS_002	PA	SS					
_		_							
20 dBm									
10 dBm									
0 dBm									
10.d0m									
-10 UBM									
_SPURIOUS_LINE_AB	S_002								
-20 dBm									
-20 dBm									
-30 0811									
-40 dBm									
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9.0 KHZ			16000 pt	s	80	IU.U MHZ/			8.0 GHZ

2 Result Summary					
Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
9.000 kHz	150.000 kHz	1.000 kHz	17.953 50 kHz	-66.03 dBm	-50.03 dB
150.000 kHz	30.000 MHz	10.000 kHz	702.22500 kHz	-39.12 dBm	-23.12 dB
30.000 MHz	862.000 MHz	100.000 kHz	861.792 00 MHz	-42.90 dBm	-26.90 dB
862.000 MHz	869.000 MHz	100.000 kHz	864.217 25 MHz	14.75 dBm	-35.25 dB
869.000 MHz	1.000 GHz	100.000 kHz	873.028 25 MHz	-38.54 dBm	-22.54 dB
1.000 GHz	8.000 GHz	1.000 MHz	7.967 19 GHz	-40.22 dBm	-24.22 dB

Figure 8.6-3: Conducted spurious emissions of low channel, antenna port 2



Testing data Spurious emissions conducted measurements 935210 D05 Indus Booster Basic Meas v01r04 (3.6.3)

Test data, continued

1 Sourious Emis	ssions								o 1 May
Limit Cher			DA	<u>ee</u>					OI MOX
Line SPI		RS 002	DA	ee					
		55_002		33					
20 dBm									
10 dBm									
0 dBm									
-10 dBm									
SPURIOUS LINE AR	9 002								
	.5_002								
-20 dBm									
-30 dBm									
-40 dBm									
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9.0 kHz			16000 pt	S	80	U.U MHz/			8.0 GHz

2 Result Summary					
Range Low	Range Up	RBW	Frequency	Power Abs	∆Limit
9.000 kHz	150.000 kHz	1.000 kHz	16.120 50 kHz	-66.90 dBm	-50.90 dB
150.000 kHz	30.000 MHz	10.000 kHz	702.225 00 kHz	-38.95 dBm	-22.95 dB
30.000 MHz	862.000 MHz	100.000 kHz	861.792 00 MHz	-44.54 dBm	-28.54 dB
862.000 MHz	869.000 MHz	100.000 kHz	866.22275 MHz	14.67 dBm	-35.33 dB
869.000 MHz	1.000 GHz	100.000 kHz	873.028 25 MHz	-38.28 dBm	-22.28 dB
1.000 GHz	8.000 GHz	1.000 MHz	7.993 44 GHz	-41.18 dBm	-25.18 dB

Figure 8.6-4: Conducted spurious emissions of high channel, antenna port 2

## 8.7 Spurious emissions radiated measurements

### 8.7.1 References, definitions and limits

### FCC §90.210(g)(2)

On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

### 8.7.2 Test summary

Verdict	Pass		
Tested by	P. Barbieri	Test date	January 28, 2022

## 8.7.3 Observations, settings and special notes

The spectrum was searched from 30 MHz to the 10th harmonic.

All measurements were performed using peak detector according to note 4 of 935210 D05 Indus Booster Basic Meas v01r04 paragraph 3.6.3. Testing was performed with RF ports terminated with 50 Ohm load.

In the graphics below, no radiated spurious emission found and the limit is exceeded only by the carrier.

Spectrum analyser settings:

, , ,	
Resolution bandwidth:	100 kHz and 1 MHz
Video bandwidth:	VBW ≥ 3 × RBW
Detector mode:	Peak
Trace mode:	Max Hold
Input signal frequency	

input signal frequency	
Low channel	864.5 MHz
High channel	866.5 MHz

### 8.7.4 Test equipment used

Equipment	Manufacturer	Model no.	Asset no.
Spectrum Analyzer	Rohde & Schwarz	FSW43	101767
EMI Receiver	Rohde & Schwarz	ESW44	101620
<b>RF Vector Signal Generator</b>	Rohde & Schwarz	SMBV100A	263254
RF Vector Signal Generator	Rohde & Schwarz	SMBV100A	263397
Antenna Trilog 25MHz - 8GHz	Schwarzbeck Mess-Elektronik	VULB9162	9162-025
Antenna 1 - 18 GHz	Schwarzbeck Mess-Elektronik	STLP9148	STLP 9148-152
Double Ridge Horn Antenna	RFSpin	DRH40	061106A40
Broadband Amplifier	Schwarzbeck Mess-Elektronik	BBV9718C	00121
Broadband Bench Top Amplifier	Sage	STB-1834034030-KFKF-L1	18490-01
Controller	Maturo	FCU3.0	10041
Tilt antenna mast	Maturo	TAM4.0-E	10042
Turntable	Maturo	TT4.0-5T	2.527
Semi-anechoic chamber	Nemko S.p.a.	10m semi-anechoic chamber	530

Notes: NCR - no calibration required, VOU - verify on use



Testing data Spurious emissions radiated measurements 935210 D05 Indus Booster Basic Meas v01r04 (3.8)

8.7.5 Test data



Figure 8.7-1: Radiated spurious emissions below 1 GHz, low channel with antenna in horizontal polarization



Testing data Spurious emissions radiated measurements 935210 D05 Indus Booster Basic Meas v01r04 (3.8)

Test data, continued



Figure 8.7-2: Radiated spurious emissions from 1 GHz to 10 GHz, low channel with antenna in horizontal polarization



Testing data Spurious emissions radiated measurements 935210 D05 Indus Booster Basic Meas v01r04 (3.8)

Test data, continued



Figure 8.7-3: Radiated spurious emissions below 1 GHz, low channel with antenna in vertical polarization



Testing data Spurious emissions radiated measurements 935210 D05 Indus Booster Basic Meas v01r04 (3.8)

Test data, continued



Figure 8.7-4: Radiated spurious emissions from 1 GHz to 10 GHz, low channel with antenna in vertical polarization



Testing data Spurious emissions radiated measurements 935210 D05 Indus Booster Basic Meas v01r04 (3.8)

Test data, continued



Figure 8.7-5: Radiated spurious emissions below 1 GHz, high channel with antenna in horizontal polarization



Testing data Spurious emissions radiated measurements 935210 D05 Indus Booster Basic Meas v01r04 (3.8)

Test data, continued



Figure 8.7-6: Radiated spurious emissions from 1 GHz to 10 GHz, high channel with antenna in horizontal polarization



Testing data Spurious emissions radiated measurements 935210 D05 Indus Booster Basic Meas v01r04 (3.8)

Test data, continued



Figure 8.7-7: Radiated spurious emissions below 1 GHz, high channel with antenna in vertical polarization



Testing data Spurious emissions radiated measurements 935210 D05 Indus Booster Basic Meas v01r04 (3.8)

Test data, continued



Figure 8.7-8: Radiated spurious emissions from 1 GHz to 10 GHz, high channel with antenna in vertical polarization



## 8.8 Frequency stability measurements

## 8.8.1 References, definitions and limits

## FCC § 90.213(a)

Unless noted elsewhere, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.

Fraguanay range	Fixed and base	Mobile stations		
(MHz)	stations	Over 2 watts output power	2 watts or less output power	
Below 25	<sup>1 2 3</sup> 100	100	200	
25-50	20	20	50	
72-76	5		50	
150-174	<sup>5 11</sup> 5	<sup>6</sup> 5	<sup>4 6</sup> 50	
216-220	1.0		1.0	
220-222 <sup>12</sup>	0.1	1.5	1.5	
421-512	<sup>7 11 14</sup> 2.5	<sup>8</sup> 5	<sup>8</sup> 5	
806-809	<sup>14</sup> 1.0	1.5	1.5	
809-824	<sup>14</sup> 1.5	2.5	2.5	
851-854	1.0	1.5	1.5	
854-869	1.5	2.5	2.5	
896-901	<sup>14</sup> 0.1	1.5	1.5	
902-928	2.5	2.5	2.5	
902-928 <sup>13</sup>	2.5	2.5	2.5	
929-930	1.5			
935-940	0.1	1.5	1.5	
1427-1435	<sup>9</sup> 300	300	300	
Above 2450 <sup>10</sup>				



 Section 8
 Testing data

 Test name
 Frequency stability measurements

 Specification
 935210 D05 Indus Booster Basic Meas v01r04 (3.7)

## 8.8.2 Test summary

Verdict	Pass		
Tested by	P. Barbieri	Test date	February 8, 2022

## 8.8.3 Observations, settings and special notes

Testing was performed per ANSI C63.26 Paragraphs 5.6.3, 5.6.4 and 5.6.5 methods.

## 8.8.4 Test equipment used

Equipment	Manufacturer	Model no.	Asset no.
EMI Receiver	Rohde & Schwarz	ESU8	100202
RF Vector Signal Generator	Rohde & Schwarz	SMBV100A	263254
<b>RF Vector Signal Generator</b>	Rohde & Schwarz	SMBV100A	263397
Climatic Chamber	MSL	EC500DA	15022

Notes: NCR - no calibration required, VOU - verify on use

#### 8.8.5 Test data

## Table 8.8-1: Transmitter frequency stability results for antenna port 1

Test conditions	Frequency, Hz	Drift, Hz	Drift, ppm	Limit ±ppm	Margin, ±ppm
+50 °C, Nominal	865499816.0	20.4	0.02357	1.5	1.48
+40 °C, Nominal	865499812.9	17.3	0.01999	1.5	1.48
+30 °C, Nominal	865499808.7	13.1	0.01514	1.5	1.48
+20 °C, -15% voltage	865499797.9	2.3	0.00266	1.5	1.50
+20 °C, Nominal	865499795.6	Reference	Reference	Reference	Reference
+20 °C, +15% voltage	865499793.1	-2.5	-0.00289	1.5	1.50
+10 °C, Nominal	865499775.3	-20.3	-0.02345	1.5	1.48
0 °C, Nominal	865499763.0	-32.6	-0.03767	1.5	1.46
–10 °C, Nominal	865499740.2	-55.4	-0.06401	1.5	1.44
–20 °C, Nominal	865499733.5	-62.1	-0.07175	1.5	1.43
–30 °C, Nominal	865499664.7	-130.9	-0.15124	1.5	1.35

#### Table 8.8-2: Transmitter frequency stability results for antenna port 2

Test conditions	Frequency, Hz	Drift, Hz	Drift, ppm	Limit ±ppm	Margin, ±ppm
+50 °C, Nominal	865499816.4	20.6	0.02380	1.5	1.48
+40 °C, Nominal	865499813.3	17.5	0.02022	1.5	1.48
+30 °C, Nominal	865499808.9	13.1	0.01514	1.5	1.48
+20 °C, -15% voltage	865499798.3	2.5	0.00289	1.5	1.50
+20 °C, Nominal	865499795.8	Reference	Reference	Reference	Reference
+20 °C, +15% voltage	865499792.5	-3.3	-0.00381	1.5	1.50
+10 °C, Nominal	865499775.4	-20.4	-0.02357	1.5	1.48
0 °C, Nominal	865499763.2	-32.6	-0.03767	1.5	1.46
–10 °C, Nominal	865499741.1	-54.7	-0.06320	1.5	1.44
–20 °C, Nominal	865499732.3	-63.5	-0.07337	1.5	1.43
–30 °C, Nominal	865499666.4	-129.4	-0.14951	1.5	1.35



# Section 9 EUT photos

## 9.1 Set-up photos



Figure 9.1-1: Antenna port testing set-up



Figure 9.1-2: Antenna port testing set-up in climatic chamber

## Section 9 EUT photos







Figure 9.1-3: Radiated emissions set-up for frequencies below 1 GHz



Figure 9.1-4: Radiated emissions set-up for frequencies above 1 GHz



## 9.2 External photos

Figure 9.2-1: EUT photo

End of the test report