RF Test Report:

Airspan AirSynergy 2.6

FCC ID:O2J-265AS

SC_TR_52_A

Prepared for:
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1 Revision History

Revision	Originator	Date	Comment
A	C Blackham	19 Mar 2012	1st release

2 Purpose

This document details the Airspan AirSynergy base station, model number 902-03-207, designed for operation in the 2572 – 2614 MHz band.

3 Reference Documents

[Ref 1]	47CFR2	Electromagnetic compatibility and Radio spectrum Matters (ERM); Telecommunications network equipment, ElectroMagnetic Compatibility (EMC) requirements
[Ref 2]	47 CRF27	Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement
[Ref 3]	TIA-603-C	Land Mobile FM or PM – Communications Equipment – Measurement and Performance Standards
Ref 4	KDB 662911 D01	Federal Communications Commission Office of Engineering and Technology Laboratory Division; Emissions Testing of Transmitters with Multiple Outputs in the Same Band (e.g., MIMO, Smart Antenna, etc)

4 Test Information

4.1 Client

Airspan Communications Ltd
Capital Point,
33 Bath Road
Slough,
SL1 3UF
UK

4.2 Test personnel

Testing was performed by Charlie Blackham of Sulis Consultants Ltd.

4.3 Test sample

The results herein only refer to sample detailed in section 6

5 Product Description

The Airsynergy supports operation with 10 MHz bandwidths, comprising 1024 subcarriers respectively. Each of these subcarriers can be modulated in a number of modes:

- BPSK ½
- QPSK ½ and ¾
- 16 QAM ½ and ¾
- 64 QAM ½ and ¾

Based on pre-testing, the following four modulation schemes will be used during testing:

- 64 QAM ¾

The unit is fitted with two RF transceiver RF ports, RF-1 and RF-3. These support MIMO operation and are connected to a variety of external cross-polarised sectored antennas having gains of up to 18.0 dBi.

6 Test Configuration

6.1 Test sample and Operating mode

The equipment under test (EUT) was:

Manufacturer	Name	Model Number	Serial Number
Airspan	AirSynergy	902-03-207	MAC address: 00 01 aa ff fe 94

Table 1: Equipment under test

6.2 Support equipment

The support equipment was:

Description	Manufacturer	Name	Serial Number
Laptop	Dell	Latitude	AIRN005837
Mains – 48 V PSU	Phihong	POE injector	PO2400077A1

Table 2: Support Equipment

6.3 Test equipment

Description	Manufacturer	Name	Serial Number	Calibration certificate
Receiver	Rohde & Schwarz	FSQ 26	200186	R&S 39391 23 Nov 2011
Network Analyser	Rohde & Schwarz	Vector Network Analyser	100104	R&S 36199 18 Nov 2011
Attenator	Marconi Instruments	210-10	D5295	Calibrated in-situ using Network Analyser
RF cable	Sucoflex	104	5884/4	

Table 3: Test Equipment

6.4 Equipment set-up

Equipment was configured as per figure 1:

- A "putty" sessions running on the laptop allows the Airsynergy unit to be controlled and set to required frequency, bandwidth, modulation and power.
- The insertion loss of the Attenuator and Co-ax cable were measured using a Network Analyser and their path-loss was programmed into the FSQ as a Transducer Factor.

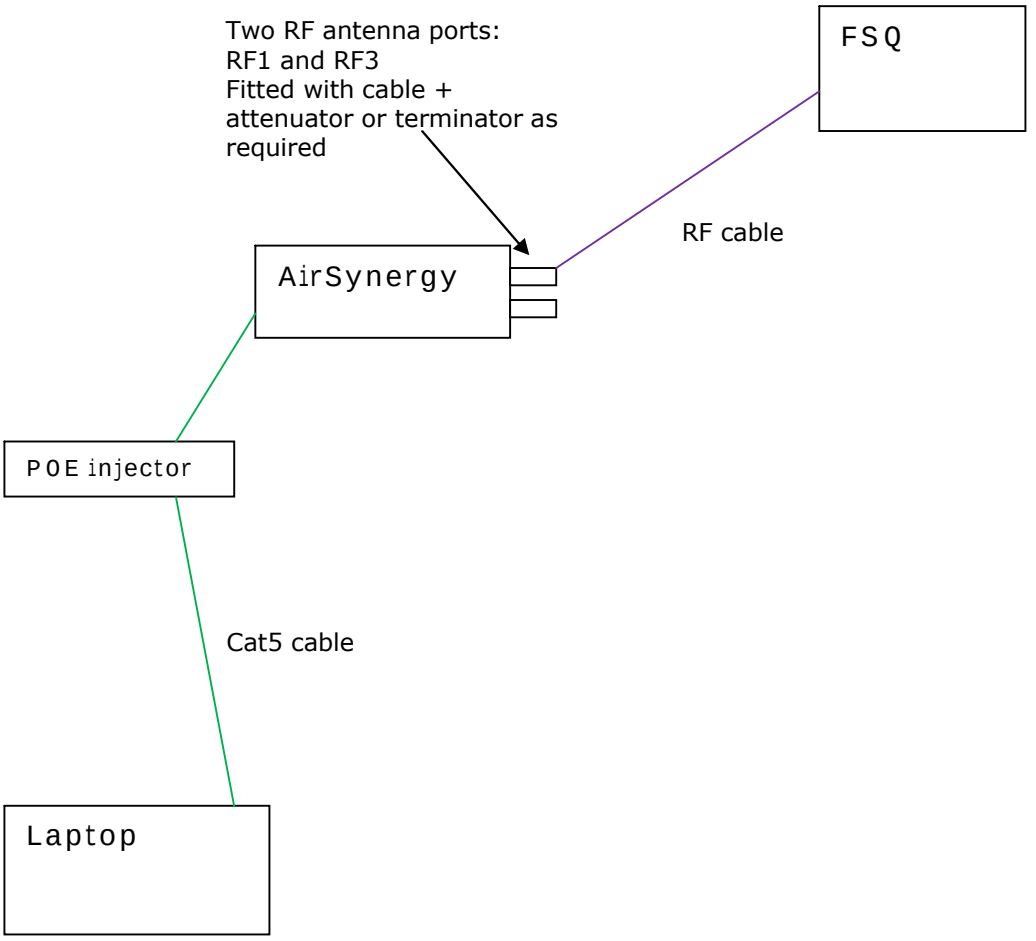


Figure 1: Airsynergy configuration for test

7 Summary of Tests performed

Test	47 CFR Part	Limit	Result	Section
Transmit Power	27.50(h)(1)	63.0 dBm	Pass	8
Spectral Power Density	27.50(h)(4)	45.23 dBm	Pass	9
Conducted Spurious Emissions at Band Edge	27.53(m)(2) 2.1051	-13.0 dBm	Pass	10
Conducted Spurious Emissions	27.53(m)(2) 2,1051	-13.0 dBm	Pass	11
Occupied Bandwidth	2.1049	None	Pass	12

Table 4: Summary of tests performed

8 Transmit Power 47CFR25.50(h)

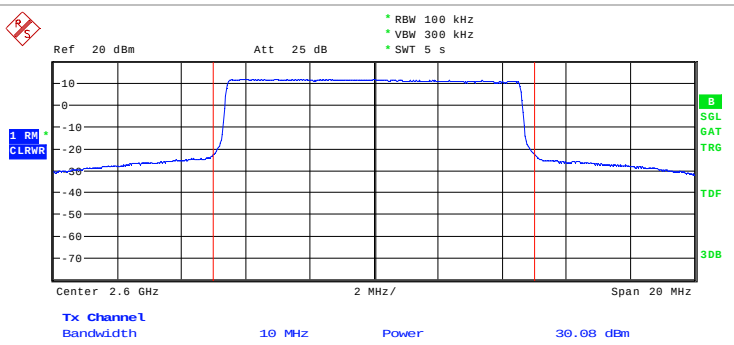
The equipment was configured as per figure 1 and the measurements were made conducted using the RMS detector of the FSQ which was gated to only perform measurement during the ON time of the transmitter.

The transmit power of each port was measured individually, summed and then converted to EIRP by adding 18.0 dBi.

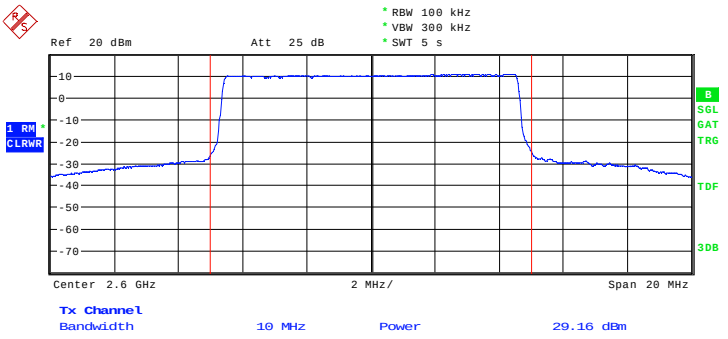
Since the channel bandwidth of the transmitter is greater than both 6.0 and 5.5 MHz, and the EIRP is well within maximum permitted, a conservative maximum EIRP limit for Airsynergy is 33dBW will be used.

TX Freq (MHz)	Port	TX power (dBm)	Summed TX power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP limit (dBm)	Result
2598.0	RF3	30.08	32.65	18.0	50.65	63.0	Pass
2598.0	RF1	29.16					

Table 5: Transmit power test result



Transmit Power Port RF3



Transmit Power Port RF1

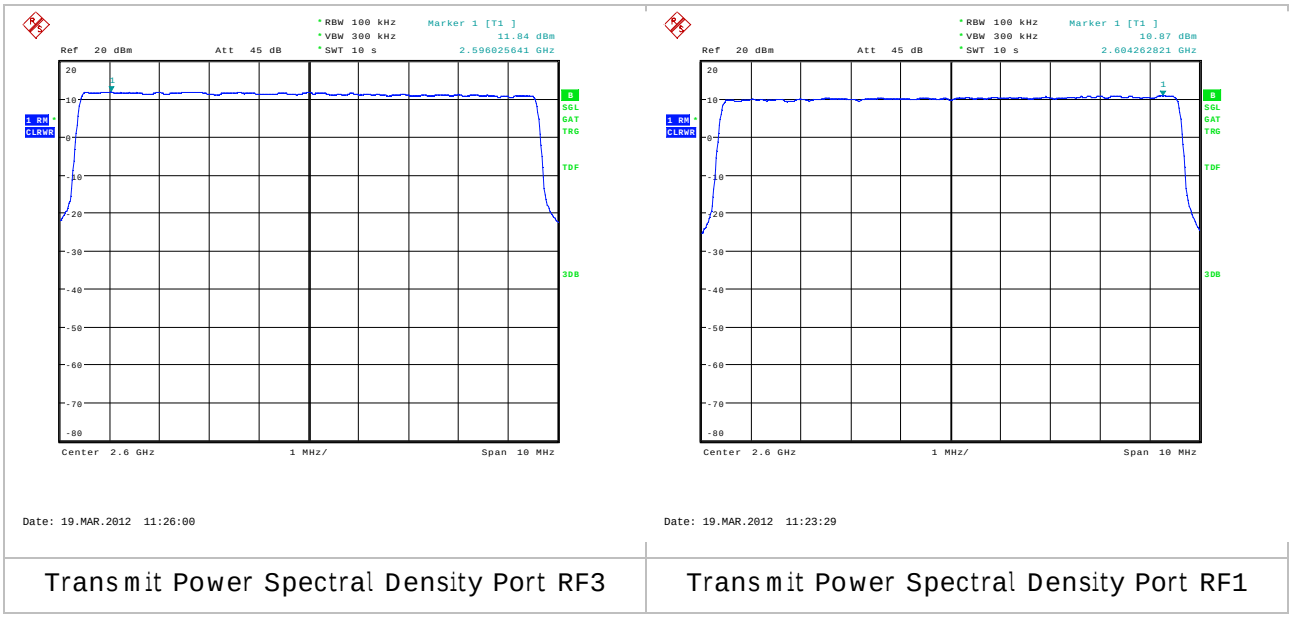
Figure 2: Transmit Power plots

9 Spectral Power Density

The equipment was configured as per figure 1 and the measurements made using the RMS detector of the FSQ which was gated to only perform measurement during the ON time of the transmitter.
The marker peak-search function was used to find the highest power spectral density and compared to the limit of 33.3 W or 45.23 dBm

TX Freq (MHz)	Port	TX power /100 kHz (dBm)	Summed TX power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP limit (dBm)	Result
2598	RF3	11.84	14.39	18.0	32.39	45.23	Pass
	RF1	10.87					

Table 6: Transmit Power Density test results



Transmit Power Spectral Density Port RF3	Transmit Power Spectral Density Port RF1

Figure 3: Transmit Power Density plots

10 Conducted Band Edge

This test was performed at top and bottom of the band. The equipment was configured as per figure 1 and the measurements made gated using the RMS detector of the FSQ.

Channel	Measurement range (MHz)	Port	Max Emission (dBm)	Graph
2578	2540 – 2580	3	-3.27	CBE-3L
		1	-3.90	CBE-1L
2608	2605.5 – 2650	3	-1.86	CBE-3
		1	-0.90	CBE-1

Table 7: Conducted Band Edge Emissions

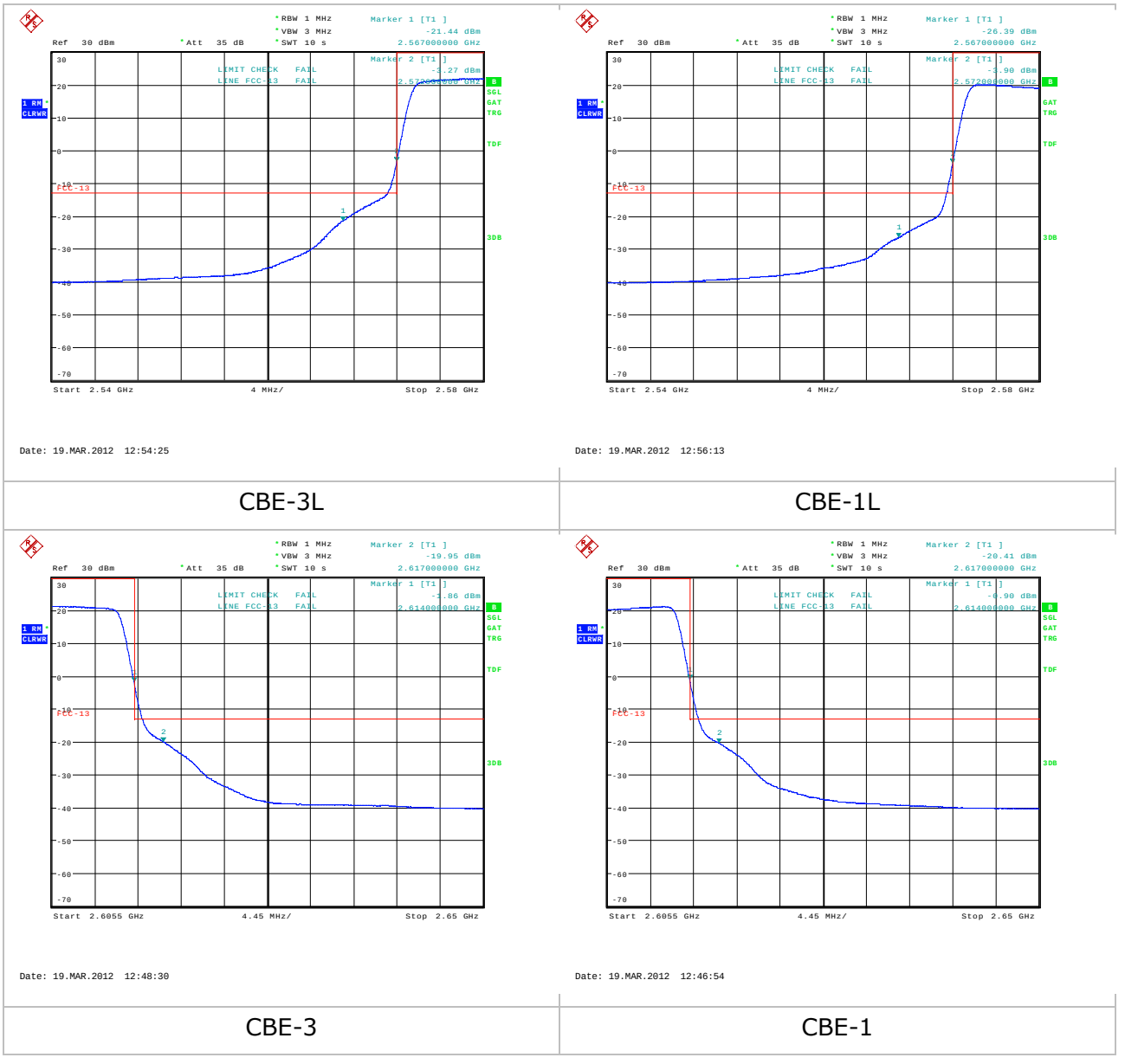


Figure 4: Band Edge plots with 1MHz RBW

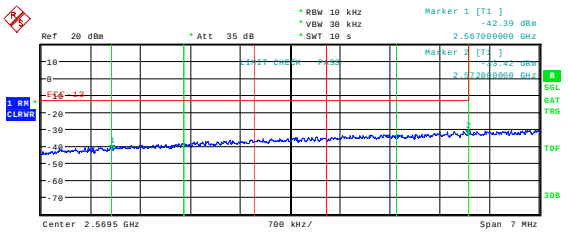
Markers were placed on the plots in figure 4 to show where power level for individual ports was failing the limit and also where the level had dropped to approximately -20 dBm/MHz.

The power in these 1MHz bands near to the band edge were remeasured using the Spectrum Analyser's integrated Channel Power Measurement capability with measurement gated such that it was only made during the on time of the transmitter.

Power from each port in each band of interest was measured, summed linearly and compared against limit of -13.0 dBm.

TX Frequency (MHz)	Port	1MHz band centre frequency (MHz)	Power / MHz (dBm)	Power / MHz (mW)	Combined power (mW)	Combined Power (dBm)	Result
2578	3	2567.5	-25.47	0.0028	0.0109	-19.61	Pass
	1	2567.5	-20.91	0.0081			
	3	2568.5	-23.31	0.0047	0.0181	-17.42	Pass
	1	2568.5	-18.71	0.0135			
	3	2569.5	-21.71	0.0067	0.0272	-15.65	Pass
	1	2569.5	-16.89	0.0205			
	3	2570.5	-20.55	0.0088	0.0383	-14.17	Pass
	1	2570.5	-15.31	0.0294			
	3	2571.5	-19.9	0.0102	0.0491	-13.09	Pass
	1	2571.5	-14.1	0.0389			
2608	3	2614.5	-17.38	0.0183	0.0336	-14.74	Pass
	1	2614.5	-18.16	0.0153			
	3	2615.5	-18.51	0.0141	0.0269	-15.70	Pass
	1	2615.5	-18.93	0.0128			
	1	2615.5	-18.93	0.0128	0.0231	-16.36	Pass
	1	2616.5	-19.86	0.0103			

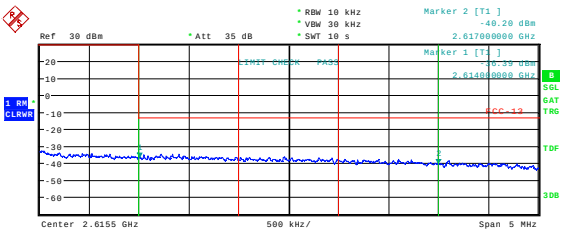
Table 8: Conducted Band Edge Emissions – channel power



Tx Channel			
Bandwidth	1 MHz	Power	-16.89 dBm
Adjacent Channel			
Bandwidth	1 MHz	Lower	-18.71 dBm
Spacing	1 MHz	Upper	-15.31 dBm
Alternate Channel			
Bandwidth	1 MHz	Lower	-20.91 dBm
Spacing	2 MHz	Upper	-14.10 dBm

Date: 19.MAR.2012 13:06:56

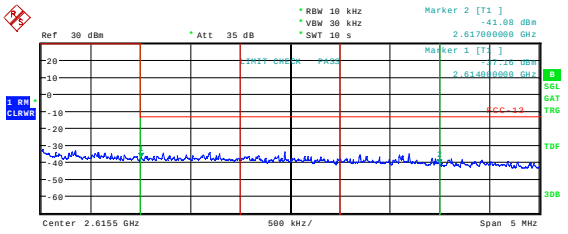
CBE-1L



Tx Channel			
Bandwidth	1 MHz	Power	-18.51 dBm
Adjacent Channel			
Bandwidth	1 MHz	Lower	-17.38 dBm
Spacing	1 MHz	Upper	-19.95 dBm

Date: 19.MAR.2012 12:40:47

CBE-3



Tx Channel			
Bandwidth	1 MHz	Power	-18.93 dBm
Adjacent Channel			
Bandwidth	1 MHz	Lower	-18.16 dBm
Spacing	1 MHz	Upper	-19.86 dBm

Date: 19.MAR.2012 12:44:03

CBE-1

Figure 5: Band Edge plots with 1MHz RBW

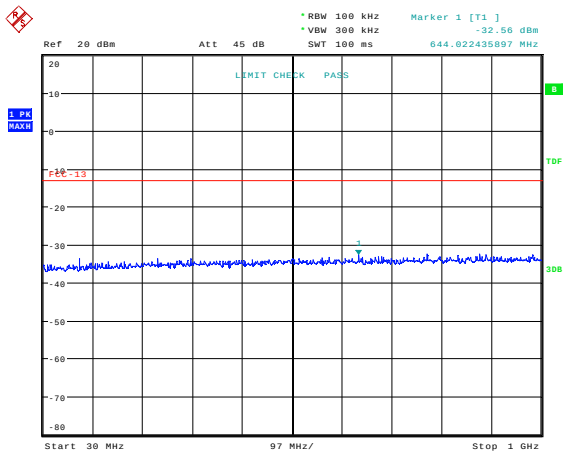
11 Conducted Spurious Emissions

Initial scan was performed on top channel using peak detector and max-hold on port RF-3 which had the highest transmit power.

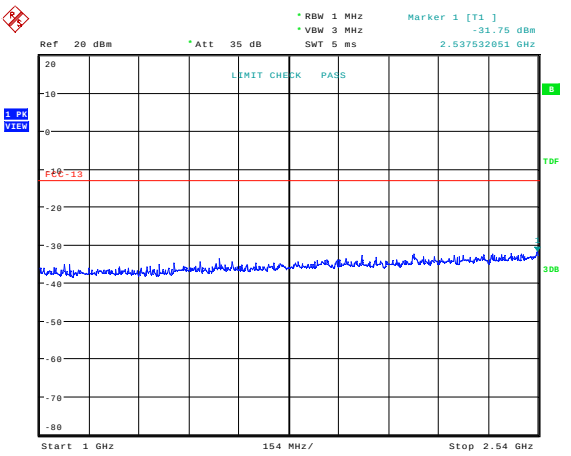
As no emissions or harmonics of note were found, determination of total spurious emission for comparing with limit line was done by adding 10 log (2), or 3dB to the emission level measured on port RF-3.

Frequency Range	Maximum emission (Measured)	Maximum emission (calculated)	Limit (dBm)	Result	Plot
30-1000	-32.56 dBm At 644.02 MHz	-29.56 dBm At 644.02 MHz	-13.0	Pass	CSE-1
1000-2540	-31.75 dBm At 2537.5 MHz	-28.75 dBm At 2537.5 MHz	-13.0	Pass	CSE-2
2540 – 2572	See section 10				
2614 - 2650	See section 10				
2650-12000	-36.73 dBm At 2650 MHz	-33.73 dBm At 2650 MHz	-13.0	Pass	CSE-3
12000-26500	-35.02 dBm at 24524.8 MHz	-32.02 dBm at 24524.8 MHz	-13.0	Pass	CSE-4

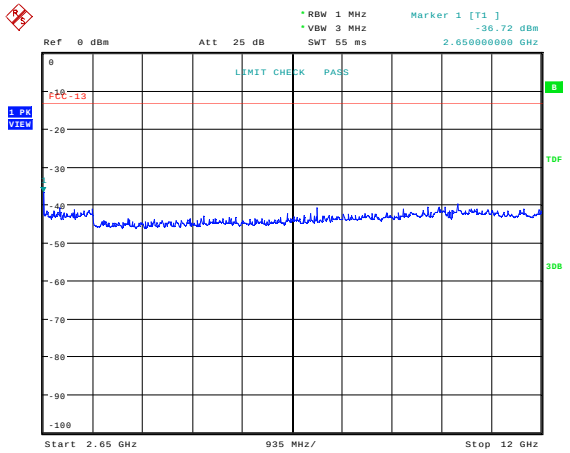
Table 9: Conducted Spurious emissions pre-scans (RF-3)



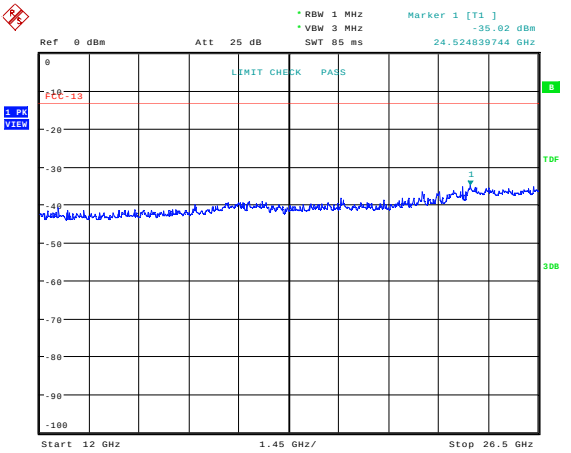
CSE-1



CSE-2



CSE-3



CSE-4

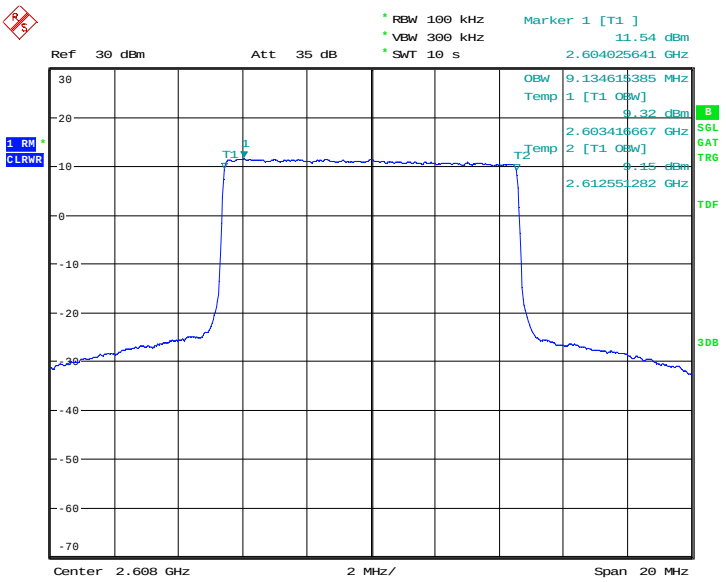
Figure 6: Conducted Spurious Emissions

12 Occupied Bandwidth

The occupied bandwidth was measured using the inbuilt function on the FSQ. Measurement was made using RMS detector and gated measurement.

Frequency (MHz)	Bandwidth (MHz)	Result	Plot
2608	9.1346	Pass	OCC-1

Table 10: Occupied Bandwidth test results



OCC-1

Figure 7: Occupied Bandwidth