13 Radiated Spurious Emissions

13.1 Requirement and test method

(m) For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts in accordance with the standards below. If a licensee has multiple contiguous channels, out-of-band emissions shall be measured from the upper and lower edges of the contiguous channels.

(2) For digital base stations, the attenuation shall be not less than 43 + 10 log (P) dB

Attenuation of 43+10log(P) dBm equates to an absolute limit of -13dBm

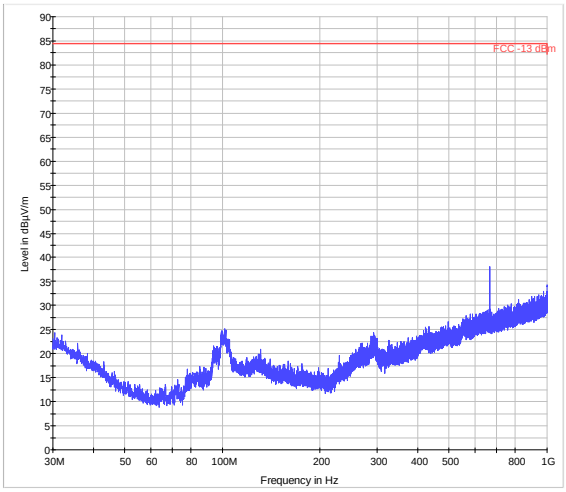
All measurements were performed at a 3m distance
Pre-scan measurements were performed with a spectrum analyser, using a peak detector with 100 kHz RBW for frequencies below 1 GHz and 1 MHz for frequencies above 1 GHz.
The cabinet radiation was performed while antenna ports were terminated with 50Ω load.
Where pre-scans showed emissions within 20dB of the limit, final measurement was made using substitution method.

13.2 Results

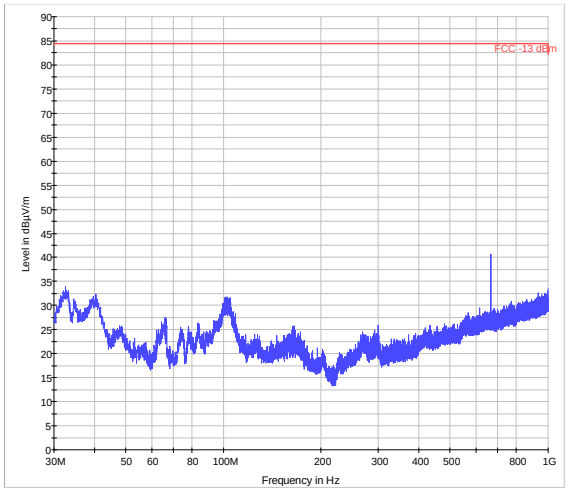
Initial pre-scans were performed using peak detector.
For any emissions within 20dB of the limit, substitution test was performed, this was only required for 3rd harmonic and the results shown in table below:

Bandwidth	Frequency (MHz)	Substituted radiated power (dBm)	Limit (dBm)	Result
5 MHz	7708.47	-31.7	-13.0	Pass
10 MHz	7689.73	-32.4	-13.0	Pass

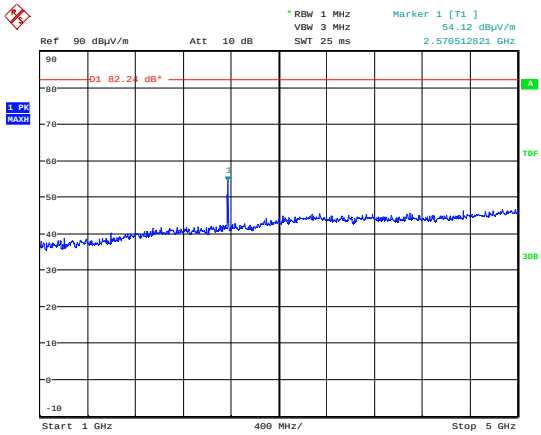
Table 10: Radiated Spurious Emissions



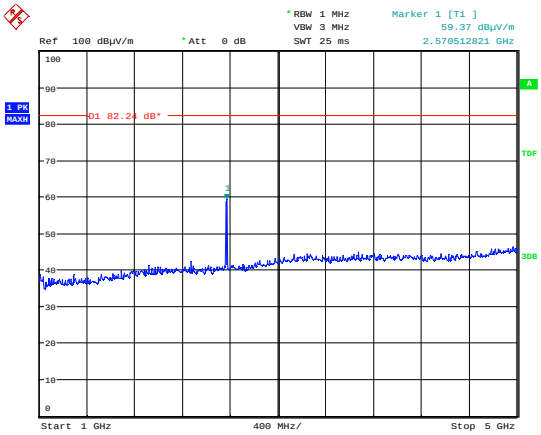
30 - 1000 MHz, Horizontal



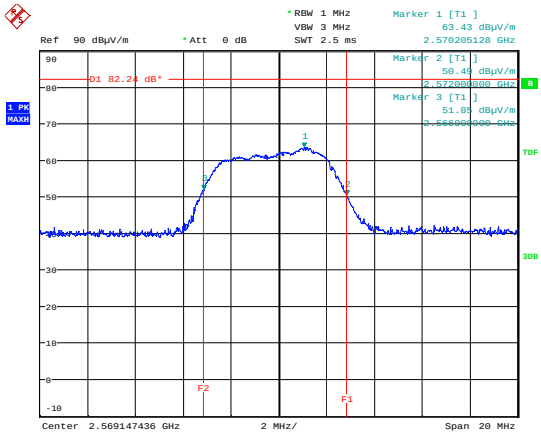
30 - 1000 MHz, Vertical



1 – 5 GHz, Horizontal



1 – 5 GHz, Vertical



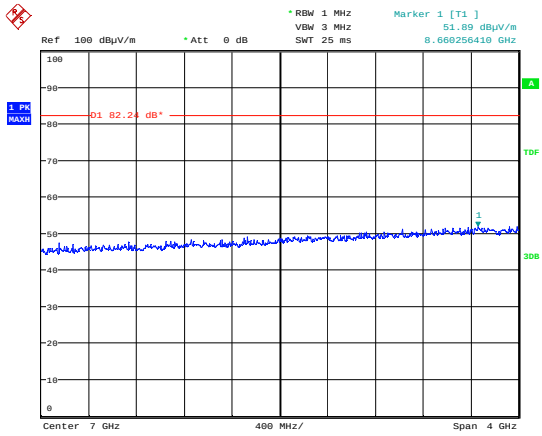
Band edge measurement

Band edge measurement performed on single channel showing how 5 MHz signal complies with band edge requirements for 6 MHz licensed channel.

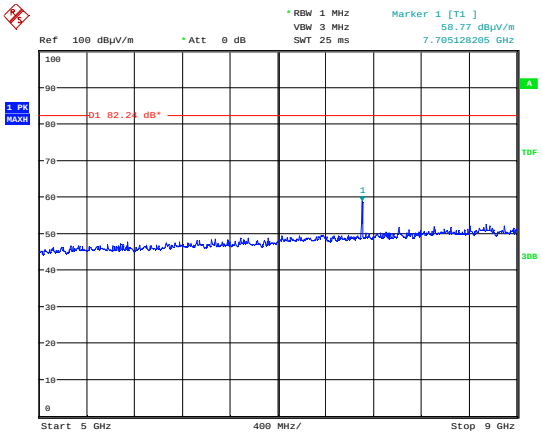
The -13dBm limit line between F1 and F2 should be ignored as this is "in band".

The "band edge" measurements at markers 2 and 3 were over 30dB below limit so final measurements were not required.

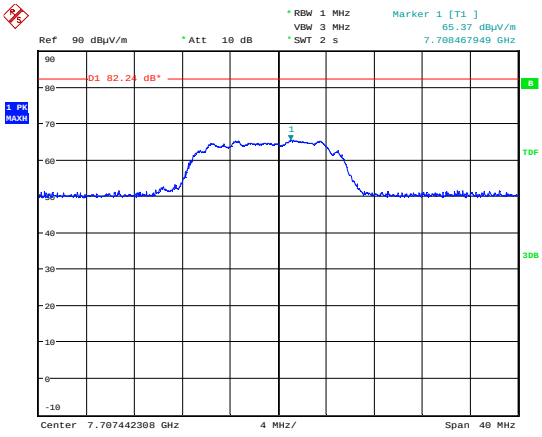
Figure 11: RSE Plots, 5 MHz channels, pt1



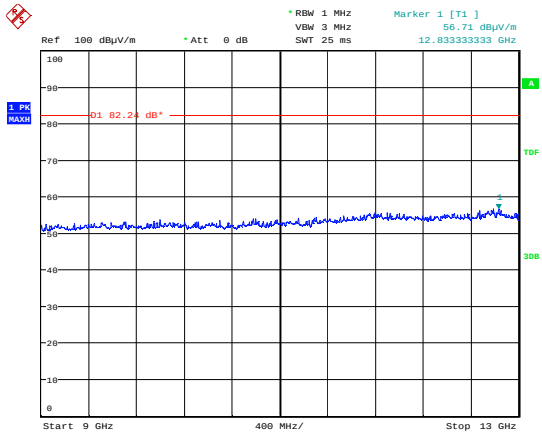
5 – 9 GHz, Horizontal



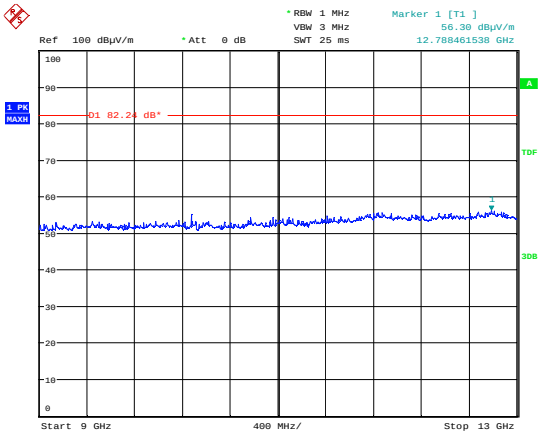
5 – 9 GHz, Vertical



3rd Harmonic, Vertical

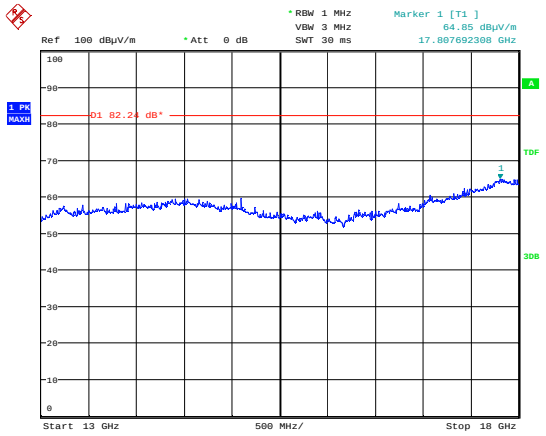


9 – 13 GHz, Horizontal

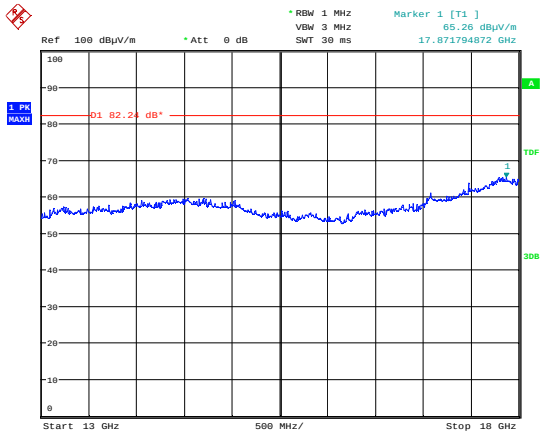


9 – 13 GHz, Vertical

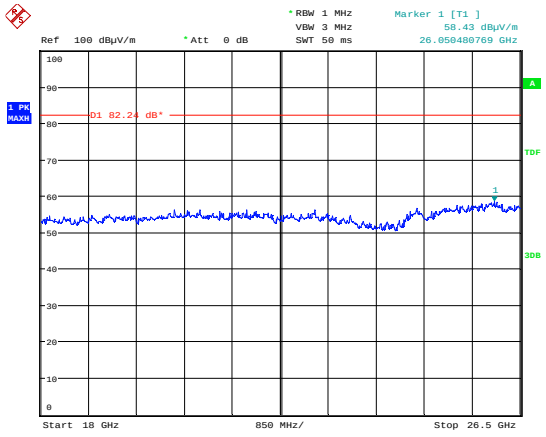
Figure 12: RSE Plots, 5 MHz channels, pt2



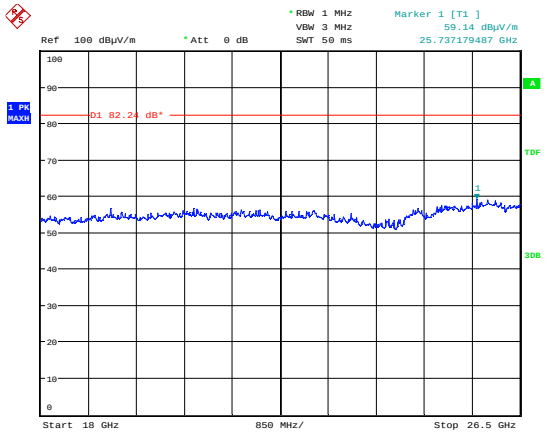
13 – 18 GHz, Horizontal



13 – 18 GHz, Vertical

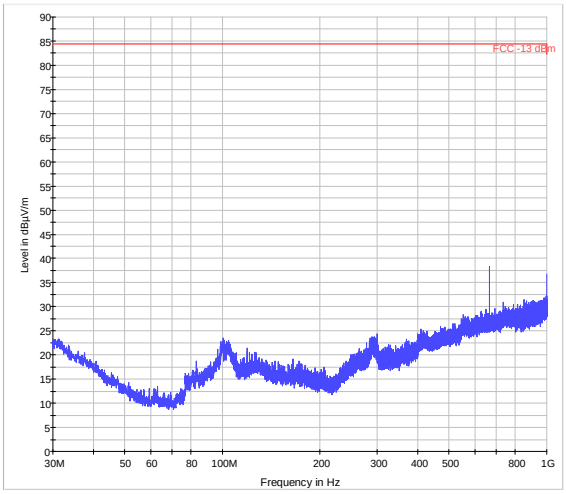


18 – 26.5 GHz, Horizontal

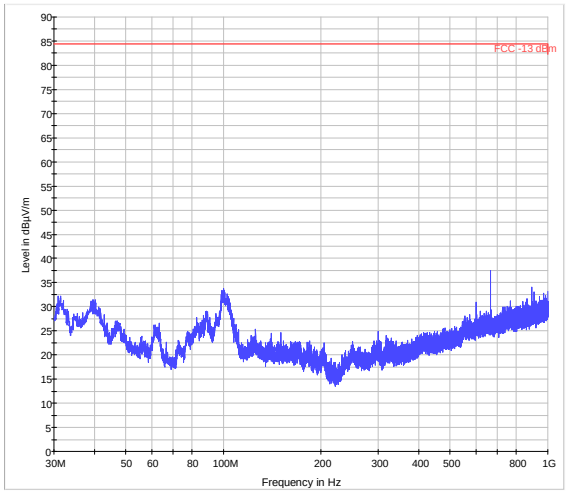


18 – 26.5 GHz, Vertical

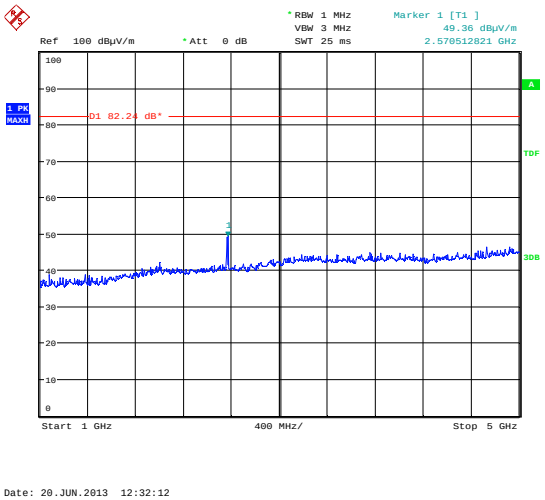
Figure 13: RSE Plots, 5 MHz channels, pt3



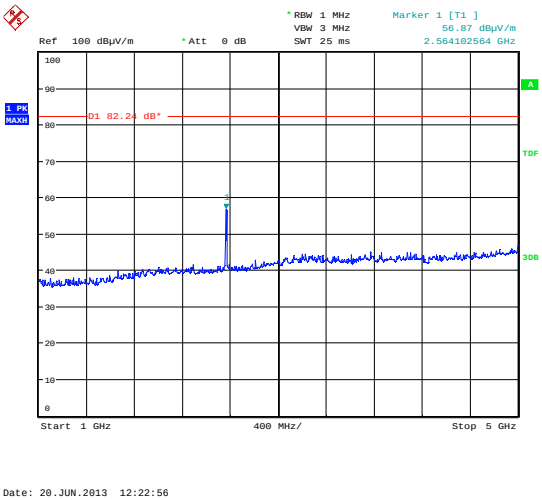
30 - 1000 MHz, Horizontal



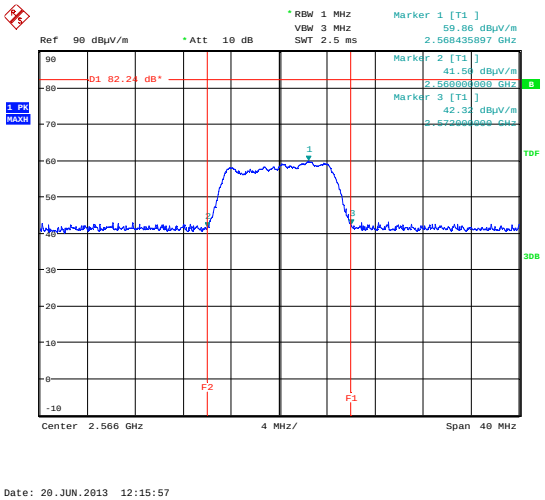
30 - 1000 MHz, Vertical



1 – 5 GHz, Horizontal



1 – 5 GHz, Vertical



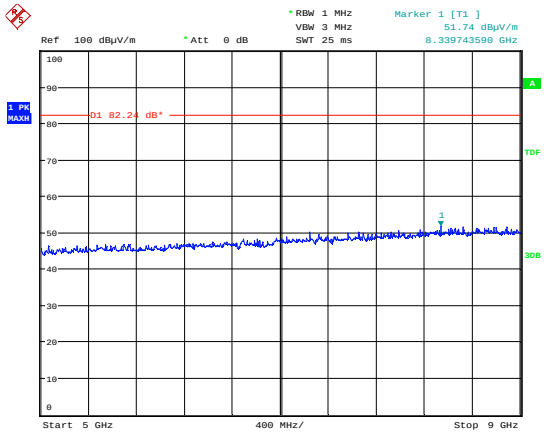
Band edge measurement

Band edge measurement performed on single channel showing how 5 MHz signal complies with band edge requirements for 6 MHz licensed channel.

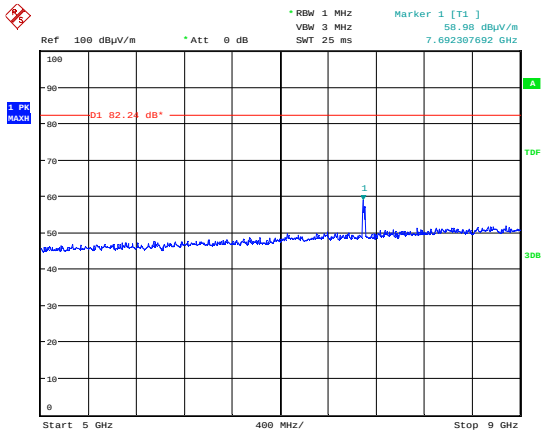
The -13dBm limit line between F1 and F2 should be ignored as this is "in band".

The "band edge" measurements at markers 2 and 3 were over 30dB below limit so final measurements were not required.

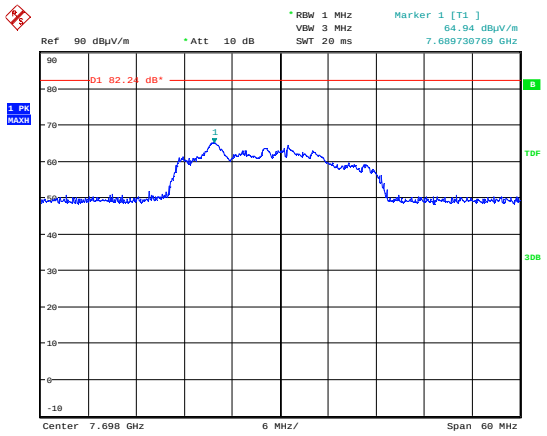
Figure 14: RSE Plots, 10 MHz channels, pt1



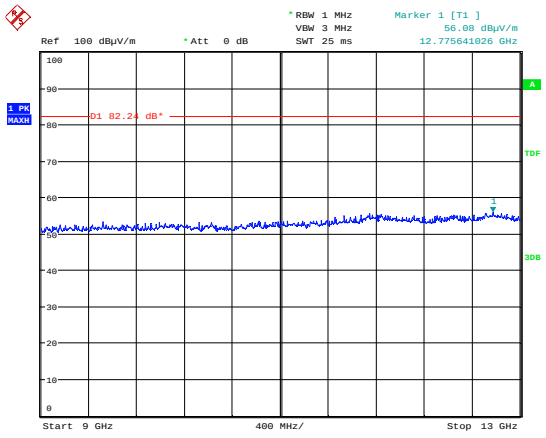
5 – 9 GHz, Horizontal



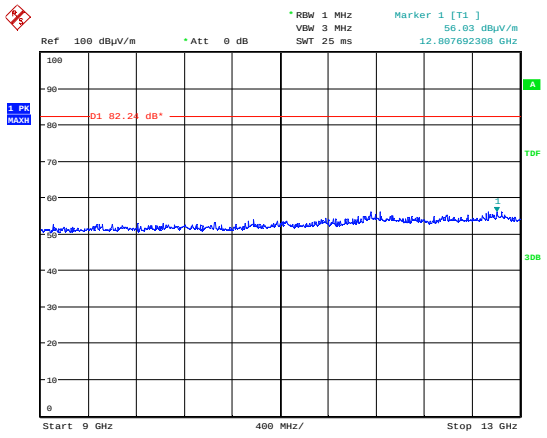
5 – 9 GHz, Vertical



3rd Harmonic, Vertical

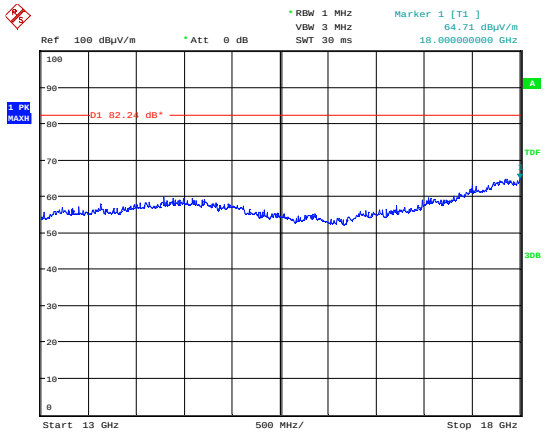


9 – 13 GHz, Horizontal

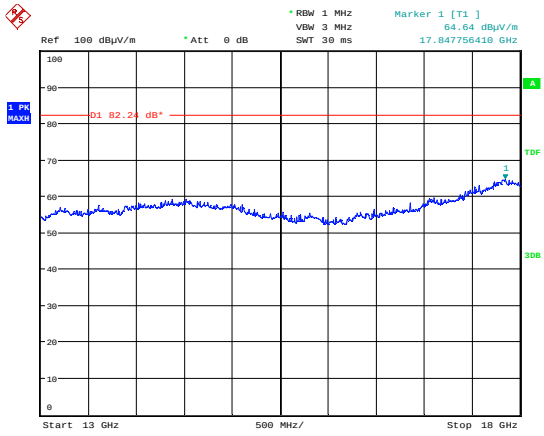


9 – 13 GHz, Vertical

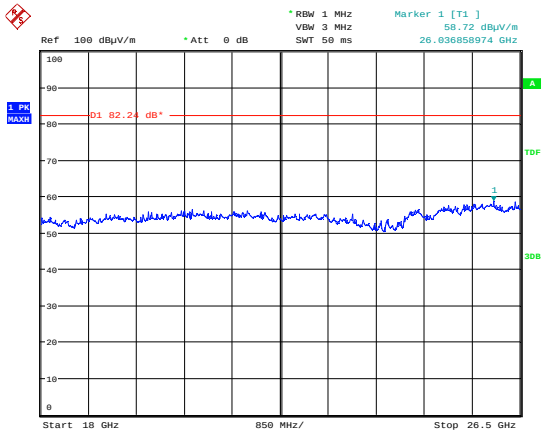
Figure 15: RSE Plots, 10 MHz channels, pt2



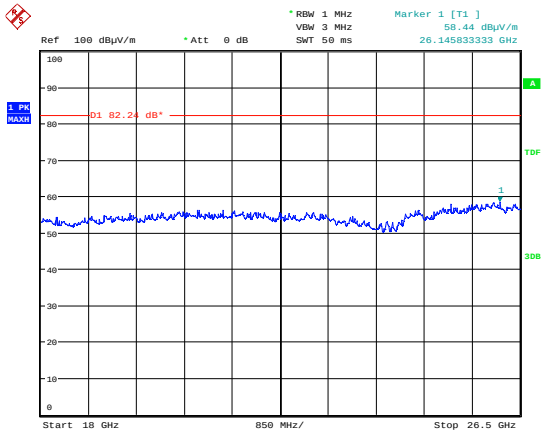
13 – 18 GHz, Horizontal



13 – 18 GHz, Vertical



18 – 26.5 GHz, Horizontal



18 – 26.5 GHz, Vertical

Figure 16: RSE Plots, 10 MHz channels, pt3

14 Mains Conducted Emissions

Test method as per 15.107.

Figure 17: Mains conducted emissions test set-up

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Powerline Conduction 150kHz - 30MHz

EUT:	Airspan AirSynergy
Manuf:	Sulis Consultants
Op Cond:	LISN UH396, cable UH21 & Receiver UH03
Operator:	DW
Test Spec:	FCC
Comment:	Live Line, 110V, 60Hz
	EUT in normal operation (TXing) 5MHz bandwidth
Result File:	AS-LL.dat : New Measurement

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	5kHz	10kHz	PK+AV	50msec	Auto	OFF	60dB

Transducer	No.	Start	Stop	Name
1	1	9kHz	30MHz	UH21
	2	9kHz	30MHz	UH396

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	2sec
	Subranges:	25
	Acc Margin:	20 dB

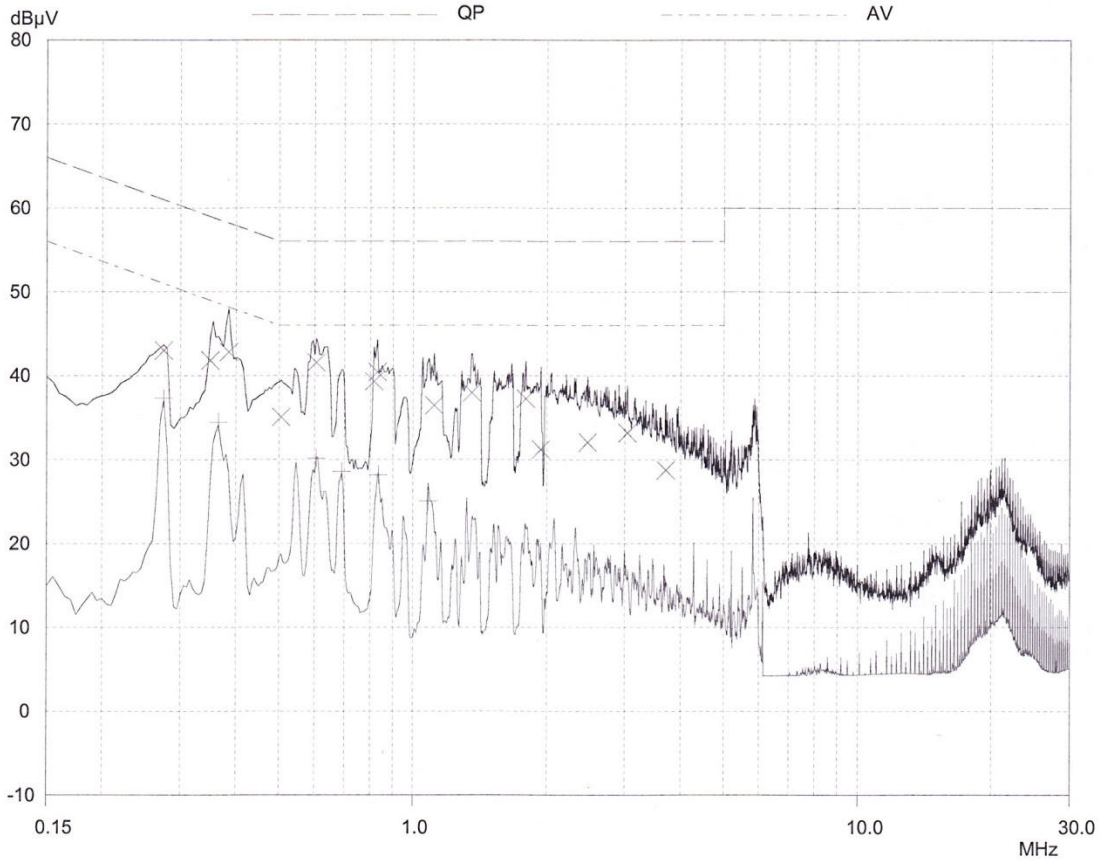

Figure 18: Mains conducted emissions; Live line scan

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Powerline Conduction 150kHz - 30MHz

EUT:	Airspan AirSynergy
Manuf:	Sulis Consultants
Op Cond:	LISN UH396, cable UH21 & Receiver UH03
Operator:	DW
Test Spec:	FCC
Comment:	Live Line, 110V, 60Hz
	EUT in normal operation (TXing) 5MHz bandwidth
Result File:	AS-LL.dat : New Measurement

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	5kHz	10kHz	PK+AV	50msec	Auto	OFF	60dB

Transducer	No.	Start	Stop	Name
1	1	9kHz	30MHz	UH21
	2	9kHz	30MHz	UH396

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	2sec
	Subranges:	25
	Acc Margin:	20 dB

Final Measurement Results

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB
0.275	43.00	60.97	17.97
0.35	41.81	58.96	17.15
0.385	42.82	58.17	15.35
0.505	35.05	56.00	20.95
0.605	41.55	56.00	14.45
0.815	39.30	56.00	16.70
0.83	40.43	56.00	15.57
1.115	36.46	56.00	19.54
1.355	37.96	56.00	18.04
1.79	37.25	56.00	18.75
1.935	31.22	56.00	24.78
2.47	32.07	56.00	23.93
3.035	33.20	56.00	22.80
3.705	28.76	56.00	27.24

Frequency MHz	AV Level dBµV	AV Limit dBµV	AV Delta dB
0.275	37.30	50.97	13.67
0.365	34.45	48.61	14.16
0.605	30.18	46.00	15.82
0.69	28.59	46.00	17.41
0.835	28.21	46.00	17.79
1.08	25.07	46.00	20.93

Figure 19: Mains conducted emissions; Live line final measurements

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Powerline Conduction 150kHz - 30MHz

EUT:	Airspan AirSynergy
Manuf:	Sulis Consultants
Op Cond:	LISN UH396, cable UH21 & Receiver UH03
Operator:	DW
Test Spec:	FCC
Comment:	Neutral Line, 110V, 60Hz
	EUT in normal operation (TXing) 5MHz bandwidth
Result File:	AS-LL.dat : New Measurement

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	5kHz	10kHz	PK+AV	50msec	Auto	OFF	60dB

Transducer	No.	Start	Stop	Name
1	1	9kHz	30MHz	UH21
	2	9kHz	30MHz	UH396

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	2sec
	Subranges:	25
	Acc Margin:	20 dB

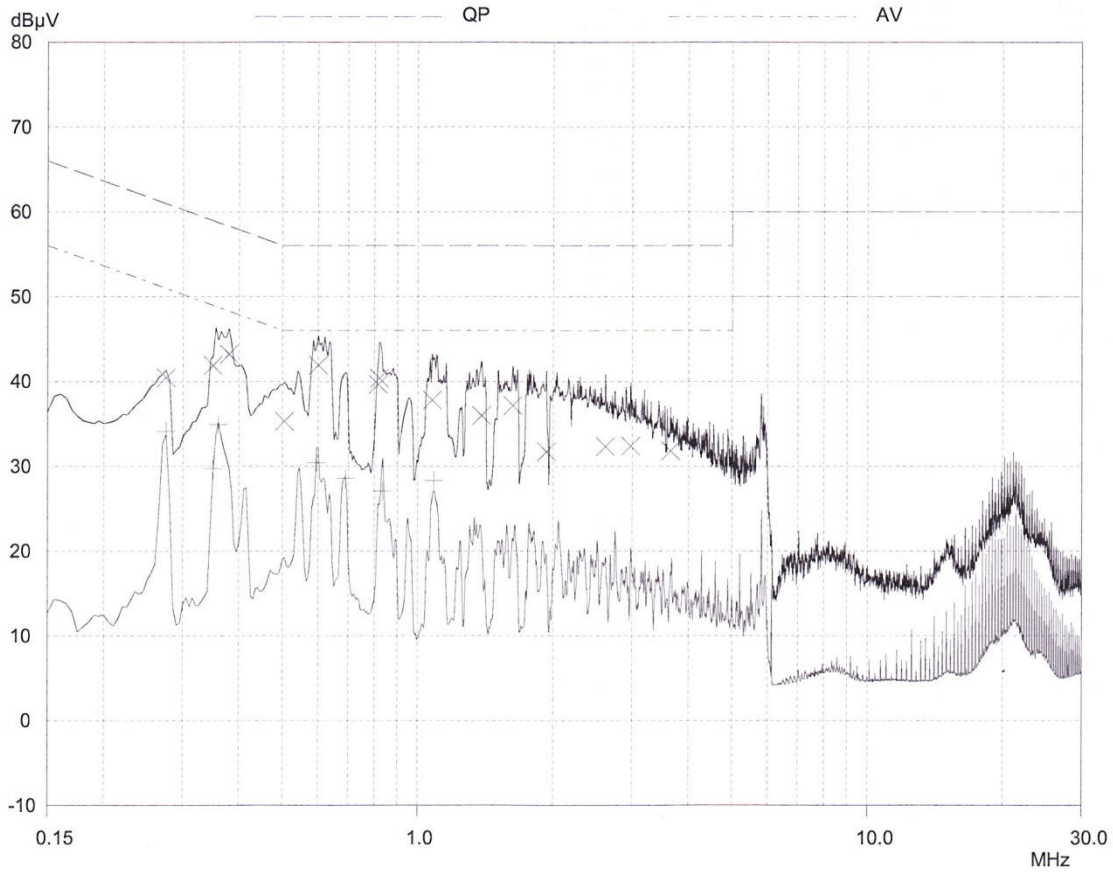

Figure 20: Mains conducted emissions; Neutral line scan

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Powerline Conduction 150kHz - 30MHz

EUT:	Airspan AirSynergy
Manuf:	Sulis Consultants
Op Cond:	LISN UH396, cable UH21 & Receiver UH03
Operator:	DW
Test Spec:	FCC
Comment:	Neutral Line, 110V, 60Hz
	EUT in normal operation (TXing) 5MHz bandwidth
Result File:	AS-LL.dat : New Measurement

Scan Settings (1 Range)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	5kHz	10kHz	PK+AV	50msec	Auto	OFF	60dB

Transducer	No.	Start	Stop	Name
1	1	9kHz	30MHz	UH21
	2	9kHz	30MHz	UH396

Final Measurement:

Detectors:	X QP / + AV
Meas Time:	2sec
Subranges:	25
Acc Margin:	20 dB

Final Measurement Results

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB
0.275	40.42	60.97	20.55
0.35	41.87	58.96	17.09
0.38	43.22	58.28	15.06
0.505	35.30	56.00	20.70
0.6	41.91	56.00	14.09
0.815	39.64	56.00	16.36
0.82	40.37	56.00	15.63
1.075	37.79	56.00	18.21
1.385	35.96	56.00	20.04
1.625	37.15	56.00	18.85
1.93	31.74	56.00	24.26
2.615	32.33	56.00	23.67
2.975	32.39	56.00	23.61
3.65	31.82	56.00	24.18

Frequency MHz	AV Level dBµV	AV Limit dBµV	AV Delta dB
0.275	34.10	50.97	16.87
0.35	29.73	48.96	19.23
0.36	34.92	48.73	13.81
0.595	30.43	46.00	15.57
0.69	28.59	46.00	17.41
0.835	27.05	46.00	18.95
1.085	28.33	46.00	17.67

Figure 21: Mains conducted emissions; Neutral line scan final measurements