



The SDR-play RSP1 is a powerful wideband full-featured SDR which covers all frequencies from 10 kHz up to 2 GHz. All it needs is a PC and an antenna to provide excellent communications receiver functionality. Combined with the power of readily available SDR receiver software (including our own 'SDRuno') you can enjoy all modes of operation while monitoring up to 10 MHz of spectrum at a time. An open API allows developers to create new demodulators or applications around the platform.

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## RF Tuning Range

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The RF tuning range of the SDRplay module is detailed below.

- Continuous Coverage from 10KHz – 2GHz

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## Front End Filtering

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The front end is protected by a series of passive RF filters. These filters are automatically selected based on the RF frequency programmed. The filter ranges are shown below

- 12 MHz Low Pass Filter
- 12 – 30 MHz Band Pass Filter
- 30 – 60 MHz Band Pass Filter
- 60 – 120MHz Band Pass Filter
- 120 – 250 MHz Band Pass Filter
- 250 – 420 MHz Band Pass Filter
- 420 – 1000 MHz Band Pass Filter
- 1000MHz High Pass Filter

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## Intermediate Frequencies

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The SDR play module supports the modes of operation

- Zero IF for all IF bandwidths
- Low IF for bandwidths  $\leq 1.536$ MHz

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## IF Bandwidths

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The following IF filter bandwidths are supported

- 200 kHz
- 300 kHz
- 600 kHz
- 1.536 MHz
- 5.000 MHz
- 6.000 MHz
- 7.000 MHz
- 8.000 MHz

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## ADC Characteristics

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- 12 bit native ADC
- Sample Frequency 2MSPS – 10.66MSPS
- 10.4 ENOB
- 60dB SNR
- 67dB SFDR

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## Connectivity

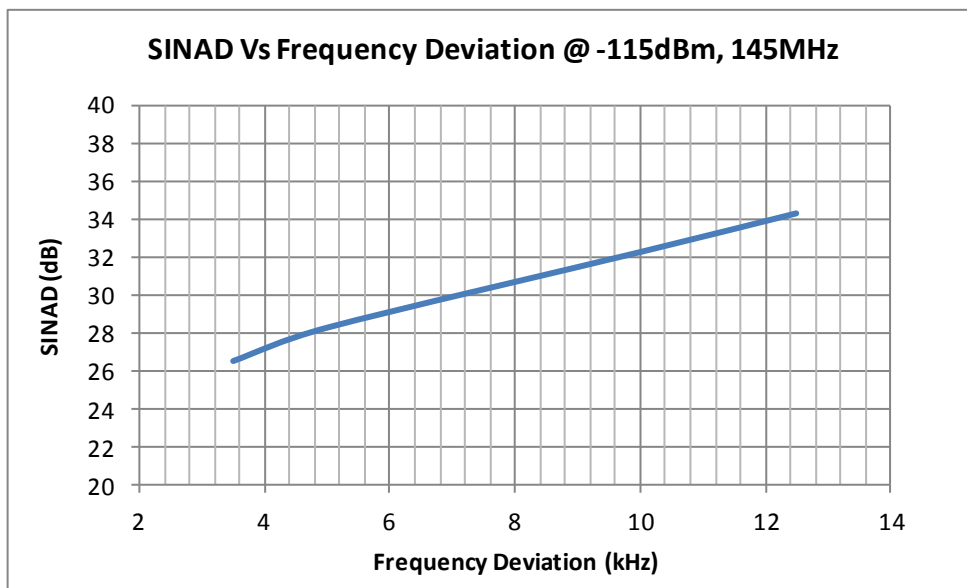
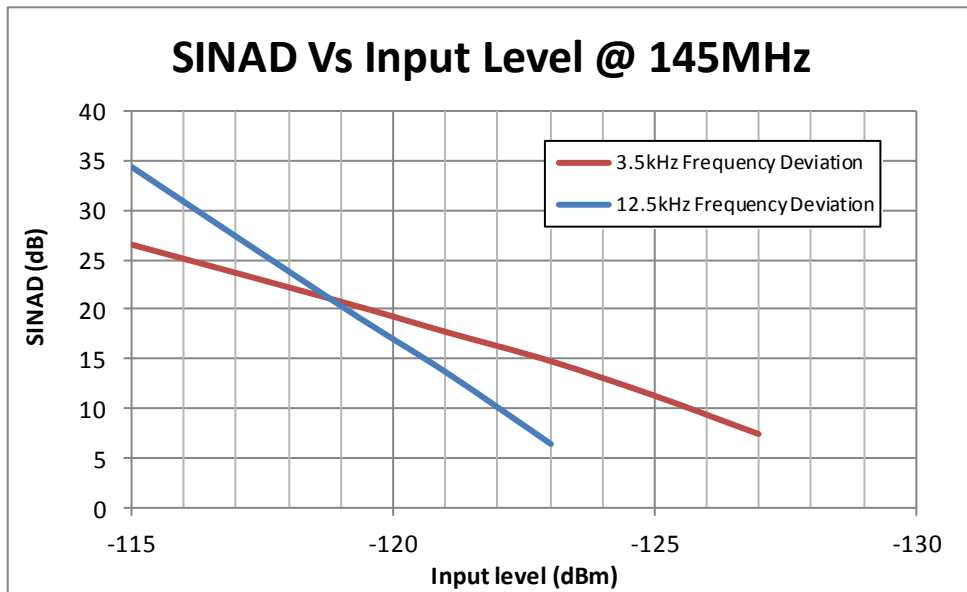
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- Single SMA RF connector
- High Speed USB 2.0 socket (type B)

## Narrow Band FM Characteristics

The plots below show the narrow band FM characteristics of the SDRplay module. The plots show the SINAD performance for different narrow band FM frequency deviations. In addition the SINAD Vs Input level is also shown. These measurements are taken at range of different test frequencies, in each case a 1kHz audio tone was used to conduct the measurements

### 145MHz Test Results

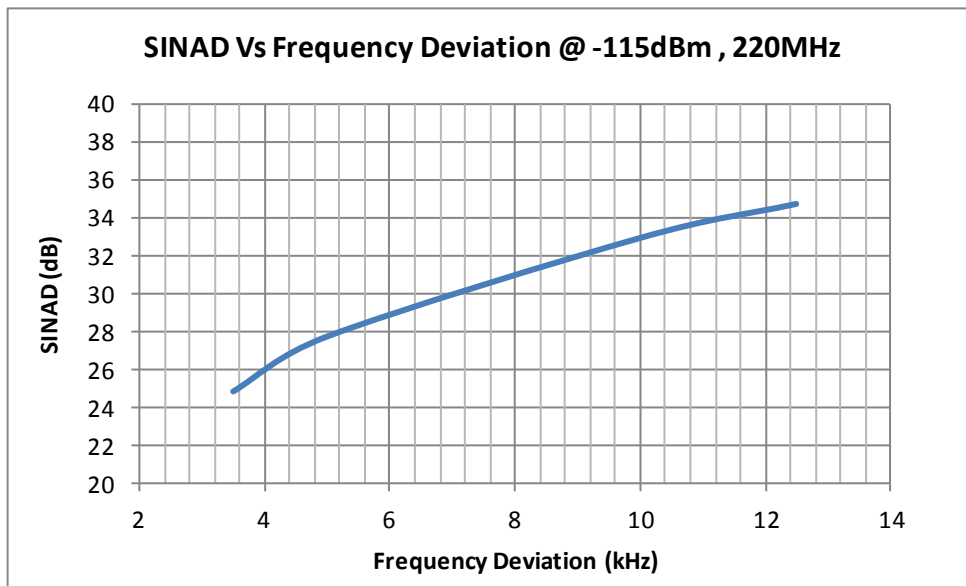
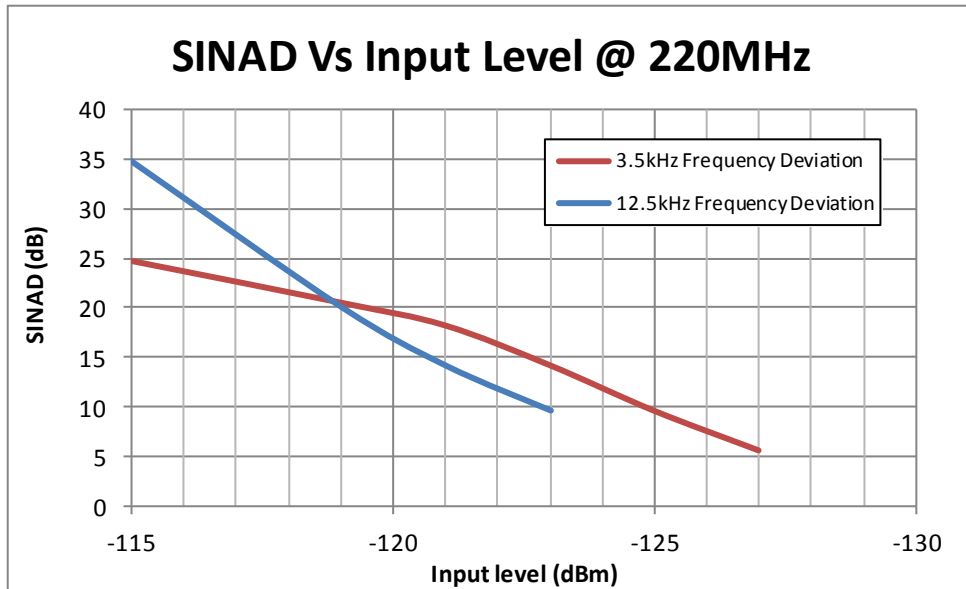


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## Narrow Band FM Characteristics

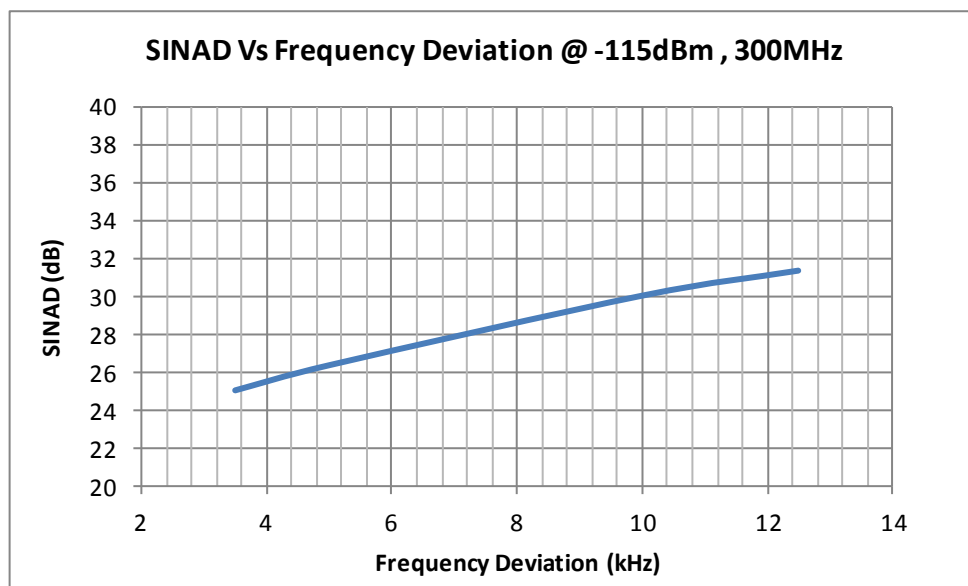
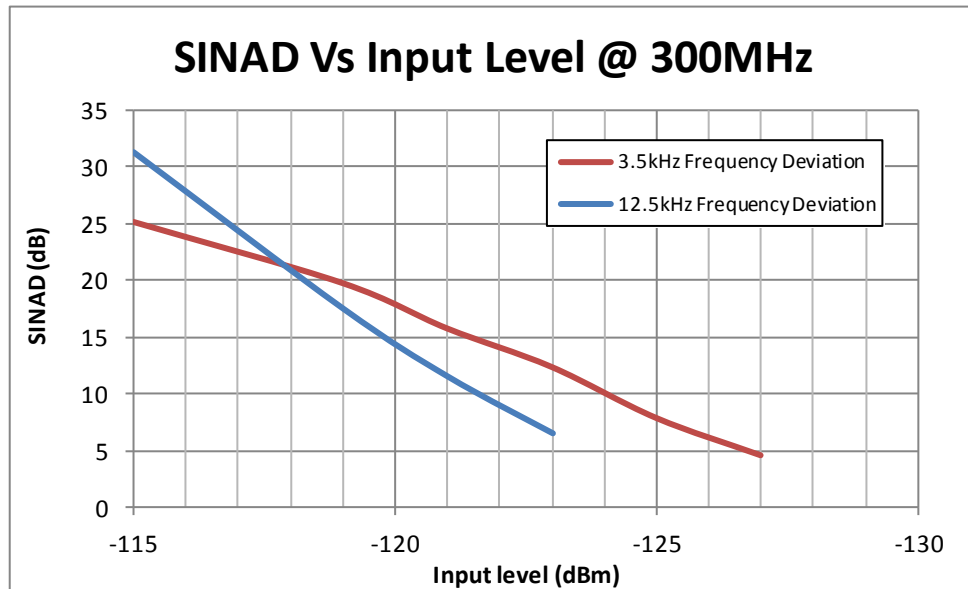
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### 220MHz Test Results



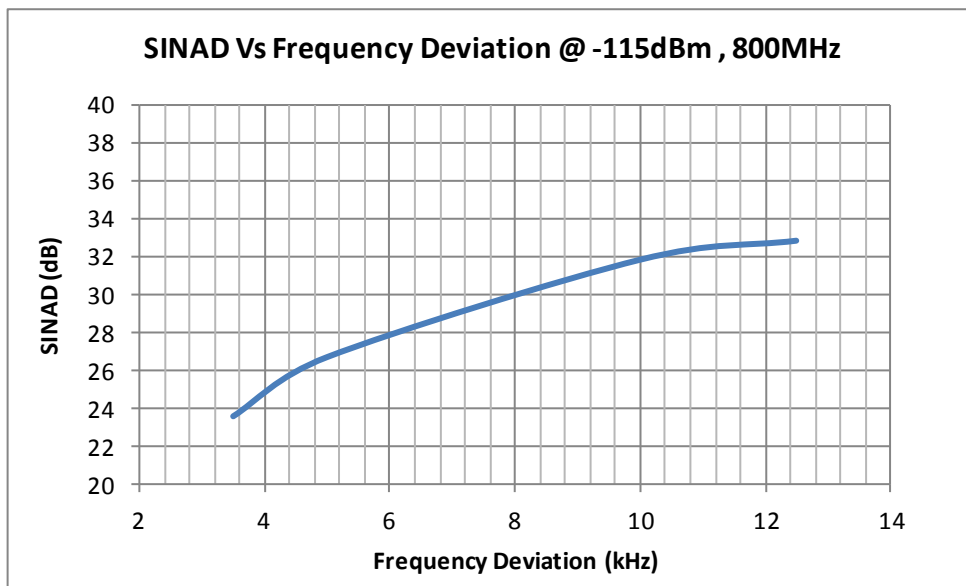
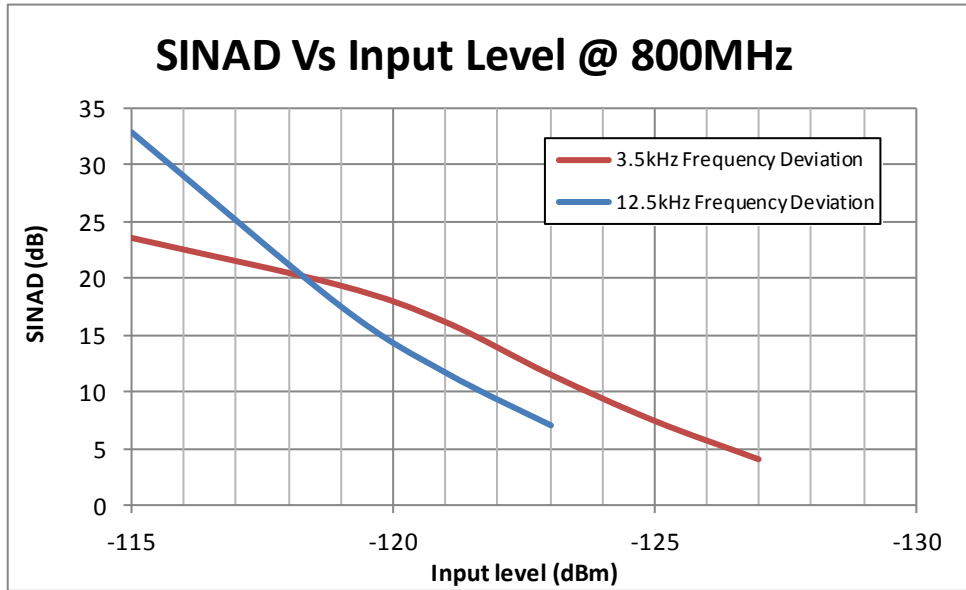
## Narrow Band FM Characteristics

### 300MHz Test Results



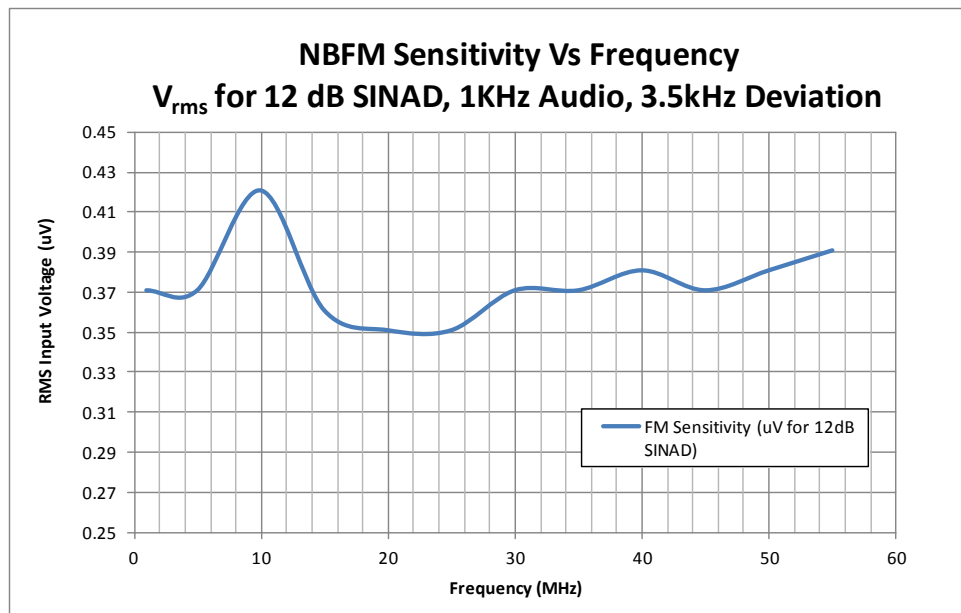
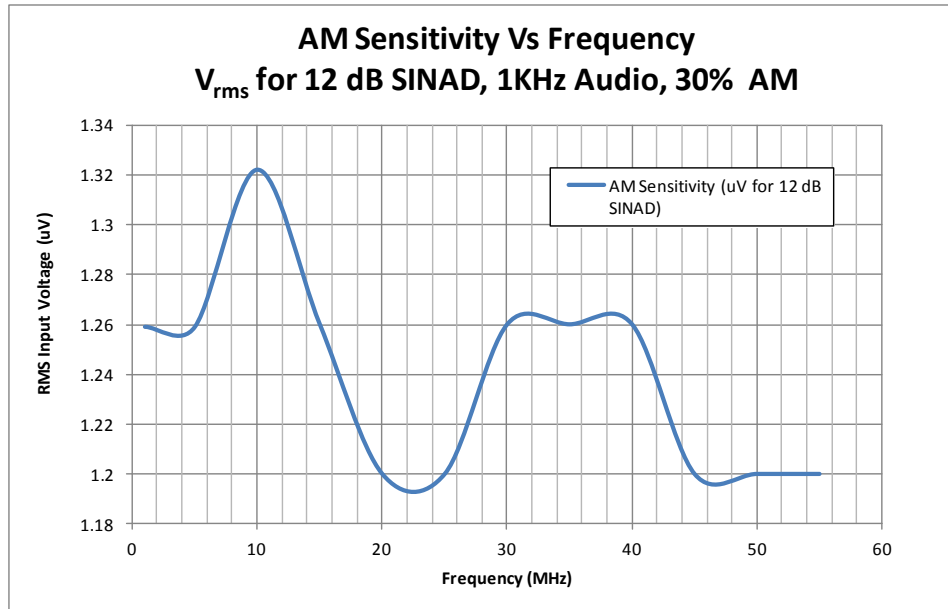
## Narrow Band FM Characteristics

### 800MHz Test Results



## HF Band AM / FM Sensitivity Characteristics

The plots below show the AM and NBFM sensitivity characteristics of the SDRplay module across the HF bands. The plots show the input voltage requirement to achieve 12 dB SINAD. The AM signal has a 1 KHz modulating tone with 30% AM and the FM signal has a 1 KHz audio tone with 3.5 KHz deviation



## Gain, Noise Figure and IIP3

The tables below show the gain, noise figure and IIP3 data for the SDRplay module. The data is given for each of the main front end gain states. The noise figure and gain data can be used to help calculate whether there is sufficient SNR in the receiver when the tuner LNA is enabled within the AGC routine. Further information on programming the AGC can be found in the AGC reference note. The data has been split down to show the performance for each of the front end filter configurations.

Frequency (MHz)	MSi001 LNA & Mixer High Gain Mode			MSi001 LNA Low Gain Mode			MSi001 LNA & Mixer Low Gain Mode			LNA Gain Step	Mixer Gain Step
	Gain	Noise Figure	IIP3 Point	Gain	Noise Figure	IIP3 Point	Gain	Noise Figure	IIP3 Point		
<b>1</b>	99.85	13.25	-8.38	76.80	32.54	17.91	57.48	57.46	18.43	23.05	19.32
<b>2</b>	99.87	12.85	-7.72	76.86	32.27	18.11	57.42	57.26	18.68	23.02	19.44
<b>4</b>	99.86	12.71	-6.41	76.77	31.92	18.54	57.38	56.82	19.00	23.09	19.39
<b>8</b>	99.89	12.55	-5.25	76.57	31.56	18.75	57.21	55.20	19.44	23.32	19.36
<b>11.99</b>	99.79	12.51	-6.50	76.47	32.80	17.86	57.06	58.07	18.80	23.32	19.41

Frequency (MHz)	MSi001 LNA & Mixer High Gain Mode			MSi001 LNA Low Gain Mode			MSi001 LNA & Mixer Low Gain Mode			LNA Gain Step	Mixer Gain Step
	Gain	Noise Figure	IIP3 Point	Gain	Noise Figure	IIP3 Point	Gain	Noise Figure	IIP3 Point		
<b>12</b>	100.12	12.40	-8.02	76.41	30.47	17.92	56.91	55.06	18.75	23.71	19.50
<b>17</b>	99.92	10.92	-7.56	76.48	30.09	18.40	57.06	53.24	18.81	23.45	19.42
<b>21</b>	99.78	10.64	-7.06	76.30	29.86	18.39	56.86	52.67	18.67	23.48	19.44
<b>25</b>	99.66	10.60	-7.22	76.16	29.72	18.40	56.68	52.79	18.92	23.50	19.48
<b>29.99</b>	99.54	12.28	-7.64	75.94	30.18	19.00	56.15	54.30	19.60	23.60	19.79

Frequency (MHz)	MSi001 LNA & Mixer High Gain Mode			MSi001 LNA Low Gain Mode			MSi001 LNA & Mixer Low Gain Mode			LNA Gain Step	Mixer Gain Step
	Gain	Noise Figure	IIP3 Point	Gain	Noise Figure	IIP3 Point	Gain	Noise Figure	IIP3 Point		
<b>30</b>	99.07	11.33	-7.47	75.22	29.20	19.26	55.64	52.05	19.61	23.84	19.59
<b>36</b>	99.13	12.41	-7.60	75.20	29.16	18.97	55.59	52.06	19.31	23.93	19.61
<b>42</b>	98.95	11.30	-7.63	75.00	29.11	19.06	55.38	52.21	19.15	23.95	19.62
<b>48</b>	98.74	11.40	-7.63	74.77	29.07	19.17	55.06	51.87	19.48	23.97	19.70
<b>54</b>	98.45	12.19	-7.20	74.54	29.17	19.83	54.83	52.04	20.02	23.91	19.70
<b>59.99</b>	98.20	12.45	-6.09	74.68	29.19	21.29	54.80	51.95	21.24	23.52	19.88

**Gain, Noise Figure and IIP3**

Frequency (MHz)	MSi001 LNA & Mixer High Gain Mode			MSi001 LNA Low Gain Mode			MSi001 LNA & Mixer Low Gain Mode			LNA Gain Step	Mixer Gain Step
	Gain	Noise Figure	IIP3 Point	Gain	Noise Figure	IIP3 Point	Gain	Noise Figure	IIP3 Point		
<b>60</b>	110.77	6.17	-15.55	87.35	23.12	7.53	68.35	39.05	7.36	23.43	19.00
<b>72</b>	111.91	4.32	-15.42	88.19	21.64	8.13	69.22	35.82	8.22	23.72	18.96
<b>84</b>	111.88	4.23	-15.16	88.24	21.54	8.48	69.26	35.90	8.24	23.64	18.98
<b>96</b>	111.74	4.09	-15.24	87.99	21.45	8.12	69.04	36.00	8.19	23.75	18.95
<b>108</b>	111.21	4.19	-14.98	87.78	21.69	8.19	68.84	36.76	8.29	23.43	18.94
<b>119.99</b>	110.92	4.26	-14.92	87.34	21.68	8.40	68.19	36.90	8.41	23.58	19.15

Frequency (MHz)	MSi001 LNA & Mixer High Gain Mode			MSi001 LNA Low Gain Mode			MSi001 LNA & Mixer Low Gain Mode			LNA Gain Step	Mixer Gain Step
	Gain	Noise Figure	IIP3 Point	Gain	Noise Figure	IIP3 Point	Gain	Noise Figure	IIP3 Point		
<b>120</b>	112.24	4.22	-15.34	87.83	18.73	9.20	68.35	28.78	8.89	24.42	19.48
<b>146</b>	112.50	3.50	-15.30	88.29	18.47	9.45	69.22	28.01	8.99	24.21	19.07
<b>172</b>	112.51	3.45	-15.32	88.32	18.37	9.46	69.26	27.89	9.28	24.19	19.05
<b>198</b>	112.26	3.82	-14.91	87.92	18.45	9.56	69.04	28.35	9.30	24.34	18.88
<b>224</b>	111.77	4.17	-14.43	87.48	19.06	9.86	68.84	29.29	9.70	24.29	18.63
<b>249.99</b>	110.95	4.14	-14.14	86.70	19.88	10.04	68.19	30.88	9.95	24.24	18.51

Frequency (MHz)	MSi001 LNA & Mixer High Gain Mode			MSi001 LNA Low Gain Mode			MSi001 LNA & Mixer Low Gain Mode			LNA Gain Step	Mixer Gain Step
	Gain	Noise Figure	IIP3 Point	Gain	Noise Figure	IIP3 Point	Gain	Noise Figure	IIP3 Point		
<b>250</b>	108.13	6.45	-27.75	82.76	23.04	0.86	63.70	40.81	0.42	25.37	19.06
<b>276</b>	106.89	6.57	-27.97	82.28	23.65	0.70	63.20	41.80	0.50	24.62	19.07
<b>302</b>	106.80	5.44	-28.00	82.36	23.57	0.58	63.30	41.68	0.63	24.44	19.06
<b>328</b>	106.94	4.83	-28.10	82.31	23.54	0.39	63.24	41.91	0.79	24.63	19.08
<b>354</b>	106.10	5.19	-27.94	81.51	23.68	0.60	62.40	41.58	0.82	24.59	19.11
<b>380</b>	103.45	6.57	-27.52	79.55	23.35	0.74	60.37	41.09	0.75	23.90	19.18



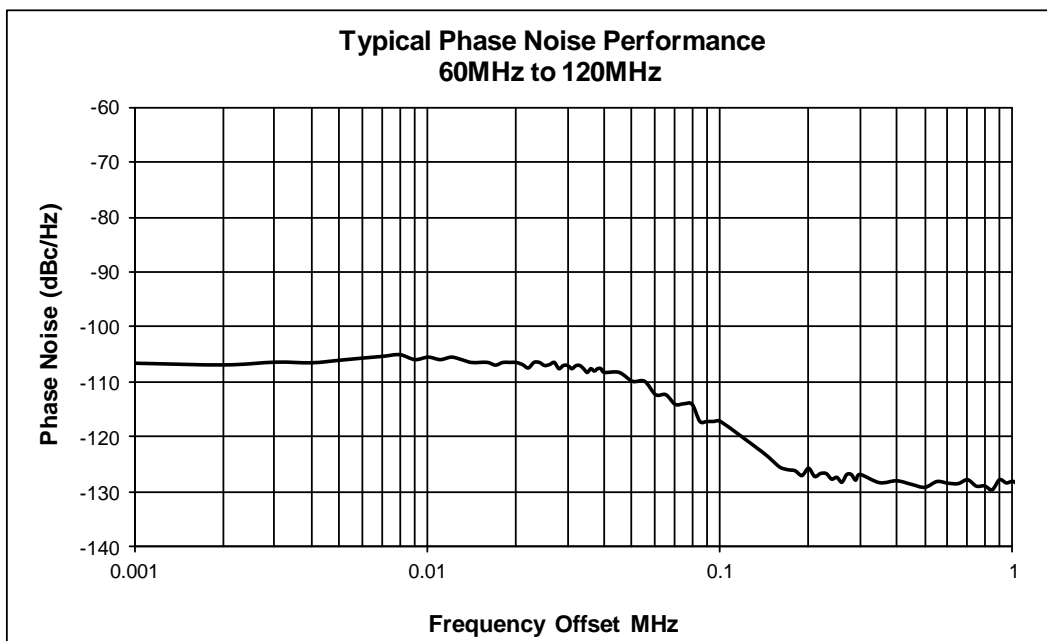
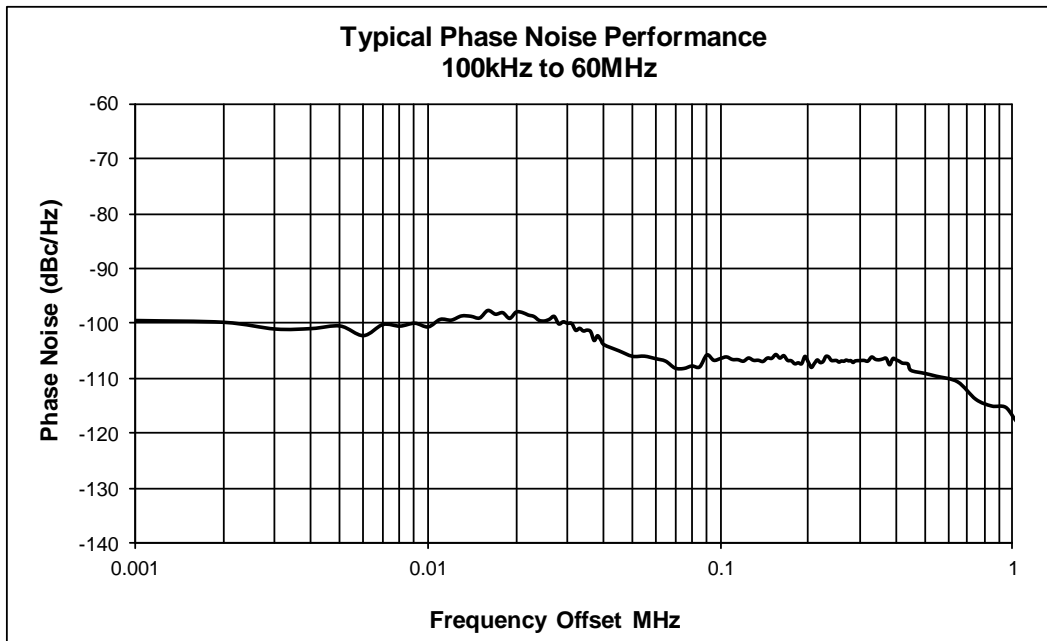
**Gain, Noise Figure and IIP3**

Frequency (MHz)	MSi001 LNA & Mixer High Gain Mode			MSi001 LNA Low Gain Mode			MSi001 LNA & Mixer Low Gain Mode			LNA Gain Step	Mixer Gain Step
	Gain	Noise Figure	IIP3 Point	Gain	Noise Figure	IIP3 Point	Gain	Noise Figure	IIP3 Point		
<b>420</b>	104.49	3.57	-17.96	95.21	5.52	-9.24	75.86	14.72	-9.04	9.28	19.35
<b>480</b>	104.50	3.54	-17.93	94.93	5.51	-9.16	75.59	14.80	-8.93	9.56	19.34
<b>540</b>	104.36	3.40	-17.94	94.95	5.36	-9.08	75.63	14.53	-9.17	9.41	19.32
<b>600</b>	104.67	3.35	-17.85	95.25	5.25	-9.16	75.99	14.22	-9.17	9.42	19.26
<b>660</b>	104.75	3.46	-17.98	95.09	5.37	-9.01	75.78	14.35	-8.95	9.67	19.30
<b>720</b>	104.13	3.59	-17.74	94.27	5.79	-8.71	74.91	15.22	-8.76	9.86	19.36
<b>780</b>	103.06	3.99	-17.63	93.15	6.62	-8.51	73.73	16.46	-8.40	9.91	19.42
<b>840</b>	101.82	4.25	-17.38	92.00	7.25	-8.51	72.52	17.30	-8.33	9.82	19.48
<b>900</b>	101.18	4.84	-17.49	91.38	7.35	-8.64	71.85	17.52	-8.63	9.79	19.53
<b>960</b>	101.44	4.75	-17.77	91.56	7.48	-9.00	72.06	17.34	-8.97	9.88	19.50
<b>999.99</b>	101.49	4.41	-17.92	91.71	7.15	-9.13	72.23	17.04	-9.29	9.78	19.48

Frequency (MHz)	MSi001 LNA & Mixer High Gain Mode			MSi001 LNA Low Gain Mode			MSi001 LNA & Mixer Low Gain Mode			LNA Gain Step	Mixer Gain Step
	Gain	Noise Figure	IIP3 Point	Gain	Noise Figure	IIP3 Point	Gain	Noise Figure	IIP3 Point		
<b>1000</b>	103.76	5.81	-14.25	101.94	7.28	-11.43	82.60	17.93	-11.45	1.82	19.34
<b>1100</b>	105.14	5.19	-14.86	102.87	6.81	-12.07	83.52	15.90	-11.94	2.27	19.35
<b>1200</b>	108.24	3.97	-15.62	105.04	6.08	-13.33	85.66	15.36	-13.00	3.20	19.39
<b>1300</b>	112.21	3.34	-16.93	107.78	4.92	-14.40	88.38	15.01	-14.51	4.43	19.40
<b>1400</b>	113.37	3.43	-16.89	108.62	4.89	-13.91	89.26	14.97	-13.83	4.75	19.36
<b>1500</b>	112.10	3.94	-15.02	107.06	5.65	-12.04	87.65	15.68	-11.84	5.04	19.41
<b>1600</b>	110.29	4.42	-13.75	105.14	6.41	-11.46	85.61	17.10	-11.11	5.16	19.52
<b>1700</b>	109.06	4.23	-13.33	103.94	6.28	-11.00	84.39	17.14	-11.02	5.12	19.55
<b>1800</b>	108.58	4.21	-13.21	103.34	6.13	-10.93	83.81	17.10	-10.84	5.24	19.53
<b>1900</b>	107.62	4.70	-13.19	103.44	6.99	-10.77	83.97	17.05	-10.65	4.18	19.47
<b>2000</b>	104.98	6.38	-13.04	102.16	7.88	-10.75	82.75	18.19	-10.70	2.83	19.41

## Phase Noise

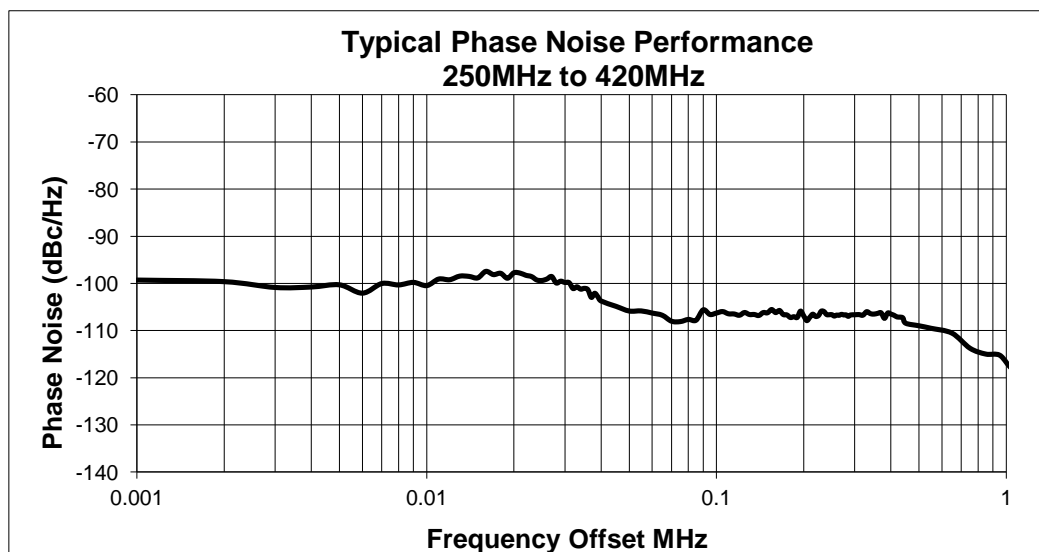
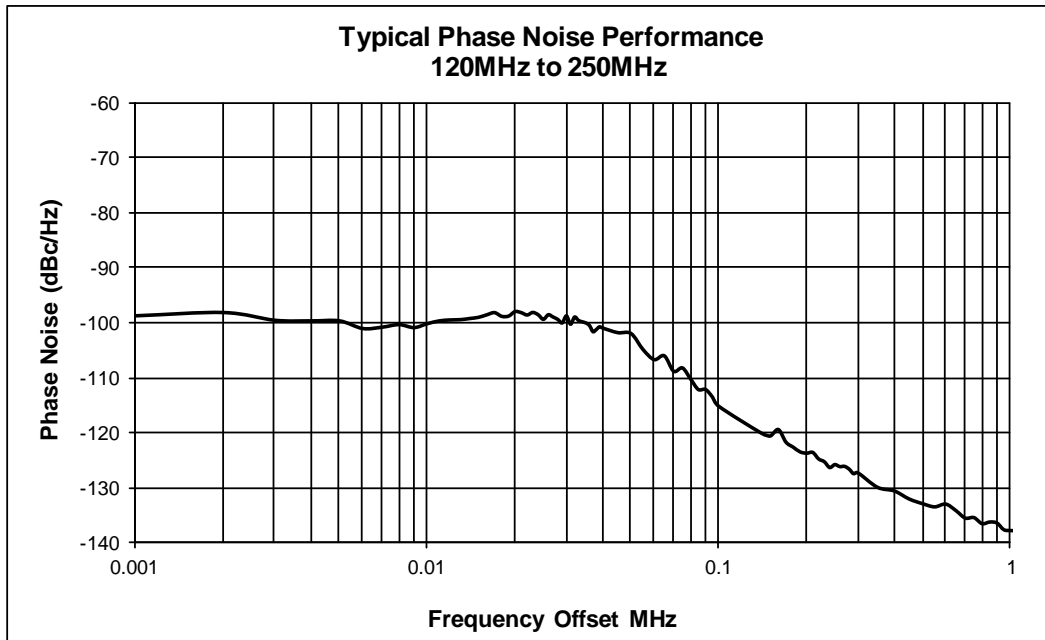
The tables below show typical phase noise plots for the SDRplay module. An example of the phase noise performance for different frequency coverage areas has been considered.



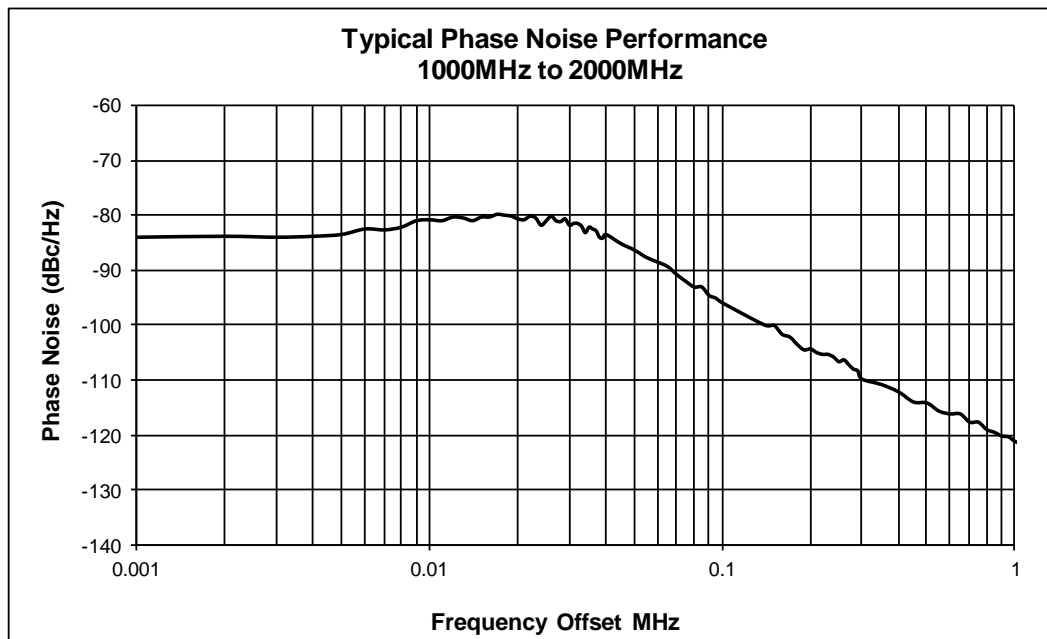
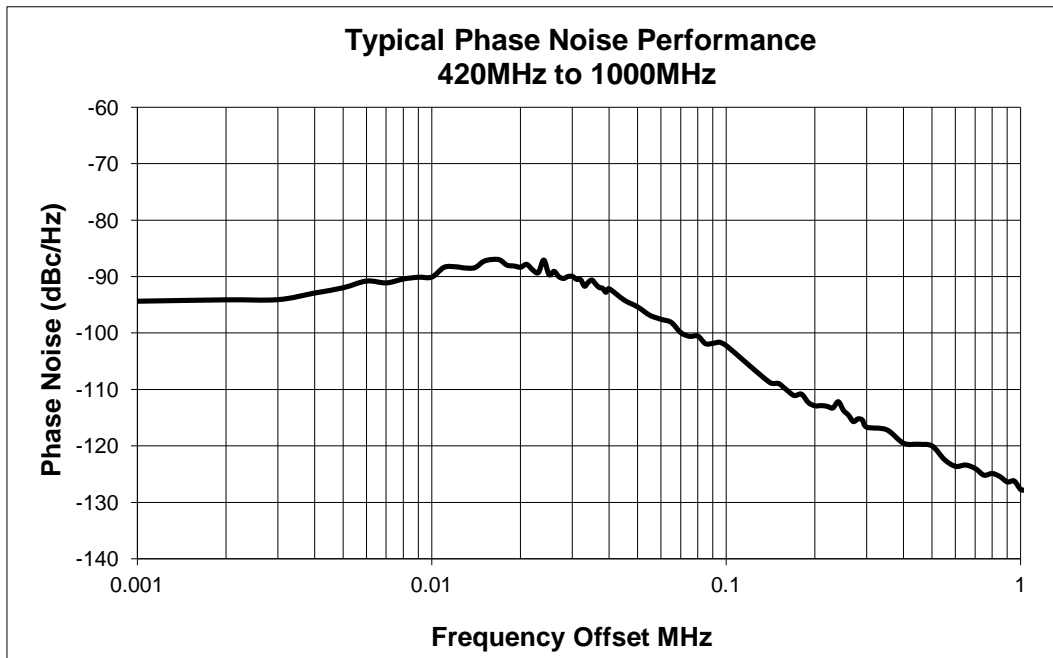
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## Phase Noise

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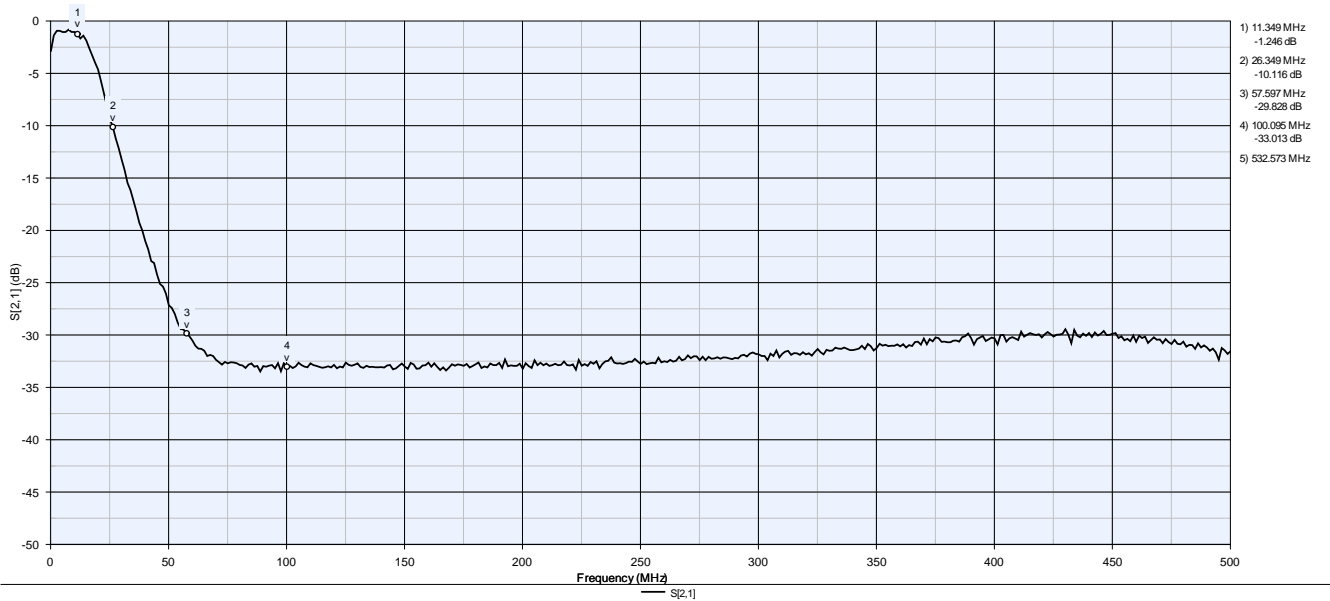
## Phase Noise



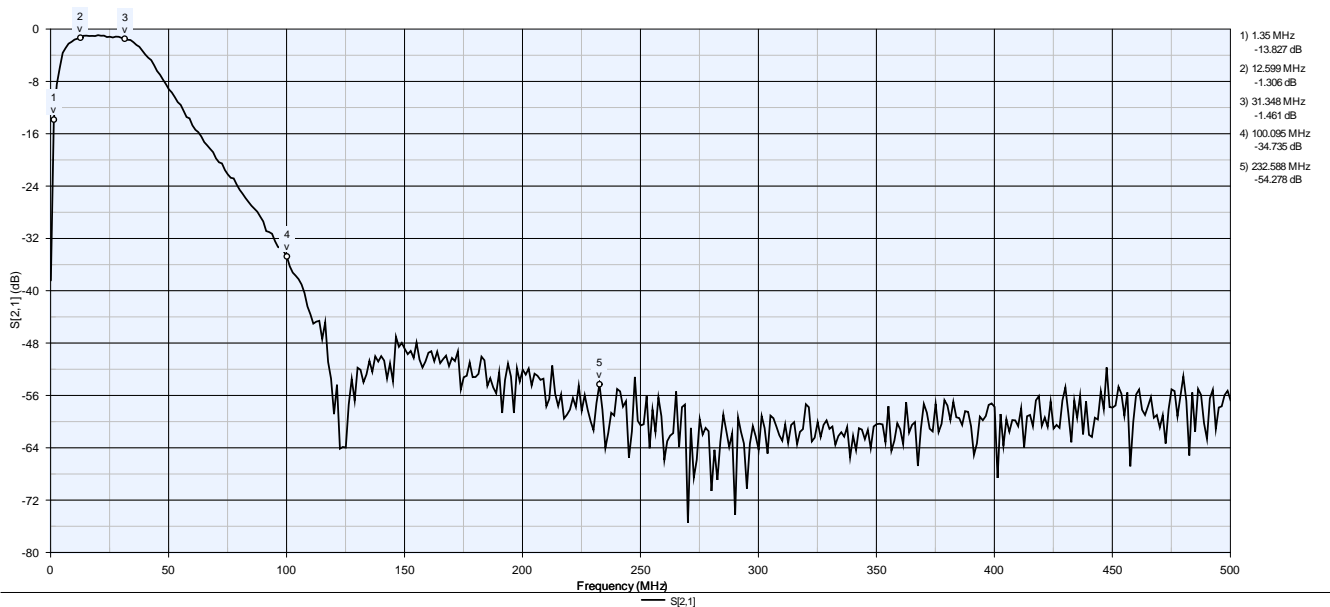
## Front End Filtering

The front end is protected by a series of passive RF filters. These filters are automatically selected based on the RF frequency programmed. The frequency response of the different RF filters is shown.

### 0 – 12MHz Low Pass Filter

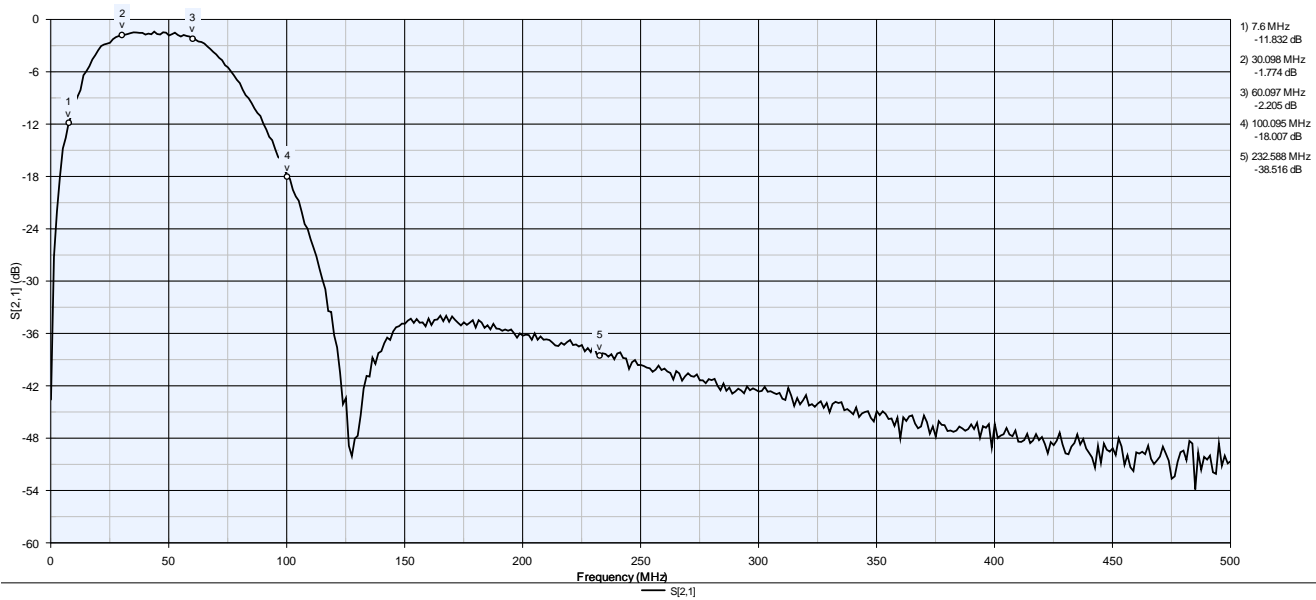


### 12 - 30MHz Band Pass Filter

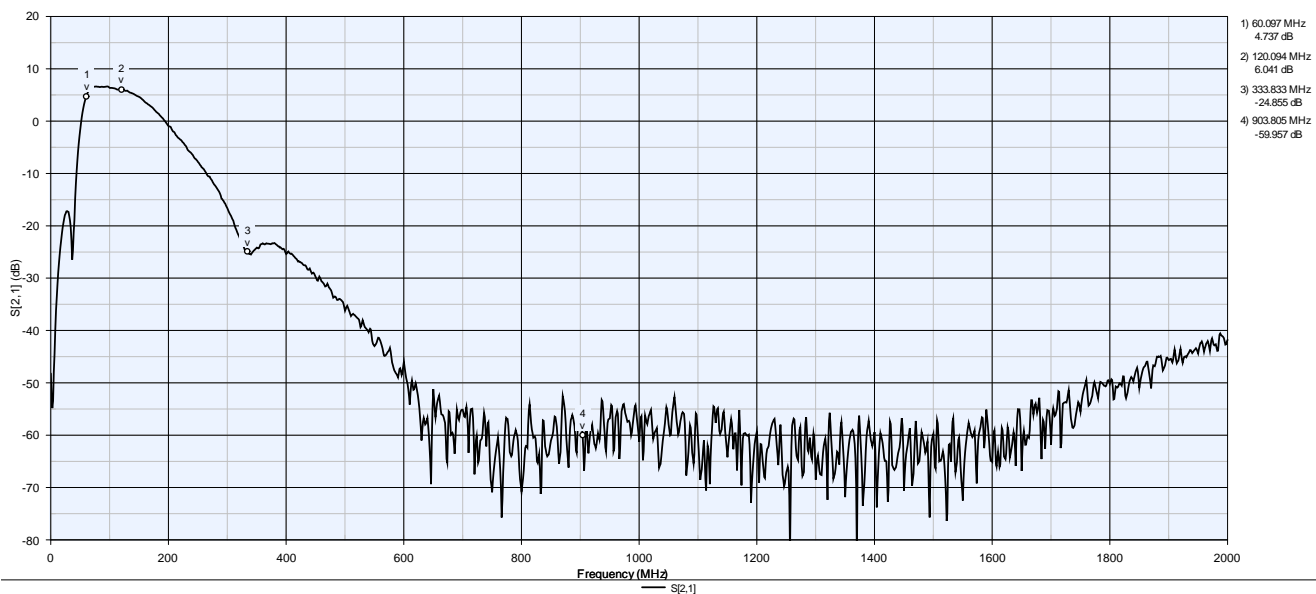


## Front End Filtering

### 30 – 60MHz Band Pass Filter

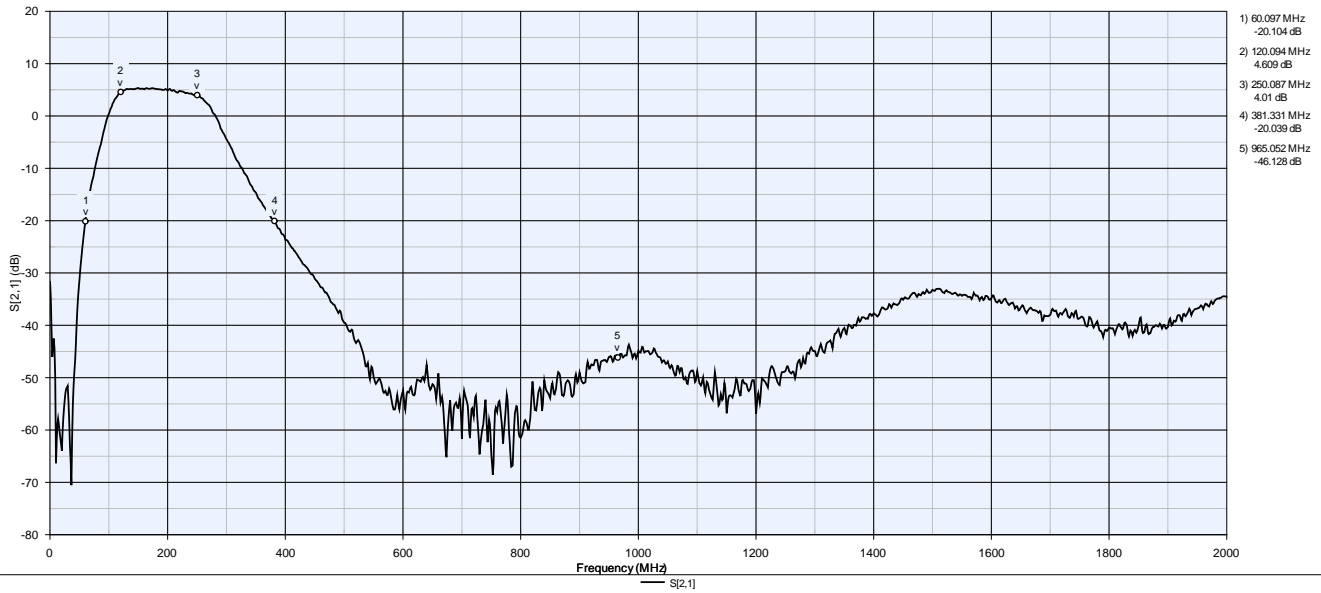


### 60 - 120MHz Band Pass Filter

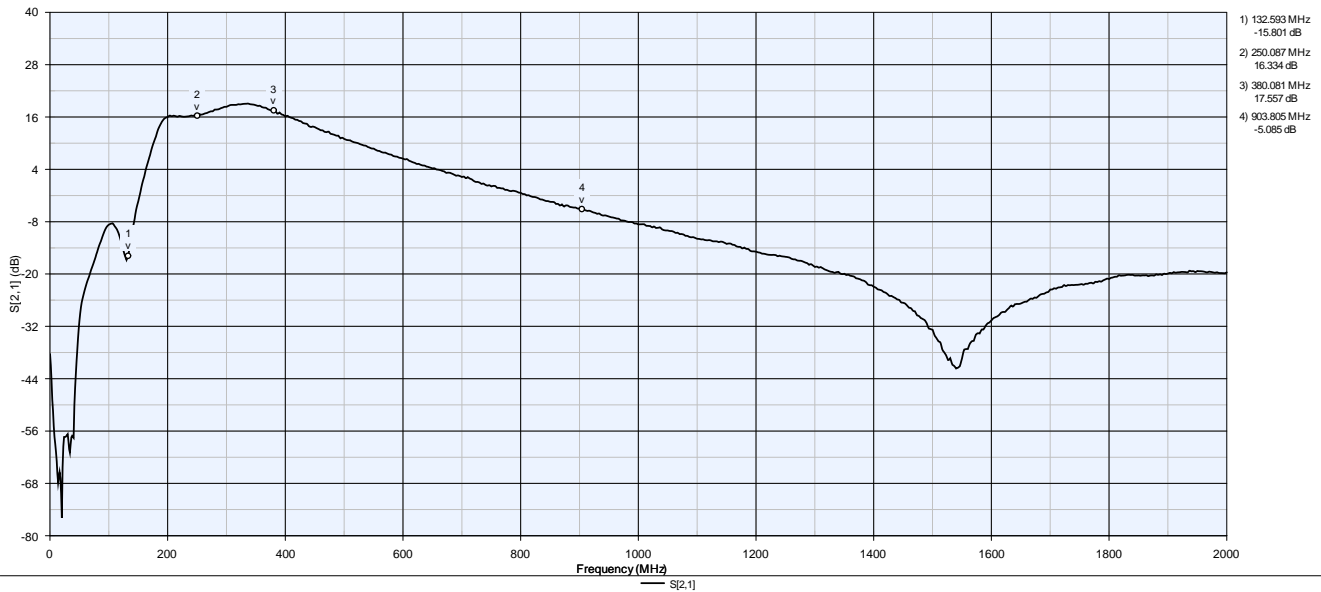


## Front End Filtering

### 120 - 250MHz Band Pass Filter

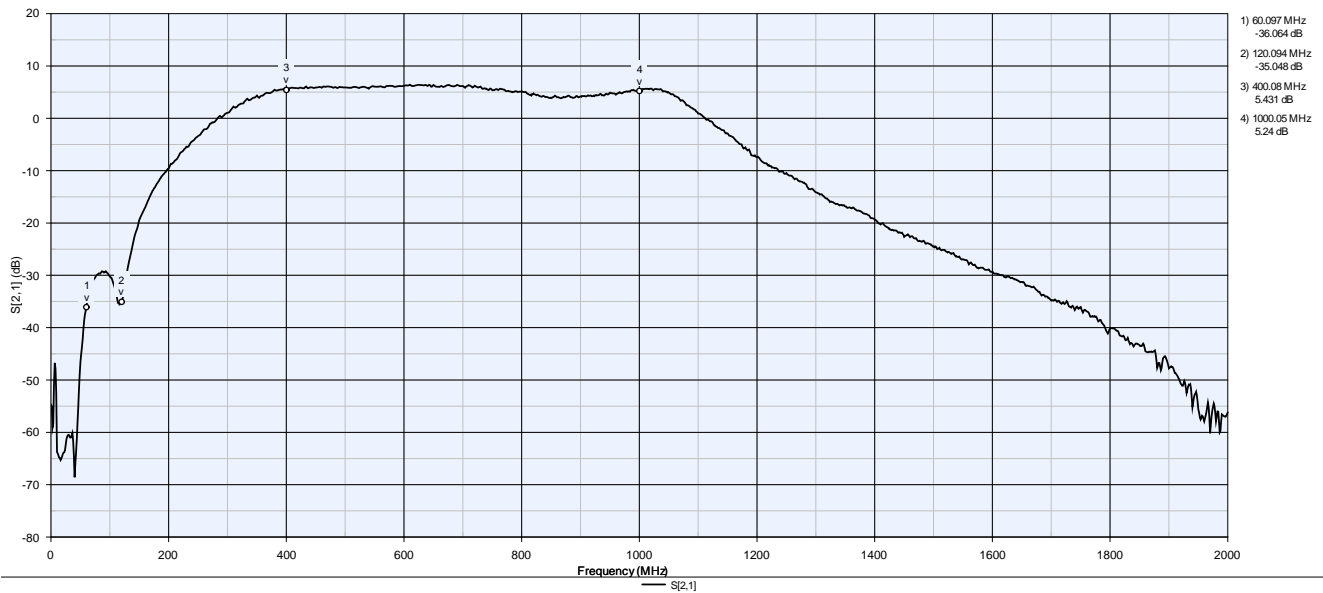


### 250 - 420MHz Band Pass Filter



## Front End Filtering

### 420 - 1000MHz Band Pass Filter



### 1000 - 2000MHz Band Pass Filter

