

Spectrum Analyzer 102+

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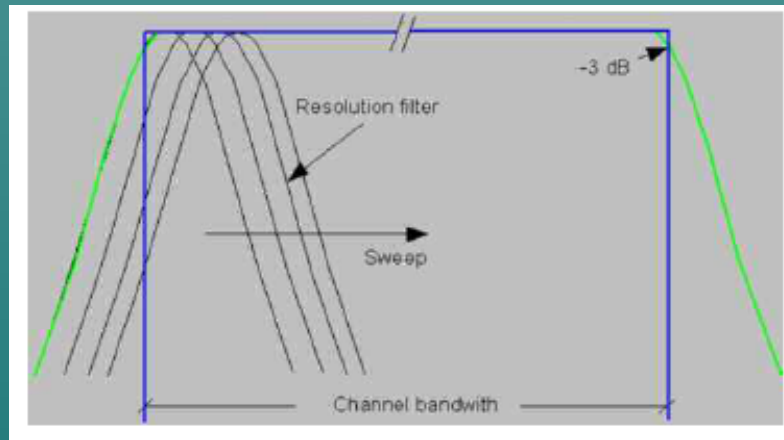
Presented at Kansas City
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Spectrum Analyzer 102

- Review of last presentation
- Detectors
 - ◆ Types
 - ◆ How each one works
 - ◆ When to use which
 - ◆ What difference it makes
 - ◆ Hints and Kinks
- Questions

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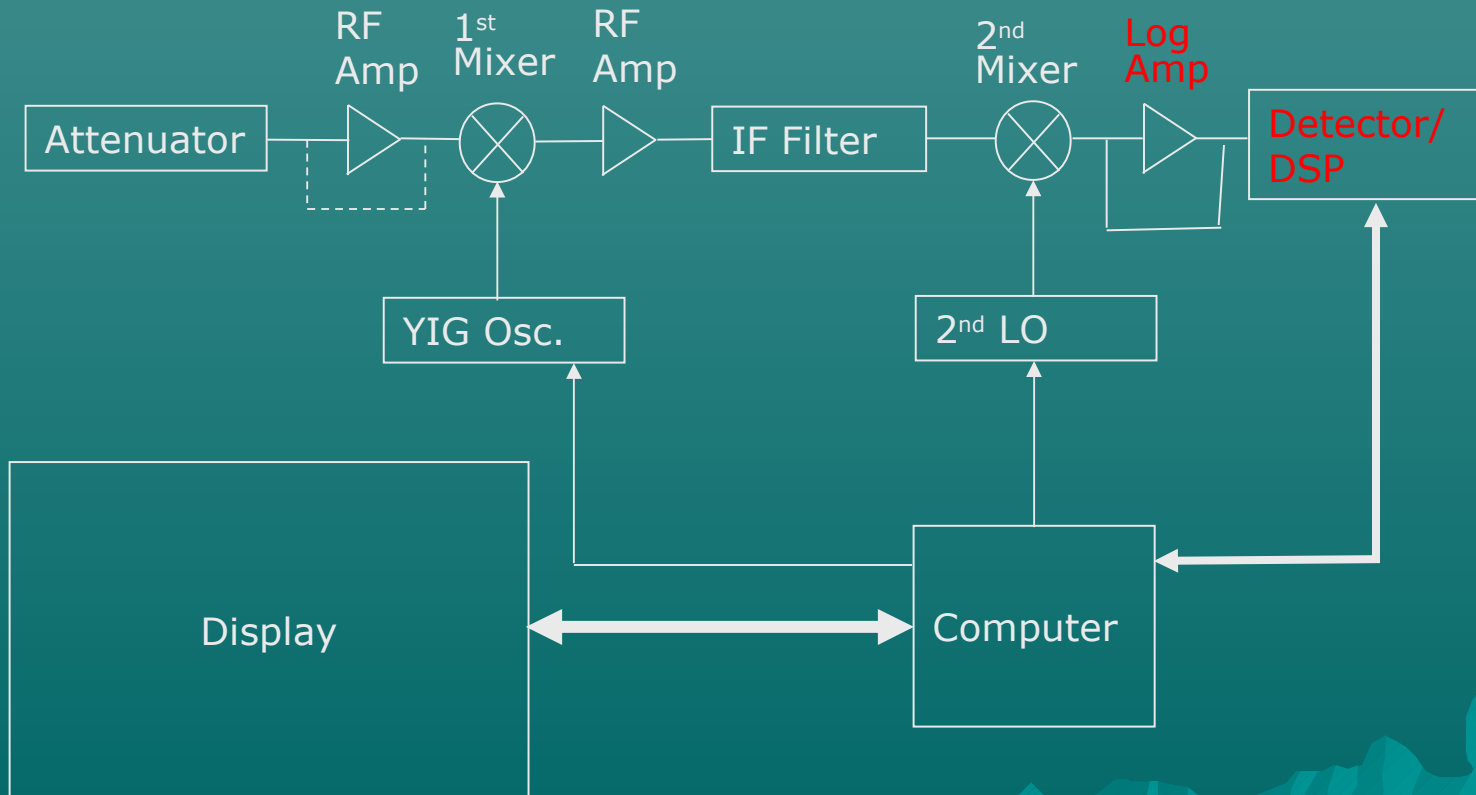
- A spectrum analyzer is a swept-frequency receiver.



- Receivers have at least 3 basic components
 - ◆ Frequency converter and amplifier
 - ◆ Selectivity for the desired signal
 - ◆ Detector to demodulate the signal

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- Typical Block Diagram



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Reference Material

Rohde & Schwarz Book

- ◆ Fundamentals Of Spectrum Analysis—
Christoph Rauscher, 2007
ISBN -3-939837-01-5978

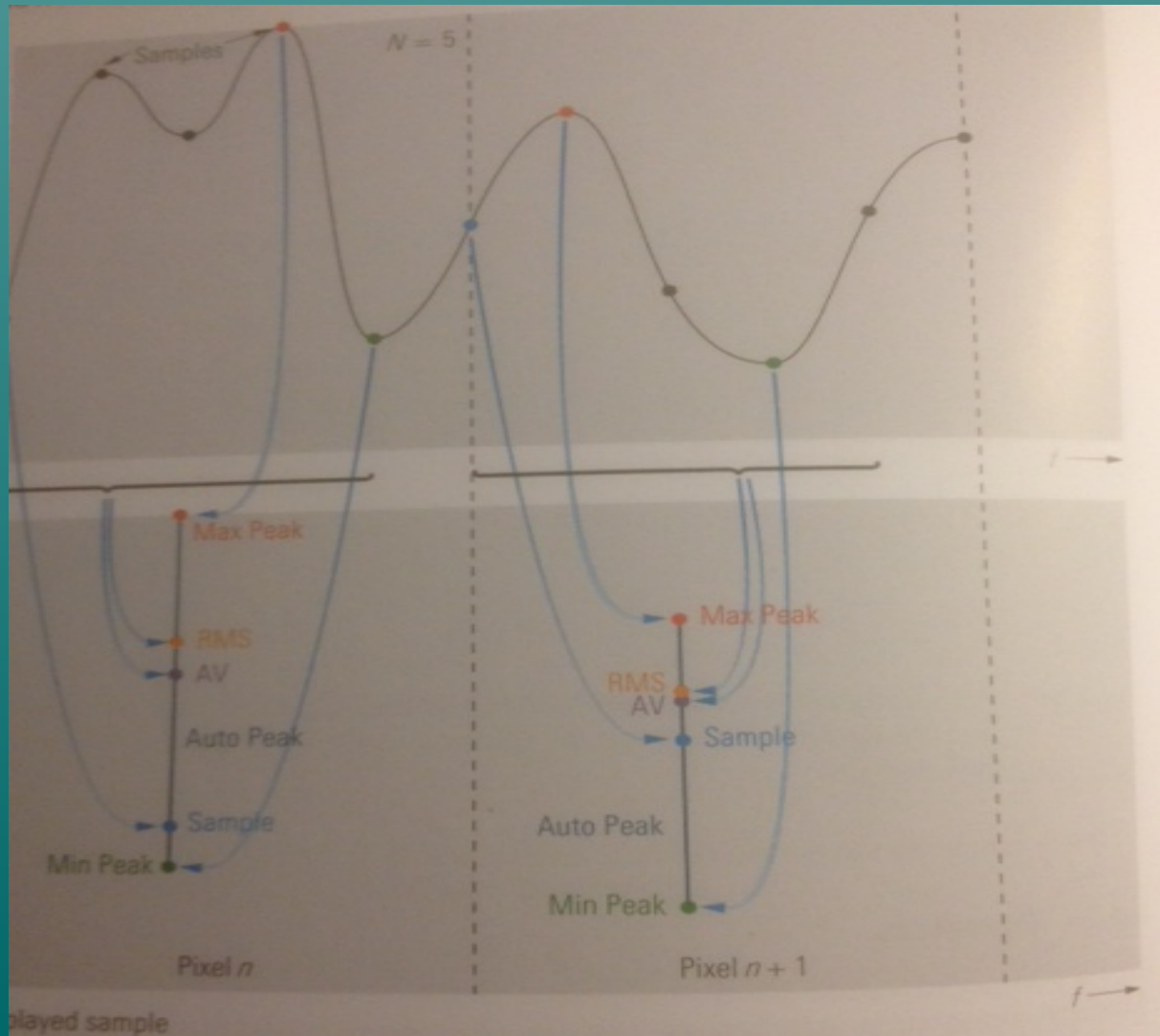
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- How do displayed values get born?
- SA has a set number of display points
of Points > Span/RBW
- At least 1 measured value per point but could be many measured values
- Measured values get “mapped” to a display point (pixel)

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- Detector Types
- Max Peak
- Min Peak
- RMS
- Average
- Sample
- Quasi Peak

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- Max Peak

- ◆ Simple- Maximum measured value captured

- Min Peak

- ◆ Simple – Minimum measured value captured

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– RMS

- ◆ Root Mean Square

- ◆ Value = $\sqrt{1/N \sum v_i^2}$

– Average

- ◆ $1/N \sum v_i$

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– Sample

- ◆ Only one measured value is chosen
- ◆ Usually based upon time

– Quasi Peak

- ◆ Specified attack and decay time constants
- ◆ Used for specific emission measurements

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- ◆ Two types of signals
- ◆ Periodic
- ◆ Noise-like

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- ◆ Which detector do I use for the signal and what impact is there if I use an inappropriate one?
- ◆ What is the default detector for the Spectrum Analyzer?

Spectrum Analyzer 102

- ◆ Which detector do I use for the signal and what impact is there if I use an inappropriate one?
 - What are you trying to measure?
- ◆ What is the default detector for the Spectrum Analyzer?
 - Depends on the mfgr and the mode of operation

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- ◆ Example—Sinewave
- ◆ IF Envelope is measured
- ◆ Max peak and min peak will have the same value at the same time so no error exists
- ◆ Average Value, Sample, and RMS values should also be the same

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- ◆ Example—IBOC or DTV signal
 - ◆ IF Envelope is measured
 - ◆ Due to randomness of instantaneous voltage differences between the detectors will result in different displayed values.
 - ◆ Max peak and min peak will NOT have the same value at the same time difference occurs
 - ◆ Average Value, Sample, and RMS values should will also be different

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- ◆ Example—IBOC or DTV signal
- ◆ Max peak detector
 - If long sweep times are used, the displayed waveform will have an overall higher value
 - If short sweep times are used there are fewer measured values and thus it may match close to the sample detector mode

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- ◆ Example—IBOC or DTV signal
- ◆ Min peak detector
 - If long sweep times are used, the displayed waveform will have an overall lower value
 - If short sweep times are used there are fewer measured values and thus it may match close to the sample detector mode

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- ◆ Example—IBOC or DTV signal
- ◆ RMS detector
 - Minimum impact with sweep
 - Power is calculated based upon the number of measured values associated with a pixel. This is the best mode for measuring IBOC or DTV.

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- ◆ Example—IBOC or DTV signal
- ◆ Average detector
 - Less impact with sweep speed
 - Displayed is calculated based upon the number of measured values associated with a pixel. Based upon waveform characteristics, the error compared to RMS detector is 1.05 dB less

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- ◆ Example—IBOC or DTV signal
- ◆ Sample detector
 - Vary dependent with sweep speed
 - Displayed is calculated based upon the number of measured values associated with a pixel. Based upon waveform characteristics, the error compared to RMS detector is 2.5 dB less

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- ◆ Impact of video filter
 - Video filter reduces the waveform peaks and smoothens the waveform so less variation no matter what detector is used. If a log amp is used before the envelope detector then there is an additional 1.45 dB of correction to apply compared to sample detector.
- ◆ So if an RMS detector is not available, use the Sample detector and add 2.5 dB

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◆ LIVE DEMO