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Agilent's EMI Receiver: - An Historical Perspective

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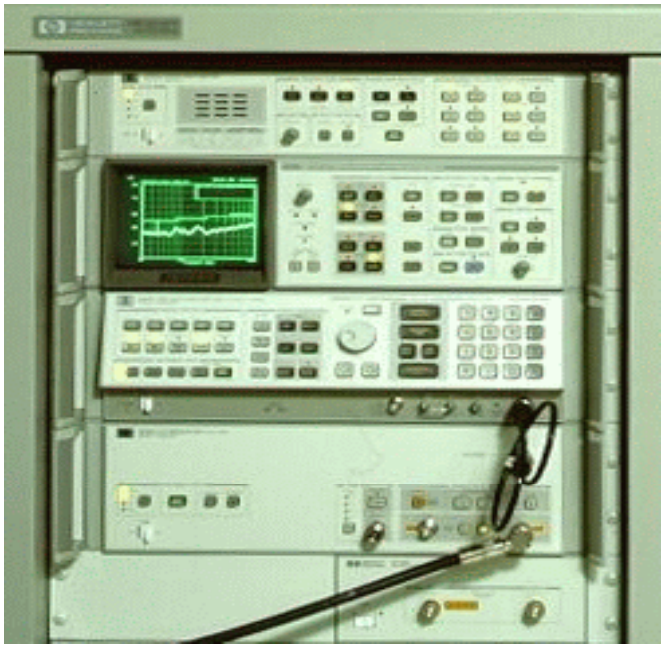
Objectives

- Historical Perspective
- How technical improvements affect throughput
- Technical Point: Bucketization and Pixelation

Legacy Agilent Solutions



HP 8571/72/73/74
Introduced - 1983

- Based on 8566/68
  - First Microprocessor Controlled Spectrum Analyzer
  - Lock and Roll
    - 10 MHz Synthesized Sweeps
    - 2% Span Accuracy
  - Amplitude Accuracy Top Division for Log Display
    - Log Amplifier doesn't respond correctly to CISPR pulse measurement
    - Need Linear Scale for all final measurements
  - 1001 Data Points
  - 10 dB Step Size Attenuator
- Added Preselector
  - Required Extensive Calibration
  - Comb Generator for Calibration
- Added CISPR Detectors and Bandwidths

Legacy Agilent Solutions

8542/46A
Introduced - 1994

- Based on 859x
  - Low Cost SA from late 1980s
    - User driven automated alignment
  - Lock and Roll
    - 10 MHz Synthesized Sweeps
    - 2% Span Accuracy
  - Amplitude Accuracy Top Three Divisions for Log Display
    - Log Amplifier doesn't respond correctly to CISPR pulse measurement
    - Need Linear Scale for all final measurements
  - 401 Data Points
  - 10 dB Step Size Attenuator
  - Built in CISPR detectors and bandwidths
  - Optional Tracking Generator
- Added Preselector
  - Required calibration
  - Comb Generator for calibration

Agilent PSA Based EMI Measurement Receiver

- Based on PSA
  - Designed for Telecom - 1999
  - Fully Synthesized Sweeps
    - Typical span accuracy 0.02%
  - All Linear Digital IF
    - Log amplitude is a numeric exercise
    - Amplitude accuracy anywhere on screen in either LIN or LOG scale
  - 30 dB more dynamic range than 8566
  - 101 to 8192 Data Points
  - 2 dB Step Size Attenuator
- Added CISPR &MIL Std detectors and bandwidths 2005
- Preselector Added in 2007
  - Family of Sources for User Alignment
    - Leveled Source
      - Source Control
      - EMI Toolset (Cable Losses, Volumetric Site Attenuation)
    - No Comb Generator

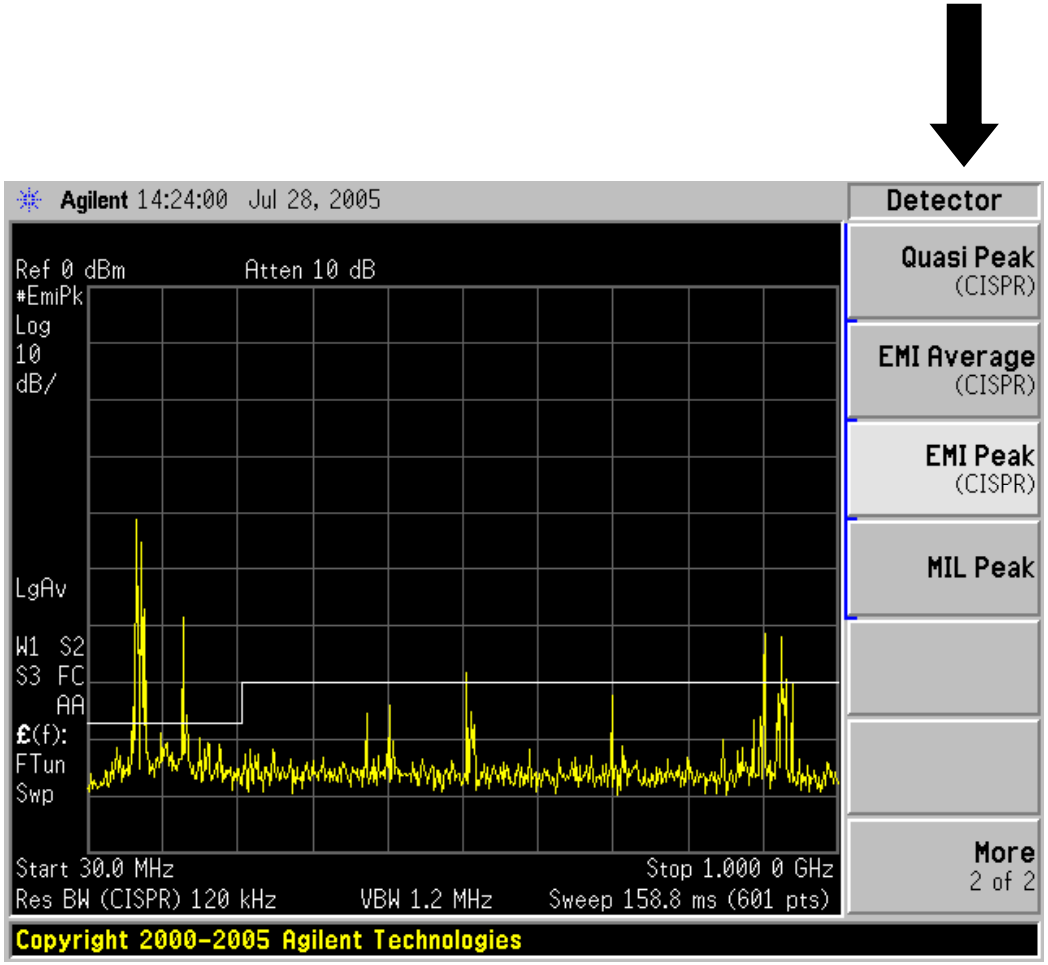
PSA Series Standard Features since June 2005

~~CISPR Defined Detectors and~~ Resolution Bandwidths

- Peak, Quasi-Peak and Average detectors
- 200 Hz, 9 kHz and 120 kHz -6 dB bandwidths
- 1 MHz bandwidth

MIL-STD Resolution Bandwidths

- 10, 100 Hz, 1, 10, 100 kHz, 1 MHz -6 dB bandwidths



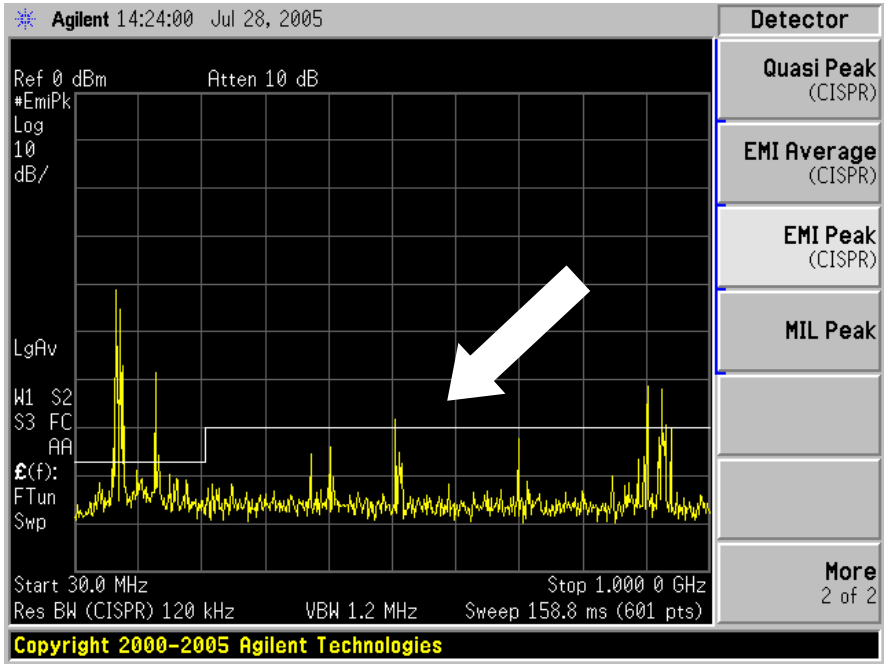
PSA Series Standard Features since June 2005

Limit lines

- Standards based limit lines downloadable from www.agilent.com/find/emc
- Set pass/fail curves for spur searches, max output power and more
- 2 sets of limit lines, with margins, dynamic around center frequency and level

Amplitude correction

- 4 sets of AmpCor available (Cable, Antenna, Other, User)
- 200 points per set available
- Programmable freq. vs. amp. curve to calibrate whole system



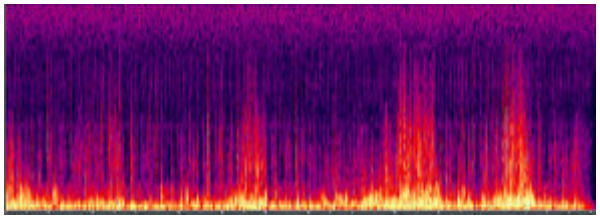
America's Market Speaks

- Customers drive Agilent to leverage PSA as EMI solution (2004)
  - Recognized its technical advantages would benefit test time
    - Requested quasi-peak detector at a minimum
  - Required replacement for legacy HP equipment
  - Believed spectrum analyzer superior to receiver mode
- Agilent responds with EMI package (2005)
  - EMI peak, quasi-peak, average detectors (automatic resolution bandwidths)
  - Limit lines and transducer factors
- Customer response (2005)
  - Early adopters see 30% improvement in throughput
    - Customized software
- Agilent gets religion! (2005)
  - Preselector developed for full CISPR16-1-1 compliance
- Customers response (2007)
  - The **WORD** is out in close-knit community pressing Agilent for immediate solution
  - Unprecedented request for VIP demonstrations

The challenge of measuring Radiated Emissions

Radiated Emissions are difficult because of multiple dimensions!

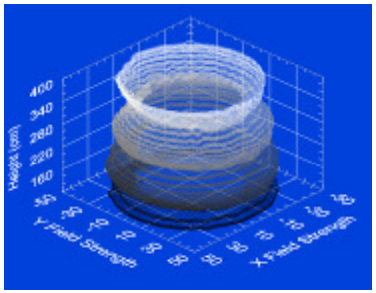
5 -Time



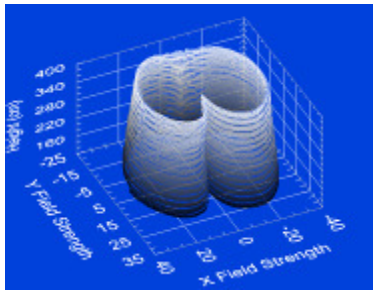
1 – Azimuth (angle)

2 - Antenna Height

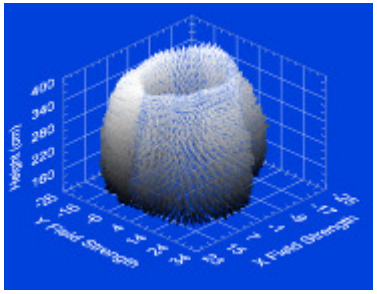
3 - Field Strength



1500.260MHz



218.120MHz



41.2563MHz

4 - Frequency

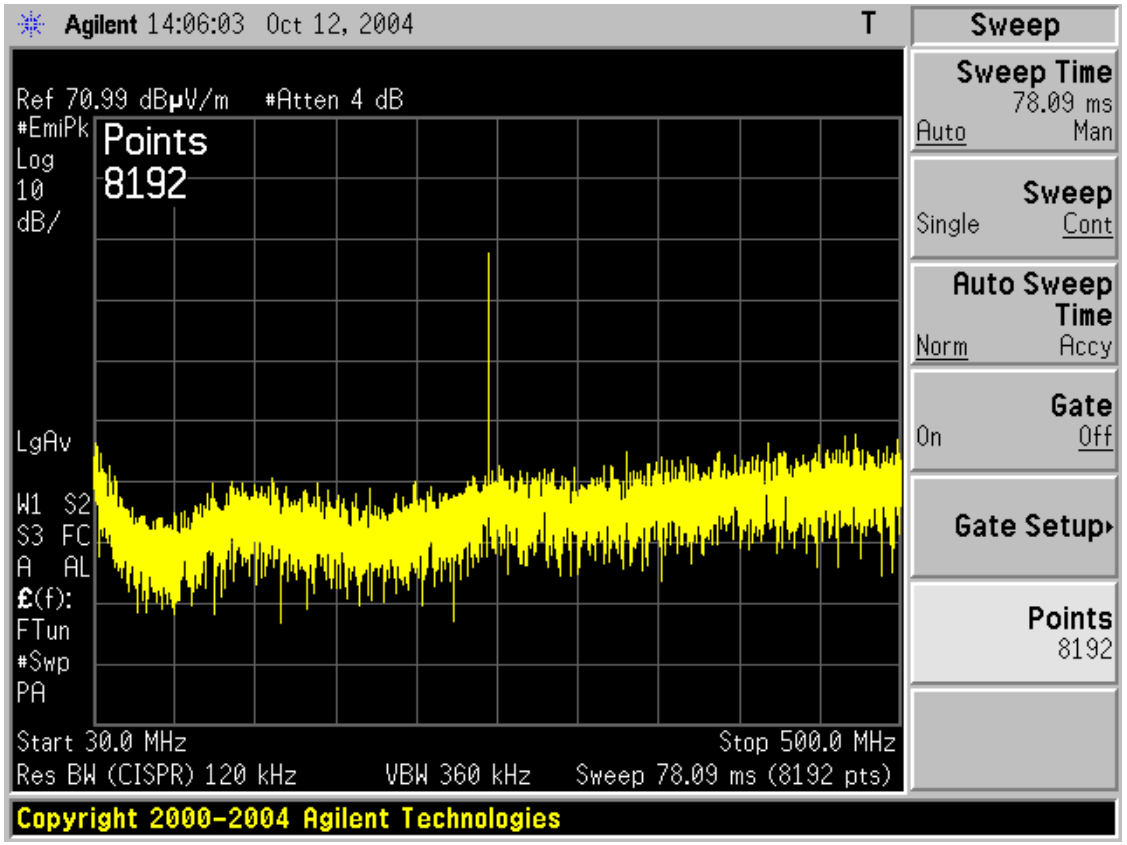
Typical EMC Task Flow

Percent of test time:		
5%	**Test Preparation**	Initiate documentation trail
10%	**Initial Scan**	Measure list of suspect frequencies (**using peak detector**)
5%	**Frequency Filter**	Generate frequency list for full measurement
25%	**Spatially Maximize**	Spatially measure suspect frequencies (**with correct detector**) **and** compare to limit
50%	**Troubleshoot**	Solve emission issues
5%	**Audit**	Qualify products in all flavors (all option configurations)
Plus ½ day	**Report**	Document measurement results

Detector Demo:

Emc_det.exe

Bucketization and Pixelation



~550 pixels

Bucketization: Hardware limitation of the number of data points collected.

If DP = 10 then signal appears @ ~ 250 MHz

Goal: **Each DP = 1/3 IF**

Pixelation: Display limitation whereby the number of data points cannot be displayed.

PSA: VGA display.

640 pixels – menu

~550 pixels

Customer Testimonial

"The PSA is like having eight 8566B spectrum analyzers in one."

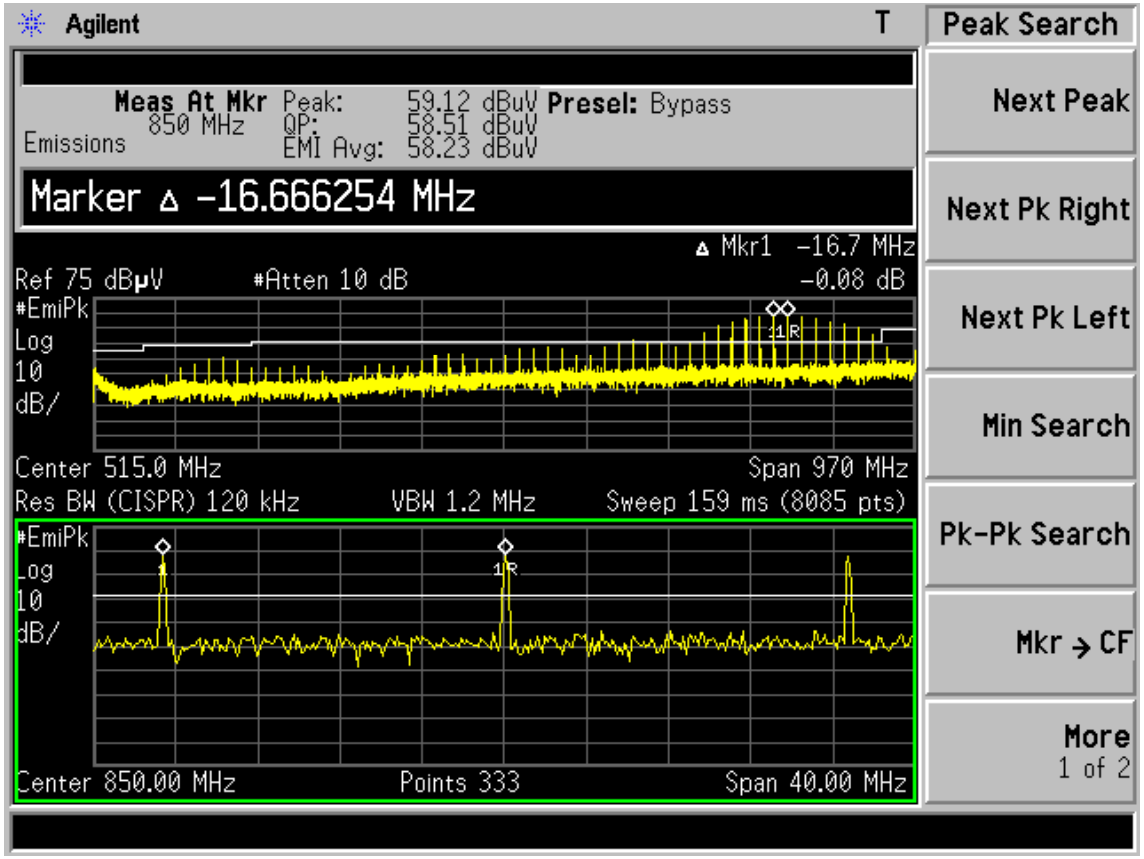
Senior EMI Test Engineer

For the same amount of data acquisition:

- 8566B takes 8 scans
- PSA takes 1 scan

Pixelation Solution

Synchronized Zoom Trace (SZT)



Sales Tools and Information Sources

To Learn More . . .

www.agilent.com/find/emc

www.agilent.com/find/N9039A