

Gerald Youngblood – K5SDR  
President

# Software Defined Radios We've Been Busy...



Tune In Excitement!™

Radios that just keep  
getting better.™



# Moore's Law Keeps Making PC Based SDRs Better

SDR-1000 Development System →

SDR-1000 Project Began →

SDR-1000 Shipped →

FLEX-5000 Shipped →

FLEX-3000 Shipped →

FLEX-1500 Shipped →

Processor	Transistor count	Date of introduction	Manufacturer	Process
Intel 4004	2,300	1971	Intel	10 μm
Intel 8008	3,500	1972	Intel	10 μm
Intel 8080	4,500	1974	Intel	6 μm
Intel 8088	29,000	1979	Intel	3 μm
Intel 80286	134,000	1982	Intel	1.5 μm
Intel 80386	275,000	1985	Intel	1.5 μm
Intel 80486	1,180,000	1989	Intel	1 μm
Pentium	3,100,000	1993	Intel	0.8 μm
AMD K5	4,300,000	1996	AMD	0.5 μm
Pentium II	7,500,000	1997	Intel	0.35 μm
AMD K6	8,800,000	1997	AMD	0.35 μm
Pentium III	9,500,000	1999	Intel	0.25 μm
AMD K6-III	21,300,000	1999	AMD	0.25 μm
AMD K7	22,000,000	1999	AMD	0.25 μm
Pentium 4	42,000,000	2000	Intel	180 nm
Atom	47,000,000	2008	Intel	45 nm
Barton	54,300,000	2003	AMD	130 nm
AMD K8	105,900,000	2003	AMD	130 nm
Itanium 2	220,000,000	2003	Intel	130 nm
Cell	241,000,000	2006	Sony/IBM/Toshiba	90 nm
Core 2 Duo	291,000,000	2006	Intel	65 nm
AMD K10	463,000,000/758,000,000 <sup>[1]</sup>	2007	AMD	65 nm
Itanium 2 with 9MB cache	592,000,000	2004	Intel	130 nm
Core i7 (Quad)	731,000,000	2008	Intel	45 nm
POWER6	789,000,000	2007	IBM	65 nm
Six-Core Opteron 2400	904,000,000	2009	AMD	45 nm
Six-Core Core i7	1,170,000,000	2010	Intel	32 nm
Dual-Core Itanium 2	1,700,000,000 <sup>[2]</sup>	2006	Intel	90 nm
Six-Core Xeon 7400	1,900,000,000	2008	Intel	45 nm
Quad-Core Itanium Tukwila	2,000,000,000 <sup>[3]</sup>	2010	Intel	65 nm
8-Core Xeon Nehalem-EX	2,300,000,000 <sup>[4]</sup>	2010	Intel	45 nm

# New From FlexRadio...



# Introducing the FLEX-1500



- 160-6m
- 48 kHz Panadapter
- >80 dB IMD DR<sub>3</sub>
- All Mode
- 5W PEP & CW
- 0 dBm Transverter IF
- 10 MHz Ref. Input
- USB Interface
- Only 1.2 Pounds
- 4" W x 6" D x 2" H

# The FlexRadio Family

Introducing...  
**FLEX-1500**  
**HF-6M**



**Excitement Anywhere!™**

>80 db Dynamic Range Receiver  
48 KHz Receive Bandwidth  
Transverter Interface  
5W PEP Out

Take it With You...  
**FLEX-3000**  
**HF-6M**



**Excitement Anywhere!™**

>90 db Dynamic Range Receiver  
96 KHz Receive Bandwidth  
Built in Auto Tuner  
100 Watts Output  
Only 7 Pounds!

FLEXibility...  
**FLEX-5000A**  
**HF-6M**  
+2M&70CM



**Tune in Excitement!™**

99 db Dynamic Range Receiver  
192 KHz Receive Bandwidth  
Optional VHF/UHF Module  
Optional 2nd Receiver  
Optional Auto Tuner  
100 Watts Output

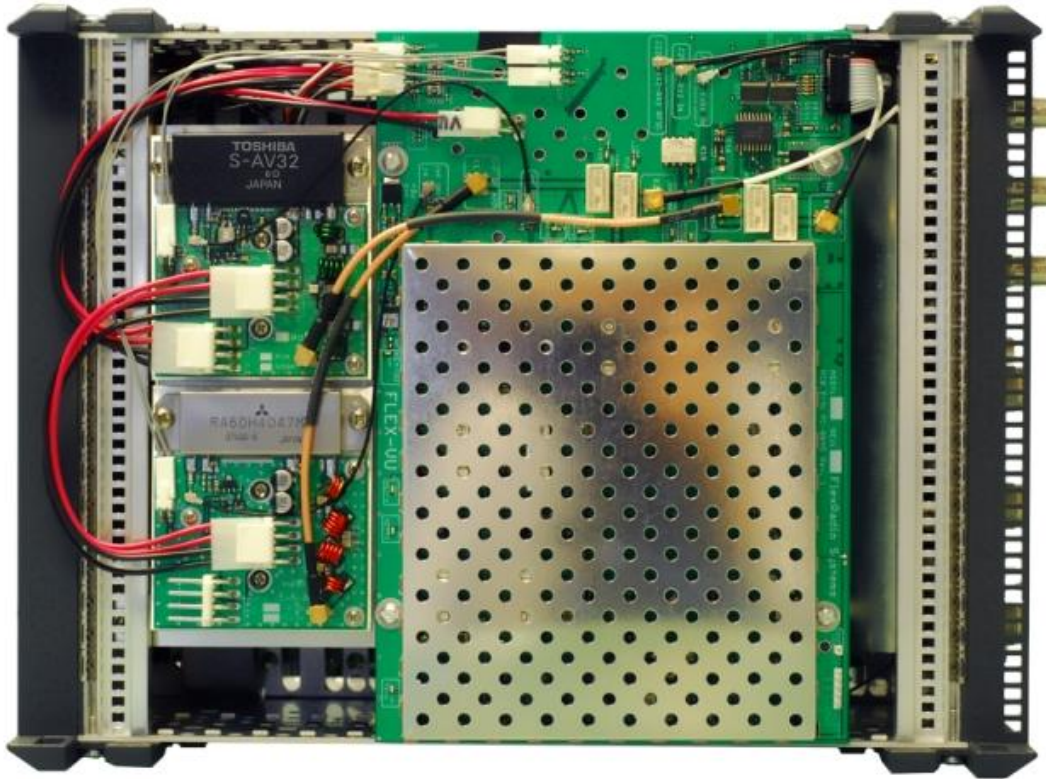
Integrated...  
**FLEX-5000C**  
**HF-6M**  
+2M&70CM



**Tune in Excitement!™**

Integrated Computer  
99 db Dynamic Range Receiver  
192 KHz Receive Bandwidth  
Optional VHF/UHF Module  
Optional 2nd Receiver  
Optional Auto Tuner  
100 Watts Output

# FLEX-VU5k VHF/UHF Upgrade for FLEX-5000



- 2 m and 70 cm
- All Mode Operation
- Cross Band Full Duplex
- Satellite Modes B & J
- 60W Output
- +17 dBm Option
- Reference Locked LOs
- Dedicated V & U BNCs

# Introducing PowerSDR™ 2.0



The screenshot displays the PowerSDR 2.0 software interface, which is a software-defined radio (SDR) application. It features a dark-themed user interface with multiple windows and panels. The top right corner prominently displays the "FlexRadio Systems" logo and the tagline "Software Defined Radios". The interface is divided into several sections: a top control bar with frequency and power level indicators, a central area with multiple spectrograms and waveforms, and a bottom control panel with various knobs, sliders, and buttons. The text "See it - Work it - Log it" is overlaid on the bottom left of the screenshot, and "Tune In Excitement!" is written in large white letters at the bottom center. The overall layout is complex and detailed, showing the capabilities of the software in handling multiple radio channels simultaneously.

FlexRadio Systems  
Software Defined Radios

See it - Work it - Log it

Tune In Excitement!

 **FlexRadio Systems**  
Software Defined Radios

Copr. FlexRadio Systems 2009



# PowerSDR™ 2.0 Features

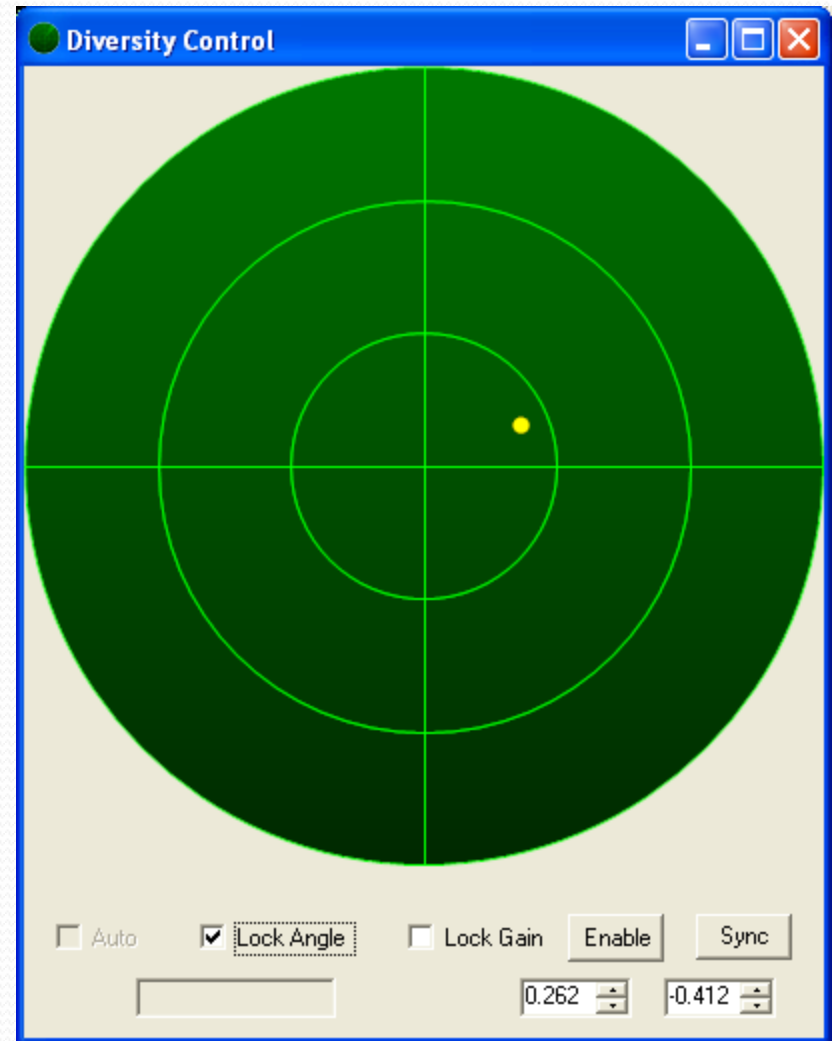
- New User Interface – Downloadable Skins
- Automated Wide Band Image Rejection
- Enhanced ALC Algorithms
- New Downward Expander Transmitter Gain Shaping
- Enhanced Noise Reduction and Notch Filtering
- Completely Revamped & Improved CW Keying
- Improved Transmit/Receive Turn Around Time
- Greatly Improved FLEX-3000 ATU Algorithms
- FLEX-1500 Support
- Integrated Software Installer



# FLEX-5000

## Beyond Diversity...

- Fully Synchronous Receivers
- Beam Steering
- Noise Notching
- Signal Notching
- Adaptive SNR Optimization
- In PowerSDR™ 2.0 as Beta
- <http://w9oy-sdr.blogspot.com>



# The Commercial Front...

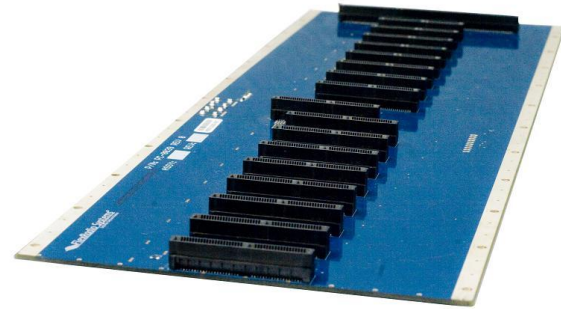
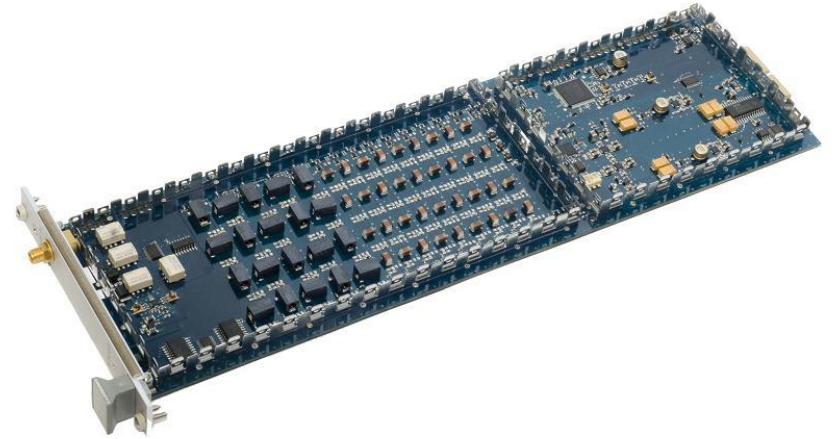


# CDRX-3200 32 Channel Synchronous Receiver



- 32 Fully Independent Receivers
- Patent Pending Technology
- Synchronous to GPS System
- 200 kHz Channels
- 100 kHz – 100 MHz Tuning
- IMD DR<sub>3</sub>: >105 dB @ 100 Hz
- Phase Noise: < -150 dBc/Hz
- GigE Streaming I/Q Data
- 7U Chassis, 100W Total

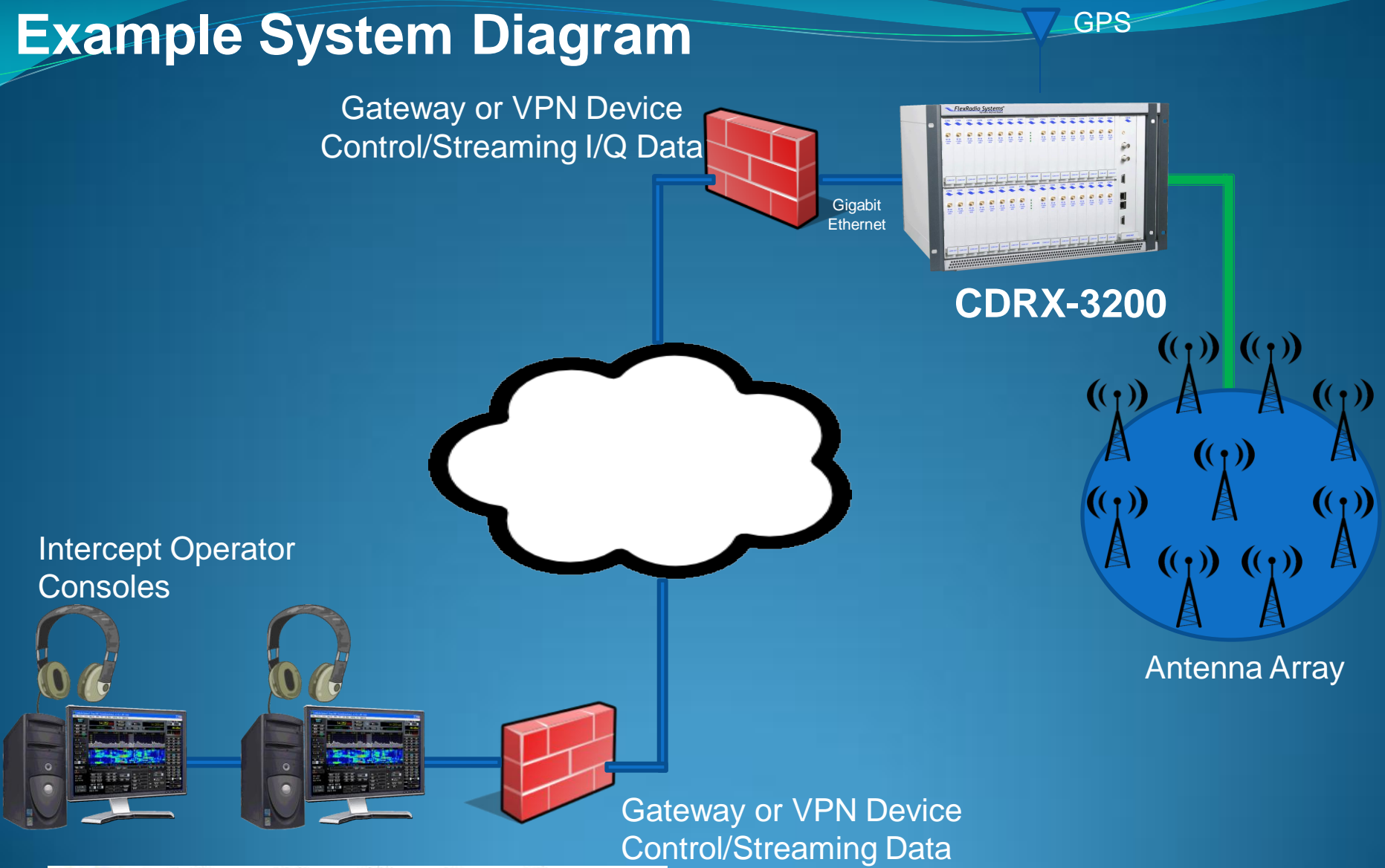
# CDRX in the Raw



# CDRX-3200 In The Rack



# CDRX-3200 Intercept Operator Example System Diagram



# SERX-16 Survey Receiver



- 180MSPS Direct Sampling Receiver
- 16 Streaming 250kHz Channels
- Polyphase Down Sampling DDCs
- DDCs Combine for Reconstruction
- Real-time FFT (256–8192 bins)
- DDC look-back up to 4.3 seconds
- >90dB Wideband SFDR
- Phase Noise: <-150 dBc/Hz
- RX Bands: HF & Low VHF
- 70MHz and 140MHz 25 MHz BW IF
- Optional full wideband I/Q stream
- PCI Express x4 Lanes (GigE Opt.)
- Virtex-5 SX95T FPGA

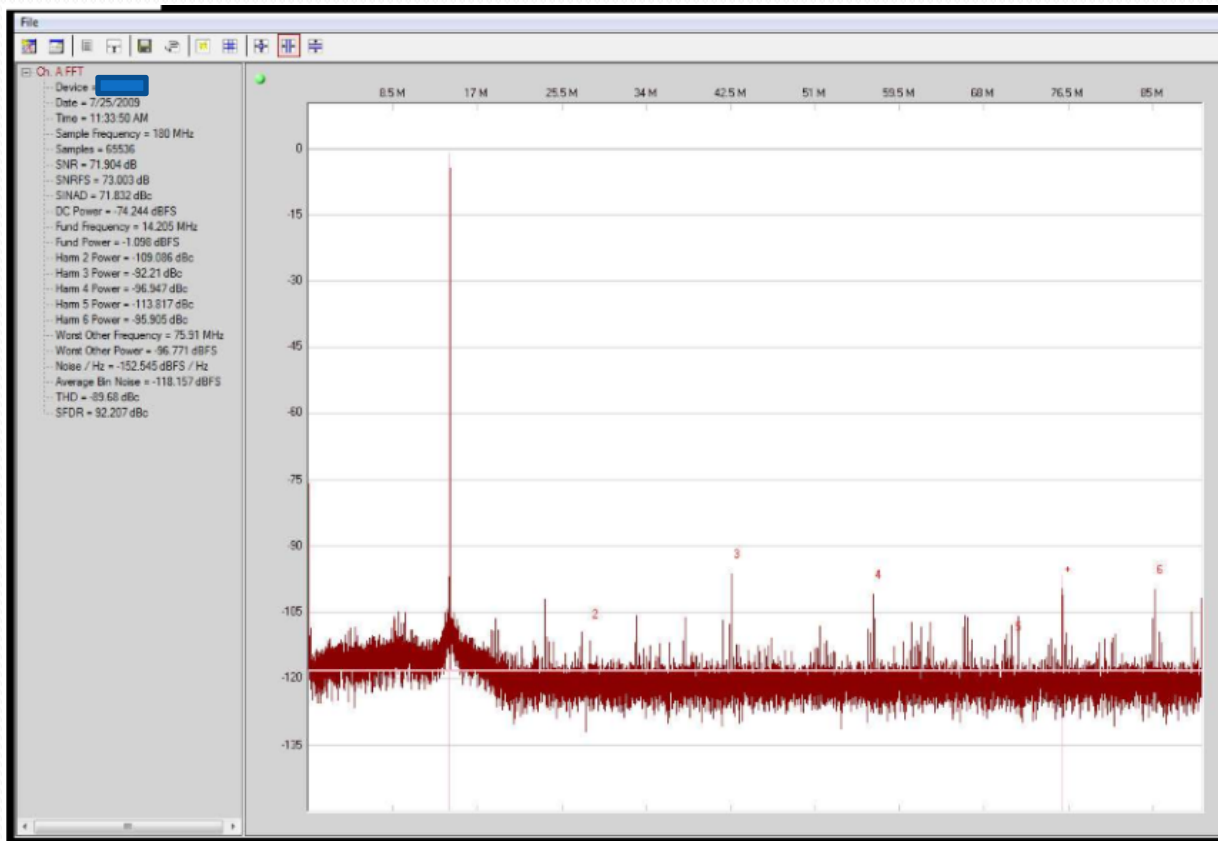


# SERX-16 Survey Receiver

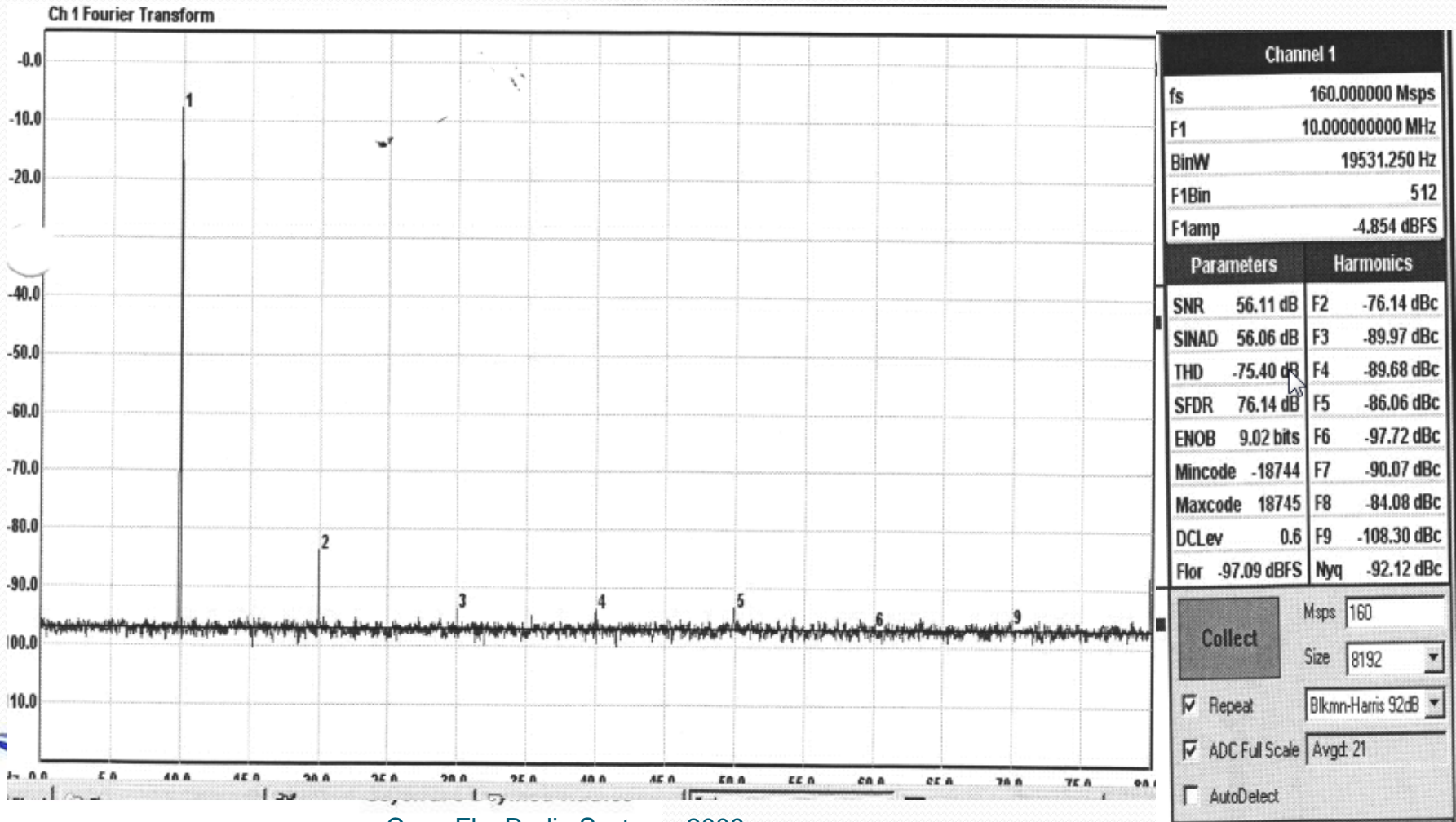


# SERX: 92 dBc SFDR @ -1 dBFS

## 180 Msps



# LTC6400-20 & 160 Msp/s LTC2209: 76 dB SFDR @ -5 dBFS



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# Software Defined Radios

## The Software Is The Radio



Tune In Excitement!™