

Apache ANAN-10 SDR

By

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For WCARC

Apache ANAN-10

- This is a digital-down-conversion (DDC) and digital-up-conversion (DUC) Software Defined HF transceiver
- Does *not* require a sound card, DSP, Firewire, or USB intf.
- Based on open source Hermes Board which includes Mercury (RX + Alex filters) + Metis (Ethernet) + Penelope (TX) TAPR boards + 15W Apollo PA
- Recommended: i3 2GHz CPU and 4GB RAM
- 1000mbs (Gigabit) capable ethernet full duplex
- 13.8vdc @7A
- firmware upgradeable
- S/W - Suggest HPSDR/OpenHDR – Unlike Flex 6000 series, it is FREE & upgraded regularly
- Cost: under \$1500 - surpasses Flex 5000 performance

The Key is FPGA

- Field Programmable Gate Arrays
- These are large sets of gates in a reconfigure-able array.
- Chips can be reprogrammed by code.
- These are fast!

ANAN-10 Specs 1



SPECIFICATIONS & HIGHLIGHTS

	ANAN – 10	ANAN – 100	ANAN – 100D
GENERAL			
Pricing (Introductory)	US\$ 1449.00 (Regular \$1795)	US\$ 1989.00 (Regular \$2495)	US\$2889.00 (Regular \$3495)
Warranty	1 Year Limited Manufacturer's Warranty*	1 Year Limited Manufacturer's Warranty*	1 Year Limited Manufacturer's Warranty*
FPGA	EP3C40	EP3C40	EP4CE115
Logic Elements	40K	40K	115K
On Board DSP Processing Capability	Yes (limited by FPGA LEs)	Yes (limited by FPGA LEs)	Extensive, including optional Soft Core processing
FLASH RAM	16MB	16MB	128MB
SRAM	-	-	32Mbit
Master Clock	122.88MHz	122.88MHz	122.88MHz

ANAN-10 Specs 2

CLOCK Phase Noise @ 10KHz	-149dBc	-149dBc	-149dBc
10MHz Reference TCXO	± 2.5PPM	± 2.5PPM	± 2.5PPM
External 10Mhz Reference Input Ethernet	Yes	Yes	Yes
	GIGABIT	GIGABIT	GIGABIT
Modes	AM,FM,RTTY,CW,LSB,USB,DIGITAL (limited only by the application software)	AM,FM,RTTY,CW,LSB,USB,DIGITAL (limited only by the application software)	AM,FM,RTTY,CW,LSB,USB,DIGITAL (limited only by the application software)
Frequency Step	1 Hz	1 Hz	1 Hz
Antenna Ports(50 Ω)	3	3	3 + 1
I/O's	Seven User-Configurable Open-collector outputs	Seven User-Configurable Open-collector outputs	Seven User-Configurable Open-collector outputs
	Four user- configurable 12 bit buffered Analogue inputs	Four user- configurable 12 bit buffered Analogue inputs	Four user- configurable 12 bit buffered Analogue inputs
VNA***	10Khz - 55Mhz VNA	10Khz - 55Mhz VNA	10Khz - 55Mhz VNA

ANAN-10 Specs 3

Housing	Customized Rugged Extruded Aluminum Housing	Customized Rugged Extruded Aluminum Housing	Customized Rugged Extruded Aluminum Housing
Dimensions(W×D×H)	135mm ×160mm ×68mm	265mm ×220mm ×80mm	265mm ×220mm ×80mm
Weight	1.5Kg (Approx)	4.5Kg (Approx)	4.5Kg (Approx)
RECEIVER			
Architecture	Direct Down Conversion	Direct Down Conversion	Direct Down Conversion
Number of ADC'S	1	1	2
Number of Receivers**	4 Recommended	4 Recommended	7 + 7
ADC Resolution	16 BIT	16 BIT	16 BIT
Frequency Coverage	10 KHz- 55 MHz	10 KHz- 55 MHz	10 KHz- 55 MHz
Dynamic Range	125 dBm	125dBm	125dBm
Diversity Reception	No	No	Yes
Noise Floor(500Hz Bandwidth)	-135 dBm	-135 dBm	-135 dBm

ANAN-10 Specs 4

Receiver Front End Filtering Preamplifier	NA 20 dB	Combination of 5 HPF & 7 LPF Banks 20 dB, 20dB LNA for 6M (MDS -142dBm)	Combination of 5 HPF & 7 LPF Banks 20 dB, 20dB LNA for 6M (MDS -142dBm)
Attenuator	Software selectable 31dB in 1dB steps	Software selectable 6dB in 1dB steps	Software selectable 31dB in 1dB steps
Spurious and Image rejection	Greater than 100 dB	Greater than 100 dB	Greater than 100 dB
Audio Amplifier	1W @ 8Ω	1W @ 8Ω	1W @ 8Ω
TRANSMITTER			
Architecture	Direct Up Conversion	Direct Up Conversion	Direct Up Conversion
Number of DAC's	1	1	1
RF Output	1-10W	1-100W	1-100W
Coverage	160M-6M	160M-6M	160M-6M
Modes	AM,FM,RTTY,CW,LSB,USB,DIGITAL (limited only by the application software)	AM,FM,RTTY,CW,LSB,USB,DIGITAL (limited only by the application software)	AM,FM,RTTY,CW,LSB,USB,DIGITAL (limited only by the application software)
Modulation	Digital Low Level	Digital Low Level	Digital Low Level
Carrier & Unwanted Sideband Suppression	Greater than -90dbc	Greater than -90dbc	Greater than -90dbc
Harmonic Suppression	Greater than 50dB(HF) Greater than 60dB(VHF)	Greater than 50dB(HF) Greater than 60dB(VHF)	Greater than 50dB(HF) Greater than 60dB(VHF)

Specs: 2-Tone IMD

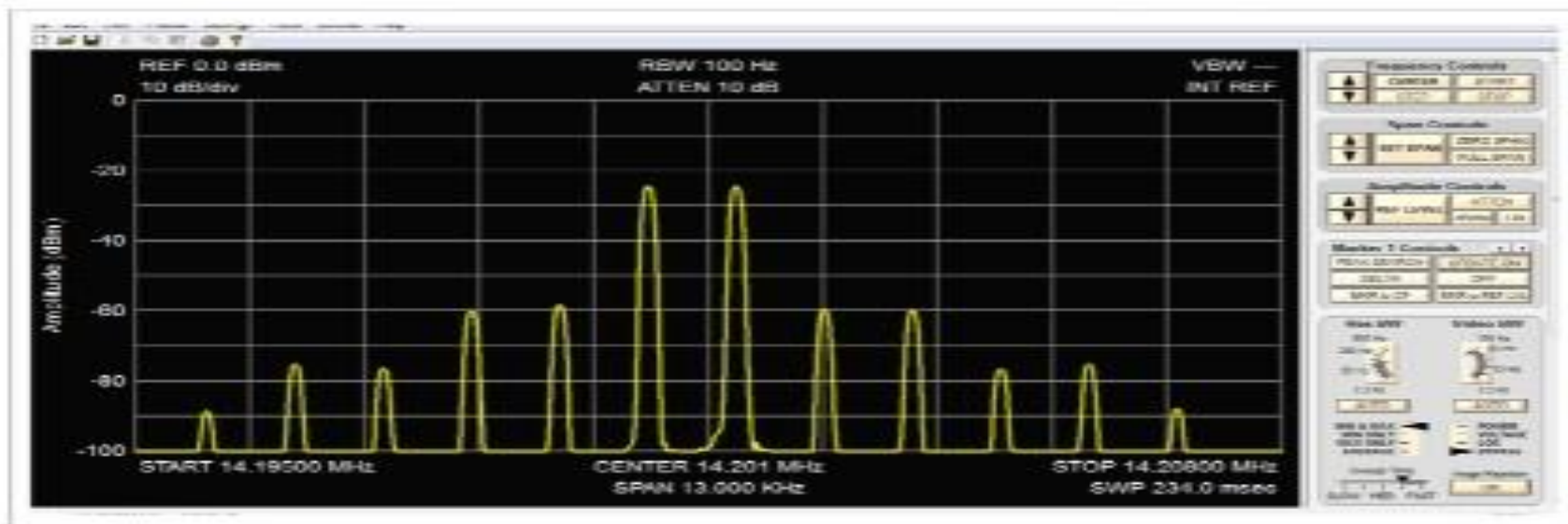


Production ANAN-10 Transceiver Transmitter testing for IMD, Harmonic & Spurious emissions

ANAN-10 Production Model

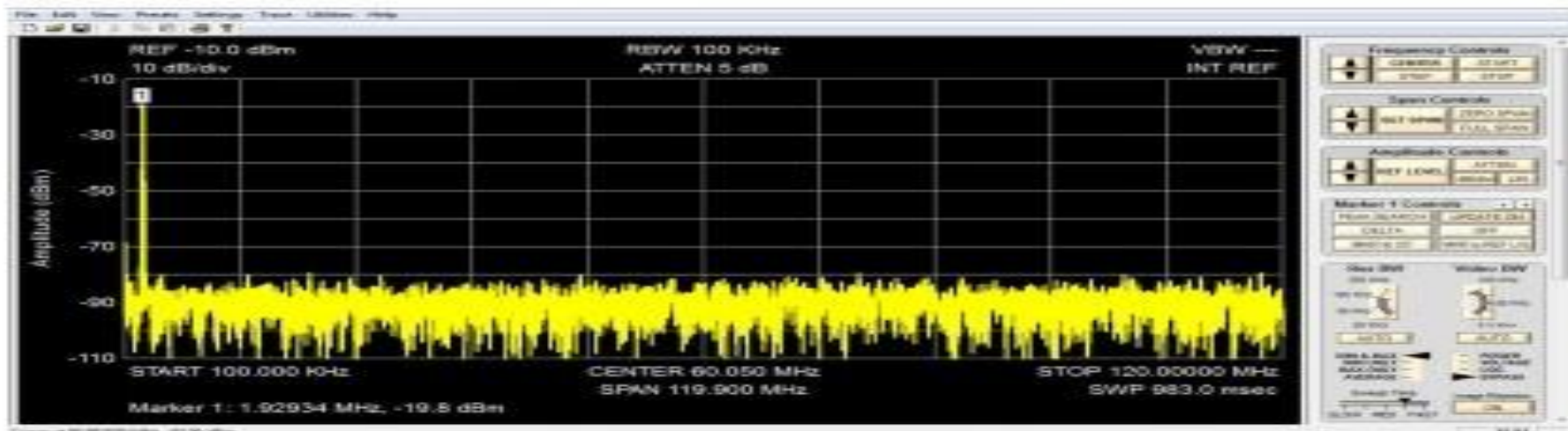
Firmware version 1.8

PowerSDR(tm) WSWC release 2.2.3 (9/10/12), Apache Labs Installer

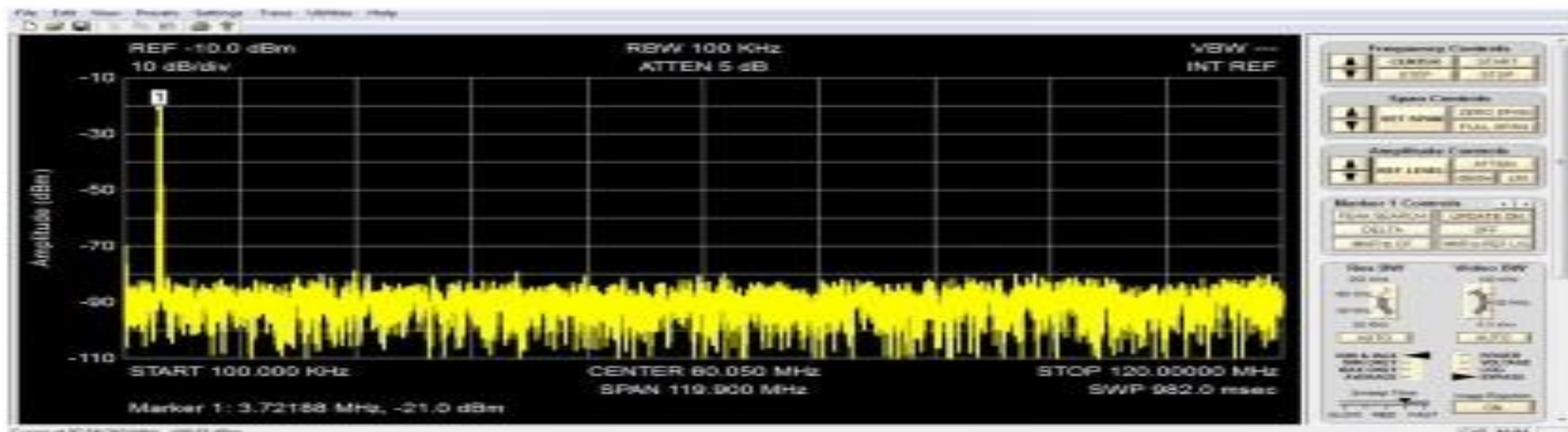


Two Tone IMD test @ 14.2MHz and 10W power output, Third-order intermodulation distortion (IMD) are better than -34dBm or -40dBm below PEP.

Specs: Spurious 160m & 80m



160M, 10W



80M, 10W

My Comments

- I am still learning!
- So far, It is an incredible radio which surpasses everything else that I have worked with, both commercial and Amateur
- Every report has praised my signal & audio
- Much fewer ghosts than Flex series, so far
- I have not found anything that I do not like. Perhaps get the 100W version if you prefer higher power but not necessary, in my opinion.

73 from VE3CVG