

Modular Up/Down Converter P/N 5502A

Description:

The Modular Up/Down Converter unit is an instrument designed to be user configured to meet the testing requirements for hand-held and man-pack civil and military transceivers.

Basic unit is composed of a mainframe, which contains a linear power supply, and a series of slots in which can be installed a series of modules, specifically designed for each configuration (fig.1).



Fig.1 - 5502A Mainframe

At the moment, the following modules were available:

- 5502A - Mainframe Unit (with 8 slots).
- 55020A - 275-380 MHz Local Oscillator Unit.
- 55021A - 200-500 to 70 MHz Downconverter and Radio Interface Module.
- 55022A - 70 to 200-500 MHz Upconverter Module.
- 55023A - 50-500 MHz 4 channel splitter/combiner.

Other modules will be later available, or manufactured under customer specifications.

Basic unit requires the following modules:

- Mainframe 5502A
- TX LO 55020A
- RX LO 55020A
- Down Converter and Antenna Interface 55021A
- Up Converter 55022A

This minimum set is able to interface one single transceiver, which operates on separate frequencies for TX and RX. If frequencies are the same, only one LO unit is then required.

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A more complex scenario involves for example 4 transceivers. To handle this configuration, 2 mainframes are required, configured as follows:

TX Mainframe:

- n.1 LO 55020A
- n.4 Down Converter Modules 55021A
- n.1 Splitter/Combiner 55023A (optional)

RX Mainframe:

- n.1 LO 55020A
- n.4 Up Converter Modules 55022A
- n.1 Splitter/Combiner 55023A (optional)

This is the configuration on delivery. One slot remains free in each mainframe for future expansions.

The 4 IF channels can be routed to a Link Emulator Unit. Frequency Spacing can be accommodated in the bandwidth of the IF channel (70 MHz \pm 20 MHz).

Patching at IF level by using the splitter/combiners 55023A can determine various scenarios, for example:

- One radio talking with all other three
- Cross-strapping between two set of radios

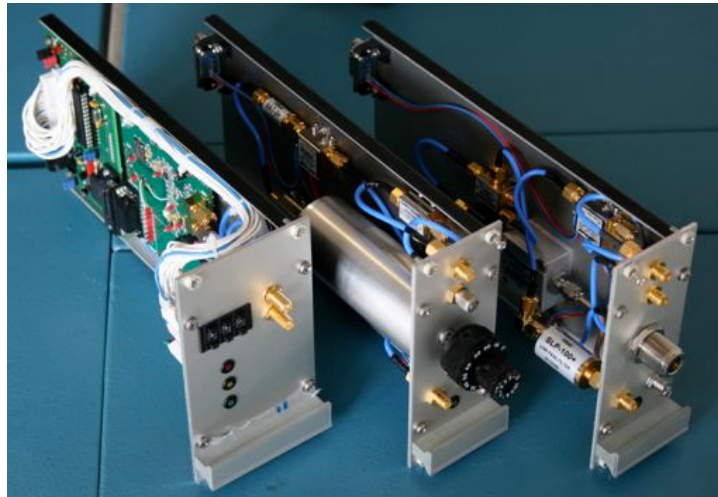


Fig.2 - LO, TX, and RX Modules

Modules Description

55020A Local Oscillator

The 55020A is an UHF Local Oscillator module, which provides a signal to drive the up and down converters. The basic unit is programmed by means of BCD thumbwheels with a resolution of 1 MHz. An internal TCXO provides the required reference. Unit has two outputs 90 degrees out of phase. Normally, only one is used. A daisy chain method is used to drive n modules without using excessive power. Design is based on the ADF4360 family of Analog Devices's integrated PLL/Synthesizers (see fig.3).

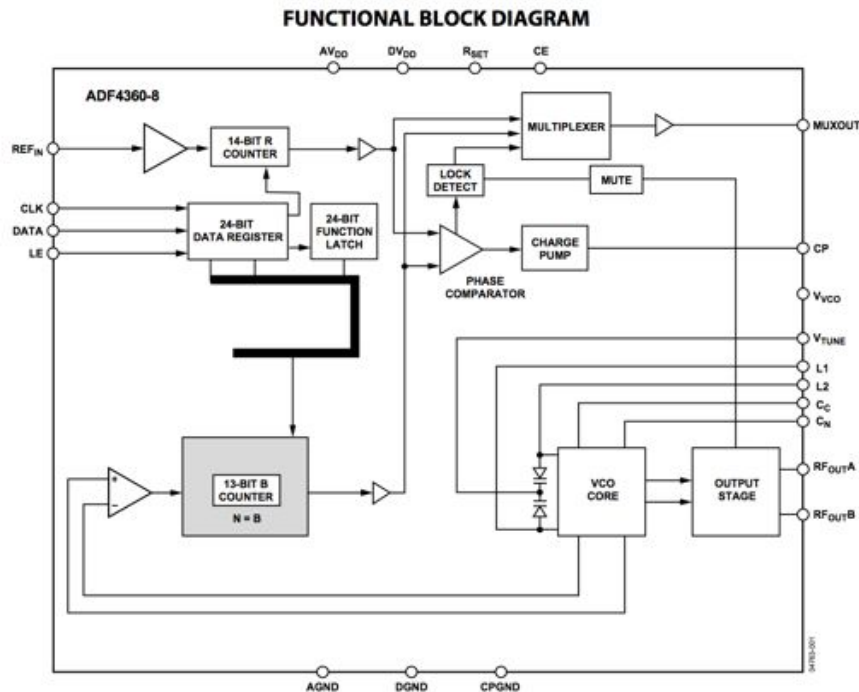


Fig.3 - Local Oscillator Block Diagram.

Basic Specifications:

Tuning Range _____ 275 - 380 MHz
 Resolution _____ 1 MHz
 Power Output _____ 2 x 0 dBm
 Phase Noise _____ refer to fig.4

Future Options:

- Remote Programming
- Increased Resolution
- High Stability Oven Reference

Frequency Bands

By using sum or difference in the IF, the following bands can be covered with the 55020A Local Oscillator (refer to table 1).

IF	MIN	MAX	MIX
0	275	380	LO
70	345	450	IN+LO
	205	310	IN-LO
50	325	430	IN+LO
	225	330	IN-LO

Tab.1 - Frequency coverage (MHz)

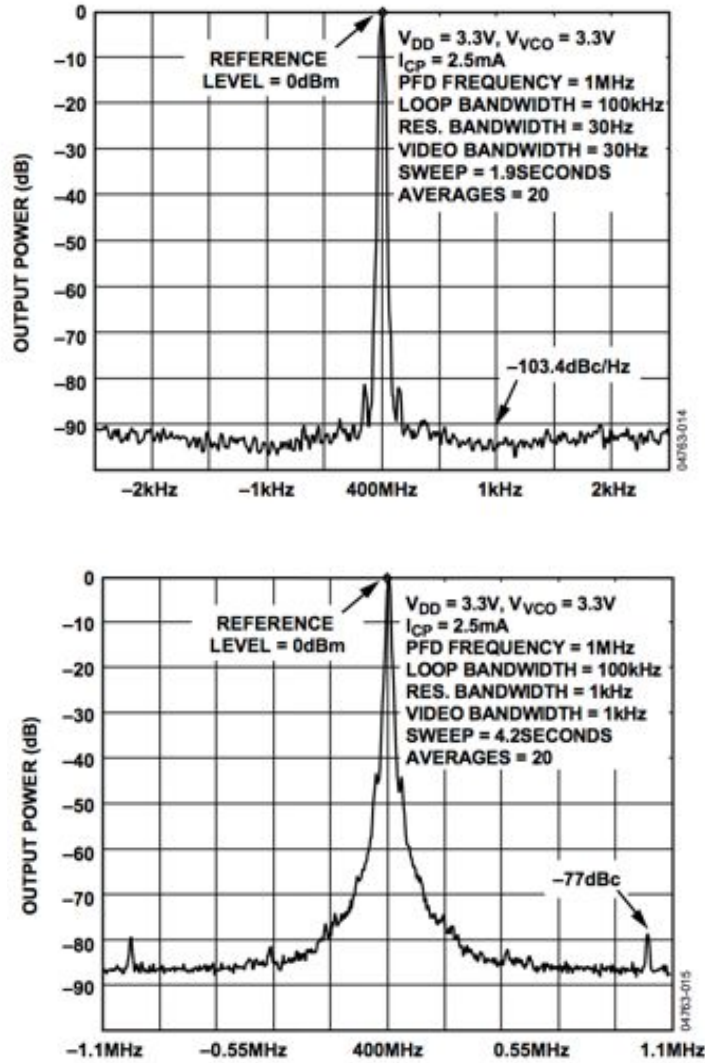


Fig.4 - Local Oscillator Phase Noise and Spurs @400 MHz.

55021A Down-Converter

The 55021A is a 200-500 MHz to 70 MHz downconverter, which also includes a transceiver radio interface. Unit (refer to figure 6) contains a directional coupler, a termination load/attenuator, a mixer, and a band-pass filter. Signal from the transceiver antenna is applied to the directional coupler CP2 and the termination load AT1 before applied to the downconverter mixer MX1. Directional coupler CP2 is used to insert the signal coming from the upconverter module 55022A through J4, which is applied to the antenna input when transceiver is in receive mode. Mixer output is routed to the band-pass filter with a center frequency of 70 MHz, and a bandwidth of ± 14 MHz @1.5 dB and ± 24 MHz @3 dB before applied to the IF output. Local oscillator signal, provided by LO module is applied to coupler CP1, and amplified by A1 before applied to mixer LO input. CP1 is required for daisy-chaining of more units.

Basic Specifications:

Input Frequency Range _____	200 - 500 MHz
LO Frequency Range _____	5 - 500 MHz
Max Input Level (no damage) _____	2W (33 dBm)
RX Coupling level _____	20 dB
TX Module Gain _____	-40 dB
IF Bandwidth (SBP-70+ Minicircuits) _____	70 MHz ± 24 MHz @3 dB

Optional:

IF center frequency, and bandwidth can be changed to 60 or 50 MHz by replacing the passband filter with the following models: SIF-70, SBP-60, SIF-50.

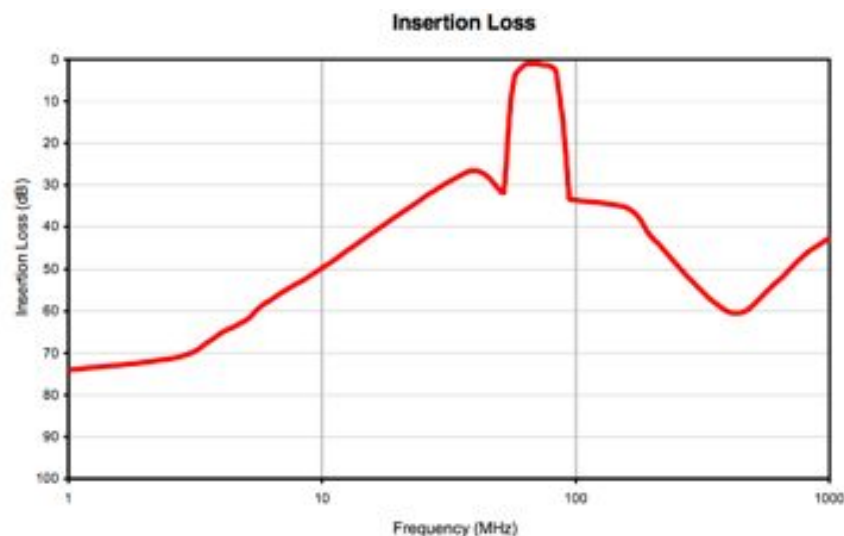


Fig.5 - SBP-70+ Frequency Response

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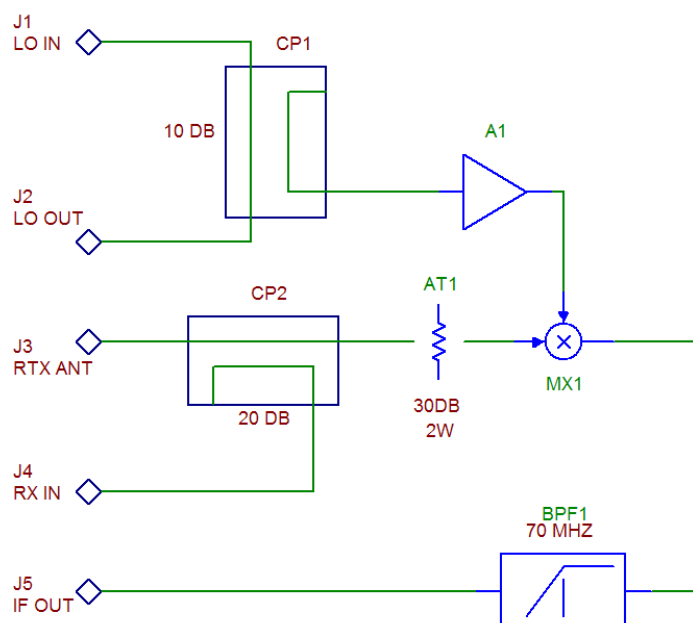
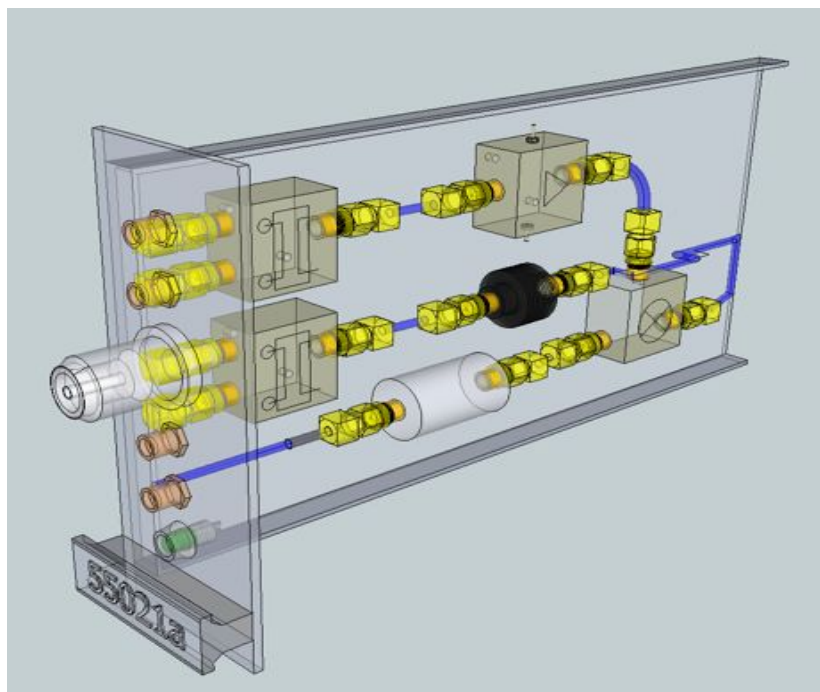


Fig.6 - 55021A Down-Converter Module and Tranceiver Interface



TECHNICAL SPECIFICATION

REF:	SP-099/C
DATA:	31/03/11
PAG:	8/10

55022A Up-Converter

The 55022A is a 70 MHz to 200-500 MHz upconverter module (refer to figure 7). Module contains a mixer and a rotary attenuator. IF input signal is applied through J4 first to a low-pass filter having an upper frequency of 100 MHz, then is routed to mixer MX1, which upconverts the incoming signal. Signal is then attenuated by AT1 (up to 110 dB in steps of 1 dB). Output signal is then routed to the tranceiver interface module 55021A RX input. Local oscillator signal, provided by LO module is applied to coupler CP1, and amplified by A1 before applied to mixer LO input. CP1 is required for daisy-chaining of more units.

Basic Specifications:

Output Frequency Range	_____	200 - 500 MHz
LO Frequency Range	_____	5 - 500 MHz
Max Attenuation Range	_____	110 dB
Module Gain (excluding attenuator)	_____	-10 dB
IF output bandwidth	_____	0 - 100 MHz @ 3 dB

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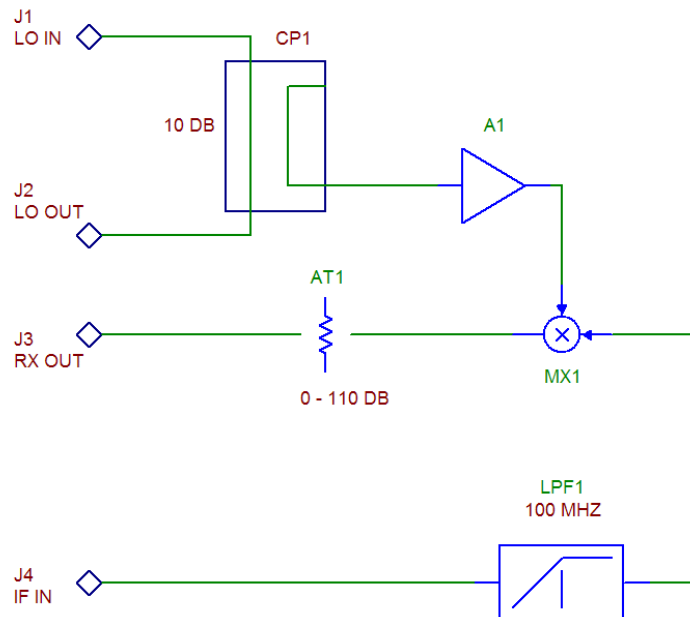
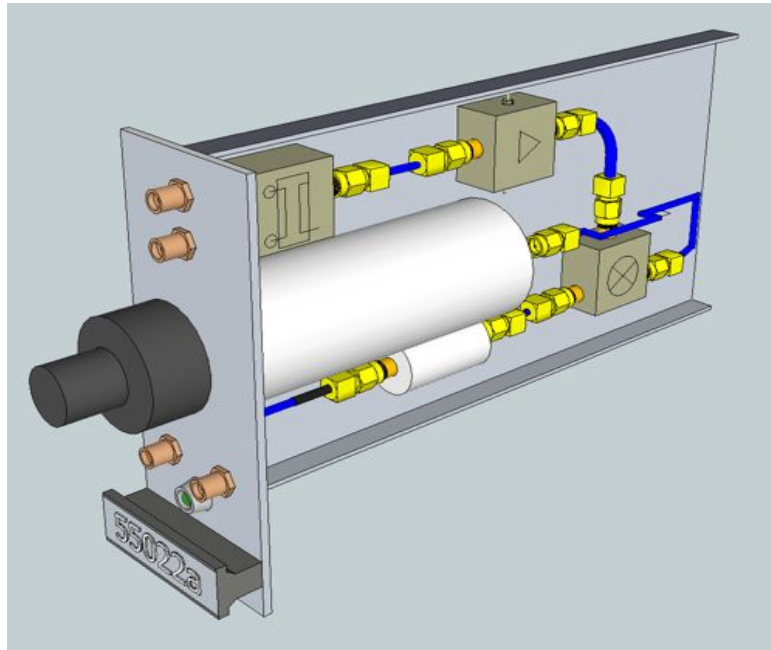


Fig.7 - 55022A Up-Converter Module

55023A - Splitter/Combiner

The 55023A is a 4 channel passive splitter/combiner module, which is intended to be used to patch IF and/or RX signals ranging from 5 to 500 MHz. Design is based on a Minicircuits component (see fig.8).

ZB4PD1-500+



SMA version shown
CASE STYLE: UU188

**Fig.8 - 55023A Power Splitter/Combiner
(internal component)**