

ANAPICO



Especificaciones de los productos

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APSIN 3000B Product Specification

Fast-Switching Low-Noise Signal Generator



- Excellent signal quality and stability
- Fast switching and trigger modes
- Powerful Ethernet LAN control (GUI, API, Web, SCPI)
- Handheld: light weight, compact and rugged design
- Truly Portable: rechargeable internal battery (optional)
- Reliable: quality design for low cost of ownership

Introduction

The APSIN3000 is a low-noise and fast-switching CW signal source. The frequency range covered with a 0.001 Hz resolution is from 9 kHz up to 3.3 GHz (APSIN3000), and 6.5 GHz (APSIN6000), respectively.

The APSIN3000 provides broadest frequency range, highest output power, and lowest harmonic levels amongst signal generators of its size and cost. It is targeted for applications where a high-quality CW source is required. It offers an alternative to expensive high-end RF signal generators, where small size and excellent RF performance at an attractive cost is required.

The very compact and rugged design of the APSIN allows multiple units to be stacked in crowded environments like laboratories or production test facilities. A 19 inch rack-mount kit is also available. Light weight (less than three kilograms fully equipped) and optionally internal rechargeable batteries make the APSIN an easy-to-use truly portable instrument.

The APSIN operates with an internal ultra-stable temperature compensated 100 MHz reference (OCXO) and can be phase-locked to a selectable external reference. Multiple units can be synchronized daisy-chaining the units' reference inputs and outputs. Integration of multiple signal sources within a production test environment is now easy, affordable and repeatable.

The APSIN uses a standard Ethernet LAN interface (RJ-45) with a TCP/IP protocol and uses SCPI 1999 command language, enabling remote control over the LAN or from any PC or Laptop computer. The instrument is supplied with a quickly installed graphical user interface (GUI). Additional supplied software (API, DLLs) enable straightforward integration of the signal generator into larger automated test systems or measurement equipment. An intuitive front panel with rotary knob allow easy direct access to all the functionality of the APSIN.

Specifications

The specifications in the following pages describe the warranted performance of the signal generator for $25 \pm 10 \text{ }^\circ\text{C}$ after a 30 minute warm-up period. Typical specifications describe expected, but not warranted performance. Min and Max specifications are warranted.

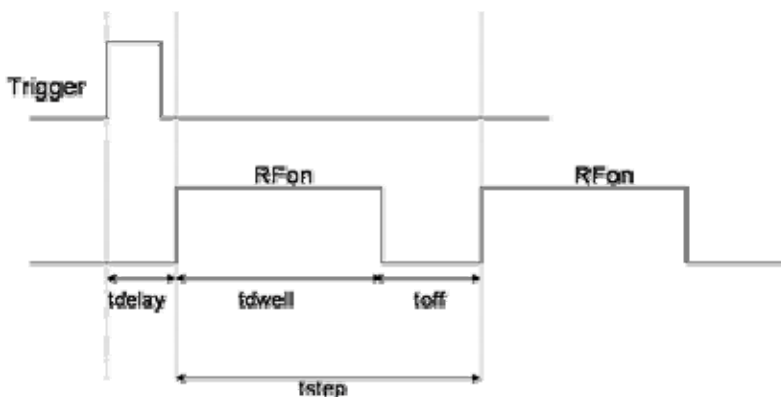
Parameter	Min.	Typ.	Max.	Note
Frequency range	9 kHz		3300 MHz	settable to 3400 MHz
resolution		0.001 Hz		1
Phase resolution		0.1 deg		
Settling time		20 μs	200 μs	
Frequency update rate		2 ms		2
List/Sweep mode			1 ms	
SSB Phase noise				
at 1 kHz from carrier		-120 dBc/ Hz		3
at 20 kHz from carrier		-130 dBc/ Hz		3
at 200 kHz from carrier		-132 dBc/ Hz		3
at 1 MHz from carrier		-135 dBc/ Hz		3
at 10 MHz from carrier		-146 dBc/ Hz		3
Wideband noise		-146 dBc/ Hz -155 dBc/ Hz		<i>carrier <1.5 GHz</i> <i>carrier >1.5 GHz</i>
Total jitter		120 fs RMS		BW over 10 Hz to 20 MHz (f=1 GHz)
Power level				
Range				
9 kHz to 3.3 GHz	-45 dBm		+13 dBm	4
10 MHz to 2 GHz			+16 dBm	
9 kHz to 3.3 GHz	-100 dBm			w option PE
Resolution		0.1 dB		Optional 0.02 dB
Level uncertainty		± 0.2 dB	± 1 dB	5
Output impedance		50 Ohms		
Spectral purity				
Output harmonics		-40 dBc	-35 dBc	6
Sub-harmonics		-70 dBc		
Non-harmonic spurious				
close to carrier (< 1 MHz offset)		-80 dBc	-60 dBc	
wideband		-70 dBc	-55 dBc	
Residual FM @ 1GHz		1.5 Hz RMS		0.3 kHz to 3 kHz, weighted (ITU-T)
		15 Hz RMS		0.01 kHz to 15 kHz
Residual AM @ 1GHz		0.01 %		RMS value (0.01 kHz to 15 kHz)
Frequency sweep				
Sweep type: linear, logarithmic, random				
Step time	1.0 ms			
Dwell time	50 μs		10 s	
Off-time (incl. transient time)	0 or 50 μs		<i>Step time</i>	7
Timing accuracy per point		0.2 μs	0.6 μs	
Power sweep				
Sweep type: linear, list				
Step time	400 μs			
Dwell time	50 μs		10 s	
Off-time (incl. transient time)	0 or 50 μs		<i>Step time</i>	7
Time resolution		0.2 μs		
Timing accuracy per point		0.2 μs	0.6 μs	
Generalized list sweep				
allows individual setting of frequency, power, dwell-time, and off-time for each point				
List size	2		3'501	
Step time	1.0 ms			
Dwell time	50 μs		10 s	
Off-time (incl. transient time)	0 or 50 μs		<i>Step time</i>	7
Time resolution		0.2 μs		

Parameter	Min.	Typ.	Max.	Note
Timing accuracy per point		0.2 μ s	0.6 μ s	
Trigger auto, bus (SCPI), trigger key, external				
Trigger delay	50 μ s		10'000 μ s	
Trigger modulo (use every Nth trigger)	1		255	
Trigger edge: positive or negative				
Reference frequency input	1 MHz		100 Mhz	8
Reference input level	-5 dBm	0 dBm	+13 dBm	9
Accuracy/ Locking Range			+/- 1.0 ppm	
Reference input impedance		50 Ohms		
Internal reference frequency		100 MHz		
Temperature stability (0 to 50 degC)			\pm 100 ppb	
Aging 1 st year		0.5 ppm		
Aging per day (after 30days operations)			5 ppb	
Warm-Up time		5 min		
Output of internal reference		5 dBm 50 Ohms		
Reverse Power Protection				
DC Voltage		10 V		
RF power			36 dBm	
Dimensions				
Excluding connectors	W x L x H = 172 x 220 x 106 mm			
Including connectors	W x L x H = 172 x 243 x 106 mm			

Notes:

- internal resolution is much smaller
- time from receipt of SCPI command or trigger signal
- at 1 GHz output carrier frequency;
- guaranteed level is -30 to + 13dBm in 0.1 dB resolution; below -30 dBm the resolution is 0.5 dB. Settable level is -45 to +16 dBm;
option PE: guaranteed level is -100 to + 13 dBm with 0.1 dB resolution. Below -100 dBm the resolution is 0.5 dB. Settable level is -120 to +16 dBm
- ALC on, -30 dBm < P_{out} < +13 dBm
- at output connector, -10 dBm < P_{out} < +10 dBm; 3000 MHz > f > 100 MHz
- if off time is set >0 then it must be at least 50 μ s
- must be integer N • 1 MHz;
- slew rate must be > 10V/ μ s

Timing of Trigger + List sweep



Modulation Capabilities

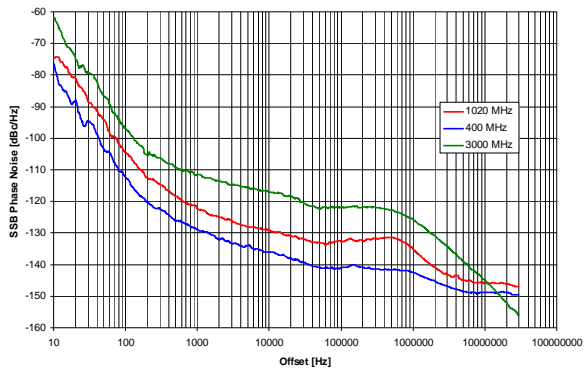
Parameter	Min.	Typ.	Max.	Note
Multifunction Generator sine, triangle, square wave Output is Sync Out at rear panel				
Frequency range	10 Hz 10 Hz		4 MHz 1 MHz 50 kHz	sine triangle square
Frequency resolution		5 Hz		
Output voltage amplitude peak-peak into 50 Ohms load	5 mV	5V	2 V	Sine, triangle Square (CMOS output)
Harmonic Distortion		1 %		< 100 kHz, 1 Vpp
Output impedance		50 Ohms CMOS		Sine, triangle square wave
Pulse Modulation (internal & external)				
On/off ratio		80 dB		Pout=10 dBm
Repetition frequency	DC 0.1 Hz		4 MHz 100 kHz	External internal
Pulse width	40 ns 180 ns		9 s	External internal
Pulse rise/fall time		10 ns		
Video crosstalk		-40 dB		
External input amplitude		1 V TTL		AC DC
Frequency modulation (internal & external) (see note 1) Maximum Frequency deviation (peak)	200 kHz AND modulation index < 10 50 kHz AND modulation index < 3 100 kHz AND modulation index < 5 200 kHz AND modulation index < 10 400 kHz AND modulation index < 20			< 143 MHz > 143 MHz to 490 MHz (N=0.125) > 490 MHz to 830 MHz (N=0.25) > 830 MHz to 1.65 GHz (N=0.5) > 1.65 GHz to 3.3 GHz (N=1)
Modulation rate	100 Hz		300 kHz	> -3dB frequency response
External input sensitivity	Settable 1 kHz/V to 300 kHz/V			1V amplitude corresponds to N· kHz deviation
Total harmonic distortion	< 1%			At modulation index = 2.4
Phase modulation (internal & external) (see note 1)				
Phase deviation (peak)	0		N·12 rad	
Modulation rate	100 Hz		300 kHz	> -3dB frequency response
External Input sensitivity	Settable 0.1 rad/V to 2 rad/V			1V amplitude corresponds to N· rad deviation
Total harmonic distortion				
AM Modulation (internal only)				
Modulation rate	1 Hz	400Hz/ 1 kHz	20 kHz	
Modulation depth	1 %		90 %	
Distortion			3 %	

Notes:

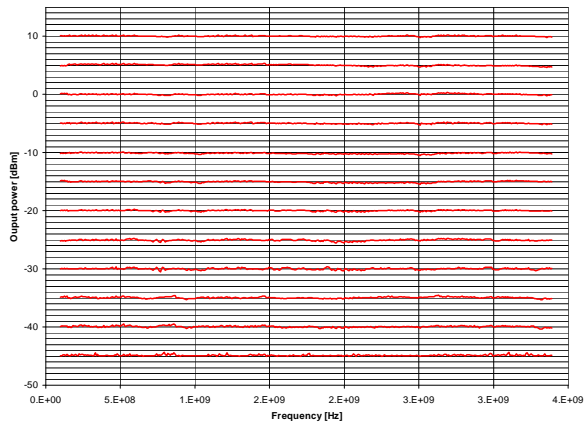
1. FM/PM modulator is supported for instruments with serial number **32233xxxxxxx** or higher

Typical performance curves

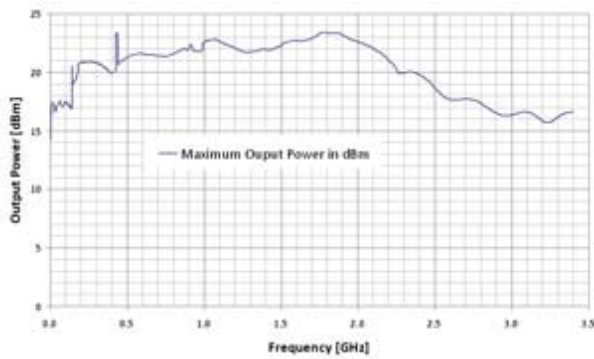
Phase Noise



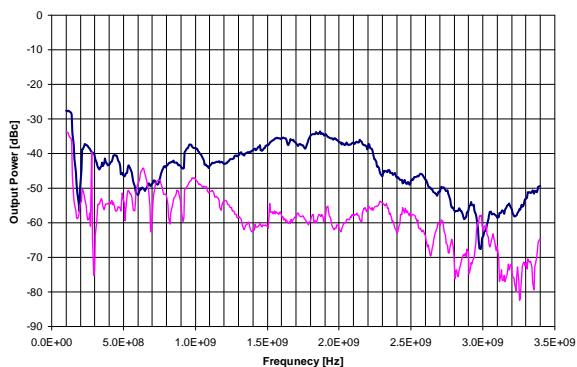
Level Accuracy



Maximum Output Power

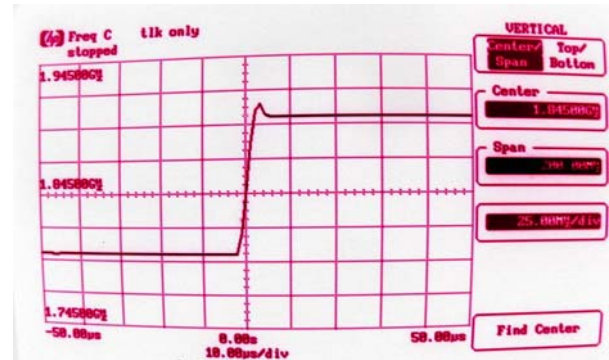


Harmonic Distortion @ +10 dBm Output Power

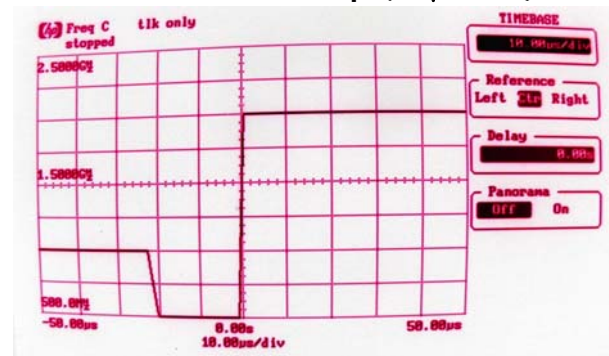


Switching transients

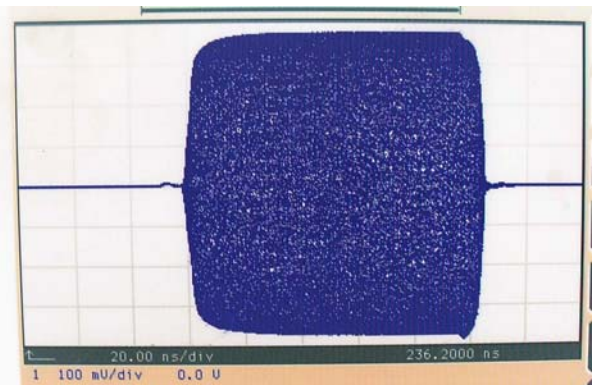
1.8 to 1.9 GHz step (10µs/div)



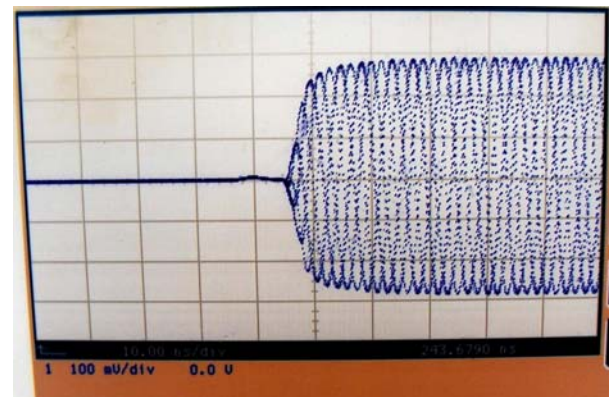
1.0 GHz to 2.0 GHz step (10µs/div)



Pulse Modulation (100ns Pulse, 20ns/div)



Rise Time (10 ns/div)



Connectors

Front panels:



option non-HC



option HC

Rear panel:



1. Trigger input: BNC female
2. Function output: BNC female
3. External reference input: BNC female
4. Internal reference output: BNC female
5. FM modulation input: BNC female
6. Pulse modulation and Trigger input: BNC female
7. LAN connection: RJ-45
8. DC Power plug (6V, 2.5A)

General Characteristics

Remote programming interfaces

LAN 10BaseT LAN interface,
Control language SCPI Version 1999.0

Power requirements 6 VDC; 20 W maximum

Mains adapter supplied: 100-240 VAC in/ 6V 2.5A DC out

Operating temperature range 0 to 55 °C

Storage temperature range -40 to 70 °C

Operating and storage altitude up to 15,000 feet



notice

Safety/EMC complies with applicable Safety and EMC regulations and directives.

Weight ≤ 2.5 kg (6 lbs) net, ≤ 4 kg (8 lb.) shipping

Dimensions 106 mm H x 172 mm W x 220 mm L
[4.21 in H x 6.77 in W x 8.66 in L]

Options

- **B3:** Rechargeable battery pack (internal, 3 hours operation)
- **PE:** Extended power range (-100 to +13 dBm)
- **HC:** Frontpanel user interface (rotary knob)
- **RM:** 19" Rack mount (1 or 2 devices)

Document History

Version/Status	Date	Author	Notes
V10	2008-1-28	jk	first release
V11	2008-5-20	jk	Minor revision
V12	2008-7-2	jk	Minor revision
V13	2008-7-10	jk	Resized document
V14	2008-7-29	jk	Added more modulation specs
V15	2009-1-20	jk	Specs for APSIN3000B
V151	2009-2-23	jk	FM deviations changed
V16	2009-3-15	jk	Power level specifications clarified
V161	2009-4-2	jk	Modulation specs revised
V162	2009-8-22	jk	Added sweep timing accuracy



APSIN 6000 Product Specification

Fast-Switching Low-Noise Signal Generator



Introduction

The APSIN6000 is a low-noise and fast-switching CW signal source covering a frequency range from 9 kHz up to 6.4 GHz.

The APSIN6000 provides broadest frequency range, highest output power, and lowest harmonic levels amongst signal generators of its size and cost. It is targeted for applications where a high-quality CW source is required. It offers an alternative to expensive high-end RF signal generators, where small size and excellent RF performance at an attractive cost is required.

The very compact and rugged design of the APSIN allows multiple units to be stacked in crowded environments like laboratories or production test facilities. A 19 inch rack-mount solution is also available. Light weight (less than three kilograms fully equipped) and optionally internal rechargeable batteries make the APSIN an easy-to-use truly portable instrument.

The APSIN operates with an ultra-stable temperature compensated 100 MHz reference (OCXO) and can be phase-locked to a selectable external reference. Multiple units can be synchronized daisy-chaining the units' reference inputs and outputs. Integration of multiple signal sources within a production test environment is now easy, affordable and repeatable.

The APSIN uses a standard Ethernet LAN interface (RJ-45) with a TCP/IP protocol and uses SCPI 1999 command language, enabling remote control over the LAN or from any PC or Laptop computer. The instrument is supplied with a quickly installed graphical user interface (GUI). Additional supplied software (API, DLLs) enable straightforward integration of the signal generator into larger automated test systems or measurement equipment. An intuitive front panel with rotary knob allow easy direct access to all the functionality of the APSIN.

Specifications

The specifications in the following pages describe the warranted performance of the signal generator for $25 \pm 10 \text{ }^\circ\text{C}$ after a 30 minute warm-up period. Typical specifications describe expected, but not warranted performance. Min and Max specifications are warranted.

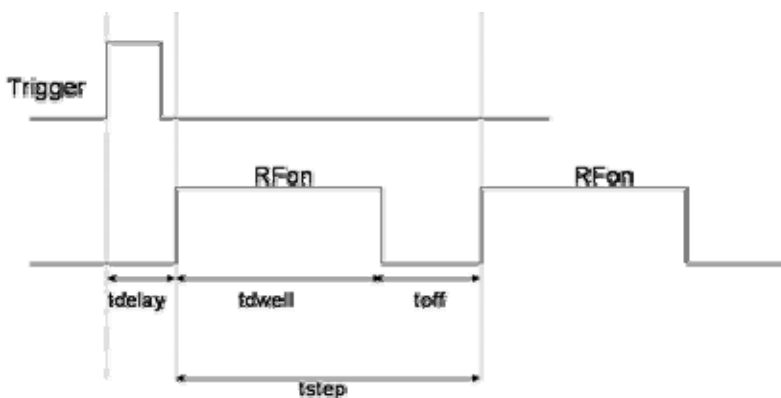
Parameter	Min.	Typ.	Max.	Note
Frequency range	9 kHz		6400 MHz	settable up to 6500 MHz
resolution		0.001 Hz		1
Phase resolution		0.2 deg		
Settling time		20 μs	200 μs	
Frequency update rate		2 ms		2
List/Sweep mode			1 ms	
SSB Phase noise				
at 1 kHz from carrier		-120 dBc/ Hz		3
at 20 kHz from carrier		-130 dBc/ Hz		3
at 1 MHz from carrier		-135 dBc/ Hz		3
Wideband noise		-146 dBc/ Hz -155 dBc/ Hz		carrier <1.5 GHz carrier >1.5 GHz
Total jitter		120 fs RMS		BW over 10 Hz to 20 MHz
Power level				
Range 300 kHz to 6.0 GHz	-60 dBm -100 dBm		+13 dBm	4 4 \rightarrow Option PE
Resolution		0.1 dB		0.02 dB (firmware 2.2 and higher)
Level uncertainty		± 0.2 dB	± 1 dB	5
Output impedance		50 Ohms		
Spectral purity				
Output harmonics		-45 dBc	-30 dBc	6
Sub-harmonics		-70 dBc		
Non-harmonic spurious close to carrier (< 1 MHz offset)		-75 dBc	-55 dBc	
wideband		-65 dBc	-55 dBc	
Residual FM @ 1GHz		1.5 Hz RMS		0.3 kHz to 3 kHz, weighted (ITU-T)
		18 Hz RMS		0.01 kHz to 15 kHz
Residual AM @ 1GHz		0.01 %		RMS value (0.01 kHz to 15 kHz)
Frequency sweep				
Sweep type: linear, logarithmic, random				
Step time (t_{step})	1.0 ms			7
Dwell time (t_{dwell})	50 μs		10 s	
Off-time (incl. transient time) (t_{off})	0 or 50 μs		Step time	8
Power sweep				
Sweep type: linear, list				
Step time (t_{step})	400 μs			7
Dwell time (t_{dwell})	50 μs		10 s	
Off-time (incl. transient time) (t_{off})	0 or 50 μs		Step time	8
Time resolution		0.2 μs		
Generalized list sweep				
allows individual setting of frequency, power, dwell-time, and off-time for each point				
List size	2		3'501	
Step time (t_{step})	1.0 ms			7
Dwell time (t_{dwell})	50 μs		10 s	
Off-time (incl. transient time) (t_{off})	0 or 50 μs		Step time	8
Time resolution		0.2 μs		

Parameter	Min.	Typ.	Max.	Note
Trigger auto, bus (SCPI), trigger key, external				
Trigger delay	50 μ s		10'000 μ s	
Trigger modulo (use every Nth trigger)	1		255	
Trigger edge: positive or negative				
Reference frequency input	1 MHz		100 Mhz	9
Reference input level	-5 dBm	0 dBm	+13 dBm	10
Accuracy/ Locking Range			+/- 1.0 ppm	
Reference input impedance		50 Ohms		
Internal reference frequency		100 Mhz		
Temperature stability (0 to 50 degC)			\pm 100 ppb	
Aging 1 st year		0.5 ppm		
Aging per day (after 30days operations)			5 ppb	
Warm-Up time		5 min		
Output of internal reference		5 dBm 50 Ohms		
Reverse Power Protection				
DC Voltage		10 V		
RF power			36 dBm	
Dimensions				
Excluding connectors	W x L x H = 172 x 220 x 106 mm			
Including connectors	W x L x H = 172 x 243 x 106 mm			

Notes:

- internal resolution is much smaller
- time from receipt of SCPI command
- at 1 GHz output carrier frequency
- guaranteed level is -30 to + 13dBm in 0.1 dB resolution; below -30 dBm the resolution is 0.5 dB. Settable level is -60 to +25 dBm; for typical maximum power see plot on page 6.
option PE: guaranteed level is -100 to + 13 dBm with 0.1 dB resolution. Below -100 dBm the resolution is 0.5 dB. Settable level is -120 to +25 dBm
- ALC on, -30 dBm < P_{out} < +13 dBm
- at output connector, -10 dBm < P_{out} < +10 dBm; f >10 MHz
- $t_{step} = t_{dwell} + t_{off} > 900 \mu$ s
- t_{off} may be lower or zero, if no off time is required. But off times > 0 and < 200us may be inaccurate
- must be integer N • 1 MHz;
- slew rate must be > 10V/ μ s

Timing of Trigger + List sweep



Modulation Capabilities

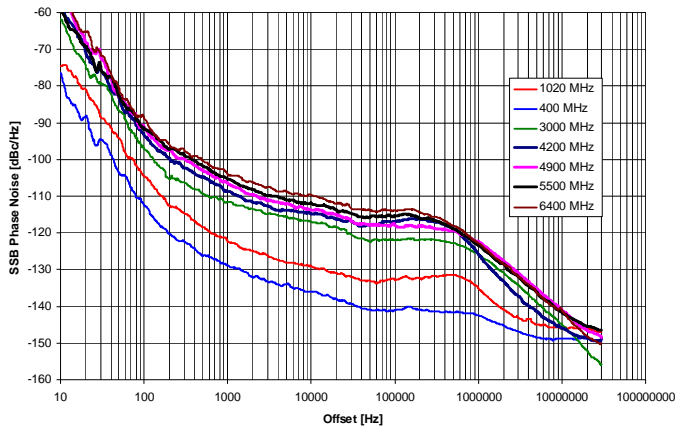
Parameter	Min.	Typ.	Max.	Note
Multifunction Generator Output is Sync Out at rear panel	sine, triangle, square wave			
Frequency range	1 Hz 1 Hz		3 MHz 1 MHz 50 kHz	sine triangle square
Frequency resolution		0.1 Hz		
Output voltage amplitude peak-peak	10 mV	5V	2 V	Sine, triangle Square (CMOS output)
Harmonic Distortion		1 %		< 100 kHz, 1 Vpp
Output impedance		50 Ohms CMOS		Sine, triangle square wave
Pulse Modulation (internal & external) On/off ratio		80 dB		
Repetition frequency	DC 0.1 Hz		4 MHz 100 kHz	External internal
Pulse width	40 ns 180 ns		9 s	External internal
Pulse rise/fall time		10 ns		
Video crosstalk		-40 dB		
External input amplitude		1 V TTL		AC DC
External input amplitude		1 V TTL		AC DC
Frequency modulation (internal & external) (see note 1) Maximum Frequency deviation (peak)	200 kHz AND modulation index < 10 50 kHz AND modulation index < 3 100 kHz AND modulation index < 5 200 kHz AND modulation index < 10 400 kHz AND modulation index < 20		< 143 MHz > 143 MHz to 490 MHz (N=0.125) > 490 MHz to 830 MHz (N=0.25) > 830 MHz to 1.65 GHz (N=0.5) > 1.65 GHz to 3.3 GHz (N=1)	
Modulation rate	100 Hz		300 kHz	> -3dB frequency response
External input sensitivity	Settable 1 kHz/V to 200 kHz/V		1V amplitude corresponds to N· kHz deviation	
Total harmonic distortion	< 1%		At modulation index = 2.4	
Phase modulation (internal & external) (see note 1)				
Phase deviation (peak)	0		N·5 rad	
Modulation rate	100 Hz		300 kHz	> -3dB frequency response
External Input sensitivity	Settable 0.1 rad/V to 2 rad/V		1V amplitude corresponds to N· rad deviation	
Total harmonic distortion				
AM Modulation (internal only)				
Modulation rate	1 Hz		20 kHz	
Modulation depth	1 %		90 %	
Distortion		3 %		

Notes:

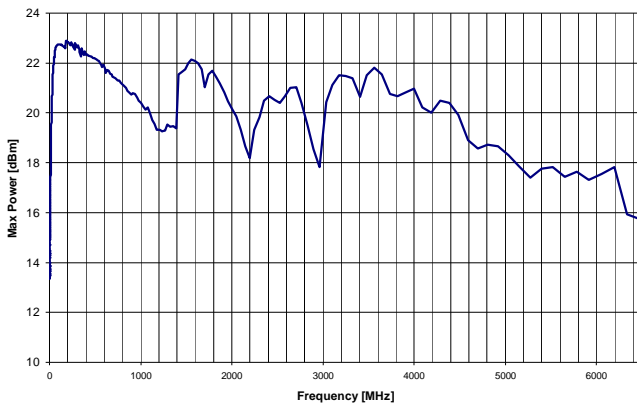
1. FM/PM modulator is supported for instruments with serial number **62233xxxxxxx** or higher.

Typical performance curves

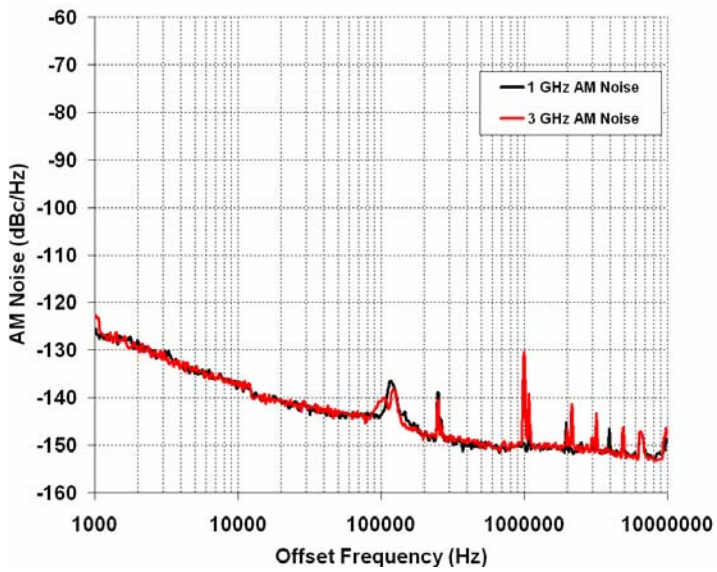
Phase Noise



Maximum output power



AM noise performance



Connectors

Front panel (HC option):



1. RF output: N female
2. RF on/off button
3. Rotary knob
4. Menu and ↓ ↑ ← → arrow keys

Rear panel:



1. Trigger input: BNC female
2. Function output: BNC female
3. External reference input: BNC female
4. Internal reference output: BNC female
5. FM modulation input: BNC female
6. Pulse modulation and Trigger input: BNC female
7. LAN connection: RJ-45
8. DC Power plug (6V, 2.5A)

General Characteristics

Remote programming interfaces

LAN 10BaseT LAN interface,

Control language SCPI Version 1999.0

Power requirements 6 VDC; 20 W maximum
Mains adapter supplied: 100-240 VAC in/ 6V 2.5A DC out
Operating temperature range 0 to 55 °C
Storage temperature range -40 to 70 °C
Operating and storage altitude up to 15,000 feet



notice

Safety/EMC complies with applicable Safety and EMC regulations and directives.

Weight ≤ 2.5 kg (6 lbs) net, ≤ 4 kg (8 lb.) shipping

Dimensions 106 mm H x 172 mm W x 220 mm L
[4.21 in H x 6.77 in W x 8.66 in L]

Options

- **B3:** Rechargeable battery pack (internal, 3 hours operation)
- **PE:** Extended power range (-100 to +13 dBm)
- **PE2:** Extended power range to -140 to +13 dBm
- **-:** Display-only frontpanel (for ATE)
- **RM:** 19" Rack mount (1 or 2 devices)

Document History

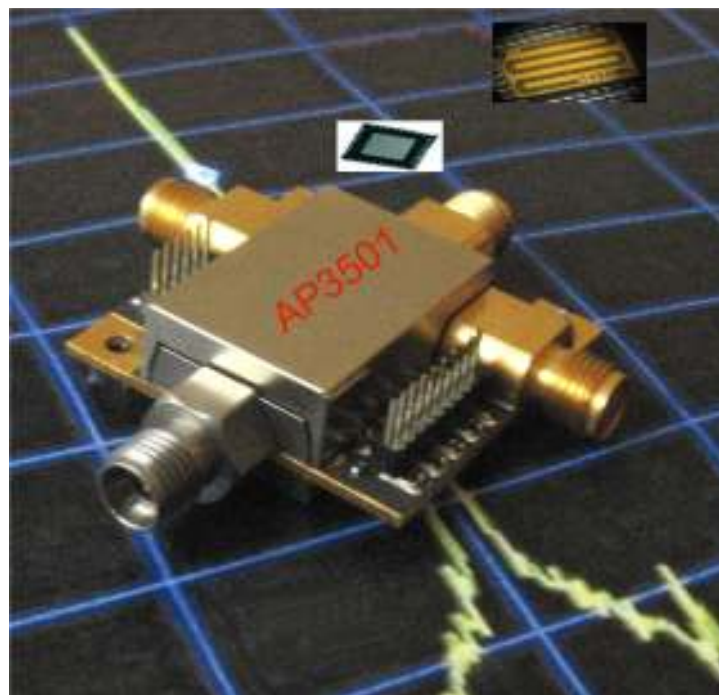
Version/Status	Date	Author	Notes
V10	2008-2-20	jk	first release
V11	2008-5-20	jk	Minor revision
V12	2008-7-2	jk	Minor revision
V13	2008-7-10	jk	Resized document
V14	2008-7-25	jk	Added list & trigger
V15	2009-1-20	jk	Added specs for option PE; AM modulation
V151	2009-2-23	jk	FM deviations changed
V16	2009-3-15	jk	Power level specifications clarified
V161	2009-4-2	jk	Modulation specs revised

AP3501 Product Specification

35 GHz High-Speed Sampler

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5.	Characteristics	5
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1. Introduction

The AnaPico AP3501 is a miniaturized 35 GHz bandwidth sampler allowing for up to 600 MSamples/s sampling rate. With a dedicated sample-and-hold/reset circuit the AP3501 can either be operated with integrating output (sample & hold) or with memory-free individual IF pulses (sample-hold-reset up to 60 MHz). The AP3501 enables high-speed sampling with an excellent spurious-free dynamic range. The aperture jitter is typically 70 fs_{RMS}.

The AP3501 is highly integrated and includes strobe generation, sampling, and charge amplification and consumes 2 W. The AC-coupled strobe input is preferably differential and ECL compatible.

The sampler device is mounted in a connectorized package (approx. 30 x 30 x 10 mm) but can also be delivered in a small SMT package with excellent thermal properties if required.

Applications for the device include:

- sampling frequency converters
- sampling receivers
- down converters
- equivalent time sampling oscilloscopes

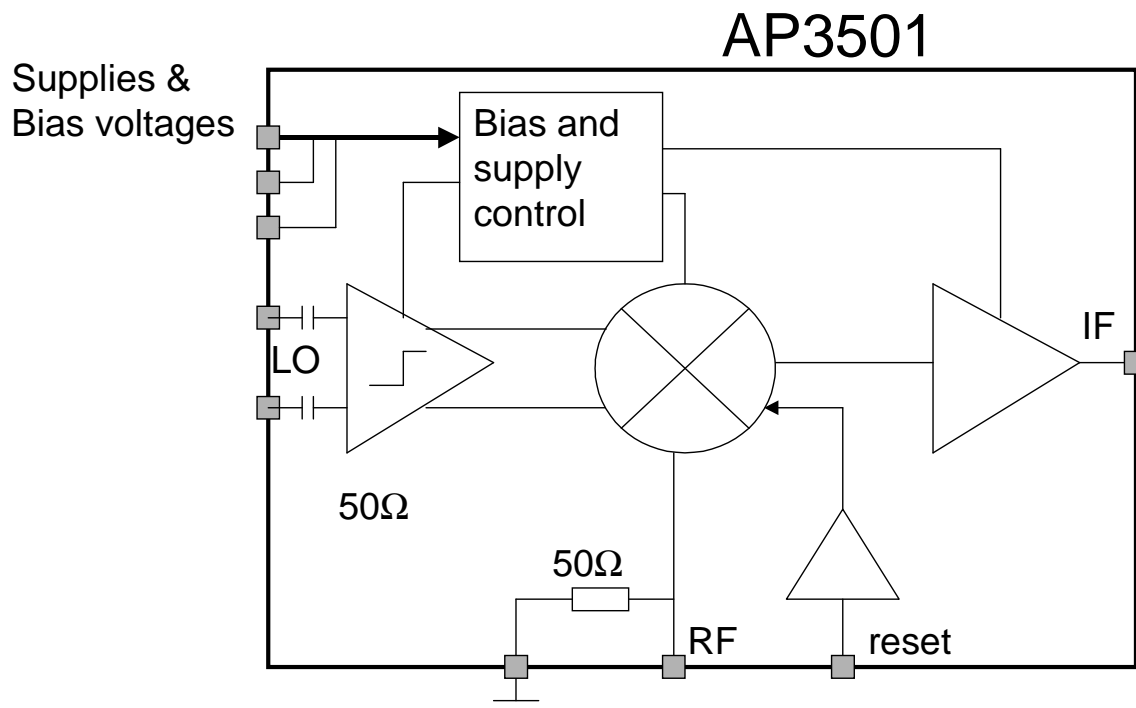
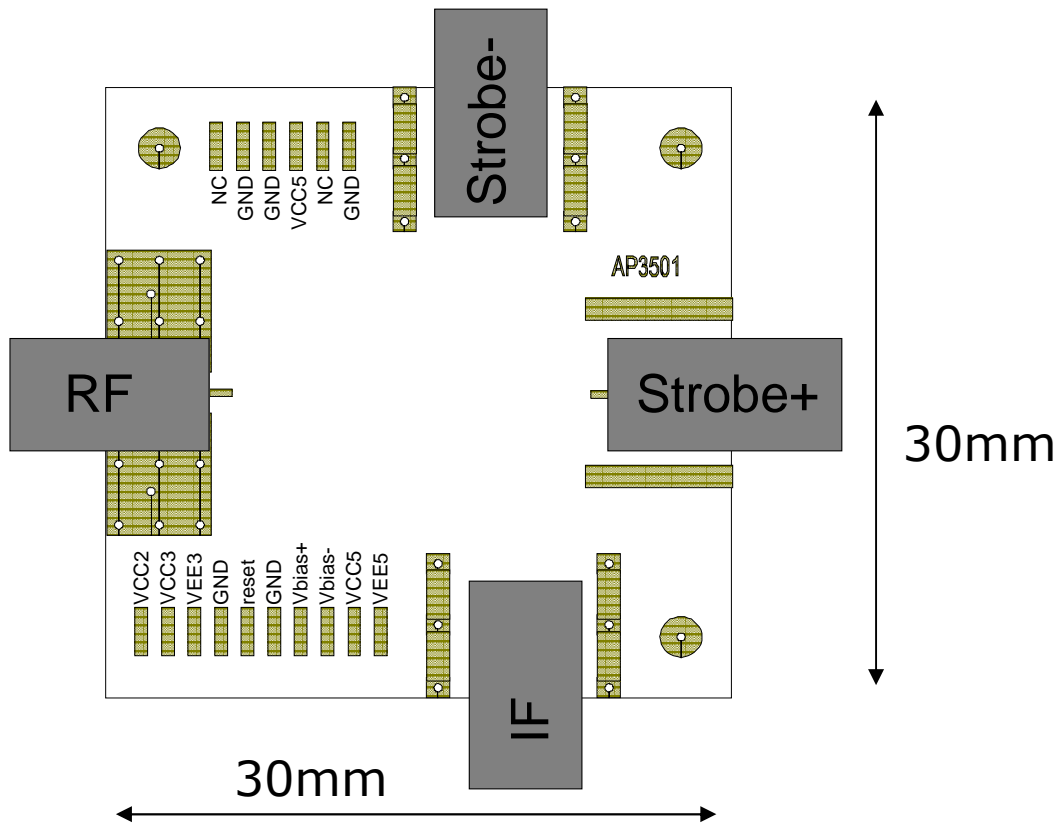


Figure 1 Equivalent circuit of the AP3501 Sampler



2. Pin description

Pin Name	Type	Description
RF	RF Signal input	Single-ended high-speed signal input
Strobe+	ECL input	Strobe input, positive (internally AC-coupled)
Strobe-	ECL input	Strobe input, negative (internally AC-coupled)
IF	Analog output	IF output
Vbias+	Analog input	External threshold adjust for sampler
Vbias-	Analog input	External threshold adjust for sampler
reset	Analog input	Reset signal input (100 Ω , internally AC-coupled)
VCC2	Supply	Positive 6V supply
VCC3	Supply	Positive 2.5V supply
VCC5	Supply	Positive 5V supply
VEE3	Supply	Negative 3V supply
VEE5	Supply	Negative 5V supply
GND	Supply	Ground, 0V reference

3. Absolute Maximum Ratings

Stress beyond the values stated below may cause permanent damage to the device. Functional operation is not implied under these conditions. Exposure to absolute maximum ratings for extended periods may adversely affect reliability.

Parameter	Symbol	Min.	Max.	Units	Note
Positive Supply voltage	V_{CC2}	-0.5	+10	V	
Positive Supply Voltage	V_{CC3}	-0.5	+5	V	
Positive Supply Voltage	V_{CC5}	-0.5	+6.75	V	
Negative Supply Voltage	V_{EE3}	-5	+1	V	
Negative Supply Voltage	V_{EE5}	-6.75	+1	V	
Sampler positive bias	V_{bias+}	-0.5	+7.5	V	
Sampler negative bias	V_{bias-}	-7.5	0.5	V	
RF input signal voltage range	V_{RF}	-2	+2	V	
IF signal voltage	V_{IF}	-5	+5	V	
Continuous Input Current at RF input	I_{RF}	-25	+25	mA	
Continuous output current at IF output	I_{IF}	-80	80	mA	
Storage Temperature	T	-40	130	°C	

4. Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Positive Supply Voltage	V_{CC2}	+5.5	+6	+8	V	
Positive Supply Voltage	V_{CC3}	+1.5	+2.5	+3.5	V	
Positive Supply Voltage	V_{CC5}	+4.7	+5	6	V	
Negative Supply Voltage	V_{EE5}		-5		V	
Negative Supply Voltage	V_{EE3}	-2	-3	-4	V	
Sampler positive bias	V_{bias+}	0	+0.8	+2.5	V	
Sampler negative bias	V_{bias-}	-2.5	-1.4	0	V	
Operating Temperature		10		55	°C	
Sampling rate	S	0		60 (800)	MHz	a
Strobe input amplitude		0.3	0.8	1.5	V	b
Strobe pulse rise/fall time			100	200	ps	
Strobe duty cycle		40	50	60	%	



Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Reset input amplitude			0.4	1.0	V	
Reset pulse rise/fall time			200	500	ps	c
Reset duty cycle		10	50	70	%	

Notes:

- Sampling rates up to 800 MS/s are possible when used as a sampling phase detector or harmonic mixer. "memory-free" sampling is possible up to 60 MS/s
- differential peak-peak amplitude
- for the typical amplitude, larger amplitude allows slower rise/fall times

5. Characteristics

All characteristics specified at operating conditions but guaranteed and tested at typical bias conditions and 25 °C.

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
input bandwidth	<i>BW</i>		35		GHz	
Spurious free dynamic range	<i>SFDR</i>		65		dB	1
IF bandwidth			tbd		MHz	
Input voltage range		-1.5 -1		1.5 1	V	2a 2b
Output offset				tbd	mV	
Aperture jitter				0.2	ps _{RMS}	
Output noise level			0.5		mV _{RMS}	3
RF Input impedance			50		Ohm	
Input return loss	<i>S11</i>			-15		4
Strobe input impedance			100		Ohm	differential
IF output impedance			50		Ohm	
Conversion gain		0.7	1	1.2		
Latency			6		ns	
Supply Current into V _{CC2}	<i>I_{CC2}</i>		230	255	mA	
Supply Current into V _{CC3}	<i>I_{CC3}</i>			15	mA	
Supply Current into V _{CC5}	<i>I_{CC5}</i>		170	190	mA	
Current from V _{EE5}	<i>I_{EE5}</i>			25	mA	
Current from V _{EE3}	<i>I_{EE3}</i>			15	mA	

Notes:

- $P_{in} < -10$ dBm, $f_{RF} = 5.001$ GHz, $f_{LO} = 100$ MHz
- a) $<10\%$ error b) for $<\pm 2\%$ linearity error
- noise integrated up to sampling rate
- package and connector dependent, up to 25GHz



6. Document History

Version/Status	Date	Author		Notes
V10	2006-3-12	jk		first release
V12	2006-5-31	jk		Included pinout
V13	2006-7-17	ul		Pin assignment updated
V14	2006-8-31	jk		Adjusted bias voltages, minor changes in performance numbers based on characterization
V20	2006-09-12	jk		Add. data
V21	2007-04-16	ul		editorial update
V22	2007-06-28	jk		editorial update



User Reference

AnaPico APCON4

Downconverter Software

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1. Introduction

This document will give a quick reference for the APCON4 control software consisting of

- APLO4.exe: GUI for controlling the Sampling Downconverter
- SDC.dll: DLL-library to control APLO4 system.

2. APLO4.exe

A screen shot of the APLO4-program is shown in Fig. 1.

At present, the program runs on PC under Windows and requires the Microsoft .NET framework installed.

The SW has been tested under Windows XP, it is currently not supported under Windows Vista.

Both the APLO4.exe and the SDC.dll must be installed in the same directory.

The GUI allows controlling the following functions:

- Establish TCP/IP connection to the AnaPico hardware controller. Currently, the controller uses fixed IPs. The static IP address can be changed under File\Network Configuration.
- To connect, select the IP address from the window in the top right corner and click on "Connect". If connection is established, the red light on top right will turn green.
- In the future the IP will be obtained from the DHCP-server, this is not yet implemented.
- Select sampling frequency. Changing every digit will automatically update the sampling rate. Currently, a frequency update takes about one second.
- Each channel can be enabled individually. Positive and negative sampling gate bias can be set. The LO amplitude can be left at the default setting.
- Reference clock: the reference clock frequency can be set. Current software implementation allows only the following references between 10 and 100 MHz in MHz steps.

- Power on/off: allows to power down a large portion of the system.
- Reset: Software reset

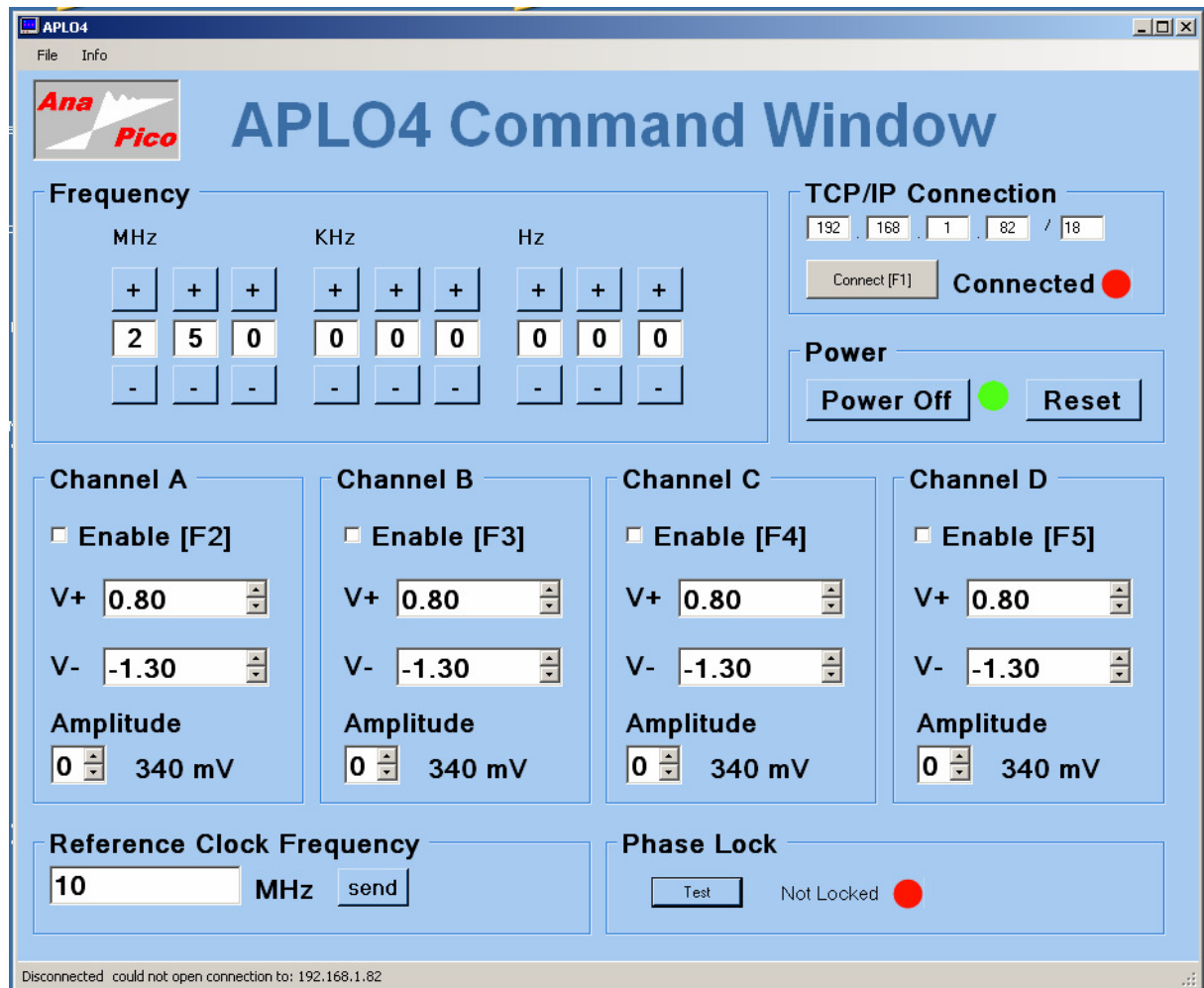


Fig. 1: Screen plot of the APLO4.exe GUI

3. Known issues

none

4. Document History

Version/Status	Date	Author		Notes
V11		jk		
V12		ul		Updates for APCON4