

NOVATECH

INSTRUMENTS

400MHz Dual Channel Programmable Signal Source

Model 426A



The Model 426A generates two channels of low distortion sinewave signals. Each channel is independently programmable in frequency, phase and amplitude from 300kHz to 400MHz with 10 μ Hz resolution. The 426A uses an internal TCXO clock by default or it can be programmed to phase lock to an externally provided signal or use an external signal directly as the synthesizer clock. When using an external signal directly, there will be no fractional frequency error if the ratio of the external frequency divided by the output frequency has a value equal to 2^y where y is an integer.

OUTPUT

TYPE: Sine Waves on each of two output channels.

IMPEDANCE: 50 Ω .

RANGE: 300kHz to 400MHz in 10 μ Hz steps.

AMPLITUDE: Approximately 0dBm into 50 Ω at 100MHz output.

CONTROL

Output frequency (48-bits), amplitude(10-bits) and phase (14-bits) are controlled by sending simple text commands over a bit-serial interface port (RS232) at 19.2kBaud. Settings can be saved via the serial port.

INTERNAL CLOCK (FACTORY DEFAULT)

TYPE: 40MHz TCXO clock in phase lock loop generates 1 GHz clock for the frequency synthesizers.

ACCURACY: $\leq \pm 1.5$ ppm at 10 to 40 $^{\circ}$ C. Stable to an additional ± 2 ppm per year, 18 to 28 $^{\circ}$ C.

EXTERNAL CLOCK (REFERENCE INPUT)

TYPE: User must supply a signal within range of 1MHz to 25MHz in 8kHz steps. Must be ± 5 ppm of value stored by "FR". Used in phase lock loop to generate 1GHz clock for the frequency synthesizers.

LEVEL: 0.75-2.0Vrms Sine or Square Wave. 50 Ω .

ACCURACY: When locked, equal to the accuracy of the user supplied signal.

EXTERNAL CLOCK (DIRECT INPUT)

TYPE: User must supply a signal within range of 250MHz to 1GHz. This signal is used directly as the clock for the frequency synthesizers.

LEVEL: 0.75-2.0Vrms Sine or Square Wave. 50 Ω .

ACCURACY: Equal to the accuracy of the user supplied signal.

SCALING: 426A firmware will use the frequency stored in "FD" and automatically apply a scale factor to the commanded frequency.

SPECTRAL PURITY (INTERNAL CLOCK)

(Typ. 50 Ω load, 10MHz ref.)

Phase Noise: < -130 dBc, 10kHz offset, 10MHz output.

Spurious: < -55 dBc below 10MHz
 < -50 dBc below 80MHz
 < -45 dBc below 160MHz
 < -35 dBc below 400MHz

Harmonic: < -60 dBc below 1MHz
 < -55 dBc below 20MHz
 < -50 dBc below 80MHz
 < -40 dBc below 160MHz
 < -35 dBc below 400MHz

POWER REQUIREMENTS

+5VDC (+4.75 to +5.25) @ < 1.0 A. (90-240VAC with provided AC-adaptor)

SIZE

39mm H, 107mm W, 172mm L, not including connectors.

ENVIRONMENTAL

Temperature: 0 $^{\circ}$ C to +50 $^{\circ}$ C operating.

Humidity: 80% to 31 $^{\circ}$ C, decreasing linearly to 50% at 40 $^{\circ}$ C.

CONNECTORS

Sine: front panel BNC; Reference In: BNC on rear panel.

RS232 control: DE9F on rear panel. +5V DC Power: 2.5mm power receptacle, center positive.

CONFIGURATIONS

Model 426A Two Output Channels

Model 426A/01 One Output Channel

426A Serial Commands

Command	Function
FN xxx.xxxxxxxxxxxx	Sets Frequency of output "N" in MHz to nearest 10 μ MHz. N=0 or 1. Maximum setting is 403 MHz. Factory default is 10MHz.
PN xxxxx	Set phase of output N. N = 0 or 1. x must be an integer from 0 to 16383. Phase is set to $N*360/16384$ degrees ($N*\pi/8192$ radians). This command sets the relative phase of the output sine wave.
PS	Synchronizes the phase alignment of both channels
I x	Sets the command update mode. This is important when precise control of phase is desired. x = A sets the update to happen immediately after each command is executed. X = M sets updates to be deferred until an I P command is sent. X = P updates all channels with pending updates.
VN xxxx	Sets the amplitude of the frequency output channel N. N is 0 or 1. x is an integer from 0 to 1023. 1023 is full scale and is the factory default.
FR xx.xxx	Stores the Reference Frequency Input in MHz in 1kHz steps. Range: 1MHz to 25MHz. This value is used in a phase lock circuit to generate a 1GHZ clock for the internal synthesizer. Factory default is 10MHz.
FD xxx.xxx	Stores the Direct Frequency Input in MHz. Range is 250.0 to 1000.0. The 426A uses this value to automatically scale the frequency command. There will be no fractional frequency error if the ratio $FD/FN = 2^y$ where y is an integer.
C x	Sets clock source for internal synthesizer(s). x = E for 1GHz via phase lock to external reference. x = D for 1 GHz via phase lock to internal 40 MHz TCXO oscillator. X = P for using a 250MHz to 1000MHz external input directly as the clock for the synthesizer(s). Factory default is x = D.
E x	Serial Echo Control. X = D for Echo Disable, x = E for Echo Enable. Factory default is Enabled.
S	Saves settings to non-volatile memory.
R	This command resets the 426A. Non-volatile data is preserved and, if valid, it is used upon restart. This is the same as cycling power.
CLR	This command restores all factory default values and restarts the 426A.
Q	Returns a formatted text string with the status of all programmable settings. An example return from a Q command is as follows: "Q, F0 = 10.0000000000, P0 = 0.00, V0 = 1023, FR: 10.000, FD: 1000.000, Clock mode: D, Update mode: A, PLL: Locked, Firmware version: 0.2, OK" Where: Q is the echo of the command, F0 is the generated output frequency, P0 is the phase, V0 is the output amplitude, FR is the reference frequency input, FD is the Direct Frequency Input, Clock Mode is E, D or P. Update Mode is the state of the I x command. A response of locked means the 426A internal 1 GHz clock is either locked to the external reference or to the internal 40MHz TCXO clock. Factory Default is internal clock.