Technical Support
Knowledge Center Open

N8241A/N8242A Frequently Asked Questions

KEYSIGHT TECHNOLOGIES

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Notices

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Contents

1. Q. [Power On] If the N8241A/N8242A is powered on after the PC is already powered on, does the PC recognize the N8241A/N8242A.

A. Yes. The N8241A/N8242A must be powered on after the PC is powered on.

2. Q. [Reset] How do I reset the N8241A/N8242A?

A. When using the IVI-C command "agn6030a_init", pass a "1" to the "resetDevice" input.

3. Q. [Self-Test] How do I run a self-test on the N8241A/N8242A and How can I tell if the self-test command ("agn6030a_self_test") is actually running?

A. It can be done programmatically using IVI-C commands.

A self-test is required by the IVI standard and there is a command in the driver to run it, but there is no real self-test to be run; it is a stub-out.

The real self-test is to initialize the unit by starting the N824xA Control Utility. If it initializes without error, all the digital circuitry is verified. Stuck bits in the DACs and signal path fidelity through all possible paths following the DACs are not checked; neither are markers or triggers. These checks aren't possible anyway without fancy loopback circuitry, canned waveforms, and extra cables or internal switching.

4. Q. [Initialize Unit] Do I need to initialize the unit when programming using IVI-C commands?

A. Yes. When using the IVI-C command "agn6030a_init", pass a "1" to the "resetDevice" input.

Note: Starting the N824xA Control Utility automatically resets the device.

5. Q. [IO Libraries] What version of Keysight IO Libraries Suite should I use?

A. Make sure you use the appropriate version of IO Libraries Suite, based on the operating system you are using.

- IO Libraries Suite 14.0 should be used with Windows® 98 and Me.
- IO Libraries Suite 15.0 or above should be used with 32-bit versions Windows 2000, XP, and Vista.

For every individual Keysight instrument, Keysight IO card (GPIB card, converters) and development copy of Keysight T&M Toolkit or VEE Pro that you own, you are entitled to one non-exclusive license of this product at no charge. Please visit our web site for other information, including how to purchase additional copies, at https://www.keysight.com/find/iosuite.

If you need further assistance, please visit the web site to talk to an Keysight engineer. https://www.keysight.com/find/assist.

6. Q. [IVI Compliance] What version of the IVI Compliance package should I be using?

A. Version 3.2 or above of the IVI compliance package should be used with Keysight N824xA Control Utility and IVI-C Drivers 1.25.3. Before making any changes, installing, or updating the IVI compliance package, refer to the Keysight N824xA Control Utility and IVI-C Drivers Read Me file.

NI IVI Compliance Package can be downloaded from National Instruments at: https://www.ni.com/ivi/ivi_prod.htm.

Version 3.0 or above of the IVI compliance package should be used with Keysight N824xA Control Utility and IVI-C Drivers 1.23.1. Before making any changes, installing, or updating the IVI compliance package, refer to the Keysight N824xA Control Utility and IVI-C Drivers Read Me file.

7. Q. [Control Utility] Can the N8241A or N8242A use the N603xA Control Utility?

A. The N603xA Control Utility can not be used with the N8241A/N8242A and the N824xA Control Utility can not be used with the N603xA!

- If you installed the N603xA Control Utility on your PC, un-install it before installing the N8241A/N8242A Control Utility.
- If you installed the N8241A/N8242A on your PC, un-install it before installing the N603xA Control Utility.

Both the N603xA Control Utility and the N8241A/N8242A Control Utility can not be installed on the same PC because they share a common .dll name which has different content depending on model. The “Control Utility and IVI-C Driver” download can be found at the following:

- https://www.agilent.com/find/AWG

8. Q. [Control Utility] Can Version 1.25.3 replace Version 1.23.1 of the Keysight N824xA Control Utility and IVI-C Drivers

A. Before installing Version 1.25.3 of the Keysight N824xA Control Utility and IVI-C Drivers, check the IVI Compliance package version on your PC. IVI – Compliance Version 3.2 or higher is required. If your PC has an older version, first un-install the IVI Compliance package and install a newer version which is available at: https://www.ni.com/ivi/ivi_prod.htm.

In addition, Version 1.23.1 replaces Version 1.21.9 of the Keysight N824xA Control Utility and IVI-C Drivers

Before installing Version 1.23.1 of the Keysight N824xA Control Utility and IVI-C Drivers, check the IVI Compliance package version on your PC. IVI – Compliance Version 3.0 or higher is required. If your PC has an older version, first un-install the IVI Compliance package and install a newer version which is available at: https://www.ni.com/ivi/ivi_prod.htm.

9. Q. [LabView] How do I synchronize two N824xAs using LabView?

A. In Help, it says the sub vi "AGN6030A Configure Clock Sync" is not currently supported. Refer to the *Application Note on Synchonization of Multiple AWGs.*

10. Q. [LabView] Is there a function to turn off pre-distortion and how would it be possible to implement it using LabView?

A. In the IVI-C documentation, there is a function. Anything you can do with the IVI-C driver can be done with LabView. Our current LabView driver does not offer full access to all of the IVI-C functions, so many operations must be created as calls to the driver DLL file. There is a boolean attribute called PREDISTORTION_ENABLED which needs to be set to VI_FALSE. Refer to the *Application Note on Predistortion.*

11. Q. [LabView] Using the LabView driver function "AGN6030A Create Waveform with Markers.vi", How should this string look when using two markers?

A. Marker data is passed to the driver as bytes – which can also look like a string (which is confusing). The two most-significant-bits in the byte are used to hold 2 marker bits – one marker byte for every 8 waveform samples. If the byte is “unsigned“, the two marker values are 64 (marker bit 1) and 128 (marker bit 2) and a value of 192 would represent both bits turned on. It is easier to specify the data this way (numerically) instead of trying to enter the data as corresponding ASCII characters.

12. Q. [Correction File] Is there an N8241A/N8242A Correction file?

A. If you would like to insert correction coefficients into the N8241A/N8242A, as is done with spectrum analyzers or signal generators where the user can go to "amplitude corrections" and enter a list of coefficients, you can't because the N8241A/N8242A doesn't have any internal memory for corrections. There is no way to insert correction coefficients using the N824xAControl Utility. (Refer to the next FAQ for information about using Matlab and a Correction File.)

13. Q. [Matlab / Correction File] Can I add an N8241A/N8242A Correction file using Matlab when the N8241A/N8242A is connected to an Keysight IQ synthesizer which is connected to an Keysight spectrum analyzer.

The AWG can be tested at different frequencies to find the correction for Amplitude and Phase at each frequency that gives the best SFDR.

How do I add this correction to my Matlab unknown wave if the user is creating a wave and I want to add the correction to the wave?

A. Perform an FFT on the wave, add the correction, and then perform an inverse FFT.

- One way to apply correction data: Use an FFT on the waveform, add the correction values, and perform an inverse FFT to apply the correction, but there may be unintended problems and so it is not a safe way to add corrections.
- Another way to apply correction data in Matlab is by creating a FIR filter and applying it to the unknown waveform before downloading to the N8241A/N8242A.

If the correction data was measured with pre-distortion on, pre-distortion will need to be on with the FIR filter.

Perform the following steps with Matlab open:
Click on “Start” in the lower left corner.

- “Toolboxes”
- “Signal Processing”
- “Filter Design & Analysis Tool”

In the “Filter Design & Analysis Tool” window:

- Response Type – select “Arbitrary Magnitude”
- FIR – select “Least-squares”

Then add in the Frequency and Magnitude Specifications.

14. Q. [Matlab] How fast can the N8241A/N8242A switch between two sequences programmed with Matlab?

A. This is a way to achieve frequency hopping if you know the order of the desired frequencies. If you use an external method of determining the order, Dynamic Sequencing (Option 300) may be a better way to frequency hop. Using either method, the change in frequency is <10 ns.

This number can be less depending on how it is measured. It depends on how many zero crossings are counted and if there is an amplitude change. A sequence must contain at least two waveforms. The total number of samples in a waveform must be greater than or equal to 128. The total number of samples in a waveform must be a multiple of 8. The fall time is less than 1 ns.

15. Q. [Markers] How do I set Markers using LabView?

A. Perhaps the front panel marker port has not been configured. In addition to creating a waveform with markers, you must assign one of the waveform marker bits to one of the four front panel marker ports. Let me know if you're not sure how to do this.

Assuming that LabView is your preferred programming environment, the AWG can also be programmed in "C" or "C++" and Matlab. Programming examples are available for C/C++ and Matlab.

Using LabView, there are two IVI-C attributes which must be altered. Although marker functions are missing from our LabView driver, you can still use the "Call Library Function" VI to accomplish the task. The AGN6030A.dll library is what you will need to call. The necessary files are found in the IVI installation directory -- usually either Program Files\IVI or sometimes located at the root level of the installation disk drive. The DLL is in the Bin subdirectory. The other file you will find useful is AGN6030A.h, which is in the Include sub-directory. This has defined constants required to call some of the functions in the library. This file also references two other files, ivifgen.h and ivi.h, which can be found in the IVI installation directory.
The two functions that need to be called (with arguments) are:

- AGN6030A_SetAttributeViString(handle,0,1150017,"1"); where 1150017 is the value for the ACTIVE_MARKER attribute.

- AGN6030A_SetAttributeViInt32(handle,0,1150013,2); where 1150013 is the value for the MARKER_SOURCE attribute and 2 is the value for marker bit 1 of the channel 1 waveform. Values of 3,4,5 will select the other three possible bits.

16. Q. [Markers] Can the N8241A/N8242A markers be programmed on a sample by sample basis?

For example, could I use a marker as a 1 bit arb running at the same clock rate as the ADCs?

If the markers are not arbitrarily programmable, what is the fastest (highest repetition rate) 50% duty cycle signal that can be programmed (assuming the use of the internal 625 MHz clock and a 5 ms duration waveform)?

A. No, the N8241A/N8242A.markers cannot be programmed on a sample by sample basis.

- The markers are generated in the FPGA which runs at fs/8 (which for an N8241A/N8242A.is {1250 MSa/s}/8 or {625 MSa/s}/8).
- The low voltage TTL chip that distributes the marker signal is not a high speed chip.

17. Q. [Security] Does the N8241A/N8242A have a cleaning procedure for DOD security?

A. The N8241A/N8242A does not have any non-volatile RAM or media that stores waveform information or settings. The security procedure is to turn off the power to the N8241A/N8242A and turn it back on. The FPGA code gets reloaded and the SRAM is reset with zeros loaded into the SRAM when the N824xA Control Utility is started.

18. Q. [Synchronization] How do I synchronize two N8241A/N8242A?

A. Using the recommended Keysight cables and power dividers, use the internal 1.25 GS/s clock and play a 500 MHz tone. The outputs of ARB 1 and ARB 2 should be within 30 picoseconds of each other. Use a DSO81304A oscilloscope (or equivalent to verify) with equal length cables from the ARB outputs to the oscilloscope. (Refer to Orderable Kit N6030AK-510 and N6030-90007.)

19. Q. [Sequencing] What is the difference between Advanced Sequencing and Dynamic Sequencing?

A. Dynamic Sequencing is Option 300. Its only contribution is to allow the scenario addresses and triggers defined by Advanced Sequencing to be directed through the AUX connector on the front panel. This provides a low-latency address strobe in addition to the hardware trigger which allows near-real-time selection of pre-defined scenarios and triggers.

20. Q. [Sequencing] What is the shortest waveform that can be defined in a memory segment?

A. The shortest waveform that can be defined in a memory segment is 102.4 ns long. This is 128 samples of 800 ps duration each. If waveforms shorter than 102.4 ns are required, they must be concatenated together to reach the 128 sample minimum and then stored in memory. There are no exceptions to this rule. The number of sequences available is 32767 (32 k); the number of scenarios available is 16383 (16 k).

To get start and stop trigger modes to support the customer use model, advanced sequencing must be used. This is included in every instrument. We may be able to discover a way to fit the pre-defined sequences into the allowed space with some creativity, in other words, there may not be more than 16 k unique scenarios required, just lots of combinations that are reused. Remember, scenarios are made up of sequences, which are made up of memory segments (32 k x 16 k is a big number).

The AWG clock must be stable. Any attempt to apply/unapply, move around, or interrupt the AWG clock will result in excessive irregularities.

So, the first thing to do is determine if combinations of 10 ns segments that will satisfy the 128 sample rule can be defined. Once we can determine this, we can move onto determining if the number of unique sequences and scenarios to be addressed exceed the limits.

21. Q. [Triggering] The N824xA trigger in specifies a maximum input voltage of 4.5 V. When I measure the trigger out of the N824xA into a 4.7 k ohm load it's 5 V. Does this mean the trigger out of one N824xA can possibly exceed the safe trigger in level of another N824xA ? Is the device incompatible with its own trig in/ trig out?

A. There's really no problem here. Marker outputs are generated by logic circuits supplied from ground and +5 V. There are 30 ohm series resistors on the outputs and the "internal" end of the resistor is diode-clamped to the supply voltages (in case someone was to attempt driving the marker output connector with a source). Trigger inputs have a 10 ohm series resistor with the "internal" end of the resistor clamped between -5 V and +5 V. Damage will not occur until you pass enough current through the 10 ohm resistor to pop one of the clamp diodes. The main point is that it is perfectly safe to connect our markers directly to trigger inputs -- we intended it to work this way. The 4.5 V number is the limit of adjustment for trigger levels (plus and minus). In most cases, it is acceptable to run markers un-terminated to trigger inputs (they have a 2 k ohm input impedance). There will be reflections on the cable, but this is usually not important for triggering to function correctly. If this becomes a problem, the marker output should be treated as a 50 ohm source, split if necessary. and 50 ohm terminations should be provided with tee connectors as close as possible to trigger inputs. Trigger levels should be lowered accordingly. This is often not necessary, but it is something to investigate if triggering problems arise.

22. Q. [Software/Hardware] What software/hardware ships with the N824xA?

A. Software (Control Utility, IVI-C drivers, LabView driver, and Demo Waveforms) can be downloaded from the following:

1. Go to: https://www.agilent.com/find/AWG
2. Select from models: N8241A, N8242A, N6030A, N6031A, N6032A, N6033A
3. Select the Technical Support/Drivers & Software tab
4. Download and install the newest version of the Control Utility and IVI-C driver before using your AWG

No cables or adapters are shipped with the N824xA.

Here are some Keysight cables that are available:

- 8120-5613 SMB (right angle) female to BNC male - 5" long (125 mm)
- 8120-5048 SMB (right angle) female to BNC male - 48" long
- 8120-6269 SMB (right angle) female to BNC male - 23.5" long
- 84000-60451 SMB (straight) female to BNC male - 87.5" long

23. Q. [Power-Line Sensitivity] How sensitive is the N8241A/N8242A to power main glitches?

A. The N8241A/N8242A was validated by varying the input AC voltage while playing a sine wave. The sine wave was monitored using a spectrum analyzer and did not drop out during the tests.

- For countries with 100 to 127V AC input, the N8241A/N8242A was tested from 88 to 142V AC.
- For countries with 200 to 240V AC input, the N8241A/N8242A was tested from 176 to 269V AC.
- Units were also tested with a 3 kV 100 kHz pulse (+ and -) on the AC input.

This test passes if there is a temporary loss of function that requires operator intervention (reload and play waveform for example). Failure would be damage to the hardware. The N8241A/N8242A passed all of these tests.

24. Q. [Option 300] Does Keysight provide a cable as part of Option 300 for plugging into the AUX Port?

Option 300 uses a 3M Mini-D connector.

A. No, Keysight does not provide a cable that plugs into the AUX Port.

25. Q. [Rack Mounting] How do I rack mount my synthetic instruments?

A. Refer to the Keysight N8200A Series Synthetic Instrument Modules, Rack Configuration Guide (N8200-90003).

For additional solutions and rack mounting information that is not included in this rack configuration guide, which include the integration of third party instruments, contact your system integrator or refer to the Keysight Technologies Enclosures Solutions Product Catalog. https://cp.literature.keysight.com/litweb/pdf/5980-0450E.pdf

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