

Procedure

Using Signal Studio Waveform Licenses

This Document

This document describes how to:

- Use the Signal Studio software to configure, generate, and download waveform files to your instrument
- Play back waveforms for evaluation and permanently license the ones you want to keep

Before using this document, you must install a Keysight 5- or 50-pack waveform license in your instrument. For license installation instructions, go to <http://rfmw.em.keysight.com/helpfiles/license>.

The following instruments support waveform licensing:

- N5172B EXG X-Series RF vector signal generator
- N5182B MXG X-Series RF vector signal generator
- N5182A MXG vector signal generator
- E4438C ESG vector signal generator
- E6607 EXT wireless communications test set
- M9381A PXIe vector signal generator (not described here—refer to the M9381A documentation)
- M9420A VXT PXIe vector transceiver (not described here—refer to the M9420A documentation)
- E6630A wireless connectivity test set (not described here—refer to the E6630A documentation)
- E6640A EXM wireless test set (not described here—refer to the E6640A documentation)
- E6650A EXF wireless test set for femtocel (not described here—refer to the E6650A documentation)

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Evaluating and Locking Waveforms to License Slots

On the EXG/MXG

On the ESG

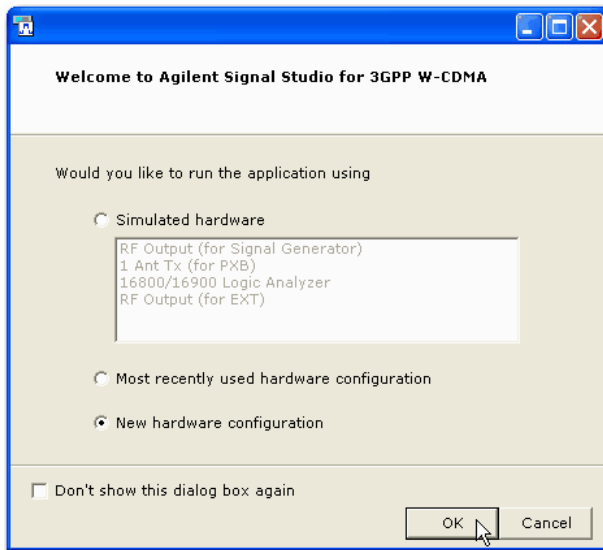
On the EXT

Using Signal Studio to Create and Download a Waveform

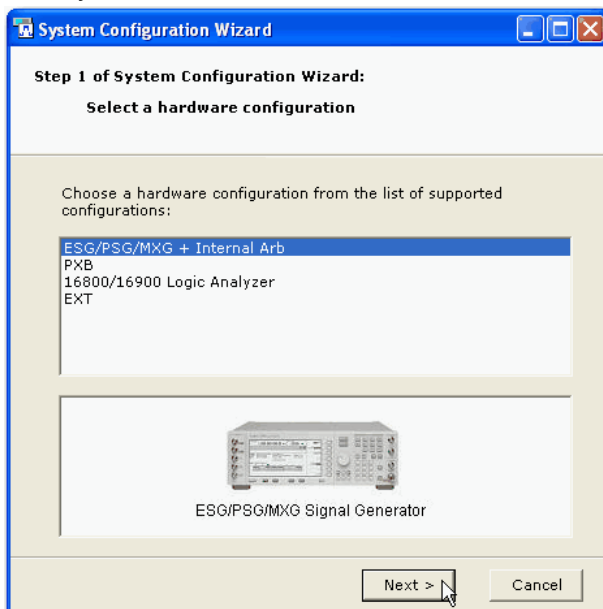
Method 1: live connection via LAN (EXG, MXG, ESG, EXT)

Note: Some Signal Studio products do not support a live connection to the EXT. In these cases, use [Method 2](#).

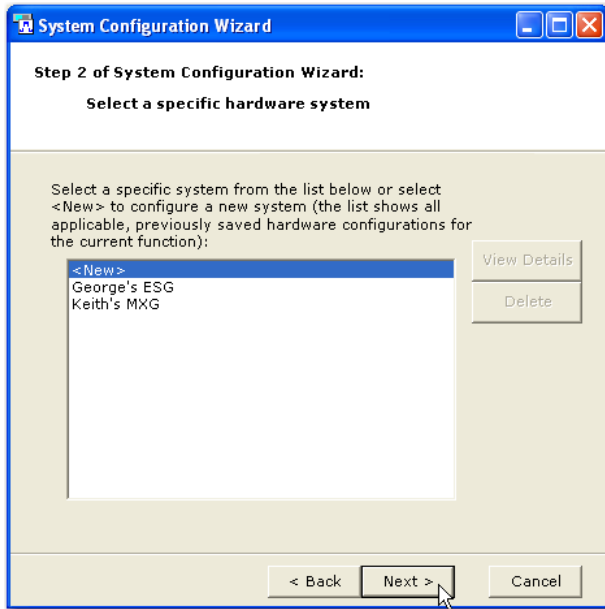
1. From the Keysight website, www.keysight.com/find/signalstudio, download and install the N76xxB Signal Studio software of your choice.
2. Open the software. The system configuration wizard appears.
3. Select **New hardware configuration** and click **OK**. If your software was previously connected to the instrument, choose **Most recently used hardware configuration**.



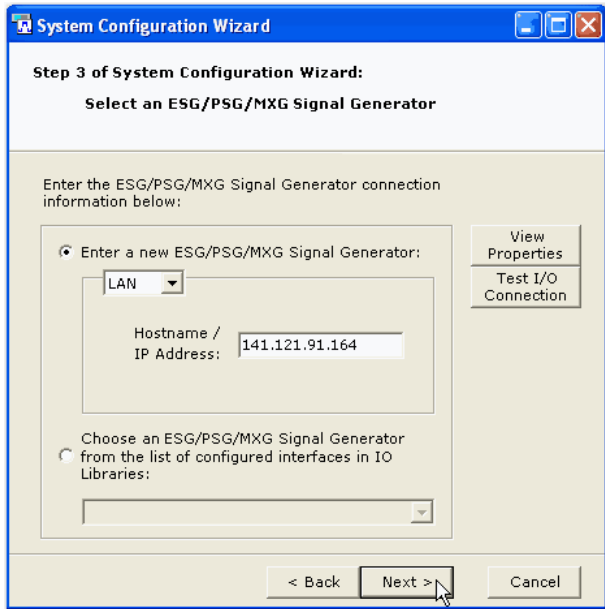
4. Select your instrument and click **Next**



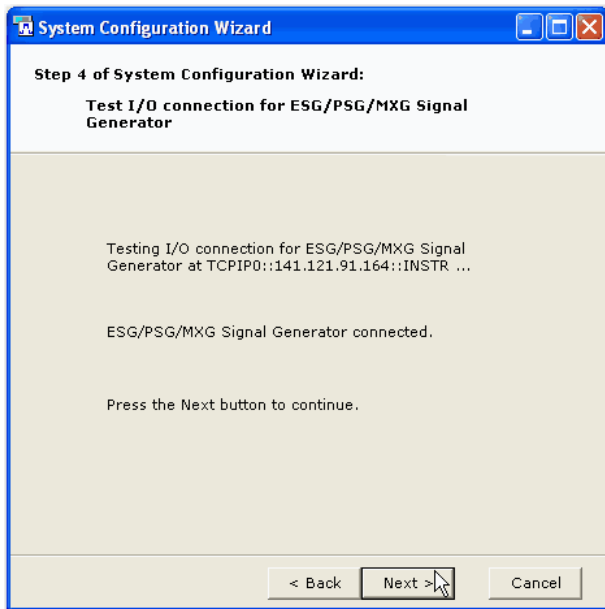
5. Click **Next**.



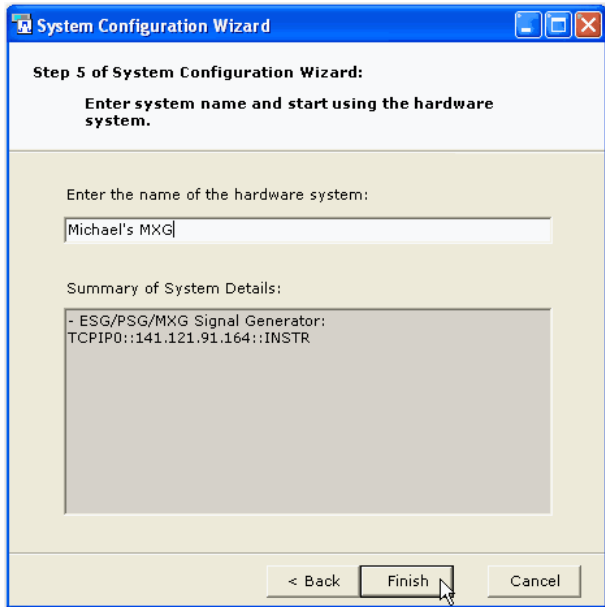
6. Enter your instrument's IP address and click **Next**.



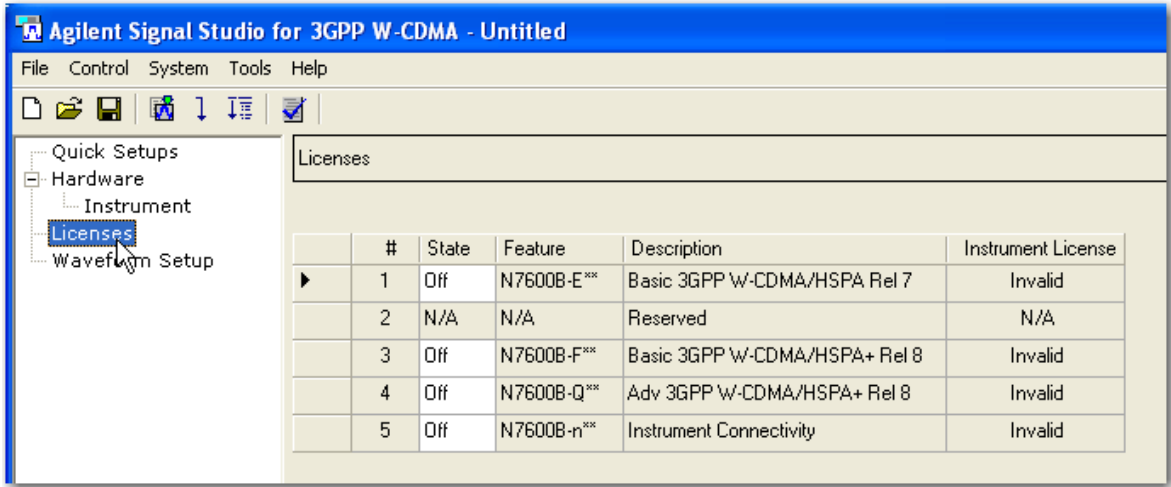
7. Click **Next**.



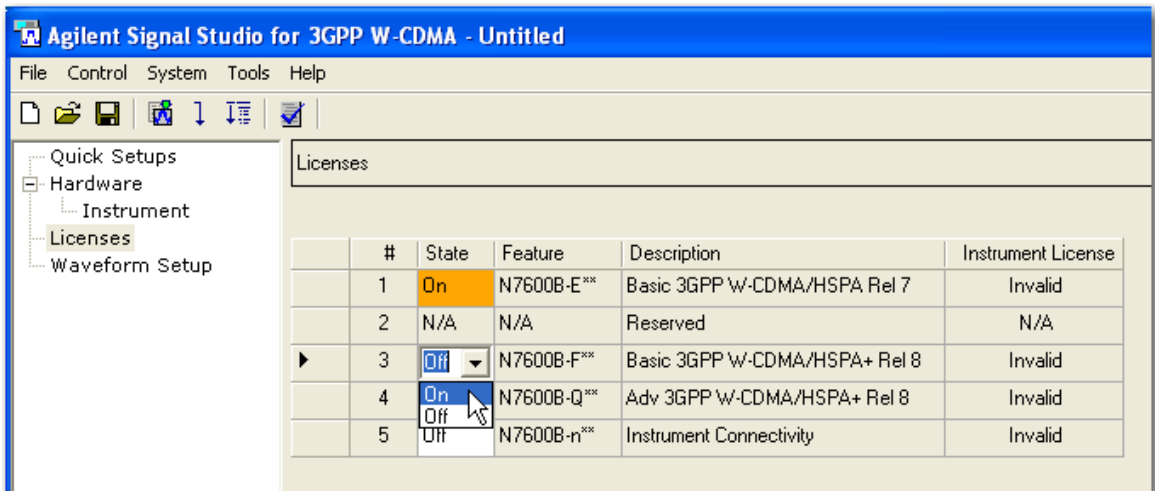
8. Enter a name for your instrument and click **Finish**.



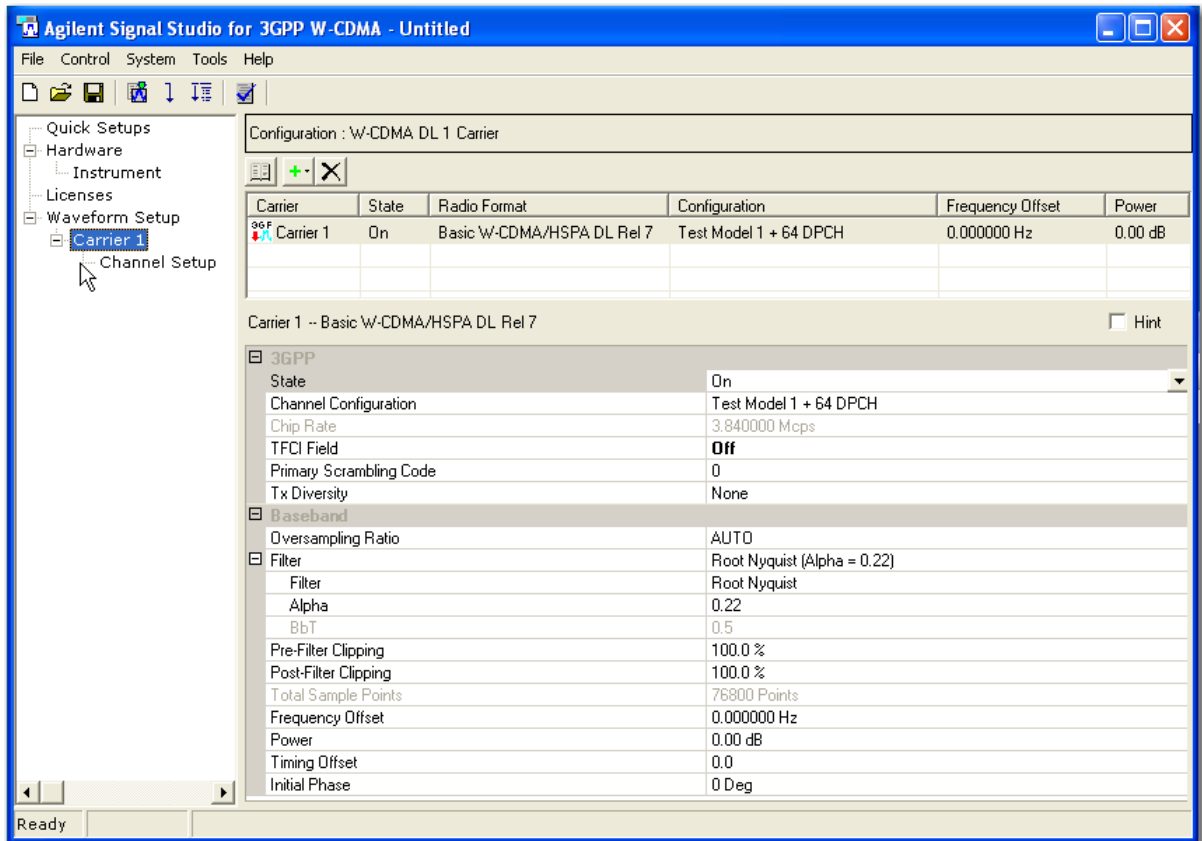
- From the software's tree view, select **Licenses**. Notice that the state of each license is set to **Off** and displays **Invalid**. If you are using the software's 14-day free trial or have previously purchased a basic capability option, those licenses will be valid and already set to **On**.



- Click the **State** field for each **Off** license and set to **On**. These licenses will continue to display **Invalid**.

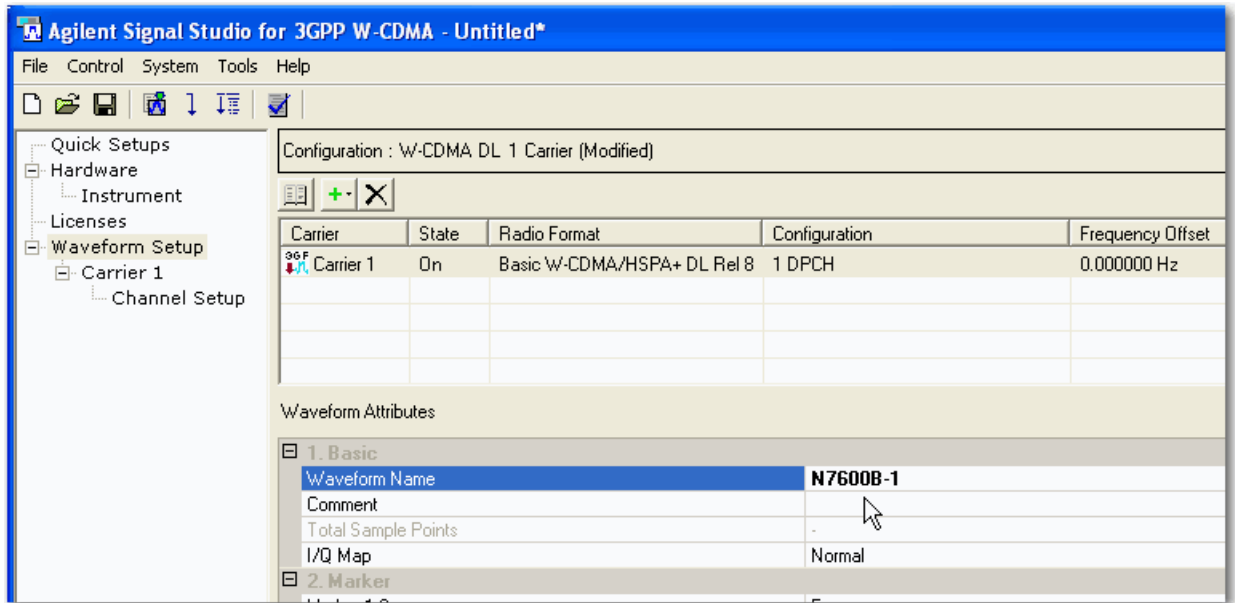


- Configure the Signal Studio waveform using the various parameter selections and settings available under the **Waveform Setup** node in the tree view. This example shows the carrier settings for the N7600B Signal Studio software. Waveform parameters vary among Signal Studio products, so refer to your software's help system for more information.

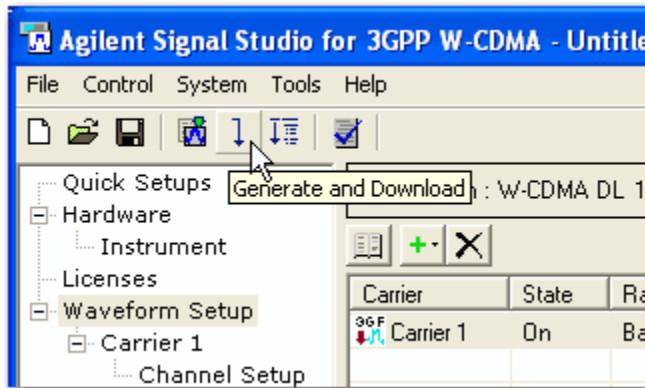


- From the tree view, select **Waveform Setup** and enter a **Waveform Name**.

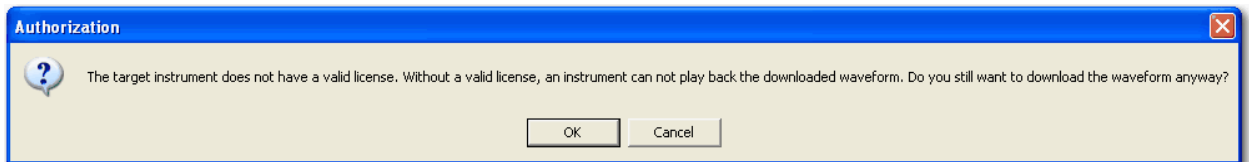
NOTE: Some Signal Studio applications do not allow waveform file names greater than eight characters.



- Click the **Generate and Download** button.



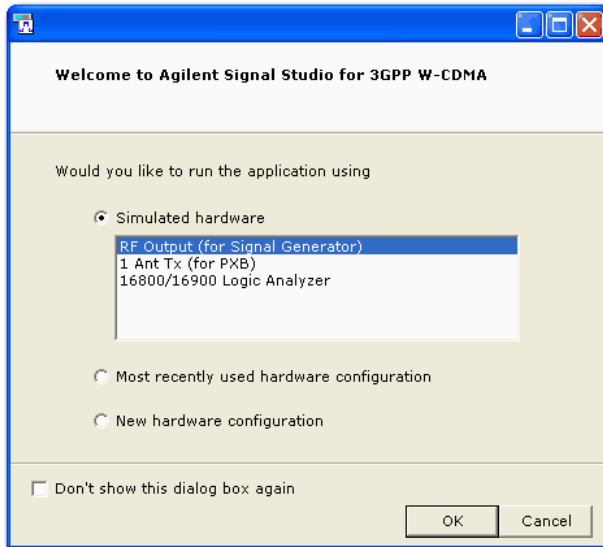
- The following message appears. Click **OK**.



The waveform file now resides in the volatile memory of your instrument.

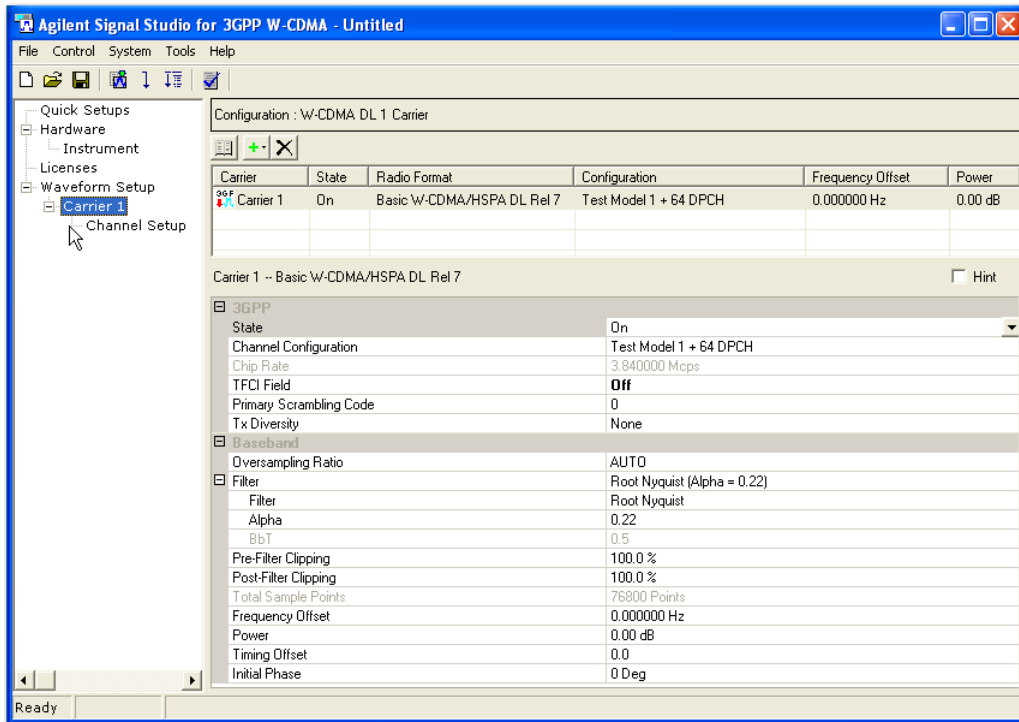
Method 2: export waveform files to a USB storage device (EXG, MXG, EXT)

1. From the Keysight website, www.keysight.com/find/signalstudio, download and install the N76xxB Signal Studio software of your choice.
2. Open the software. The system configuration wizard appears.
3. Select **Simulated hardware** and make sure RF Output (for Signal Generator) is highlighted. Click **OK**.

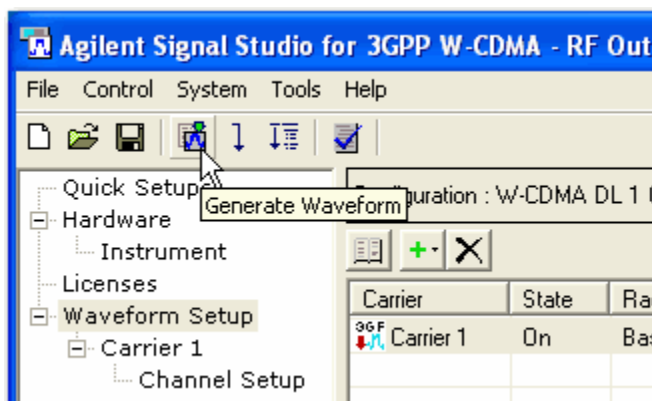


Using Signal Studio Waveform Licenses

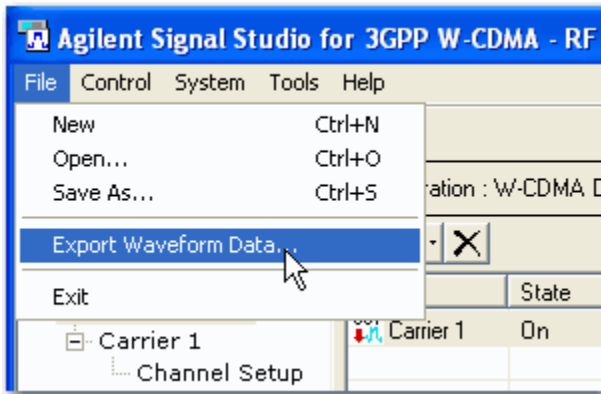
- Configure the Signal Studio waveform using the various parameter selections and settings available under the **Waveform Setup** node in the tree view. This example shows the carrier settings for the N7600B Signal Studio software. Waveform parameters vary among Signal Studio products, so refer to your software's help system for more information.



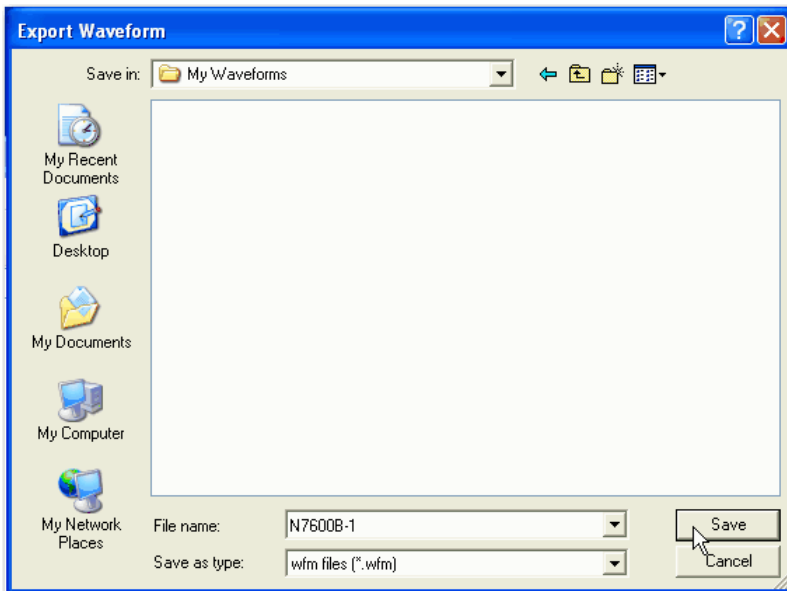
- Click the **Generate Waveform** button.



6. Under the File menu, select **Export Waveform Data**.



7. Name the waveform file and save it to your PC.



8. Copy the waveform file to a portable USB storage device.
9. Insert the USB storage device into the instrument's front panel USB port. Proceed to the appropriate step for your instrument model.

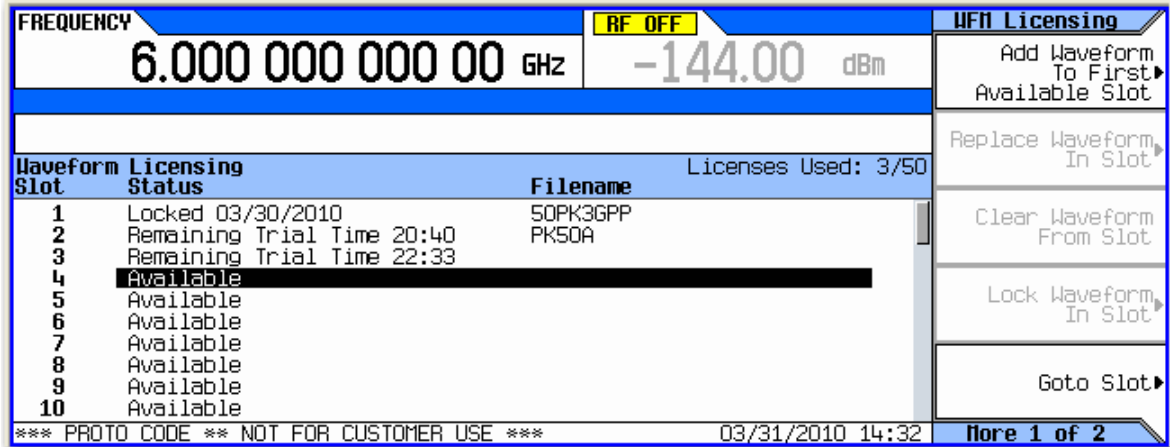
10. **For the EXT.** Make sure the EXT user interface is the active window and press **File > File Explorer**. Then locate the USB storage device and copy your waveform file to D:\NVARB. You can navigate to this folder by selecting **My Computer > User Data > NVARB**.
11. **For the EXG/MXG.** The USB file directory appears. Use the front panel knob to highlight your waveform file. Press **Copy File to Instrument > Waveform > BBG Memory** (volatile memory).

FREQUENCY		AMPLITUDE		USB Media	
900.000 000 00 MHz		-10.00 dBm		Use as ▶	
		I/Q AUGH			
USB Directory: / (This path is the default path)				3.73GB Free	
File Name	Type	Size	Modified		
Documents/	<DIR>		11/30/08 10:09		
System/	<DIR>		11/30/08 10:09		
LaunchU3.exe		1.27MB	10/23/07 09:45	Up Directory	
N7600B-1.WFM		375kB	05/21/10 14:22	Delete File or Directory ▶	
RestoreU3.exe		1.62MB	11/01/07 16:34	Create Directory	
*** PROTO CODE ** NOT FOR CUSTOMER USE ***			05/27/2010 16:01	Page 1 of 2	

Evaluating and Locking Waveforms to License Slots

On the EXG/MXG

1. Press **Local** (same key as **Cancel/(ESC)**) to unlock the instrument from remote operation.
2. Press **Mode > Dual ARB > More > Waveform Licensing**. The following screen appears, showing occupied and available waveform slots for your instrument's 5- or 50-pack license.

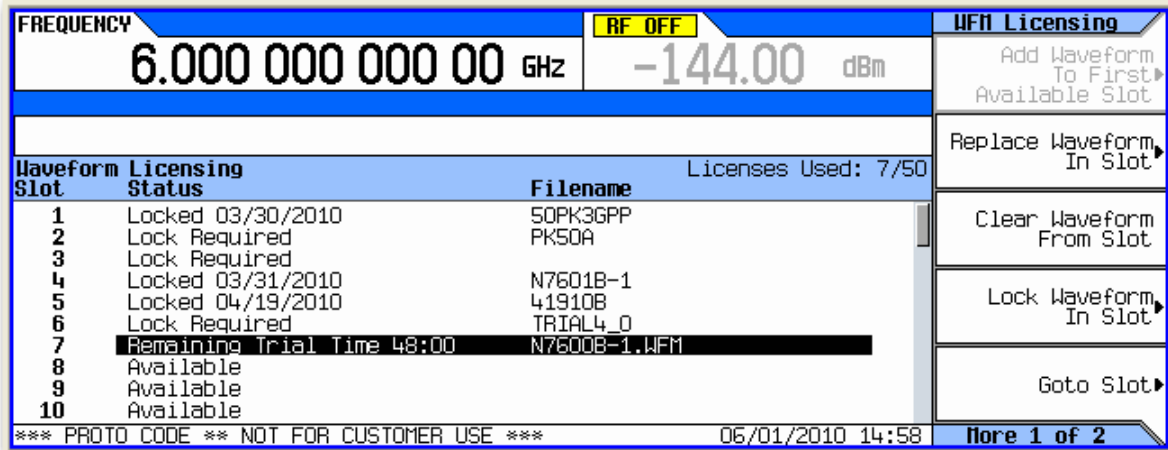


3. Press **Add Waveform To First Available Slot**. You can also use the arrow keys or front panel knob to select an occupied waveform slot and then press **Replace Waveform In Slot**. This allows you to use the remaining trial time for that slot on your waveform.

In either case, a screen appears, showing the available files stored in volatile BBG memory. The waveform file you created and downloaded with the Signal Studio software should now reside here.

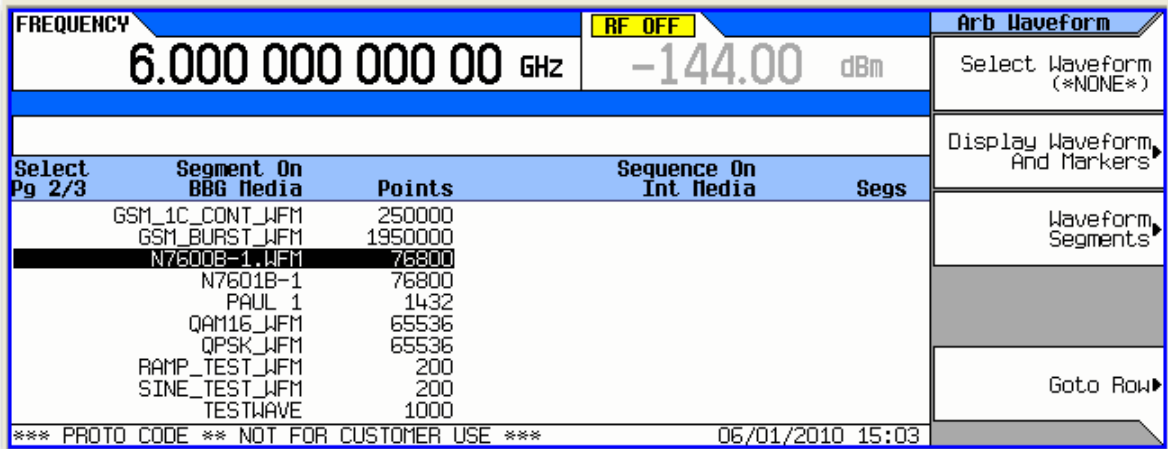


- Use the arrow keys or front panel knob to find your waveform file and press **Add Waveform**. Notice that you have 48 hours remaining to fully evaluate the waveform. The trial time applies to individual slots. Once a waveform is added to a slot, the trial time for that slot begins counting down and cannot be reset. During the trial time, you can replace and evaluate waveforms in a slot as many times as you like. At the end of the trial time, however, you can no longer play the waveform in that slot unless you license (lock) it to that slot. You can, however, still replace files in an expired, unlocked slot.



- To playback the waveform for evaluation, press **Mode > Dual ARB > Select Waveform** and use the arrow keys or front panel knob to find your waveform.

NOTE: The instrument's user interface uses the term *segment* to refer to a waveform file.



- Press **Select Waveform > ARB Off On to On**. Set your frequency and amplitude for the carrier as you like and then press **RF On/Off to On**. You can now evaluate the waveform in your specific test scenario.

- Prior to licensing (locking) your waveform file, you must save it to the instrument's non-volatile internal storage. Press **Mode** > **Dual ARB** > **Select Waveform** > **Waveform Segments** > **Load Store to Store** and use the arrow keys or front panel knob to select your waveform. Then press **Store Segment to Int Media**. If you do not save your waveform file to internal storage, you will be prompted to do so when you attempt to license the waveform file.

FREQUENCY		AMPLITUDE		Arb Segments	
2.000 000 000 00 GHz		-10.00 dBm		Load Store	
I/Q ARB					
BBG Memory Pg 2/3		~57.1MSa free Points	Int Storage Pg 1/3	~89.9MSa free Points	Store Segment To Int Media
	Segment		Segment		Store All To Int Media
	GSM_1C_CONT_WFM	250000	12TONE_WFM	2112	Delete Segment▶
	GSM_BURST_WFM	1950000	2TONE_WFM	80	
	N7600B-1.WFM	76800	41910B	76800	Delete All Segments On▶ BBG Memory
	N7601B-1	76800	50PK3GPP	131072	
	PAUL_1	1432	CDMA2K_9CHAN_WFM	262144	More 1 of 2
	QAM16_WFM	65536	CDMA2K_PILOT_WFM	131072	
	QPSK_WFM	65536	EDGE_1C_BURST_WFM	250000	
	RAMP_TEST_WFM	200	EDGE_1C_CONT_WFM	250000	
	SINE_TEST_WFM	200	EDGE_BURST_WFM	1950000	
	TESTWAVE	1000	GSM_1C_BURST_WFM	250000	
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- To license the waveform into a 5- or 50-pack slot, press **Mode** > **Dual ARB** > **More** > **Waveform Licensing** and use the arrow keys or front panel knob to select your waveform file's slot.

FREQUENCY		AMPLITUDE		WFM Licensing	
2.000 000 000 00 GHz		-10.00 dBm		Add Waveform To First▶ Available Slot	
I/Q ARB					
Waveform Slot		Licensing Status	Filename	Licenses Used: 7/50	
1	Locked	03/30/2010	50PK3GPP	Replace Waveform▶ In Slot	
2	Lock Required		PK50A	Clear Waveform From Slot	
3	Lock Required			Lock Waveform▶ In Slot	
4	Locked	03/31/2010	N7601B-1	Goto Slot▶	
5	Locked	04/19/2010	41910B		
6	Lock Required		TRIAL4_0		
7	Remaining Trial Time 47:37		N7600B-1.WFM		
8	Available				
9	Available				
10	Available				
*** PROTO CODE ** NOT FOR CUSTOMER USE ***				06/01/2010 15:20	

- Press **Lock Waveform In Slot**. A warning message appears. Press **Confirm Locking Waveform**.

NOTE: Be sure to keep a backup copy of the waveform.

FREQUENCY 2.000 000 000 00 GHz **AMPLITUDE** -10.00 dBm

I/Q ARB

Lock In Slot

Confirm Locking Waveform

***** Waveform Lock Warning!!! *****

Once a waveform is locked it will use up an available license slot and it can not be un-locked. Be sure that you want to lock this waveform.

Important! Keep a backup copy of the waveform elsewhere in case you delete all files in Int Storage.

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- Your waveform file is now locked to a 5- or 50-pack slot and permanently licensed to your instrument.

FREQUENCY 2.000 000 000 00 GHz **AMPLITUDE** -10.00 dBm

L I/Q ARB

WFN Licensing

Add Waveform To First Available Slot

Replace Waveform In Slot

Clear Waveform From Slot

Lock Waveform In Slot

Goto Slot

Waveform Slot	Licensing Status	Filename
1	Locked 03/30/2010	50PK3GPP
2	Lock Required	PK50A
3	Lock Required	
4	Locked 03/31/2010	N7601B-1
5	Locked 04/19/2010	41910B
6	Lock Required	TRIAL4_0
7	Locked 06/01/2010	N7600B-1.WFM
8	Available	
9	Available	
10	Available	

Licenses Used: 7/50

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On the ESG

1. Press **Local** to unlock the instrument from remote operation.
2. Press **Mode > Dual ARB > Waveform Licensing**. The following screen appears, showing occupied and available waveform slots for your instrument's 5- or 50-pack license.

FREQUENCY: 4.000 000 000 00 GHz AMPLITUDE: -136.00 dBm

RF OFF MOD ON

Waveform Licensing Licenses Used: 1/5

Slot	Status	Filename
1	Lock Required	
2	Available	
3	Available	
4	Available	
5	Available	

04/02/2010 14:42

3. Use the arrow keys or front panel knob to highlight the first available slot. and press **Add Waveform To First Available Slot**. You can also select an occupied waveform slot and then press **Replace Waveform In Slot**. This allows you to use the remaining trial time for that slot on your waveform.

In either case, a screen appears, showing the available files stored in volatile waveform memory (WFM1). The waveform file you created and downloaded with the Signal Studio software should now reside here.

FREQUENCY: 4.000 000 000 00 GHz AMPLITUDE: -136.00 dBm

ALC OFF RF OFF MOD ON

Catalog of WFM1 Files Licenses Used: 1/5

Waveform	Status
AGT.WAVEFORM	Waveform License Not Required
ARBIJITTER	Waveform License Not Required
CDMA2K_PILOT_WFM	Waveform License Not Required
GSM_1C_BURST_WFM	Waveform License Not Required
JITTER	Waveform License Not Required
JITTER_2	Waveform License Not Required
N7500B-1	Waveform License Not Required
RAMP_TEST_WFM	Waveform License Not Required
REALSECURE	Waveform License Not Required
SECURETEST	Waveform License Not Required

04/02/2010 15:32

- Use the arrow keys or front panel knob to find your waveform file and press **Add Waveform**. Notice that you have 48 hours remaining to fully evaluate the waveform. The trial time applies to individual slots. Once a waveform is added to a slot, the trial time for that slot begins counting down and cannot be reset. During the trial time, you can replace and evaluate waveforms in a slot as many times as you like. At the end of the trial time, however, you can no longer play the waveform in that slot unless you license (lock) it to that slot. You can, however, still replace files in an expired, unlocked slot.

Slot	Status	Filename
1	Lock Required	
2	Remaining Trial Time 48:00	N7600B-1
3	Available	
4	Available	
5	Available	

- To playback the waveform for evaluation, press **Mode > Dual ARB > Select Waveform** and use the arrow keys or front panel knob to find your waveform file.

NOTE: The instrument's user interface uses the term *segment* to refer to a waveform file.

(1/5)	Segment	Points	Sequence	Segs
	AGT.WAVEFORM	224000	256_SEQ_TEST	256
	ARBIJITTER	50000	BAD_SEQ2	1
	CDMA2K_PILOT_WFM	131072	BIG_SEQ_TEST	1
	GSM_1C_BURST_WFM	312564	GSM EDGE BASIC	1
	JITTER	50000	LONG_SEQ	31744
	JITTER_2	50000	NEW PATTERN 1	2
	N7600B-1	153600	NEW PATTERN 2	4
	RAMP_TEST_WFM	200	RECURSE_TEST	1
	REALSECURE	200	RECURSE_TEST1	1
	SECURETEST	200	RECURSE_TEST10	1

- Press **Select Waveform > ARB Off On to On**. Set your frequency and amplitude for the carrier as you like and then press **RF On/Off to On**. You can now evaluate the waveform in your specific test scenario.

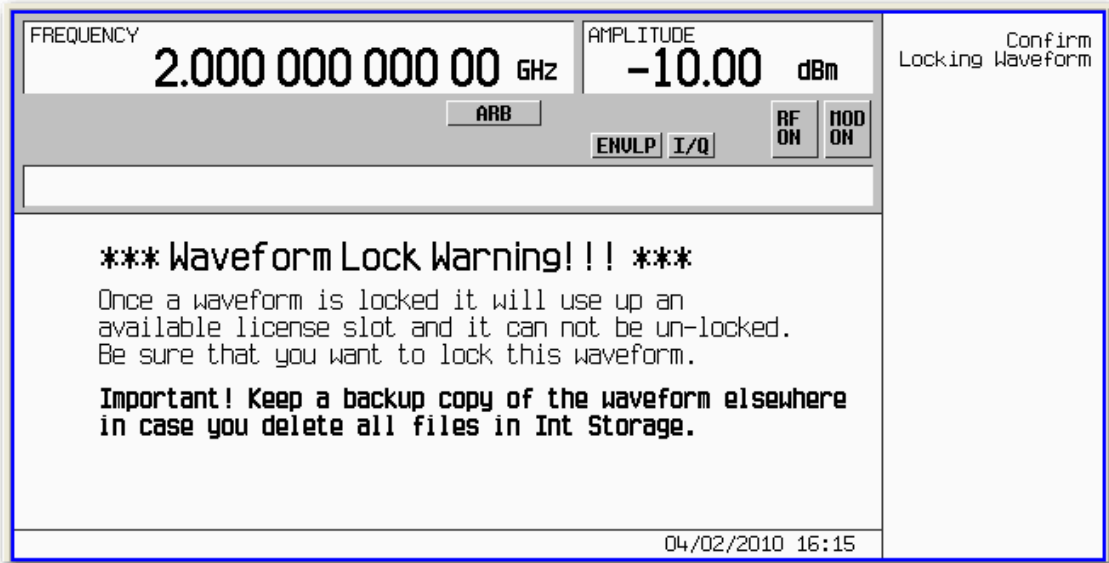
- Prior to licensing (locking) your waveform file, you must save it to the instrument's non-volatile waveform memory (NVWFM). Press **Mode** > **Dual ARB** > **Select Waveform** > **Waveform Segments** > **Load Store** to **Store** and use the arrow keys or front panel knob to select your waveform. Then press **Store Segment to NVWFM**. If you do not save your waveform file to internal storage, you will be prompted to do so when you attempt to license the waveform file.

WFM1 (1/2)	Segment	Points	NWFM (1/2)	Segment	Points
	AGT.WAVEFORM	224000		AGT.WAVEFORM	224000
	ARBIJITTER	50000		ARBIJITTER	50000
	CDMA2K_PILOT_WFM	131072		CDMA2K_PILOT_WFM	131072
	GSM_1C_BURST_WFM	312564		GSM_1C_BURST_WFM	312564
	JITTER	50000		JITTER	50000
	JITTER_2	50000		JITTER_2	50000
	N7600B-1	153600		N7600B-1	153600
	RAMP_TEST_WFM	200		REALSECURE	200
	REALSECURE	200		SECURETEST	200
	SECURETEST	200		WCDMA3GPP_WAVEFORM	268800

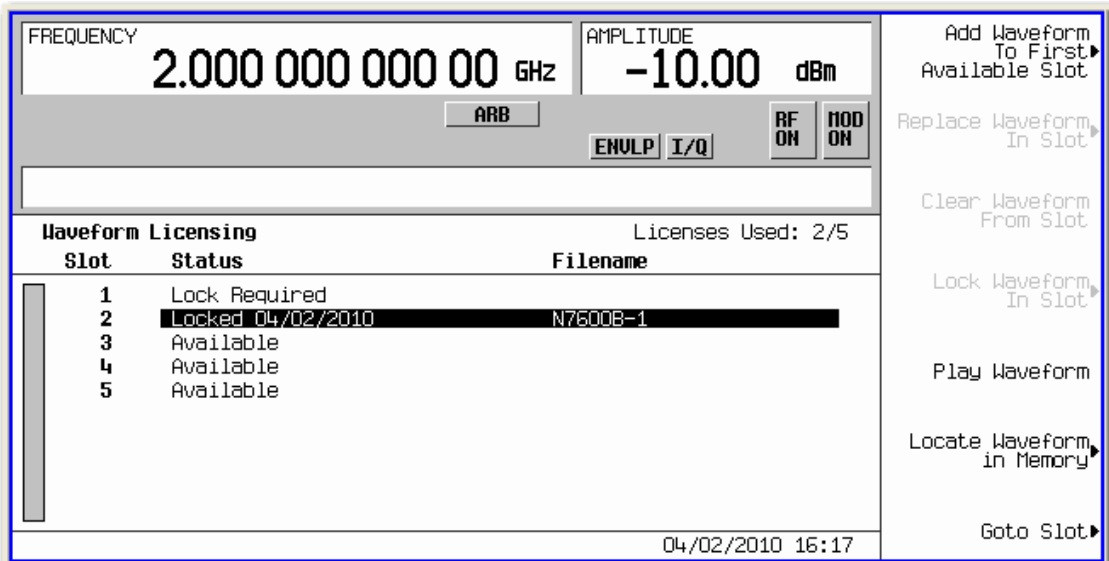
- To license the waveform into a 5- or 50-pack slot, press **Mode** > **Dual ARB** > **Waveform Licensing** and use the arrow keys or front panel knob to select your waveform file's slot.

Slot	Status	Filename
1	Lock Required	
2	Remaining Trial Time 47:24	N7600B-1
3	Available	
4	Available	
5	Available	

- Press **Lock Waveform In Slot**. A warning message appears. Press **Confirm Locking Waveform**.
NOTE: Be sure to keep a backup copy of the waveform.



- Your waveform file is now locked to a 5- or 50-pack slot and permanently licensed to your instrument.



On the EXT

1. Press **Local** (same key as **Cancel/(ESC)**) to unlock the instrument from remote operation.
2. Press **Source** > **More 1 of 2** > **Modulation Setup** > **ARB** > **More 1 of 2** > **Waveform Utilities** > **Multi-Pack Licenses**. The following screen appears, showing occupied and available waveform slots for your instrument's 5- or 50-pack license.

Agilent IQ Analyzer (Basic) - Complex Spectrum (Prototype - Limited Sale Allowed)

Center Freq: 100.000000 MHz
 Trig: Free Run Avg|Hold:>25/25
 PNO: Wide IFGain:Auto Atten: 6 dB (Elec 0)

Licenses Used: 6/50

Slot	Status	Filename
1	LOCKED: 8/18/2010	sample.wfm
2	LOCKED: 8/19/2010	GSM_1C_BURST.WFM
3	Remaining Trial Time: 28 hours	EDGE_1C_BURST.WFM
4	Remaining Trial Time: 28 hours	WCDMA_BasicTM1_64DPCH.wfm
5	Remaining Trial Time: 45 hours	CDMA2K_9CHAN.WFM
6	Remaining Trial Time: 47 hours	EDGE_1TS_WFM1.wfm

Multi-Pack Licenses

Add Waveform

Replace Waveform

Clear Waveform from Slot

Lock Waveform in Slot

3. Press **Add Waveform** > **Segments on Hard Disk**. Then use the arrow keys or mouse to select a waveform file from NVARB memory.

NOTE: The instrument's user interface uses the term *segment* to refer to a waveform file.

Agilent IQ Analyzer (Basic) - Complex Spectrum (Prototype - Limited Sale Allowed)

Center Freq: 100.000000 MHz
 Trig: Free Run Avg|Hold:>25/25
 PNO: Wide IFGain:Auto Atten: 6 dB (Elec 0)

Current Directory: D:\NVARB Available ARB Memory: 2 GB

Segments on HDD	Size (KB)	Segments in ARB Memory	Size (KB)
CDMA2K_9CHAN.WFM	1280		
CDMA2K_PILOT.WFM	640		
EDGE_1C_BURST.WFM	1221		
EDGE_1TS_WFM1.wfm	317		
EDGE_BURST.WFM	9521		
GSM_1C_BURST.WFM	1221		
GSM_1TS_WFM1.wfm	317		
GSM_BURST.WFM	9521		
MT_31TONES_2MHZSPC.WFM	0		
MT_7TONES_2KHZSPC.WFM	6		
N7600B-1.wfm	937		
QAM16.WFM	320		
QPSK.WFM	320		

HDD Segments

Load Segment To ARB Memory

Load All To ARB Memory

- Press **Load Segment to ARB Memory**.

The screenshot shows the Agilent IQ Analyzer interface. The top status bar indicates 'Agilent IQ Analyzer (Basic) - Complex Spectrum' and '(Prototype - Limited Sale Allowed)'. The main display area shows 'Center Freq: 100.000000 MHz', 'Trig: Free Run', and 'Atten: 6 dB (Elec 0)'. Below this, the 'Current Directory' is 'D:\NVARB' and 'Available ARB Memory' is '1.990 GB'. A table lists 'Segments on HDD' and 'Segments in ARB Memory'. The 'Load Segment To ARB Memory' button on the right sidebar is highlighted in blue.

Segments on HDD	Size (KB)	Segments in ARB Memory	Size (KB)
CDMA2K_9CHAN.WFM	1280	N7600B-1.wfm	9600
CDMA2K_PILOT.WFM	640		
EDGE_1C_BURST.WFM	1221		
EDGE_1TS_WFM1.wfm	317		
EDGE_BURST.WFM	9521		
GSM_1C_BURST.WFM	1221		
GSM_1TS_WFM1.wfm	317		
GSM_BURST.WFM	9521		
MT_31TONES_2MHZSPC.WFM	0		
MT_7TONES_2KHZSPC.WFM	6		
N7600B-1.wfm	937		
QAM16.WFM	320		

- Press **Return** and use the arrow keys or mouse to select your waveform. Then press **Add Waveform**. A dialog box appears. Click **OK**.

The screenshot shows the Agilent IQ Analyzer interface with the 'Add Waveform' dialog box open. The dialog box contains a warning icon and the following text: 'This will assign the selected waveform to a multi-pack slot. Once the waveform is assigned to the slot it cannot be undone. Are you sure you want to do this? Press Enter to process or Esc to Cancel'. The 'OK' button is highlighted. The background interface shows 'Sample Rate 125.00000000 MHz' and 'Licenses Used: 7/50'. The 'Add Waveform' button on the right sidebar is also highlighted.

Using Signal Studio Waveform Licenses

- Notice that you have less than 48 hours (display shows 47 hours) remaining to fully evaluate the waveform. The trial time applies to individual slots. Once a waveform is added to a slot, the trial time for that slot begins counting down and cannot be reset. During the trial time, you can replace and evaluate waveforms in a slot as many times as you like. At the end of the trial time, however, you can no longer play the waveform in that slot unless you license (lock) it to that slot. You can, however, still replace files in an expired, unlocked slot.

Agilent IQ Analyzer (Basic) - Complex Spectrum (Prototype - Limited Sale Allowed)

Center Freq: 1.000000000 GHz
 PNO: Wide IFGain:Auto
 Center Freq: 1.000000000 GHz
 Trig: Free Run Avg|Hold:>25/25
 Atten: 6 dB (Elec 0)

Licenses Used: 7/50

Slot	Status	Filename
1	LOCKED: 8/18/2010	sample.wfm
2	LOCKED: 8/19/2010	GSM_1C_BURST.WFM
3	Remaining Trial Time: 27 hours	EDGE_1C_BURST.WFM
4	Remaining Trial Time: 27 hours	WCDMA_BasicTM1_64DPCH.wfm
5	Remaining Trial Time: 44 hours	CDMA2K_9CHAN.WFM
6	Remaining Trial Time: 47 hours	EDGE_1TS_WFM1.wfm
7	Remaining Trial Time: 47 hours	N7600B-1.wfm

Multi-Pack Licenses

Add Waveform

Replace Waveform

Clear Waveform from Slot

Lock Waveform in Slot

- To playback the waveform for evaluation, press **Source** > **More 1 of 2** > **Modulation Setup** > **ARB** > **Select Waveform** and use the arrow keys or mouse to highlight your waveform.
- Press **Select Waveform** > **Return** > **ARB Off On to On**. Set your frequency and amplitude for the carrier as you like and then press **Source** > **RF On/Off** to **On**. You can now evaluate the waveform in your specific test scenario.
- To license the waveform into a 5- or 50-pack slot, press **Source** > **More 1 of 2** > **Modulation Setup** > **ARB** > **More 1 of 2** > **Waveform Utilities** > **Multi-Pack Licenses** and use the arrow keys or mouse to select your waveform file's slot.

Agilent IQ Analyzer (Basic) - Complex Spectrum (Prototype - Limited Sale Allowed)

Center Freq: 1.000000000 GHz
 PNO: Wide IFGain:Auto
 Center Freq: 1.000000000 GHz
 Trig: Free Run Avg|Hold:>25/25
 Atten: 6 dB (Elec 0)

Licenses Used: 7/50

Slot	Status	Filename
1	LOCKED: 8/18/2010	sample.wfm
2	LOCKED: 8/19/2010	GSM_1C_BURST.WFM
3	Remaining Trial Time: 26 hours	EDGE_1C_BURST.WFM
4	Remaining Trial Time: 26 hours	WCDMA_BasicTM1_64DPCH.wfm
5	Remaining Trial Time: 43 hours	CDMA2K_9CHAN.WFM
6	Remaining Trial Time: 46 hours	EDGE_1TS_WFM1.wfm
7	Remaining Trial Time: 46 hours	N7600B-1.wfm

Multi-Pack Licenses

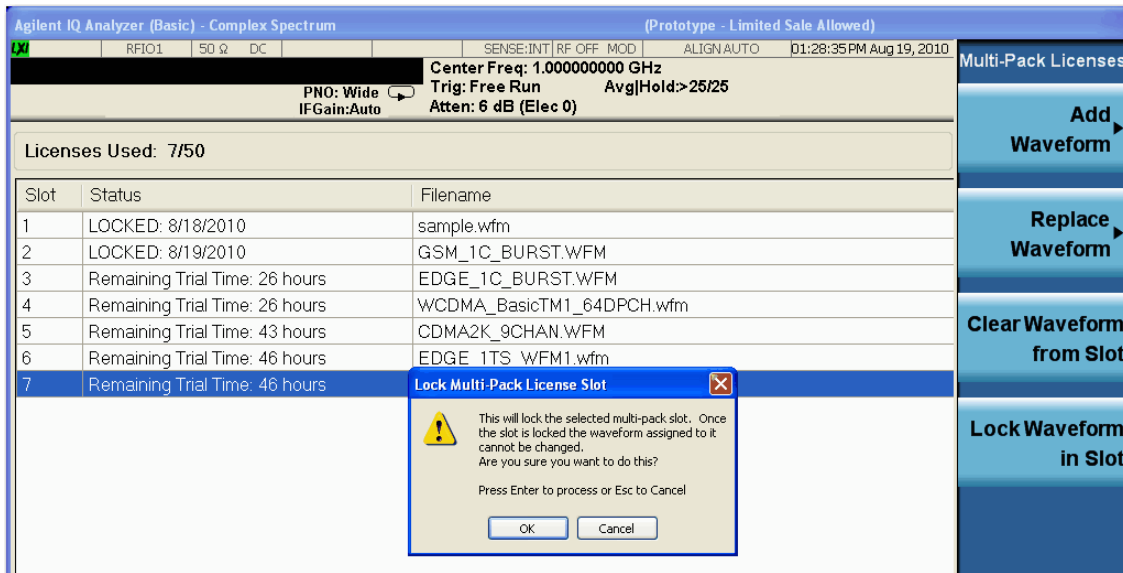
Add Waveform

Replace Waveform

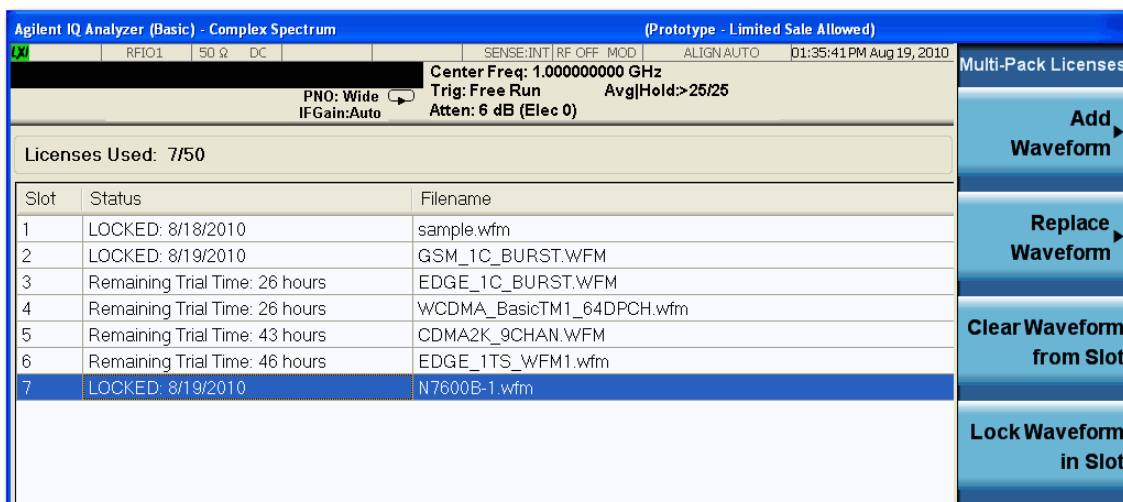
Clear Waveform from Slot

Lock Waveform in Slot

- Press **Lock Waveform In Slot**. A dialog box appears, asking you to confirm your decision. Click **OK**.
NOTE: Be sure to keep a backup copy of the waveform.



- Your waveform file is now locked to a 5- or 50-pack slot and permanently licensed to your instrument.



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