

Keysight Technologies Signal Studio Waveform Licenses

Notices

© Copyright 2016 Keysight Technologies, Inc.

The information contained in this document is subject to change without notice.

Keysight Technologies makes no warranty of any kind with regard to this material, including but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Keysight Technologies shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

Manual Part Number

N5180-90085

Edition

Edition 1, April 2016

Published by:

Keysight Technologies, Inc.
1400 Fountaingrove Parkway
Santa Rosa, CA 95403

Using Signal Studio Waveform Licenses

Introduction

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/wireless/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)

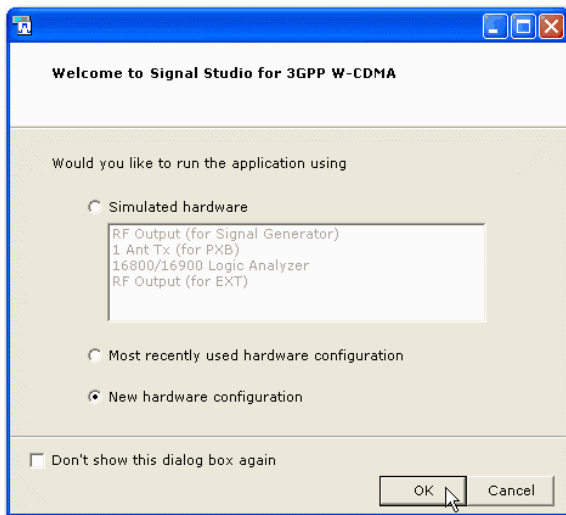
Using Signal Studio to Create and Download a Waveform

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

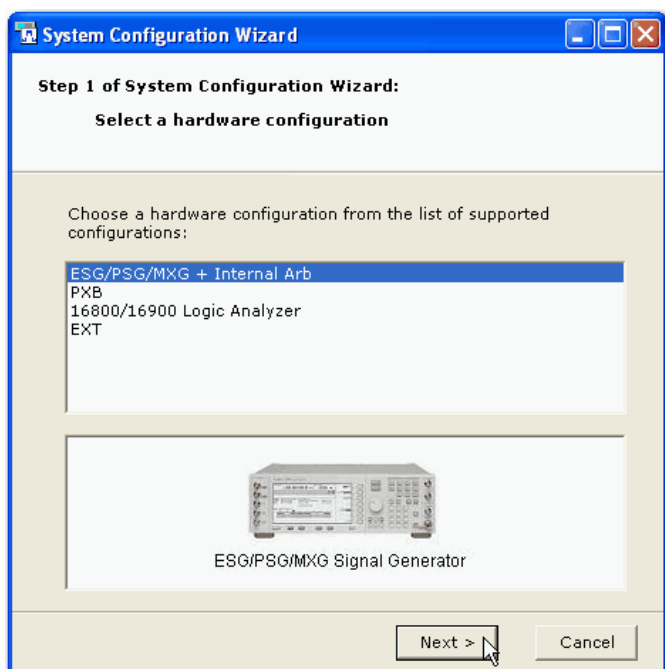
NOTE

Some Signal Studio products do not support a live connection to the EXT. In these cases, use **Method 2: Export waveform files to a USB storage device (EXG, MXG, EXT)** on page 10.

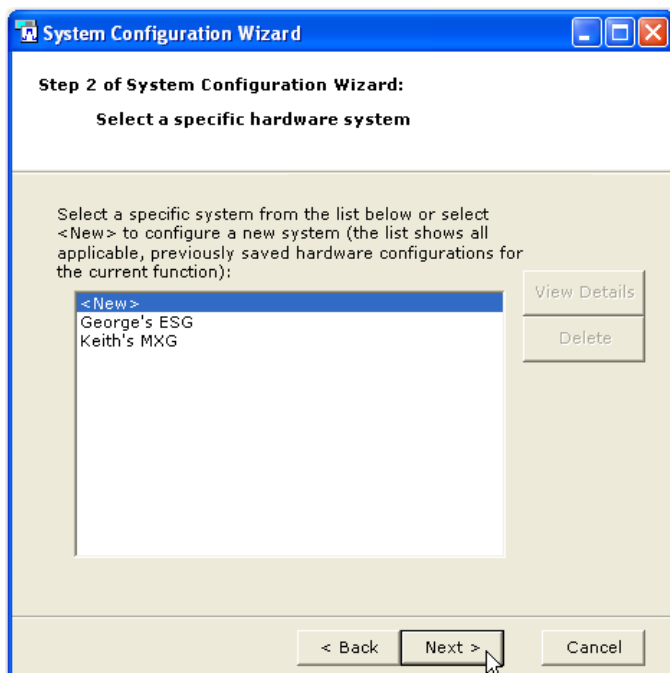
1. From the Keysight website, www.keysight.com/find/signalstudio, download and install the N76xxB Signal Studio software of your choice.
2. Open the software. The system configuration wizard appears.
3. Select **New hardware configuration** and click **OK**. If your software was previously connected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



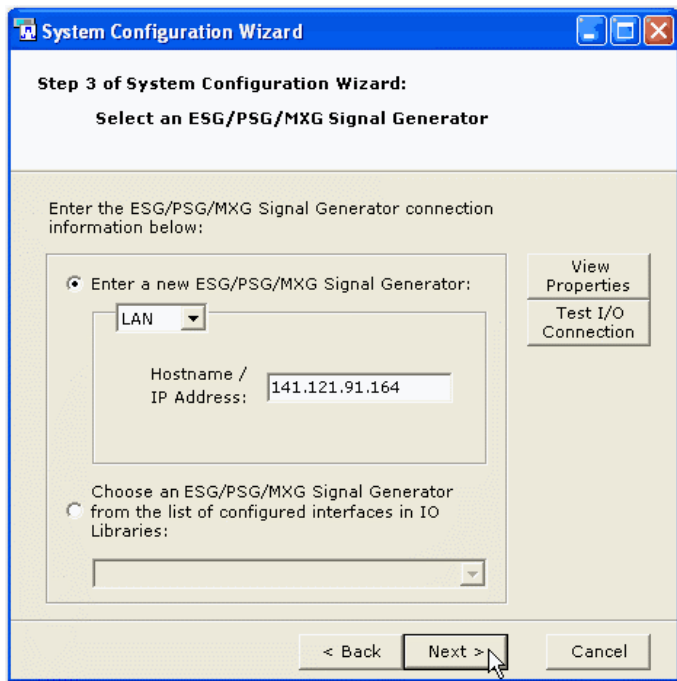
4. Select your instrument and click **Next**.



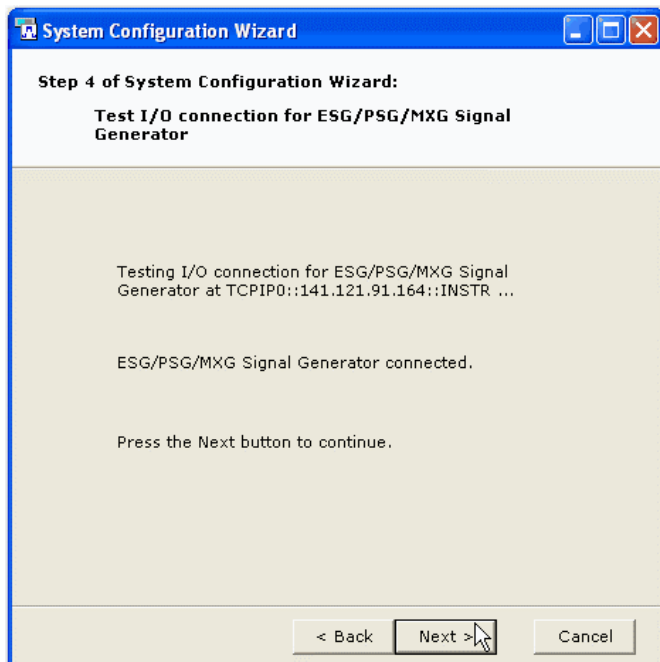
5. Click **Next**.



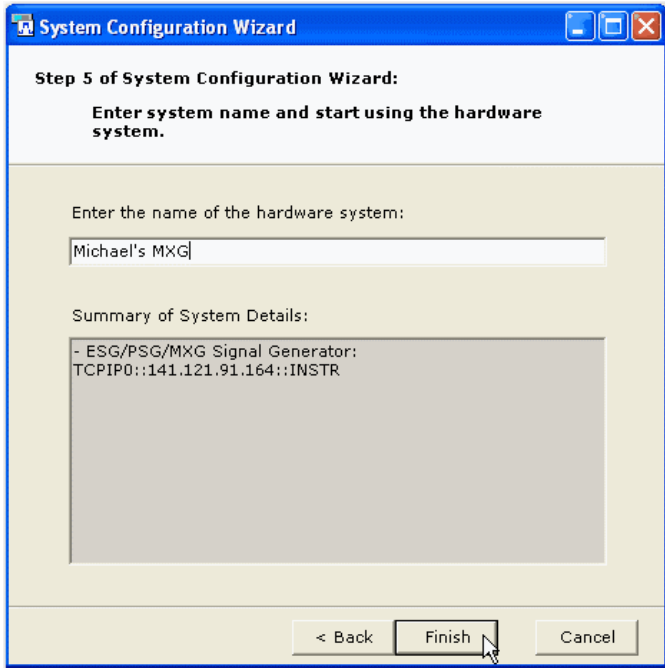
6. Enter your instrument's IP address and click **Next**.



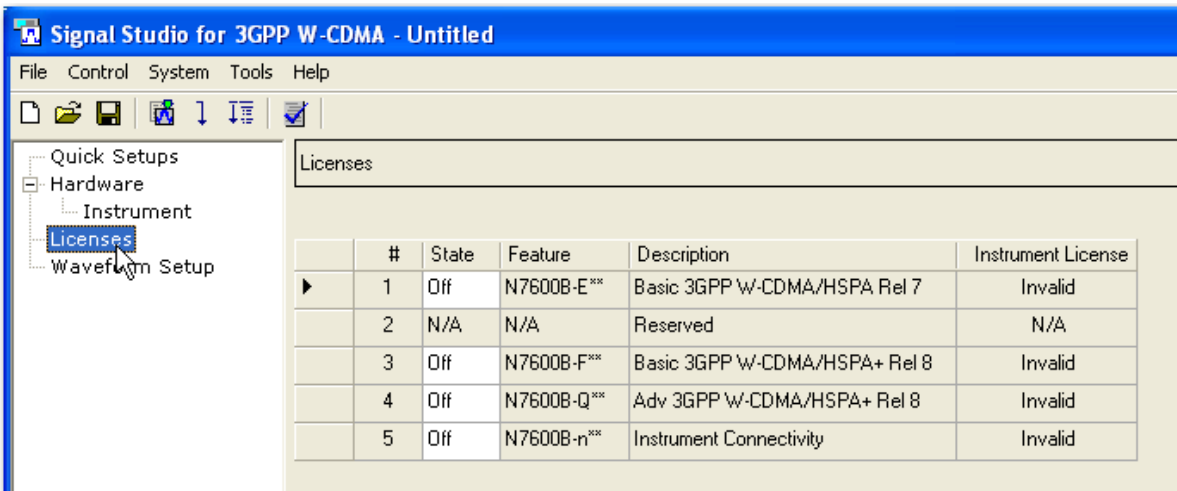
7. Click **Next**.



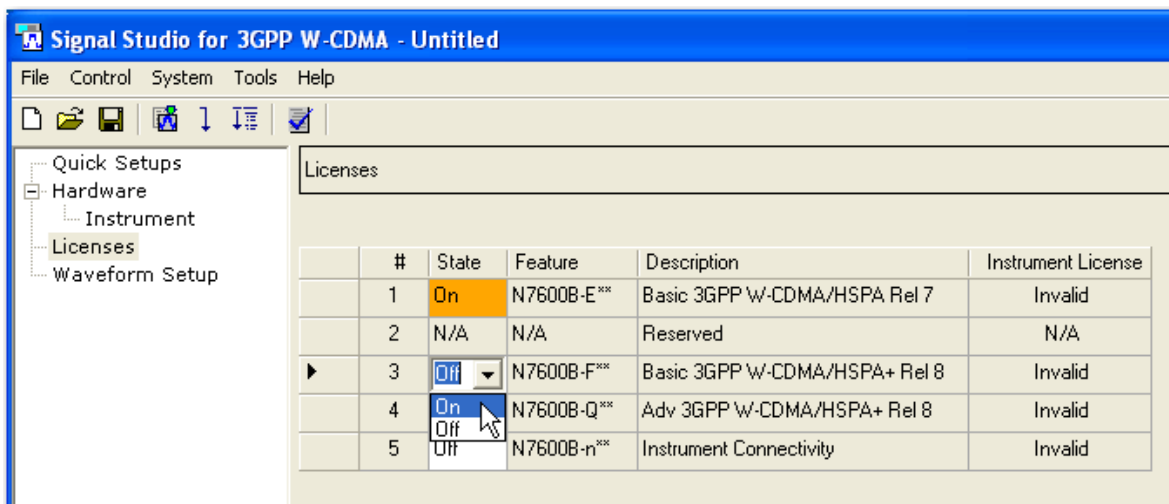
8. Enter a name for your instrument and click **Finish**.



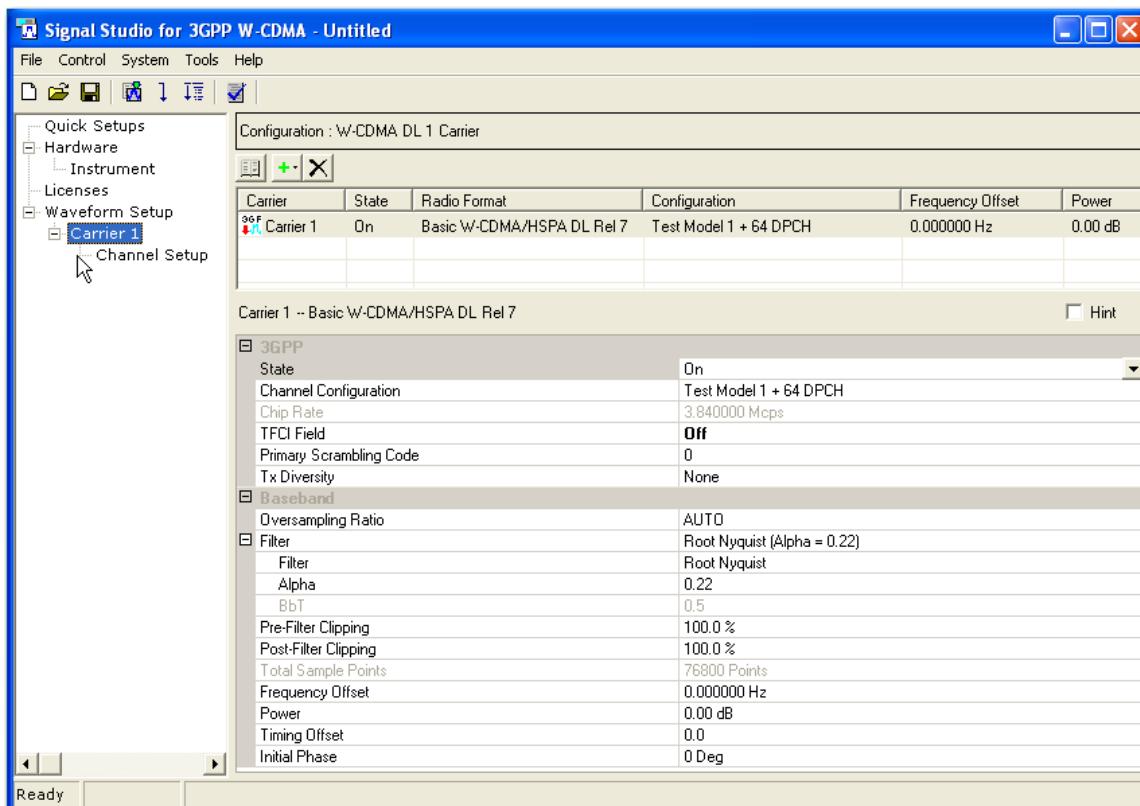
9. From the software's tree view, select **Licenses**. Notice that the state of each license is set to **Off** and displays **Invalid**. If you are using the software's 14-day free trial or have previously purchased a basic capability option, those licenses will be valid and already set to **On**.



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



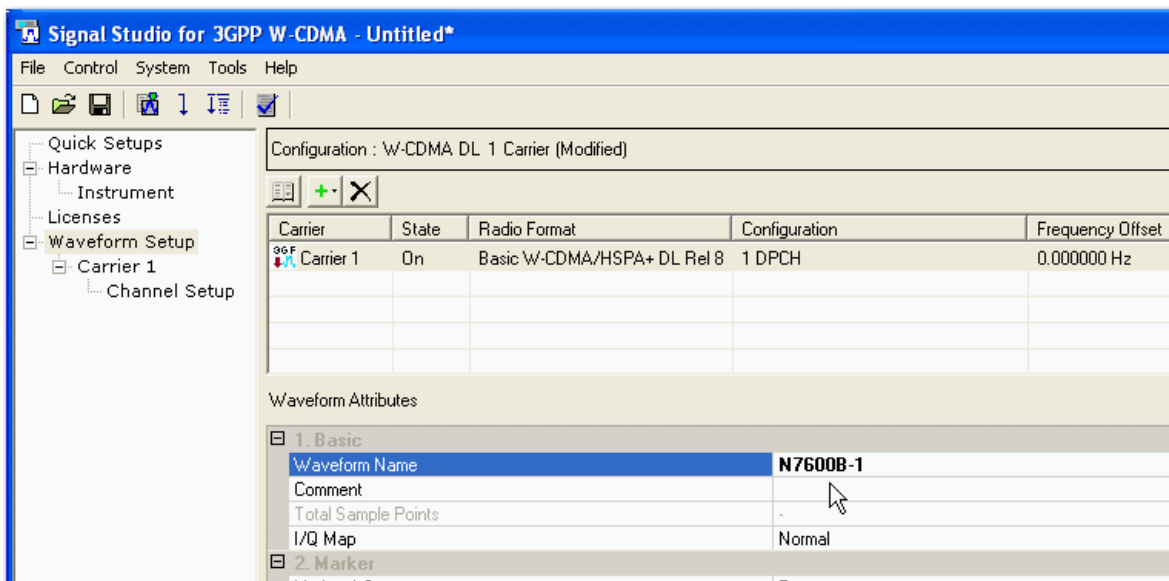
11. Configure the Signal Studio waveform using the various parameter selections and settings available under the **Waveform Setup** node in the tree view. This example shows the carrier settings for the N7600B Signal Studio software. Waveform parameters vary among Signal Studio products, so refer to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



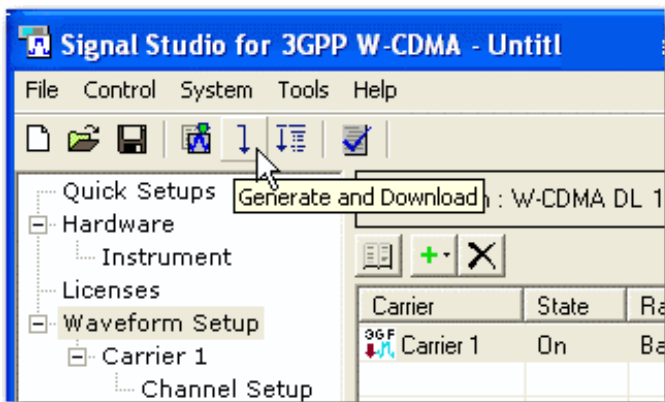
12. From the tree view, select **Waveform Setup** and enter a **Waveform Name**.

NOTE

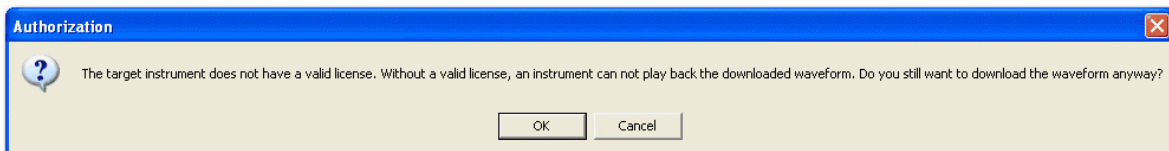
Some Signal Studio applications do not allow waveform file names greater than eight characters.



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



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

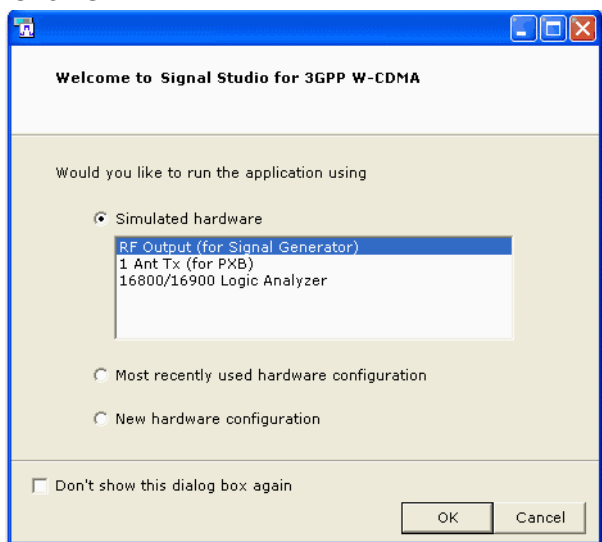


The waveform file now resides in the volatile memory of your instrument.

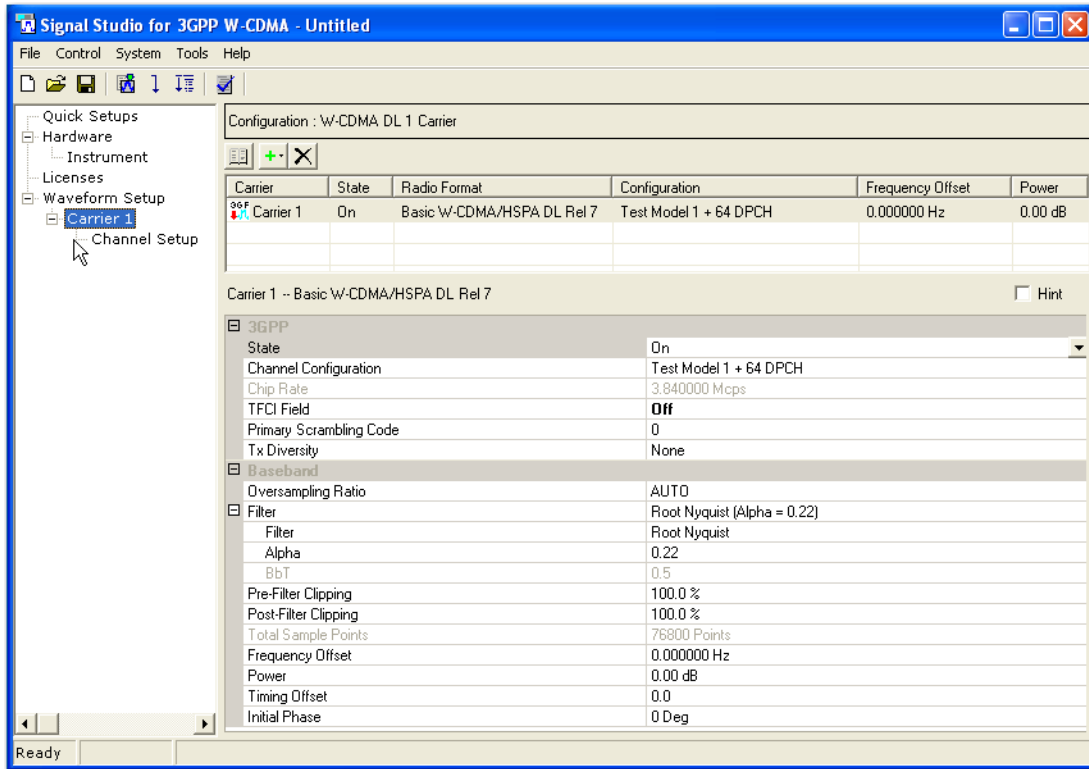
Using Signal Studio to Create and Download a Waveform

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

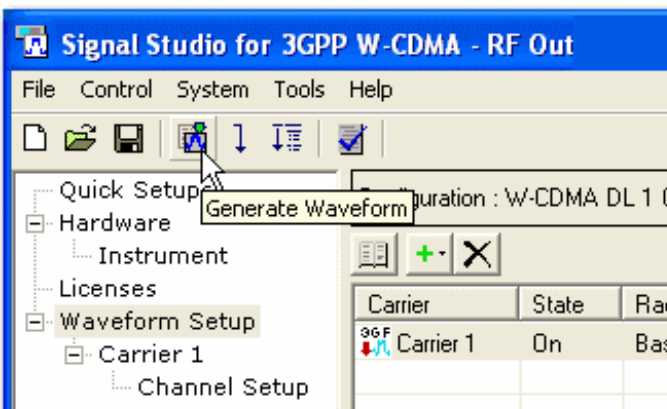
1. From the Keysight website, www.keysight.com/find/signalstudio, download and install the N76xxB Signal Studio software of your choice.
2. Open the software. The system configuration wizard appears.
3. Select **Simulated hardware** and make sure RF Output (for Signal Generator) is highlighted. Click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



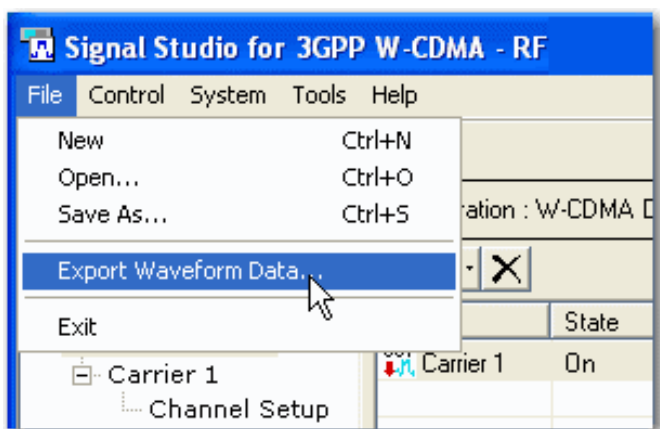
- Configure the Signal Studio waveform using the various parameter selections and settings available under the **Waveform Setup** node in the tree view. This example shows the carrier settings for the N7600B Signal Studio software. Waveform parameters vary among Signal Studio products, so refer to your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



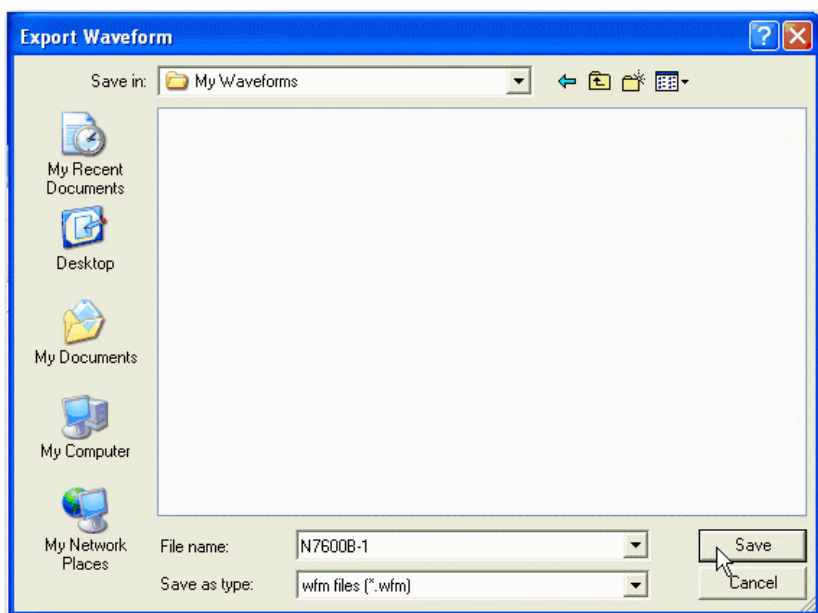
- Click the **Generate Waveform** button.



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

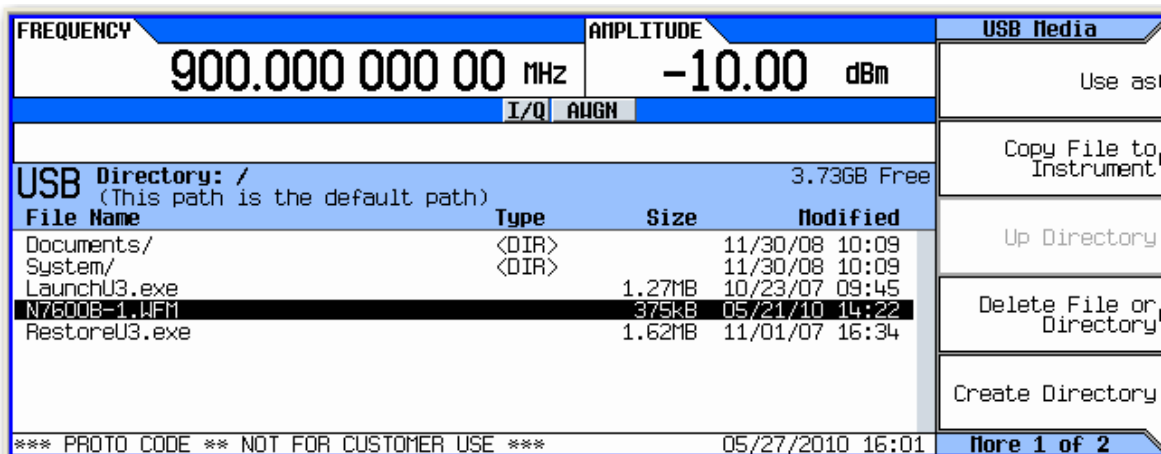


7. Name the waveform file and save it to your PC.



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 > NVAR**.
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).



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.

FREQUENCY			RF OFF	WFM Licensing	
6.000 000 000 00 GHz			-144.00	dBm	
				Add Waveform To First Available Slot	
				Replace Waveform In Slot	
Waveform Licensing			Licenses Used: 3/50		
Slot	Status	Filename			
1	Locked 03/30/2010	50PK3GPP			
2	Remaining Trial Time 20:40	PK50A			
3	Remaining Trial Time 22:33				
4	Available				
5	Available				
6	Available				
7	Available				
8	Available				
9	Available				
10	Available				
*** PROTO CODE ** NOT FOR CUSTOMER USE ***			03/31/2010 14:32		More 1 of 2

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.

FREQUENCY		RF OFF	Add To Slot
6.000 000 000 00 GHz		-144.00 dBm	Add Waveform
			Catalog Type (BBG Segments)
Catalog of BBG Segment Files in BBG Memory		Licenses Used: 6/50	
Waveform	Status		
GSM_1C_CONT_WFM	Waveform License Not Required		
GSM_BURST_WFM	Waveform License Not Required		
N7600B-1.WFM			
N7601B-1	Waveform Licensed		
PAUL_1	Waveform License Not Required		
QAM16_WFM	Waveform License Not Required		
QPSK_WFM	Waveform License Not Required		
RAMP_TEST_WFM	Waveform License Not Required		
SINE_TEST_WFM	Waveform License Not Required		
TESTWAVE	Waveform License Not Required		
*** PROTO CODE ** NOT FOR CUSTOMER USE ***		06/01/2010 14:49	

4. 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.

FREQUENCY		RF OFF	WFM Licensing
6.000 000 000 00 GHz		-144.00 dBm	Add Waveform To First Available Slot
			Replace Waveform In Slot
Waveform Licensing		Licenses Used: 7/50	Clear Waveform From Slot
Slot	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	Remaining Trial Time 48:00 N7600B-1.WFM		
8	Available		
9	Available		
10	Available		
*** PROTO CODE ** NOT FOR CUSTOMER USE ***			

5. 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.

FREQUENCY			RF OFF	Arb Waveform	
6.000 000 000 00 GHz			-144.00	dBm	
				Select Waveform (*NONE*)	
				Display Waveform And Markers	
Select Pg 2/3	Segment On BBG Media	Points	Sequence On Int Media	Segs	
	GSM_1C_CONT_WFM	250000			
	GSM_BURST_WFM	1950000			
	N7600B-1.WFM	76800			
	N7601B-1	76800			
	PAUL 1	1432			
	QAM16_WFM	65536			
	QPSK_WFM	65536			
	RAMP_TEST_WFM	200			
	SINE_TEST_WFM	200			
	TESTWAVE	1000			
*** PROTO CODE ** NOT FOR CUSTOMER USE ***			06/01/2010 15:03		Goto Row

6. 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.

7. 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			
						Store Segment To Int Media	
						Store All To Int Media	
						Delete Segment▶	
						Delete All Segments On▶	
						BBG Memory	
Pg 2/3				Pg 1/3		Store 1 of 2	
Segment Points				Segment Points			
~57.1MSa free				~89.9MSa free			
GSM_1C_CONT_WFM 250000				12TONE_WFM 2112			
GSM_BURST_WFM 1950000				2TONE_WFM 80			
N7600B-1.WFM 76800				41910B 76800			
N7601B-1 76800				50PK3GPP 131072			
PAUL 1 1432				CDMA2K_9CHAN_WFM 262144			
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			
*** PROTO CODE ** NOT FOR CUSTOMER USE ***				06/01/2010 15:15			

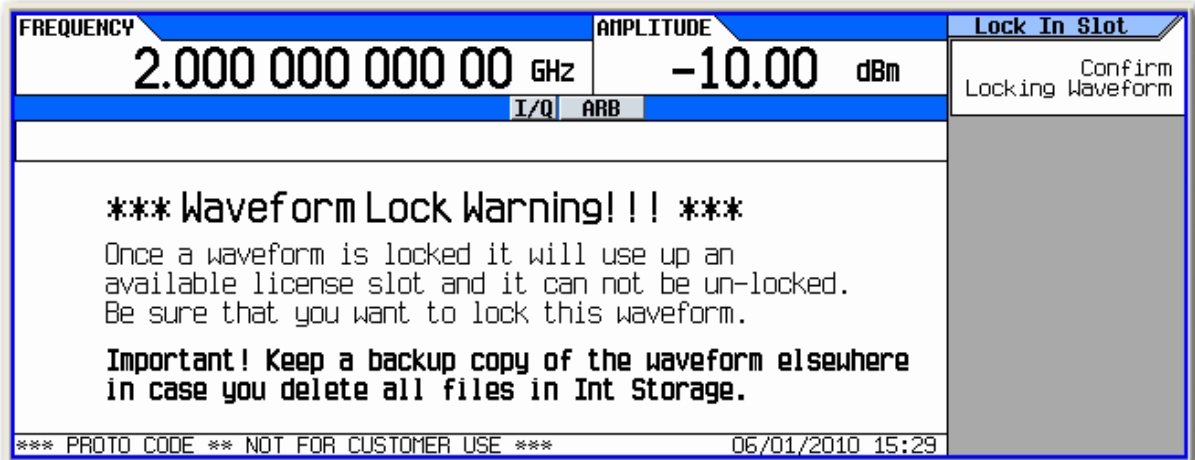
8. To license the waveform into a 5- or 50-pack slot, press **Mode > Dual ARB > More > Waveform Licensing** and use the arrow keys or front panel knob to select your waveform file's slot.

FREQUENCY				AMPLITUDE		WFM Licensing	
2.000 000 000 00 GHz				-10.00 dBm		Add Waveform To First Available Slot▶	
				I/Q ARB		Replace Waveform In Slot▶	
						Clear Waveform From Slot	
						Lock Waveform In Slot▶	
						Goto Slot▶	
Waveform Licensing				Licenses Used: 7/50			
Slot 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 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		Store 1 of 2	

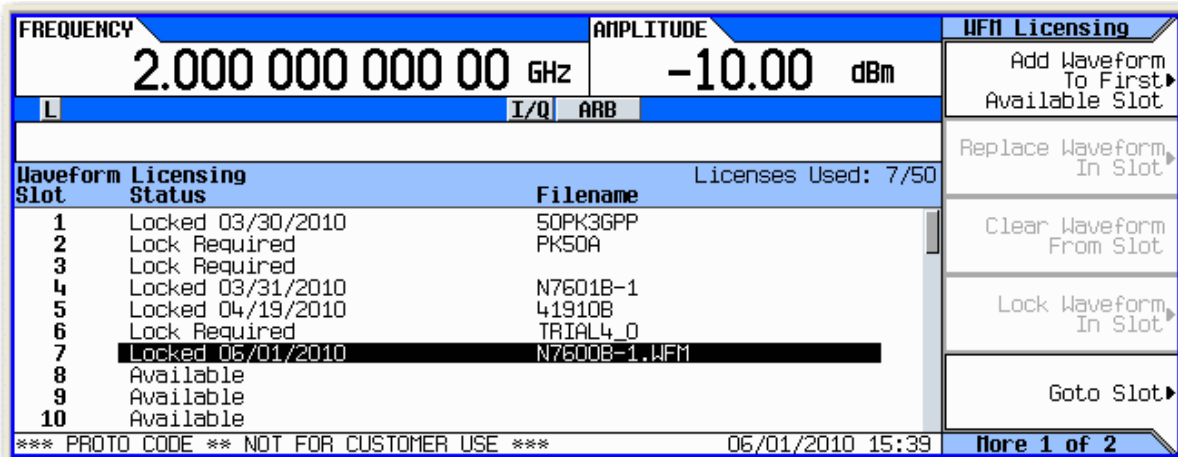
9. Press **Lock Waveform In Slot**. A warning message appears. Press **Confirm Locking Waveform**.

NOTE

Be sure to keep a backup copy of the waveform.

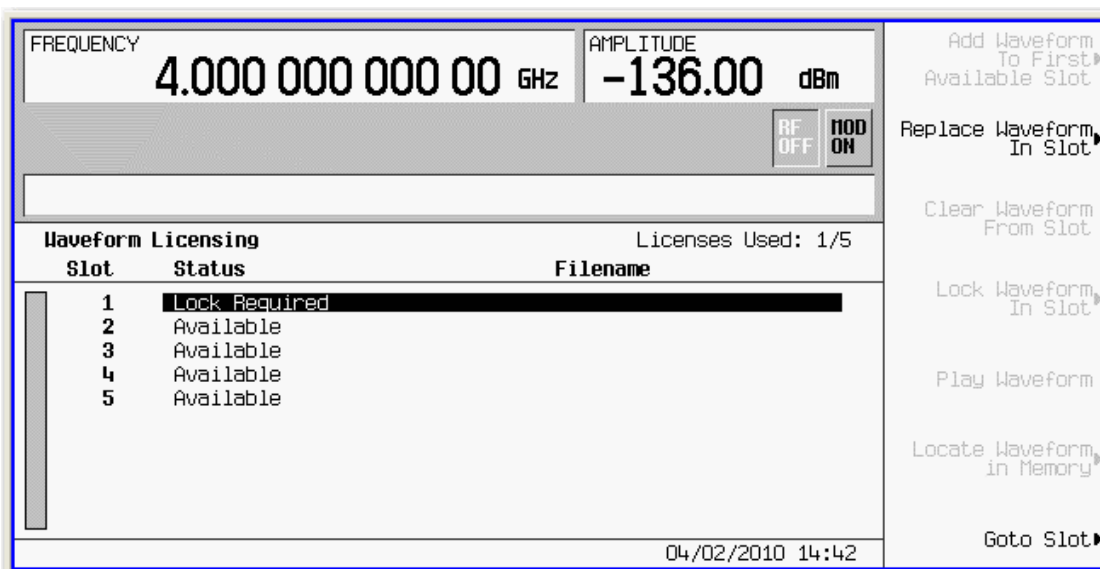


10. Your waveform file is now locked to a 5- or 50-pack slot and permanently licensed to your instrument.



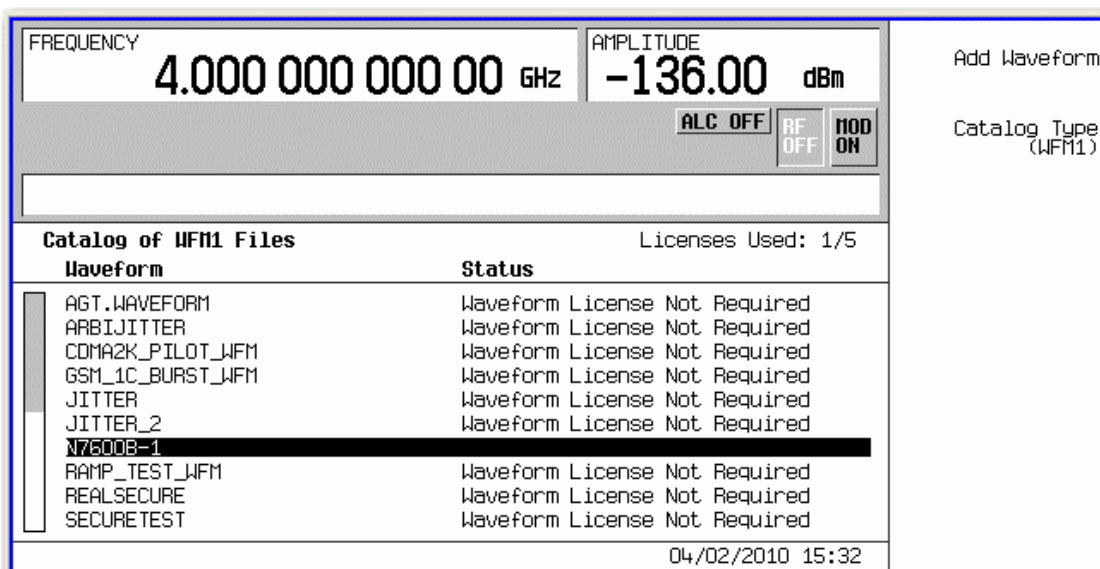
On the ESG

1. Press **Local** 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. 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.



4. 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.

FREQUENCY 4.000 000 000 00 GHz AMPLITUDE -136.00 dBm

ALC OFF RF OFF MOD ON

Waveform Licensing Licenses Used: 2/5

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

04/02/2010 15:35

Menu options on the right:

- Add Waveform To First Available Slot
- Replace Waveform In Slot
- Clear Waveform From Slot
- Lock Waveform In Slot
- Play Waveform
- Locate Waveform in Memory
- Goto Slot

5. 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.

FREQUENCY 4.000 000 000 00 GHz AMPLITUDE -136.00 dBm

RF OFF MOD ON

Select Waveform (1/5) N7600B-1

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

04/02/2010 16:00

Menu options on the right:

- Select Waveform (*NONE*)
- Show Waveform Sequence Contents
- Waveform Segments
- Display Markers
- Goto Row
- Page Up
- Page Down

6. 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.
7. 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.

FREQUENCY 2.000 000 000 00 GHz		AMPLITUDE -10.00 dBm		Load Store	
ARB		ENULP I/Q		RF ON MOD ON	
WFM1 ~65710336 points free		NVWFM ~1684778291 points free		Store Segment To NVWFM Memory	
(1/2)	Segment	Points	(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
				Delete Segment▶	
				Delete All WFM1 Files	
				Rename Segment	
				Goto Row▶	
04/02/2010 16:09					

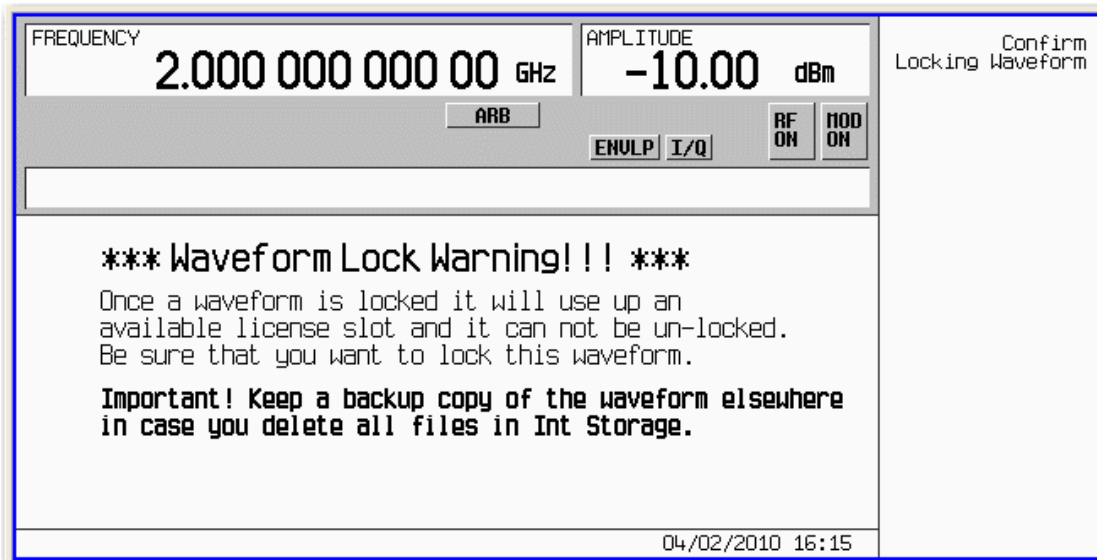
8. To license the waveform into a 5- or 50-pack slot, press **Mode > Dual ARB > More > Waveform Licensing** and use the arrow keys or front panel knob to select your waveform file's slot.

FREQUENCY 2.000 000 000 00 GHz		AMPLITUDE -10.00 dBm		Add Waveform To First Available Slot▶	
ARB		ENULP I/Q		RF ON MOD ON	
Waveform Licensing		Licenses Used: 2/5		Replace Waveform In Slot▶	
Slot	Status	Filename			
1	Lock Required				
2	Remaining Trial Time 47:24	N7600B-1			
3	Available				
4	Available				
5	Available				
				Clear Waveform From Slot	
				Lock Waveform In Slot▶	
				Play Waveform	
				Locate Waveform in Memory▶	
				Goto Slot▶	
04/02/2010 16:11					

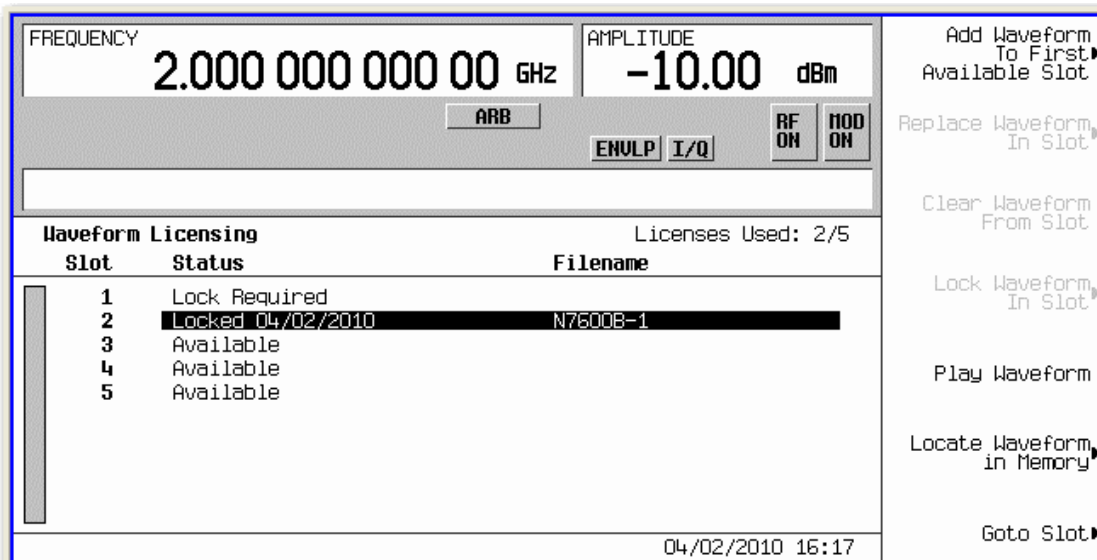
9. Press **Lock Waveform In Slot**. A warning message appears. Press **Confirm Locking Waveform**.

NOTE

Be sure to keep a backup copy of the waveform.



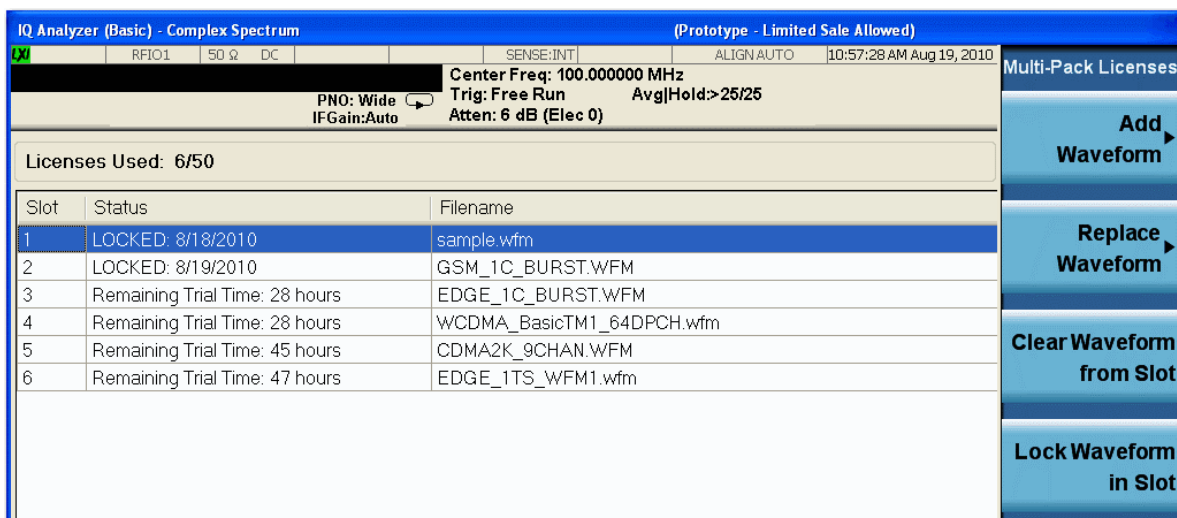
10. Your waveform file is now locked to a 5- or 50-pack slot and permanently licensed to your instrument.



Evaluating and Locking Waveforms to License Slots

On the EXT

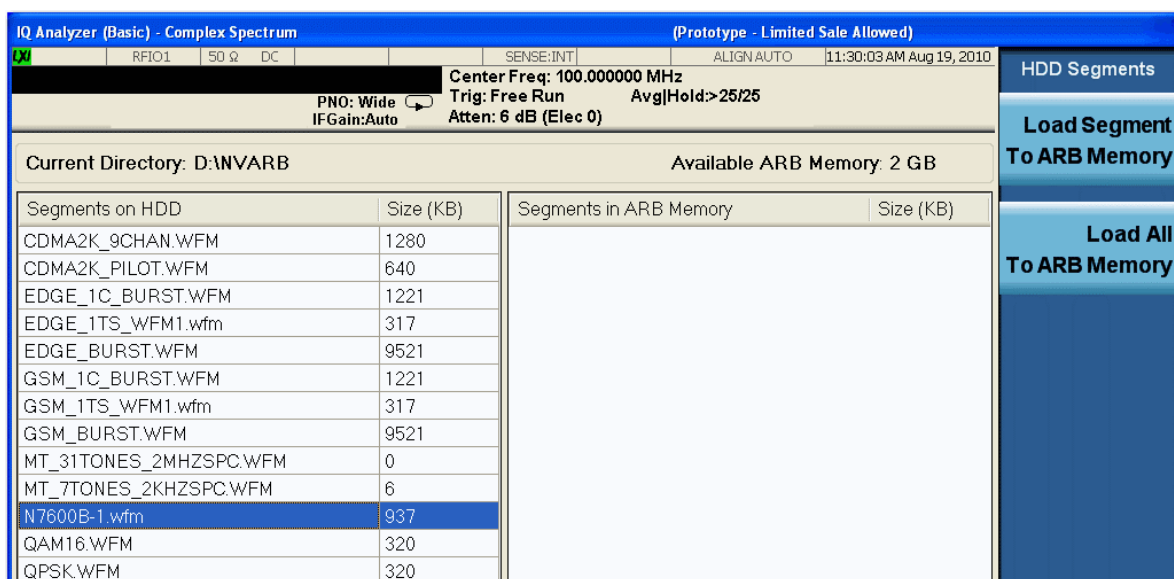
1. Press **Local** (same key as **Cancel/(ESC)**) to unlock the instrument from remote operation.
2. Press **Source > More 1 of 2 > Modulation Setup > ARB > More 1 of 2 > Waveform Utilities > Multi-Pack Licenses**. The following screen appears, showing occupied and available waveform slots for your instrument's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



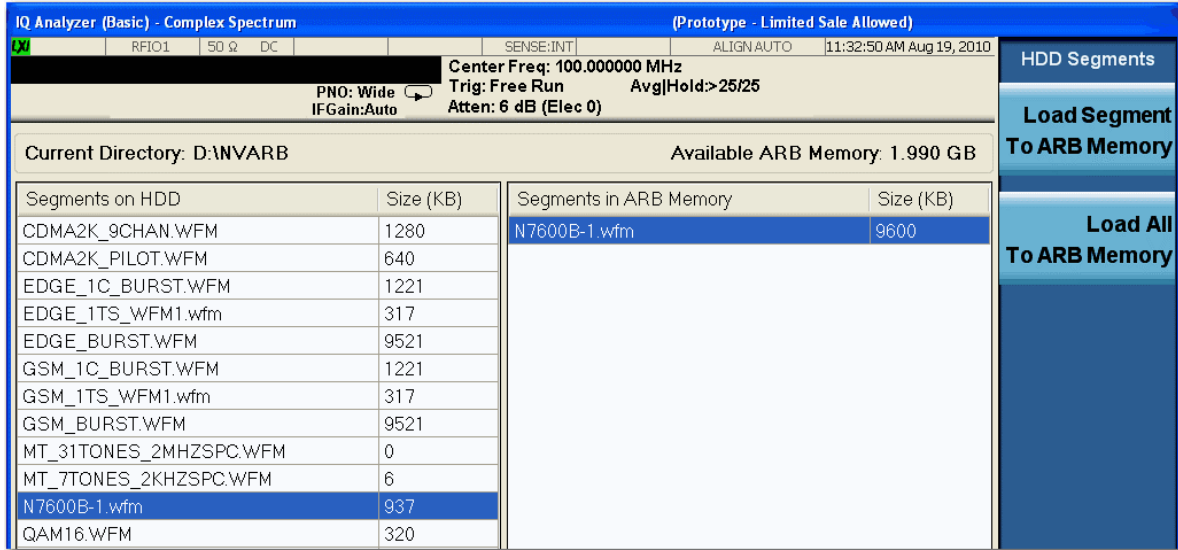
3. Press **Add Waveform > Segments on Hard Disk**. Then use the arrow keys or mouse to select a waveform file from NVARB memory.

NOTE

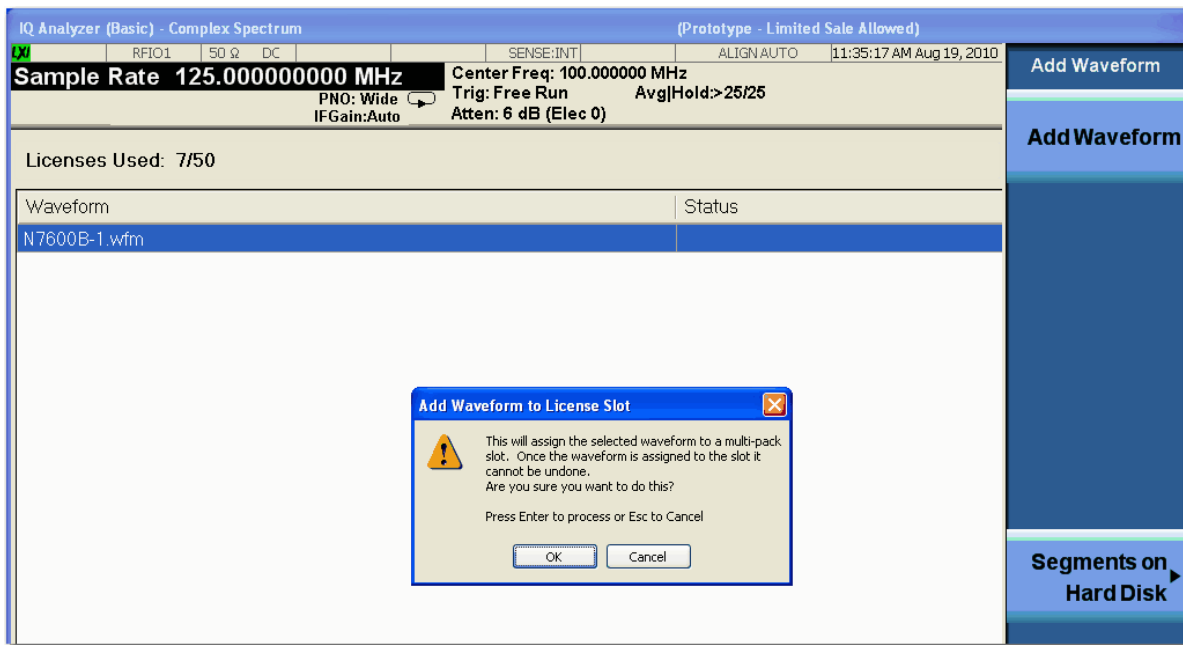
The instrument's user interface uses the term segment to refer to a waveform file.



4. Press Load Segment to ARB Memory.



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



Evaluating and Locking Waveforms to License Slots

- 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.

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

RFIO1 50 Ω DC SENSE:INT ALIGN AUTO 12:01:30 PM Aug 19, 2010

Center Freq 1.000000000 GHz Center Freq: 1.000000000 GHz
 PNO: Wide IFGain:Auto 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.

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

RFIO1 50 Ω DC SENSE:INT RF OFF MOD ALIGN AUTO 01:26:33 PM Aug 19, 2010

Center Freq: 1.000000000 GHz Center Freq: 1.000000000 GHz
 PNO: Wide IFGain:Auto 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

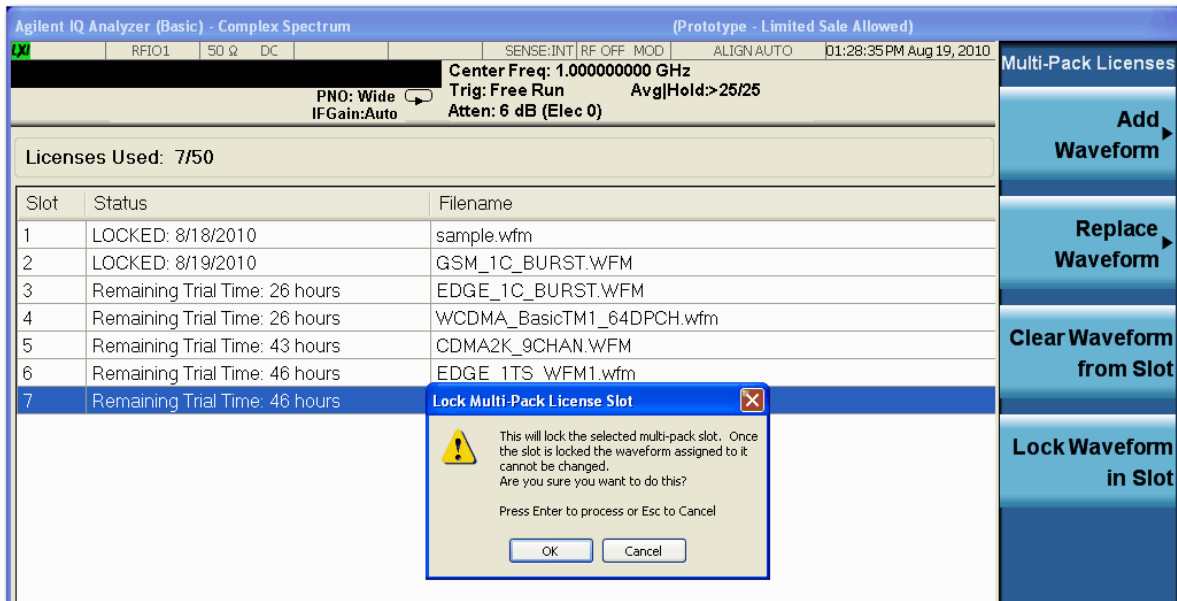
Clear Waveform from Slot

Lock Waveform in Slot

10. 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.



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

