

Keysight Technologies Signal Studio Waveform Licenses

N5172B EXG X-Series RF Vector Signal Generator
N5182A MXG Vector Signal Generator
N5182B MXG X-Series RF Vector Signal Generator
E4438C ESG Vector Signal Generator
E6607 EXT Wireless Communications Test Set

User's
Guide

Notices

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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)

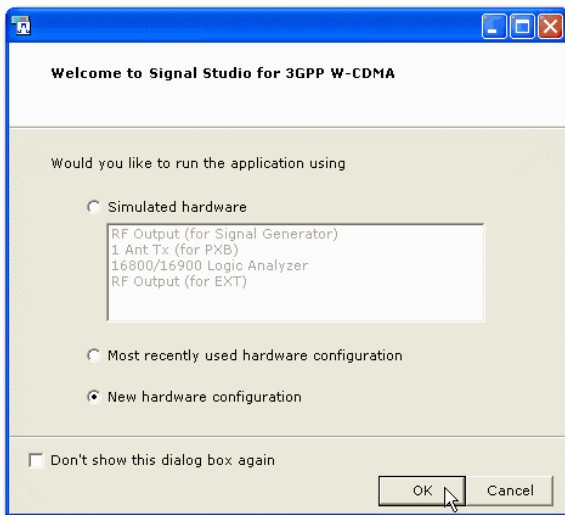
Using Signal Studio to Create and Download a Waveform

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

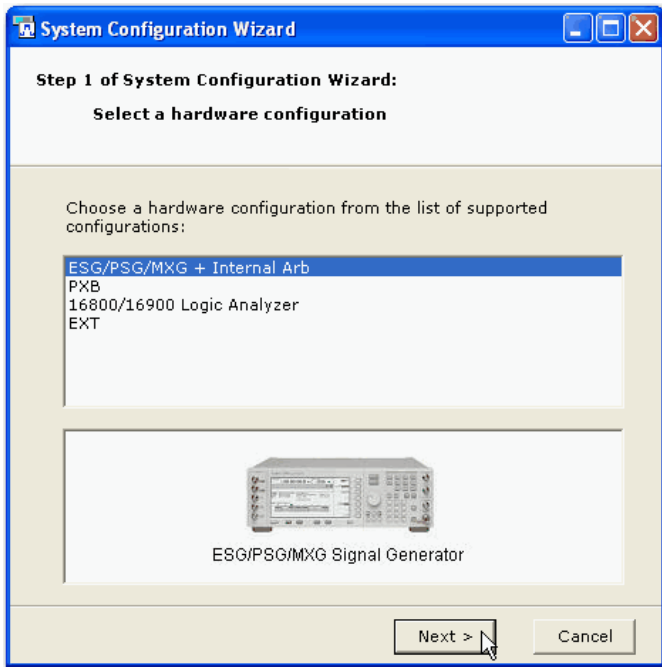
NOTE

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 11.

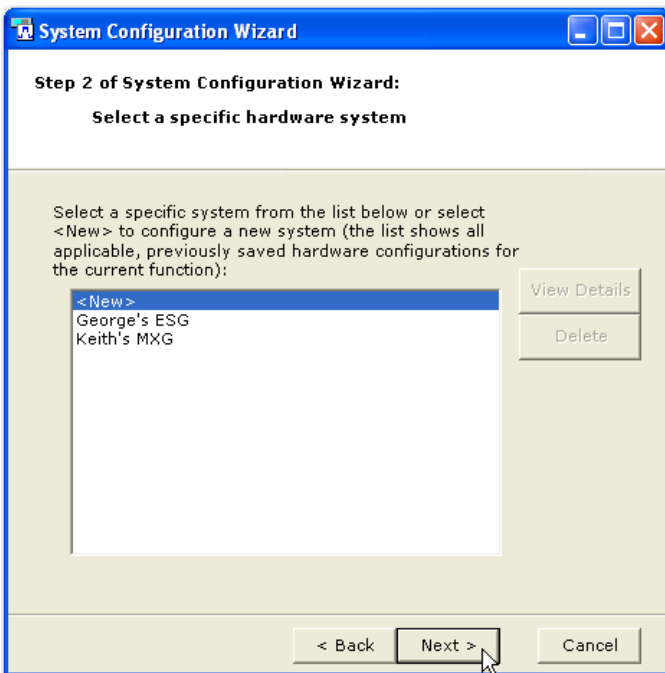
1. From the Keysight website, www.keysight.com/find/signalstudio, download and install the N76xxB Signal Studio software of your choice.
2. Open the software. The system configuration wizard appears.
3. Select **New hardware configuration** and click **OK**. If your software was previously connected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



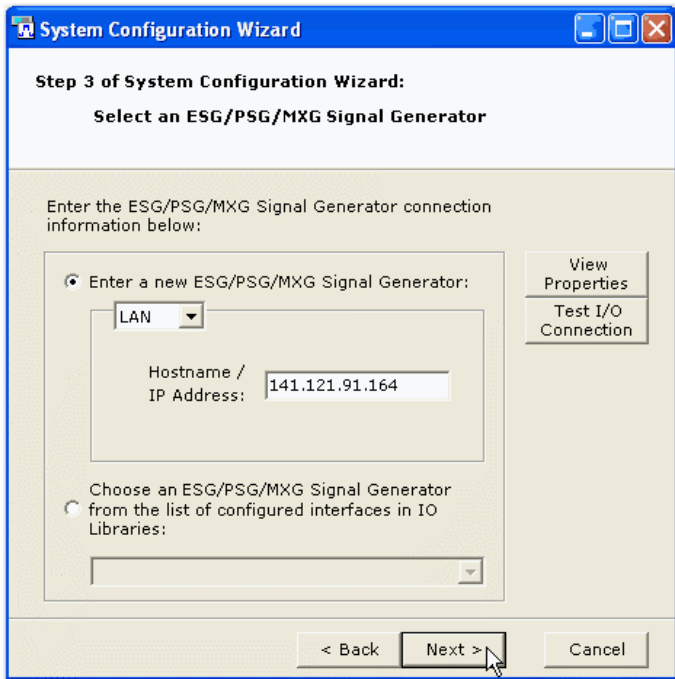
4. Select your instrument and click **Next**.



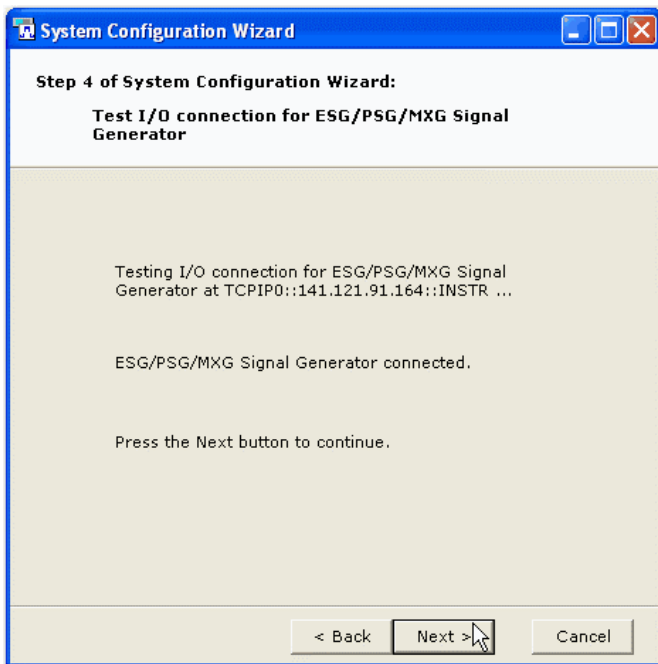
5. Click **Next**.



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

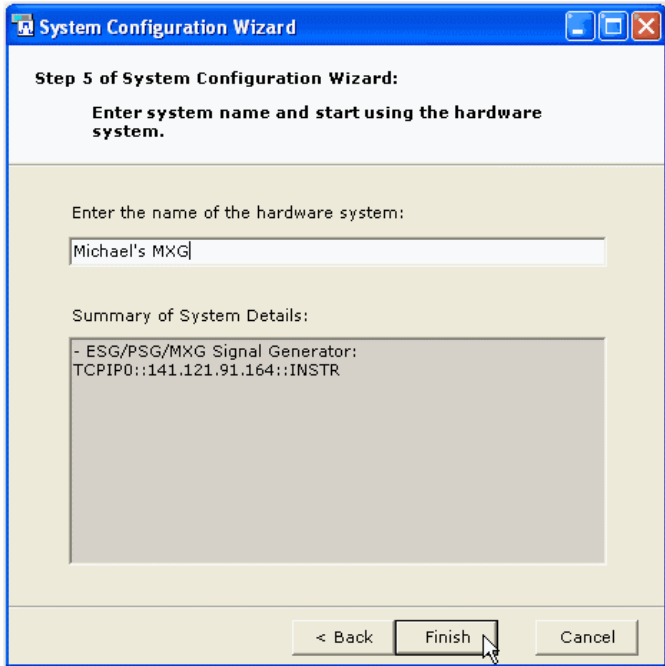


7. Click **Next**.

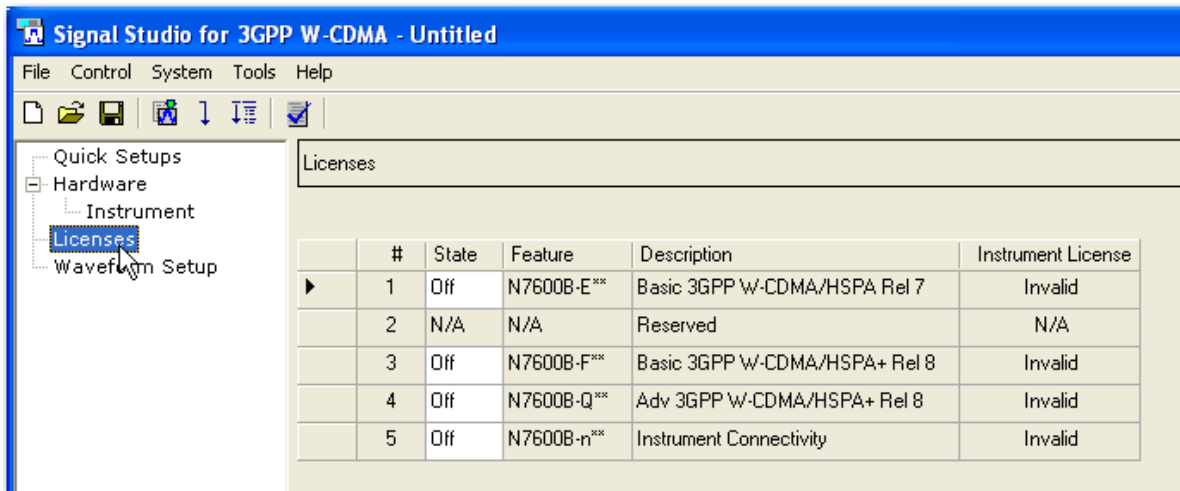


Using Signal Studio to Create and Download a Waveform

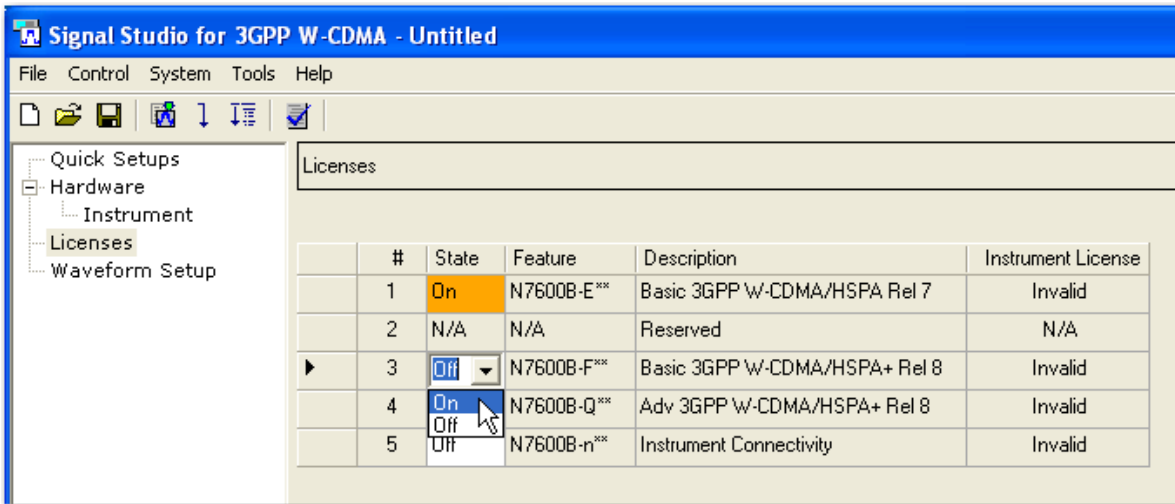
8. Enter a name for your instrument and click **Finish**.



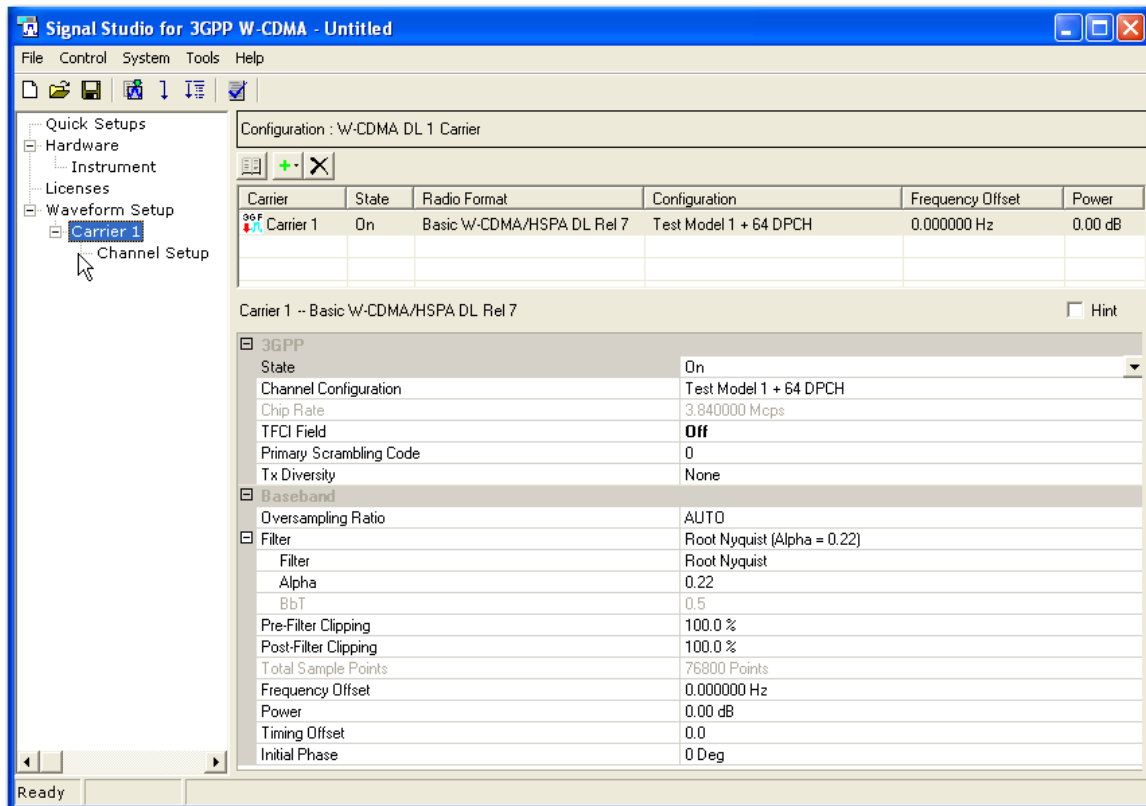
9. From the software's tree view, select **Licenses**. Notice that the state of each license is set to **Off** and displays **Invalid**. If you are using the software's 14-day free trial or have previously purchased a basic capability option, those licenses will be valid and already set to **On**.



- 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.

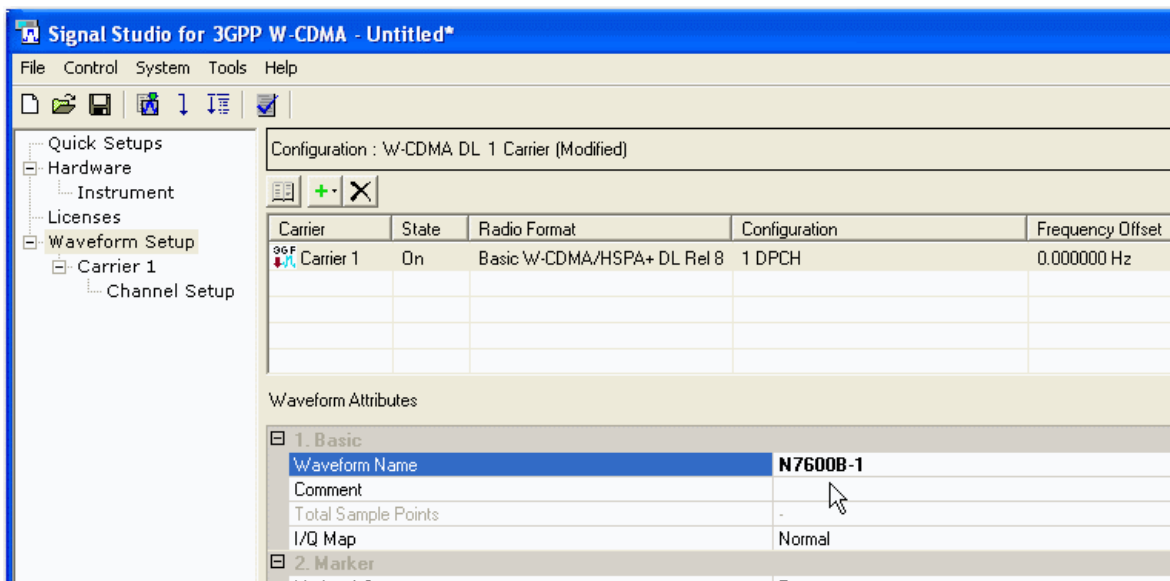


Using Signal Studio to Create and Download a Waveform

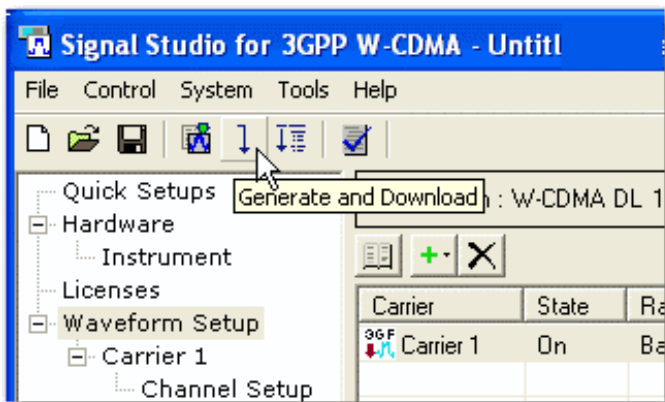
12. From the tree view, select **Waveform Setup** and enter a **Waveform Name**.

NOTE

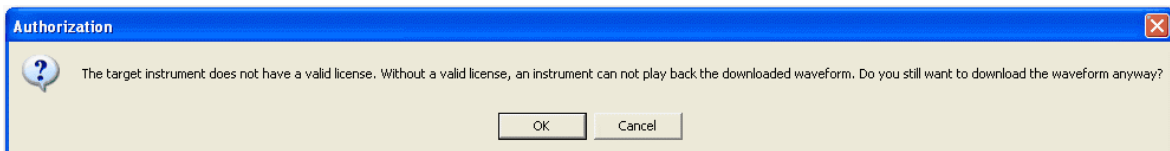
Some Signal Studio applications do not allow waveform file names greater than eight characters.



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



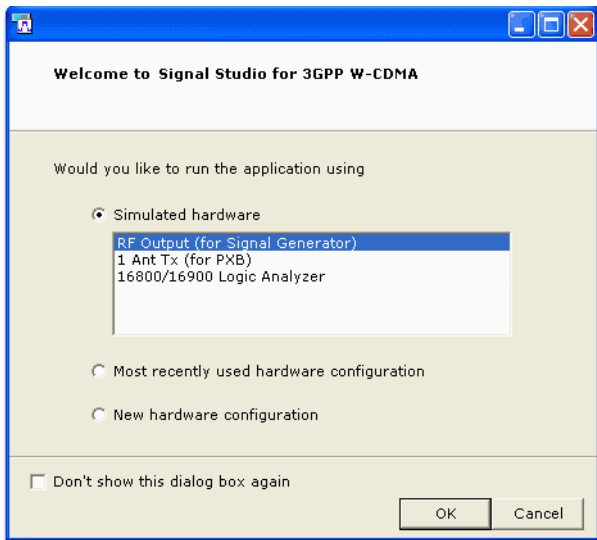
14. The following message appears. Click **OK**.



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

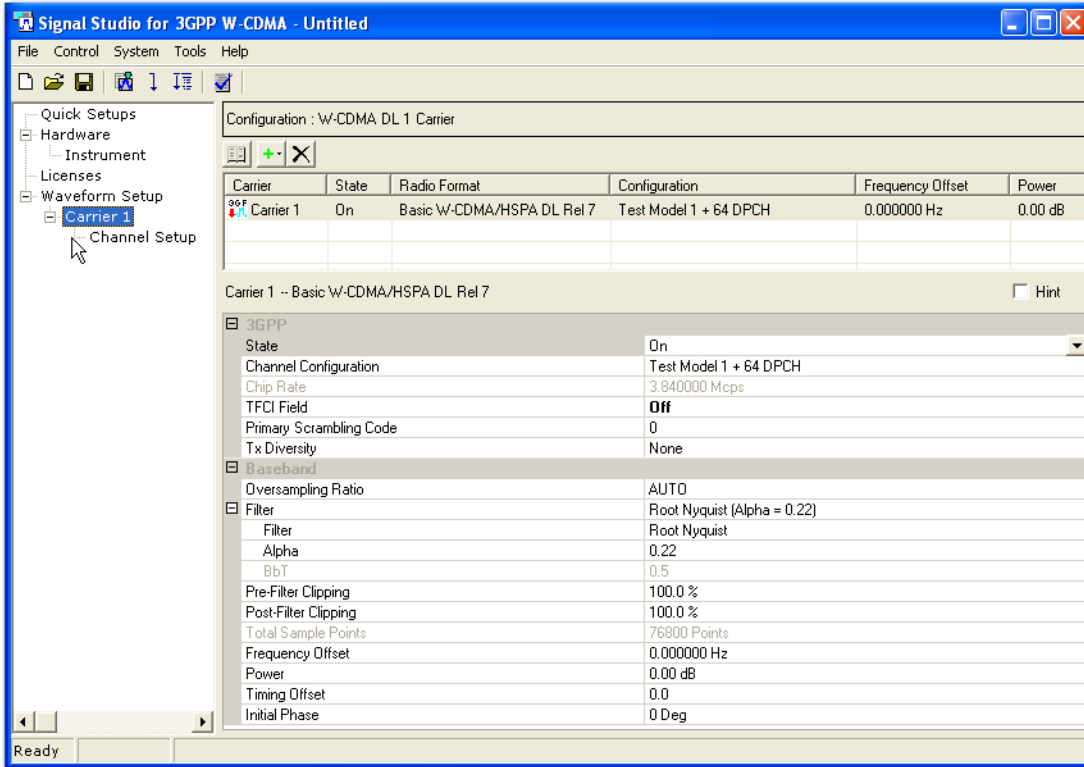
Method 2: Export waveform files to a USB storage device (EXG, MXG, EXT)

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**.

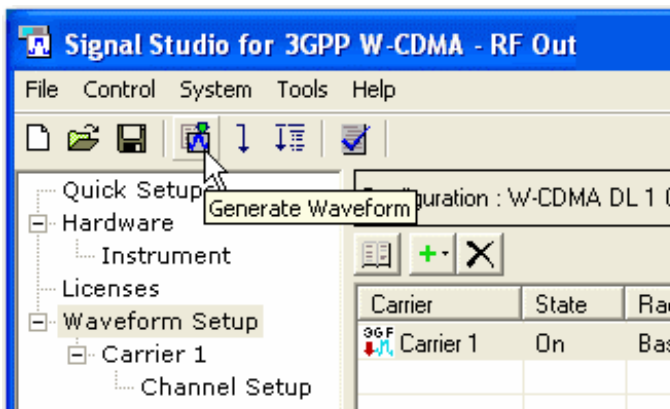


Using Signal Studio to Create and Download a Waveform

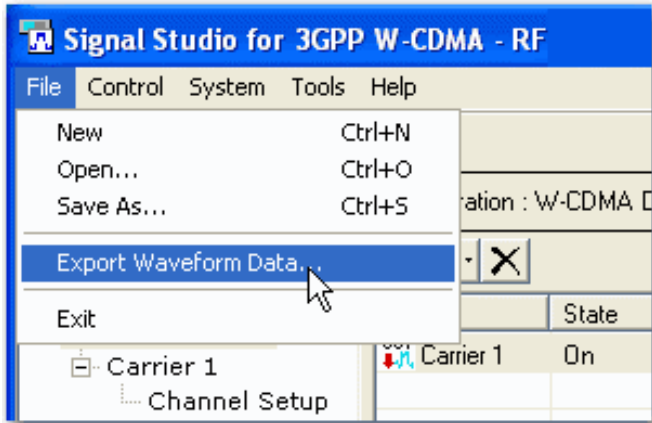
4. Configure the Signal Studio waveform using the various parameter selections and settings available under the **Waveform Setup** node in the tree view. This example shows the carrier settings for the N7600B Signal Studio software. Waveform parameters vary among Signal Studio products, so refer to your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



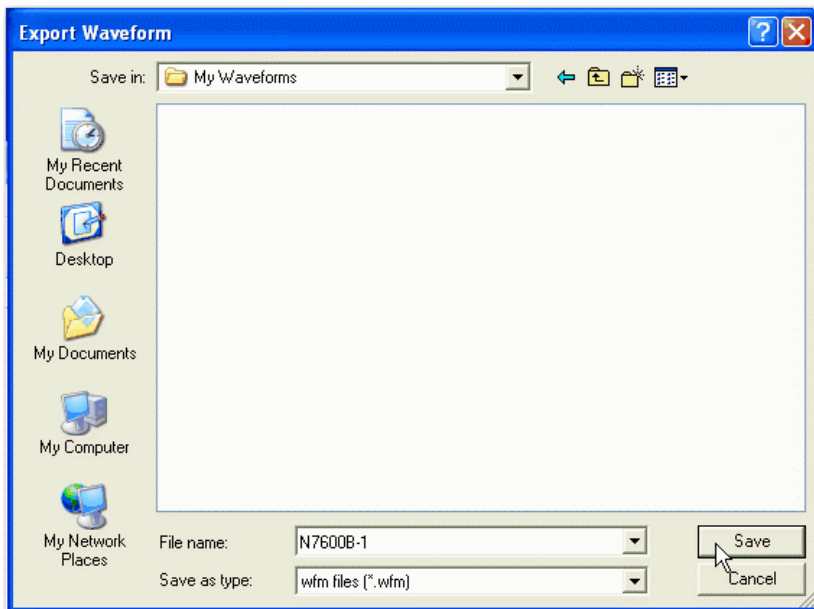
5. Click the **Generate Waveform** button.



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.

Using Signal Studio to Create and Download a Waveform

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).

FREQUENCY		AMPLITUDE		USB Media	
900.000 000 00 MHz		-10.00 dBm		Use as ▶	
I/Q AMGN					
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		
N7500B-1.WFM		375kB	05/21/10 14:22		
RestoreU3.exe		1.62MB	11/01/07 16:34		
*** 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.

FREQUENCY		RF OFF	WFM Licensing
6.000 000 000 00 GHz		-144.00 dBm	Add Waveform To First Available Slot
Waveform Licensing		Licenses Used: 3/50	Replace Waveform In Slot
Slot	Status	Filename	Clear Waveform From Slot
1	Locked 03/30/2010	50PK3GPP	Lock Waveform In Slot
2	Remaining Trial Time 20:40	PK50A	
3	Remaining Trial Time 22:33		Goto Slot
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 of BBG Segment Files in BBG Memory		Licenses Used: 6/50	Catalog Type (BBG Segments)
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	

Evaluating and Locking Waveforms to License Slots

- 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	UFI Licensing
6.000 000 000 00 GHz		-144.00 dBm	Add Waveform To First Available Slot
Waveform Licensing			Replace Waveform In Slot
Slot	Status	Filename	Licenses Used: 7/50
1	Locked 03/30/2010	50PK3GPP	Clear Waveform From Slot
2	Lock Required	PK50A	
3	Lock Required		Lock Waveform In Slot
4	Locked 03/31/2010	N7601B-1	
5	Locked 04/19/2010	41910B	Goto Slot
6	Lock Required	TRIAL4_0	
7	Remaining Trial Time 48:00		
8	Available	N7600B-1.WFM	
9	Available		
10	Available		
*** PROTO CODE ** NOT FOR CUSTOMER USE ***			06/01/2010 14:58
			Page 1 of 2

- 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*)
Select Pg 2/3			Display Waveform And Markers
Segment On BBG Media	Points	Sequence On Int Media	Segs
GSM_1C_CONT_WFM	250000		Waveform Segments
GSM_BURST_WFM	1950000		
N7600B-1.WFM	76800		Goto Row
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

- 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		Int Storage			
Pg 2/3	Segment	~57.1MSa free Points	Pg 1/3	Segment	~89.9MSa free Points
	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	
Page 1 of 2					

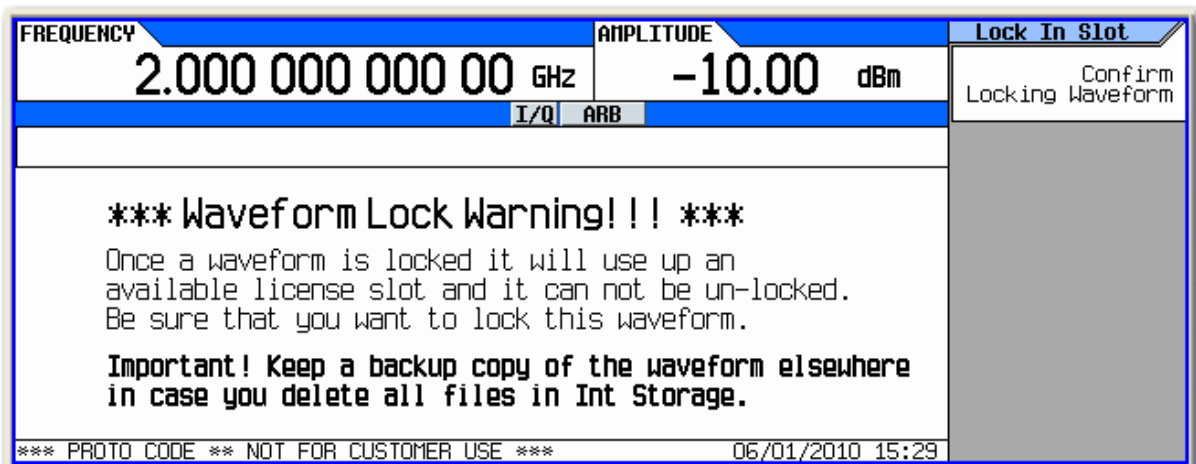
- To license the waveform into a 5- or 50-pack slot, press **Mode > Dual ARB > More > Waveform Licensing** and use the arrow keys or front panel knob to select your waveform file's slot.

FREQUENCY		AMPLITUDE		Waveform 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		
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	
Page 1 of 2					

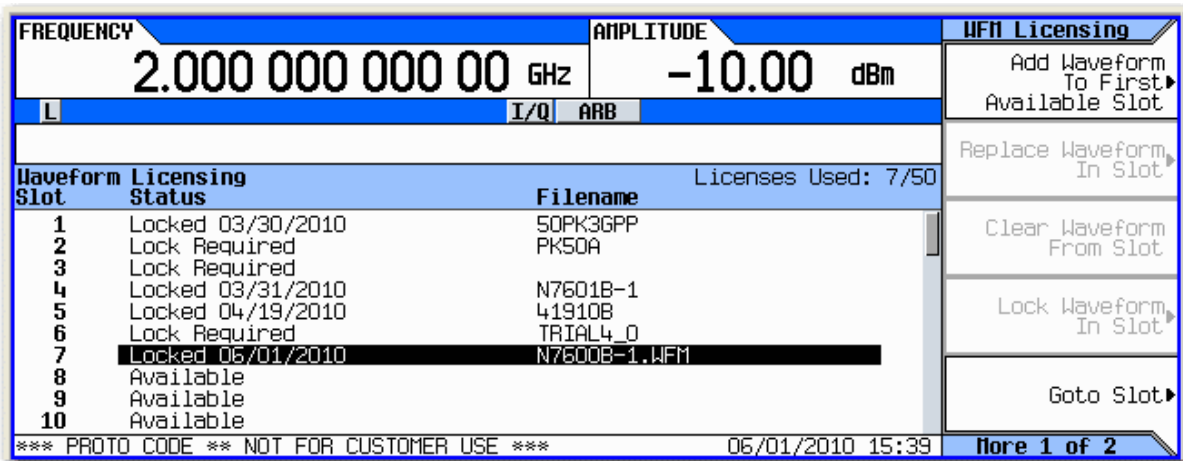
9. Press **Lock Waveform In Slot**. A warning message appears. Press **Confirm Locking Waveform**.

NOTE

Be sure to keep a backup copy of the waveform.

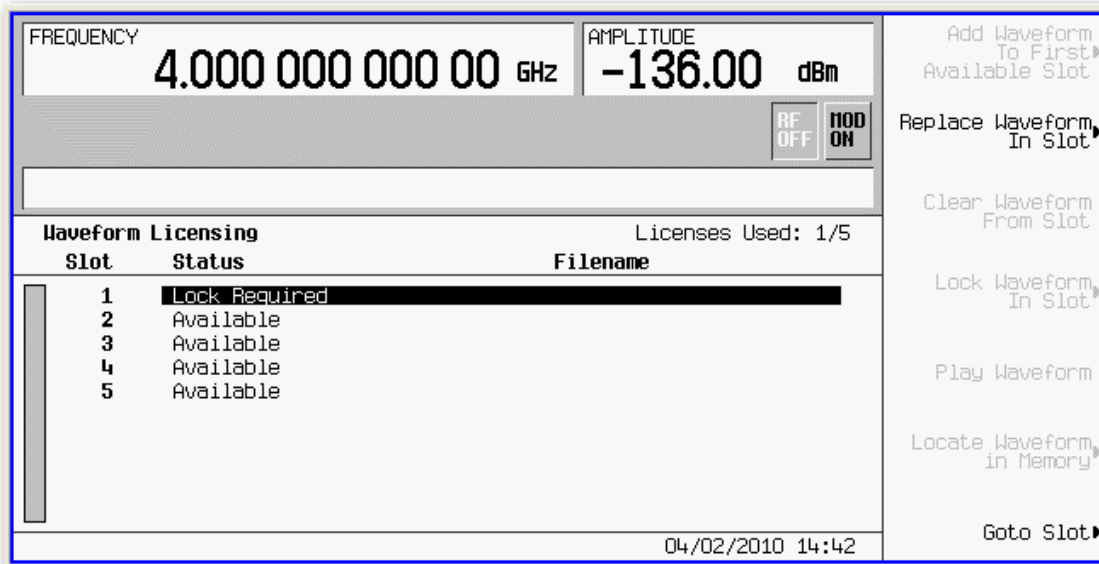


10. Your waveform file is now locked to a 5- or 50-pack slot and permanently licensed to your instrument.



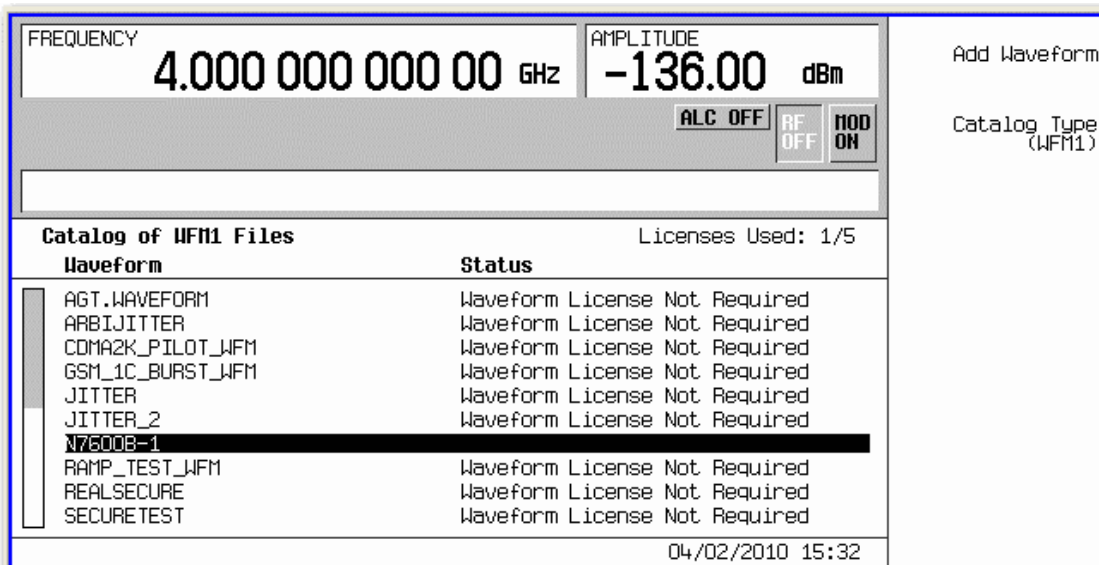
On the ESG

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.



Evaluating and Locking Waveforms to License Slots

- 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.

NOTE

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

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

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.

WFM1 (1/2)	Points	Segment	NWFM (1/2)	Points	Segment
	~65710336 points free			~1684778291 points free	
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	

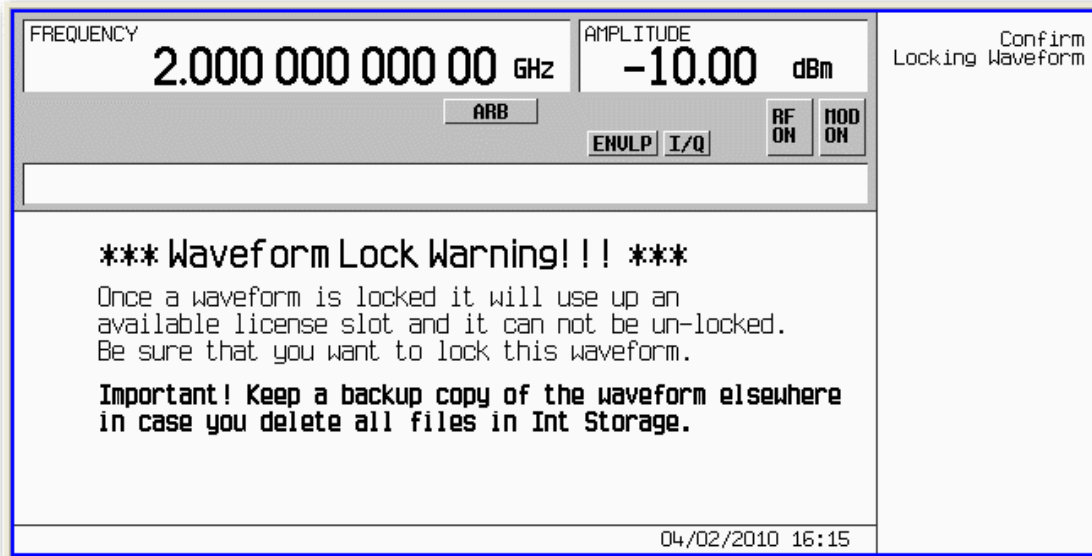
8. To license the waveform into a 5- or 50-pack slot, press **Mode > Dual ARB > More > Waveform Licensing** and use the arrow keys or front panel knob to select your waveform file's slot.

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

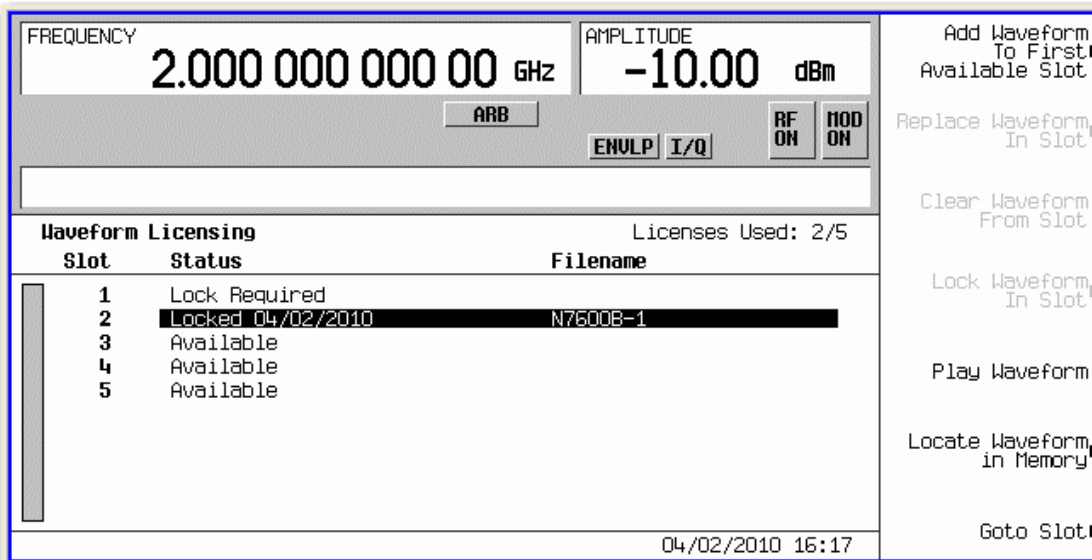
9. Press **Lock Waveform In Slot**. A warning message appears. Press **Confirm Locking Waveform**.

NOTE

Be sure to keep a backup copy of the waveform.

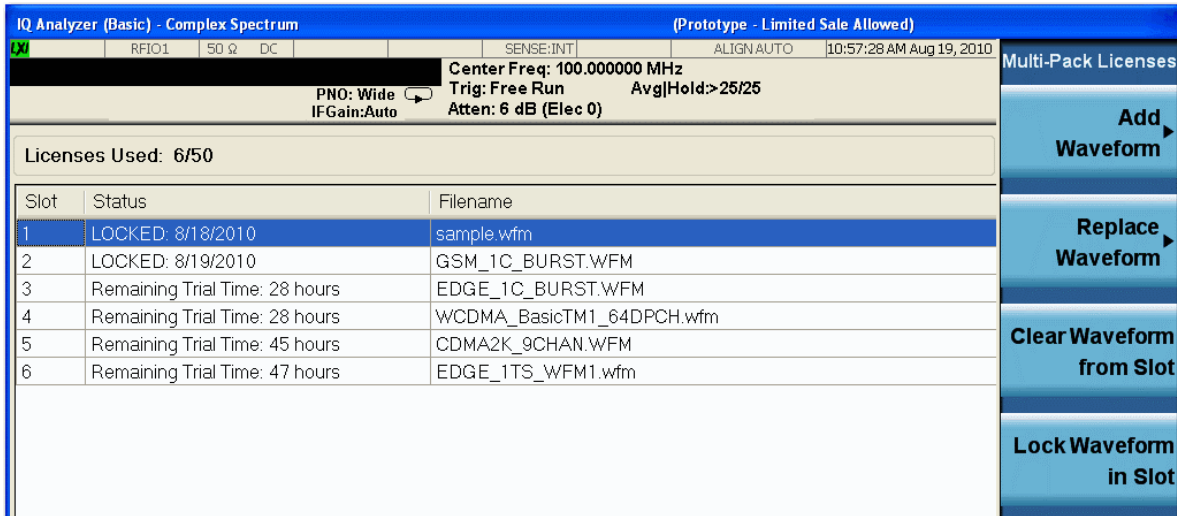


10. Your waveform file is now locked to a 5- or 50-pack slot and permanently licensed to your instrument.



On the EXT

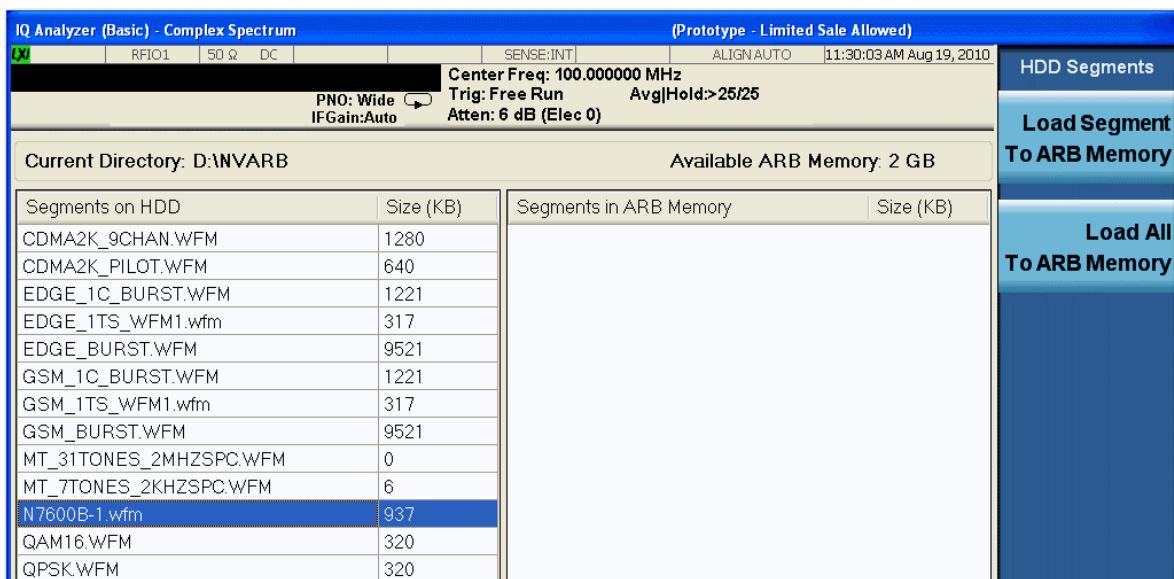
1. Press **Local** (same key as **Cancel/(ESC)**) to unlock the instrument from remote operation.
2. Press **Source > More 1 of 2 > Modulation Setup > ARB > More 1 of 2 > Waveform Utilities > Multi-Pack Licenses**. The following screen appears, showing occupied and available waveform slots for your instrument's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



Evaluating and Locking Waveforms to License Slots

4. Press Load Segment to ARB Memory.

The screenshot shows the IQ Analyzer (Basic) - Complex Spectrum interface. The top status bar indicates the center frequency is 100.000000 MHz and the available ARB memory is 1.990 GB. The 'Load Segment to ARB Memory' dialog box is open, displaying a table of segments on the HDD and a list of segments in ARB memory.

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		

5. 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 IQ Analyzer (Basic) - Complex Spectrum interface. The top status bar indicates the sample rate is 125.000000000 MHz and the licenses used are 7/50. The 'Add Waveform to License Slot' dialog box is open, displaying a warning message and a table of waveforms.

Waveform	Status
N7600B-1.wfm	

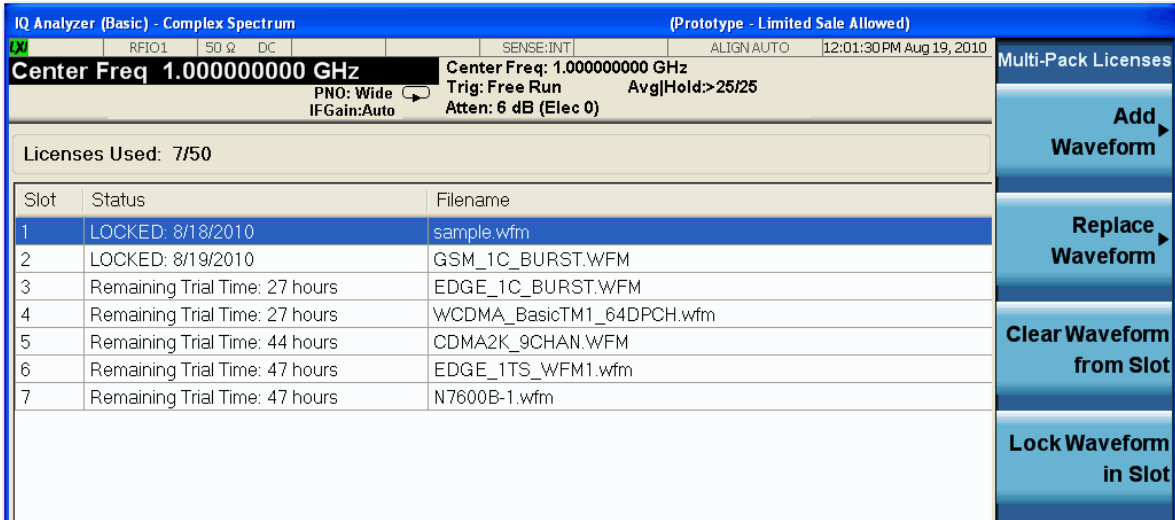
Add Waveform to License Slot

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?

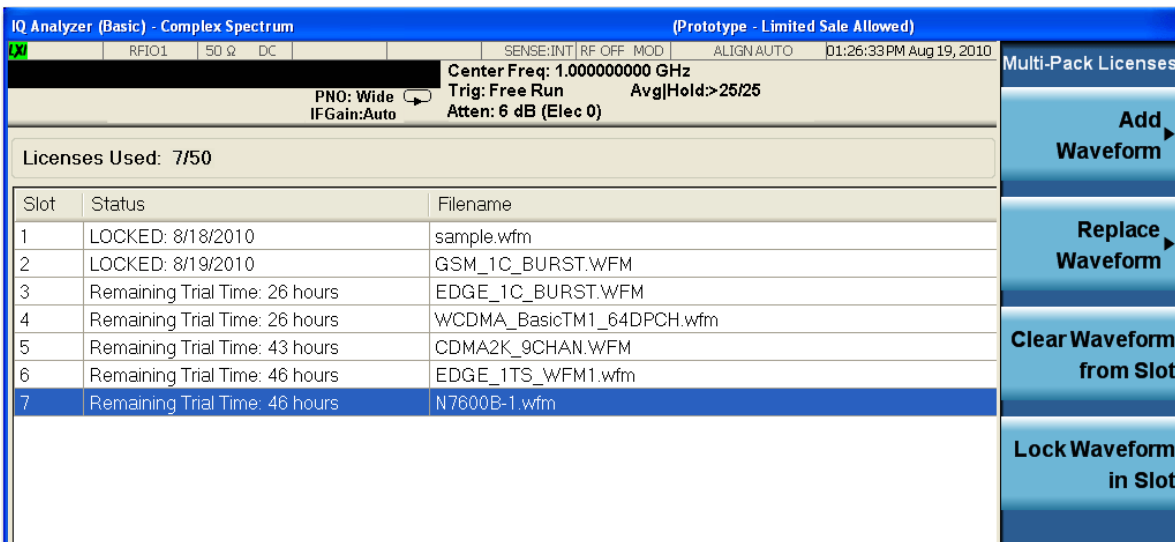
Press Enter to process or Esc to Cancel

OK Cancel

- 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.



- 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.



Evaluating and Locking Waveforms to License Slots

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.

The screenshot shows the Agilent IQ Analyzer interface. At the top, it displays 'Agilent IQ Analyzer (Basic) - Complex Spectrum' and '(Prototype - Limited Sale Allowed)'. The main display area shows a table of license slots. Slot 7 is selected, and a dialog box titled 'Lock Multi-Pack License Slot' is open. The dialog box contains a warning icon and the following text: 'This will lock the selected multi-pack slot. Once the slot is locked the waveform assigned to it cannot be changed. Are you sure you want to do this? Press Enter to process or Esc to Cancel'. There are 'OK' and 'Cancel' buttons at the bottom of the dialog box. The table below shows the license slots and their associated waveforms.

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	LOCKED: 8/19/2010

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

The screenshot shows the Agilent IQ Analyzer interface after the license slot has been locked. The main display area shows the same table of license slots as in the previous screenshot, but now Slot 7 is marked as 'LOCKED: 8/19/2010' and the filename is 'N7600B-1.wfm'. The dialog box is no longer present.

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	LOCKED: 8/19/2010	N7600B-1.wfm



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