

# Keysight Technologies Signal Studio Waveform Licenses

This document provides support for the following models:

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

# Notices

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## Introduction

This document describes how to:

- Use the N76xxC 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>.

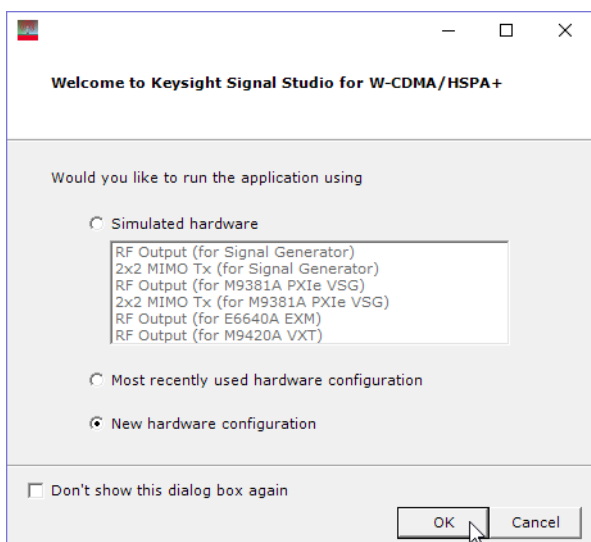
The following instruments support waveform licensing:

- 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
- M9381A PXIe vector signal generator (not described here—refer to the M9381A documentation)
- M9420A/21A VXT PXIe vector transceiver (not described here—refer to the M9420A/21A documentation)
- E6640A EXM wireless test set (not described here—refer to the E6640A documentation)

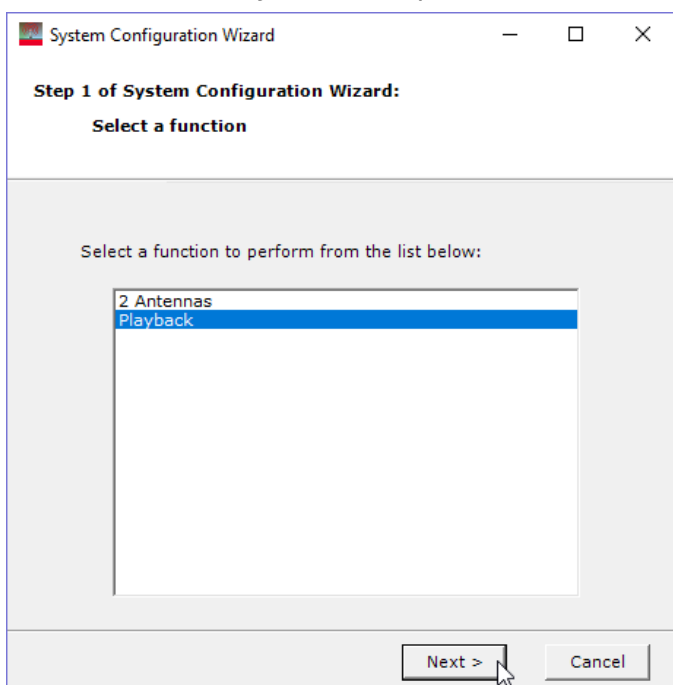
## Using Signal Studio to Create and Download a Waveform

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

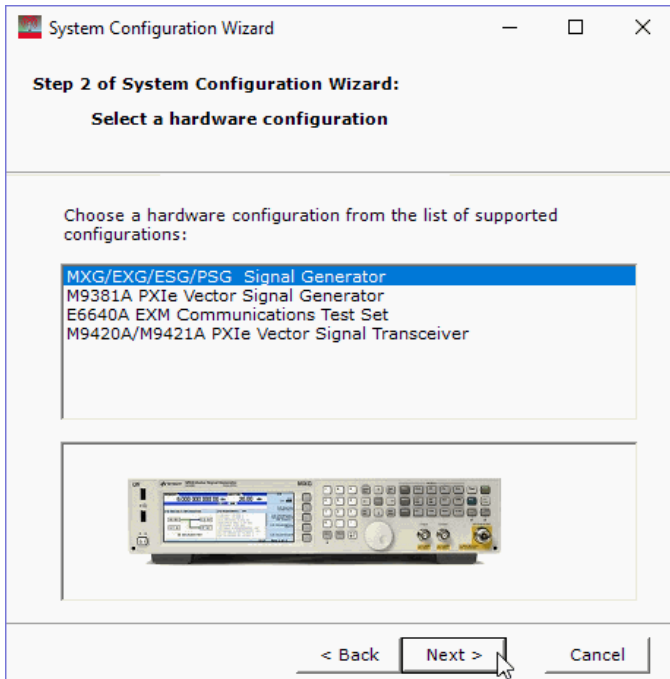
1. From the Keysight website, [www.keysight.com/find/signalstudio](http://www.keysight.com/find/signalstudio), download and install the Signal Studio software of your choice.
2. Open the software. The system configuration wizard appears.
3. Select **New hardware configuration** and click **OK**. If your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



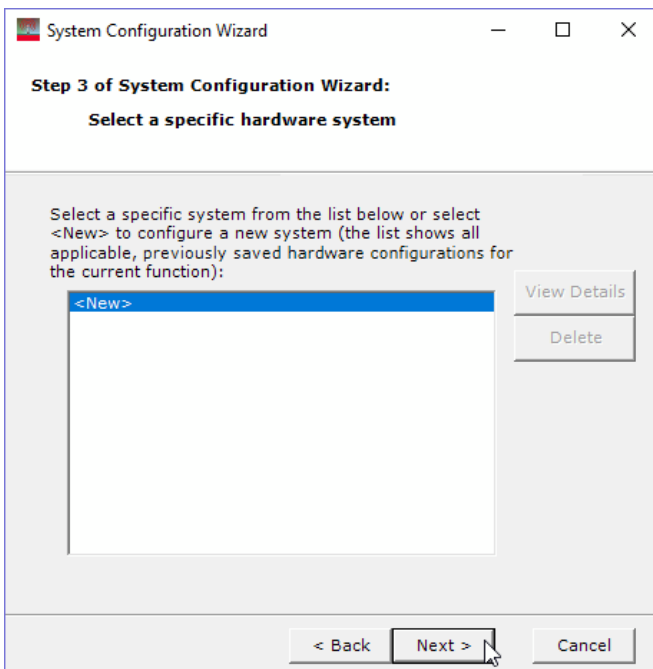
4. Select the function you want to perform and click **Next**.



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

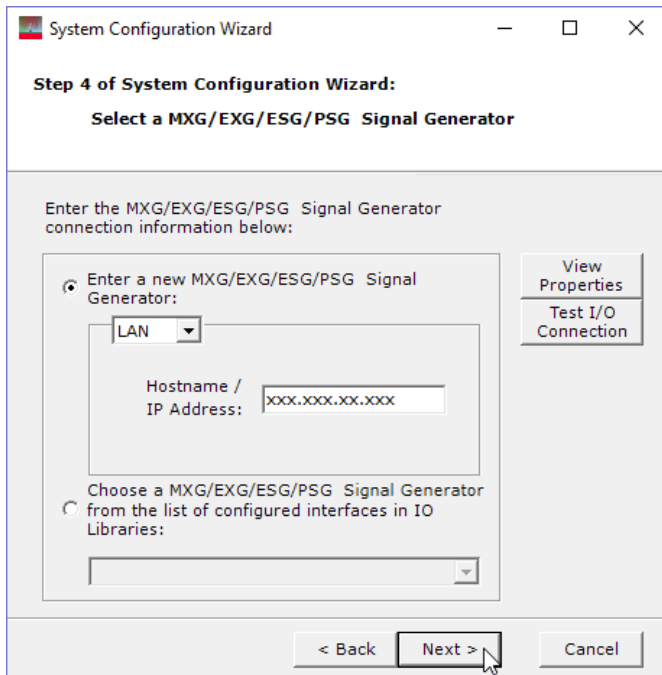


6. Click **Next**.

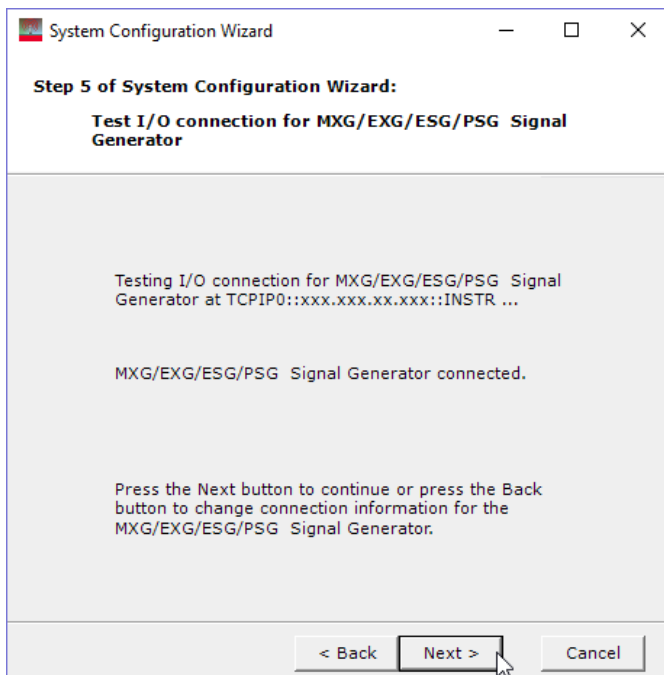


Using Signal Studio to Create and Download a Waveform

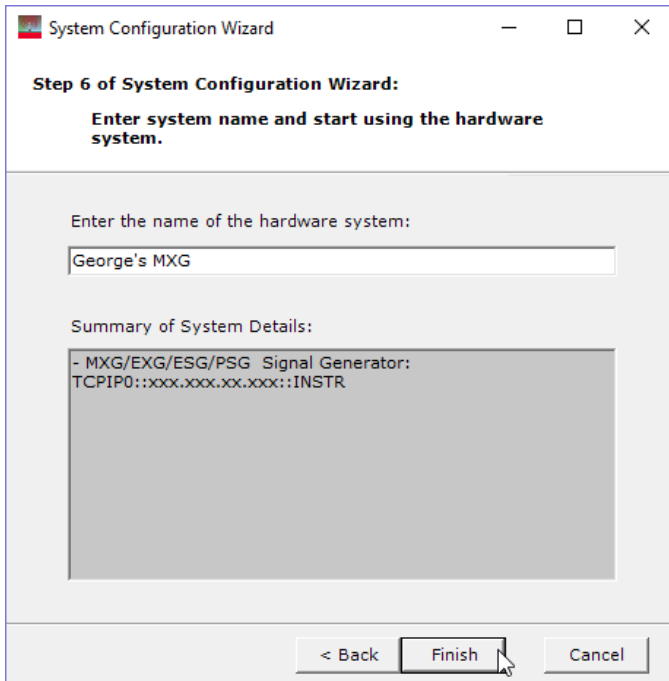
**7. Enter your instrument's IP address and click Next.**



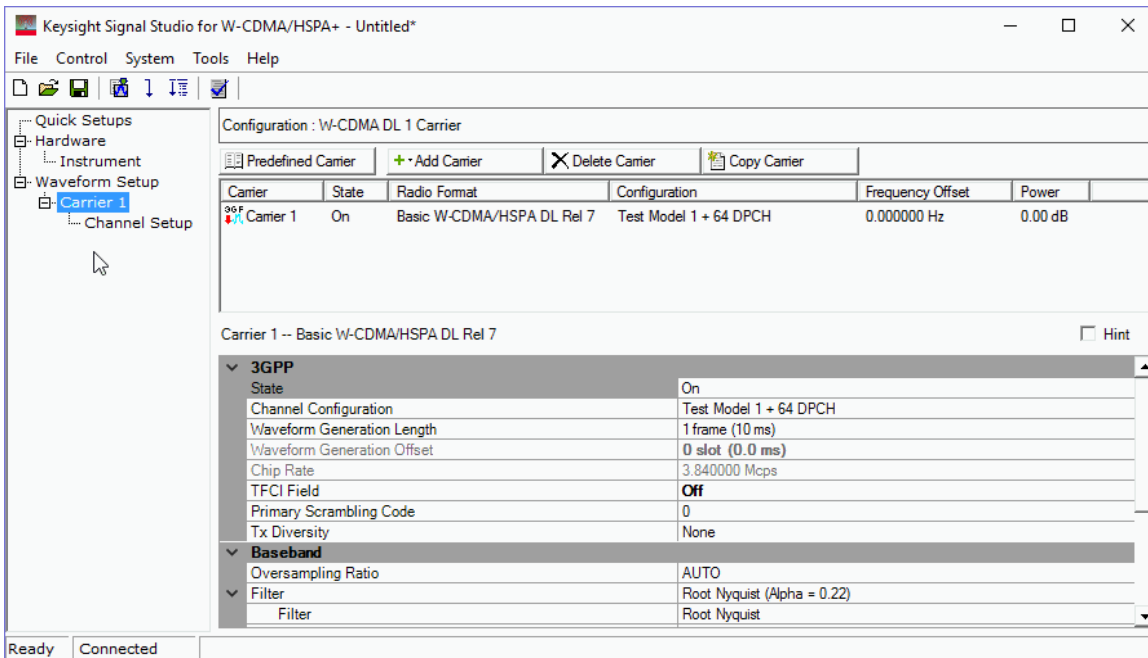
**8. Click Next.**



9. Enter a name for your hardware system and click **Finish**.

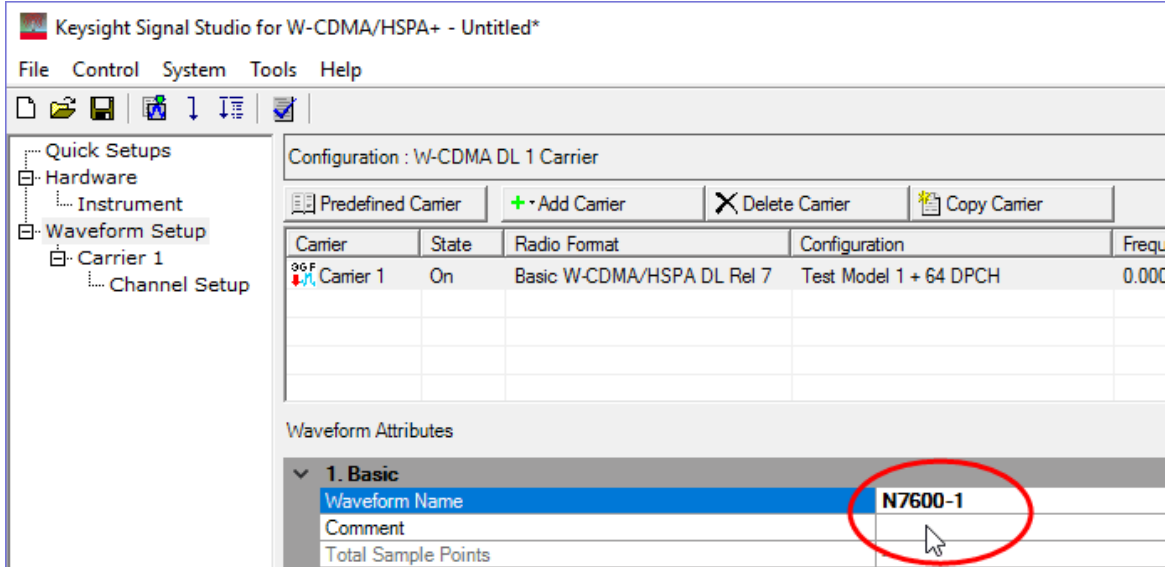


10. Configure the Signal Studio waveform using the various parameter selections and settings available under the **Waveform Setup** node in the tree view. This example shows the carrier settings for the N7600C Signal Studio software. Waveform parameters vary among Signal Studio products, so refer to your software's help system for more information.

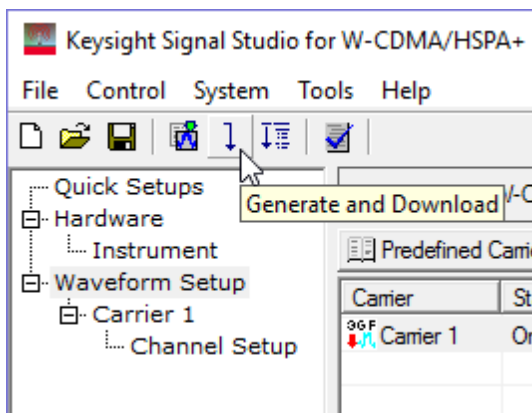


Using Signal Studio to Create and Download a Waveform

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



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



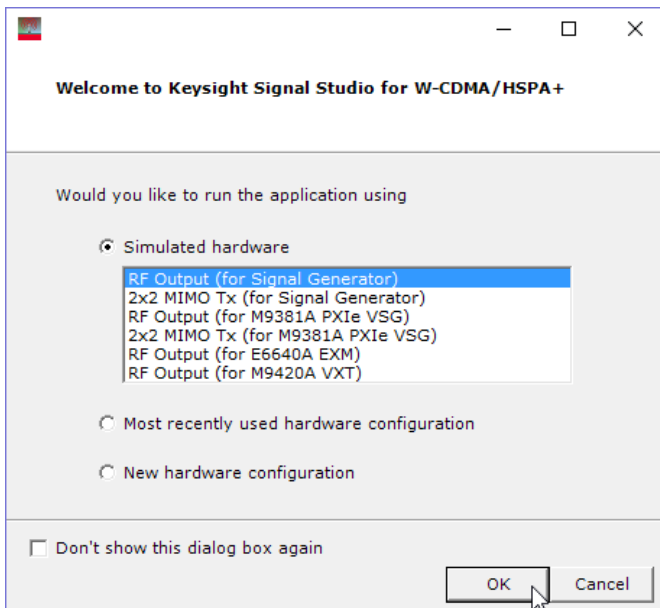
13. An Authorization message window may appear that reads, “The target instrument does not have a valid license. Without a valid license, an instrument cannot play back the downloaded waveform. Do you still want to download the waveform anyway?” Click **OK**.

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



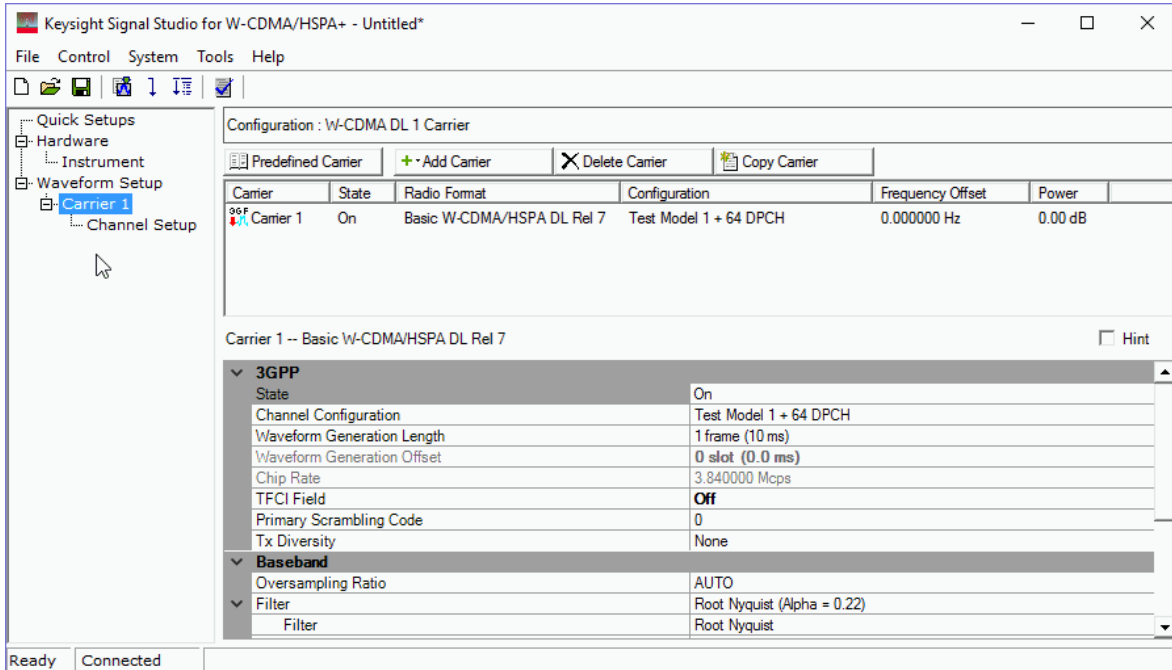
## Method 2: Export waveform files to a USB storage device (EXG, MXG)

1. From the Keysight website, [www.keysight.com/find/signalstudio](http://www.keysight.com/find/signalstudio), download and install the 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**.

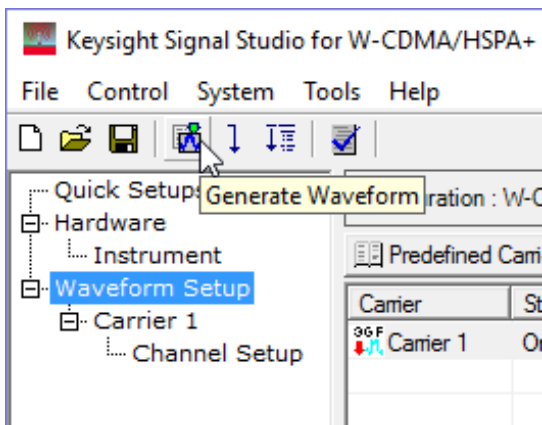


## Using Signal Studio to Create and Download a Waveform

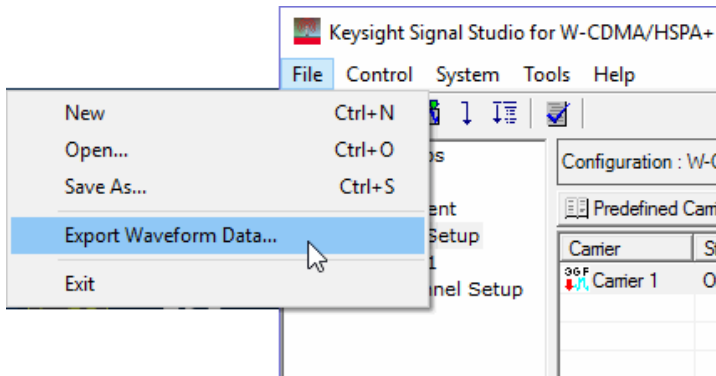
4. Configure the Signal Studio waveform using the various parameter selections and settings available under the **Waveform Setup** node in the tree view. This example shows the carrier settings for the N7600C Signal Studio software. Waveform parameters vary among Signal Studio products, so refer to your software's help system for more information.



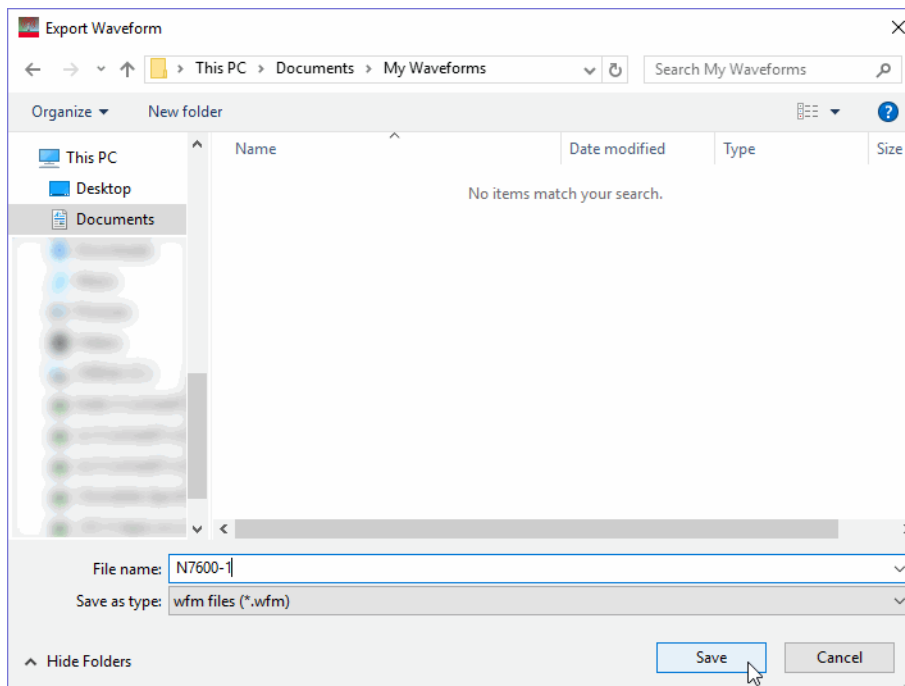
5. Click the **Generate Waveform** button.



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. 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).

The screenshot displays the USB media interface in Signal Studio. At the top, the frequency is set to 900.000 000 00 MHz and the amplitude is -10.00 dBm. Below this, the interface shows the USB directory structure. The current directory is '/', with 3.73GB of free space. A table lists the files and directories:

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
<b>N7500-1.WFM</b>		<b>375kB</b>	<b>05/21/10 14:22</b>
RestoreU3.exe		1.62MB	11/01/07 16:34

On the right side of the interface, there are several menu options: 'Use as', 'Copy File to Instrument', 'Up Directory', 'Delete File or Directory', and 'Create Directory'. At the bottom, the status bar shows '\*\*\* PROTO CODE \*\* NOT FOR CUSTOMER USE \*\*\*' and the date/time '05/27/2010 16:01'. The page number 'More 1 of 2' is also visible.

## 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
			Clear Waveform From Slot
			Lock Waveform In Slot
			Goto Slot
Waveform Slot	Licensing Status	Filename	Licenses Used: 3/50
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	Page 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		
N7600-1.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
			Replace Waveform In Slot
			Clear Waveform From Slot
			Lock Waveform In Slot
			Goto Slot
*** PROTO CODE ** NOT FOR CUSTOMER USE ***		06/01/2010 14:58	Page 1 of 2

Waveform Slot	Licensing Status	Filename	Licenses Used: 7/50
1	Locked 03/30/2010	SOPK3GPP	
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		N7600-1.WFM
8	Available		
9	Available		
10	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.

FREQUENCY		RF OFF	Arb Waveform
6.000 000 000 00 GHz		-144.00 dBm	Select Waveform (*NONE*)
			Display Waveform And Markers
			Waveform Segments
			Goto Row
*** PROTO CODE ** NOT FOR CUSTOMER USE ***		06/01/2010 15:03	

Select Pg 2/3	Segment On BBG Media	Points	Sequence On Int Media	Segs
	GSM_1C_CONT_WFM	250000		
	GSM_BURST_WFM	1950000		
	N7600-1.WFM	76800		
	N7601B-1	76800		
	PAUL 1	1432		
	QAM16_WFM	65536		
	QPSK_WFM	65536		
	RAMP_TEST_WFM	200		
	SINE_TEST_WFM	200		
	TESTWAVE	1000		

- 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 <b>Store</b>	
		I/Q ARB			
				Store Segment To Int Media	
				Store All To Int Media	
				Delete Segment▶	
				Delete All Segments On BBG Memory▶	
*** PROTO CODE ** NOT FOR CUSTOMER USE ***		06/01/2010 15:15		Page 1 of 2	

BBG Memory		Int Storage	
Pg 2/3	Segment Points	Pg 1/3	Segment Points
	GSM_1C_CONT_WFM 250000		12TONE_WFM 2112
	GSM_BURST_WFM 1950000		2TONE_WFM 80
	<b>N7600-1_WFM 76800</b>		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

- 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▶	
*** PROTO CODE ** NOT FOR CUSTOMER USE ***		06/01/2010 15:20		Page 1 of 2	

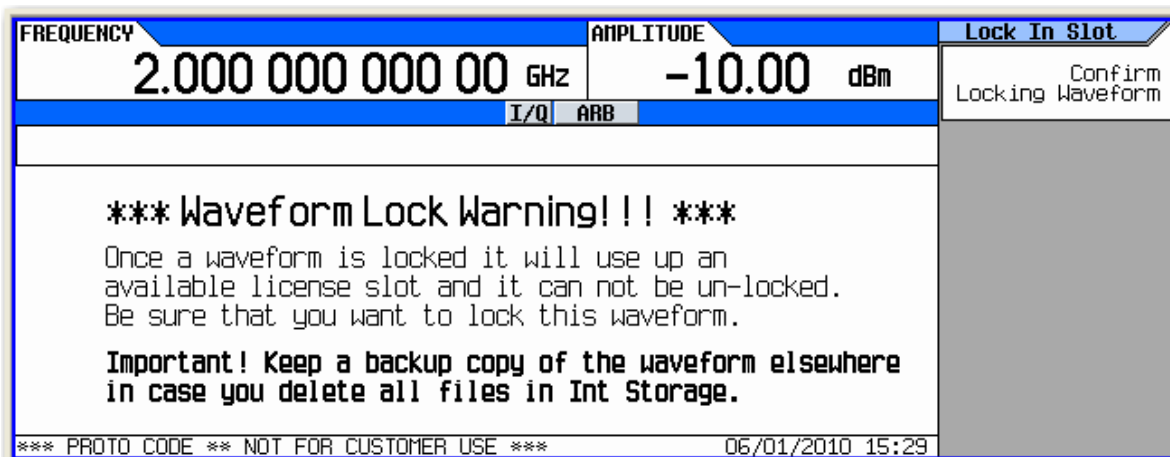
  

Waveform Slot	Licensing Status	Filename
1	Locked 03/30/2010	50PK3GPP
2	Lock Required	PK50A
3	Lock Required	
4	Locked 03/31/2010	N7601B-1
5	Locked 04/19/2010	41910B
6	Lock Required	TRIAL4_0
7	Remaining Trial Time 47:37	<b>N7600-1.WFM</b>
8	Available	
9	Available	
10	Available	

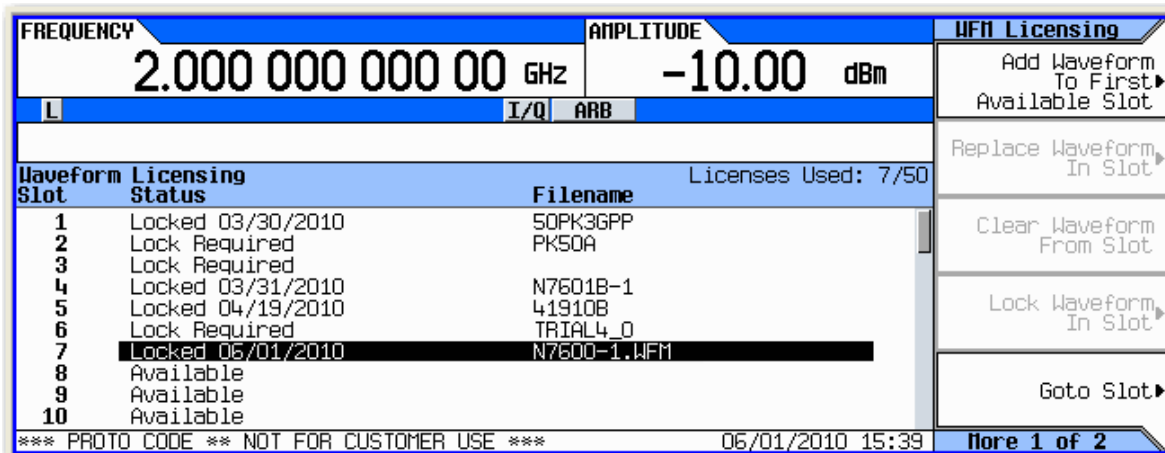
9. Press **Lock Waveform In Slot**. A warning message appears. Press **Confirm Locking Waveform**.

**NOTE**

Be sure to keep a backup copy of the waveform.



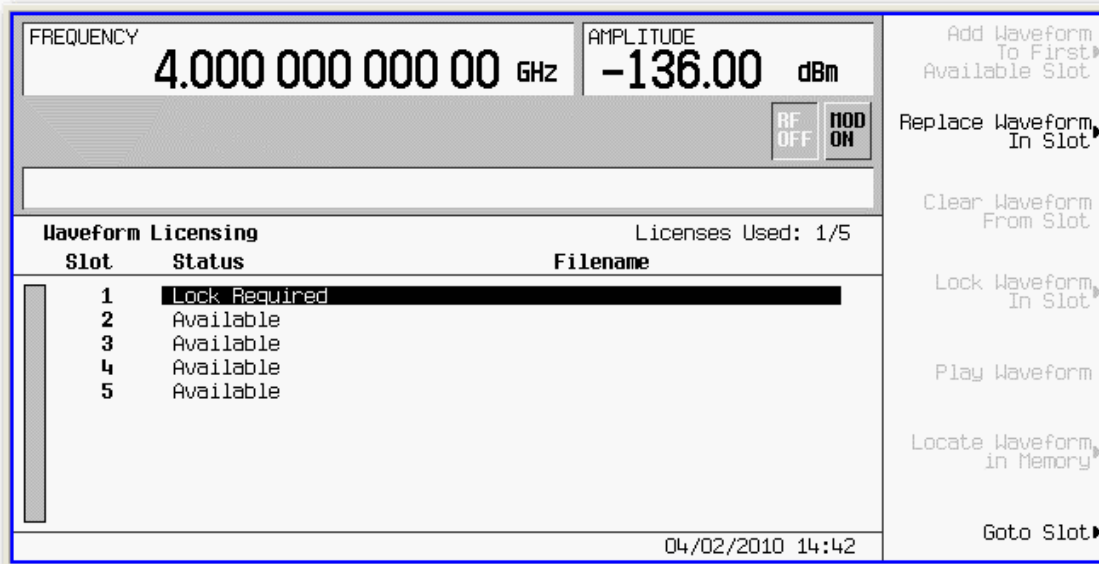
10. Your waveform file is now locked to a 5- or 50-pack slot and permanently licensed to your instrument.





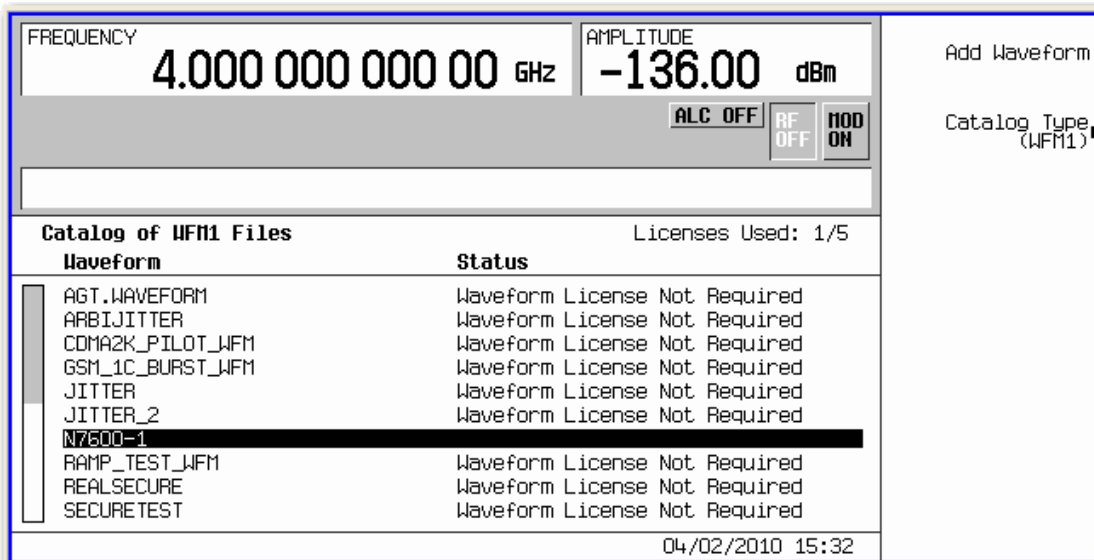
On the ESG

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	N7600-1
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.

(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
	N7600-1	153600	NEW_PATTERN_2	4
	RAMP_TEST_WFM	200	RECURSE_TEST	1
	REALSECURE	200	RECURSE_TEST1	1
	SECURETEST	200	RECURSE_TEST10	1

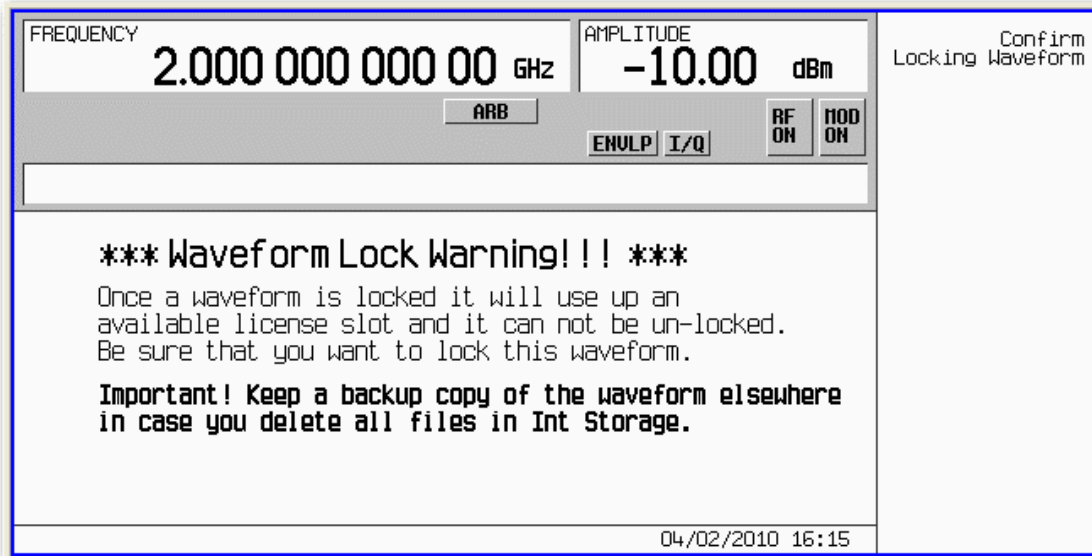
- Press **Select Waveform > ARB Off On to On**. Set your frequency and amplitude for the carrier as you like and then press **RF On/Off to On**. You can now evaluate the waveform in your specific test scenario.
- Prior to licensing (locking) your waveform file, you must save it to the instrument's non-volatile 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.

- 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.

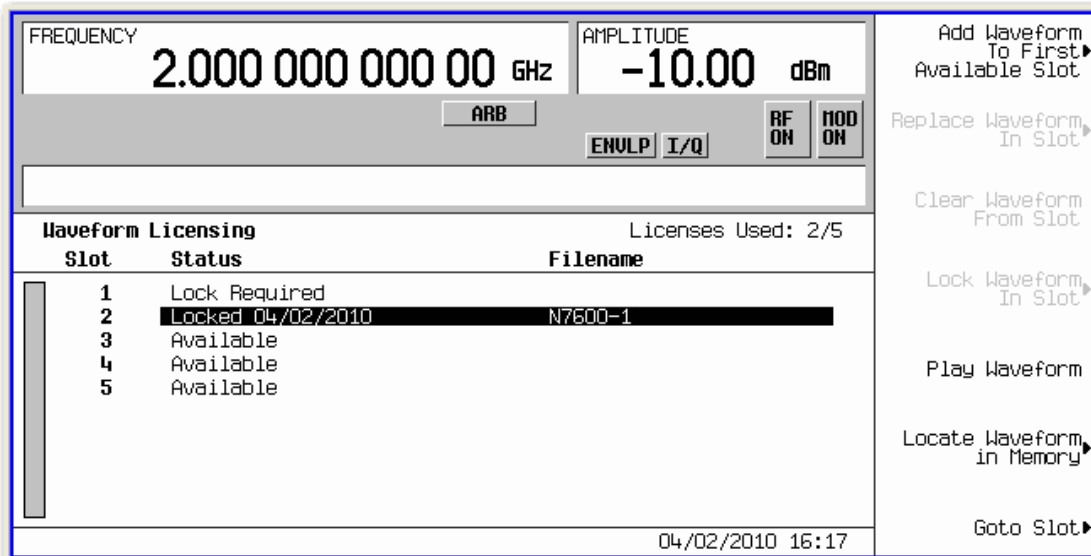
9. Press **Lock Waveform In Slot**. A warning message appears. Press **Confirm Locking Waveform**.

**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.





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