

# Streamline Field Test with Agilent N9342C Handheld Spectrum Analyzer (HSA)



## Introduction

In the field, RF issues like faulty transmitter and antenna, amplifier overdrive and signal interference, can impact the operation of an RF system and result in degraded system performance. Testing RF issues therefore becomes mandatory. With the rapid development of various RF systems – such as cellular, satellite, broadcasting, or military-related – testing becomes more challenging. Today's field engineers or technicians now need to run routine tests on more systems. The optimal solution is to equip them with a handheld spectrum analyzer (HSA) that can perform all measurements in a straightforward go/no-go manner without complicated instrument setup.

As the new member of the Agilent handheld spectrum analyzer (HSA) family, the N9342C HSA measures up to 7 GHz, has great performance, and a rich set of features, including a built-in

GPS receiver. A GPS antenna is also built in to enable the N9342C HSA to get precise geographic location information without the need of an external GPS antenna. Most important of all, the N9342C HSA offers a dream tool tailored to make field routine measurements easier than ever before, with the industry's first innovative Task Planner.

## Challenges of Field Spectrum Analysis

A spectrum analyzer is a powerful tool which can perform various measurements such as frequency and power, spur, distortion, and adjacent channel power ratio. It is also one of the more complex test and measurement tools for field engineers and technicians to use.

In the field, the instrument has to be set up to make the correct measurements. This set-up process can take



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a substantial amount of time. In fact, sometimes field engineers and technicians spend more time pushing instrument set-up buttons than they do actually making measurements, compromising their speed, productivity, and flexibility.

Another unfortunate consequence of pushing a multitude of buttons for set-up is the high probability of operators making mistakes. The cost of such errors can be quite high — for example, in instances where the engineer has to drive hundreds of miles to redo the measurement.

So what is the field technician’s dream tool? After in-depth market research it became clear that operators want an instrument that needs just one button press that automatically does the setup, captures signals, saves the result, and generates a report.

## What is Task Planner?

Task Planner, (Option code N9342C-TPN or N9342CK-TPN as the upgrade), is a unique tool that addresses the above mentioned field testing challenges. Tailored for field users, Task Planner is an innovative tool that works exactly in the manner favored by the field user. Task Planner streamlines multiple measurements with minimum manual operation, cutting test setup time by up to 95 percent and allowing users to greatly improve productivity.

Task Planner is an intuitive tool with a user-friendly interface. To begin using Task Planner, users create a pre-defined task plan file consisting of up to 20 tasks using the free N9342C HSA PC software. Next, the task plan file is transferred to the N9342C, which executes the measurements sequentially and automatically. Measurement results are then logged and a corresponding measurement report, with screenshots, is generated. Once created, the task plan file can run on all N9342Cs and can be distributed easily via email or USB flash drive.

The following example is taken from a typical RF transmitter measurement, including three different measurements: channel power, occupied bandwidth (OBW), and adjacent channel power ratio (ACPR). Detailed instructions are given.

### Step 1: Create a Task Plan File (.TPF)

Creating a task plan file is a two part process. First, the N9342C is set up according to the test requirement and the

instrument state files (.STA) are saved. Second, these state files are loaded into the N9342C HSA PC software to compile the task plan file (.TPF). Note one state file is required for one measurement task, e.g. if six tasks are required then six state files need to be saved. Currently up to 20 measurement tasks can be saved in one task plan.

In the following example, three different measurement tasks (channel power, OBW and ACPR), will be made so three different state files need to be saved. After that the free N9342C HSA PC software is used to compile the task plan file (.TPF) based on the three N9342C state files.

#### Step 1.1: Save state files

Instructions for N9342C HSA	Keystrokes for N9342C HSA
Set center frequency and span	[Freq], {Center Freq}, [2], {GHz}, [Span], [10], {MHz}
<b>Task 1:</b> Channel power	[Meas], {Channel Power} {Integrated BW}, [5],
Set integrated bandwidth	{MHz}
Save the state file for channel power	[Shift], {File}, {Save As}, input file name [WCDMA_CHP], use the rotating knob to choose File Type: STA", [Enter]
<b>Task 2:</b> Occupied bandwidth (OBW)	[Meas], [Meas], {OBW}
Save the state file for OBW	[Shift], {File}, {Save As}, input file name [WCDMA_OBW], use the rotating knob to choose File Type: STA", [Enter]
<b>Task 3:</b> Adjacent channel power ratio (ACPR)	[Meas], [Meas], {ACPR}
Set main channel BW, adjacent channel BW and space	{Main Channel}, [3.84], {MHz}, {Adj Chn BW}, [3.84], {MHz}, {adj Chn Space}, [5], {MHz}
Save the state file for ACPR	[Shift], {File}, {Save As}, input the file name [WCDMA_ACPR], use the rotating knob to choose File Type: STA", [Enter]

## Step 1.2: Compile task plan file (.TPF) with the free N9342C HSA PC software

*Note: Make sure the Agilent I/O library and the N9342C HSA PC software are correctly installed. Connect N9342C HSA and PC via a USB cable.*

Run the N9342C HSA PC software

Establish the connection between the PC and the N9342C HSA

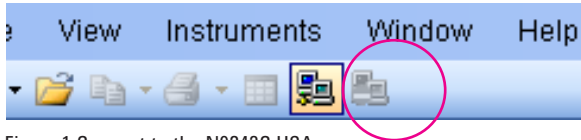


Figure 1 Connect to the N9342C HSA

- Click the connection shortcut in the toolbar as shown in Figure 1
- Select the N9342C HSA in the connect instrument dialog box
- Click "Ok" button

*Note: For connection issue, please refer to the built-in help of the PC software: [Help] [Contents] [Getting Started] [Preparation]*

Add state files into the task plan file

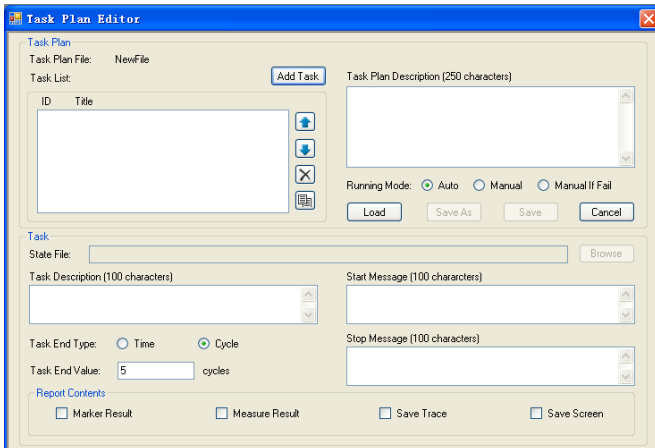


Figure 2 Task Plan Editor

- Click "Instruments" then "Task Plan Editor" to open the task plan editor as shown in Figure 2



Figure 3 Add from the device

- Click "Add Task" button in the task plan editor

*Note: if these state files are on the PC, you should choose media type "PC" before clicking "Add Task" button.*

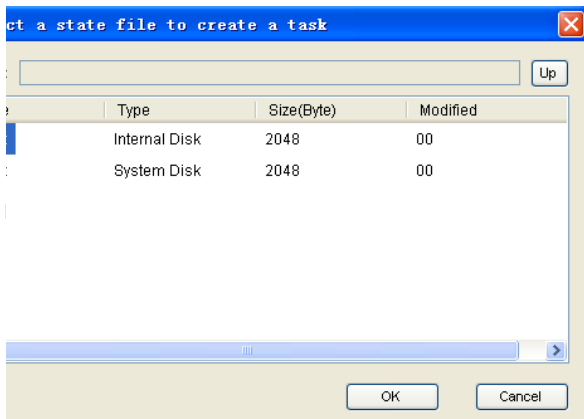


Figure 4 Select a state file

- Double click the "Driver C" in the "Select a state file to create a task" dialog box as shown in Figure 4
- Double click file WCDMA\_CHP.STA
- Repeat the steps from b to d to add WCDMA\_OBW.STA, and WCDMA\_ACPR.STA to the task plan

### Edit the task list

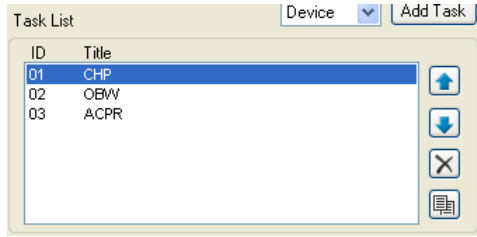


Figure 5 Task List

The task list can be easily edited:

- Click button and to move up or down the file
- Click button to delete task files
- Click button to copy files
- Double click the selected task file to rename the selected task

### Edit the task description, start/stop message, report contents, and limits

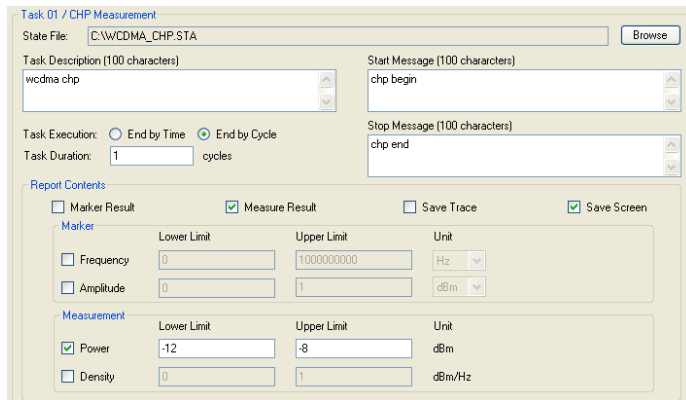


Figure 6 Edit a task

**Note:** Use the Task Description and Start/Stop message to give brief instructions to field engineer/technician on test setup.

**Note:** Task Execution can be ended by either Time or Cycle. If "End by Time" is selected, the unit of the unit of "Task Duration" is seconde.

**Note:** About report contents

Four types of report content are provided:

#### Marker result

If this is selected, the N9342C will log the marker readout if the marker is enabled in the state file. The upper and lower limits can be set up for marker frequency and amplitude to indicate the PASS/FAIL of the marker readout.

#### Measure Result

Measure result is only shown when the measurement is CHP, OBW, or ACPR. The upper and lower limits can be set up to indicate the PASS/FAIL of the measurement result.

#### Save Trace

If this is selected, the N9342C HSA will save the trace (.TRC) at the end of the current task.

#### Save Screen

If this is selected, the N9342C HSA will capture the screen (.JPG) at the end of the current task.

The following demonstration is on Test 1: Channel power (see Figure 6).

a) Task description:

- Select CHP in the task list
- Input "wcdma chp" in the Task Description box
- Input "chp begin" in the Start Message box
- Input "chp end" in the Stop Message box

b) Set Task Execution to "End by Cycle "and set Task Duration to 1

c) Set Report Contents as the following:

- CHP's lower limit is -12 dBm and upper limit is -8 dBm

d) Select the task "OBW"

Input "wcdma obw" in the Task Description box

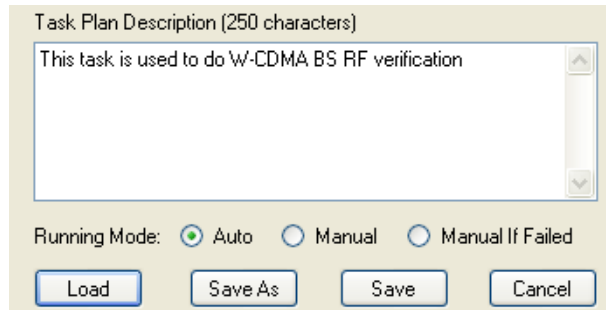
- Input "obw begin" in the Start Message box
- Input "obw end" in the Stop Message box
- Set lower limit as 4 MHz and upper limit as 5 MHz

e) Select the task "ACPR"

- Input "wcdma acpr" in the Task Description box
- Input "acpr begin" in the Start Message box
- Input "acpr end" in the Stop Message box
- Set  $\pm 5$  MHz ACPR's lower limit as -60 dBc and upper limit as -44.2 dBc.
- Set  $\pm 10$  MHz ACPR's lower limit as -60 dBc and upper limit as -49.2 dBc

Edit the Task Plan Description, Running Mode and save the task plan.

a) Input "This task is used to do W-CDMA BS RF verification" as the Task Plan Description



b) Select "Auto" as the Running Mode

Figure7 Task Plan Running Mode

**Note: About running mode**

There are three choices (see Figure 8):

**Auto**

Tasks are executed non-stop till all tasks are completed.

**Manual**

After one measurement task is finished, there is a measurement result report (Figure 8) and you can choose to

- {Redo} Redo the current task
- {Next} Execute the next task
- {Skip} Skip the next task

**Manual if Failed**

The measurement tasks are executed non-stop but if there is a failed result, e.g. passing the defined limit, it will enter "Manual" mode.

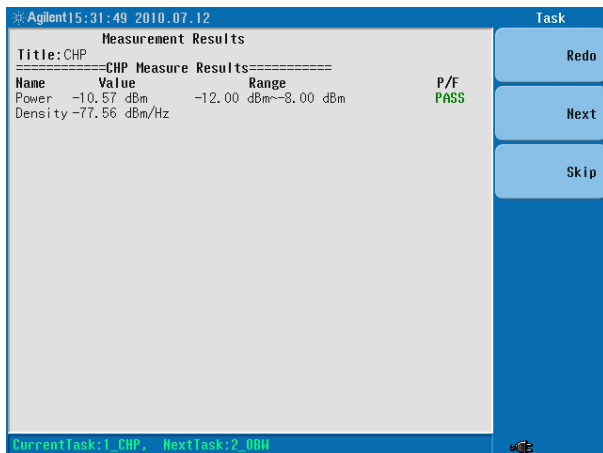


Figure 8 Task Measurement Result

A "Load" button is provided to load an existing \*.TPF for future modification.

c) Click the "Save as" button and save this file as: "W-CDMA.tpf. Close the "Task Plan Editor" dialog box.

## Step 2: Transfer the Task Plan File to the N9342C HSA

There are two ways to transfer the task plan file to the N9342C HSA: via a USB flash drive or using the N9342C HSA PC software. In this example we will use the USB flash drive to transfer the task plan file to the N9342C HSA. Note the task plan file needs to be placed in the "N934XDATA" directory in the USB flash drive. If the "N934XDATA" doesn't exist, please create one under the root directory of the USB flash drive. Insert the USB flash drive to the USB port on the N9342C and go to the next step.

## Step 3: Run Task Planner

### Instructions for N9342C HSA

Enter Task Planer

Load the task plan file

Run the task plan file (Figure 9)

### Keystrokes for N9342C HSA

[Mode], Task Planner

[Directory], [Media Type], [USB], use the rotating knob to select file "W\_CDMA.TPF", [Enter]

{Run}

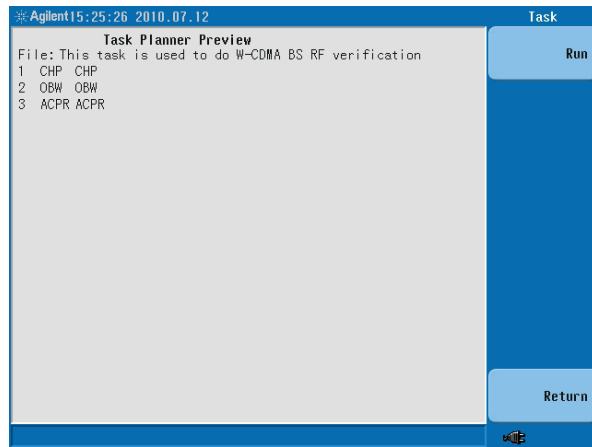


Figure 9 Task Plan Preview

Run task 1: Channel power

- Press [Enter] after the "chp begin Enter/Esc to Confirm" message appears
- Press [Enter] after the "chp end Enter/Esc to Confirm" message appears

Run task 2: OBW

- Press [Enter] after the "obw begin Enter/Esc to Confirm" message appears
- Press [Enter] after the "obw end Enter/Esc to Confirm" message appears

Run task 3: ACPR

- Press [Enter] after "acpr begin Enter/Esc to Confirm" message appears
- Press [Enter] after "acpr end Enter/Esc to Confirm" message appears

Read the report

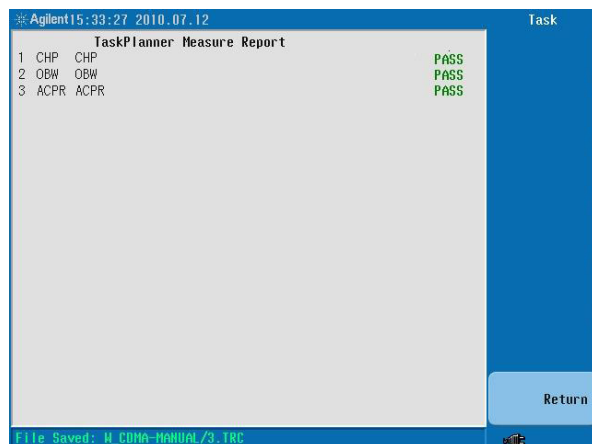


Figure10 Task Plan Measurement Result

N9342C HSA automatically creates a folder whose name is the same as the task plan file name (for this demo, the directory is named as W\_CDMA) to save all report contents, including a text report, screenshots, and trace files depending on the choices of report contents. The PASS/FAIL result is shown in the report

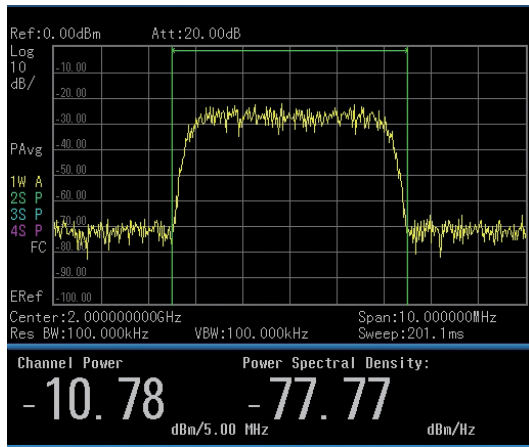


Figure 11 Channel Power Measurement Result

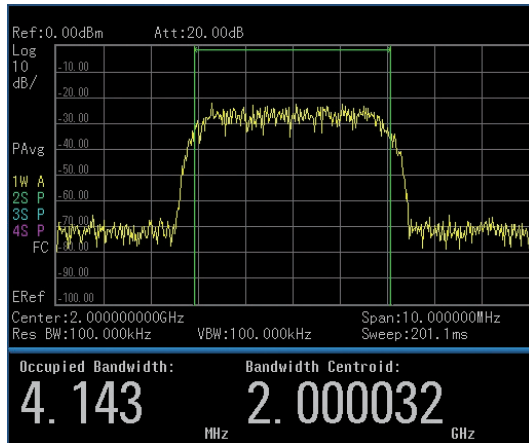


Figure 12 OBW Measurement Result

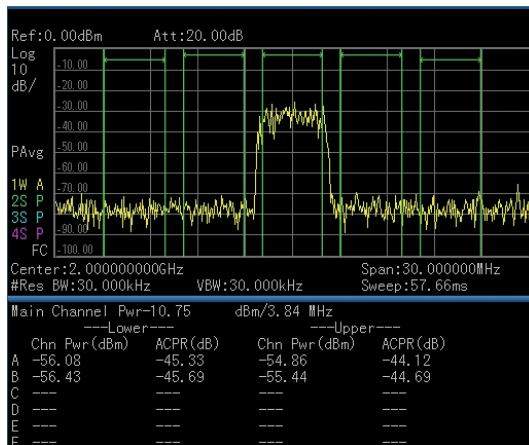


Figure 13 ACPR Measurement Result

## Summary

The Agilent N9342C HSA's Task Planner option is a great tool for making complex field measurements simpler to perform and faster to obtain. The Task Planner saves field engineers/technician from tedious instrument setup and boosts work efficiency. It also offers a more effective operation model: an experienced field engineer creates the task plan file then distributes it to the less-experienced field technicians. This allows technicians of any skill level to simply drive to the designated spot and run the Task Planner on the N9342C to make the measurements. With both the Task Planner and the built-in GPS receiver, the N9342C HSA guarantees the RF measurements are made in the right way, at the right time, and at the right place.



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