

**Manufacturer:** National Instruments

**Board Assembly Part Numbers** (Refer to Procedure 1 for identification procedure):

Part Number and Revision	Description
147931A-01L	USRP N320
147931A-03L	USRP N320 W/O TPM
147932A-01L	USRP N321
147932A-03L	USRP N321 W/O TPM

**Volatile Memory**

<i>Target Data</i>	<i>Type</i>	<i>Size</i>	<i>Battery Backup</i>	<i>User<sup>1</sup> Accessible</i>	<i>System Accessible</i>	<i>Sanitization Procedure</i>
Waveform storage	DRAM	2 GB	No	Yes	Yes	Cycle Power
Device operation	FPGA / Processor	Xilinx XC7Z100 (-01/-03)	No	Yes	Yes	Cycle Power
Device operation storage	DRAM	1 GB	No	Yes	Yes	Cycle Power

**Non-Volatile Memory (incl. Media Storage)**

<i>Target Data</i>	<i>Type</i>	<i>Size</i>	<i>Battery Backup</i>	<i>User Accessible</i>	<i>System Accessible</i>	<i>Sanitization Procedure</i>
Module configuration	EEPROM	256 B	No	Yes	Yes	Procedure 2
JTAG interface configuration	EEPROM	256 B	No	No	Yes	None
RF configuration, slot 0	EEPROM	64 KB	No	Yes	Yes	Procedure 3
RF configuration, slot 1	EEPROM	64 KB	No	Yes	Yes	Procedure 3
RF control PLD, slot 0	CPLD	Altera 10M04SA	No	Yes	Yes	Procedure 4
RF control PLD, slot 1	CPLD	Altera 10M04SA	No	Yes	Yes	Procedure 4

<sup>1</sup> Refer to *Terms and Definitions* section for clarification of *User* and *System Accessible*

## Procedures

### Procedure 1 – Board Assembly Part Number identification:

To determine the Board Assembly Part Number and Revision, refer to the label applied to the surface of your product. The Assembly Part Number should be formatted as “P/N: 147931x-01L” for the USRP N320, “P/N: 147931x-03L” for the USRP N320 without TPM, “P/N: 147932x-01L” for the USRP N321, or “P/N: 147932x-03L” for the USRP N321 without TPM, where “x” is a capital letter indicating the revision (e.g. A, B, C...).

### Procedure 2 – Clear the Module Configuration EEPROM:

This EEPROM stores device-specific serial numbers and MAC addresses. The user is provided with commands to directly modify these critical values. To prevent rendering the device inoperable, the original EEPROM contents should be saved and referenced for future use, prior to clearing the device. However, it is also possible to completely erase the device with user-defined values. Both options (A and B) are shown below.

As a precursor to all the following instructions, log into the device using a remote console.

#### *Option A: Save and Restore Original Data*

##### Save:

User-accessible portions of the module EEPROM may be read from the device using the following command entered in the console. Save the information in any format of your choosing.

```
eeeprom-dump
```

##### Restore:

User-accessible portions of the module EEPROM may be written using the following command entered in the console. Use the --help flag to view the latest command syntax. Enter the previously saved data into the command in the appropriate fields.

```
eeeprom-init
```

#### *Option B: Erase Data*



*Caution: The erase procedure renders the module inoperable. The device will still be able to have communications established with it and can be reprogrammed with the contents from “Option A: Save and Restore Original Data”; however, the driver will report a fatal error if any configuration is attempted without restoring the data. If you want to use a module again after erasing the EEPROM without having stored a copy of the original EEPROM contents, contact National Instruments for information about costs and procedures to return the module to the factory for repair.*

To erase the EEPROM contents, use the following command. Use the --help flag to view the latest command syntax. Enter zeroes or data of your choosing into the fields.

```
eeeprom-init
```

**Procedure 3 – Clear the RF Configuration EEPROM:**

This EEPROM stores device-specific serial numbers and board revisions. The user is provided with commands to directly modify these critical values. To prevent rendering the device inoperable, the original EEPROM contents should be saved and referenced for future use, prior to clearing the device. However, it is also possible to completely erase the device with user-defined values. Both options (A and B) are shown below.

As a precursor to all the following instructions, log into the device using a remote console.

*Option A: Save and Restore Original Data*

Save:

User-accessible portions of the module EEPROM may be read from the device using the following command entered in the console. Save the information in any format of your choosing. The command is entered once for daughterboard slot 0 and once for daughterboard slot 1, as shown below.

```
db-dump 0  
db-dump 1
```

Restore:

User-accessible portions of the module EEPROM may be written using the following command entered in the console. Use the --help flag to view the latest command syntax. Enter the previously saved data into the command in the appropriate fields. The command must be repeated for every daughterboard slot that should be restored.

```
db-init
```

*Option B: Erase Data*

*Caution: The erase procedure renders the module inoperable. The device will still be able to have communications established with it and can be reprogrammed with the contents from “Option A: Save and Restore Original Data”; however, the driver will report a fatal error if any configuration is attempted without restoring the data. If you want to use a module again after erasing the EEPROM without having stored a copy of the original EEPROM contents, contact National Instruments for information about costs and procedures to return the module to the factory for repair.*

To erase the EEPROM contents, use the following command. Use the --help flag to view the latest command syntax. Enter zeroes or data of your choosing into the fields. The command must be repeated for every daughterboard slot that should be erased.

```
db-init
```

**Procedure 4 – Clear the RF Control PLD:**

All sections of the CPLD on each of the daughterboards may be overwritten from the FPGA using built-in API commands. The most recent CPLD image is located in the Ettus Research files server.

To clear the current CPLD image and load factory defaults, follow these steps:

- 1) Log into the device using a remote console.
- 2) Download the `usrp_n320_rh_cp1d.svf` file to your device.  
The file will be saved to the `/usr/share/uhd/images/` directory.

```
uhd_images_downloader -t n320_cp1d
```

- 3) Run the following commands to update the CPLD on both daughterboards.

```
python3 /usr/lib/python3.5/site-packages/usrp_mpm/dboard_manager/rhodium_update_cp1d.py  
--file=/usr/share/uhd/images/usrp_n320_rh_cp1d.svf --dboards=0
```

```
python3 /usr/lib/python3.5/site-packages/usrp_mpm/dboard_manager/rhodium_update_cp1d.py  
--file=/usr/share/uhd/images/usrp_n320_rh_cp1d.svf --dboards=1
```

- 4) The API call will report success at the end of the procedure on each daughterboard. If failures are reported contact National Instruments for assistance.

## Terms and Definitions

### **Cycle Power:**

The process of completely removing power from the device and its components and allowing for adequate discharge. This process includes a complete shutdown of the PC and/or chassis containing the device; a reboot is not sufficient for the completion of this process.

### **Volatile Memory:**

Requires power to maintain the stored information. When power is removed from this memory, its contents are lost. This type of memory typically contains application specific data such as capture waveforms.

### **Non-Volatile Memory:**

Power is not required to maintain the stored information. Device retains its contents when power is removed. This type of memory typically contains information necessary to boot, configure, or calibrate the product or may include device power up states.

### **User Accessible:**

The component is read and/or write addressable such that a user can store arbitrary information to the component from the host using a publicly distributed NI tool, such as a Driver API, the System Configuration API, or MAX.

### **System Accessible:**

The component is read and/or write addressable from the host without the need to physically alter the product.

### **Clearing:**

Per *NIST Special Publication 800-88 Revision 1*, “clearing” is a logical technique to sanitize data in all User Accessible storage locations for protection against simple non-invasive data recovery techniques using the same interface available to the user; typically applied through the standard read and write commands to the storage device.

### **Sanitization:**

Per *NIST Special Publication 800-88 Revision 1*, “sanitization” is a process to render access to “Target Data” on the media infeasible for a given level of effort. In this document, clearing is the degree of sanitization described.