

## 1. Generating 'radioberry.rbf' file in Intel Quartus Prime Lite.

I was able to build it by installing 'Quartus Prime Lite' and using the make command only!  
Also did user interface compilation instead of command line compilation

My PC specs

Core i5-7300u @2.6GHz, RAM 16GB

Windows11, 23H2

Elapsed time: 04m46s

Laptop-PC specs I used also.

Core i5-7Y57 @1.2GHz, RAM 8GB

Windows11, 21H2

Elapsed time: abt. 8min

### 1-1. Download 'Quartus Prime Lite Edition' (no licence file required).

<https://www.intel.com/content/www/us/en/software-kit/825278/>

intel-quartus-prime-lite-edition-design-software-version-23-1-1-for-windows.html

The screenshot shows the Intel website's download center for the Quartus Prime Lite Edition. The page has a blue header with the Intel logo and navigation links. Below the header, there's a section titled 'Intel® Quartus® Prime Lite Edition Design Software Version 23.1.1 for Windows'. This section includes a table with columns for ID, Date, Software Type, Software Package, Version, and Operating Systems. The table lists the software package 'Quartus® Prime Lite' with version '23.1.1 (Latest)' for Windows. Below the table, there's a 'Feedback' button and a paragraph of text stating that the software includes functional and security updates and that users should keep their software up-to-date. At the bottom, there's a note about the software being subject to removal from the web when support for all devices in this release are available in a newer version, or all devices supported by this version are obsolete. It also mentions that users can subscribe to a customer notification mailing list.

### 1-2. Double-click 'qinst-lite-windows-xxx.exe' to install

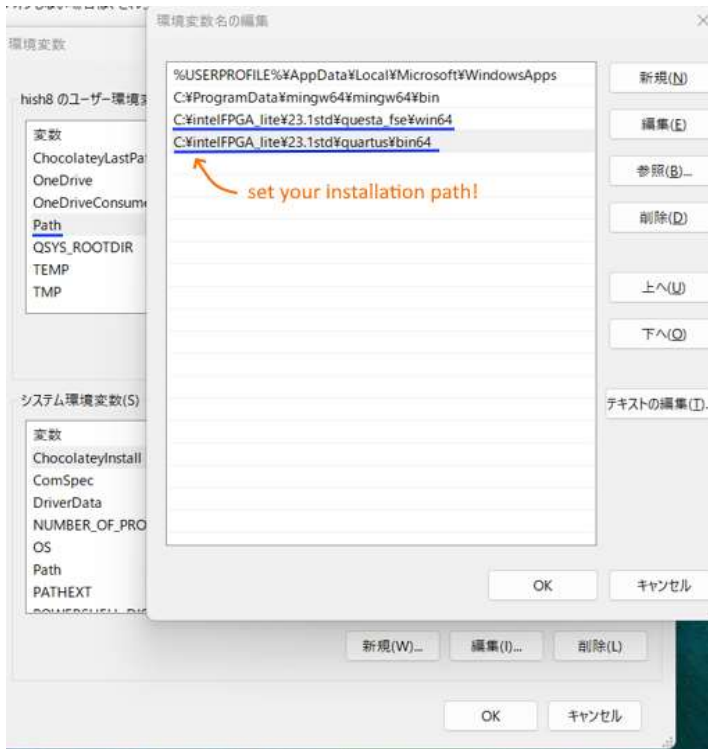
Select the 'Cyclone 10LP' device library during installation

The screenshot shows the Intel Quartus Prime Lite Edition 23.1std.1.993 for Windows installer window. The window has a title bar with the Intel logo and a close button. The main area is divided into two panes. The left pane shows a tree view of the installation components, including 'Quartus® Prime Lite Edition (Free)', 'Quartus® Prime (includes Nios II EDS)', 'Quarta®-Intel® FPGA and Starter Editions', 'Starter Edition', 'Devices', 'Arria® II device support', 'Cyclone® IV device support', 'Cyclone® 10 LP device support', 'Cyclone® V device support', 'MAX® II, MAX® V device support', 'MAX® 10 FPGA device support', 'Add-ons and Standalone Software', 'Quartus® Prime Programmer and Tools 23.1std.1.993', 'Quartus® Prime Help 23.1std.1.993', and 'Ashling RiscFree IDE for Intel® FPGAs 23.1std.1.993'. The right pane shows the 'Description' of the selected component, 'Cyclone 10 LP device support', with its md5sum, sha1sum, and sha256sum. Below the panes, there's a 'Download to:' field with a file path. There are checkboxes for 'Auto: install after download', 'Agree to Intel License Agreement', 'Install to:', 'After-install actions', 'Create shortcuts on Desktop', and 'Launch USB Blaster II driver installation'. At the bottom, there's a 'Disk Space Required' section showing the download size (2.94 GB) and installation size (12.51 GB), and a 'Status' section showing the progress of the installation (100% downloaded). The window has 'Settings', 'Help', and 'Log' buttons at the bottom left, and 'Download', 'Stop', and 'Close' buttons at the bottom right.

### 1-3. Set the path to the “Environment Variables” in Windows.

C:\intelFPGA\_lite\23.1std\questa\_fse\win64

C:\intelFPGA\_lite\23.1std\quartus\bin64 ← Need to add new path.



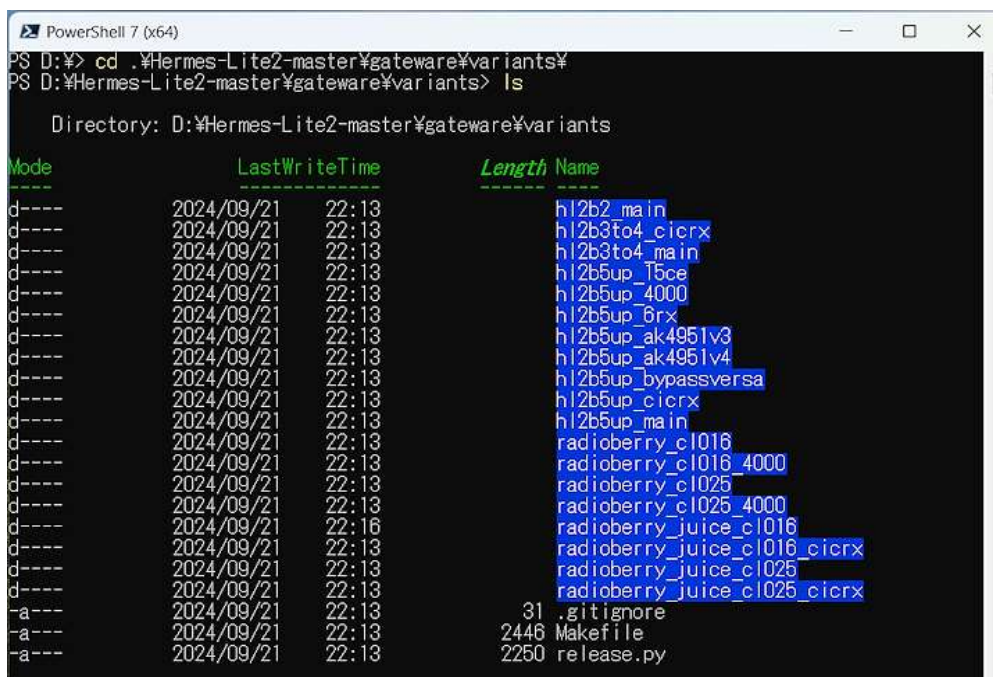
### 2. Download verilog codes

<https://github.com/softerhardware/Hermes-Lite2>

Get the code 'Hermes-Lite2-master.zip' and extract it to your directory

```
> cd Hermes-Lite2-master/gateway/variants
```

```
> ls
```





### 3. Compile the Verilog Code 'radioberry\_juice\_cl016'

Execute Windows powershell

> cd Hermes-Lite2-master/gateway/variants/radioberry\_juice\_cl016

> mkdir build

> make

```
PowerShell 7 (x64)
PS D:\Hermes-Lite2-master\gateway\variants\radioberry_juice_cl016> make
quartus_sh --flow compile radioberry -c radioberry
Info: *****
Info: Running Quartus Prime Shell
Info: Version 23.1std.1 Build 993 05/14/2024 SC Lite Edition
Info: Copyright (C) 2024 Intel Corporation. All rights reserved.
Info: Your use of Intel Corporation's design tools, logic functions
Info: and other software and tools, and any partner logic
Info: functions, and any output files from any of the foregoing
Info: (including device programming or simulation files), and any
Info: associated documentation or information are expressly subject
Info: to the terms and conditions of the Intel Program License
Info: Subscription Agreement, the Intel Quartus Prime License Agreement,
Info: the Intel FPGA IP License Agreement, or other applicable license
Info: agreement, including, without limitation, that your use is for
Info: the sole purpose of programming logic devices manufactured by
Info: Intel and sold by Intel or its authorized distributors. Please
Info: refer to the applicable agreement for further details, at
Info: https://fpgasoftware.intel.com/eula.
Info: Processing started: Sat Sep 21 22:18:45 2024
Info: Command: quartus_sh --flow compile radioberry -c radioberry
Info: Quartus(args): compile radioberry -c radioberry
Info: Project Name = D:\Hermes-Lite2-master\gateway\variants\radioberry_juice_cl016\radioberry
Info: Revision Name = radioberry
Info (125068): Revision "radioberry" was previously opened in Quartus Prime software version 20.1.1 Lite Edi
Info: Created Quartus Prime Default Settings File D:\Hermes-Lite2-master\gateway\variants\radioberry_juice_
Info: cl016\radioberry_assignment_defaults.qdf, which contains the default assignment setting information from Qua
Info: rtus Prime software version 20.1.1 Lite Edition.
Info (125069): Default assignment values were changed in the current version of the Quartus Prime software -
Info: - changes to default assignments values are contained in file c:\intelfpga_lite\23.1std\quartus\bin64\assign
Info: ment_defaults.qdf
Info: *****
Info: Running Quartus Prime Analysis & Synthesis
Info: Version 23.1std.1 Build 993 05/14/2024 SC Lite Edition
Info: Processing started: Sat Sep 21 22:18:57 2024
Info: Command: quartus_map --read_settings_files=on --write_settings_files=off radioberry -c radioberry
Info (16303): High Performance Effort optimization mode selected -- Timing performance will be prioritized a
Info: t the potential cost of increased compilation time
Info (16304): Mode behavior is affected by advanced setting Perform Register Retiming for Performance (d
```

```
Info (332119): Slack End Point TNS Clock
Info (332119): =====
Info (332119): 2.975 0.000 radioberry_juice_core_i|ad9886pll_inst|altpll_component|aut
o_generated|pll1|clk[1]
Info (332119): 5.928 0.000 rffe_ad9886_clk76p8
Info (332119): 6.213 0.000 rb-phy-clk
Info (332119): 6.230 0.000 radioberry_juice_core_i|ad9886pll_inst|altpll_component|aut
o_generated|pll1|clk[0]
Info (332119): 49.807 0.000 radioberry_juice_core_i|ad9886pll_inst|altpll_component|aut
o_generated|pll1|clk[3]
Info (332119): 49.941 0.000 fan_clk
Info (332114): Report Metastability: Found 122 synchronizer chains.
Info (332114): Typical MTBF of Design is 1e+09 years or 3.15e+16 seconds.

Info (332114): Number of Synchronizer Chains Found: 122
Info (332114): Shortest Synchronizer Chain: 2 Registers
Info (332114): Fraction of Chains for which MTBFs Could Not be Calculated: 0.410
Info (332114): Worst Case Available Settling Time: 12.184 ns
Info (332114): Typical MTBF values are calculated based on the nominal silicon characteristics, at nomin
al operating conditions.
Info (332114): - Under typical conditions, an increase of 100ps in available settling time will increa
se MTBF values by a factor of 10.8
Info (332102): Design is not fully constrained for setup requirements
Info (332102): Design is not fully constrained for hold requirements
Info: Quartus Prime Timing Analyzer was successful. 0 errors, 55 warnings
Info: Peak virtual memory: 4945 megabytes
Info: Processing ended: Sat Sep 21 22:23:31 2024
Info: Elapsed time: 00:00:10
Info: Total CPU time (on all processors): 00:00:09
Info (293000): Quartus Prime Full Compilation was successful. 0 errors, 415 warnings
Info (23030): Evaluation of Tcl script c:\intelfpga_lite\23.1std\quartus\common\tcl\internal\qsh_flow.tcl wa
s successful
Info: Quartus Prime Shell was successful. 0 errors, 415 warnings
Info: Peak virtual memory: 4626 megabytes
Info: Processing ended: Sat Sep 21 22:23:31 2024
Info: Elapsed time: 00:04:46
Info: Total CPU time (on all processors): 00:00:01
PS D:\Hermes-Lite2-master\gateway\variants\radioberry_juice_cl016> ls
```

```
> cd built      'radioberry.rbf' file here
> ls
```

```
PowerShell 7 (x64)
PS D:\Hermes-Lite2-master\gateway\variants\radioberry_juice_c1016>
PS D:\Hermes-Lite2-master\gateway\variants\radioberry_juice_c1016> cd .\build\
PS D:\Hermes-Lite2-master\gateway\variants\radioberry_juice_c1016\build> ls

Directory: D:\Hermes-Lite2-master\gateway\variants\radioberry_juice_c1016\build

Mode                LastWriteTime         Length Name
----                -
-a---      2024/09/21   22:23             5893 radioberry.asm.rpt
-a---      2024/09/21   22:23              26 radioberry.done
-a---      2024/09/21   22:23          1356330 radioberry.fit.rpt
-a---      2024/09/21   22:23             567 radioberry.fit.smsg
-a---      2024/09/21   22:23             646 radioberry.fit.summary
-a---      2024/09/21   22:23            10279 radioberry.flow.rpt
-a---      2024/09/21   22:23             232 radioberry.jdi
-a---      2024/09/21   22:20          2033325 radioberry.map.rpt
-a---      2024/09/21   22:20            1123 radioberry.map.smsg
-a---      2024/09/21   22:20             496 radioberry.map.summary
-a---      2024/09/21   22:23            20637 radioberry.pin
-a---      2024/09/21   22:23           264773 radioberry.rbf
-a---      2024/09/21   22:23              21 radioberry.sld
-a---      2024/09/21   22:23          496915 radioberry.sof
-a---      2024/09/21   22:23          1434717 radioberry.sta.rpt
-a---      2024/09/21   22:23             7332 radioberry.sta.summary

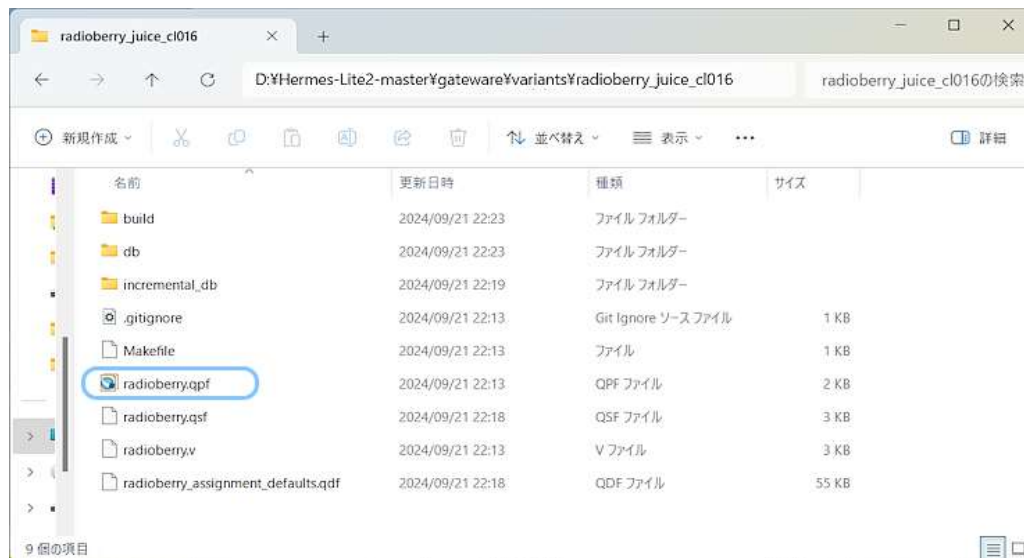
PS D:\Hermes-Lite2-master\gateway\variants\radioberry_juice_c1016\build>
```

```
> cat radioberry.fit.summary
```

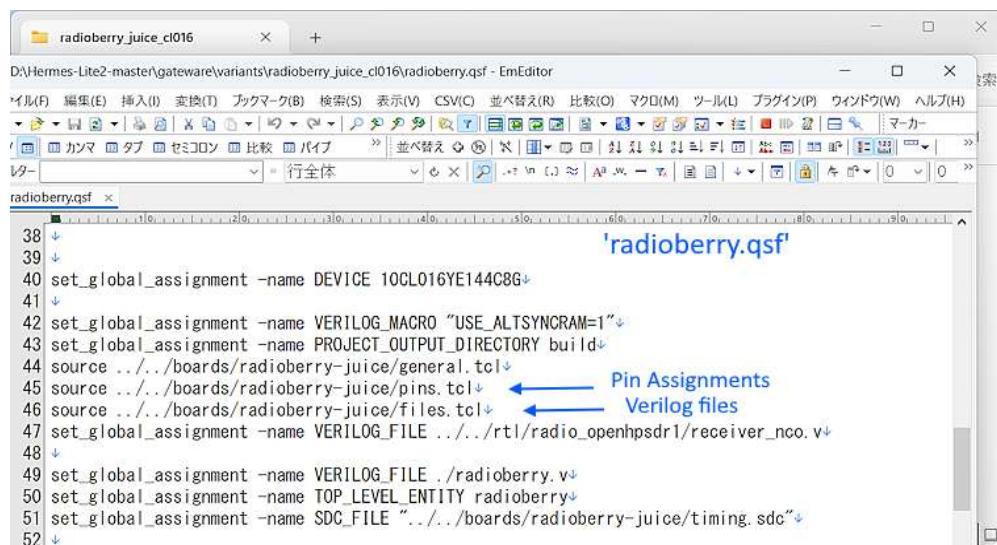
```
PowerShell 7 (x64)
PS D:\Hermes-Lite2-master\gateway\variants\radioberry_juice_c1016\build> more radioberry.fit.summary
Fitter Status : Successful - Sat Sep 21 22:23:11 2024
Quartus Prime Version : 23.1std.1 Build 993 05/14/2024 SC Lite Edition
Revision Name : radioberry
Top-level Entity Name : radioberry
Family : Cyclone 10 LP
Device : 10CL016YE144C8G
Timing Models : Final
Total logic elements : 13,772 / 15,408 ( 89 % )
    Total combinational functions : 10,641 / 15,408 ( 69 % )
    Dedicated logic registers : 11,173 / 15,408 ( 73 % )
Total registers : 11218
Total pins : 45 / 79 ( 57 % )
Total virtual pins : 0
Total memory bits : 369,152 / 516,096 ( 72 % )
Embedded Multiplier 9-bit elements : 76 / 112 ( 68 % )
Total PLLs : 1 / 4 ( 25 % )
PS D:\Hermes-Lite2-master\gateway\variants\radioberry_juice_c1016\build>
```

#### 4. Compile Verilog Code with GUI

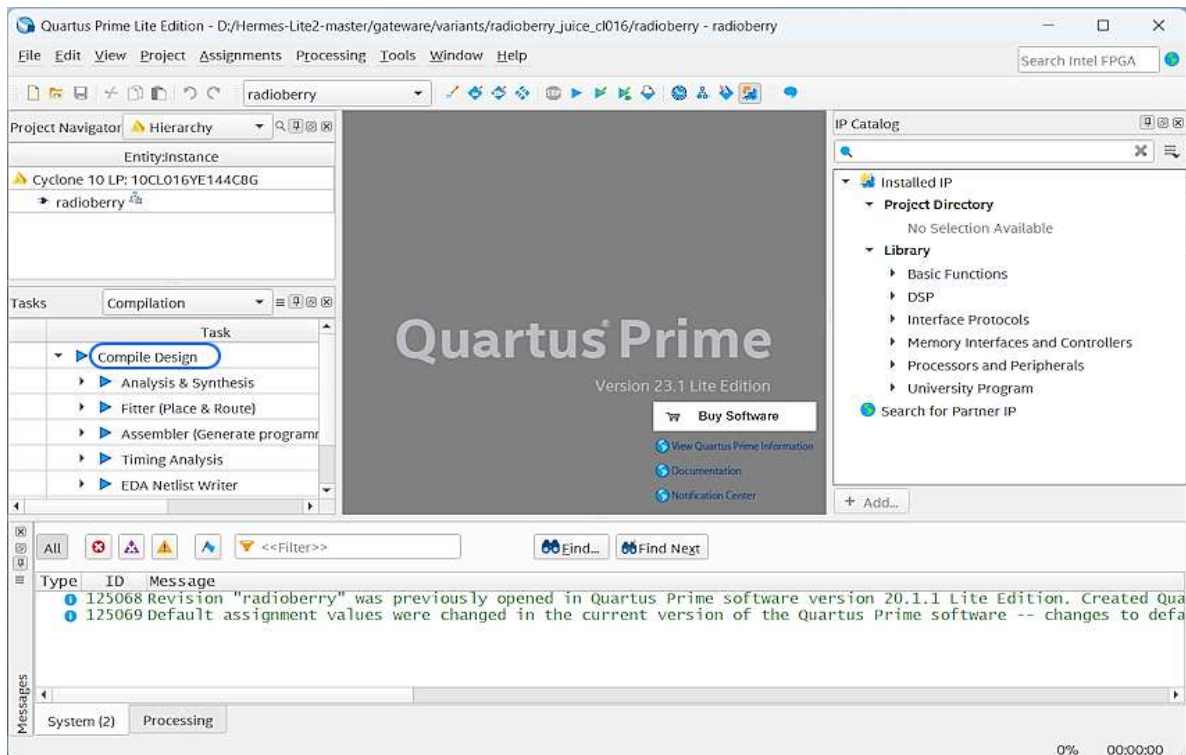
```
> cd Hermes-Lite2-master/gateway/variants/radioberry_juice_cl016  
> ls
```



Double-click on 'radioberry.qpf' to start the Quartus Prime Lite edition.

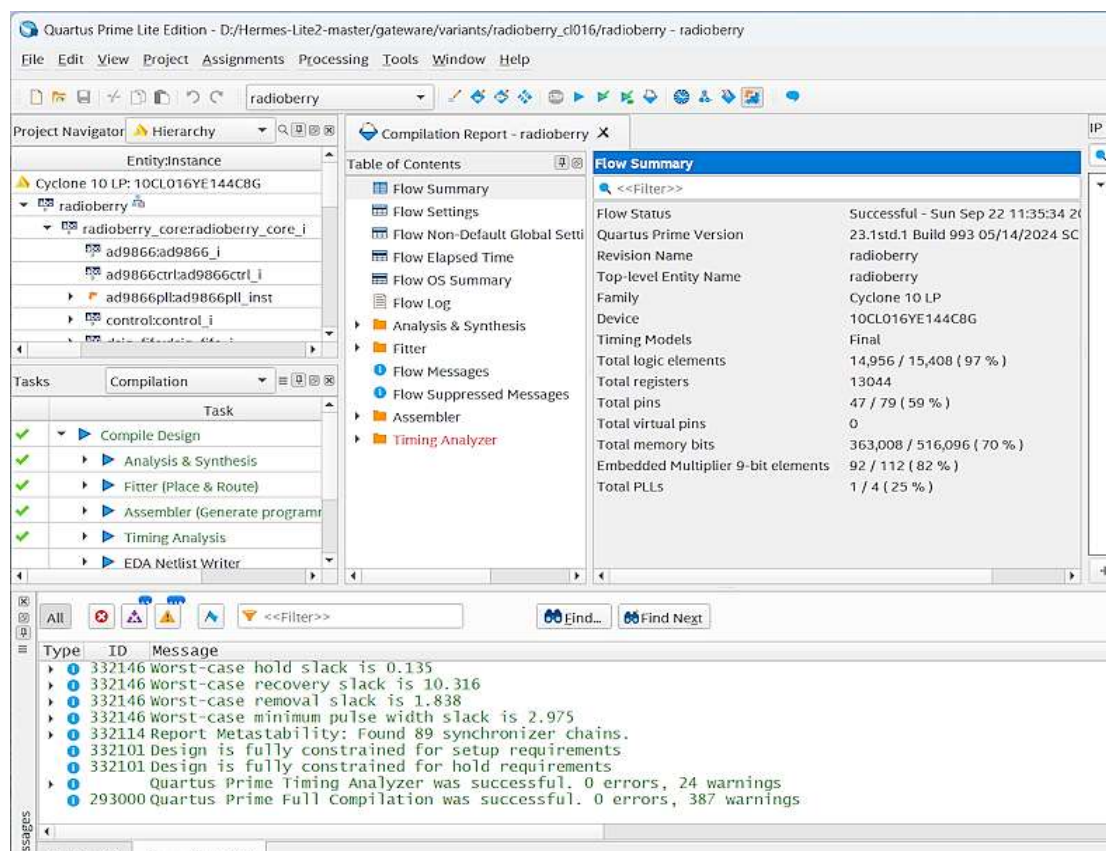






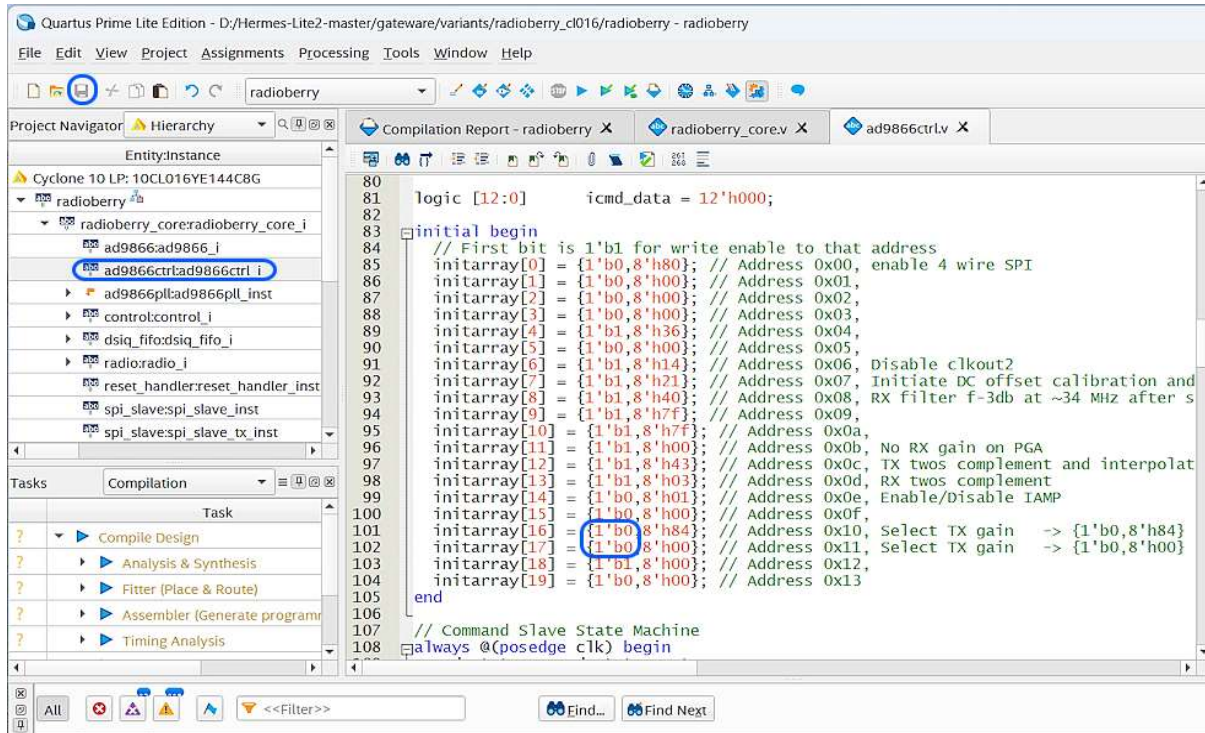
Double-click on 'Compile Design'

Check that there are no errors.



The 'radioberry.rbf' file can be in the build directory.

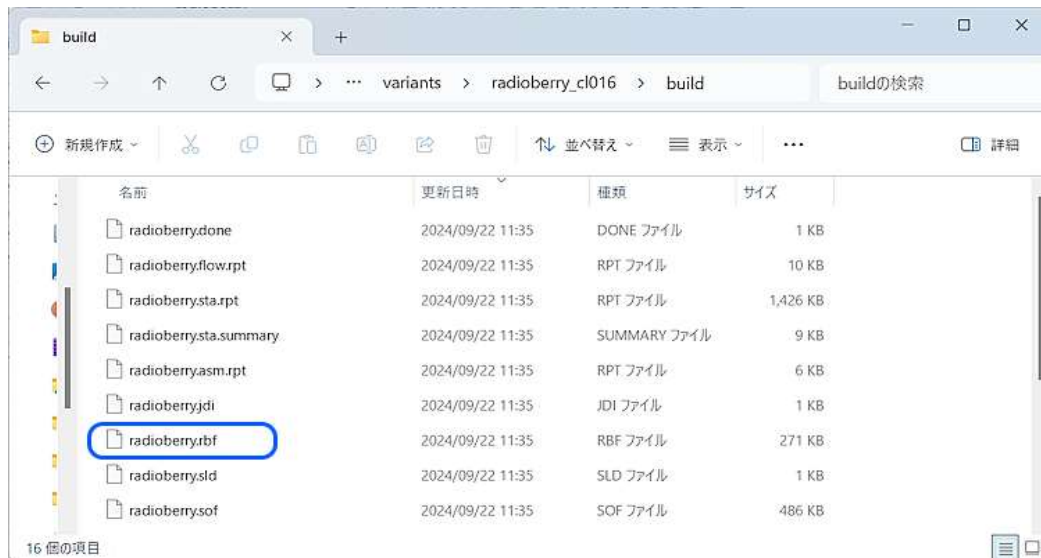
Click on 'ad9866ctrl:' and Modify line 101,102. and save.



Double-click on 'Compile Design' again.

Check that there are no errors.

The 'radioberry.rbf' file can be in the build directory. : )



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2024.09.22 Yado-san, jg1twp