



ADRV902x JCOM Receiver Device Model

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INTRODUCTION

This preliminary applications information document describes how to use Analog Devices, Inc. ADRV902x JESD204C channel object model (JCOM) receiver MathWorks® Matlab®-based model. It also describes the results expected when the model is used in a JESD204C class C-M reference system

Rev. PrA

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REVISION HISTORY

2/2019—Revision 0: Initial Version

SOFTWARE REQUIREMENTS

- Operating systems: Linux, Microsoft® Windows®, or Apple® macOS®.
- MathWorks® Matlab®, versions 2013a and later.
- MathWorks® Matlab® toolboxes: Control System Toolbox™, RF Toolbox™, and Signal Processing Toolbox™.
- JCOM reference implementation versions: J40.

JCOM REFERENCE IMPLEMENTATION VALIDATION

The following tool is required to perform this verification:

- Linux: md5sum – This utility is typically installed by default in all major distributions. It can be obtained as part of GNU's core utilities packages:
<https://www.gnu.org/software/coreutils>.
- Apple® macOS®: md5 – This utility is part of the operating system and should be installed by default.
- Microsoft® Windows®: certutil – This utility is part of the certificate services and should be installed by default.

The tool needs to be in the executable path to be called by the ADRV902x receiver model.

USAGE

The ADRV902x receiver model implements a JCOM receiver model as described in JESD204C.1 clause E.1, with a maximum data rate of 24.33Gbps. The model may be used to obtain the JCOM of a system, as shown in Figure 1.

The ADRV902x receiver model has two optional arguments, which may be specified in any order:

- FB: This is a floating-point number representing the data rate (in Gbps) of the JCOM analysis. Consequently, it shall be between 6.375 and 32. If not provided the default is 24.33.
- BOOST: This is a string, one of "LOW" or "HIGH" (case insensitive), to be selected depending on the insertion loss at the data rate Nyquist frequency of the channel. If not provided the default is "HIGH".

JESD204C compliance of the ADRV902x receiver model may be verified with the JCOM reference implementation configuration file, as shown in the example below:

```
# ADRV902x receiver test config
# File: adrv902x_rx.cfg

FB, 24.0
TX_MODEL, cat_c_tx
TX_ARGS, `(TX (FB_MAX 24))`
TX_API_VERSION, 1.0
RX_MODEL, adrv902x
RX_ARGS, `(RX (FB 24) (BOOST "HIGH"))`
RX_API_VERSION, 1.0
VICTIM_PATH, REF_CHANNEL(0.309)
```

This example configuration file assumes that the directory structure follows the standard JCOM reference implementation structure shown with the ADRV902x receiver model in the +adrv902x MathWorks® Matlab® package directory in Figure 2.

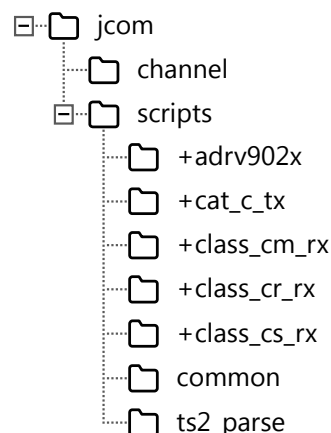


Figure 2: Standard JCOM Directory Structure Showing a +adrv902x MathWorks® Matlab® Package (Where the ADRV902x Receiver Model Should Be Placed for Usage with the Example JCOM Configuration File— adrv902x_rx.cfg).

ADRV902X Receiver JCOM Model

Preliminary Applications Information

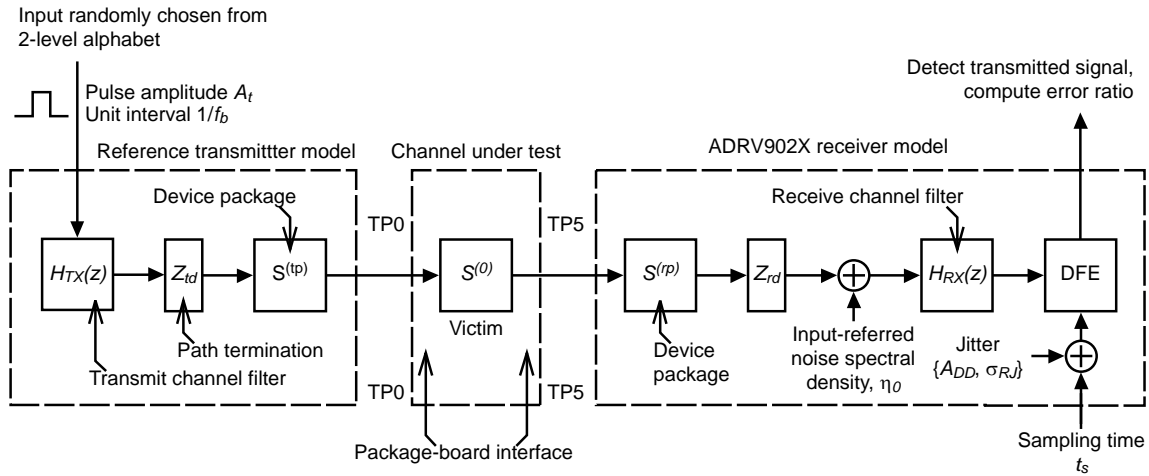


Figure 1. Serial Link Model for JCOM Simulation (Crosstalk Channels Not Shown for Simplicity)

When JCOM is run within MathWorks® Matlab® with the example configuration file and directory structure, the output shown in the example on the next page should be the result (JCOM J40 output shown):

```
>> addpath common
>> warning('off', 'all')
>> jcom('adv902x_rx.cfg');
JESD204C.1 JCOM (Revision J40)
Reference implementation of JESD204C.1 clause 5.2.9

Configuration source: adv902x_rx.cfg
+-----+-----+-----+-----+
| k | Type | TX | | RX | | Channel |
+-----+-----+-----+-----+
| 0 | Victim | TxAPI (0, 'cat_c_tx', '(TX (FB_MAX 24))') | RxAPI (0, 'adv902x', '(RX (FB 24) (BOOST "HIGH"))') | REF_CHANNEL(0.309) |
+-----+-----+-----+-----+

OP_DIAGNOSTICS = 0
OP_DISPLAY_WINDOW = 0
OP_CSV_REPORT = 0
OP_SAVE_FIGURE_TO_CSV = 0
OP_SAVE_MODEL_DATA = 0
OP_RESULT_DIR = ./jcom/scripts/jcom_results
OP_SAVE_FIGURES = 0
OP_PORT_ORDER = [1 3 2 4]

-----
Victim transmitter (Category C reference transmitter model)
Category C
Output range: [200.000mV, 600.000mV]
SNDR: 27.000[dB]
Max. data rate: 24.00000[Gbps]
Filter settings: 124
Total lanes: 6
Receiver (Analog Devices, Inc. ADRV902x receiver model (initial public release))
Model locked
Link max. data rate: 24.00000[Gbps]

-----
--- JCOM case summary (1/6) -----
TX lane: 1 (index 1)
Filter setting: 69
RX lane: 1 (index 1)
Filter setting: 34
IL @ fb/2: 22.752[dB]
JCOM: 7.939dB >= 2.000dB ---> PASS
-----
--- JCOM case summary (2/6) -----
```

```
TX lane: 3 (index 2)
  Filter setting: 54
RX lane: 1 (index 1)
  Filter setting: 38
IL @ fb/2: 23.752[dB]
JCOM: 7.326dB >= 2.000dB ---> PASS
-----
--- JCOM case summary (3/6) -----
TX lane: 4 (index 3)
  Filter setting: 69
RX lane: 1 (index 1)
  Filter setting: 34
IL @ fb/2: 23.437[dB]
JCOM: 7.918dB >= 2.000dB ---> PASS
-----
--- JCOM case summary (4/6) -----
TX lane: 6 (index 4)
  Filter setting: 69
RX lane: 1 (index 1)
  Filter setting: 34
IL @ fb/2: 24.229[dB]
JCOM: 7.262dB >= 2.000dB ---> PASS
-----
--- JCOM case summary (5/6) -----
TX lane: 7 (index 5)
  Filter setting: 54
RX lane: 1 (index 1)
  Filter setting: 38
IL @ fb/2: 23.682[dB]
JCOM: 7.851dB >= 2.000dB ---> PASS
-----
--- JCOM case summary (6/6) -----
TX lane: 9 (index 6)
  Filter setting: 54
RX lane: 1 (index 1)
  Filter setting: 38
IL @ fb/2: 24.591[dB]
JCOM: 7.327dB >= 2.000dB ---> PASS
-----
--- JCOM final results -----
JCOM: 7.262dB (7.261695dB) PASS
fb: 24.00000[Gbps]
Worst case: 4
TX (Category C reference transmitter model)
  Lane: 6
  Filter setting: 69
RX (Analog Devices, Inc. ADRV902x receiver model (initial public release))
PCB IL @ fb/2: 20.830190dB
Total IL @ fb/2: 24.229203dB
Run time: 75[sec]
-----
>>
```