RF Toolbox Release Notes

These Release Notes describe the changes introduced in the RF Toolbox, Version 1.2 for Release 14 with Service Pack 3. The following topics are discussed in these notes:
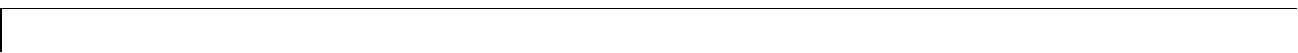
- "New Features" on page 1-2
- "Upgrading from an Earlier Release" on page 1-4
- "Platform Limitations" on page 1-5
- "Known Software and Documentation Problems" on page 1-6

The RF Toolbox Release Notes also provide information about recent versions of the product, in case you are upgrading from an earlier version:

- "RF Toolbox 1.1 Release Notes" on page 2-1
- "RF Toolbox 1.0.1 Release Notes" on page 3-1
- "RF Toolbox 1.0 Release Notes" on page 4-1

Printing the Release Notes
If you would like to print the Release Notes, you can link to a PDF version.

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RF Toolbox 1.2 Release Notes

New Features

This section summarizes the new features and enhancements introduced in the RF Toolbox 1.2.

New Circuit Object

The RF Toolbox Version 1.2 contains the following new circuit object.

Circuit Object	Description
rfckt.rlcgline	Construct an RLCG transmission line object

Toolbox Enhancements

The toolbox has the following enhancements for Version 1.2.

Improved Transmission Line Object

The new Freq property of the circuit object, rfckt.txline, is a vector of positive frequencies at which the parameter values are known.

The Loss, PV, and Z0 properties of the circuit object, rfckt.txline, can now be vectors of line loss, phase velocity, and characteristic impedance values that correspond to the frequencies specified in the Freq property.

The new IntpType property of the circuit object, rfckt.txline, is the interpolation method used to calculate the parameter values between the known frequencies.

Improved Touchstone Data File Support

The RF Toolbox can now read data from Touchstone data files that contain comments and spaces between sections of data.

Improved Demos

The RF Toolbox demos have new documentation and can be accessed using an improved interface.

New Command Window Help for Functions That Act on Circuit Objects

You can access help for functions that act on circuit objects by using the syntax `help` *functionname* at the MATLAB command prompt.

Upgrading from an Earlier Release

There are no known issues involved in moving from RF Toolbox Versions 1.1 to Version 1.2. For information about upgrading from RF Toolbox Versions 1.0.1 to Version 1.1, see "Upgrading from an Earlier Release" on page 2-3.

Platform Limitations

The RF Toolbox 1.2 features have the platform limitations described in this section.

RF Tool Available Only on UNIX and Windows

RF Tool, the RF analysis GUI, is available only on supported UNIX and Windows platforms. It is not available on the Mac.

Known Software and Documentation Problems

At publication time, the RF Toolbox had no significant known open bugs. The Bug Reports interface on the MathWorks Web site will be updated if any important bugs become known to the MathWorks after the publication of these release notes.

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RF Toolbox 1.1 Release Notes

New Features

This section summarizes the new features and enhancements introduced in the RF Toolbox 1.1.

- Added five new objects that are used to store rfdata such as network parameters, noise figure, power, IP3, and spot noise.
- Added three new circuit objects: `rfckt.delay` for delay lines, `rfckt.hybridg` for hybrid G connected networks, and `rfckt.passive` for RF passive networks.
- A new `write` method allows saving of RF network data into files for all rfckt objects.
- The new methods, `read` and `restore`, read and restore data for `rfckt.datafile`, `rfckt.amplifier`, and `rfckt.mixer`.
- Added the functions `stabilitymu` and `stabilityk`, which calculate the stability factors µ and k.
- Added the functions `h2g` and `g2h`, which convert between hybrid G and hybrid H parameters.
- It is now possible to create the objects `rfckt.amplifier` and `rfckt.mixer` from a MATLAB variable.
- Added the frequency-dependent NF and IP3 data types to the AMP format.
- The `analyze` method now takes three additional optional inputs for the load, source, and reference impedances.

Upgrading from an Earlier Release

This section describes the upgrade issues involved in moving from RF Toolbox Versions 1.0.1 to Version 1.1.

Plot figures are integrated into the RFTool GUI

In earlier versions, a plot figure would appear in a separate window after clicking the **Plot** button. In this version, plot figures are integrated into the GUI itself.

RF Toolbox 1.0.1 Release Notes

New Features

The RF Toolbox, Version 1.0.1, includes bug fixes but no new features.

Major Bug Fixes

The RF Toolbox 1.0.1 includes bug fixes made since Version 1.0. You can see a list of the particularly important Version 1.0.1 bug fixes.

If you are viewing these Release Notes in PDF form, please refer to the HTML form of the Release Notes, using either the Help browser or the MathWorks Web site and use the link provided.

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RF Toolbox 1.0 Release Notes

Introduction to the RF Toolbox

The RF Toolbox enables you to create and combine RF circuits for simulation in the frequency domain with support for both nonlinear and noise data. You can read, write, analyze, combine, and visualize RF network parameters.

Work Directly with Network Parameter Data

You can work directly with your own network parameter data or with data from files. Functions enable you to:

- Read and write RF data in Touchstone® `.snp`, `.ynp`, `.znp`, and `.hnp` formats, as well as the MathWorks .AMP format.
- Convert among S, Y, Z, h, T, and ABCD network parameters
- Plot your data on X-Y plane and polar plane plots, as well as Smith® charts
- Calculate cascaded S-parameters and de-embed S-parameters from a cascaded network
- Calculate input and output reflection coefficients, and voltage standing-wave ratio (VSWR) at the reflection coefficient

Model RF Networks

You can also assemble RF networks from circuit objects that model:

- Passive networks and general circuit elements using Touchstone `.snp`, `.ynp`, `.znp`, and `.hnp` files.
- Amplifiers and mixers using data from Touchstone format `.s2p`, `.y2p`, `.z2p`, and `.h2p` files as well as the MathWorks format `.amp` files.
- Transmission lines based on their geometries.
- LC ladder filters based on their electrical interactions.

From these components and previously created network objects, you can create cascaded, hybrid, parallel, and series networks.

Functions associated with these objects enable you to:

- Analyze network parameters at specified frequencies
- Calculate needed parameters
- Plot network parameters in X-Y plane, polar plane, and Smith chart formats.

- Extract parameters from an object
- Perform a variety of utility functions such as copying an object and listing valid parameters for visualization.

You can move network data among Touchstone format files or MathWorks format `.amp` files, your workspace, and circuit or data objects – wherever you need it.

The RF Blockset, which accepts data generated by the RF Toolbox, provides time-domain simulation

Analyze Circuits Interactively

A graphical tool, RF Tool, enables you to design, analyze, and visualize RF components and networks interactively, then export the circuits to your workspace or to a file for use with RF Toolbox functions and other circuit objects.

Additional Topics

This rest of this introduction includes these topics:

- "RF Circuits" on page 4-3
- "Data Visualization" on page 4-4
- "Data Format Support" on page 4-4
- "RF Analysis GUI" on page 4-4
- "Required Products" on page 4-4

RF Circuits

The RF Toolbox provides classes that enable you to model these circuit objects and networks.

- Passive networks
- Amplifiers and mixers
- Transmission lines: coaxial, coplanar waveguide, general transmission, microstrip, parallel-plate, and two-wire
- SeriesRLC and shuntRLC circuits

- LC ladder filters: LC bandpass pi, LC bandpass tee, LC bandstop pi, LC bandstop tee, LC highpass pi, LC highpass tee, LC lowpass pi, and LC lowpass tee
- Networks: cascade, hybrid, parallel, and series

You can also model general circuit elements from data files.

Data Visualization

The RF Toolbox enables you to plot the network parameters of the circuits you create.

You can generate an X-Y plane plot, polar plane plot, or Smith chart of one or more selected network parameters directly from your data. You can also generate these plots from circuit objects you create using the RF Toolbox. See the rfckt and rfdata reference pages for information.

Data Format Support

The RF Toolbox supports the Touchstone SnP, YnP, ZnP, and HnP data file formats. It also introduces the MathWorks AMP format for amplifier data. For more information about this format, see AMP File Format in the RF Toolbox documentation.

RF Analysis GUI

RF Tool is an RF analysis GUI that provides a visual interface for creating and analyzing RF (radio frequency) components and networks. You can create RF circuits quickly with the GUI. You can also import and export circuits from the MATLAB workspace and RF data files.

RF Tool also provides the ability to set circuit parameters, analyze circuits, view their resulting S-parameter data, and visualize the data using X-Y plane plots, polar plane plots, and Smith charts.

Required Products

The RF Toolbox requires MATLAB. It provides simulation in the frequency domain. The RF Blockset, which can accept data generated by the RF Toolbox, provides time-domain simulation.

Demos

Demos of the RF Toolbox capabilities are available on the Demos tab of the MATLAB Help browser. These demos show examples of

- RF data objects
- RF circuit objects
- De-embedding S-parameters
- Placing circles on a Smith chart
- Designing impedance matching networks