



## SDRuno Release Notes



### Overview

This document provides an overview of the modifications, changes and enhancements made to the SDRuno Application Software.

Version 1.1 and upward will only be developed for the RSP. The EXTIO version V1.05 is based on V1.04.

## Version 1.40.1 (Hotfix) (21<sup>st</sup> August 2020)

### Added

- IFAGC setting indicator on the main panel. Only shows when the IFAGC is disabled.
- Ability to switch between isochronous and bulk transfer mode with indicator on main panel when in Bulk transfer mode.
- ClosingDown, SP1MinFreqChanged & SP1MaxFreqChanged plugin events.
- GetSP1MinFrequency & GetSP1MaxFrequency plugin functions.
- Enable the VRX panels tooltips.

### Changed

- Math error exception trap information now directed to status bar.
- Panels can now snap to the edge of the screen to aid placement.

### Fixed

- Selecting either 70cm, 33cm or 23cm bands whilst not in ZIF mode would cause an issue where the wrong settings are applied, and the spectrum could mirror about the centre.
- Memory leaks caused by the statusbar entries not being cleared on exit.
- Phase calculation error during diversity wheel use causing application exception.
- Switching from Diversity back to master causes only Tuner 2 panel to be displayed and does not show active tuner button lit.
- Number of plugins loaded was 2x what it should be as the counter was increased twice per load.
- Closing SDRuno whilst DAB plugin open does not leave DAB mode before ini file is saved.
- Plugins do not inform SDRuno when they are unloading by themselves, so the loaded plugin count ends up being wrong.

### Known Issues

- SP2 CWAFC drift issue (Zoom/window size/freq display)
- IF output mode disabled SP1 spectrum mouse clicks

## Version 1.4 (12<sup>th</sup> August 2020)

### Added

- Plugin system.
- SP1 Panel now has support for ultra-wide 4K displays (5120 x 2160).
- Step lock button in the SP1 panel – also CTRL-L (toggle) with the relevant VRX in focus.
- Squelch line in the SP1 display (SQLC THR. Button toggles view if squelch is enabled).
- Auto-start the IQ stream on SDRuno start-up (enable in the OPT menu).
- Phase and amplitude lock buttons in the Diversity panel.
- Start SDRuno with just a wav file.
- Two extra zoom levels for the SP2 panel.
- Save positions of settings panels in the ini file.
- Automatic LO system (Zero-IF mode) – default is enabled.
- Enable/Disable for Automatic LO system along with offset value in Main Panel Settings.
- Saving workspace now allows press of Escape to abort the save.

### Changed

- Improved squelch function (now uses the dBm value calculated in the audio bandwidth).
- The main Windows API installer is now used to avoid multiple versions of the API being installed unnecessarily.
- MW notch filter enabled for bands framed between 2 and 30 MHz (RSP dependent).
- SP2 panel timestamp now the same as the SP1 panel.
- The icon for the ExtIO version is no longer added to the desktop to avoid confusion.
- Status bar is less intrusive.
- Default RF gain value was too low.
- API : 64-bit redistributable incorrectly installed on a 32-bit OS.
- Replaced Ex Control Panel with Plugin Control Panel in the default layouts (the option to switch back to the Ex Control Panel has been left in the OPT->Auto Layout menu).
- Memory Panel Filter is now editable.
- Memory Panel now prompts to save the current bank when either starting a new bank or opening a bank (if it has been changed since the last save).
- When not band framed, the broadcast notch no longer changes when changing frequency.

### Fixed

- SWFM > 50% volume audio distortion.
- iCallbackSamples stored incorrect value for 10 MHz sample rate in the ini file.
- Bias-T inconsistent behaviour between RSPs (can be used irrespective of the active port, but only when streaming). The RSPduo is the exception – Tuner 2 must be in use to activate the Bias-T.
- Occasional missing timestamp from waterfall and CSV file.
- Cycling through VRXs can sometimes cause crash if RX control panel not visible.
- API 3.07 installer Windows XP 64-bit support
- Rare bug that can cause errors reading in the VRX workspace settings from the ini file
- Sometimes exception errors can cause the log file to be lost.
- Architecture in the log file would report x86 even on x64 systems because SDRuno is a 32bit application.
- IF gain reduction values stored in the ini file can be read incorrectly in gain mode.
- IFAGC always starts enabled even if disabled in the Main Panel Settings
- SDRuno always started on the previous band even if band had been unframed before closing.
- Memory Panel did not use the ini file saved path before trying to use path in CSIDL\_PERSONAL and could cause a crash if there is a problem with it.
- IARU S-Meter initialisation assumes frequency is < 30 MHz and displays incorrectly.
- Text size scaling in the Status bar when the display is scaled.
- Decimation was not considered when going into HDR mode (sample rate mismatch).

- When band framed, selecting the band menu would cause LO LOCK to disengage and leave incorrect sample rate (causing audio issues).
- Going back to 1.33 after using 1.4 would cause incorrect input device to be selected.
- Going back to 1.33 and then going forward to 1.4 caused the API 3.07 to NOT be installed.
- Setting Scan field in Memory Panel to Yes instead of Y could cause the scan to crash.
- Non-English locale could cause SDRuno to crash on exit.
- Ref clock output status not displayed in the main panel until the main panel settings were opened.
- WFM->SWFM->WFM did not return the volume level to the right value.
- Power/SNR output to file could skip some timestamps.
- S-Meter in T-Mate2 controller does not display correctly for > 30 MHz if IARU-1 setting is in use

**Known Issues**

- SP2 CWAFC drift issue (Zoom/window size/freq display)
- IF output mode disabled SP1 spectrum mouse clicks

## Version 1.33 (24<sup>th</sup> November 2019)

### Added

- RSPdx support. Including the new HDR mode for frequencies lower than 2 MHz
- HDR group to the band buttons (only for hardware supporting HDR mode e.g. RSPdx). Note: All framed bands lower than 2 MHz will use HDR mode when HDR compatible hardware is in use
- Status bar now appears at the bottom of the VRX0 main spectrum panel
- Save Workspace button in the Main Panel
- CAT commands updates:
  - SM to return power measurement and SNR
  - SM0; return S-Meter value (range 0 to 20) e.g. SM00011;
  - SM1; return dBm power value as an integer (e.g. SM00066; = -66.0 dBm)
  - SM2; return dBm power value as a float (e.g. SM00668; = -66.8 dBm)
  - SM3; return SNR value as a float (e.g. SM00224; = 22.4 dB)
  - RG; return RF gain state (e.g. RG002; = RF gain state 2)
  - RGnnn; set RF gain state (e.g. RG005; = set RF gain state 5)
- Step size for DSB mode (default 500 Hz same as LSB/USB)
- ExtIO version of SDRuno (v1.05) added so that installing V1.22 is no longer required
- History of actions is stored in a log file on exit (stored in %appdata%\SDRplay directory)
- Windows Start Menu & SDRuno Main Panel OPT Menu entries to open the Data Directory in an Explorer window (location of the ini and log files)
- OPT Menu entry to open the previous session's log file in Notepad

### Changed

- Splash screen now has more details on what is being done during the start-up/shutdown phases
- Keypad buttons now have green "on" state
- TMatte main encoder push button now = LO Lock toggle (except in HDR mode)
- Date/Time display moved to the Status bar from the Main Panel
- When the scanner is in operation, the RX control panel is now available to the user except for functions that need to remain locked to prevent interference with the scanner operation. For example, the volume control is now available during scanning
- Gain calibration adjusted when DAB notch enabled (API) – can help military airband scanning
- ADC OVERLOAD status indicator update (see known issues)
- error.log is now SDRuno\_#.log (where # is the SDRuno instance number)
- Improved handling of missing folders to store memory banks and wav files

### Fixed

- SP2 window contents not always appearing centred on start-up
- SP2 title plate duplicating when the window was less than a certain width
- Handle decimation > 1 when selecting a memory panel frequency outside of the visible bandwidth
- Decimation dropdown values in Zero-IF mode not always displaying correctly
- Installer not able to install the API service on Windows XP
- RMS S-Meter value used for SNR even when S-Meter is set to Peak mode
- Band button light goes off when manual frequency entered within visible bandwidth
- Add lockout adding extra blank lines to the memory panel
- Selecting IQ OUT mode sent a change to FM command to Omni-Rig
- Scanning Airband (ROW) 8.333 kHz step size rounding error
- Sample rate mismatch issue when closing SDRuno focused on an unused Band button group
- Starting the scanner before opening the scanner config could cause the wrong settings to be used

### Known Issues

- SP2 CWAFC drift issue (Zoom/window size/freq display)
- IF output mode disabled SP1 spectrum mouse clicks
- ADC OVERLOAD may appear "stuck". If Stop/Play does not clear, close and restart SDRuno
- PWR/SNR to CSV may have missing entries

## Version 1.32 (9<sup>th</sup> July 2019)

### Added

- Added MRC (Maximal-Ratio Combining) Diversity mode for the RSPduo.
- Option in the OPT menu to restart the API service.
- Prevention of cellular frequency ranges being used for the scanner.
- COM21 – COM256 added to the list of COM ports available for CAT control.

### Changed

- Improved auto update check.
- SDRuno will now start the API service upon start-up if it is not already started.
- SDRuno will now attempt to restart the API service if communication is lost when pressing play.
- Selecting frequency in the memory panel will only change the sample rate if necessary.
- Modified settings for the API service to allow SDRuno to be able to stop/start/pause

### Fixed

- Decimation dropdown values in ZeroIF mode could be hidden in certain circumstances.
- Memory Panel scan will not crash if non-numerical characters are in the frequency field.
- Band framing for bands > 2 MHz wide will not crash using RSPduo master/slave mode.
- Bias-T now works in RSPduo slave mode.
- Stop/Pause when using a wav file as input would have issues if zoom was being used.

### Known Issues

- SP2 CWAFC drift issue (Zoom/window size/freq display)
- IF output mode disabled SP1 spectrum mouse clicks

## Version 1.31 (9<sup>th</sup> April 2019)

### Added

- Added four extra levels of Zoom in the SP1 display.
- Added Auto-layout option for default workspace.
- Added IF Mode control (LIF/ZIF) on main panel to ease changing from Low IF to Zero IF mode and vice-versa.
- Added frequency lockout button to the frequency scanner to provide a 1 click lockout function
- Added four additional custom presets for the scanner to give a total of 8. The name field for these custom presets is now editable.
- Blind scanning now displays the description field if the frequency has already been saved in the memory panel.
- RSPduo slave settings now saved separately to the ini file.
- Added warning to scanner to alert user to stop the scanner to allow other functions in SDRuno to be made available again.
- Locked out the Rx Control Panel, Sample rate control and IF mode selection whilst scanner is actively scanning to avoid users from creating an operational conflict with the scanner.
- Error log now created if SDRuno exits abnormally which can be sent to [software@sdrplay.com](mailto:software@sdrplay.com) for analysis

### Changed

- Power Meter and SNR text changed in SP1 display so that it is locked to the S-meter. This avoids the text falling outside of the window if the window size is reduced.
- Minimum size for SP2 window reduced to allow a better fit on 1366 x 768 displays.
- All band framing buttons that frame bands wider than 2 MHz now use ZIF mode rather low IF mode. This affects the following bands: 6m, 2m, 1.25m, 70cm, 33cm & 23cm.
- Improved the scanner accuracy for low SNR values. This allows the threshold to be set closer to the noise floor without false triggering.
- Memory Panel scan now uses the mode, sub-mode and filter bandwidth that is defined in the memory panel.
- Improved speed of selection of stored frequencies in the memory panel.
- Mode and bandwidth for scanner presets only changed after the scanner start button is pressed.
- Changing audio output device no longer requires the input stream to be stopped and restarted before changes take effect.
- Removed audio input dropdowns in the Main Window Settings Panel, as these are not used.
- Selecting a frequency from the memory panel that is outside of the current bandwidth will force any band framing to be cancelled and a standard 2 MHz sample rate to be applied.

### Fixed

- Update API service to reduce the problems of the service hanging as a result of communication time-outs between the service and the application.
- Forced all message boxes to remain in the foreground.
- Improved error checking during the read of the SDRuno.ini file at start-up, to reduce the risk of a corrupted .ini from crashing the application.
- AM software filter limit on .ini file parsing increased from 5000 to 11900
- Fixed bug that prevented a changed background colour from being saved and correctly recalled upon start-up.
- Corrected bug that prevented the first item on the memory panel from being scanned on subsequent loops after the first loop had completed.
- Fixed workspace saving/recalling for multiple monitor setups.
- Removed erroneous scanning frequency message during a scan where no signals are found.
- Corrected bug that prevented the proper scan range from being set for scan ranges between 1.5 MHz and 3 MHz.
- Fixed minor graphical issues affecting the frame of the Main Panel and keypad zero button in the Rx Control Panel.

- In the memory panel, if the S-Field is blank it is treated as if it were a 'Y' to prevent the scanner from crashing SDRuno.
- Fixed bug that occasionally prevented the recorder and scanner panels from closing correctly, thus preventing their settings from being correctly saved to the .ini file.
- Fixed bug that incorrectly allowed the right clicking of the Scanner panel to bring up Recorder save folder window.
- Fixed CAT control RE1; from hanging SDRuno if the Recorder hasn't previously been used.
- Enabled Recorder Panel Button Hints
- RF gain not being applied correctly on SDRuno start-up from the ini file

**Known Issues**

- SP2 CWAFC drift issue (Zoom/window size/freq display)
- IF output mode disabled SP1 spectrum mouse clicks

## Version 1.3 (14<sup>th</sup> March 2019)

**Added**

- Frequency Scanner (range and list)
- IQ output (SP2 bandwidth) for VFO
- New IF AGC to add user configurability and reduce the visual disturbance caused by rapidly changing strong signals
  - Added user configuration parameters: attack time, decay time, decay delay and decay threshold
  - All IF AGC parameters now on a single panel within the Main Panel settings
  - Reduce visual spectrum disturbance due to rapidly changing strong signals by aligning the gain calibration value to the packet of IQ data where the gain change occurred
- Option to disable audio limiters in RX Control Settings (OUT)
- Extended SM CAT command for power level to return dBm instead of S-Meter
  - SM1; return VFO power in dBm as a positive number: SM00084; returned = -84 dBm
- CAT command to start and stop recording (RE)
  - RE; get recording status
  - RE0; stop recording
  - RE1; start recording
  - RE4; pause recording
  - return status codes:
    - RE0000 = stopped, RE0001 = recording, RE0002 = paused, RE0006 = set command failure
- On exit, a prompt will appear if the memory panel has been changed since it was last saved
- Add version number to Main Window title bar
- Splash screen to show when SDRuno is starting and closing

**Changed**

- Recommended for ALL RSP models
- Reconfigured band framing buttons to minimise unwanted spurious responses.
- Auto layout for 1920x1080 now incorporates the Frequency Scanner window
- Settings no longer saved in Registry and are stored using ini file instead
- SDRuno now defaults to start in Gain mode rather than Gain Reduction mode
- RSP1 gain control style now the same as other RSPs

**Fixed**

- Incorrect gain value set when press Play! in "Gain" mode
- RSP1A gain control above 250 MHz
- RSP1 gain control
- Toggling Show Smeter checkbox in SP1 settings caused SDRuno to hang



- RSPduo single tuner mode switching from tuner 1 to tuner 2 in the region 375 - 420 MHz could lose signal

## Version 1.24 (21<sup>st</sup> August 2018)

### Changed

- No functionality changes, improved interoperability with other software using the service API

## Version 1.23 (19<sup>th</sup> June 2018)

### Fixed

- No change to SDRuno. The installer includes an update to the service API which fixes the 10 MHz operation in single tuner mode on tuner 2 of the RSPduo

## Version 1.23 (18<sup>th</sup> May 2018)

### Added

- Support for service-based API
- Support for RSPduo (single tuner and dual tuner modes)
- Band framing now works in Low IF mode ( $\leq 2$  MHz sample rate) as well as Zero IF mode
- “Auto Layouts” for RSPduo master/slave (can also be used for other RSPs)
- Blacklist of serial numbers of stolen RSP devices

Note: The software will not work with these devices until the user contacts SDRplay.

### Changed

- Main Window resized to accommodate RSPduo controls
- Gain Reduction to Attenuation
- Low IF mode now only 6 MHz (normal mode) or 8 MHz (ADS-B compatible mode)
- SDRuno and API optimisation. Improvement in performance
- SNR measurement shows – when less than 6dB
- Unframing the band
- Clicking on a FM frequency in the memory panel will unframe the band (if framed)
- Removed ExtIO version from installation (not compatible with service API)

### Fixed

- Settings panels now behave as intended on minimize/restore
- Memory panel columns can now be resized
- Improved error handling
- Step size drop down menu not identifying which step size has been applied
- IF gain “bounce” and issues switching ports fixed in gain mode

## Version 1.22 (13<sup>th</sup> January 2018)

### Added

- Support for 1366x768 default layout
- ADC overload detection in AGC off mode
- ADC overload acknowledgment system to avoid lockout condition
- Custom step size for each mode
- Band Button Groups (Ham Lower, Ham Upper, Broadcast)
- Two additional SP1 width presets (2560 and 3840)
- Additional menu option in memory panel to reset column widths (helps when upgrading)
- Scheduled Recording
- Auto update

### Changed

- Registry reset now only clears 1.2+ entries
- SP1 Window max size supports 4K displays (3840x2160)
- Small improvements to the memory panel (panel width and field width changes)
- Improvements to the IF output mode
- UTC time fixed to 24 hour format
- Play!/Stop button colour co-ordinated
- Move MUTE button to make way for VOLUME label
- Moved Squelch value display to the right

### Fixed

- Log10 SING error
- Aero support detection to try to prevent rendering issues
- Freezing when switching to HiZ port in gain mode
- Gain "pumping" issue when in gain mode
- Settings panels not displaying properly when "un-minimised"
- Zoomed in frequency scale drag out of bounds bug
- Noise floor measurement bug
- Improved RSP error handling
- Sample rate change causing spectrum display issues
- Device selection bug

## Version 1.21 (13<sup>th</sup> November 2017)

### Added

- Ham band framing buttons can now toggle on or off
- Restored VFO button for centring of the VFO on the SP1 display

### Changed

- Changes to the default settings of the SP1 waterfall display
  - Waterfall averaging (WF avg) now set to 'off' by default
  - Tweaks to the default waterfall gain and contrast settings
- Changed the default step size for USB and LSB to 500 Hz
- Recalling stations from the memory panel automatically unlocks the LO if necessary
- Auto calibration system now selects DAB sub mode if not already selected
- Memory panel now responds to Ctrl+W

### Fixed

- Bug fixes associated with the redrawing of the SP1 display
- Bug fix affecting the storing of the calibration values for the RSP2
- Bug fix affecting CW Zap and CW AFC if the SP2 display FFT is not a 2<sup>n</sup> size
- Fixed missing Main Window Instance value
- Fixed Windows XP support

\*\*\*\*\*

## Version 1.2 (27<sup>th</sup> October 2017)

### Added

- IQ Wav file custom encoding
- LO LOCK toggle hotkey - 'K'
- Support for MHz frequency input using the M key
- Support for MHz frequency input using the new . (DOT) and MHz keypad buttons
- IF output frequency and enable state stored
- Auto swap I/Q when in IF output mode
- Facility to save Power and SNR measurements to a CSV file
- Changing modes now changes the default step size
- MCTR / TCTR / RSYN buttons state stored

### Changed

- Keypad Ham band button functionality
  - Set and lock LO to centre of the band
  - Set SP1 display to show the entire selected band using appropriate sample rate and decimation factor
  - Ham band selection indicated by depressed keypad button
  - Default demodulation mode automatically selected for major Ham and broadcast bands
- Zoom automatically zooms to the VFO
- Workspaces now saved using CTRL+W
- Default workspace opens windows to try to fill the screen
- MA button default state is enabled
- RBW slider used to define SP1 FFT size and display quality
- Improved zoom functionality
- Improved SP1 and SP2 settings defaults
- Decimation filter improved for reduced spurious aliasing
- Decimation values optimised for performance and usability

### Fixed

- LSB/USB filter bandwidths all have same 100Hz offset from centre frequency
- MA button now supports minimise/restore
- Corrected error reporting
- CAT control now supports ID; command
- Improved the ADC Overload messaging functionality. Message colour now more suitable for colour blind people.

\*\*\*\*\*

## Version 1.13 (15<sup>th</sup> March 2017)

### Bug Fixes

- Fixed RSP2 IF AGC/gain slider display issues

### Updates

- Added IF Output mode for transceivers
- Added 250 Hz to frequency step size list
- Default page in the settings panels is now the left most page each time SDRuno is started
- Added RSP2 IF GR/Gain value
- Added Factory Reset in the Main Window OPT menu (1<sup>st</sup> Instance only)
- Improved power function error handling
- Added support for Sub Modes, Filter BW and Port Selction in the Memory Panel
- Changed RDS window colour scheme to match other windows
- Added new hotkeys 'v', '-' and '+' which are for VFO, Out and In zoom buttons in the SP1 window
- Hotkey 'b' now opens AND closes the memory panel
- Changed the default sync Rig->VRX setting to true
- API – RefClk o/p no longer stops when the master RSP2 stops streaming

\*\*\*\*\*

## Version 1.12 (23<sup>rd</sup> December 2016)

### Bug Fixes

- Various in API and SDRuno including > 1GHz operation

### Updates

- API improvements including AGC and gain measurement (see API release notes)

\*\*\*\*\*

## Version 1.11 (21<sup>st</sup> November 2016)

### Bug Fixes

- Windows XP start up issue and some others from 1.1

### Updates

- ADC overload notification
- Added 24k to digital filter presets

\*\*\*\*\*

## Version 1.1 (11<sup>th</sup> November 2016)

### Bug Fixes

- **1.04.1** – fixed issue where highlighted filter wasn't always the one loaded.
- Waterfall in combo mode now flows the same direction as other modes

### Updates (RSP only V1.1)

- Tighter integration of RSP controls
- Calibrated power measurement
- Automatic S-Meter calibration
- SNR meter
- dBm scale for both SP1 and SP2 windows
- Automatic frequency calibration
- Support for IARU S-Meter standard
- Zoom to VFO button in SP1 window
- More improvements to AGC scheme
- More improvements to DC offset compensation scheme
- Reversed default mouse wheel scroll direction
- Waterfall in combo mode direction can be reversed in the same way as other modes
- Added extra frequency step sizes
- LSB / USB filter presets back to being the same
- USER filter preset renamed to DIGITAL
- Support for both gain and gain reduction displays
- Updated hardware driver – now reports as SDRplay device

### Updates (EXTIO only V1.05)

- maximum bandwidth changed to 2.5MHz

\*\*\*\*\*

## Version 1.04 (22<sup>nd</sup> September 2016)

### Bug Fixes

- Recording directory not able to be changed/stored
- Switching to/from Wav file input causing RSP streaming issues

### Known Issues

- **1.04.1** – Selectable filter presets – functional but can be unclear what is set when switching modes

\*\*\*\*\*

## Version 1.03 (18<sup>th</sup> September 2016)

### Bug Fixes

- High DPI resolution issue.
- Various minor bug fixes and typos

### Updates

- Reworked filter cutoffs
- Separate out EXTIO functionality
- RSP Ready indicator in Main Window/SETT/Input
- Rename FM Stereo Noise Reduction button and slider to FMS-NR to avoid confusion with SNR (Signal Noise Ratio)
- Improvements to tuner AGC scheme
- Improvements to DC offset scheme
- Removed unused buttons in SP1/SP2 windows
- LO display in RSP advanced window and the SP1 window
- Change defaults (LNA OFF / AGC ON)
- Added RDS PTY support

\*\*\*\*\*

## Version 1.02 (23<sup>rd</sup> June 2016)

### Bug Fixes

- Fixed VLF tuning issue.

\*\*\*\*\*

## Version 1.01 (22<sup>nd</sup> June 2016)

### Bug Fixes

- **1.00.1** – Default save directory for memory banks and wav files is now My Documents
- Memory call caused SDRuno not to start on Windows XP and Windows Vista
- CPU load hint showed Studio1 instead of SDRuno
- Fixed some references in user manual along with updated directory save details.

### Updates

- Changed registry location to [HKCU\Software\SDRplay\SDRuno\1.01] to enforce directory fix.

\*\*\*\*\*

## Version 1.00 (19<sup>th</sup> June 2016)

### Known Issues

- 1.00.1 – When saving memory banks, saving to the Program Files area can cause an error/crash.

\*\*\*\*\*



For more information go to <https://www.sdrplay.com>

For support go to <https://www.sdrplay.com/support>

## Legal Information

SDRPlay modules use a Mirics chipset and software. The information supplied hereunder is provided to you by SDRPlay under license from Mirics. Mirics hereby grants you a perpetual, worldwide, royalty free license to use the information herein for the purpose of designing software that utilizes SDRPlay modules, under the following conditions:

There are no express or implied copyright licenses granted hereunder to design or fabricate any integrated circuits or integrated circuits based on the information in this document. Mirics reserves the right to make changes without further notice to any of its products. Mirics makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Mirics assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. Typical parameters that may be provided in Mirics data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters must be validated for each customer application by the buyer's technical experts. SDRPlay and Mirics products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Mirics product could create a situation where personal injury or death may occur. Should Buyer purchase or use SDRPlay or Mirics products for any such unintended or unauthorized application, Buyer shall indemnify and hold both SDRPlay and Mirics and their officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that either SDRPlay or Mirics were negligent regarding the design or manufacture of the part. Mirics FlexiRF™, Mirics FlexiTV™ and Mirics™ are trademarks of Mirics .

SDRPlay is the trading name of SDRPlay Limited a company registered in England # 09035244.

Mirics is the trading name of Mirics Limited a company registered in England # 05046393