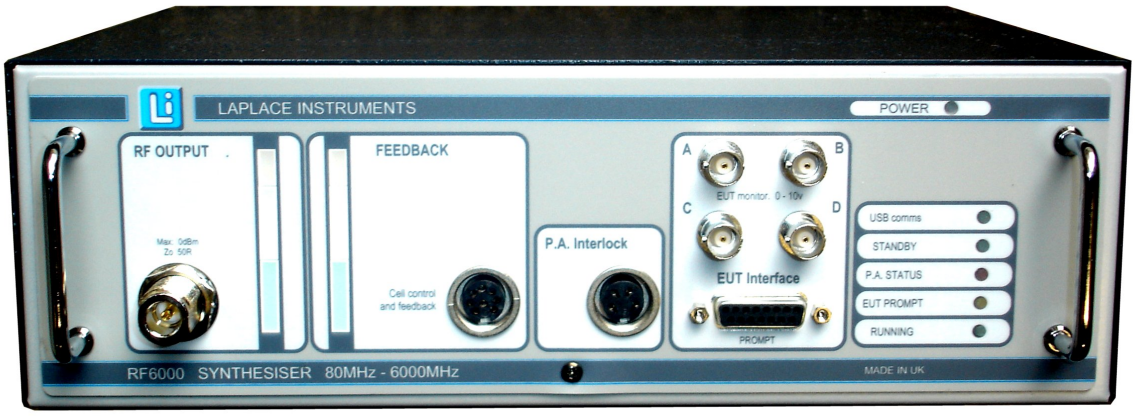
RF6000

RF SIGNAL SYNTHESISER and SYSTEM CONTROLLER



USER GUIDE

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1.0 SPECIFICATION

Output carrier frequency:	80MHz – 6GHz
Resolution:	0.2% of current value
Step size:	0.2% to 9% of current value
Level (carrier signal):	-60dBm to 0dBm
Indication:	Bargraph indication of level.
THD (worst case):	10%
Modulation:	off, 1KHz sine, 80% AM modulation 200Hz, 20Hz & 1Hz pulsed. 100% level
Output connector:	N type
Ext. feedback probe:	Input: 0-2.5V Calibration via PC software.
Connector:	8 pin circular
Indication:	Bargraph
Mode:	Open loop (pre-scan) or closed loop.
EUT status:	Qty 4, 0- 10v input
Fault modes:	Stop, pause, continue.
Connector:	BNC
EUT prompt:	4 pole c/o volt free contacts.
Modes:	Pulsed, Continuous, off
Connector:	15 pin Dee type
P.A. interlock:	Contact closure enforces standby mode.
Connector:	4 pin circular

General

Supply:	110V or 230V, auto sensing. 50 or 60Hz
Size:	120 x 64 x 188mm
Weight:	3.5kg

Control:	From supplied PC software via USB port.
Environment:	Windows XP, Win7, Win8, Win10
Main control:	Start test (RUN) Stop test (STOP) Pause at frequency (Dwell) Single frequency mode
Setup screen:	Enables all parameters of a test scan and EUT details to be programmed.
Parameters:	Start and end frequencies Frequency step (% of current value) Field strength (3 - 20V/m) Dwell time (1 - 99 seconds) Modulation mode.
Single freq. Screen:	Manually or automatically ramp the field strength at one frequency.
Custom scan:	Specify field level vs frequency
Report screen:	Plot all details of the test including setup parameters, actual vs. target settings and EUT status.
Status window:	Real time indication of operating mode, EUT status and P.A. status.

Menus

File:	All standard Windows facilities, including printer output and file Save, Open commands. Test results and setup data can be stored/recalled separately.
Display:	Set trace colours. Add Title.
Config:	Enter EUT monitor channel details Select feedback probe type Enter cell characteristics, Check USB connections Enter file path data.
Indication:	Mains power Output signal level (bargraph) P.A. status, EUT status, EUT prompt

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2. SPECIAL NOTE

The RF6000 is designed for use with the LaplaCell range of EMC test cells. These cells are fitted with a field sensor to provide feedback to the field strength level control system. These synthesisers will not work correctly unless this feedback signal is present.

If the unit is to be used without the cell connected, option –RH is available which should be included at time of order. This adds a remote sensor interface which is connected via the RS232 port on the rear panel. This will accept feedback from Holaday, Narda, Radisense or other standard probes that use similar protocols. In this mode the field level at the location of the probe is controlled automatically.

2.1 Remote sensor option for anechoic chamber operation

The RF6000 can be used with a field sensors (see above) for use in anechoic chambers. This -RH option must be specified at time of ordering. This manual will apply in all respects apart from the following:

Sensor requirements:
The system is designed for the following sensor types….
Holaday HI-4422 or the HI-6005
Radisense RSS1004A probe and CTR1001S interface
Narda EP-600 range (or equivalents).
The sensor should be connected to the synthesiser via the appropriate fibre optic cable and serial adaptor. This adaptor or serial cable is connected via the serial port provided on the rear panel of the unit. The synthesiser will recognise the probe and power the adaptor automatically.

Note that the calibration data for the sensor must be correctly loaded and linked to the software prior to use. This is normally undertaken by Laplace Instruments Ltd prior to despatch.

If the sensor is not connected, or if the sensor battery is flat, the system will not run when RUN or PRE-SCAN is initiated.

In operation, the software will work as described in the following sections. Both closed loop (sensor used alongside the EUT) and open loop (Pre-scanned with EUT absent) modes can be used. In addition, the sensor can be used to check and calibrate the test volume using the pre-scan mode and by processing the resultant pre-scan data in (for example) Excel.

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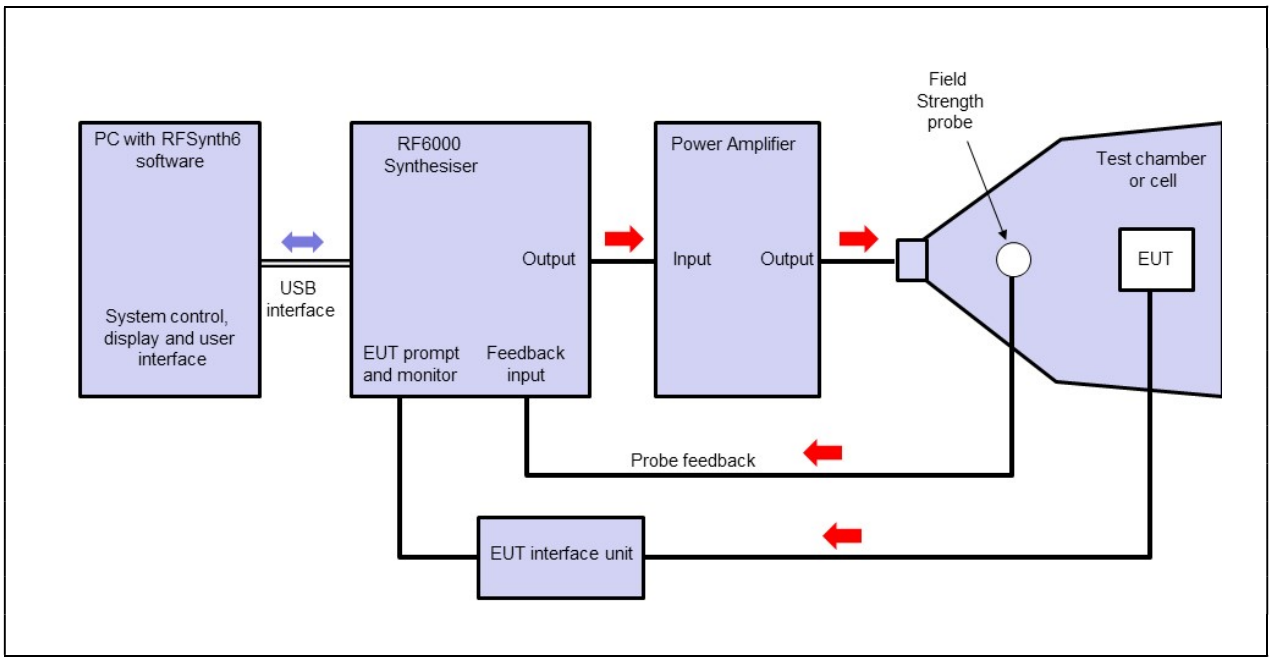
3. INTRODUCTION

The RF6000 RF signal synthesiser is specifically designed to provide the signals required for testing RFI immunity of products to international standard IEC61000-4-3.

IEC61000-4-3
IEC61000-4-3 immunity testing requires that the EUT (equipment under test) operates satisfactorily when subject to a strong electromagnetic field.
This requires a ***scan*** at a certain fixed ***level*** (specified by the standard) of field strength. The ***scan*** will comprise a series of '***steps***' in frequency. Each step increase is specified as a percentage of current frequency value.
This percentage is variable from 0.2% to 9%.
At each ***step***, the frequency is held, the ***level*** adjusted to achieve the required field strength as measured by a field sensor, a prescribed modulation mode is initiated and then the conditions held for a '***dwell***' time. The EUT should be monitored to detect faulty operation during the test.
During the ***dwell*** time, a 1KHz, AM modulation at 80% depth is applied to the signal.
In addition, a specific test is required in mobile phone bands with a pulsed modulation of 100% depth to simulate the fields which may be experienced from mobile phones.

The synthesiser generates a signal at the required frequency, modulation and level which can be fed to transmitting antenna or test chamber via a suitable fixed gain Power Amplifier. If used with a compact cell, the Laplace RF1100, RF1300 and/or RF1600 amplifiers make ideally matched companions.

Typical System



Frequency and modulation are simple set values but the level is controlled via a field strength sensor feedback loop. (But see note in section 2).
The PC will provide the level set point in terms of sensor output (i.e. already adjusted to take account of cell characteristics)
Two operating modes are available: real time feedback or pre-scanned level. The former takes account of the effect of the EUT inside the cell.

The Synthesiser also acts as an interface to the EUT with status input and 'prompt' outputs that can initiate the product to perform an operating cycle at each step.
A single frequency mode is available in which the cell is effectively controlled directly by the operator from the PC, enabling specific weaknesses in the EUT to be investigated.

System components

- Synthesiser The RF6000. Linked to PC via USB port. Generates the required signals and controls the amplitude to produce required field strength inside cell. Also interfaces simple EUT status signal back to PC and generates simple 'prompt' signal to EUT under PC control
- PC with RFSynth6 software package. This acts as the User interface and main controller for the system.
- EUT monitoring facilities
    - EUT excitation and monitoring. The RF6000 is fitted with 4 channels of 0 – 10v inputs to monitor the EUT status.
    - Video interface running in separate window. Camera and camera hardware interface and software are supplied separately.

The interface between the EUT and the RF6000 must be produced by the user to suit the requirements of the EUT.

Cell characteristics

The cell may be distinctly non linear in frequency characteristics. Generally each cell is individually calibrated by the manufacturer and the resultant characteristics programmed into the software.

Field control technique

There are two quite distinct ways in which field strength can be controlled. The synthesiser allows use of both techniques.
To understand the background to these alternative techniques, imagine the following scenario:
The equipment to be tested (EUT) is to be used in an area close to a strong transmitter, perhaps a TV station, and may therefore be subject to quite strong RF fields. Indeed in one location at which the product is to be located, the field strength from the transmitter is 10V/m, as measured with an accurate field strength probe prior to installing the product. When the product is installed at this location, it will modify the field in this vicinity, possibly reducing the field to only 5V/m simply due to the RF characteristics of the product.

The question is therefore raised: how should the product be tested?

Either:

1. Open loop mode (Pre-scan). Generate the 10V/m in the 'empty' space first, then place the product into that space but do not attempt to control the field strength which may now have suffered a significant change. This emulates the 'real world' situation as described above, but may result in actual field strengths applied to the product significantly less than the 10V/m nominal.

Or:

2. Closed loop mode (Standard). Control the field strength with the product in the 'space' to give 10V/m. This may appear to to more 'correct' but could give a false impression of the performance of the produce in actual situations.

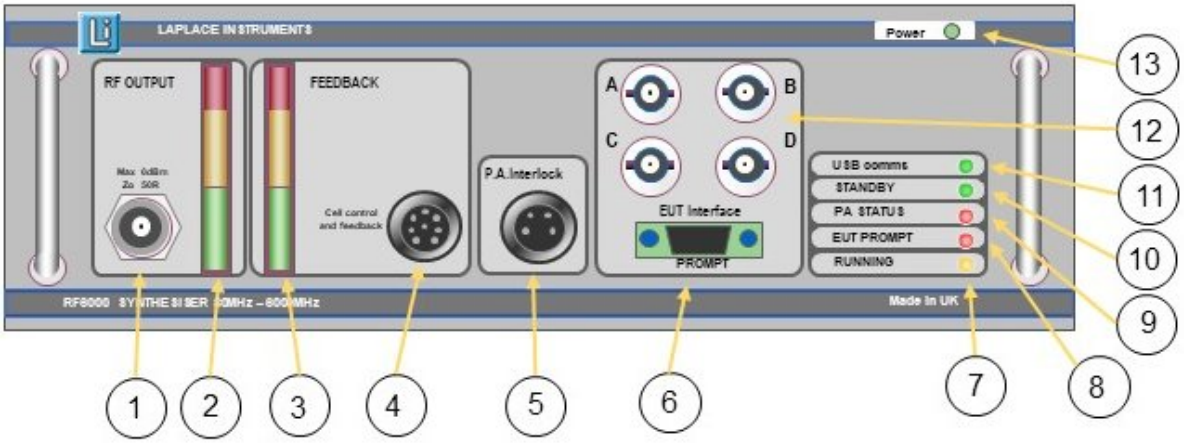
The synthesiser and the software permit both techniques.

Technique 1 is the preferred method (according to the standard), but technique 2 is often used.

4. Synthesiser Hardware Description

The RF6000 acts as the ‘hub’ of the immunity test system. It generates the signal that is applied to the EUT, controls the field strength via a feedback signal from the cell, provides interfaces for the EUT and interfaces to the controlling PC via the serial port.

The features of the front panel are:



1. 50ohm N type for signal out. This signal should be taken via a suitable RF power amplifier to the cell or antenna. Maximum signal out is typically 0dBm.

2. Signal out level indication. This is provided so that the user can visually observe the activity of the system. Note that this level does not represent field strength, that is largely determined by the characteristics of the amplifier/cell or antenna. NOTE: An excursion into the red zone does NOT indicate an overload, it simply indicates that the output is approaching full scale.

3. Feedback signal indication. This indicates an approximation of the feedback signal level to show the activity on this line.

4. Connection to the test cell. This includes an output to control the cell range and the input signal from the sensor inside the cell.

5. This connects to any Laplace power amplifier (via the LETIS where fitted) and forces ‘standby’ mode when the amplifier is not required.

6. EUT prompt output. This enables the system to ‘prompt’ the EUT each time the test begins a ‘dwell’ period. This can ensure that the EUT is fully exercised at all test frequencies during the test. See section 4.1.1

7. System status. Indicates that the system has set frequency and stress level and has entered ‘dwell’ mode.

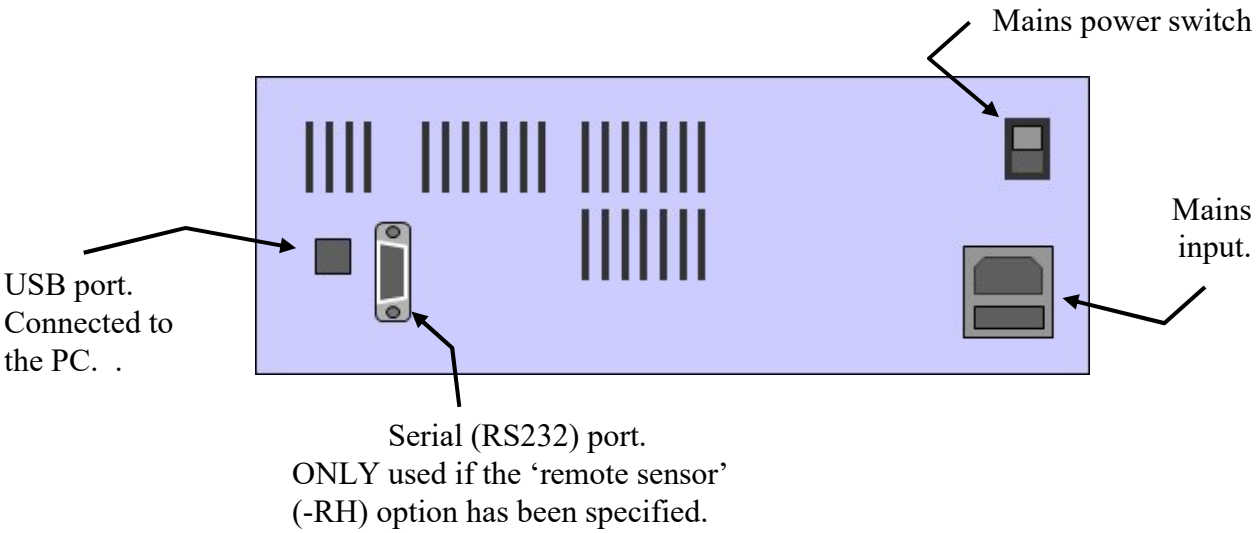
8. Indicates the operation of the EUT prompt signal.

9. Indicates the status of the power amplifier standby control.

10. Indicates when the system is in standby mode.

11. USB communications activity.
12. EUT monitoring inputs, channels A through to D.
13. Mains power ON/OFF indicator.

Rear panel



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CAUTION

- Ensure equipment is properly grounded to earth before use.
- Do not cover any ventilation slots.
- Use only 'volt free' contacts for the EUT status signal.

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4.1 Interconnections

4.1.1 EUT status connections

EUT monitor

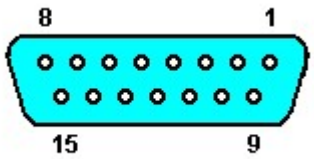
These connections relate to the monitoring of the EUT whilst immunity testing is ongoing. Immunity tests can take some time, so automatic monitoring is an advantage as it avoids the need for continuous presence of a person during the test.

4 identical channels are provided, each with BNC input and a range of 0- 10V dc. The input impedance is 100K. These are sampled by the RF6000 during each dwell period and results can be plotted on the screen as a test progresses.

Each channel can be configured for pass/fail thresholds using the Configure…. EUT Settings menu.

EUT Prompt

The prompt output from the Synthesiser is a 4 pole c/o relay. All the contacts are brought out to a standard 15 way Dee type connector.



Connection details

Common	NO	NC
10	1	9
11	3	2
12	7	8
13	15	14

The relay operates according to the mode selected in the software (see section 5.4.2)

Off: Not operated
Pulsed: Closes for 1 second at the start of each Dwell period.
On: Closed during each Dwell period.

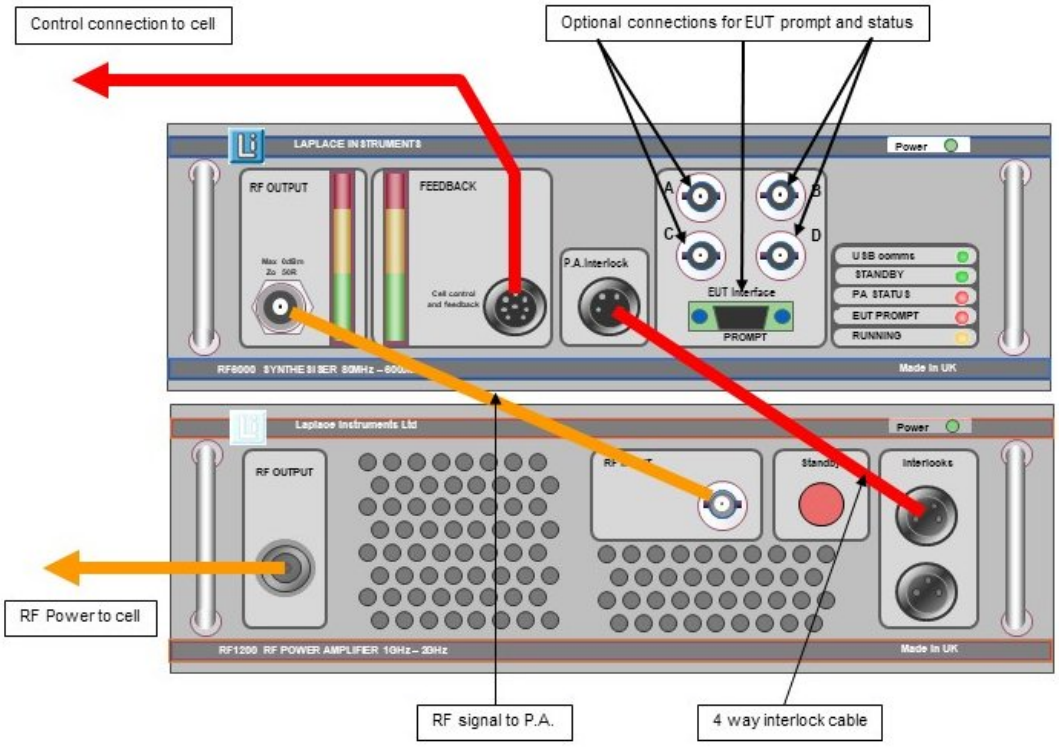
Notes:

- NO contacts are closed when EUT prompt operates
- NC contacts are opened when EUT prompt operates
- Contact rating is 20v rms or 40v dc, 300mA.
- When pulsed prompt is used, contacts close for approx 1 second.

Operation of this EUT Prompt is set in the main screen.

4.1.2 System Connections

This diagram shows the cabling connections when using the Synthesiser with a single power amplifier. All 4 cables shown in this diagram are included with the shipment. The optional connections to the EUT prompt and EUT status sections are supplied with the appropriate mating halves. Note that if the system is used with remote sensor, the control connection to cell is redundant and not supplied.

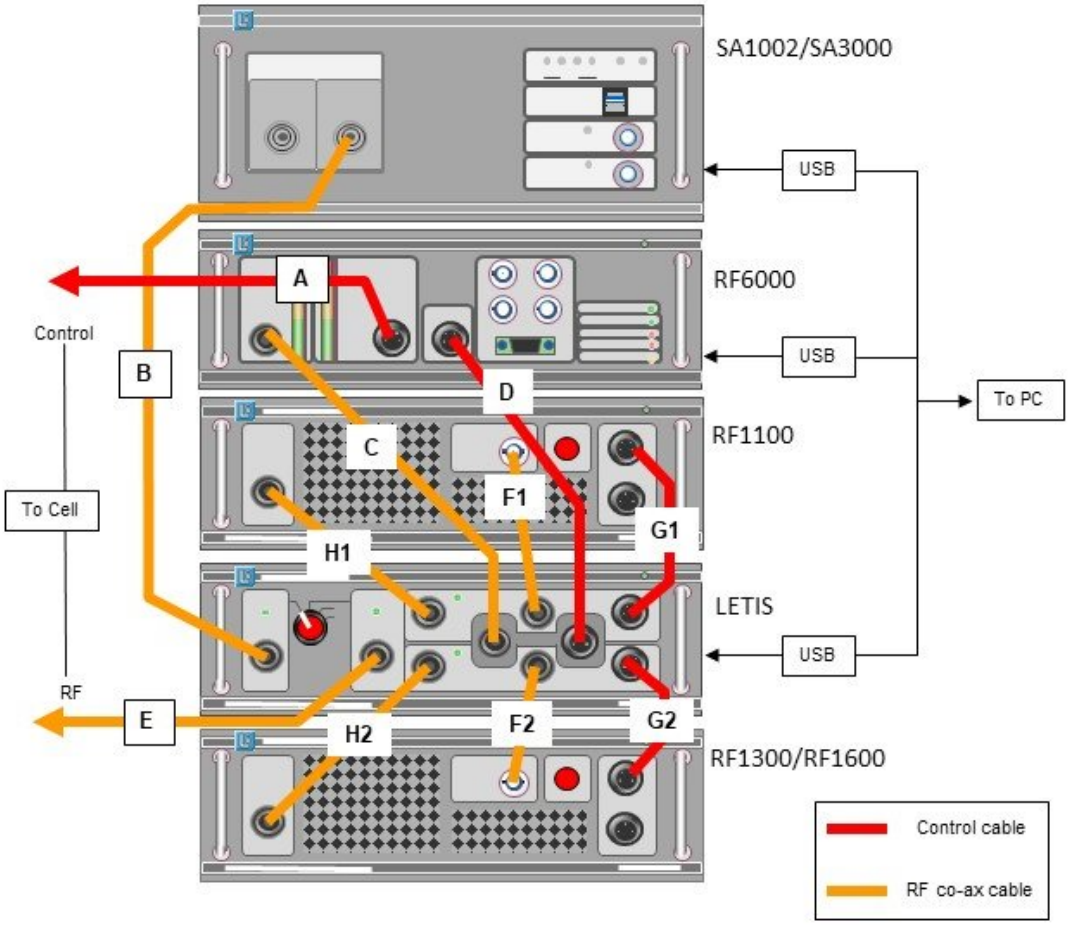


If using the Synthesiser with both the RF1100 and RF1300 or RF1600 power amplifiers, the three cables (c), (d) and (f) which connect to each power amplifier must be switched over at 1GHz. This requirement is achieved automatically if a LETIS is used.

a) Connect the mains power cable to each item and switch on.
b) Connect supplied USB lead from USB port on PC to rear panel connector on Synthesiser.
c) Connect RF output lead from Synthesiser to RF input on RF1100 power amplifier (P.A.), with the supplied BNC - BNC lead.
d) Connect RF output from RF1100 to cell RF connector (N type) using cable provided. Note, normally ALWAYS leave this cable connected to cell. When disconnecting the RF1100 or any other device (eg EMC analyser), always disconnect at the end remote from the cell. (If not using a cell, connect to a suitable antenna or other load)
e) Connect the supplied 8 way cable from the cell to the feedback connector on the RF6000. Not required if not using a cell, but note that an alternative field sensor must be connected via the serial port on the rear panel..
f) Connect the supplied 4 way cable from the Synthesiser to the RF1100.
g) Note that when using the LaplaCell, the 3 way connector on the RF1100 is not used.

4.1.3 LETIS

The LETIS (Laplace EMC Test Integration System) enables all the switching between power amplifiers to be done automatically. If using this unit, the interconnections are as shown below. Note that this diagram is for a complete system which includes the SA1002 or SA3000 analyser for emissions measurement.

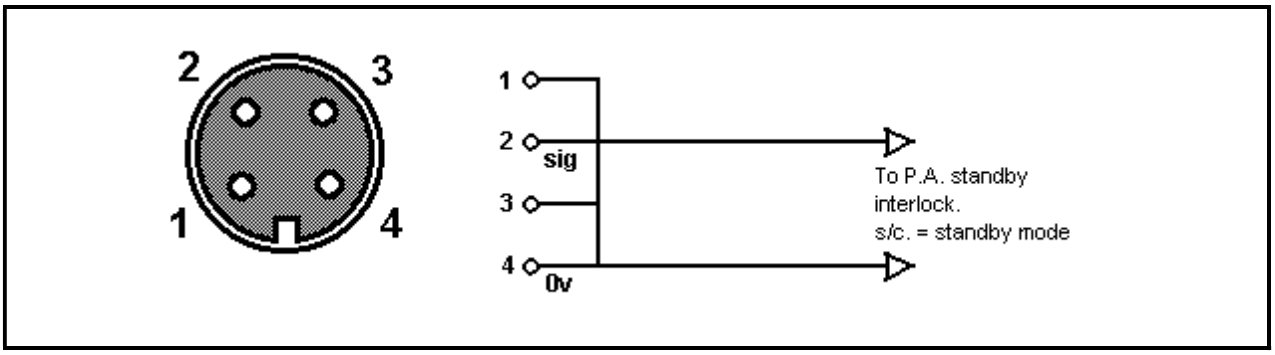


Further details are included with the LETIS User Guide.

4.1.4 System interconnection circuits

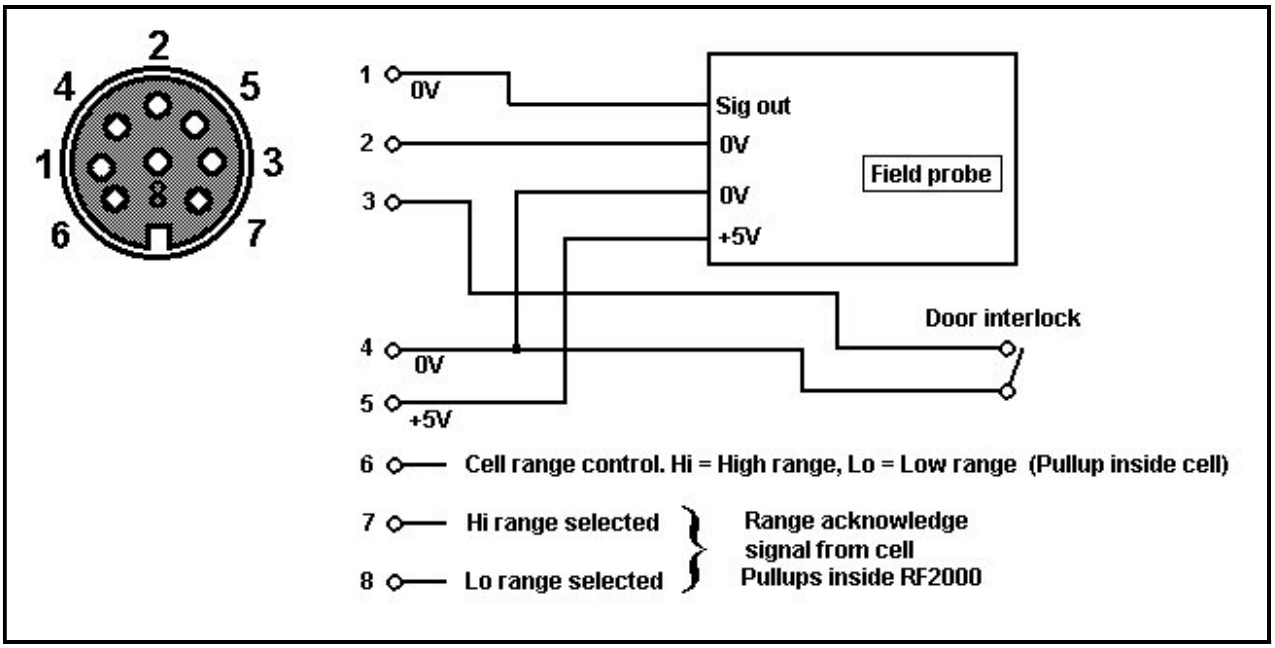
These are provided so that the Synthesiser can be interfaced with other third party hardware. When using Laplace ancillaries, this section is redundant.

PA Status



Cell Control and Feedback

Not used when the 'remote sensor' option is specified. The sensor is connected at the rear panel.



The RF6000 requires an analogue signal for field strength feedback. The range of the feedback signal is 0- 3v. The standard version of the RF6000 assumes a response time of approx 10ms to match the performance of the probe included with the LaplaCell. If an alternative probe is to be used, ensure the response time is similar or shorter than the 10ms quoted above. If a probe with a longer response time is to be used, contact Laplace Instruments Ltd or the distributor for advice.
This connector provides +5v at 20mA for probe power and a connection for the cell door interlock.
The 8 way cable supplied with the LaplaCell provides all the required interconnections.

5. Synthesiser Software

The software programme (RFSynth6) supplied with the Synthesiser is a Windows application which will run under 64 bit versions of Windows, Win7, Win8 and Win10 This program has the following functions:

- Control of the Synthesiser
- Programming of the test sequence
- Display of the results of the test
- Recording of results and setups to disk, and subsequent opening of those saved files.

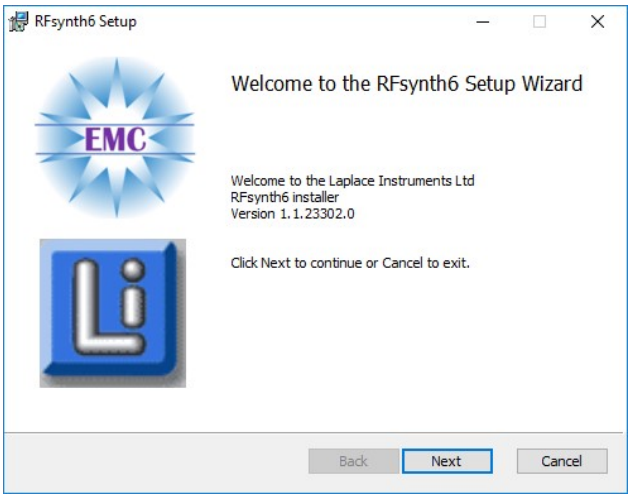
5.1 Installation

To install the program, insert the supplied USB memory stick and run 'RFSynth6.msi'. This should create a directory c:\Program Files\RFSynth6 and copy files into this directory.

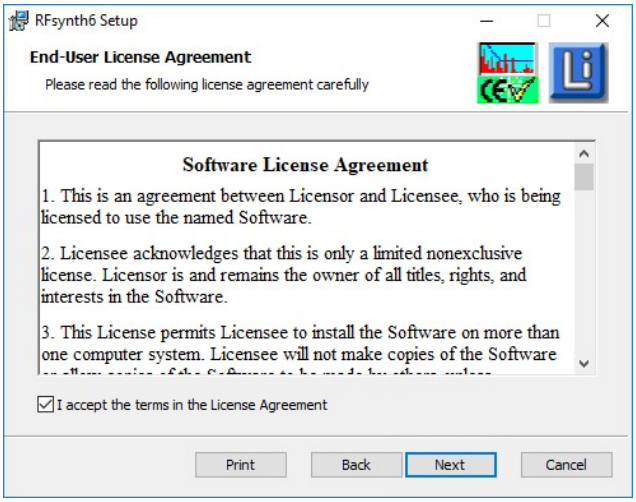
5.1.1 Installation of the Synthesiser USB Device Drivers under Windows.

Connect the Synthesiser to the USB port on your computer using the supplied cable and switch on the Synthesiser.

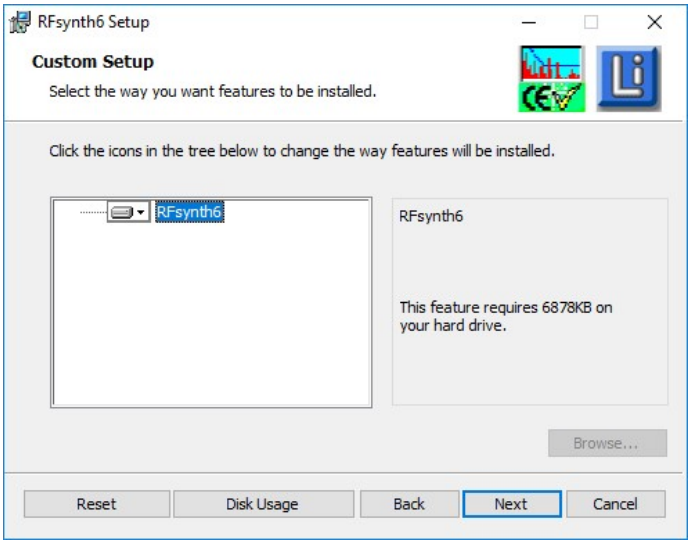
Windows should automatically detect that the USB device has been connected and may prompt for a device driver. (Some versions of Windows will do this automatically, so the following procedure would not be required).



Click Next.

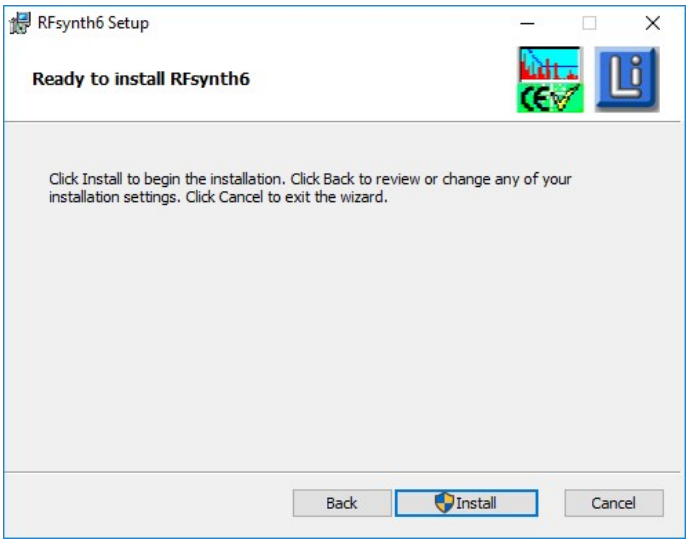


Read and accept, then click 'Next'

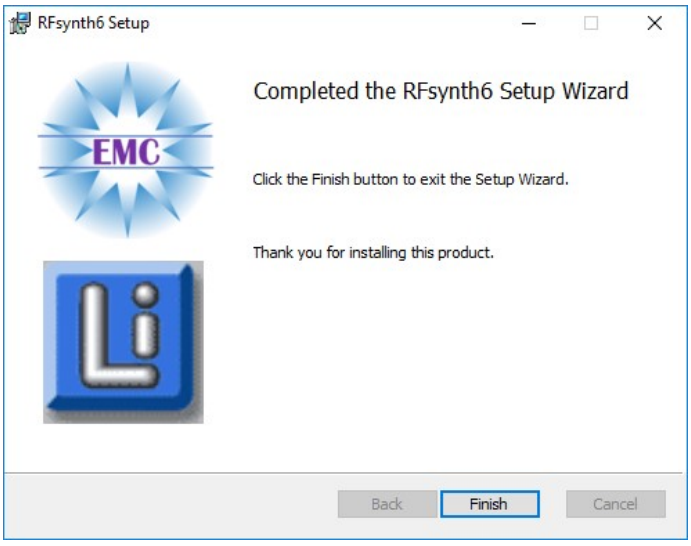


This next screen allows you to select different locations for the software. It is recommended that the default be accepted

Click Next



Click 'Install'. A pop-up may appear which may request administrator rights. In this case the Admin password will be required.

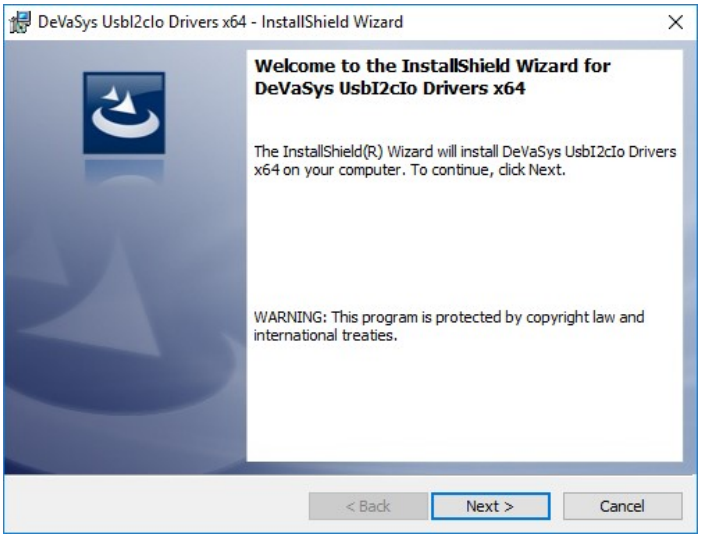


Install is now completed.

Click 'Finish'.

A desktop icon will appear.

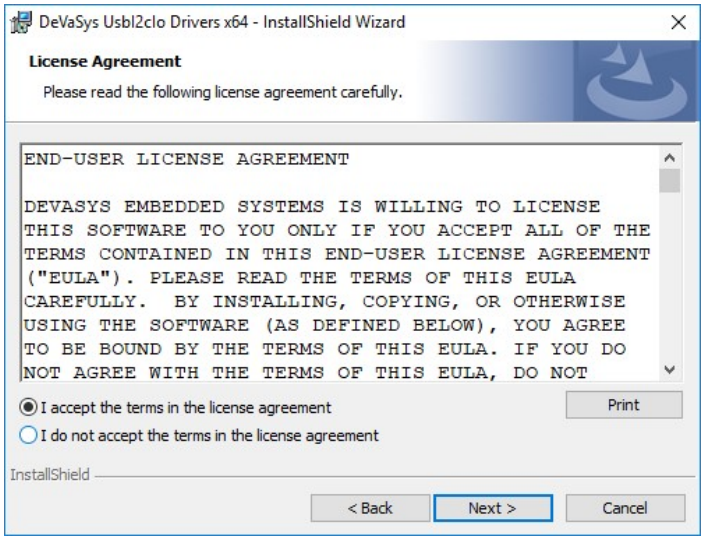
Now the drivers need to be installed……



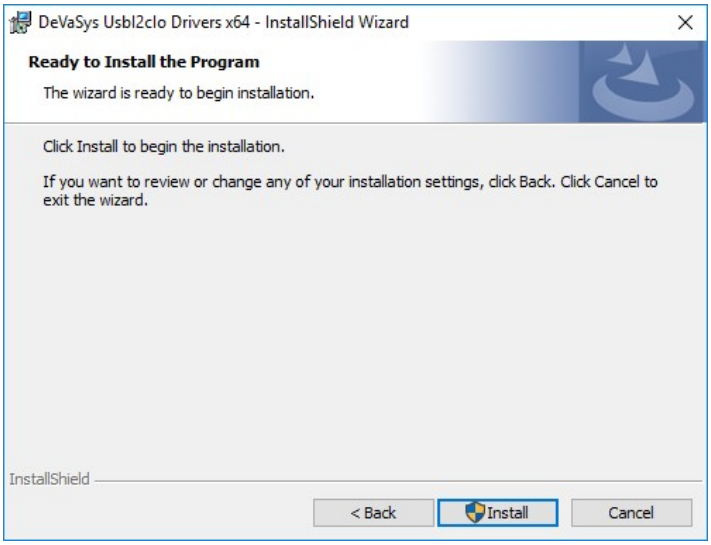
The required USB driver is on the USB memory stick.

Click on the ….
DeVaSys_UsbI2cIo_Drivers_x64.msi

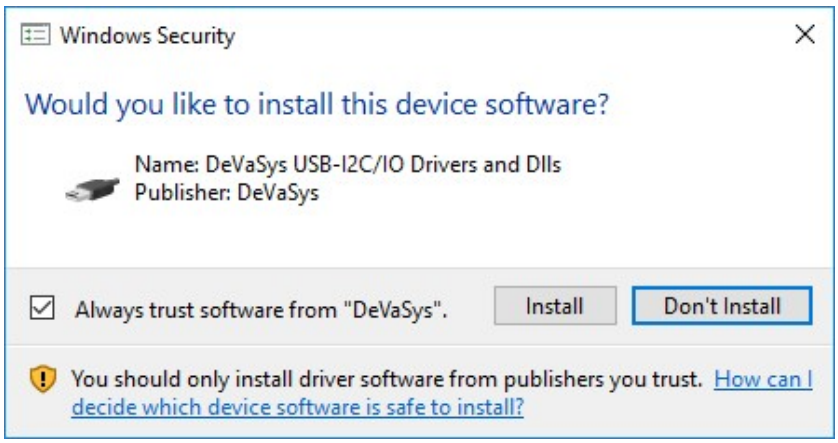
Click ‘Next’.



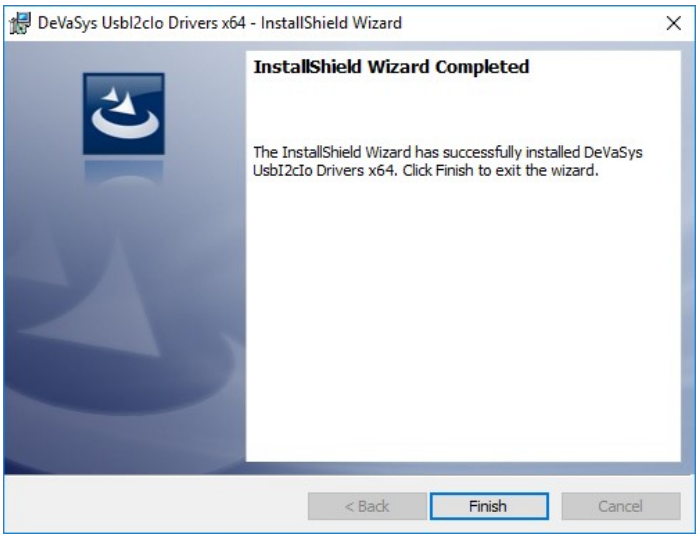
Read and accept, then click ‘Next’



Click ’Install’. A pop-up may appear which may request administrator rights. In this case the Admin password will be required.



Click 'Install'



The installation is now complete.

The hardware needs to be attached so that the driver can complete the setup before the RFSynth6 software will run properly. This only needs to be done once, thereafter the software will run without the software, but only for file view and printout purposes.

Repeat the sequence for any other USB devices connected (eg LETIS). Windows will automatically prompt you to load the second USB device driver.

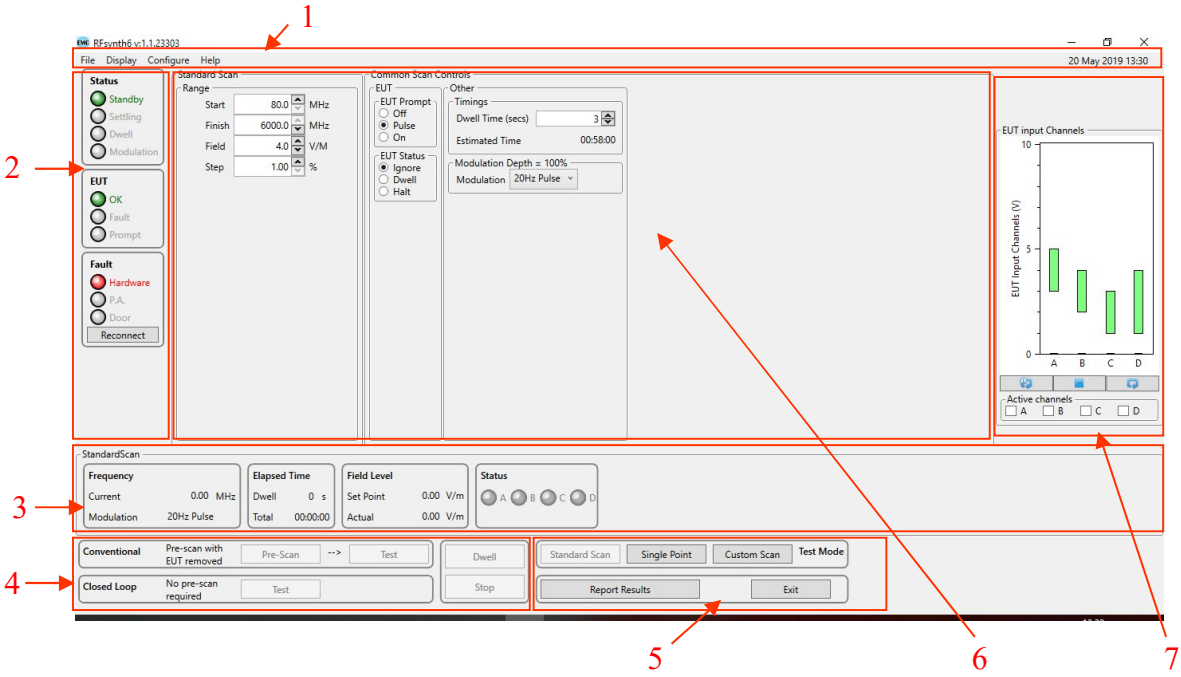
You should load the cell calibration file (cell0nnn.csv) from the supplied USB stick onto your PC using the main menu item, Configure…… Cell Calibration item.

To start the program, run RFSynth6.exe using the icon on the desktop.

5.2 Overview

The screen layout

The screen is divided into 7 main areas:



1. The **Main Menu** bar across the top (File, Display, Configure, Help) in a conventional Windows application style.
   A full description of each menu item is given later.

2. The **status indicator** areas running down the left hand side.
   i) Synthesiser operating mode
   ii) EUT status
   iii) System fault indicators.

3. The **Monitor** area.
   Displays current test parameters, continuously updated as a test proceeds.

4. The **Main operating control buttons**
   Controls Pre-Scan, Test, Dwell (Pause), and STOP.

5. The **Main Test mode selection.**
   These control the mode of operation AND the content of area 6 (see below).
   The three test modes are:
   i) **Standard Scan** - For conventional frequency scan of signal at fixed level (V/m).
   ii) **Single Point** (frequency) - Manual or semi-automatic control of frequency and level.
   iii) **Custom Scan** - Enables programming of complex scan profiles as required, for example, by products which are sensitive to certain frequencies (eg radio receivers).
   iv) **Report Results** - Displays a screen on which the results of a test are plotted graphically for ease of viewing and interpretation.

6. The **main setup and results** display area.
   This area shows one of 4 different screens, one for each of three operating modes plus a reporting page, selected by the Test Mode Select buttons in area 5.

Main Operating Modes

The system has 3 quite separate modes of operation.

The modes are:

1. **Standard** mode. Conventional scans between a start and finish frequency at a fixed field strength level and programmable step size.
   Modulation, EUT prompting and EUT monitoring as required.
2. **Single frequency** mode. Manual control of frequency and field strength so that specific problems can be investigated. In addition this mode provides secondary features:
   a) Can be used at the GSM mobile phone frequencies, pulsed field test required by the standards for testing mobile phone immunity.
   b) Total manual control of the operation of the test.
3. **Custom scan** mode. Enables a frequency vs. field strength profile to be programmed.

In addition, the Standard and Custom scan modes can be run with either the normal (using probe feedback for field control) technique, or with the 'Pre-Scanned' technique. See section 5.4.1

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In the next sections the operation of the software is described in terms of the procedures which would typically be adopted for a practical application.

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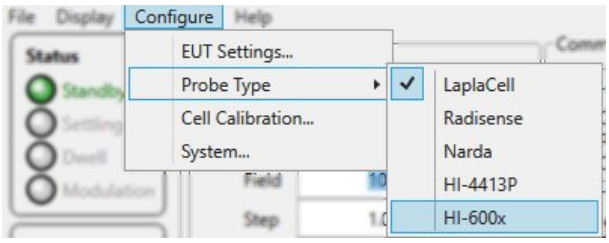
5.3 Preparation

- Switch all hardware on.
- Connect all cables (see section 4.1.2)
- Run the software

5.3.1 The calibration file for the cell or sensor should be installed.

See section 6.3.3

If not using a LaplaCell, you can select alternative probe types as required.

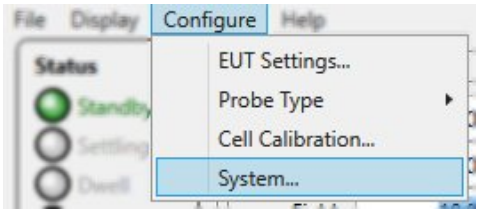


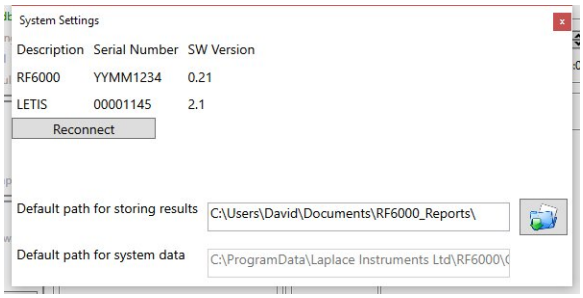
5.3.2 EUT monitoring

- Prepare the EUT monitoring interface and connect to the RF6000. (See section 4.1.1)
- If using the cell camera and/or internal lighting, position these for optimum viewing.

5.3.2 System interfaces

Check the Configure… System menu and ensure that the hardware USB links are listed in the table.





Set the paths for results and system data are appropriate.

5.4 Operating Procedure (Standard Scan)

5.4.1 Choice of test mode, Pre-scanned or Closed loop.

For the purposes of this description, use of the LaplaCell will be assumed.

If Pre-scanned testing is to be used, this requires the cell to be 'empty' so that the field can be set inside the test volume without any distortion due to the presence of the EUT.

If Closed Loop testing is required, ……

Install, configure and connect the EUT inside the test cell
Check all EUT related systems are working properly.

a) EUT operation.
b) EUT status interface (check response on Synthesiser software screen when EUT is made to 'fail').
c) EUT prompt signal.

5.4.2 Configuring the test.

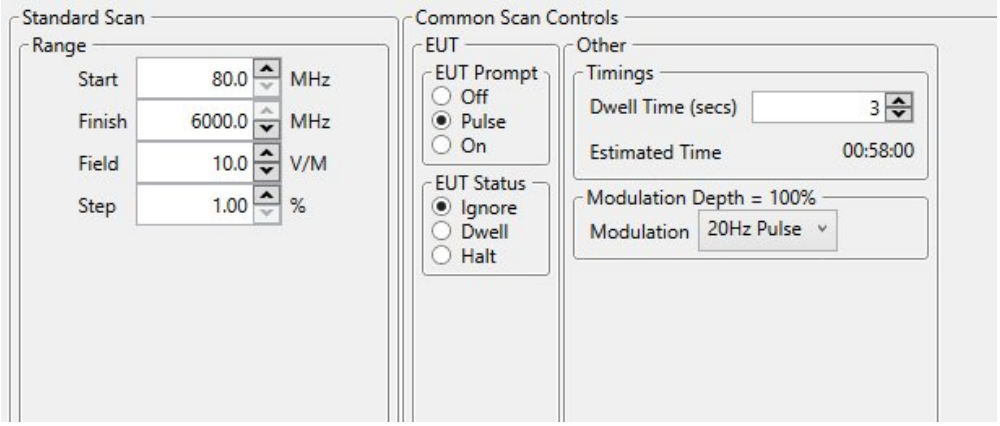
Select 'Standard Scan' button in the Test Mode selection area.

1. Check Hardware and Door Fault indicators on the PC screen are not showing.
   Note that the PA fault will normally show as an indication that the Power Amps are in standby mode.

2. Ensure P.A. standby buttons are out (if not using a LETIS, these should **not** be illuminated. If LETIS is used, these **will** be illuminated until the scan starts). Make sure the cell door is closed.

3. Check the cell door interlock. (Opening the door should cause door fault indicator to show and force power amplifier(s) to go into Standby mode)

4. When all is ready to start the test, the test parameters can be entered in the Standard mode window.



5. Type in the start and finish frequencies. Note that the maximum frequency is determined by the synthesiser model.

6. Type in the required field strength.

7. Enter the required step size in %. For normal testing 0.5% or 1% is used. However for a fast scan, a larger step size can be used. For very careful testing for narrow band effects, smaller step sizes can be used.

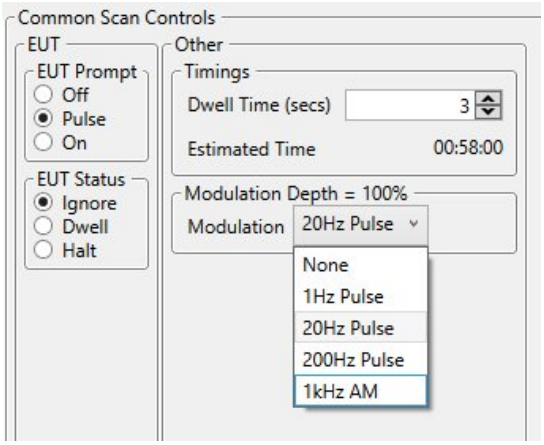
8. Select EUT prompt OFF or Pulsed or ON as required. (this parameter is not used during a pre-scan). See section 4.1.1 for details.

9. Select EUT status either OFF (if not used) or Halt if the test is to be stopped in the event of an EUT failure, or Continue if an EUT failure is to be ignored. Note that failures are marked and recorded even if 'Continue' is selected. (this parameter is not used during a pre-scan).

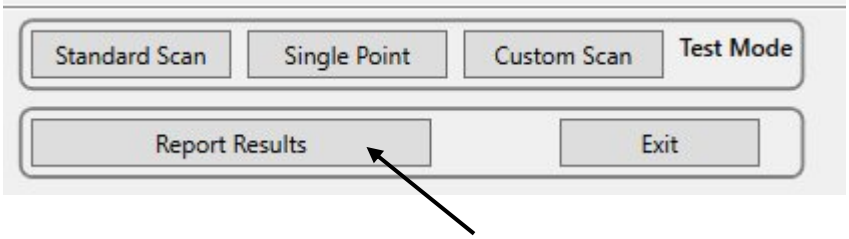
10. Select dwell time at each test frequency in seconds.

11. The Estimated Time field will automatically calculate the approximate total time for the test.

12. Select the required modulation. For most tests involving a scan the 1KHz modulation is normally used.

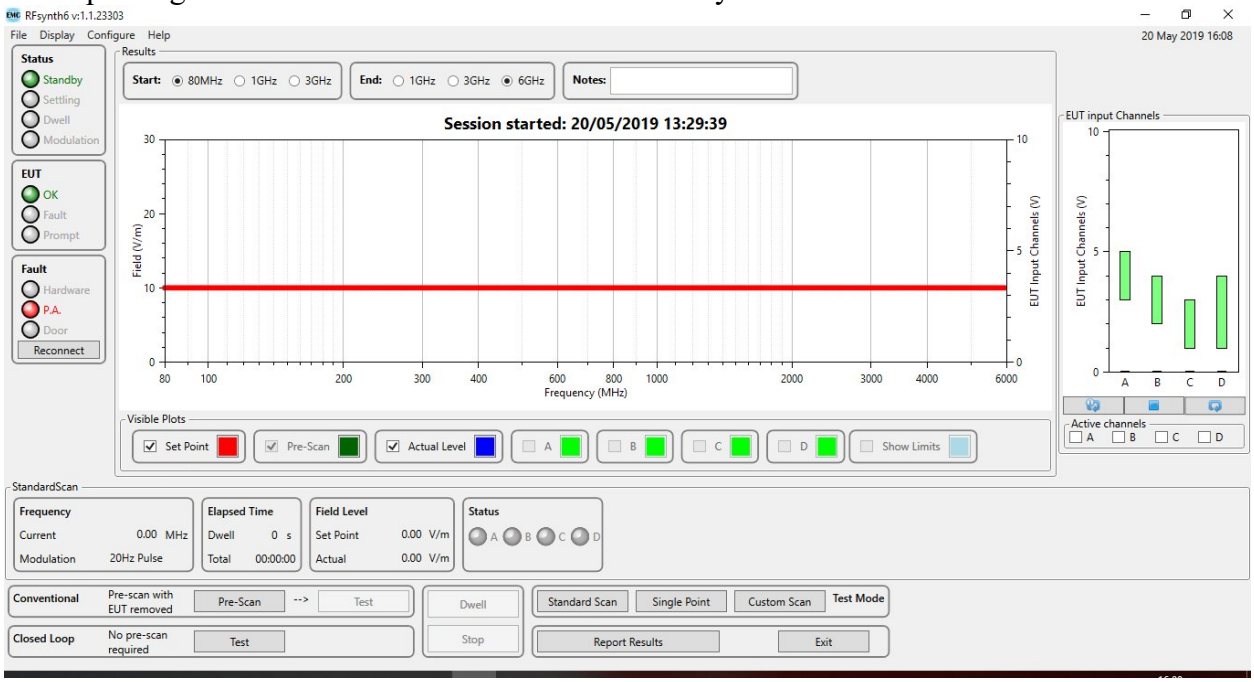


5.4.3 Running the scan.



Once the scan is fully programmed, click on the 'Report Results' button in the test mode section to view the results of the test as the test proceeds. The target field strength profile will be displayed as a red line.

The Report Results window shows the target stress, the actual achieved stress and the EUT monitor levels as the test proceeds.
This screen can be configured for start and finish frequencies using the selectors at the top of the plotting area. A note can also be added to identify the test.



2. Select the chosen test technique…either 'Conventional' or 'Closed loop'
Conventional defines the Pre-scan mode of operation because this is the preferred technique according to the standard.
   a) If using conventional technique, note that the Test button is greyed out until a Pre-Scan has been acquired.
   b) Once this scan is completed, the EUT can be installed in the cell and when the conventional 'Test' button is subsequently clicked, the scan progresses using the pre-scan data. This pre-scan data can be stored for future use if required..

3. If 'Closed loop' is preferred, just click the 'Test' button in the closed loop section and the test will start immediately.

4. NOTE: If using the Lc600 or Lc300 cell, ensure that the frequency range switch on the cell is set to Auto position. The Synthesiser will automatically switch the cell range as required. If the switch is set to a manual position, the software will flag an error.

a) The system Status indicators will initially show ‘Settling’ as the system creates the required frequency and then ramps up the field strength to the desired value. A small dot on the results plot will show field increasing and settling at each step. When the correct conditions are achieved, the Status indicators will change to ‘Running’ and, if modulation is selected the ‘Modulation’ indicator will show.

b) The actual field strength achieved will be shown as a blue line on the Report Results screen. This should appear close to the target (red) line.

c) The EUT status (if relevant) will be indicated in the Status indication area and as the colour tint in the plot area.

d) Actual achieved frequency and field strength will be reported in the monitor window, together with current dwell time and total elapsed time.

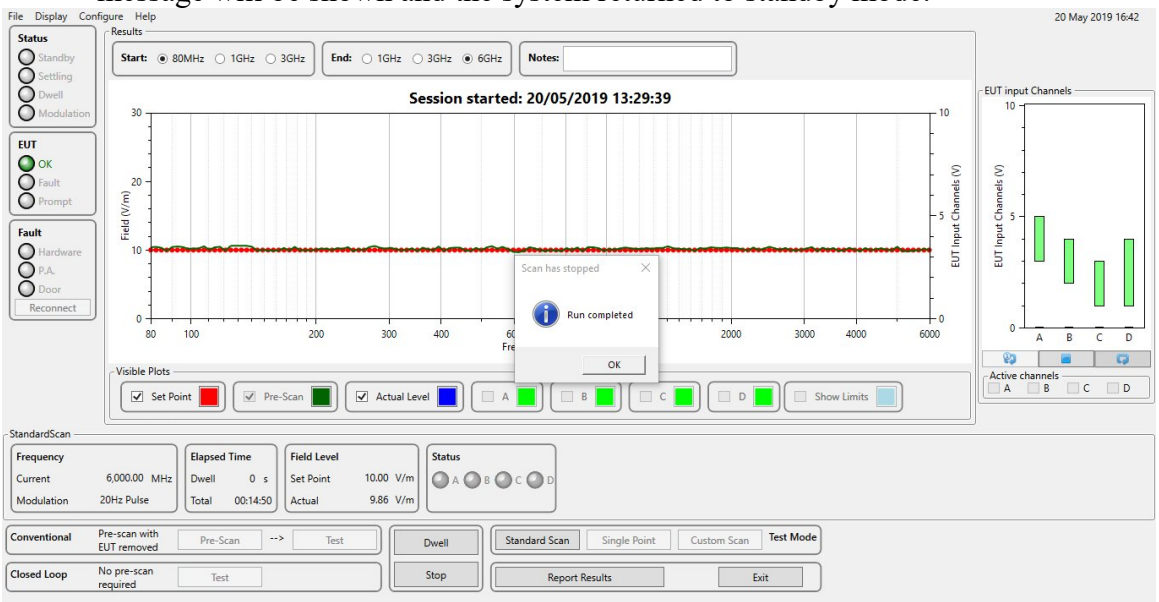
e) At the end of each Dwell period, modulation is switched off, the system reduces the signal level to avoid ‘overshooting’ at the next frequency point, increases frequency to the next point, adjusts the signal level to the required stress level then switches modulation back on and starts the next dwell period.

f) If ‘Pre-scan’ was selected, the scan proceeds without any dwell period, modulation or EUT monitoring.

g) At any time during the scan the dwell time at any particular frequency can be extended indefinitely by clicking on the Dwell button on the lower edge of the screen. The Dwell button will also act as a Resume button.

h) If you need to stop the scan before it reaches the end, click on the Stop button.

i) If the test is allowed to proceed until either the scan reaches the Finish frequency or the EUT causes the scan to stop (EUT Status set to Halt), an End of Run message will be shown and the system returned to standby mode.



The above shows the screen after a pre-scan. The green line shows the actual achieved levels for comparison against the target level.
If the conventional Test button is now clicked, the test will be performed using the pre-scan data.

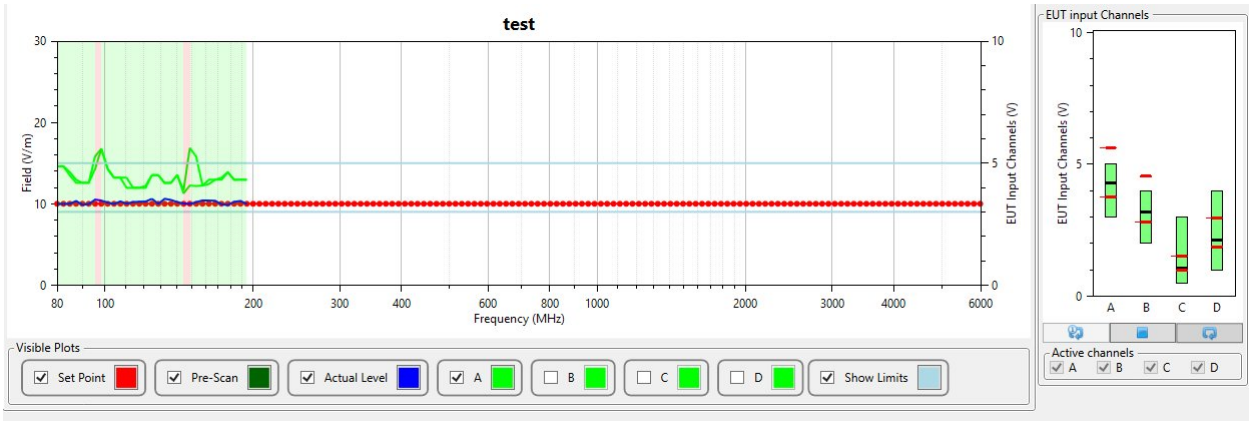
This Pre-Scan data can be saved for future use. Use File….Save Pre-Scan.

When this PRE-SCAN is completed, the EUT can be placed in the cell.
To then do a Pre-Scanned test, simply click on the Test button in the 'Conventional' section.

The REPORT RESULTS screen will show the target level, as normal, plus the actual field strength inside the cell as measured by the field probe. This feedback is not used for the control, but gives an indication of how the EUT is reacting to the applied field. For instance, if the EUT is such that it absorbs RF energy at a particular frequency, this will be shown in the feedback level.

5.4.4 Display of Results

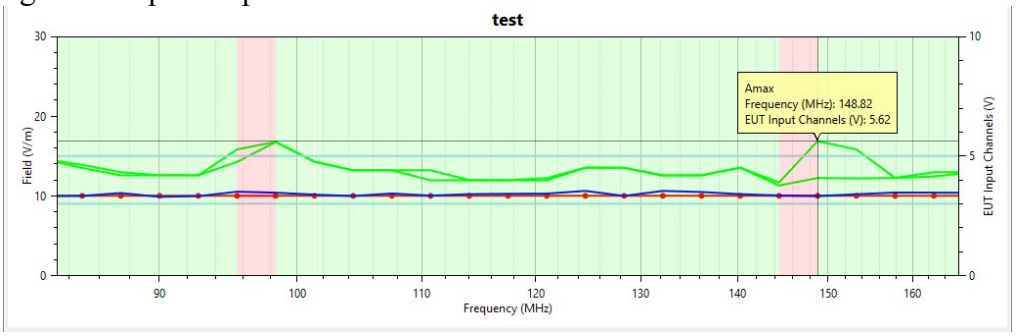
Whilst a test is in progress, the results are plotted as they are received.



Red trace: Target stress level
Blue trace: Actual achieved stress level.
Green trace: EUT monitor, channel A.
Light blue traces: EUT channel A pass/fail thresholds

Note how the plotting area background colour changes when the EUT is outside the pass/fail thresholds. If the EUT signal fluctuates during a dwell period, the maximum and minimum levels are shown, resulting in a 'split' trace.

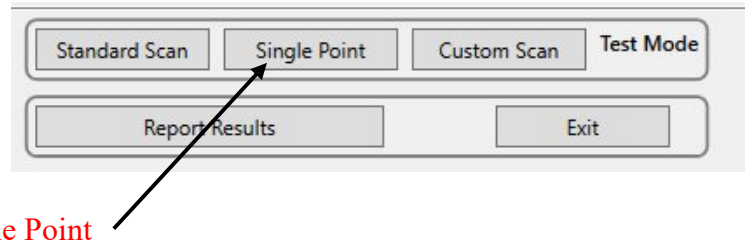
To zoom into any part of the results screen, use <CNTRL> <Right Mouse Button> and drag to highlight the required span.



Clicking the left mouse key over any trace will display the value and frequency of that point.

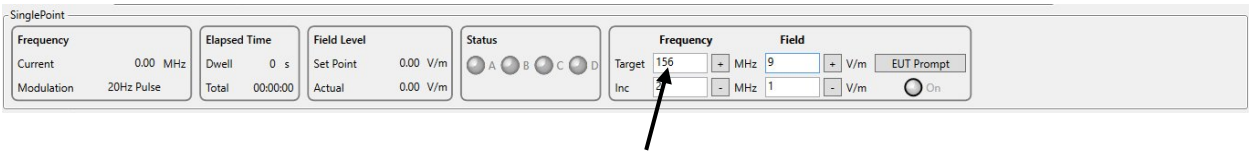
To exit zoomed view, use Right Mouse Button and select 'Reset Zoom'.

5.5 Investigative Test - Single Point mode



1. Select Single Point

2. Single frequency mode enables the user to set a frequency and modulation mode and to manually control the field strength using simple UP and DOWN buttons. Frequency can also be adjusted in the same way.



3. Enter the desired frequency in the Frequency field, or click on the UP or DOWN buttons until the frequency is reached. Note that the step size is set by the Step Inc. field.

4. Set the starting field strength Level in the Field window.

5. Click on the Closed Loop Test button. The system will ramp up to the set level and remain a that level.

6. The frequency and level can be adjusted by clicking on the appropriate UP or DOWN buttons.

7. If modulation is required, select the appropriate modulation in the pull-down menu. The modulation will only change when one of the frequency or level buttons is clicked.

8. The Monitor area (3) will show the actual achieved levels and frequency.

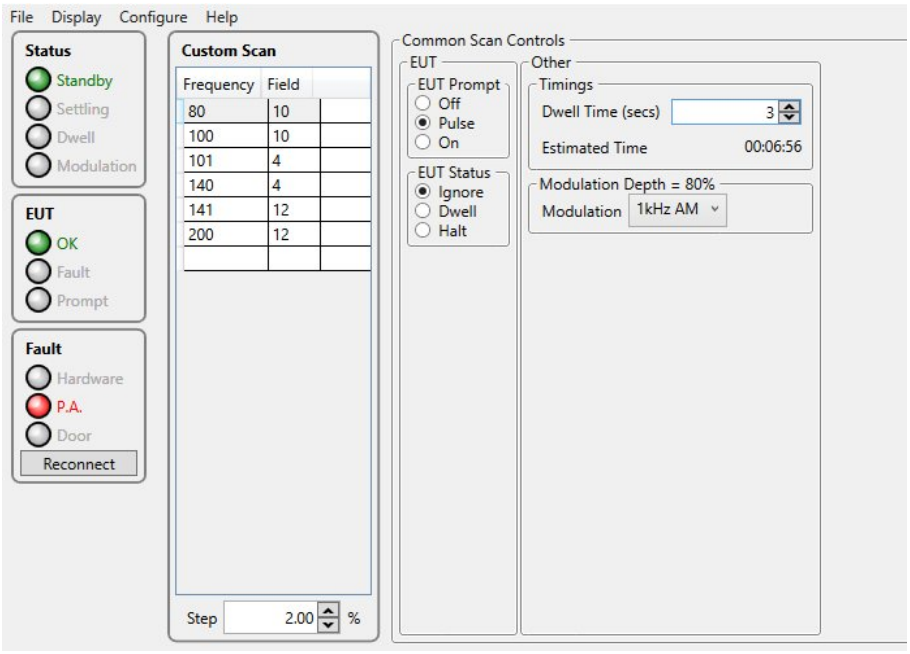
9. The Report Results window will show the progress of the test.

10. To end the test, click on the STOP button.

5.6 Custom Scan Mode

In some cases it may be necessary to vary the field strength as the scan proceeds. Situations where this would be an advantage is if the EUT is intentionally sensitive at certain frequencies and should be be subjected to strong fields at these points. A telemetry receiver would be an example of this. Alternatively, products which have to work in the vicinity of strong transmitters may be tested at a lower field for most frequencies (maybe 3V/m, domestic environment), but at transmitter frequencies, a higher field strength would be sensible.

If a custom scan is required, the profile is entered by clicking on the 'Custom Scan' button in the test mode area.



The profile is entered in the custom scan table. Only the 'change' points need to be specified. The software will automatically interpolate between the entered points. Where a step is required, enter 2 closely spaced frequencies as shown above.
Prompt, status, frequency step, dwell time and modulation can also be specified.

The image below shows the results of the above custom scan settings.

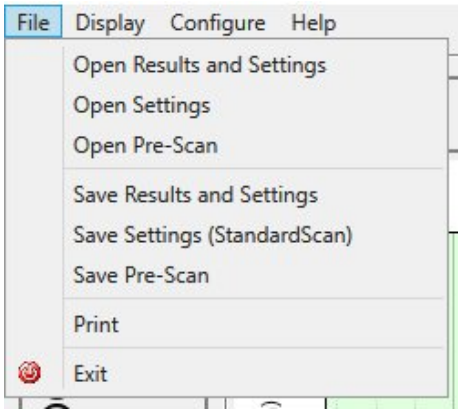
Note:

- The blue trace shows actual stress levels applied.
- The cursor can be used to read frequency and stress levels at each step.
- The EUT monitor section shows the pass/fail thresholds, the max and min excursions for each channel (red bars) and the current value (black bar).
- The background colour for the plotting area shows pale green normally, but changes to pale red if any of the EUT monitoring signals exceed the pass/fail thresholds.

6.0 Software Reference

6.1 File menu

File....Open....



File....open....results and Settings
Loads all setup parameters and results of a previously saved test. Overwrites all the parameters and data currently in memory.

File...open....Setup only
Loads previously saved setup parameters only.

File....open....pre-scan
Loads pre-scan data, complete with all setup parameters.

File...Save Results and Settings Stores current results and setup information.

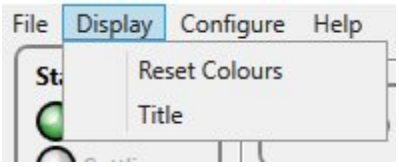
File....Save Settings (Standard Scan).... Saves just the settings for a standard scan.

File….Save Pre-Scan Saves the pre-scan data.

Print … Prints to the local printer. Produces a hardcopy of the plot screen and a tabular list of the results. These include for each frequency step…
Freq (MHz), Field (V/m), EUT status plus for each EUT channel, Input max, input min and pass/fail status.

File....Exit
Exits the program. Any data not Stored to disk will be lost

6.2 Display

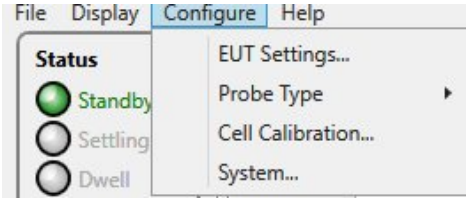


Reset colours changes the colours of the traces to the defaults.

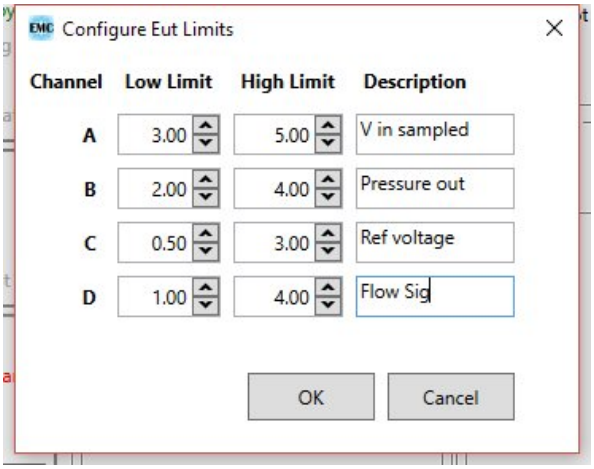
Note that these colours can be changed by clicking on the colour block next to each trace selector button…….

Title allows the user to enter the text to appear at the top of the results area.

6.3 Configure....



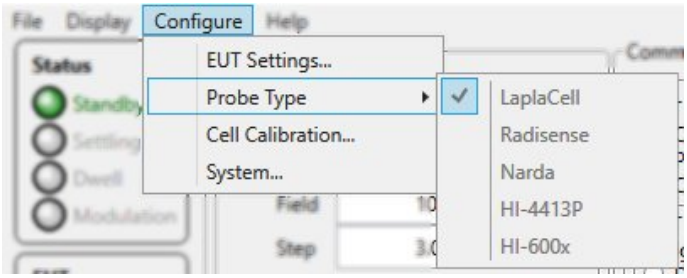
6.3.1 EUT Settings



For each channel…..
The low and high thresholds can be entered.
A description can be entered.

All these parameters are saved when File..Save Results and Settings is used.

6.3.2 Probe Type

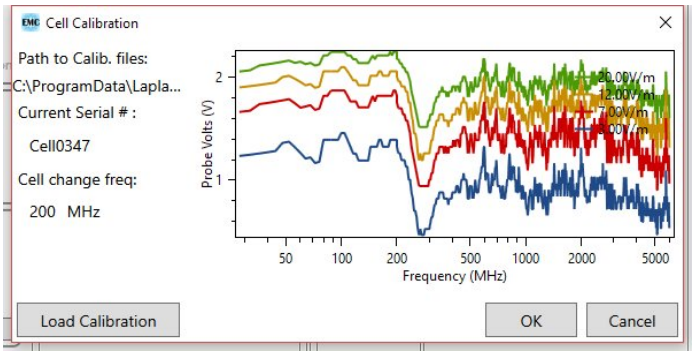


Select the appropriate probe.

Note that for all probes apart from the LaplaCell, the -RH option is required.

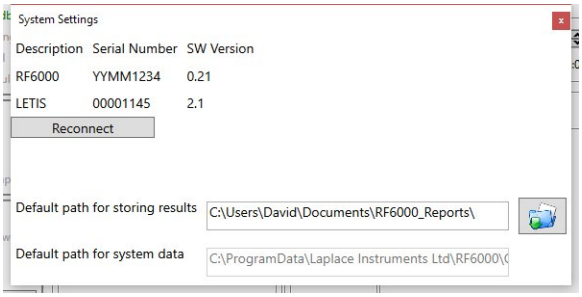
6.3.3 Cell Calibration.

Under Configure… Cell calibration, check the cell serial number and calibration plots. If this is the first use of the system, these must be installed. Click the 'Load calibration' button. Enter the serial number (note, this should be a 4 digit number with the first digit a 'zero', ie 0342, for a cell with serial number 342. Then click Browse to find the file on the supplied USB memory stock. The file will have a .csv extension. (eg. Cell0342.csv)



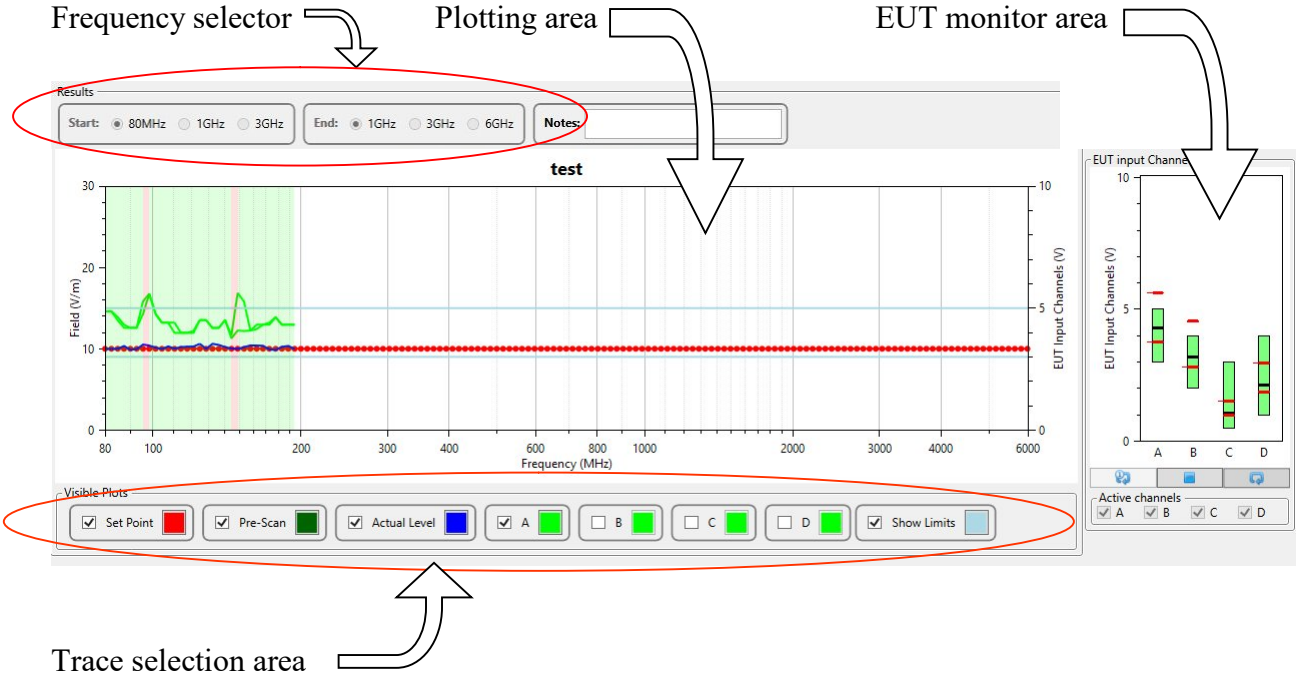
6.3.4 System ….

a) This enables the USB links to be checked and are operating correctly. Ensure that the hardware USB links appear in the table.



b) Set the paths for results and system data are appropriate.

7.0 Report Results screen



Trace Selection

Traces can be switched On/Off using the selectors, and trace colours can be changed by clicking on the colour block.

EUT Monitor

The EUT Monitor area displays for each channel…
- Max and Min thresholds (Green bands)
- Current input value (Black bars)
- Max and min levels (Red bars)

The control buttons:

Switch channels On/Off

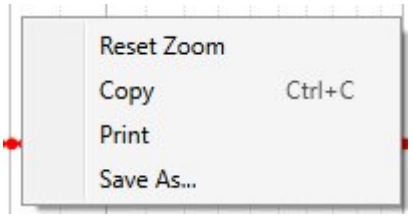
Frequency selection area.

- The buttons across the top of this area will select the start and finish frequencies of the display.

Plotting area

- This area will show the target stress level with each step indicated by a dot. The default colour is red.
- As the test proceeds, actual stress level and any EUT inputs will be plotted.
- Clicking on any point on any of the traces will show the frequency and value of that point on that trace.
- Right clicking anywhere on the plotting area will reveal a menu…

a) Reset zoom. Return to the full span.
b) Copy. Pastes the plotting area to the clipboard.
c) Print: Prints the plotting area to the printer.
d) Save As… Saves the plotting area as a .png file.



- Right click and hold enables the plot to be dragged left or right. (useful when zoomed).

- Control+ Right Click enables the user to use the cursor to open a zoomed view using the cursor to drag the required span.

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