



SIGNAL ANALYSER

CONNECTED • SECURE • LIVE

Signal Analyser

Introduction

The CSL Signal Analyser is a portable, battery operated device for monitoring Cellular and Wi-Fi signal strength.

Warnings:

This product should only be charged with the supplied charger. Use of incorrect charger may result in unintended consequences

This product is compliant with Class A EMC requirements. Operation of this device in a residential environment could cause radio interference.

Instructions For Safe Use:

Do not expose the device to water or any other liquid. Liquids may cause a short circuit and damage to the device.

The provided stylus should be used to input on the device. Excessive pressure to the device could crack the device and may also injure the user.

The device should not be used while driving a car or other motor vehicle.

For all compliance certificates and numbers, please visit <https://www.csl-group.com/uk/patents-and-trademarks.html>

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Signal Analyser

Enabling

This section provides basic information to enable you to set up your Signal Analyser quickly.

AERIAL

Connect the aerial on top of the device.

POWERING UP YOUR DEVICE

1. Make sure the battery is fully charged using the Micro USB port on the bottom of the device (this typically takes 2 hours). The device will not operate correctly for surveys or monitoring while a USB is connected.
2. Once power is connected the device will turn on.

THE FIRST EVER POWER UP MAY TAKE 2-3 MINUTES AS THE UNIT WILL BE DOING A BACKGROUND NETWORK SEARCH TO ESTABLISH THE AVAILABLE NETWORKS IN YOUR LOCATION

FITTING A SIM

A SIM is only required when using Monitor Mode and not when performing single or multiple network surveys

1. Ensure your device is powered down and insert the SIM into the SIM slot on the bottom right hand side of your Signal Analyser. To remove the SIM, use a pen to depress before detaching. When a SIM is inserted a SIM Icon will be displayed in the top left hand corner of the screen

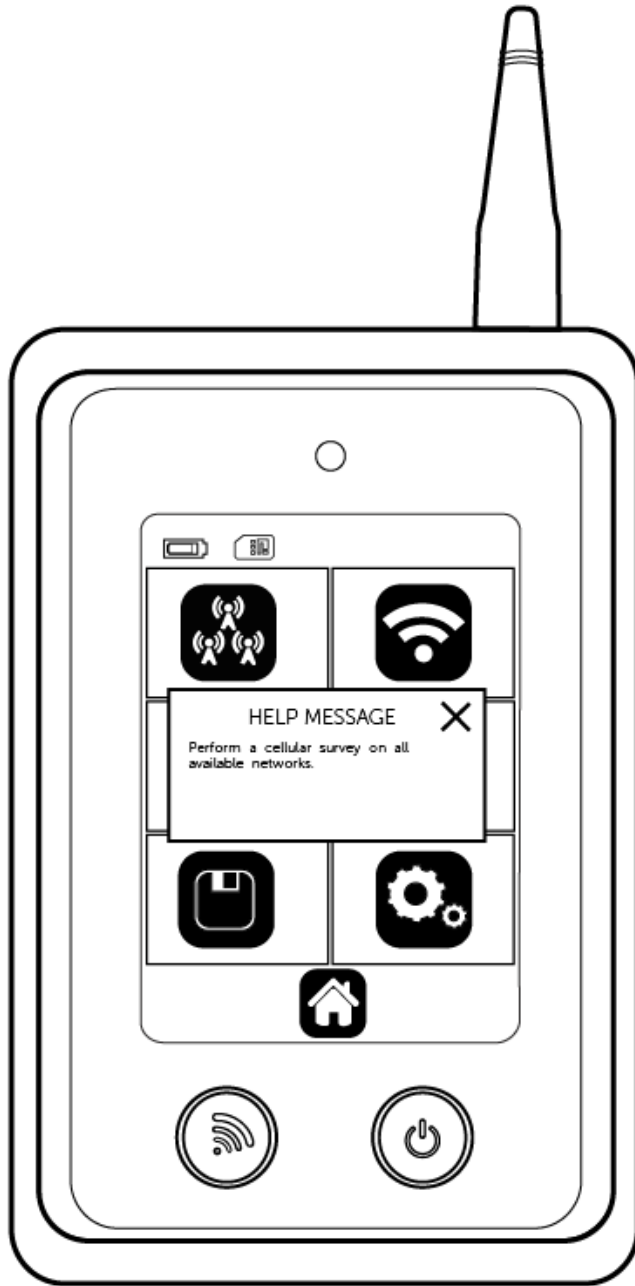
IF YOU WISH TO USE A MICRO/NANO SIM YOU WILL NEED TO USE THE SIM CARRIER SUPPLIED

2. Place the SIM inside the carrier and push this into the SIM slot on the bottom right hand side of your Signal Analyser. To release use a pen to depress the SIM carrier and then detach

HELP TEXT

1. Press and hold (for 3 seconds) the icon you would like explaining. A pop up box will then show with the description
2. To close the pop up box press the X in the top right hand corner






Figure 2 - Help Text





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Site Survey (Radio)




MULTI NETWORK SURVEY

- 1 - Select the Cellular icon on the home screen  .
- 2 - Select the Multi Network icon  .
- 3 - Choose either 2G, 3G, 4G or all technologies (for the 2G variant the technology will be limited to 2G only).
- 4 - Select the Start icon  for the survey to begin. If you wish to name the survey before you start select the Name Survey icon  , name your survey and press Go  .
- 5 - A Survey Progress bar will then display the status of your survey. The survey should take 2-3 minutes.
- 6 - Once the survey has been completed the results will be available.

SINGLE NETWORK SURVEY

- 1 - Select the Cellular icon on the home screen  .
- 2 - Now select Single Network icon  .
- 3 - Choose either 2G, 3G, 4G or all technologies (for the 2G variant the technology will be limited to 2G only).
- 4 - Select the required network (if you can't see your preferred network press refresh so that the unit locates all available networks in the area). You can also select Any Network option which allows the radio module to decide which is best for your location.

REFRESHING NETWORKS MAY TAKE 2-3 MINUTES

5 - Select the Start icon  for the survey to begin. If you wish to name the survey before you start select the Name Survey Icon , name your survey  and press Go  .

6 - A survey progress bar will then display showing the progress of the survey. The survey should take 2-3 minutes.

7 - Once the survey has been completed the results will be available.

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Survey Results (Radio)

TOP NETWORKS

Shows the highest signal strength readings for each available network in your location; up to 5 networks will be displayed (if available). Press the right arrow to enter the Best Cells section.

BEST CELLS

Shows the highest signal strength readings across all technologies and networks in your location; up to 5 cells will be displayed (if available). Press the right arrow to enter the Cell Properties section.

CELL PROPERTIES

Shows basic information for each cell. To view advanced information press the screen in the appropriate area. See below for more information. If further results are available use the down arrow to view these.

ADVANCED CELL PROPERTIES

| PARAMETER | DESCRIPTION | TECHNOLOGY |
|--------------|--|------------|
| Network | The network to which the cell belongs | 2G, 3G, 4G |
| Type | The radio technology | 2G, 3G, 4G |
| Cell Number | The cell number you are investigating | 2G, 3G, 4G |
| ARFCN | The cell carrier assigned radio channel (BCCH - Broadcast Control Channel) | 2G |
| BSIC | Base Station Identification Code | 2G |
| RSSI (RxLev) | Reception Level (in dBm) | 2G, 3G, 4G |
| BER | Bit Error Rate (in %) | 2G |
| MCC | Mobile Country Code | 2G, 3G, 4G |
| MNC | Mobile Network Code | 2G, 3G, 4G |
| LAC | Location Area Code | 2G, 3G |
| CELLID | Cell Identifier | 2G, 3G |
| Cell Status | Cell status; Outputs [suitable, low priority based on the received system information, forbidden, barred based on the received system information, low level, unknown] | 2G, 3G, 4G |
| NUMARFCN | Number of valid channels in the Cell Channel Description | 2G |
| ARFCNN | ARFCN of a valid channel in the Cell Channel Description | 2G |
| NUM CHANNELS | Number of valid channels in the BCCH Allocation list | 2G |
| BAN | The ARFCN of a valid channel in the BA list | 2G |

| | | |
|-------------|--|----|
| SCR CODE | Scrambling Code | 3G |
| RSCP | Received Signal Code Power - RSCP level (in dBm) | 3G |
| ECIO | EC/IO ratio level (in dB) | 3G |
| BW | Bandwidth (in MHz) | 4G |
| TAC | Tracking Area Code | 4G |
| UARFN | The cell carrier frequency designated by UTRA Absolute Radio Frequency Channel | 3G |
| EARFCN | Cell carrier frequency designated by EUTRA Absolute Radio Frequency Channel Number | 4G |
| PHY CELL ID | Physical Cell ID | 4G |
| RSRP | Reference Signal Received Power | 4G |
| RSRQ | Reference Signal Received Quality - RSRQ level (in dBm) | 4G |

Figure 3 - Cell Properties

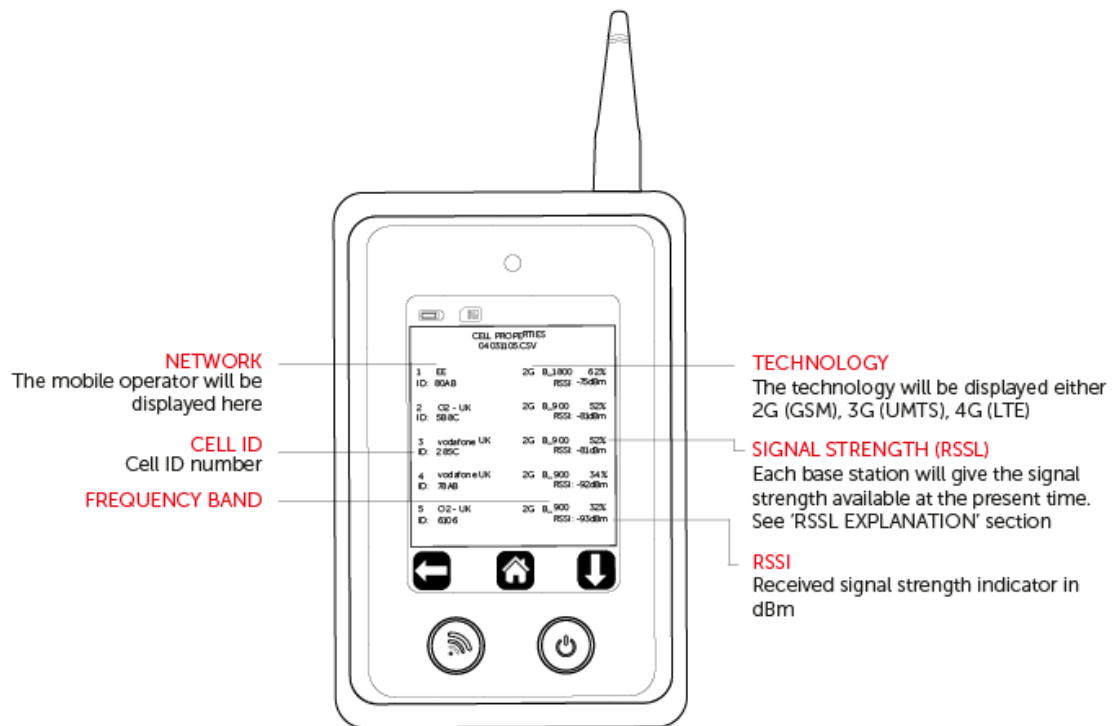
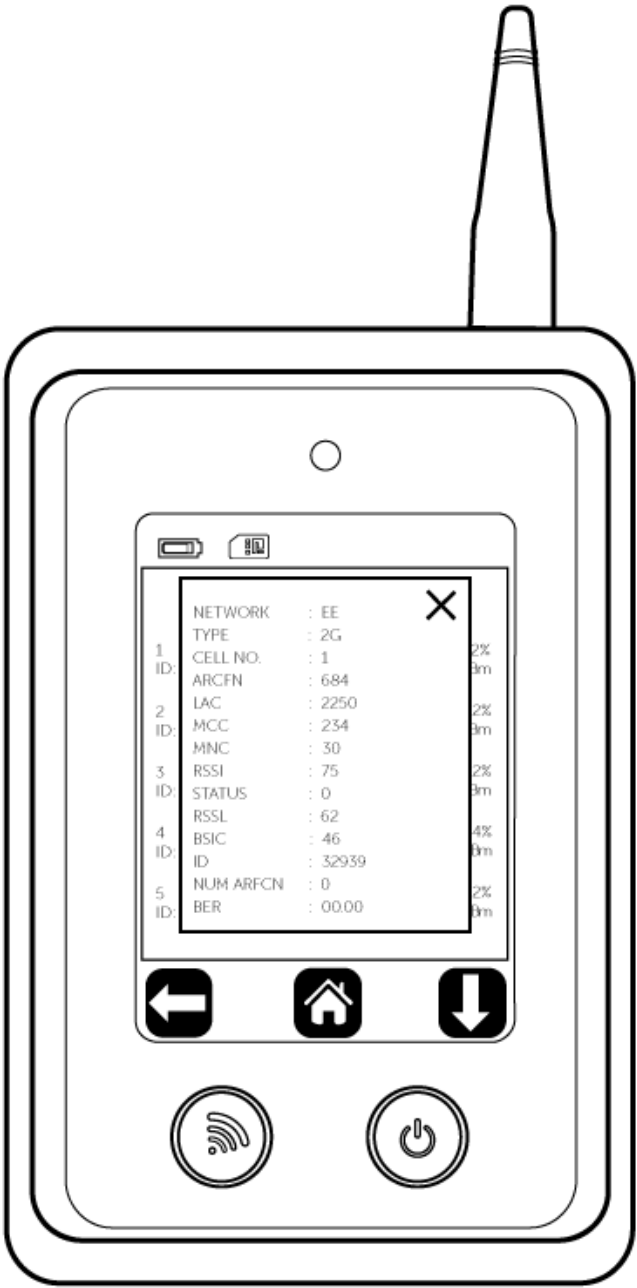






Figure 4 - Advanced Cell Properties



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Site Survey (Wi-Fi)

WI-FI SURVEY

- 1** - Select the Wi-Fi icon on the home screen 
- 2** - Select the Start icon  for the survey to begin. If you wish to name the survey before you start select the Name Survey Icon , name your survey, and press Go 
- 3** - A survey progress bar will then display, showing the progress of the survey. The survey should take 5-10 seconds
- 4** - Once the survey has been completed the results will be available

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Survey Results (Wi-Fi)

TOP SSID

Shows the highest signal strength readings for each available SSID in your location and the number of Access Points (APs); up to 5 networks will be displayed (if available). Press the right arrow to enter the Best Access Points section.

BEST ACCESS POINTS

Shows the Best Access Points for your location and the channel number. Press the right arrow to enter the Access Point section.

ACCESS POINT PROPERTIES

Shows basic information for each SSID. To view advanced information, press the screen in the appropriate area. See below for more information. If further results are available use the down arrow to view these.

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Monitor Mode (Radio)

1 - If you are performing Monitor Mode, ensure a SIM card is inserted as per the 'FITTING A SIM' section. The SIM card used must be the technology required or higher e.g. 4G is capable of performing Monitor Mode for 4G, 3G, and 2G. The SIM does not need to be for the same network provider you wish to monitor.

2 - Select the Monitor Mode icon



3 - Select the Single Network icon



4 - Choose either 2G, 3G or 4G or any network (for the 2G variant the technology will be limited to 2G only).

5 - Select the required network (to ensure all available networks are displayed press refresh).

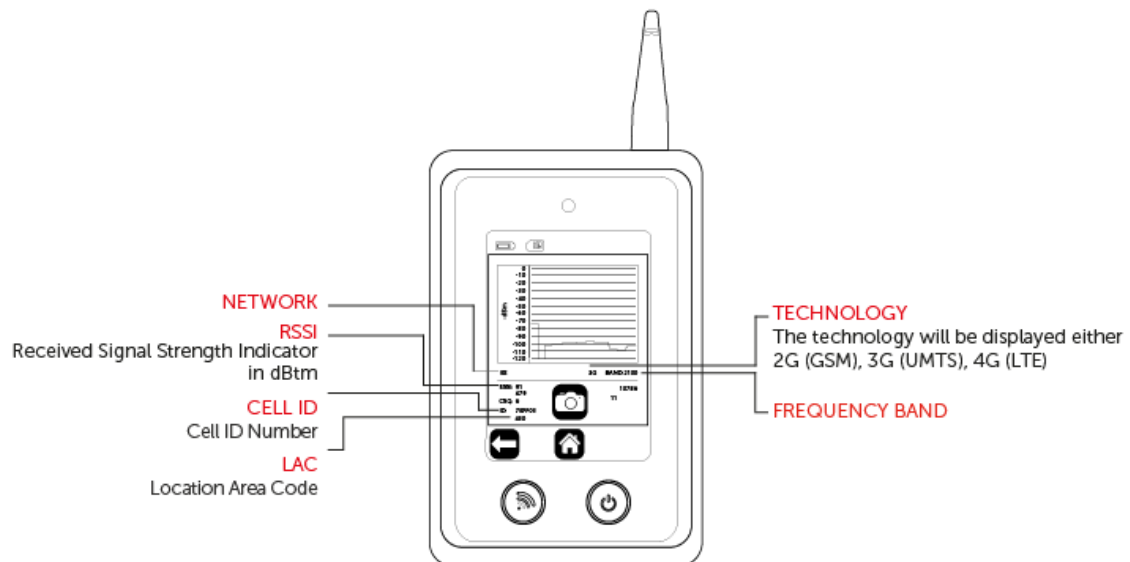
REFRESHING NETWORKS MAY TAKE 2-3 MINUTES

6 - Live Monitor Mode will now run.

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Monitor Mode Result (Radio)

Figure 5 - Monitor Mode




MONITOR MODE SNAPSHOT

1 - Ensure Monitor Mode is running

2 - Press the Snapshot icon 

3 - The rename survey option will automatically display, name the survey then press

Go  to save. A file will now be created, but can only be viewed in a table format on your laptop/PC (you will not see a graph).

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Monitor Mode (Wi-Fi)


1 - Select the Monitor Mode icon 

2 - Select the Wi-Fi icon 

3 - Choose either SSID, Channel, MAC, Connect

SSID

Live Monitor Mode will run on a specific SSID

1 - Select the SSID icon 

2 - Choose the SSID you wish to monitor (to ensure all available SSIDs are displayed press refresh)

3 - Live Monitor Mode will now run

CHANNEL

Live Monitor Mode will run on a specific channel

1 - Select Channel icon 

2 - Choose the channel you wish to monitor

3 - Live Monitor Mode will now run a list of Access Points (APs) per channel which will be displayed via a table. Push any channel with APs present to view the SSIDs and signal strengths (in dBm)

MAC

Live Monitor Mode will run on a specific MAC address


1 - Select MAC icon 

2 - Select the MAC address you wish to monitor

3 - Live Monitor Mode will now run

CONNECT

Connect to a specific SSID and run live Monitor Mode


- 1** - Select the connect icon  and it will constantly signal Google to provide you with ping times in ms
- 2** - Select the SSID you wish to connect to
- 3** - Enter the password for the SSID you have selected
- 4** - Live Monitor Mode will now run

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Monitor Mode Results (Wi Fi)

SAVE RESULTS

1 - Ensure Monitor Mode is running

2 - Press the Save Results icon 

3 - The Rename Survey option will automatically display, name the survey then


press Go  to save. A file will now be created, but can only be viewed in a table format on your laptop/PC (you will not see a graph)

Figure 6 - Wi-Fi monitor when SSID, MAC and Connect options are selected

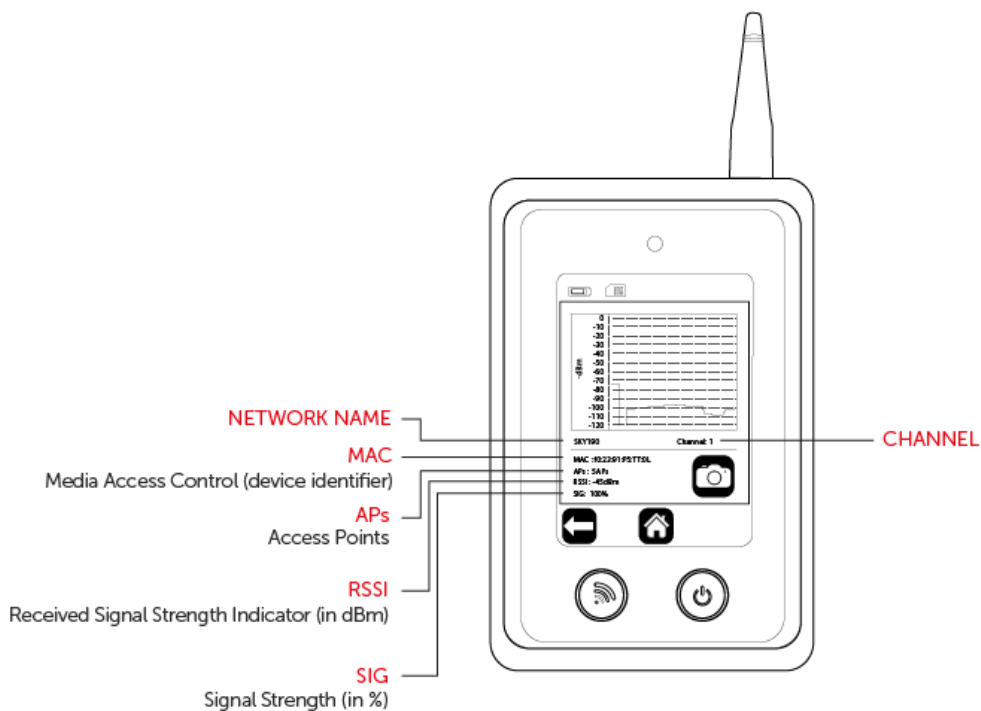
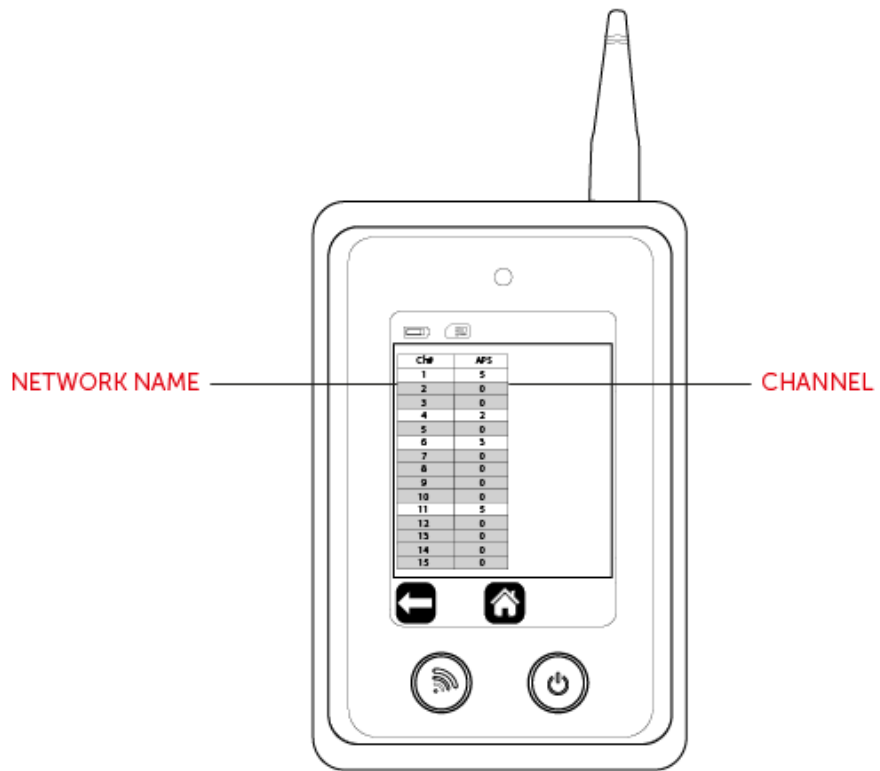


Figure 7 - Wi-Fi monitor when the Channel option is selected



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Saved Files


Viewing Saved Files

1 - Select the Saved Results icon . Results will be shown in descending order by time.

2 - Then select either the Multi Cellular icon  or Wi-Fi . Results will be shown in descending order by time.

3 - Select the file you wish to view. Results will now be shown in the same format as per the 'RESULTS' section.

Deleting Saved Files

1 - Select and hold the file you wish to delete. A Delete icon  will now show in the top right hand corner.

2 - Press delete. This file has now been deleted.

Downloading Saved Files

1 - Ensure the Signal Analyser is switched on.

IF THE DEVICE IS SWITCHED OFF AND CONNECTED TO THE USB PORT ON A PC/LAPTOP THIS WILL CHARGE THE DEVICE ONLY

2 - Connect Signal Analyser via a USB lead to your PC/Laptop.

3 - Once connected click on Start then select Computer. The Signal Analyser files will be shown under devices with removable storage.

4 - Select Analyser.

5 - Select the applicable folder (Cellular Snapshot, Cellular Survey , Wi-Fi Snapshot and Wi-Fi survey) and your results will be displayed as a list of CSV files.










6. These files can now be copied to a folder or displayed using a CSV file editor.

YOU CANNOT READ/WRITE FILES AND RUN A SURVEY WHILE THE SIGNAL ANALYSER IS CONNECTED TO THE USB PORT, THIS MAY CAUSE THE UNIT TO CRASH

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Settings

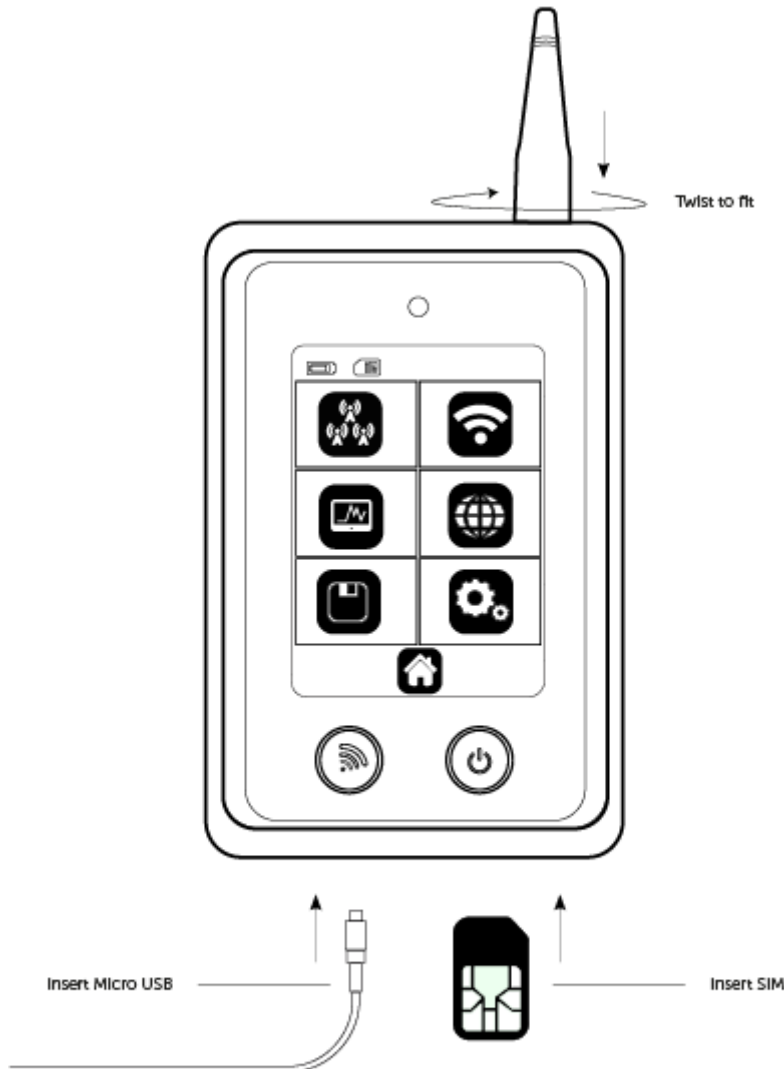
Enter the settings menu

| ICON | DESCRIPTION | FUNCTION |
|--|---|---|
| Brightness Icon  | Adjust brightness | Increase/decrease brightness |
| Languages Icon  | Change device language | Select language |
| Time Icon  | Set time/date | Set time/date |
| Auto-Off Icon  | Define how long the device stays powered on with no action | Set auto-off time |
| Default Survey Icon  | Define which survey the quick survey button on the front of the device executes | Select survey |
| Sounder Icon  | Turn sound on/off | Turn sound on/off |
| Power Save Icon  | Power saver to send radio module to sleep | Turn power save on/off |
| Device Information Icon  | View firmware version | View firmware version, Radio module, Radio firmware, IMEI, SIM status |
| Factory Reset Icon  | Restore factory defaults | Complete a factory reset back to default settings |

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Technical Specifications

Figure 1 - Signal Analyser Diagram



RSSL EXPLANATION

To ensure that a consistent approach is used to all Radio Access Technologies (RAT) - such as 2G, 3G and 4G - a new, more accurate method for calculating percentage of the signal strength has been introduced. The RSSL is not based on CSQ readings alone provided by the radio module, but is calculated from the raw data received from the network readings. The value is mapped through the whole range and is consistent across each RAT. The value calculation includes both signal strength and signal quality measurements.

The example of such mapping for a 3G cell is:

RSCP: -80 dBm
 RSRQ: -4 dB
 CSQ: 19
 ECIO: 12

SPECIFICATIONS

| | |
|------------------|---|
| Model | CS2389 2G/GSM, 3G/UMTS, 4G/LTE |
| Dimensions | 172mm (h) x 72mm (w) x 20mm (d) |
| Weight | 149g including aerial |
| Temperature | -20°C to + 60°C transit, -4°C to +40°C operating |
| Humidity | 0-80% non-condensing |
| Warranty | 2 years |
| Radio Technology | GSM, UMTS, LTE, Wi-Fi 2.4Ghz (depending on version) |
| Battery | 3.7 Volt 1500mAh |
| Charger | 5 Vdc micro USB plug-top charger or equivalent |

FREQUENCY BAND

| Part Number | CS2389 |
|----------------|---|
| 4G Bands (MHz) | 2100 (B1) 1900 (B2) 1800 (B3) 1700 (B4) 850 (B5) 2600 (B7) 900 (B8) 700 (B12) 700 (B13) 700 (B14) 850 (B18) 1900 (B25) 850 (B26) 850 (B19) 800 (B20) 700 (B28) |
| 3G Bands (MHz) | 2100 (B1) 1900 (B2) 1700 (B4) 850 (B5) 850 (B6) 900 (B8) 850 (B19) |
| 2G Bands (MHz) | 1900 (B2) 1800 (B3) 850 (B5) 900 (B8) |
| Wi-Fi | 2.4Ghz |

CERTIFICATIONS

International Radio Approval

The CS2389 Signal Analyser incorporates an independently tested and approved 4G/3G/2G radio module that meets the requirements of European radio communication standards
Approval Authority: 0063

