



## GSP-730/GRF-1300A/ USG-LF44

### FEATURES

#### GSP-730 Spectrum Analyzer

- Frequency Range : 150kHz ~ 3GHz
- Autoset Function
- Noise level :  $\leq -100\text{dBm}$
- RBW Range : 30kHz, 100kHz, 300kHz, 1MHz
- ACPR/CHPW/OCBW Measurement
- 3 Traces in Different Colors
- Split Window Function
- Limit Line Function
- Remote Control Software
- Presentation Material for Training Courses
- Support Interface : USB Device/Host, RS-232C
- 5.6" TFT LCD with VGA Output

#### GRF-1300A RF and Communication Trainer

- Waveform Support :  
Sine Wave : 0.1 ~ 3MHz  
Square Wave : 0.1 ~ 3MHz  
Triangle Wave : 0.1 ~ 3MHz
- RF Frequency : 870 ~ 920MHz
- AM Modulation & FM Modulation
- 5 On/Off Switches and 5 Test Points to Simulate 8 Failure Conditions for Learning Outcome Test
- USB Interface to Provide Remote Control
- Mixer & 2.4GHz Band Pass Filter

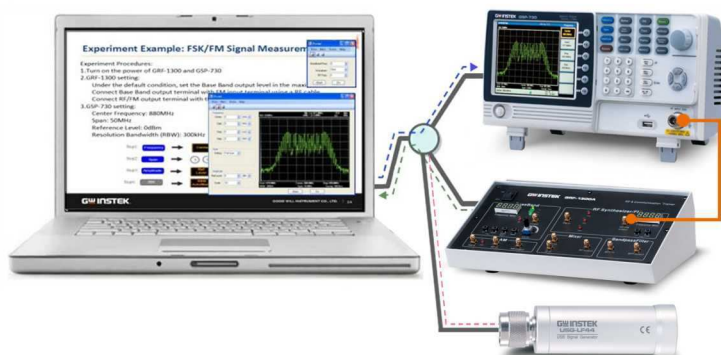
#### USG-LF44 RF Signal Generator

- Frequency Range : 34.5MHz ~ 4400MHz
- Output Power Range : -30dBm ~ 0dBm
- Continuous Wave Signal Without any Modulation
- Support Fixed Frequency, Frequency Sweep, Frequency Hopping & Power Sweep Mode
- -107dBc/Hz Phase Noise@100kHz Offset
- Frequency Resolution : 10kHz
- PC USB Interface Powered and Controlled
- External PC Software Support Different Operating System

## Turn-key Solution for RF and Communication Experiment Courses

GW Instek GSP-730 is a 3 GHz Spectrum Analyzer developed mainly to fulfill the demands of RF Communications education. Budget constraint and inadequate teaching tools are normally the two hurdles for schools to provide high-quality courses for RF communications experiments. GSP-730, a spectrum analyzer of full functions, combines with the GRF-1300A training kit to provide customer an economical turn-key solution for 3GHz RF and Communications Experiment Courses.

Properly connect GSP-730 Spectrum Analyzer, GRF-1300A RF and Communications Trainer, USG-LF44 RF Signal Generator and a PC to perform ongoing experiments while the lecture is being given. Using a PC, teacher can present teaching material with Power Point slides and simultaneously control GSP-730, GRF-1300A and USG-LF44 to perform experiments and get spectrum displays parameter readings on the PC screen. GSP-730, GRF-1300A and USG-LF44 easily transfer the current teaching materials including the PowerPoint slides, textbook and the remote control software into electronic-teaching system.



### Fully-electronic RF Training System

The combination of GSP-730, GRF-1300A and USG-LF44 forms a fundamental training system for RF communications and telecommunications classes in the universities, colleges, vocational schools and the training center in military as well as the private companies. Instead of the tremendous cost of the installation of new training system, the conjunction of GSP-730, GRF-1300A and USG-LF44 provides an economical solution to eliminate two obstacles, budget constraint and insufficiency of teaching tools.

### APPLICATIONS

- Education, Training
- Fourier Theory Investigation
- Motherboard Circuit Measurement
- Scalar Network Analyzer
- Wireless Communication Signal Measurements
  - GSM, 3G, 4G Mobile Phone
  - Bluetooth, Zigbee, Wi-Fi
  - AM/FM Modulation
- Remote Controller Maintenance

*GSP-730/GRF-1300A/USG-LF44*

**GW INSTEK**  
Simply Reliable

| SPECIFICATIONS                 |                                                               |                                                                                                                                                                                                             |                                                                                                                                                                          |
|--------------------------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>GSP-730</b>                 |                                                               |                                                                                                                                                                                                             |                                                                                                                                                                          |
| <b>FREQUENCY</b>               | <b>Frequency Range</b>                                        | Setting Range                                                                                                                                                                                               | 150kHz ~ 3GHz                                                                                                                                                            |
|                                | <b>Center Frequency</b>                                       | Setting Resolution                                                                                                                                                                                          | 0.1MHz                                                                                                                                                                   |
|                                | <b>Frequency Span</b>                                         | Accuracy                                                                                                                                                                                                    | within $\pm 50\text{kHz}$ (frequency span : 0.3GHz ~ 2.6GHz, 20 $\pm 5^\circ\text{C}$ )                                                                                  |
|                                |                                                               | Setting range                                                                                                                                                                                               | 1MHz ~ 3GHz                                                                                                                                                              |
|                                | <b>Resolution Bandwidth</b>                                   | Accuracy                                                                                                                                                                                                    | within $\pm 3\%$ (frequency span : 0.3GHz ~ 2.6GHz, 20 $\pm 5^\circ\text{C}$ )                                                                                           |
|                                | <b>SSB Phase Noise</b>                                        | Setting Range                                                                                                                                                                                               | 30KHz, 100KHz, 300KHz, 1MHz                                                                                                                                              |
|                                | <b>Inherent Spurious Response</b>                             |                                                                                                                                                                                                             | -85dBc/Hz (typical, 500kHz offset, RBW : 30kHz, Sweep time : 1.5s, Span : 1MHz@1GHz)<br>less than -45dBc@-40dBm Ref. Level (typical less than -50dBc)                    |
| <b>AMPLITUDE</b>               | <b>Reference Level</b>                                        | Input Range                                                                                                                                                                                                 | +20 ~ -40dBm                                                                                                                                                             |
|                                | <b>Average Noise Level</b><br><b>Frequency Characteristic</b> | Accuracy                                                                                                                                                                                                    | Within $\pm 2\text{dB}$ (1GHz) ; SPAN : 5MHz                                                                                                                             |
|                                |                                                               | Unit                                                                                                                                                                                                        | dBm, dBV, dB $\mu$ V                                                                                                                                                     |
|                                |                                                               |                                                                                                                                                                                                             | $\leq -100\text{dBm}$ (typical, center frequency : 1GHz RBW : 30kHz)<br>within $\pm 3.0\text{dB}$ @300MHz ~ 2.6GHz<br>within $\pm 6.0\text{dB}$ @80 ~ 300MHz, 2.6 ~ 3GHz |
|                                | <b>Input</b>                                                  | Input Impedance                                                                                                                                                                                             | 50 $\Omega$                                                                                                                                                              |
|                                |                                                               | Input VSWR                                                                                                                                                                                                  | less than 2.0@input att $\geq 10\text{dB}$                                                                                                                               |
|                                |                                                               | Input damage level                                                                                                                                                                                          | +30dBm (CW average power), 25VDC                                                                                                                                         |
|                                |                                                               | Input connector                                                                                                                                                                                             | N connector                                                                                                                                                              |
| <b>SWEEP</b>                   | <b>Sweep Time</b>                                             | Setting Range                                                                                                                                                                                               | 300ms ~ 8.4s, auto (not adjustable)                                                                                                                                      |
|                                |                                                               | Accuracy                                                                                                                                                                                                    | within $\pm 2\%$ (frequency span : full span)                                                                                                                            |
| <b>GENERAL</b>                 | <b>Display</b>                                                | 640 x 480 RGB color LCD                                                                                                                                                                                     |                                                                                                                                                                          |
|                                | <b>Communication Interface</b>                                | RS-232C                                                                                                                                                                                                     | Sub-D female-D 9 pins                                                                                                                                                    |
|                                | <b>VGA Output</b>                                             | USB Connector                                                                                                                                                                                               | USB Host/Device full speed supported                                                                                                                                     |
|                                | <b>Power Source</b>                                           | Sub-D female 15 pins                                                                                                                                                                                        |                                                                                                                                                                          |
| <b>OTHER</b>                   | <b>Operating Temperature</b>                                  | AC 100~240V, 50/60Hz                                                                                                                                                                                        |                                                                                                                                                                          |
|                                | <b>Operating Humidity</b>                                     |                                                                                                                                                                                                             |                                                                                                                                                                          |
|                                | <b>Storage Temperature</b>                                    |                                                                                                                                                                                                             |                                                                                                                                                                          |
| <b>DIMENSIONS &amp; WEIGHT</b> |                                                               | 5 ~ 45 $^\circ\text{C}$ (Guaranteed at 25 $\pm 5^\circ\text{C}$ , without soft carrying case)<br>Less than 45 $^\circ\text{C}$ / 90%RH<br>-20 ~ 60 $^\circ\text{C}$ , less than 60 $^\circ\text{C}$ / 70%RH |                                                                                                                                                                          |
| <b>GRF-1300A</b>               |                                                               | 296(L) x 153(W) x 105(H) mm / 11.6(L) x 6(W) x 4.1(H) in, Approx. 2.2kg / 4.9lb                                                                                                                             |                                                                                                                                                                          |
| <b>BASE BAND</b>               | <b>Waveforms</b>                                              | Sine, Square, Triangle                                                                                                                                                                                      |                                                                                                                                                                          |
|                                | <b>Frequency Range</b>                                        | 0.1~3MHz , Step : 10kHz                                                                                                                                                                                     |                                                                                                                                                                          |
|                                | <b>Amplitude</b>                                              | $\geq 1.5\text{Vpp}$<br>$\geq 0.75\text{Vpp}$ into 50 Ohm<br>$\leq -30\text{dBc}$                                                                                                                           |                                                                                                                                                                          |
| <b>RF/FM ANALYSIS</b>          | <b>Harmonic Distortion</b>                                    |                                                                                                                                                                                                             |                                                                                                                                                                          |
|                                | <b>Frequency Accuracy</b>                                     | $\pm 0.15\text{MHz}$                                                                                                                                                                                        |                                                                                                                                                                          |
|                                | <b>Adjustable Range</b>                                       | $\geq 45\text{MHz}$ (870M ~ 920MHz) , Step : 1MHz                                                                                                                                                           |                                                                                                                                                                          |
| <b>FM</b>                      | <b>Power Range</b>                                            | $\geq -15\text{dBm}$                                                                                                                                                                                        |                                                                                                                                                                          |
|                                | <b>Max Frequency Deviation</b>                                | $> 3\text{MHz}$                                                                                                                                                                                             |                                                                                                                                                                          |
| <b>AM</b>                      | <b>Peak Difference</b>                                        | $\geq -18\text{dBm}$                                                                                                                                                                                        |                                                                                                                                                                          |
| <b>MIXER</b>                   | <b>LO + IF</b>                                                | $\geq -35\text{dBm}$                                                                                                                                                                                        |                                                                                                                                                                          |
|                                | <b>LO - IF</b>                                                | $\geq -35\text{dBm}$                                                                                                                                                                                        |                                                                                                                                                                          |
| <b>MIXER + MODULATION</b>      |                                                               | $\geq -60\text{dBm}$                                                                                                                                                                                        |                                                                                                                                                                          |
| <b>BANDPASS FILTER</b>         | <b>Frequency Centre: 2.4GHz</b>                               | Bandwidth: $\pm 20\text{MHz}$                                                                                                                                                                               |                                                                                                                                                                          |
| <b>INTERFACE</b>               | <b>USB Device</b>                                             | USB Type B                                                                                                                                                                                                  |                                                                                                                                                                          |
| <b>DIMENSIONS &amp; WEIGHT</b> |                                                               | 165(W) x 155(H) x 90(D)mm, Approx. 1.2kg                                                                                                                                                                    |                                                                                                                                                                          |

| ORDERING INFORMATION                                                                                                                                                                                                                                |                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| <b>GSP-730</b>                                                                                                                                                                                                                                      | 3GHz Spectrum Analyzer        |
| <b>GRF-1300/1300A</b>                                                                                                                                                                                                                               | RF and Communications Trainer |
| <b>USG-LF44</b>                                                                                                                                                                                                                                     | RF Signal Generator           |
| <b>ADP-003</b>                                                                                                                                                                                                                                      | N type to SMA Adapter         |
| ACCESSORIES                                                                                                                                                                                                                                         |                               |
| <b>GSP-730</b> : Quick Start Manual x1, CD-ROM with User Manual x1, Power Cord x1                                                                                                                                                                   |                               |
| <b>GRF-1300/1300A</b> : Experiment text book of student version, Power point file and remote control software CD, GRF-1300 : RF cable x 3, Antenna x 1/<br>GRF-1300A : RF cable x 6, Antenna x 2, N to SMA adaptor connector x 1,<br>Power cord x 1 |                               |
| <b>USG-LF44</b> : USB cable x1, CD-ROM with USG software, Primary RF Software and User Manual x1                                                                                                                                                    |                               |

| OPTION             |                                                       |
|--------------------|-------------------------------------------------------|
| <b>GBK-001</b>     | GRF-1300 Experiment text book of teacher version      |
| <b>GBK-002</b>     | GRF-1300A Experiment text book of teacher version     |
| FREE DOWNLOAD      |                                                       |
| <b>PC Software</b> | Primary RF, Remote Control Software, USG Java program |

| SPECIFICATIONS                                                                                  |                                                                                                                                               |                                                                                 |                                                                                   |                                                                       |                                                                      |
|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------|
| MODEL                                                                                           | USG-LF44                                                                                                                                      | USG-0103                                                                        | USG-0818                                                                          | USG-2030                                                              | USG-3044                                                             |
| FREQUENCY RANGE                                                                                 | 34.5 MHz ~ 4.4 GHz                                                                                                                            | 100 MHz ~ 300 MHz                                                               | 800 MHz ~ 1.8 GHz                                                                 | 2.0 GHz ~ 3.0 GHz                                                     | 3.0 GHz ~ 4.4 GHz                                                    |
| OUTPUT POWER                                                                                    | -30 dBm ~ 0 dBm, in 1 dB steps                                                                                                                |                                                                                 |                                                                                   |                                                                       |                                                                      |
| INTERNAL REFERENCE FREQUENCY                                                                    | 25 MHz, aging $\pm 1$ ppm at first year                                                                                                       |                                                                                 |                                                                                   |                                                                       |                                                                      |
| FREQUENCY ACCURACY<br>(0 dBm Output Level)                                                      | $\pm 100$ Hz at 100MHz                                                                                                                        | $\pm 100$ Hz at 100MHz                                                          | $\pm 800$ Hz at 800MHz                                                            | $\pm 2$ kHz at 2GHz                                                   | $\pm 3$ kHz at 3GHz                                                  |
| FREQUENCY RESOLUTION                                                                            | 10 kHz                                                                                                                                        |                                                                                 |                                                                                   |                                                                       |                                                                      |
| OUTPUT ISOLATION                                                                                | $\leq -75$ dBc, Output Control On/Off                                                                                                         |                                                                                 |                                                                                   |                                                                       |                                                                      |
| MODE CONTROL                                                                                    | Fixed Frequency / Single Sweep / CW Sweep / Hopping / Power Sweep                                                                             |                                                                                 |                                                                                   |                                                                       |                                                                      |
| STEP DWELL                                                                                      | $\leq 1000$ ms in 1 ms steps                                                                                                                  |                                                                                 |                                                                                   |                                                                       |                                                                      |
| FREQUENCY OFFSET                                                                                | -50 kHz ~ 50 kHz in 10 kHz steps                                                                                                              |                                                                                 |                                                                                   |                                                                       |                                                                      |
| OUTPUT FLATNESS<br>(0 dBm Output Level)                                                         | -1 dBm ~ 3.5 dBm, typical                                                                                                                     | -1 dBm ~ -2 dBm, typical                                                        | -1 dBm ~ -0.5 dBm, typical                                                        | -1 dBm ~ -0.5 dBm, typical                                            | -1 dBm ~ 3.5 dBm, typical                                            |
| PHASE NOISE<br>Carrier Frequency<br>at 10kHz Offset Frequency<br><br>at 100kHz Offset Frequency | fc = 1.0 GHz<br>< -97 dBc/Hz,<br>typical -100 dBc/Hz<br>< -107 dBc/Hz,<br>typical -110 dBc/Hz                                                 | fc = 200 MHz<br>< -100 dBc/Hz,<br>typical<br>< -110 dBc/Hz,<br>typical          | fc = 1.3 GHz<br>< -97 dBc/Hz,<br>typical<br>< -102 dBc/Hz,<br>typical             | fc = 1.5 GHz<br>< -93 dBc/Hz,<br>typical<br>< -100 dBc/Hz,<br>typical | fc = 3.7 GHz<br>< -88 dBc/Hz,<br>typical<br>< -94 dBc/Hz,<br>typical |
| 2ND HARMONICS<br>(0 dB Attenuation)                                                             | $\leq -15$ dBc, typical<br>34.5 MHz ~ 2.0 GHz<br>$\leq -10$ dBc, typical<br>2.0 GHz ~ 3.0 GHz<br>$\leq -25$ dBc, typical<br>3.0 GHz ~ 4.4 GHz | $\leq -45$ dBc, typical<br>> 100 MHz                                            | $\leq -25$ dBc, typical<br>> 800 MHz                                              | $\leq -30$ dBc, typical<br>2.0 GHz ~ 3.0 GHz                          | $\leq -25$ dBc, typical<br>3.0 GHz ~ 4.4 GHz                         |
| 3rd HARMONICS<br>(0 dB Attenuation)                                                             | $\leq -5$ dBc, typical<br>34.5 MHz ~ 2 GHz<br>$\leq -20$ dBc, typical<br>2.0 GHz ~ 3.0 GHz<br>$\leq -40$ dBc, typical<br>3.0 GHz ~ 4.4 GHz    | $\leq -7$ dBc typical<br>$\leq 150$ MHz<br>$\leq -35$ dBc, typical<br>> 150 MHz | $\leq -25$ dBc, typical<br>$\leq 900$ MHz<br>$\leq -35$ dBc, typical<br>> 900 MHz | $\leq -55$ dBc, typical<br>2.0 GHz ~ 3.0 GHz                          | $\leq -40$ dBc, typical<br>3.0 GHz ~ 4.4 GHz                         |
| SPURIOUS RELATED TO<br>RESOLUTION SETTINGS                                                      | $\leq -30$ dBc, typical, Resolution < 1MHz<br>$\leq -65$ dBc, typical, Resolution $\geq 1$ MHz                                                |                                                                                 |                                                                                   |                                                                       |                                                                      |
| SPURIOUS RELATED TO THE<br>FUNDAMENTAL OUTPUT                                                   | $\leq -60$ dBc, typical                                                                                                                       | $\leq -60$ dBc, typical                                                         | $\leq -65$ dBc, typical                                                           | $\leq -65$ dBc, typical                                               | $\leq -65$ dBc, typical                                              |
| SUPPORTED OS                                                                                    | Windows/Linux/Mac/Android                                                                                                                     |                                                                                 |                                                                                   |                                                                       |                                                                      |
| INTERFACE                                                                                       | USB 2.0                                                                                                                                       |                                                                                 |                                                                                   |                                                                       |                                                                      |
| USB CONNECTOR TYPE                                                                              | Mini B                                                                                                                                        |                                                                                 |                                                                                   |                                                                       |                                                                      |
| SUPPLY VOLTAGE                                                                                  | 5V nominal                                                                                                                                    |                                                                                 |                                                                                   |                                                                       |                                                                      |
| CURRENT CONSUMPTION                                                                             | 200 mA                                                                                                                                        |                                                                                 |                                                                                   |                                                                       |                                                                      |
| RF CONNECTOR TYPE                                                                               | N-type male                                                                                                                                   |                                                                                 |                                                                                   |                                                                       |                                                                      |
| IMPEDANCE                                                                                       | 50 $\Omega$ nominal                                                                                                                           |                                                                                 |                                                                                   |                                                                       |                                                                      |
| OUTPUT VSWR                                                                                     | < 1.5 : 1, Output Level @ -30 dBm                                                                                                             |                                                                                 |                                                                                   |                                                                       |                                                                      |
| MAXIMUM PERMISSIBLE DC VOLTAGE                                                                  | $\pm 25$ V                                                                                                                                    |                                                                                 |                                                                                   |                                                                       |                                                                      |
| MAXIMUM REVERSE POWER                                                                           | +30dBm (1W)                                                                                                                                   |                                                                                 |                                                                                   |                                                                       |                                                                      |
| ELECTROMAGNETIC<br>COMPATIBILITY                                                                | EN 55011 class A, EN 61326-1 (industrial environment), EN 61326-2-1, EN 61000-4-2, EN 61000-4-3<br>EN 61000-4-11                              |                                                                                 |                                                                                   |                                                                       |                                                                      |
| DIMENSIONS & WEIGHT                                                                             | 30(W) x 103(H) x 30(D)mm; Approx. 100g                                                                                                        |                                                                                 |                                                                                   |                                                                       |                                                                      |

Specifications subject to change without notice.

USGGD1DH

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