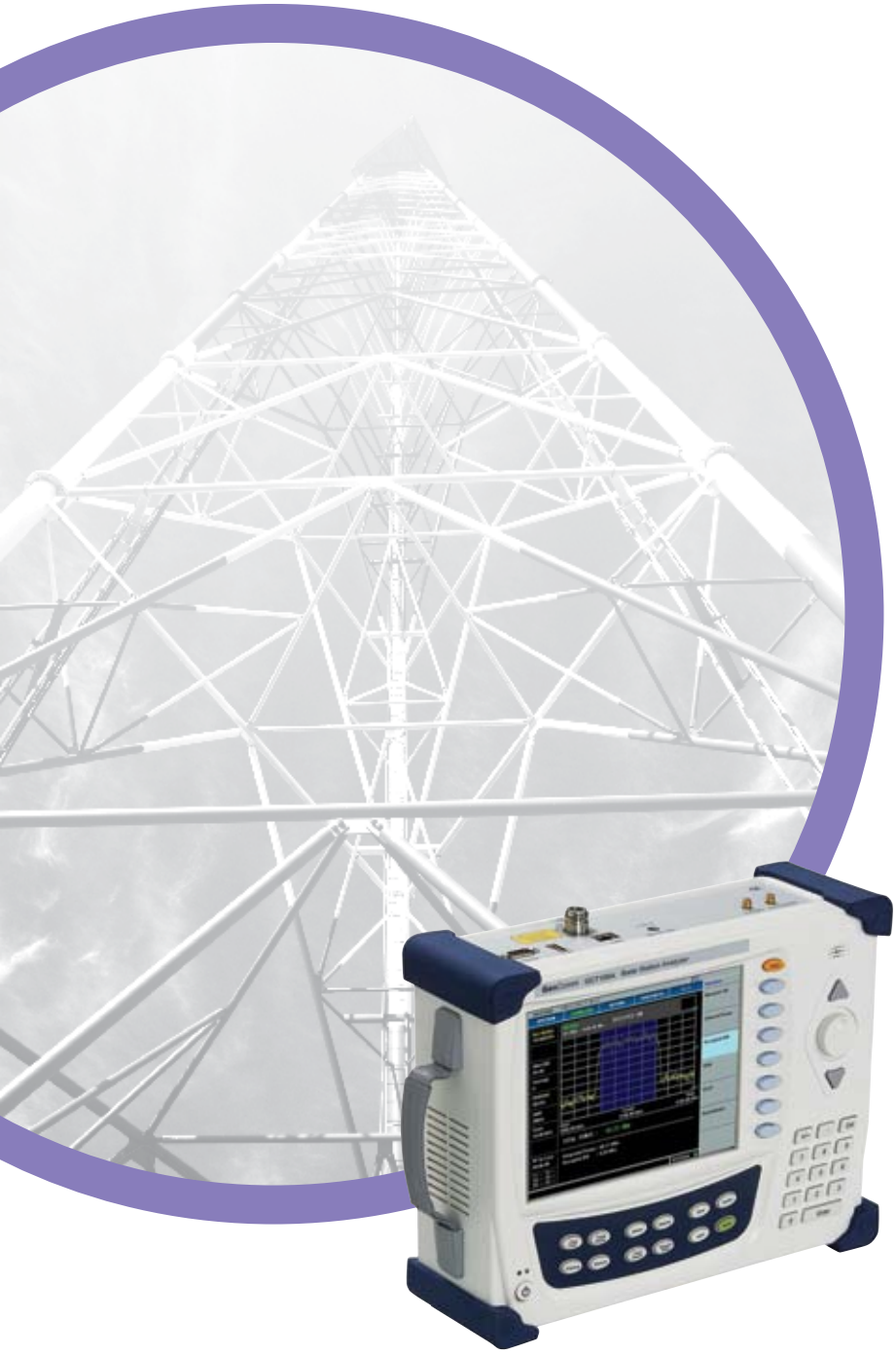


GC7105A

Base Station Analyzer

GenComm

GC7105A
Base Station Analyzer

Introduction

The GC7105A is a Base Station Analyzer for installation and maintenance of modern wireless communication systems. It combines the functionality of spectrum analysis, cable and antenna analysis, power meter, and modulation analysis, including:

- CDMA2000, EVDO
- GSM, GPRS, EDGE
- WCDMA, HSDPA

The GC7105A has been designed with a wide bandwidth analysis capability, ensuring the compatibility with future wideband technologies such as Fixed WiMAX and Mobile WiMAX.

The GC7105A is the perfect field testing solution that combines portability, due to its lightweight design and battery extended operation, and performance, with its multifunction capability and high resolution display.

In addition, the GC7105A provides an Auto-Measurement test capability which dramatically increases user's productivity.

The GC7105 is the optimal solution for installation and maintenance of wireless communications systems.

Features

Multi-function Integration

The GC7105A has integrated all the necessary functions to test and measure modern wireless communication systems. Its combined functionality includes spectrum analysis, cable and antenna analysis, power meter, channel scanner, E1/T1 analysis and modulation analysis for CDMA2000, EVDO, GSM, GPRS, EDGE, WCDMA, and HSDPA.

Easy-to-use User Interface

A common interface through its multiple functions provides the same menu structure that is easy to learn and use. It allows a quick configuration set for complicated radio systems, making a single button action to properly configure the instrument.

Auto-Measurement and Error Logging

The Auto-Measurement function is used to test mobile systems and store the results to either internal or external memory under specified measurement conditions and schedules through user defined scenario. This functionality is particularly important for effective tracking, monitoring and isolating intermittent problems.

Compact and Lightweight Design

The GC7105A is a compact and portable solution for users to perform outdoor maintenance jobs. The built-in high capacity Li-ion battery allows jobs at remote sites without being restricted by power cord.

Easy to upgrade

The GC7105A was designed to support all features upgrades, either hardware or firmware, to be implemented in the instrument's framework, providing convenience, and reliability. This architecture has the unique benefits of configuring the Base Station Analyzer for today's needs and an easy upgrade path for future requirements.

Excellent Performance and Portability, Ideal for Field Testing

Architecture

UPPER VIEW

RF IN
RF input signal port for Spectrum and Transmitter Analysis

SERIAL
D-sub interface port to connect an optional external power sensor

USB
USB port for data saving and firmware upgrading with USB memory stick

LAN
Ethernet Communication port to connect a PC with the applicaion SW

DC 15V-19V IN
External DC input port

RF OUT
RF output port for Cable and Antenna Analysis

FREQ REF
SMA female connector for external reference clock signals

SYNC
SMA female connector for PP2S external signals

GPS
SMA female connector for GPS antenna providing location information and frequency reference

E1/T1
E1/T1 interface port

FRONT VIEW

8.4" Color LCD
High resolution LCD Display

FREQ/CHAN
Sets Frequency and selects standard frequency bands

AMPLITUDE
Sets Scale, Refenence Level, Attenuation

POWER & LED
Power ON/OFF
Green LED : Power On status
Red LED : Extennal power

ESC
Cancels inputs or moves to previous menus

SPEAKER
Sounds internal beep if it is ON

KNOB & ARROWS
Moves marker positions or selects items on table lists

SOFT KEYS
Selects menu displayed on the screen

DATA ENTRY KEYS
Inputs numeric values

ENTER
Enters values to test parameters or settings

TRACE
Captures up to 6 traces.
Assigns saved trace to Trace CH.
Selects Active trace

BW/AVG
Sets Average, RBW and RBW/VBW

MARKER
Supports six markers for each trace

PEAK SEARCH
Searches the highest peak of the trace

MEASURE
Measures Channel Power, Occupied Bandwidth

MEASURE SETUP
Easy to setup for Channel Power & Occupied Bandwidth

SAVE
Measurement result can be saved either by graphic file or data file

LOAD
Recalls saved traces to compare with current or other saved traces

SYSTEM
Identifies and/or revises system information or upgrade firmware

MODE
Selects mode
- Spectrum Analyzer
- TX Analyzer
- Cable and Antenna Analyzer
- E1/T1 Analyzer
- Power Meter

The Complete Solution for Servicing Cell Site

- **Spectrum Analyzer**
  Frequency Range: 100KHz ~ 3GHz

- **Transmitter Analyzer**
  - CDMA2000, 1xEVDO
  - WCDMA, HSDPA, GSM, GPRS, EDGE

- **Over The Air Measurement (OTA)**
  - CDMA2000
  - WCDMA
  - GSM

- **Cable and Antenna Analyzer**
  - Cable Loss
  - Voltage Standing Wave Ratio (VSWR)
  - Distance to Fault (DTF)
  - Gain/Loss Measurement

- **Interference Analyzer**
  Frequency Range: 100KHz ~ 3GHz

- **Channel Scanner**
  Up to 20 channels

- **GSM Channel Scanner**
  Up to 128 GSM downlink signals

- **RF Power Meter**
  - Internal
  - External (Terminating, Through-line Power Sensor)

- **E1/T1 Analyzer**
  - E1/T1 Trunk line TX/RX metrics

Main Functions

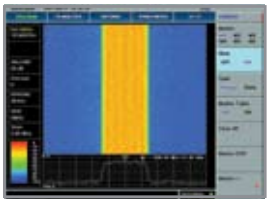
Spectrum Analyzer

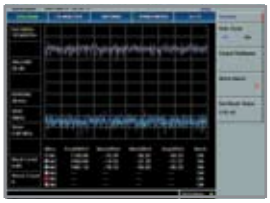
The Base Station Analyzer has a general purposed spectrum analyzer which is the most flexible test tool for RF analysis. Beyond this basic spectrum analysis functionality, a built in RF measurement application provides a single button RF power measurements including:

- Channel Power
- Adjacent Channel Power
- Spectrum Emission Mask
- Occupied Bandwidth

Interference Analyzer

The Base Station Analyzer has an interference analyzer which is the most effective way to identify periodic or intermittent interference.
A spectrogram display allows the user to capture spectrum activity while displaying frequency, power and time information.
The signal tracking capability is particularly useful for observing signal strength at a single frequency over time with an audible indication.





Transmitter Analyzer

The modulation measurement suite of the Base Station Analyzer provides not only RF parametric analysis but also modulation parametric analysis for modern wireless communication systems. Built-in wireless standard test procedures allow users to test each of the following items with a single button action.

- CDMA2000 / EVDO Analyzer
  - CDMA Channel Power
  - CDMA Adjacent Channel Power
  - CDMA Spectrum Emission Mask
  - CDMA Occupied Bandwidth
  - CDMA Code Domain Power
  - Frequency Error
  - Time Offset
  - Waveform Quality
  - PN Search
- WCDMA / HSDPA Analyzer
  - WCDMA Channel Power
  - Adjacent Channel Leakage Power Ratio (ACLR)
  - WCDMA Spurious Emission Mask
  - WCDMA Occupied Bandwidth
  - WCDMA Code Domain Power
  - Error Vector Magnitude (EVM)
  - Peak Code Domain Error (PCDE)
  - Auto Scramble Search
- GSM / GPRS / EDGE Analyzer
  - RMS Phase Error
  - Peak Phase Error
  - Burst Power
  - Frequency Error
  - Training Sequence Code (TSC)
  - IQ Origin Offset
  - Occupied Bandwidth
  - Power vs. Time

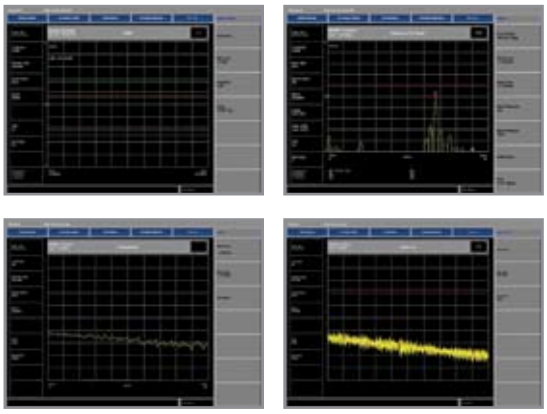
Main Functions

Cable and Antenna Analyzer*

The Base Station Analyzer can perform also the function of an antenna and cable analyzer that measures cable loss, distance to fault (DTF) and voltage standing wave ratio (VSWR).

The antenna and cable analysis functionality can characterize active and passive devices such as cables, filters, amplifiers, antennas and multiplexers.

In one port measurement, users can measure feed-line cable loss, DTF location, and Antenna VSWR. And with two ports measurements users can perform gain measurements, insertion loss, and isolation; particularly useful for filters, amplifiers, Tower Mounted Amplifiers (TMA), RF path gain, and antenna isolation.

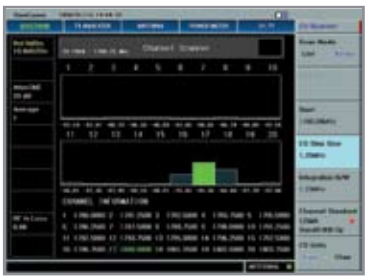


Over The Air Measurements*

The Base Station Analyzer provides over the air measurements for a quick performance characterization of the base station.
This function is especially useful in testing cell sites which are not easily accessible.

Channel Scanner

The Base Station Analyzer has the function of measuring multiple transmitted signals. The channel scanner can measure up to 20 channels in GSM, CDMA or WCDMA networks.
Using existing format-based or custom parameters, the user will be able to easily verify improper multi-channel power levels.



GSM Channel Scanner

The Base Station Analyzer has the function to display channel power and related information up to 128 GSM down link signals. This channel scanner can quickly identifies improper power levels that affect network performance; this can be done either over the air or directly connected to the cell site.

Main Functions

Power Meter

The Base Station Analyzer can perform two power testing methodologies:

- Internal, for standard power measurements without the assistance of external power sensors.
- External, for high accuracy power measurements with the assistance of external power sensors.

The internal power meter, with no additional power sensors, uses the spectrum analyzer functionality. It is a simple test methodology with reasonable accuracy. On the other hand, external power sensors perform power measurements more accurately.
The Base Station Analyzer can be equipped with a Directional Power Sensor (through-line) which has the advantage to minimize service disruption and covers an ultra-wide power range.

- Power displays in either dBm or Watts.
- Upper/Lower limit available with Pass/Fail indication.

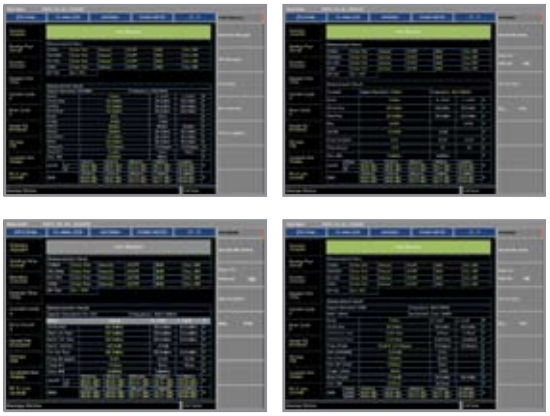
E1/T1 Analyzer*

The Base Station Analyzer also provides a testing solution for E1/T1 transmission lines. Various test modes are available including:

- Mode: Terminated, Monitor, Bridge, Loop
- Frame: PCM30, PCM31, Unframed
- Code: AMI, HDB3, B8ZS
- TX Pattern: 1-8, 1-16, ALL0, ALL1, 0101, 2E20
- E1/T1 Pulse Mask
- Alarm, Error Count and Logging

Auto-Measure*

Cell sites may present irregular malfunctions which are difficult to isolate. In such cases, the Base Station Analyzer monitors the cell site for a long period of time in order to capture enough measurement data to detect the exact symptoms and isolate the problem.
The Auto-Measure functionality provides an easy setup for testing, including the programming of measurement schedules such as starting time, duration, intervals, and measurement parameters.
Based on user definable conditions, the Base Station Analyzer performs the tests and automatically stores the results.



*Availability information upon request.

Specifications

Standard

Frequency Accuracy	±0.05ppm Internal
Frequency Aging	±0.5ppm / year
Display	8.4"TFT LCD
	800 x 600 mode

Frequency and Time Reference

Even Second	TTL
10 MHz,13MHz,15MHz	-10 ~ +10dBm

Spectrum Analyzer

Input Frequency Range	100kHz ~ 3GHz		
Maximum Input Level	+30dBm (1W)		
Amplitude Accuracy	±1.0dB		
Resolution Bandwidth	100Hz ~ 1MHz (1-3 sequence)		
Video Bandwidth	1Hz ~ 1MHz (1-3 sequence)		
Dynamic Range	> 85dB		
Input Attenuation	0 ~ 55dB (step 5dB)		
SSB phase noise	-95dBc @30KHz offset		
	-105dBc @100KHz offset		
DANL	Typical -140dBm		
	@100Hz RBW with Preamp On		
	Frequency	Typical	Max
	10MHz ~ 1GHz	-140dBm	-142dBm
	1GHz ~ 2GHz	-138dBm	-140dBm
	2GHz ~ 3GHz	-138dBm	-138dBm
Measurement Range	DANL ~ +30dBm		
Port 1 VSWR	<1.5		

Power Meter

Frequency Range	100KHz ~ 3GHz
Display	±100dBm (user settable)
Measurement Range	-70dBm ~ +30dBm
Offset Range	0 ~ 60dB
Accuracy	-40dBm ≤ Power ≤ +30dBm ±1.0dB
	-70dBm ≤ Power < -40dBm ±1.5dB
VSWR	< 1.5
Maximum Power	+30dBm(1W) without external attenuator

Cable and Antenna Analyzer

Frequency Range	25MHz ~ 3GHz
Frequency Resolution	100KHz
Data Point	126, 251, 501, 1001

VSWR

VSWR Range	1 ~65
Return Loss	0 ~ 60dB
Resolution	0.01 or 0.01dB

Cable Loss

Dynamic Range	0 ~ 30dB
Resolution	0.01dB

DTF(Distance to Fault)

Distance	1250m (4125ft)
Horizontal Range	0 to (# of data points-1) x (resolution-1)/2
Resolution	$(1.5x10^8)(V_P)/(Delta)(ZF)$
	Vp: Cable's relative propagation velocity
	Delta[Hz] = Stop Freq – Start Freq
	ZF(Zoom Factor) = Setup Dist./Max Dist.
VSWR Range	1 ~ 65
Return Loss Range	0 ~ 60dB

Gain/Loss Measurement

Frequency Range	25MHz ~ 3GHz	
Frequency Resolution	100KHz	
Output Power Level	-10dBm typical	
Dynamic Range	25MHz ~ 2GHz	80dB
	2GHz ~ 3GHz	60dB

Channel Scanner

Frequency Range	100KHz ~ 3GHz
Frequency Accuracy	±10Hz + Ref Freq/Time Accuracy
Measurement Range	-110 ~ +20dBm
Channel Power Accuracy	±1.0dB

Specifications

CDMA TX Analyzer

Frequency Range	410MHz ~ 495MHz, 805MHz ~ 940MHz 1750MHz ~ 2170MHz
Frequency Accuracy	±10Hz + Ref Freq/Time Accuracy
Waveform Quality (p)	±0.005 for 0.9 < p < 1
Pilot Time Alignment (Tau)	± 0.5μs
Code Domain Power	±0.5dB relative power ±1.5dB absolute power
Pilot Power	±1.0dB
Channel Power	±1.0dB

EVDO TX Analyzer

Frequency Range	410MHz ~ 495MHz, 805MHz ~ 940MHz 1750MHz ~ 2170MHz
Frequency Accuracy	±10Hz + Ref Freq/Time Accuracy
Waveform Quality(p)	±0.005 for 0.9 < p < 1
Pilot Time Alignment (Tau)	± 0.5μs
Code Domain Power	±0.5dB relative power ±1.5dB absolute power
Pilot Power	±1.0dB
Channel Power	±1.0dB

WCDMA/HSDPA TX Analyzer

Frequency Range	869MHz ~ 894MHz, 1710MHz ~ 2170MHz
Frequency Accuracy	±10Hz + Ref Freq/Time Accuracy
EVM Accuracy	±2.0% for 2% < EVM < 20%
Residual EVM	3.0% typical
Code Domain Power	±0.5dB for code channel power > -27dB 16, 32, 64 DCPH (Test Mode 1) 16, 32 DCPH (Test Mode 2, 3)
CPICH Accuracy	±1.0dBm
Channel Power	±0.7dB (Typical)
Occupied Bandwidth	±100KHz
Residual ACLR	< -56dB @5MHz, < -58dB@10MHz
ACLR Accuracy	±0.7dB

GSM / GPRS / EDGE TX Analyzer

Frequency Range	450MHz ~ 500MHz, 820 ~ 965MHz 1705MHz ~ 1995MHz
Frequency Accuracy	±10Hz + Ref Freq/Time Accuracy
GMSK Modulation Quality	
(RMS Phase) Measurement Accuracy	±0.5deg
Residual Error (GSMK)	0.5deg
Peak Phase Error Accuracy	±2.0deg
8PSK Modulation Quality	
Measurement Accuracy	±1.5% (2% < EVM < 25%)
Residual Error (8PSK)	2.5%
Burst Power	±1.0dB

GSM Channel Scanner

Frequency Range	450MHz ~ 500MHz, 820 ~ 965MHz 1705MHz ~ 1995MHz
Frequency Accuracy	±10Hz + Ref Freq/Time Accuracy
Measurement Range	-110 ~ +20dBm
Power Accuracy	±1.0dB

High Accuracy Power Meter

Display Range	-80 ~ +80dBm
Offset Range	0 ~ 60dB
Resolution	0.01dB or 0.1xW

Directional Power Sensor (GC731A)

Frequency Range	300 ~ 3800MHz
Power Range	Average : +21.76 ~ +51.76dBm(0.15 ~ 150W) Peak : +36.02 ~ +56.02dBm(4 ~ 400W)
Measurement Uncertainty	±4% of reading Above 35℃ or Below 15℃ adds 3%
Input VSWR	300 ~ 3000MHz < 1.07 3000 ~ 3800MHz < 1.10
Connector Type	N Female

Terminating Power Sensor (GC732A)

Frequency Range	20 ~ 3800MHz
Power Range	Average: -30 ~ +20dBm(1uW ~ 100mW)
Measurement Uncertainty	±7%
Input VSWR	20 ~ 2500MHz < 1.12 2500 ~ 3800MHz < 1.25
Connector Type	N Female

Specifications

T1 Analyzer

Error Detect Code	BPV, Frame, CRC
Alarm Detection	Red Alarm, Yellow Alarm, AIS Alarm
Receive Level	+6 ~ -36dB DSX

Electrical Interface

Connectors RX/TX	RJ48C (100Ω)
Output	0dB, -7.5dB and -15dB
Line Code	AMI, B8ZS
Impedance	100Ω or 1000Ω (Bridge)

Input

Term/Bridge/Monitor/Loop	0 ~ -20dB

Transmitter and Receiver

Framing	D4, ESF, SLC96, T1 DM, Unframed
Channel Formats	Full T1
Test Pattern	1-8, 1-16, ALL1, ALL0, 0101 3E-24, QRSS, 2E-23, 2E-15 2E-23 inverse, 2E-15 inverse

Additional Functions

Reference Clock	Received or Internal
Event Log Capability	Internal Memory or External USB
Error Insertion	1E-5, 1E-6, 1E-7
Error Rate Count	CRC, Frame Code Calculated BER
Pulse Mask Checking	

E1 Analyzer

Error Detect Code	BPV, FAS, CRC-4
Alarm Detection	FAS RAI, MFAS RAI, AIS
Receive Level	+6 ~ -36dB DSX

Electrical Interface

Connectors RX/TX	RJ48C (120Ω)
Output	0dB, -6dB (ITU-T Rec.G.703)
Line Code	AMI, HDB3
Impedance	Term, Monitor 120Ω Bridge > 1000Ω

Input

Term/Bridge/Monitor	0 ~ -20dB

Transmitter and Receiver

Framing	Unframed, PCM-30, PCM-30 with CRC PCM-31, PCM-31 with CRC
Channel Formats	Full E1
Test Pattern	1-8, 1-16, ALL1, ALL0, 0101, 20ITU

Additional Functions

Reference Clock	Received or Internal
Event Log Capability	Internal Memory or External USB
Error Insertion	1, 1E-5, 1E-6 and 1E-7
Error Rate Count	CRC, Frame Code, Calculated BER
Pulse Mask Checking	

External Reference Clock

10, 13, 15MHz External Reference

Input Power	-10 ~ +10dBm
Connector Type	SMA Female

Even Second

Input Level	TTL Compatible
Connector Type	SMA Female

Environmental Condition

Operation Temperature	-5℃ ~ 50℃ (23°F ~ 122°F)
Storage Temperature	-20℃ ~ 70℃ (-4°F ~ 158°F)
Calibration Cycle	1 year

Dimension

Weight	5.6kg(12.1lb) (Including Battery)
Size (W x H x D)	315 x 245 x 95mm (12.4' x 9.6' x 3.7')

General

Interface Ports

Serial	1 Port
USB 1.1	1 Port
10Mbps LAN	1 Port
GPS Antenna (SMA)	1 Port
Built-in Speaker	

Battery (Lithium Ion)

Nominal Voltage	11.1V
Normal Capacity	7200mA
Minimum Charge Voltage	12.6V
Battery Running Time	1.5 Hours at full charge

Power Supply

AC Input	100 ~ 240V 2.5A, 50 ~ 60Hz

Specifications and product description subject to change without notice CE

Ordering Information

Standard

- Spectrum Analyzer : 100KHz ~ 3GHZ
- Power Meter : 100KHz ~ 3GHz

Options

Note: Upgrade options for the GC7105A use the designation GC7105AU before the respective option number (GC7105AU-###)

- GC7105A-002 High Accuracy Power Meter (Requires GC731A or GC732A)
- GC7105A-003 Gain/Loss Measurement (Requires GC7105A-007)
- GC7105A-004 GSP Receiver
- GC7105A-005 E1/T1 Analyzer
- GC7105A-006 Channel Scanner
- GC7105A-007 Cable and Antenna Analyzer (Recommend GC724-50509)
- GC7105A-008 Interference Analyzer
- GC7105A-009 GSM Channel Scanner
- GC7105A-010 CDMA2000 OTA (Requires GC7105A-004 and GC7105A-020)[1]
- GC7105A-011 WCDMA OTA (Requires GC7105A-004 and GC7105A-030)[1]
- GC7105A-012 GSM/GPRS/EDGE OTA (Requires GC7105A-004 and GC7105A-31 and/or 41)[1]
- GC7105A-020 CDMA Analyzer
- GC7105A-021 EVDO Analyzer (Requires GC7105A-020)
- GC7105A-030 WCDMA Analyzer
- GC7105A-031 HSDPA Analyzer (Requires GC7105A-030)
- GC7105A-040 GSM/GPRS Analyzer (Recommended GC7105A-009)
- GC7105A-041 EDGE Analyzer (Requires GC7105A-040)
- GC7105A-050 450MHz Omni RF Antenna[2]
- GC7105A-051 800MHz Omni RF Antenna[2]
- GC7105A-052 1800MHz Omni RF Antenna[2]
- GC7105A-053 1900MHz Omni RF Antenna[2]
- GC7105A-054 2100MHz Omni RF Antenna[2]

[1]Select ONE Antenna
[2]Required for OTA Measurement (options 010, 011, 12)

Standard Accessories

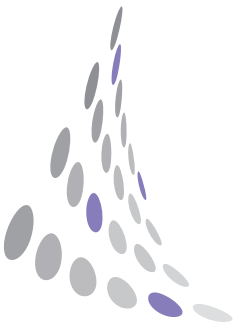
- G7105-50341 : Soft Carrying Case
- G7105-50322 : AC-DC Adapter
- G7105-50335 : Cross LAN Cable (1.5m)
- GC724-50513 : 256MByte USB Memory
- G7105-50321 : Lithium-ion Battery
- G7105-50316 : Stylus Pen
- G7105-50361 : User's Manual and Application Software CD

Optional Accessories

- GC724-50509 : Calibration Kit, 40dB, 4GHz
- G7000-50571 : Adapter N(m) to DIN(f), DC to 7.5GHz, 50Ω
- G7000-50572 : Adapter DIN(m) to DIN(m), DC to 7.5GHz, 50Ω
- G7000-50573 : Adapter N(m) to SMA(f), DC to 18GHz, 50Ω
- G7000-50574 : Adapter N(m) to BNC(f), DC to 2GHz, 50Ω
- GC724-50542 : Hard Case
- G7105-50362 : GC7105A User's Manual- Printed version

High Accuracy power meter Accessories

- GC731A : Directional Power Sensor
  (300 ~ 3800MHz, Average Power +21.76 ~ +51.76dBm, Peak Power +36.02 ~ +56.02dBm)
- GC732A : Terminating Average Power Sensor (20 ~ 3800MHz, -30 ~ +20dBm)



GC7105A

Base Station Analyzer

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