

G7104A Multimaster Base Station Tester



Key features

- **Multi-function integration**

The Multimaster has integrated all necessary functions to test and measure CDMA and WCDMA/HSDPA systems in one instrument without the need for additional equipment.

- **High accuracy & reliability**

The Multimaster was designed to be the best in class solution for wireless operators, performing highly accurate measurements with carrier-grade reliability

- **Easy-to-use user interface**

The Multimaster uses a menu structure that is easy to learn enabling engineers to quickly set the configuration for complicated radio systems. With a single button action engineers can change the configuration to a pre-defined system in no time.

- **Auto-measure and error logging**

The auto-measure function is used to test the system and store the results to either internal or external memory devices under specified measurement conditions according to a schedule. This function is particularly important for effective tracking, monitoring and isolating intermittent problems.

- **Compact and lightweight design**

The Multimaster is compact and portable for engineers to perform outdoor maintenance jobs. The built-in high capacity Li-Ion battery allows for extended jobs at remote sites without being restricted by power cords.

- **On-line firmware upgrade**

The Multimaster automatically verifies the latest firmware version and performs remote download & upgrade if necessary when it is connected to the network via an Ethernet port. The user can also easily perform firmware upgrades using a USB memory device.

Introduction

G7104A-Multimaster is a comprehensive and cost effective solution for performing base station and repeater maintenance in any environment covering all CDMA standards including cdmaOne, cdma2000 1×RTT, cdma2000 1×EVDO, and WCDMA/HSDPA.

The Multimaster eliminates the need for engineers to carry a multitude of separate instruments such as spectrum analyzer, CSTS, power meter, signal generator, antenna tester, optical power meter, and E1/T1 analyzer to service and maintain cell sites. The Multimaster has integrated all of these instruments into a single solution.

Additionally, the unique feature of multitasking screens, auto-measure, and test capability dramatically increases user's productivity.



2

The Complete Solution for BTS maintenance

Spectrum Analyzer

Frequency range: 100 kHz ~ 3 GHz

TX Analyzer

cdmaOne, cdma2000, 1x EVDO and WCDMA/HSDPA

- Code domain analysis
- Channel power
- ACP(L)R
- Emission mask
- Occupied BW
- Over the air

Signal Generator

Single carrier generator over 800 MHz ~ 2.7 GHz

- CW
- CDMA
- WCDMA

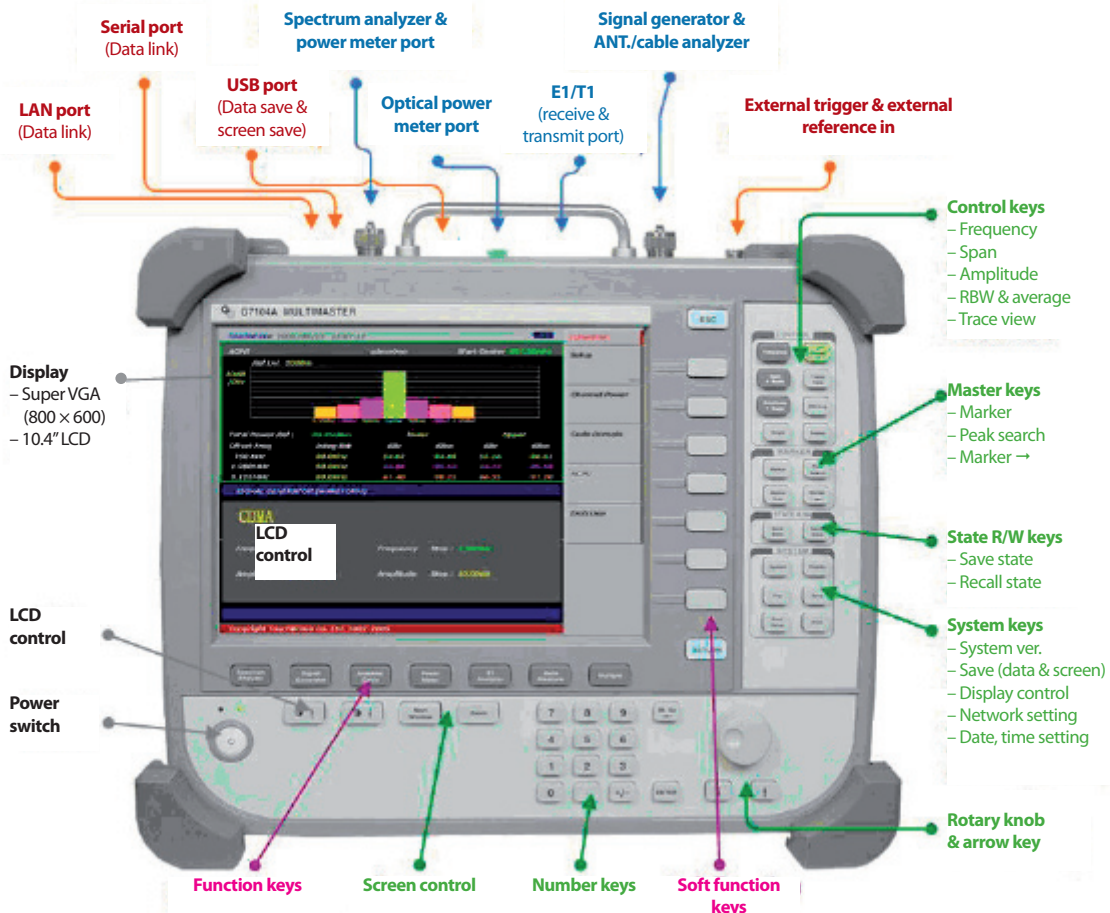
Antenna/Cable Analyzer

- Cable loss
- DTF
- VSWR (in service, out of service)

RF Power Meter

Optical Power Meter

E1/T1 Analyzer



3

Main Functions

Spectrum Analyzer

The Multimaster has the function of a 3 GHz spectrum analyzer providing field engineers and service technicians an excellent performance portable analyzer.



TX Analyzer

The Multimaster has the function of a powerful transmission analyzer to test and measure all CDMA systems, including cdmaOne, cdma2000, 1xEVDO and WCDMA/HSDPA.

- Code domain analyzer
 - Code domain power
 - Frequency error
 - Time error
 - Waveform quality
 - PN searcher
 - EVM, PCDE
 - (WCDMA/HSDPA)
- Multi-FA channel power
- ACP(L)R
- Spurious emission
- Occupied BW



Air Measurements

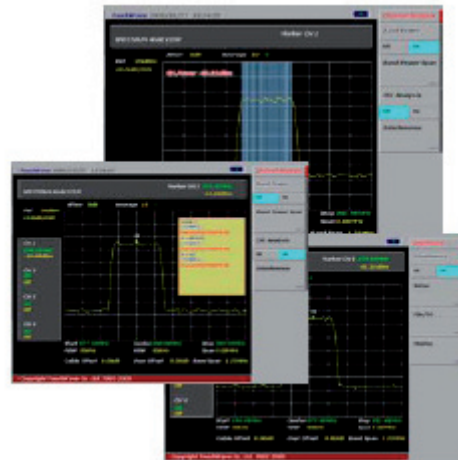
The Multimaster provides air measurements for a quick performance characterization of the base station transmitter. This function is especially useful in testing cell sites which are not easily accessible.



Channel Analysis

The Multimaster has the functions of selectable channel analyzer. It helps users to find intermittent signals, by verifying and monitoring the channel characteristics.

The result of the interference analysis can be stored as the frame based screen into the internal or external memory, and then can be replayed just like the real signal.

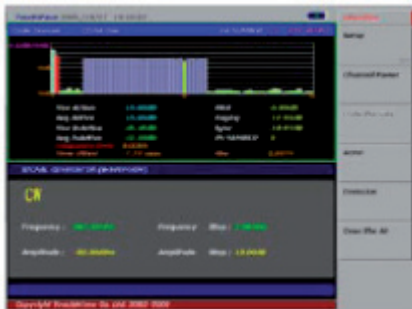


4

Signal Generator

The Multimaster has the functions of CW, CDMA, and WCDMA single carrier generator. By combining this function with others like spectrum analyzer or RF power meter, the user can easily isolate faults on the radio frequency path.

- Frequency range: 800 ~ 2,700 MHz
- Output dynamic range: -30(-10) ~ -80(-90) dBm
Values in parenthesis () are the CW signal output range.



Antenna/Cable Analyzer

The Multimaster has the functions of antenna and cable test for measuring cable loss, DTF (distance to fault) and VSWR.

The multimaster can perform non-intrusive VSWR measurements without disrupting the service, maximizing air time and minimizing subscriber's complaints.

- Cable loss: Up to 30 dB
- VSWR analyzer: 800 ~ 2,700 MHz
- In service VSWR (Tx/Rx, Rx only antenna)
 - VSWR range: Up to 8.5
- Out of service VSWR
 - VSWR range: 1.07 ~ 15
- DTF analyzer
 - Distance: up to 300 m
 - Resolution: 0.5% of measuring distance



Power Meter

Power meter consists of two main functions as described below.

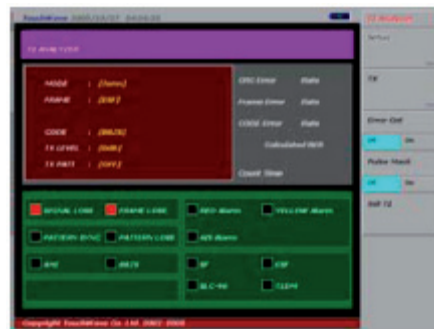
- RF power meter. Without external sensors, the Multimaster can measure RF output power transmitted from an antenna.
 - Dynamic range: 100 kHz~ 2.985 MHz
 - Power dynamic range: +30~ - 80 dBm
- Optical power meter, with a built in optical power meter, the user can measure the optical power transmitted between the master and slave units of the repeater.
 - Display unit: dBm, μ W



E1/T1 Analyzer

The Multimaster provides a testing solution for a user's E1/T1 transmission line. Various test modes are available for the user to select.

- Mode: Term, monitor, bridge, loop
- Frame: PCM30, PCM31, unframed D4, ESF
- Code: AMI, HDB3, B8ZS
- TX Pattern: 1-8, 1-16, ALL0, ALL1, 0101, 2E20
- E1/T1 pulse mask
- Alarm, error count and logging



Specifications

Standard

Frequency accuracy	± 0.05 ppm internal
Frequency aging	±0.5 ppm/yr
Display	10.4" TFT LCD 800 × 600 mode

Frequency and time reference

Even second	TTL
10 ms	TTL
10 MHz	-10 ~ +10 dBm

Spectrum Analyzer

Input frequency range	100 kHz~2,985 MHz
Maximum input level	+30 dBm (1 W)
Amplitude accuracy	± 1 dB
Bandwidth resolution	100 Hz ~ 1 MHz (1-3 Sequence)
Dynamic range	>85 dB
Input Attenuation	0~55 dB (Step 5 dB)
SSB phase noise	≤-90 dBc/Hz
DANL	<-125dBm @ 100 Hz RBW
Port 1 VSWR	<1.5

CdmaOne, cdma2000, EVDO, WCDMA/ HSDPATX Analyzer

Input dynamic range	> -40 dBm
Waveform quality (ρ)	± 0.005 for 0.9 < ρ < 1
Code domain power	± 0.5 dB (Rel.)
Channel power	± 1 dB
Adjacent channel power	± 0.75 dB
Pilot time alignment error	± 1 μs
EVM (WCDMA only)	± 2.5% (range:15~20%)
PCDE (WCDMA only)	± 1.0%

Over the air PN scanner & analysis

(except in EVDO and W-CDMA)

PN scanner	Max 5 PN analysis
Analysis parameter	Ec/Io, multi-path delay profile, channel power, pilot power, noise floor, delta paging power, delta sync power, PN offset, estimated Rho

CW Signal Generator

Frequency range	800 ~ 2,700 MHz
CW Output Level	-10 ~ -90 dBm
Level Accuracy	± 1 dB

T1 Analyzer

Error detect code	BPV, frame, CRC
Alarm detection	Red alarm, yellow alarm, AIS alarm
Receive level	+6 ~ -36 dB DSX

Electrical interface

Connectors Rx, Tx	Bantam (120 Ω)
Output	0 dB, -7.5 dB, and -15 dB

Line Code	AMI, B8ZS
Impedance	100 or 1000 Ω

Input

Term / bridge / monitor / loop	0 ~ -20 dB
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Transmitter and Receiver

Framing	D4, ESF
Channel formats	Full T1
Test pattern	1-8, 1-16, ALL1, ALL0, 0101, 3 in 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 detect	FAS RAI, MFAS RAI, AIS
Receive level	+6 ~ -36 dB DSX

Input

Term / Bridge / Monitor	0 ~ -20 dB
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Electrical interface

Connectors Rx, Tx	Bantam (120 Ω)
Output	0 dB, -6dB Conforms with ITU-T Rec.G.703

Line code	AMI, HDB3
Impedance	Term, Monitor: 120 Ω Bridge > 1,000 Ω

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

E1 Analyzer

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	

CDMA, WCDMA Signal Generator

Frequency range	800 ~ 2,700 MHz
Output level	-30 ~ -80 dBm
Level accuracy	± 1.5 dB
Filter type	IS-95B, 3GPP standard
No of Carrier	1
Assigned Walsh code	CDMA: W64, 0 WCDMA: W256,0

Antenna/Cable Analyzer

Maximum input power without damage	0.1 W
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Cable loss

Dynamic range	0 ~ 33 dB
Accuracy	0.1 dB
Resolution	0.01 dB

VSWR

Frequency range	800 ~ 2,700 MHz
Directivity	> 1.07
VSWR range	1.07 ~ 15

DTF

Range	0.1 ~ 300 m
Accuracy	< 10 m: ±0.3 m, > 10 m: ± 3%
Resolution	0.5% of measuring distance

Power Meter

Maximum input power without damage	0.1 W
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RF power

Frequency range	0.1 ~ 2,985 MHz
Accuracy	±1.0 dB

Optical power

Wavelength	1310 nm, 1510 nm, 1550 nm
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Accuracy	±1.0 dB
Measurement range	-30 ~ +15dBm

Display units	dBm, μW
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External Reference Clock
10 MHz external reference

Input power	-10 ~ +10dBm
Connector type	BNC

Even second & 10 ms

Connector type	SMA
Input level	TTL compatible

Environmental Condition

Operating temperature	-5 ~ +50 °C
Storage temperature	-20 ~ +70 °C
Calibration cycle	1 year

Power supply

AC input	100~240 V 2.5 A, 50~60 Hz
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Dimension

Weight	10.5 kg (Include battery)
Size (cm)	31 X 36 X 15
DC output	18~24 V, 6 A 120 W max.

General
Interface ports

RS-232(DB-9)	1 port
USB 1.1	1 port
10 Mbps LAN	1 port
GPS antenna (SMA)	1 port

Built-in speaker

Battery (internal Lithium Ion)

Nominal voltage	14.8 V
Nominal capacity	4,400 mA
Maximum charge voltage	16.8 V
Minimum charge voltage	12.0 V
Battery operation at full charge	2 hours

Ordering Information

GC7104A	Multimaster G7104 incl. 3GHz Spectrum Analyzer, Interference Analyzer, Channel Scanner, 3GHz Power Meter
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Supplied accessories

User's Guide
RF Reference Cable (50cm)
USB memory (128 MB)
2 x Bantam Cable (120 Ohm)
AC/DC power converter (AC 110/220V – DC 19V)
Simplex Fibre Optic Cable FC-SC (5m)
3 x Simplex Optical Adapters SC-SC, SC-FC and FC-FC
Li-Ion battery (built-in)
Power cable
Soft carrying case

Optional Accessories

GC72450509	Calibration kit, 40 dB, 4 GHz (Open-Short-Load)
GC7104-001	Cable Loss/VSWR/DTF (Transmission Analyzer)
GC7104-002	CW Signal Generator
GC7104-003	CDMA/WCDMA Signal Generator
GC7104-004	GPS Receiver
GC7104-005	cdmaOne/cdma2000 Over the Air
GC7104-006	Channel Power, ACPR, Emission, Occupied Bandwidth
GC7104-007	cdmaOne & cdma2000 demod- ulator
GC7104-008	1x EVDO demodulator
GC7104-009	WCDMA/HSDPA demodulator
GC7104-010	E1/T1 Analyzer
GC7104-011	Optical Power Meter

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