

ML8720C

Area Tester

ML8740B

Area Scanner

ML8720C Area Tester and ML8740B Area Scanner

Product Introduction

Anritsu Corporation

Version 1.00

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ML8720C/ML8740B-E-L-1

Slide 1



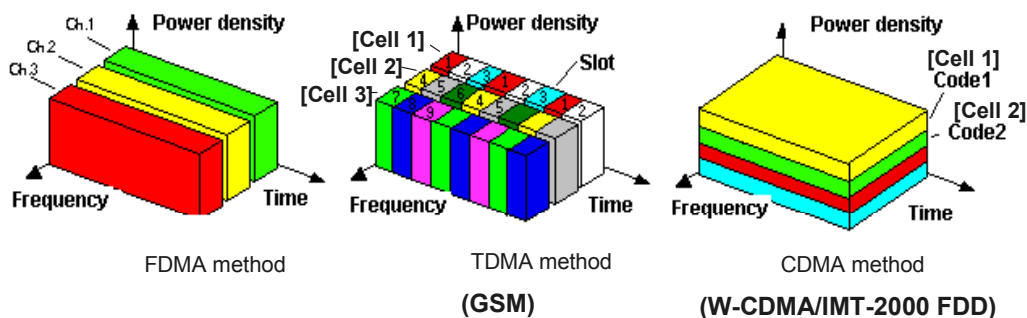
Why use high-performance tester for W-CDMA cell optimization?

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Slide 2



Outline of W-CDMA Method



GSM:

- The interference is small because different frequencies are used among neighboring cells.
- There is little affect on neighboring cells even when signal power is increased.

W-CDMA:

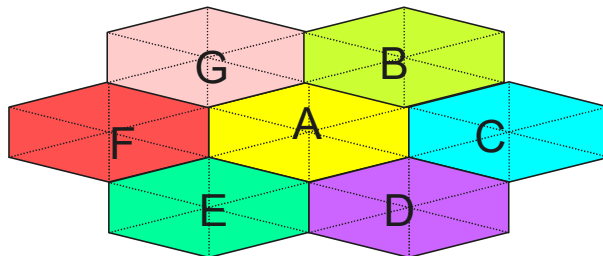
- Using the same frequency among neighboring cells causes interference with other cells.
- The voice quality deteriorates as the signal power of neighboring cells increases.

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Outline of W-CDMA Method



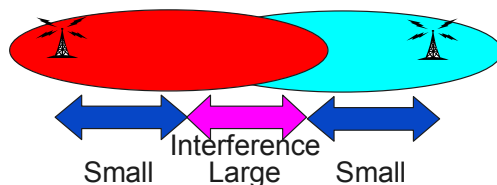
Allocation of cells in mobile system

GSM:

Can design base station parameters (TX power, antenna height, tilde angle, etc.) without paying too much attention to effect of Cell A on neighboring cells (Cells B, C, ...G)

W-CDMA:

As signal power of Cell A increases, interference with Cells B ~ G increases.
As Cell A signal power decreases, range of Cell A becomes smaller.



Interference between BTS in W-CDMA System

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Outline of W-CDMA Method

- **Measuring only receive power is insufficient for W-CDMA.**

To evaluate wave strength received from each base station:

- **RSCP** (Received Signal Code Power) Required receive power

Ratio of receive energy per chip (E_c) to receive power density (N_0) in frequency band:

- **E_c/N_0**

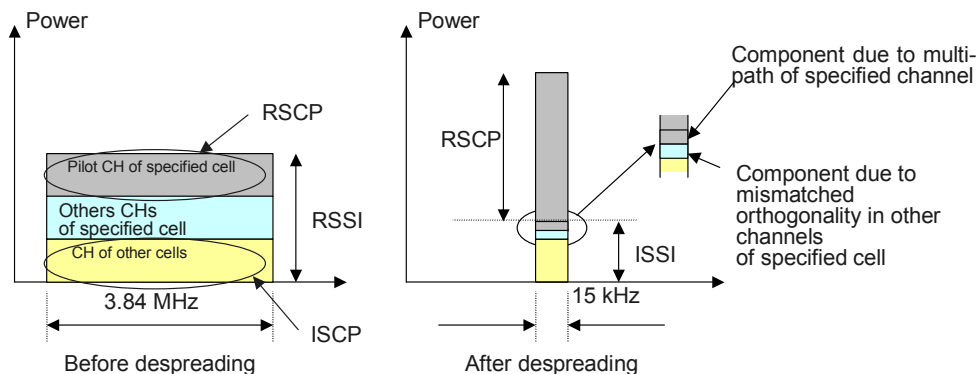
Ratio of required receive power to interference signal power:

- **SIR** (Signal Interference Ratio)

- **E_c/N_0 and SIR are especially important for confirming the interference effect.**

- **A drive test in a metropolitan area is easily effected by fusing and multi-path effects. Stable and high-accuracy measurement of RSCP, E_c/N_0 , and SIR is required in such environments.**

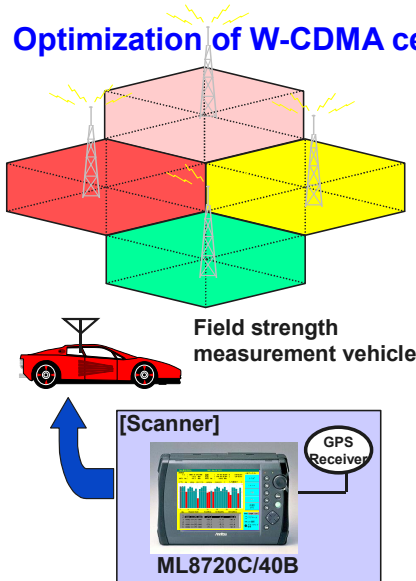
Outline of W-CDMA Method



- RSSI:** Receive signal strength indicator (total receive signal power within 3.84 MHz band)
RSCP: Receive signal code power (of Pilot channel CPICH)
ISCP: Interference signal code power
ISSI: Interference signal code power after despreading ($ISSI = ISCP/SF$)
SF: Spreading factor (of CPICH = 256)
SIR: Signal to interference ratio $SIR = RSCP/ISSI = (RSCP/ISCP) \times SF$
 E_c/N_0 : $E_c/N_0 = RSCP/RSSI$

Outline of W-CDMA Method

Optimization of W-CDMA cells



- **Coverage confirmation (drive test, walk test)**

RSCP, Ec/No and SIR are measured.

- **Optimization of each cell**

Tilt angle, antenna height, and signal power are reviewed based on measurement results.

- **Investigation and adjustment of coverage blind spots**

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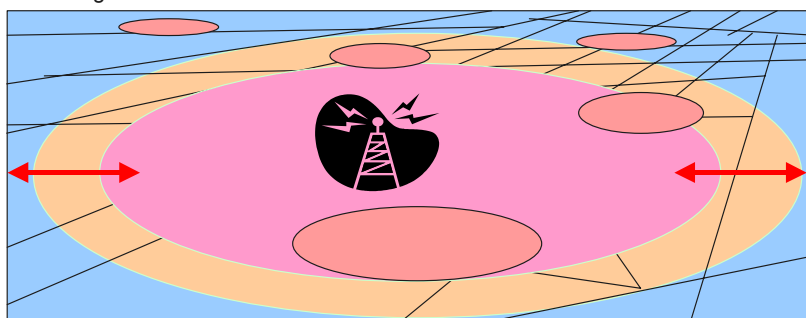
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Outline of W-CDMA Method

- Simulation area
- Measurement result
- Missing area

Optimization with wrong value degrades data speed and causes interference issues.



If a high-quality measurement instrument is not used, gaps will occur between the simulation and actual areas, or coverage blind spots will appear.

=> Extra measurement for fault analysis increases costs.

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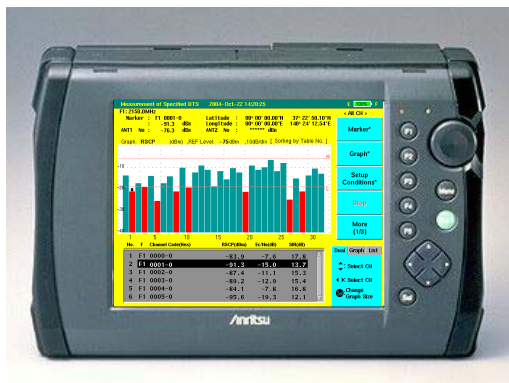
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ML8720C Area Tester

ML8740B Area Scanner



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ML8720C

Area Tester

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ML8720C Area Tester

Product Overview

The **ML8720C** is used to evaluate radio-wave propagation characteristics in the area of **W-CDMA** (UMTS) and **GSM** base stations. When it is connected to a GPS receiver, the measurement results can be correlated with position information (latitude and longitude).

For W-CDMA:

Measurement items include functions for measuring the **RSCP**, **Ec/No.** and **SIR**, which are used to evaluate the strength of radio waves received from each base station, and the delay profile, which is used to evaluate the delay characteristics of the radio wave caused by multi-path propagation.

There are two measurement modes: unspecified base station, and specified base station. The **CPICH** (Common Pilot Channel) and **SCH** (Sync Channel) from the base station are measured in both modes.

RSCP: Received Signal Code Power

Ec/No.: Ratio of desired receive power per chip to receive power density in band

SIR: Signal Interference Ratio

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ML8720C Area Tester

Product Overview

For GSM:

GSM base stations can be measured by installing the **MX872004C GSM Measurement Software**. Specified base station, unspecified base station, and combined measurement of specified and unspecified base stations are all supported. The search channel range for unspecified base station measurement can be set using the GSM channel code search range.

Up to 200 search ranges can be set so measurement, excluding unnecessary channels like TCH, etc., can be performed by setting only **BCH** as the search range.

Measurement items include functions for measuring **RSSI** and **C/I**, which are used to evaluate the strength of radio waves received from each base station, and support **BSIC** decoding.

RSSI: Received Signal Strength Indicator

C/I: Carrier to Interference Ratio

BSIC: Base transceiver Station Identity Code

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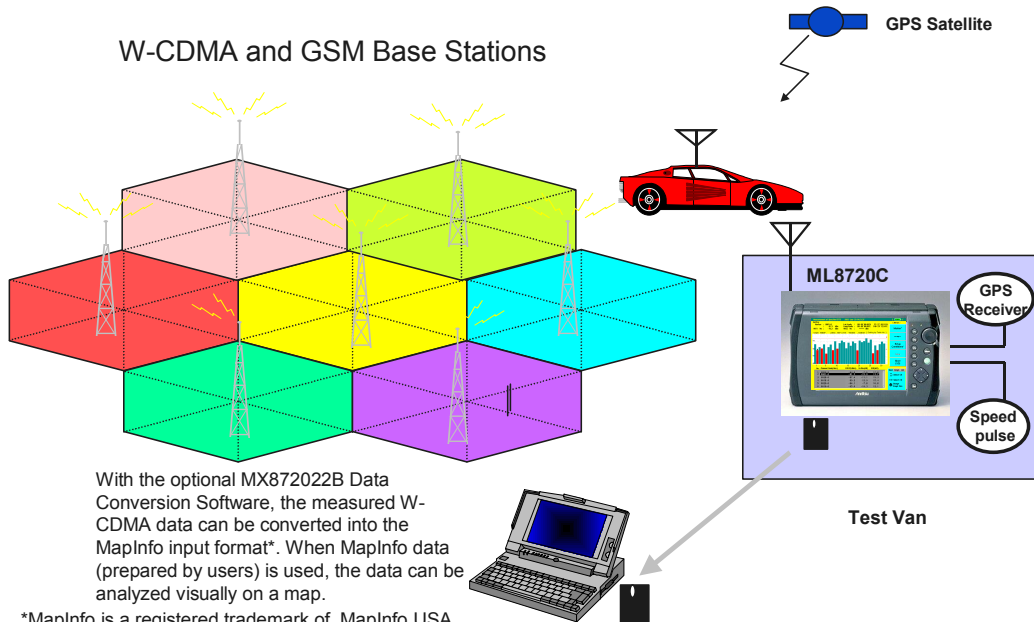
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ML8720C Area Tester

W-CDMA and GSM Base Stations



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ML8720C Area Tester

Features

- Standalone operation with 8.4-inch TFT color LCD and lithium-ion battery (External PC controller not required)
- Correlation with GPS position data
- High-accuracy measurement using diversity functions (Option 03/23)
- Two-carrier measurement function (Option 03/23) (W-CDMA + W-CDMA) or (W-CDMA + GSM)
- External trigger calibration
- BCH Demodulation (MX872002B)

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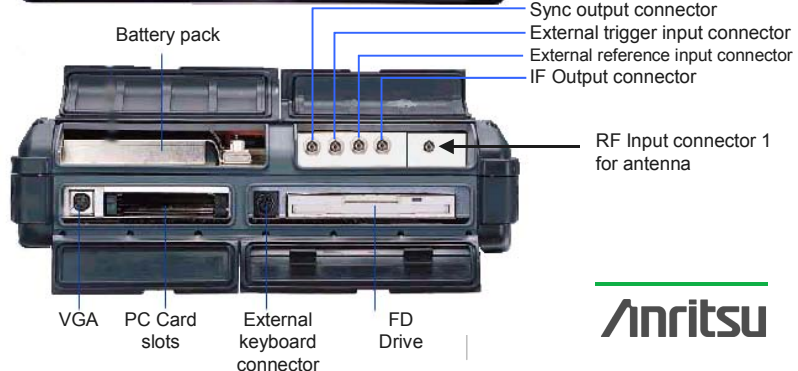
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ML8720C Area Tester



- Status indicator
- Rotary knob
- Function keys
- Menu key
- Start key
- Up/Down, Left/Right key
- Select key



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ML8720C Area Tester

Main Specifications 1/3

- Frequency range: RF Input 1 925 to 960 MHz,
1805 to 1880 MHz,
2100 to 2170 MHz
RF Input 2 (Option 03/23)
2100 to 2200 MHz
- Receive signals: W-CDMA
P-CPICH, S-CPICH, P-SCH, S-SCH,
P-CCPCH (at BCH demodulation)
GSM
BCH (C/I Measurement and BSIC decode)
- Measurement items: Specified BTS, Unspecified BTS,
Spectrum monitor, CW measurement

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ML8720C Area Tester

Main Specifications 2/3

- Power measurement

Measurement range:

W-CDMA Measurement mode: -33 to -117 dBm

GSM Measurement mode: -40 to -110 dBm

Spectrum monitor mode: -33 to -123 dBm

CW Measurement: -33 to -117 dBm

Accuracy: ± 2 dB (WCDMA RSCP, GSM RSSI)

± 1 dB typ. (23 $\pm 5^{\circ}\text{C}$)

Supported measurement van speed: 0 to 100 km/h

- W-CDMA BTS Measurement

Items: RSCP, Ec/No, SIR

Sampling interval: 10 ms min. (at 1ch measurement)

Measurement channels: 32 max.

Measurement displays: All channel, Delay profile, Finger,

Time variation, SCH Delay profile

ML8720C Area Tester

Main Specifications 3/3

- GSM BTS Measurement

Items: RSSI, C/I (supports BSIC decoding)

Sampling interval: 20 ms min. (1ch measurement, no BSIC decode)

Measurement channels: 32 max.

Measurement displays: All channel, Time variation

- Spectrum monitor: 4, 10, 30, 60 MHz span

- CW Measurement: RBW 15 kHz, Sampling time 10 ms

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ML8720C-03/23: Two-carrier Measurement

Option 03 (Model: ML8720C-03)

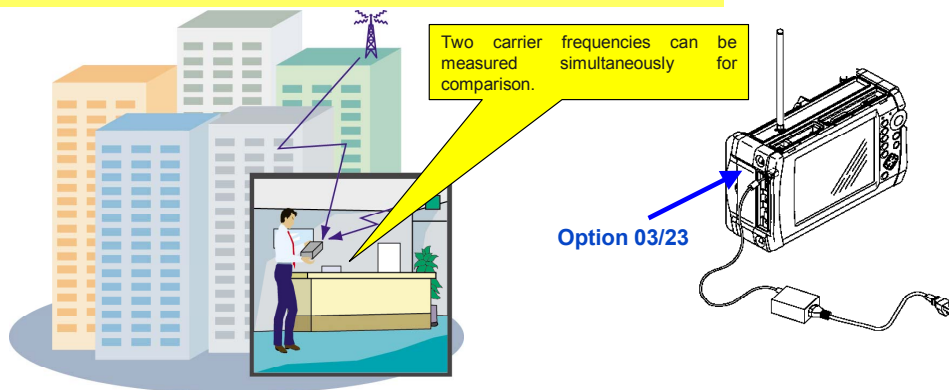
- Two-carrier Measurement
Two carrier frequencies can be measured simultaneously at specified and unspecified base station measurement.
- Diversity function
The signal from a base station supporting transmit diversity can be measured per transmit antenna at specified base station measurement. (Specify Option 03 with the ML8720C main frame when ordering.)

Option 23 (Model: ML8720C-23)

- The functionality of Option 03 is added to the ML8720C standard configuration.
(The main frame must be returned to Japan for retrofitting Option 23 to the ML8720C main frame.)

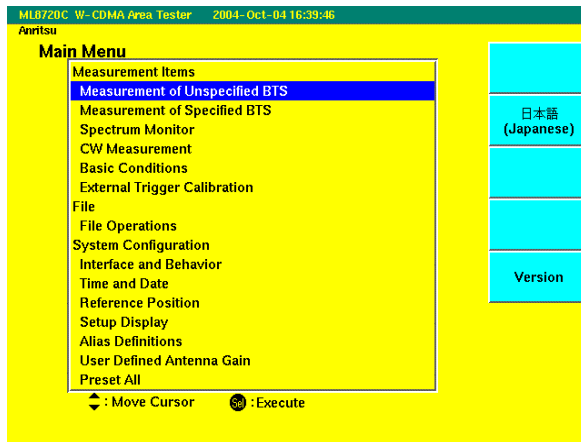
ML8720C W-CDMA Area Tester

ML8720B-03/23: Two-carrier Measurement



The maximum number of measured channels is 32 for two carrier frequencies. Simultaneous measurement of multiple carrier frequencies improves measurement efficiency. Also, simultaneously measured carrier frequencies can be compared.

Main Menu



Measurement items

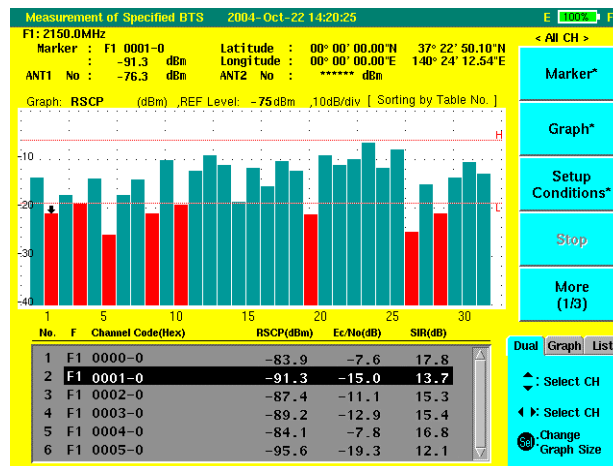
Measurement of Unspecified BTS
Measurement of Specified BTS
Spectrum Monitor
CW Measurement

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All Channel Display



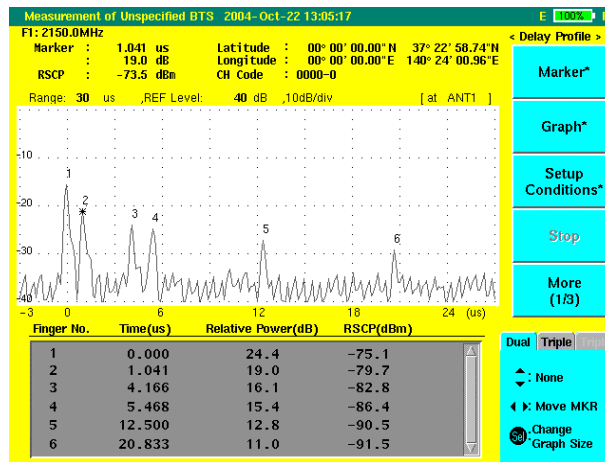
The measurement results for all received channels (32 max.) can be displayed simultaneously as a graph and data. In addition, it is possible to select statistical processing (Max, Min, Median, Average) for internally accumulated data and measurement interval setting.

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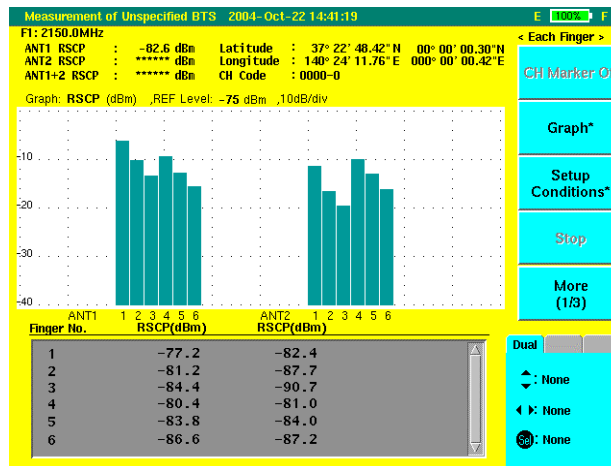
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Delay Profile Display



The delay profile for the selected channel and the multi-path can be displayed for visual confirmation. In addition, time, distance, and chip range can be selected on the horizontal axis.

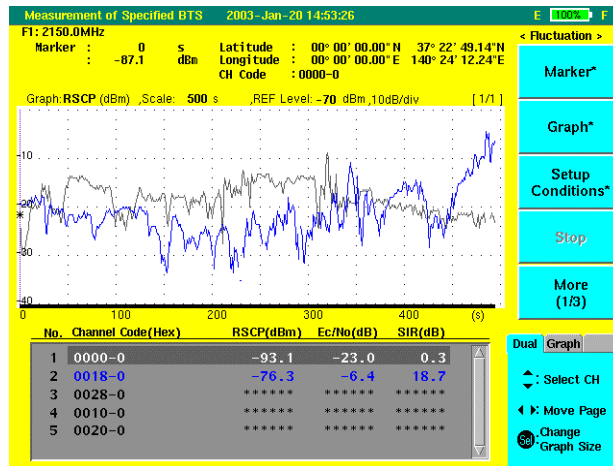
Each Finger Display



ANT2: Option 03/23
diversity

This displays the measurement results for each selected channel path (finger). When the diversity option is installed, the RSCP for up to 12 paths can be evaluated simultaneously.

Time/Distance Variation Display



This Time/Distance display is for RSCP, Ec/No. and SIR for the selected channels (6 max.).

The time variation can be measured in 10-ms intervals from 10 ms to 500 s.

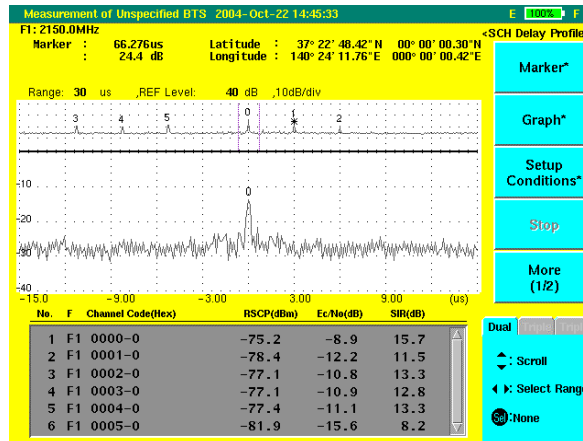
The distance variation can be measured using speed pulses (external trigger) for 1 to 500 pulses.

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SCH Delay Profile Display



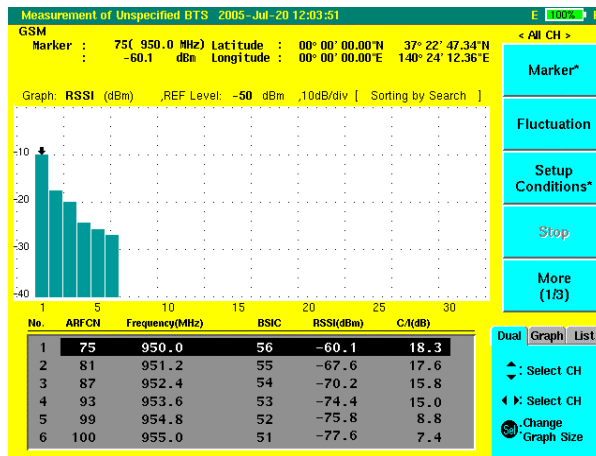
This displays the relative delay between each base station with P-SCH correlation. This screen is used to confirm frame transmission timing gap or overlap between base stations. Group No. is displayed on the graph to identify base stations.

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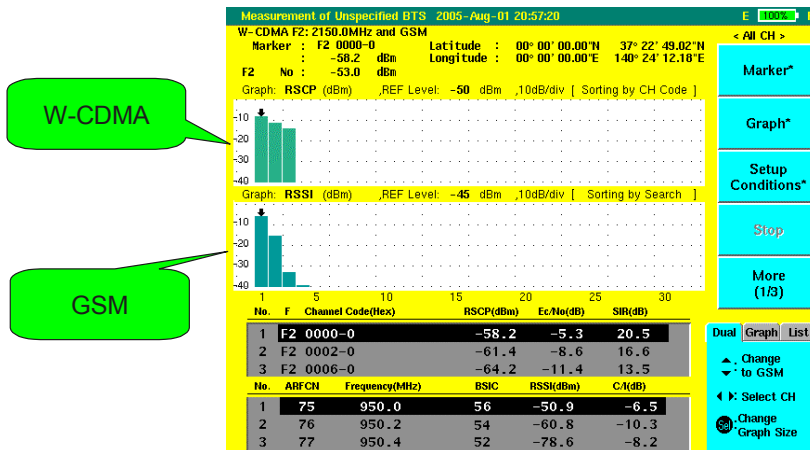
GSM Measurement [All Channel Display]



GSM Base stations can be measured by installing the MX872004C software.

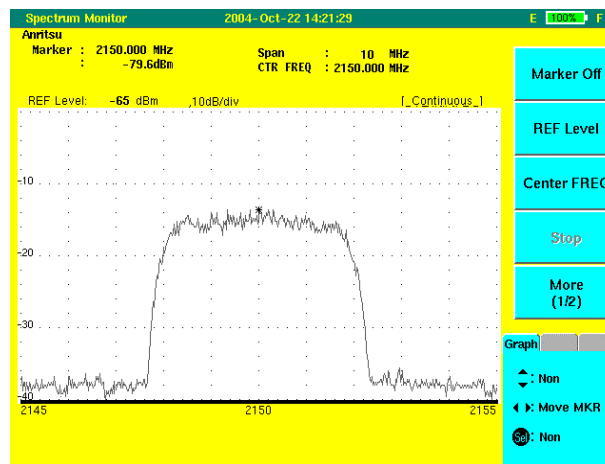
This displays up to 32 channels and data simultaneously.

W-CDMA and GSM Measurement [Dual Display]



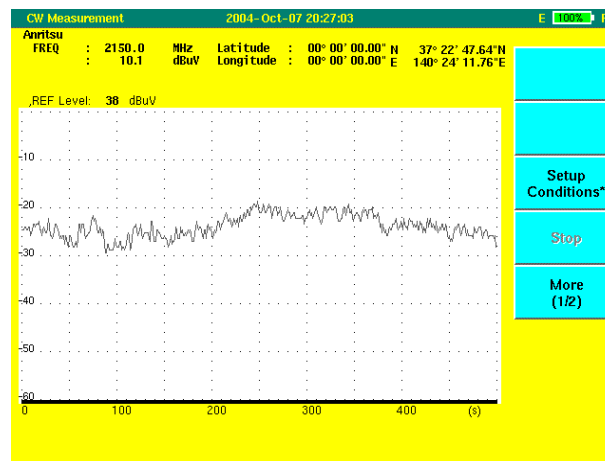
The ML8720C-03/-23 can perform measurement simultaneously. When the MX872004C GSM Measurement Software is installed, both W-CDMA and GSM base stations can be measured simultaneously.

Spectrum Monitor



This screen used to visually confirm the in-band wave. A frequency span of 4 MHz, 10 MHz, 30 MHz or 60 MHz can be selected.

CW Measurement



The minimum sampling time is 10 ms. The median or mean of the measurements can be output with GPS data.

MX872002B BCH Demodulation Software

BCH demodulation is supported by installing the MX872002B BCH Demodulation Software.

BCH: Broadcast Channel

- One downlink transport channel
 - Always transmitted to all cells via P-CCPCH
 - Broadcasts fixed information for system and cells
- *P-CCPCH: Primary Common Control Physical Channel

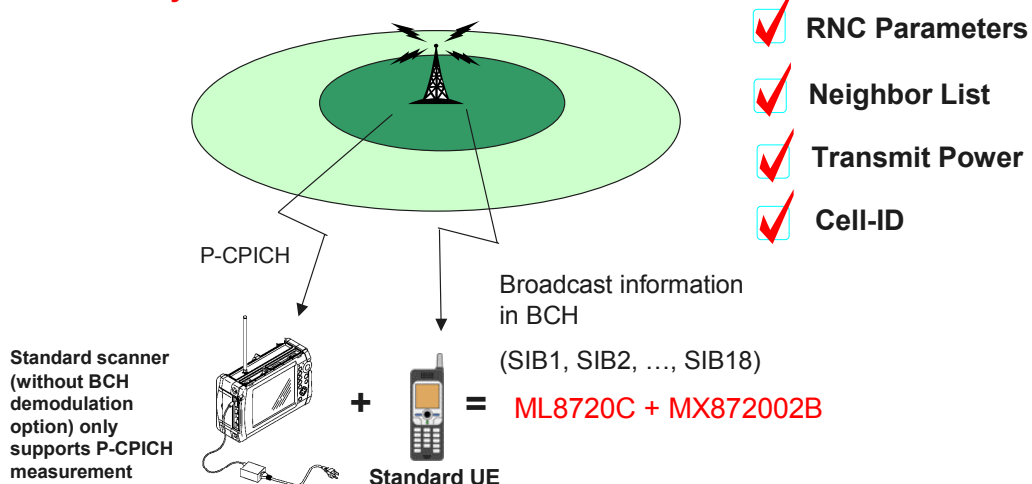
Information sent by BCH

Cell ID, RNC parameters, measured uplink interference power, peripheral cell information, etc.

MX872002B BCH Demodulation Software

Application 1

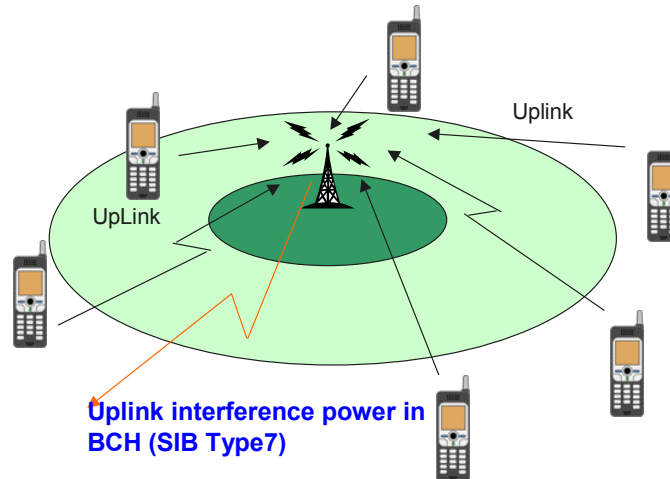
The ML8720C BCH demodulation function processes BCH information collected by a standard UE.



MX872002B BCH Demodulation Software

Application 2

The ML8720C supports advanced analysis for optimization by checking uplink interference power and downlink measurement data.



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MX872002B BCH Demodulation Software

Outline Specifications

Demodulation Data:

MIB, SB1, SB2, and SIB1 to SIB18 **[Standard: TS25.331]**

MIB, SB1, SB2 and SIB7 are always demodulated. Users can specify whether or not to demodulate the rest of SIB.

The SIB7 demodulation cycle can be specified in the range of 2 to 300 s*.

*Note: The actual cycle may vary with the other demodulation conditions and measurement environment.

Performance:

Processing time: 0.5 s (at two **P-CCPCH frames**)

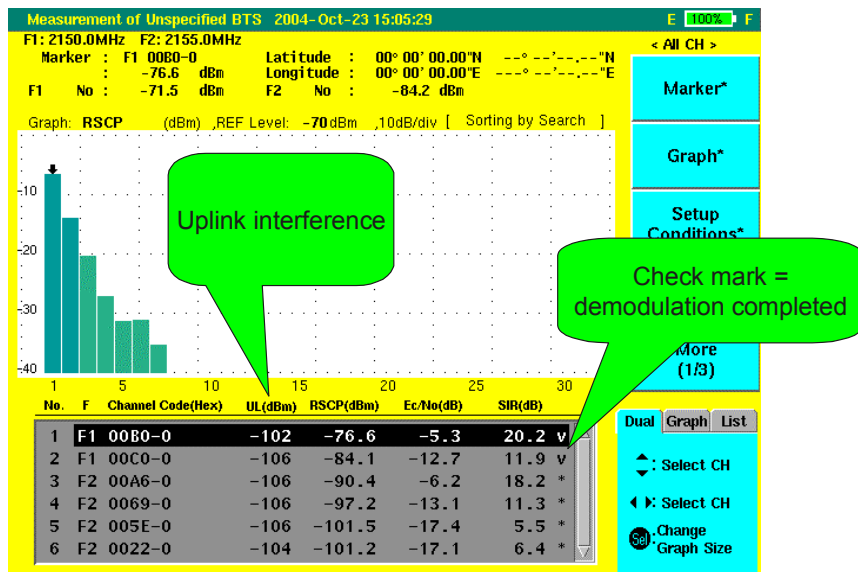
Probability: >50% (70% typ.) at E_c/N_o : -14 dB, 0 to 100 km/h

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MX872002B BCH Demodulation Software

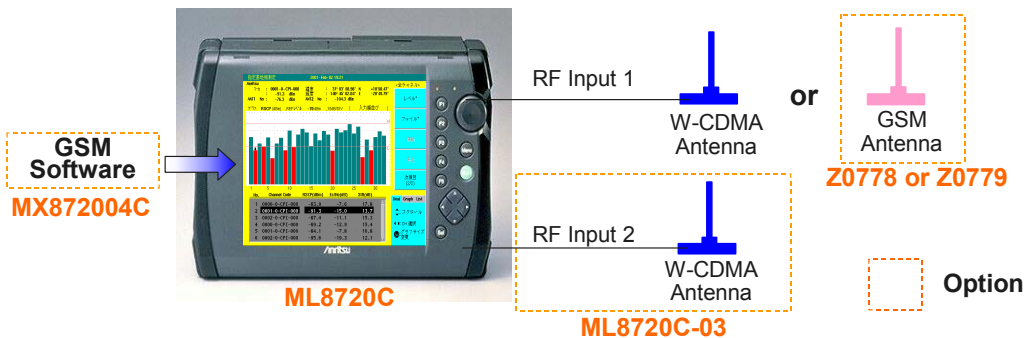


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MX872004C GSM Measurement Software



	W-CDMA (1 carrier)	W-CDMA (2 carrier)	When W-CDMA or GSM selected	At simultaneous W-CDMA, GSM meas.
ML8720C	required	required	required	required
ML8720C-03		required		required
MX872004C			required	required
Z0778 or Z0779			required	required

ML8720C Area Tester
ML8720C-03 Two-carrier Measurement Option
MX872004C GSM Measurement Software
Z0778 900/1800 MHz Whip Antenna (without antenna base)
Z0779 900/1800 MHz Vehicle Antenna (with antenna base)

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MX872022B Data Conversion Software

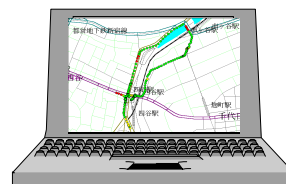
Outline

The MX872022B Data Conversion Software converts the W-CDMA measurement data file output from the ML8720C Area Tester into the MapInfo input format. With MapInfo, measurement data such as RSCP, Ec/No., and SIR can be displayed visually on a map based on latitude and longitude information. There are two conversion methods: [Simple Convert] and [Custom Convert].

MX872022B Data Conversion Software

Operating System

The MX872022B software supports Windows98 Second Edition, Windows 2000, Windows Me and Windows XP. MapInfo Professional 5.5 or later is required to display the data on a map.



MX872022B + MapInfo

ML8720C Area Tester



Soft carrying case (B0442, 0435)



Battery Pack (Z0619)



Battery Charger (Z0697)



Hard carrying case (Z0436)



Case for installation (Z0526)



Antenna mount (Z0703)

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ML8740B Area Scanner

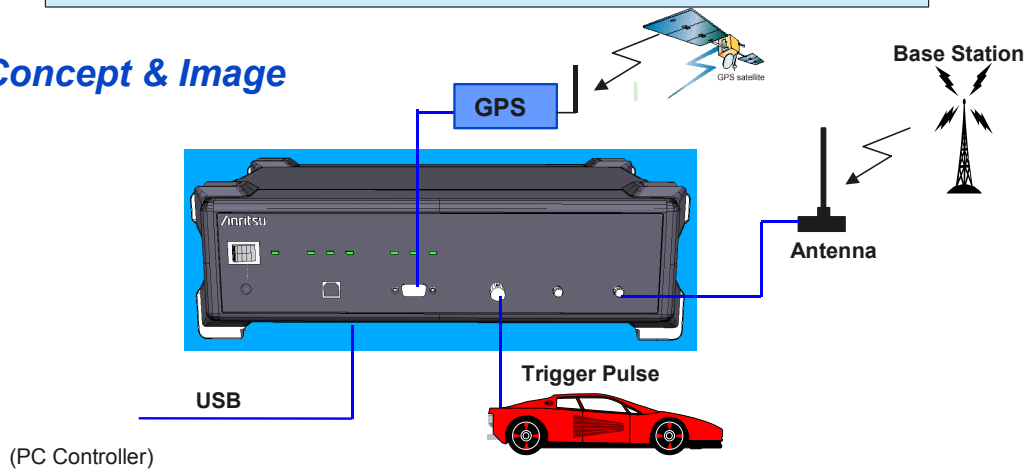
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ML8740B Area Scanner

Concept & Image



Optimized Functions for Drive Test System under PC Control

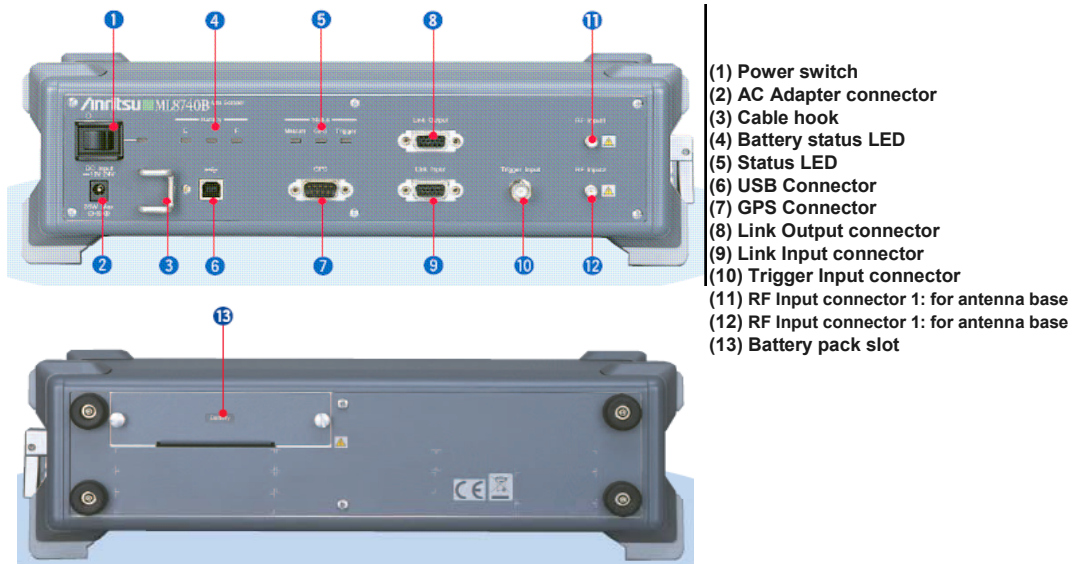
- (1) Excellent basic performance inherited from ML8720C
- (2) Low cost by eliminating display
- (3) Faster remote interface

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ML8740B Area Scanner



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ML8740B Main Specifications

* Blue: Differences between ML8720B and ML8720C

Green: Differences between ML8720B/C and ML8740B

Item	ML8720C	ML8740B
WCDMA BTS Measurement	Frequency range: 2110 to 2170 MHz (Other measuring functions and performance same as ML8720B)	
GSM BTS Measurement	Supported by software Frequency range: 925 ~960 MHz (GSM900/E-GSM), 1805 ~1880 MHz (DCS1800) *921 ~960 MHz (R-GSM) not supported. Test items: RSSI, C/I, BSIC demodulation Dynamic range: -105 to -40 dBm	
Spectrum Monitor, CW Measurement	(Same as ML8720B)	
BCH Demodulation (WCDMA)	Supported by software	
Two-carrier Measurement	Supported by option (simultaneous WCDMA/GSM measurement)	
PC Controller Interface	RS232C (Max. 115.2 kbps)	USB (Ver. 2.0 Full Speed) (Windows 2000/XP driver included)
GPS Interface	RS232C (NMEA-0183, max. 9.6 kbps)	Same as ML8720C (max. 38.4 kbps)
Sync. Interface	Sync. signal input/output (TTL, BNC connector)	Sync. input/output (TTL, Multi-pole connector)
Power	DC: 10 to 26.4 V AC: 100 to 240 V, 50 Va max. (Dedicated AC adapter) Battery: Lithium-ion battery pack	Same as ML8720C (Battery pack sold separately)
Mass and Dimensions	290W x 194H x 78D mm, <4.5 kg (Standard configuration incl. battery)	320W x 88H x 213D mm, <4 kg (Standard configuration excl. battery)

Other differences between ML8720C and ML8740B (eliminated functions):

LCD, peripheral interface (memory card, FDD, printer, external monitor, keyboard),
External I/O signals (mean frequency output, external reference input)

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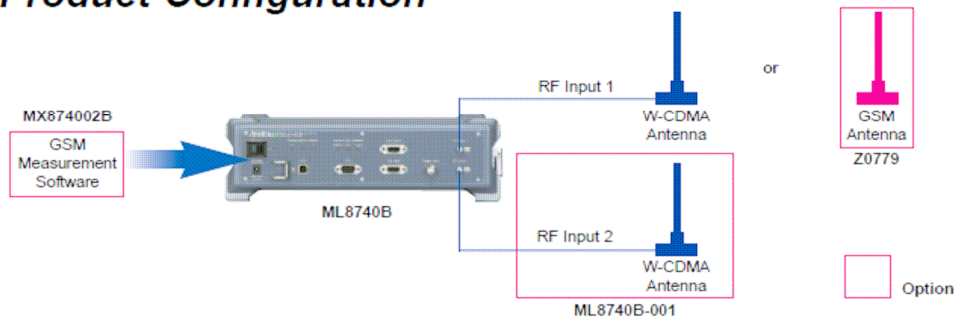
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ML8740B Area Scanner

Product Configuration



Required option list

	ML8740B	ML8740B-001	MX874002B	Z0779
W-CDMA (1 carrier)	Required			
W-CDMA (2 carrier)	Required	Required		
W-CDMA or GSM selectable	Required		Required	Required
W-CDMA and GSM simultaneously	Required	Required	Required	Required

ML8740B Area Scanner
ML8740B-001 Two-carrier Measurement Software
MX874002B GSM Measurement Software
Z0779 900/1800 MHz Vehicle Antenna

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ML8740B Area Scanner

Options

ML8740B-11 Two Carrier Measurement Software

• Two Carrier Measurement Function

This option permits simultaneous measurement of two carrier frequencies for both specified and unspecified base stations. When the MX874002B GSM Measurement Software option is installed, it is possible to perform simultaneous measurement of both W-CDMA and GSM base stations.

• Diversity Function

At specified base station measurement, this function offers CPICH measurement of base stations supporting W-CDMA transmit diversity.

(The ML8740B-001 option and the ML8740B main frame Should be ordered together)

Application Software

MX874001B BCH Demodulation Software

This software adds a BCH demodulation function for W-CDMA base stations to the ML8740B.

Information that can be demodulated:

MIB, SB1, SB2, SIB1, SIB2, SIB3, SIB4, SIB5, SIB6, SIB7, SIB8, SIB9, SIB10, SIB11, SIB12, SIB13, SIB13-1, SIB13-2, SIB13-3, SIB13-4, SIB14, SIB15, SIB15-1, SIB15-2, SIB15-3, SIB15-4, SIB15-5, SIB16, SIB17, and SIB18.

During measurement, the above system information is output as a binary file.

MX874002B GSM Measurement Software

This option adds GSM measurement functions to the ML8740B. It provides RSSI and C/I measurements as well as BSIC decoding in the GSP900 (E-GSM) and DCS1800 bands.

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