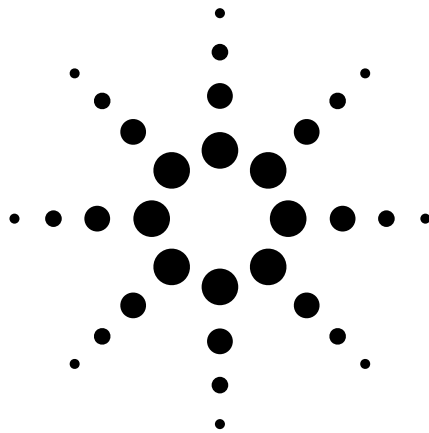
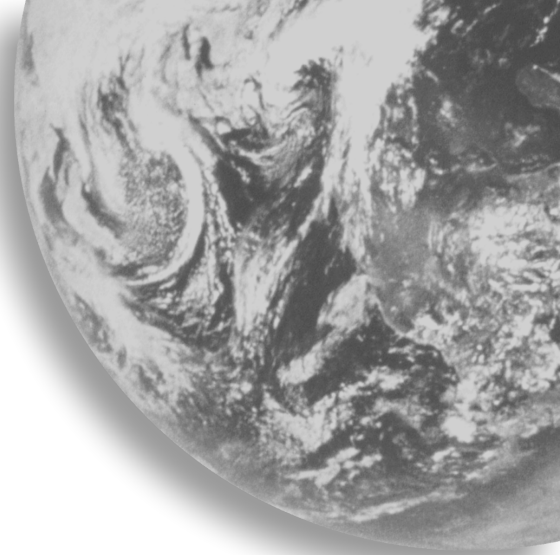


**Agilent Technologies**  
**E7476A W-CDMA (UMTS)**  
**Wireless Solutions**



**System Information**  
**Guide**



**Agilent Technologies**

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# System Information Guide

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**Agilent Technologies  
E7476A W-CDMA (UMTS)  
Wireless Solutions**

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Agilent Technologies  
1400 Fountaingrove Parkway  
Santa Rosa, CA 95403-1799

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## Welcome to Your System Information Guide

Thank you for choosing Agilent Technologies. In this Guide, you'll find the necessary information needed to support your drive test system.

For Information on...	See This
Overview of the Agilent Wireless Solutions System	<a href="#">"Introduction" on page 7</a>
Software Specifications	<a href="#">"General System Software Functionality" on page 12</a>
Hardware Specifications	<a href="#">"General Hardware Specifications" on page 31</a>
E7476A System Options	<a href="#">"Agilent E7476A System Options" on page 35</a>
System Accessories	<a href="#">"Agilent 86154A, 86153A, and N3419A System Accessories" on page 39</a>
System Part Number Summary	<a href="#">"Part Number Summary" on page 49</a>

### If You Need Help...

To Do This...	See This
View and Print this Guide	Additional Documentation, Chapter 3, <i>Getting Started Guide</i>
Contact Agilent Technologies and the Product Web site	<a href="http://www.agilent.com/find/networks">http://www.agilent.com/find/networks</a>

# Introduction

The E74xx drive test system is a scalable integrated air interface measurement system, used to obtain comprehensive RF measurement and call performance data versus location. Depending on the hardware options you have purchased, you will be able to make measurements on the following technology types:

- CDMA Cellular and PCS band
- TDMA Cellular and PCS band
- GSM900, DCS1800, GSM1900, or GSM900/DCS1800 Dual-band
- W-CDMA (UMTS) (currently not supporting phone measurements), or cdma2000

Receiver-based, phone-based, or combined measurement capabilities are selected via stackable software licenses that reside on a supplied software protection key. Measurement receivers, which can be supplied with or without an internal GPS receiver, are supplied with magnetic mounting antennas, car mounting brackets, and RS-232 connection cables to link to a laptop PC (available as an accessory). Phone software licenses are supplied with dual-port ruggedized PCMCIA serial I/O cards.

The E74xx drive test system is a scalable measurement system for wireless optimization. It has four basic configurations:

- Phone-based measurement system using a single or multiple test mobile phones
- Receiver-based measurement system using a single or multiple digital measurement receivers
- Combined phone and receiver measurement system using a single or multiple receivers and phones
- Basestation Over Air Testing (Model E7490A, CDMA only)

## Introduction

All of the above configurations can be used for indoor measurement. Measurements are matched to an imported floor plan or map in the absence of GPS.

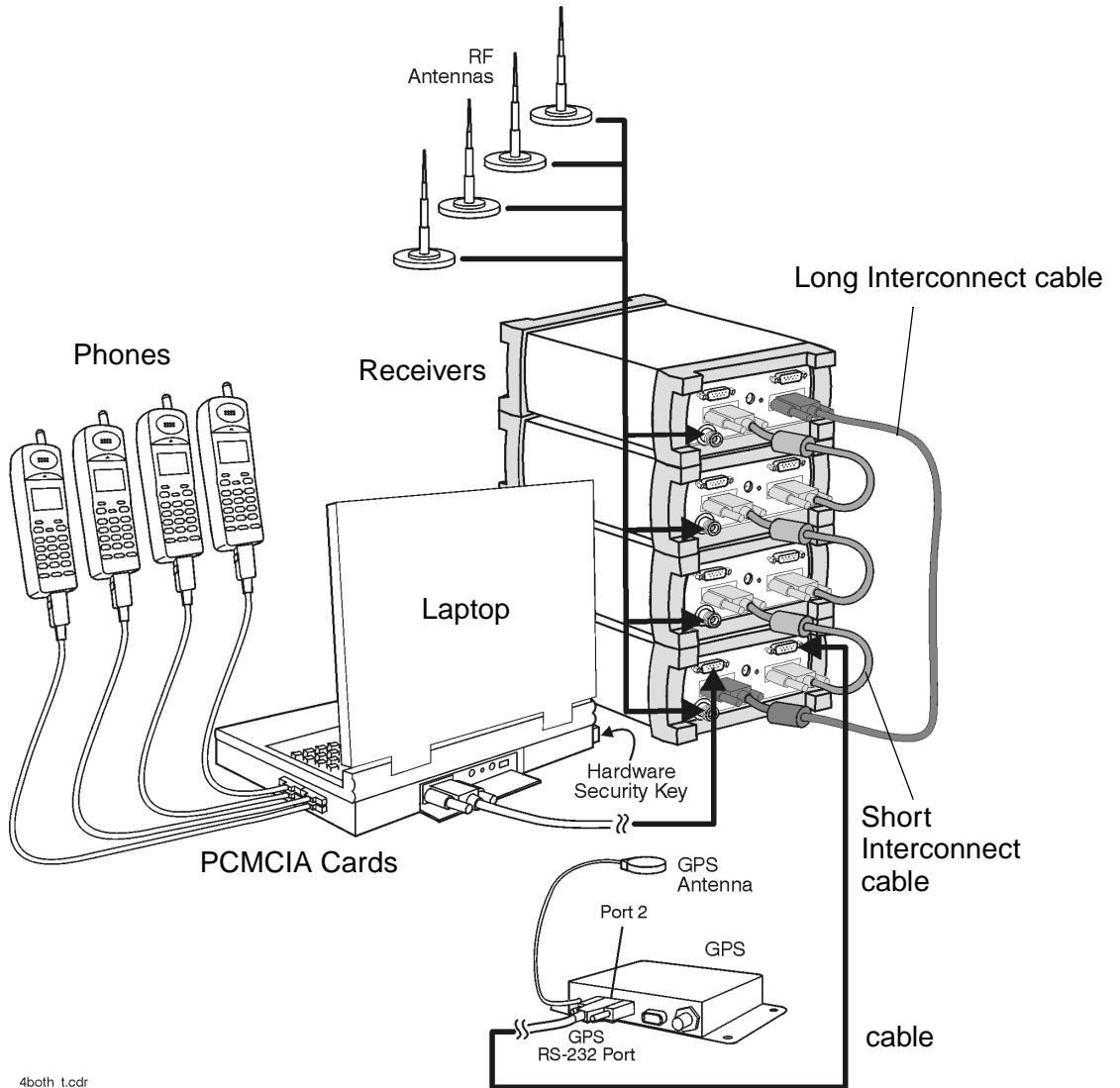
The system requires a PC with Windows 95/98 or NT 4.0 (or later) running the receiver and/or phone-based measurement software. A navigation system, such as a GPS receiver and GPS antenna, is required to obtain longitude and latitude information for logging the position at which the measurements are taken by the receiver or the phone. This type of measurement can also be accomplished by use of the indoor option in lieu of the GPS option. The GPS receiver may be integrated into the digital receiver or it may be an external device. A suitable laptop PC and external GPS receiver can be supplied as drive test accessory products. The complete system is transportable in a lightweight briefcase that can be supplied as an accessory product.

[Figure 1 on page 9](#) illustrates a four phone and four receiver system.



# Introduction

**Figure 1 Four phone and four receiver system**



4both\_t.cdr

---

## Specifications and Hardware Information

This section lists specifications and characteristics of the systems.

Specifications	Describes warranted performance over the temperature range 0°C to +55°C (unless otherwise noted) after the temperature of the Receiver has been stabilized by 30 minutes of continuous operation.
Typical	Provides useful information by giving non-warranted performance parameters. Typical refers to test data at the fiftieth percentile for a 25°C room temperature.
Characteristics	Provides useful information by giving non-warranted performance parameters. Characteristics describe product information for parameters that are either not subject to variation, non-measurable, verifiable through functional pass/fail tests, or as a matter of routine, not measured. <i>Characteristics are printed in italics.</i>

### Calibration Cycle

Agilent Technologies warrants instrument specifications over the recommended calibration interval. To maintain specifications, periodic recalibrations are necessary. We recommend that the Receiver be calibrated at an Agilent Technologies service facility every 12 months.

## General System Software Functionality

Some of the functionality of the system is common across all wireless solutions. The following sections describe these cross-solution features.

- [“Data Export” on page 12](#)
- [“Alarms and Alerts” on page 16](#)
- [“Link Editor” on page 19](#)
- [“Real-time Mapping \(Option 160\)” on page 19](#)
- [“Report Generation” on page 20](#)
- [“Virtual Front Panel Printing” on page 21](#)
- [“Indoor Measurements \(Option 180\)” on page 21](#)

### Data Export

All measurement data can be exported from the Agilent Wireless Solutions database for display and post-processing. Any measurement data can be exported. The export function provides flexible filtering capability enabling you to define the specific data to be exported. Multiple data types can be exported to a single output file.

You can save export plans, and once saved, those plans can be quickly accessed for easy data export. An export plan is made up of:

Export Plan Element	Description
Data type	Defines which data will be exported. Column order is user-definable.
Alarm	Defines which alarms will be exported.
Note	Exports any user note or auto-note entered while recording data

## General System Software Functionality

Export Plan Element	Description
Processing functions	Defines the functions that will be applied to the data during export.
Exclusion rules	Defines a set of conditions that, if true, the associated data will be excluded from the export.
Geographic binning	Defines data-reduction process in which the data is averaged based on geographic area or distance

Several different operations can be executed in order to extract the desired data in the desired format.

### Processing functions

- None
- Choose
- Count - counts number of values above or below a specified threshold
- Field
- Match
- Maximum
- Minimum
- Sort - ascend or descend
- Value(x)

### Conditionals

- Greater than (>) a threshold
- Less than (<) a threshold
- All values

### Geographic binning methods

- **Bin size**  
User defines the size in meters of bin to be used.
- **Percentage of low and high values to discard**  
User defines the percentage of values to ignore from new raw data before calculating the bin.

## General System Software Functionality

- **Bin by location (grid binning)**

Define the reference bin and point of bin to be used, choices are:

- Center of bin
- Corner of bin

Each bin then has the following secondary choices:

- Southwest extent of drive data
  - ▲ Southeast extent of drive data
  - ▲ Northwest extent of drive data
  - ▲ Northeast extent of drive data
  - ▲ User-defined reference coordinates

- **Bin by distance travelled (linear binning)**

Data is averaged based on the distance traveled.

## Data Output Formats

The output formats supported by the Agilent Wireless Solutions are listed below. The system is designed to work with MapInfo®<sup>1</sup> in an integrated manner via an OLE (object link embedded) link to the MapInfo application (MapInfo via COM). With “Run MapBasic” checked, this exports the data, launches MapInfo, creates the necessary MapInfo table, and creates a thematic map display in MapInfo. This functionality requires MapInfo be present.

- Arcview®<sup>2</sup> compatible file
- MapInfo via COM (optional - run MapBasic program after export)
- MapInfo compatible file
- Planet ®<sup>3</sup> compatible file
- Text file

1. MapInfo® is a registered trademark of MapInfo Corp.
2. ArcView ® is a registered trademark of Environmental Systems Research Institute, Inc.
3. Planet ® is a registered trademark of Metapath.

## General System Software Functionality

### Export Column Data Delimiters

- Tab
- Comma
- Space

### Optional Data Parameters

- Position
- Altitude
- Time
- Date

### Optional Settings

- Fill column data
- Column headings
- Sequence Number

### Position Formats

- Decimal degrees with direction
- Deg: Min: Sec with direction
- Signed decimal degrees
- Signed Deg: Min: Sec
- UTM (Universal Transverse Mercator)

### Coordinate Datums

It is possible to change the coordinate datum being applied by the application. It can be changed during the plan configuration.

The following datums are available:

- AGD66
- AGD84
- European
- Hu-Tzu-Shan
- NAD27 (default) (North American)

## General System Software Functionality

- NAD83 (North American)
- OS36 (GB)
- SAD69 (Brazil)
- SAD69 (Mean)
- Tokyo (J6)
- Tokyo-Korea
- WGS72 (World Geodetic System)
- WGS84 (World Geodetic System)

## Alarms and Alerts

The Wireless Solutions Software has sophisticated alarm and alert capabilities. An alarm is a boolean expression made up of one or more conditions on single or multiple measurements, including comparisons of measurement results. An alert is a simplified alarm, defined as a single condition on a single measurement. An action, or actions, can be executed when an alarm or alert occurs. The re-trigger feature re-executes an alarm's actions if all the conditions have continuously been satisfied for a specified amount of time (alarm actions are normally executed only when the conditions transition from unsatisfied to satisfied). If an alert or alarm condition occurs, while data is being logged, each data record includes the alert/alarm information.

### Alarm Wizard

The alarm wizard can be used to simplify setting up some of the more common alarms.

#### Features of the Alarm Wizard Set up

- Specify type of alarm required
- Receive notification of new or changed measurements
- Receive notification of resources required
- Customize settings, actions and other user-definable aspects
- Set default Male and Female voice alarm messages

## General System Software Functionality

### Actions (Alarms and Alerts)

- Play a .WAV audio file
- Display a text message
- Pause recording, Continue (resume) recording, or Stop recording measurements

### Alert Conditions

- Greater than ( $>$ )
- Greater than or equal to ( $\geq$ )
- Less than ( $<$ )
- Less than or equal to ( $\leq$ )
- Equal to ( $=$ )
- Not equal to ( $\neq$ )

### Alert Operators

- Value
- Delta
- Maximum
- Minimum

### Alarm Conditions

- Greater than ( $>$ )
- Greater than or equal to ( $\geq$ )
- Less than ( $<$ )
- Less than or equal to ( $\leq$ )
- Equal to ( $=$ )
- Not equal to ( $\neq$ )
- Is a subset
- Is not a subset
- Sets intersect
- Sets do not intersect
- Range (inclusive)
- Range (exclusive)



## General System Software Functionality

### Alarm Preprocess Operators

- Value
- Maximum
- Minimum
- Subset
- Average
- Count
- Delta
- dField (a change in field value)
- Field
- MaxField
- MinField
- Median

### Alarm Condition Operators

- OR
- AND
- XOR (exclusive OR)

Any measurement can be an operand in an alert or alarm. Below are some examples of alerts and alarms.

- **Alerts**
  1. Minimum (CW Power Trace) > -90 dBm
  2. Maximum(Spectrum) < -100 dBm
- **Alarms**
  3. (Heading < 300) and (GPS FIX Type = GPS 3D)
  4. Subset (CW Power Trace) NOT Subset (value Channel Power List)

System status parameters can also be used as operands in alerts and alarms. For example, an alert can be set to trigger when the available disk space on the PC drops below 10 MB or when the GPS position fix is lost.

## Link Editor

The Link Editor is available from the Tools menu and enables you to link controls in one virtual front panel (the source) with parameters in another virtual front panel (the destination). Links can be configured from either Configuration mode or Collection mode. You can:

- Link simple measurement results to parameters for other measurements.
- Link measurement parameters to parameters for other measurements.
- Invoke an action (such as a button click) on all virtual front panels of the same type.
- Invoke an action (such as a button click) on a select set of virtual front panels of the same type.

## Real-time Mapping (Option 160)

Using the Positioning virtual front panel, you can display vector and raster-based maps against a real-time, plotted measurement result. The following features are available:

- Load and control map layers (TAB format).
- Add raster maps (GIF, TIF, and PNG format).
- Zoom in and Zoom out of map detail.
- Pan automatically and manually.
- Scale automatically and manually.
- Add labels and identify points.
- Display alarms or notes on map. Click on alarm or note symbol to display the message associated with the alarm or note.
- Link a measurement result, via the link editor for display on the map as a thematic value.

## General System Software Functionality

- Map result values, in color, via the legend button. Pre-defined legends exist for most common measurement results.
- Specify base stations in StationInfo.txt to have them display on the map.
- Link the active server for a phone to the map and the program will draw a vector line from the current position to the appropriate base station.

## Report Generation

The report generator is accessed using the **Tools > New Report (Ctrl+R)** menu option, or by clicking the report generator button in Collection mode. The reports generated are in HTML format with referenced images, which are captured in PNG format. The reports and images are stored in the report folder (if default installation was used:

C:\Program Files\Agilent Technologies\E74xx\Reports\reportname\). The following details can be entered by the user:

- Title (also used for the report folder name)
- User name
- Company name
- Time report generated. By default, this is the PC system time.
- Date. By default, this is the PC system date.
- Location. By default, these are the GPS coordinates identified at the time the report was generated.
- Comments. This is optional text, entered by the user.
- A report can include all opened Virtual Front Panels, or just those minimized.
- A report may also contain textual and/or table information for specific measurements.

## General System Software Functionality

Once the report has been generated, it is displayed on the screen, using your default browser. Reports can be viewed by selecting the Reports tab while in Configuration mode. Reports can be imported and exported.

## Virtual Front Panel Printing

It is possible to print virtual front panels. This feature is accessed from the File menu. There are two print commands:

- Print (Ctrl+P) prints the application main window and all other virtual front panels.
- Print VFP prints just the active virtual front panel.

The active virtual front panel is the window with the blue title bar (if default windows colors are used).

## Indoor Measurements (Option 180)

The Agilent Wireless Solutions Software can be used for testing and measuring indoor coverage areas. These measurements are taken without reference to GPS or dead-reckoning position information.

An indoor system supports the following hardware:

- Phones
- Receivers (no PN correlation for CDMA)
- Pen tablet computer
- Computer pen input devices
- Full set of backpack accessories
- Portable power supply for computer and receiver

The measurement control virtual front panel has the following features

- Selection of data points, such as user features like CW sources

## General System Software Functionality

- Waypoint information to specify distribution of data between two waypoints.
- Automatic interpolation of data between waypoints, during recording
- Imported maps converted to layer map files. Supports GIF, TIF, and PNG formats
- Zoom in and zoom out of map area.
- Automatic and manual pan.
- Automatic and manual scaling.
- Display alarms and notes on map. Click on alarm or note symbol to display the message associated with the alarm or note.
- Link measurements to display thematic values.
- Map result values in color via the legend button. Pre-defined legends exist for most common measurement results.

---

# Agilent E7476A Software Specifications

## Software Measurement Specifications

The Agilent E7476A measurement software has the following measurement capabilities and functionality:

- [“W-CDMA \(UMTS\) Scrambling Code Analyzer” on page 23](#)
- [“CW Power Measurements” on page 26](#)
- [“Channel Power Measurements” on page 27](#)
- [“Spectrum Measurements” on page 29](#)

## W-CDMA (UMTS) Scrambling Code Analyzer

These measurements are part of Agilent E7476A Option 110.

The Agilent E7476A system measures 3GPP W-CDMA (UMTS) scrambling codes by measuring the SCH (synchronization) Channel and the CPICH (common pilot channel). These measurements are independent of network parameter settings. The system executes three different types of W-CDMA (UMTS) scrambling code measurements, listed below.

### Measurement Types

- **Primary synch channel scan**  
The results are displayed as a trace that shows the power for each synchronization code detected in one timeslot of 2560 chips. Exported data has  $E_c$ ,  $E_c/I_o$ ,  $E_b$ , and  $E_b/I_o$  available.
- **Top N**  
The system measures all of the primary sync channels in a timeslot of 2560 chips, and returns the ‘N’ strongest scrambling codes, where ‘N’ is a user-definable integer from 1 to 20. The

## Agilent E7476A Software Specifications

results are displayed in a bar graph format. The secondary sync channel and CPICH are also measured as part of the Top N measurement and can be displayed on top of each bar in the bar graph.

- **User list**

The user manually inputs a list of up to 40 scrambling codes to be measured. The measurements are displayed in a bar graph format. The user list can be imported from a text file. This allows regularly used sets of codes to be stored for quick loading into the application.

### Measurement Controls

- Frequency Units
  - Frequency
  - Channel (consistent with IS-2000 channelization definitions)
- Measurement types
  - Primary synch channels - Primary SCH Scan
  - Top N scrambling codes
    - ▲ SC decoding
  - User list of scrambling codes
- Carrier tracking (Note: This is set up in the measurement editor)

### Markers (Trace Displays only)

- Multiple markers
- Delta markers
- To Max function
- Point and click

### Display Controls

- Power display (Y-axis parameter)
  - Eb/Io
  - Eb
  - Ec/Io

- Ec
- Show value (bar graphs only)
  - None
  - Primary SCH code power (Eb, Ec, Eb/Io, or Ec/Io)
  - Secondary SCH codes\*
  - Secondary SCH code power (Eb, Ec, Eb/Io, or Ec/Io)\*
  - Scrambling code peak power (Eb, Ec, Eb/Io, or Ec/Io)
  - Scrambling code aggregate power (Eb, Ec, Eb/Io, or Ec/Io)
  - Scrambling code delay spread
  - Relative time between scrambling codes
  - Scrambling code aggregate minus peak power
  - Scrambling code peak power minus primary SCH code power
  - Secondary SCH code power minus primary SCH code power\*

\* Top N measurement only

### Measurement Results

- Cell name (User list and Top N)
- Primary SCH code power as trace (Eb, Ec, Eb/Io, or Ec/Io)
- Secondary SCH codes
- Secondary SCH code power (Eb, Ec, Eb/Io, or Ec/Io)
- Scrambling code peak power (Eb, Ec, Eb/Io, or Ec/Io)
- Scrambling code aggregate power (Eb, Ec, Eb/Io, or Ec/Io)
- Scrambling code delay spread
- Relative time between scrambling codes
- Scrambling code aggregate minus peak power
- Scrambling code peak power minus secondary SCH code power
- Secondary SCH code power minus primary SCH code power
- Io (primary SCH, scrambling code list, SC Top N)
- Carrier frequency error
- Time stamp

**Scrambling Code Peak Power (both Ec and Ec/Io)** is computed by selecting the strongest peak of the correlation for each primary synch channel. **Io** is the total received power integrated across the entire 3.84 MHz signal bandwidth.



## Agilent E7476A Software Specifications

**Scrambling Code Aggregate Power (both  $E_c$  and  $E_c/I_o$ )** is computed for a given primary synch channel by integrating the power received over the time dispersion of that primary synch channel. **Delay spread** is the duration of time over which this power is dispersed. Both aggregate power and delay spread are determined with respect to an  $E_c/I_o$  threshold of -11 dB. The system also reports the difference between the aggregate and peak primary synch channel power (**Aggregate-Peak**). This difference along with the delay spread provides a characterization of the multipath effect on that scrambling code channel.

**Relative Time** is defined as the difference in time between when a scrambling code signal is received relative to the start of the 2560 chip timeslot as arbitrarily defined in the receiver. For example, the receiver will arbitrarily record a 2560 chip sequence where the beginning of this sequence is defined as zero time. Each scrambling code will have some delay from this start and thus will have a relative time to the start of the time defined in the receiver.

**Carrier Frequency Error** is defined as the difference between the measured carrier frequency and the user specified carrier frequency. The measured carrier frequency is of the dominant primary synch channel signal. Carrier frequency error can be due to both base station carrier error and doppler shift (if moving).

## CW Power Measurements

These measurements are part of Agilent E7476A Option 110.

The Agilent E7476A can measure the peak power (CW Power) at user-defined frequencies within a user-defined resolution bandwidth. The user can define the frequencies to be measured in two different ways.

### Frequency Entry Methods

- **List:** Enter an arbitrary list of frequencies. The user list frequencies can be imported from a text file. This allows regularly used sets of frequencies or channels to be stored for quick loading into the application.

- **Trace:** Enter a start frequency, step size, and count. The system measures at the start frequency, at the (start + step) frequency, (start + (count - 1)\*step) frequency. For example, if the start frequency is set to 1900 MHz, the step size is set to 1 MHz, and the count is set to 4; then measurements are made at 1900 MHz, 1901 MHz, 1902 MHz, and 1903 MHz. Frequencies can be specified in terms of frequency units or channel number.

### Measurement Controls

- Frequency
  - Arbitrary list (list)
  - Start/step/count (trace)
- IF Bandwidth
  - 1.25 MHz
  - 5 MHz
- Resolution Bandwidth (CW power)
  - 8.36 kHz to 1 MHz in 1.25 MHz mode
  - 25.08 kHz to 2.85 MHz in 5 MHz mode
- Measurement Interval
  - Time
  - Distance
    - ▲ GPS
    - ▲ External Pulse Triggering

**External Pulse Triggering** is used for precise distance measurements by using pulses sent from the vehicle speed sensor to detect how far the vehicle has traveled. A maximum pulse rate of 3,333 pulses/second with a minimum pulse width of 100 ns can be measured. At 1 pulse per centimeter, this would correspond to a speed of approximately 120 km/hour. The maximum TTL voltage is 15 volts and triggering is on the negative edge of the pulse.

## Channel Power Measurements

These measurements are part of Agilent E7476A Option 110.

## Agilent E7476A Software Specifications

The Agilent E7476A system can measure the total power (Channel Power) within a user-defined bandwidth at a user-defined set of frequencies. This differs from the CW power measurement in that the total power is integrated across the specified channel width. The user can define frequencies to be measured in two different ways.

### Frequency Entry Methods

- **List:** Enter an arbitrary list of frequencies. The user list frequencies can be imported from a text file. This allows regularly used sets of frequencies or channels to be stored for quick loading into the application.
- **Trace:** Enter a start frequency, step size, and count. The system measures at the start frequency, at the (start + step) frequency,..., (start + (count - 1)\*step) frequency. For example, if the start frequency is set to 1900 MHz, the step size is set to 1 MHz, and the count is set to 4; the measurements are made at 1900 MHz, 1901 MHz, 1902 MHz and 1903 MHz.

Frequencies can be specified in terms of frequency units or channel number.

### Measurement Controls

- Frequency
  - Arbitrary list (list)
  - Start/step/count (trace)
- IF Bandwidth
  - 1.25 MHz
  - 5 MHz
- Resolution bandwidth (CW power only)
  - 8.36 kHz to 1 MHz in 1.25MHz mode
  - 25.08 kHz to 2.85 MHz in 5 MHz mode
- Channel width (channel power only)
  - Agilent E7476A Option 360/361
    - ▲ 8.36 kHz to 60 MHz in 1.25 MHz mode
    - ▲ 100 kHz to 60 MHz in 5 MHz mode

## Spectrum Measurements

These measurements are part of Agilent E7476A Option 110.

The Spectrum virtual front panel can be used to quickly diagnose RF problems. The system operates in both the downlink and uplink bands. The spectrum display provides the controls listed below. Frequencies can be specified in terms of frequency units or channel number.

### Measurement Controls

- Frequency, tunable range<sup>1</sup>
  - Agilent E7476A Option 360/361
    - ▲ 1920 - 1980 MHz [1895 - 1990 MHz]
    - ▲ 2110 - 2170 MHz [2100 - 2180 MHz]
- Frequency, maximum span
  - 60 MHz [80 MHz]
- IF Bandwidth
  - 1.25 MHz
  - 5 MHz

1. Spectrum measurement allows tuning  $\pm 10$  MHz above and below specified frequency ranges. In addition the Japan PHS band is also covered (down to 1895MHz). The extended ranges are shown in brackets [] The performance is not specified in these extended ranges. Characteristic noise floor increase is 2 dB  $\pm 10$  MHz. At  $-25$ MHz with respect to specified range, the characteristic noise floor increase is 5dB. Characteristic amplitude accuracy is unchanged with respect to specified range.

## Agilent E7476A Software Specifications

- Resolution bandwidth
  - 8.36 kHz to 1 MHz in 1.25MHz mode
  - 25.08 kHz to 2.85 MHz in 5 MHz mode

## Markers

- Multiple markers
- Delta markers
- To Max function
- Point and click
- Marker to center

## General Hardware Specifications

### Personal Computer Recommendations, Minimum

The PC requirements differ depending on the operating system, and on whether you wish to collect data from a single phone or multiple phones.

#### Single phone

- Windows 95/98
  - Minimum: 233 MHz Pentium, 64 Mbytes RAM
  - Recommended: 266 MHz Pentium II or III, 64 Mbytes RAM
- Windows NT/2000
  - Minimum: 233 MHz Pentium, 64 Mbytes RAM
  - Recommended: 266 MHz Pentium II or III, 128 Mbytes RAM

#### Multiple phone

- Windows 95/98
  - Minimum: 266 MHz Pentium, 64 Mbytes RAM
  - Recommended: 366 MHz Pentium II or III, 64 Mbytes RAM
- Windows NT/2000
  - Minimum: 266 MHz Pentium, 64 Mbytes RAM
  - Recommended: 366 MHz Pentium II or III, 128 Mbytes RAM

#### Common Requirements

- RS-232 DB9 Serial Port
- Parallel port: 25-pin bidirectional
- 90 Mbytes disk space for software installation
- 200 Mbytes disk space for data (recommended)
- CD-ROM drive recommended
- 800 x 600 display resolution minimum

## General Hardware Specifications

- For multiple phone capability
  - Two PCMCIA slots
  - USB port with USB/serial hub (recommended)

## External GPS Receiver Requirements<sup>1</sup>

- TSIP, TAIP, or NMEA communication protocol
- RS-232 (DB9) interface

## GPS and Vehicle Fitted Navigation Systems Supported

- Bosch Travel Pilot RGS08 Professional
- Magneti Marelli RP Nav200
- GARMIN GPSII/III/IIIplus
- Trimble DR
- Trimble 455/DR and 450
- Trimble SVeeSix
- Trimble 400

## Differential GPS Receiver Requirements

- DCI RDS-3000

## Antennas

- Receiver RF input specifications:
  - Input impedance: 50Ω
  - Connector type: Type-N

1. For Agilent E7473A CDMA options 110, 111, or 120 and Agilent E7490A option 111, or Agilent E7476A option 110, any external GPS will have to output a GPS 1 pulse/second signal for improved frequency accuracy.

## Agilent E7476A Hardware Specifications

For full details on receiver types and options, refer to the appropriate system options section in this guide.

### Agilent E7476A Option 360, 361 Receiver

Model		E6455A Receiver, Options 360, 361
Frequency	Frequency range	1920 to 1980 MHz [1895-1990] 2110 to 2170 MHz [2100-2180]
	Frequency accuracy <i>With GPS time synchronization</i>	$\pm 1$ ppm <i><math>\pm 0.05</math> ppm, characteristic</i>
	IF bandwidth	1.25 MHz, characteristic 5 MHz, characteristic
	Aging of TCXO	$\pm 1$ ppm/year
	Amplitude	Accuracy 1.25 MHz IF
	Accuracy, 5 MHz IF	$\pm 0.5$ dB from $-25$ dBm to $-100$ dBm ( $20^\circ$ to $30^\circ\text{C}$ ) typical
	Noise figure	8.0 dB typical
	Maximum safe input level	+10 dBm, 20V DC, characteristic
	1 dB compression point <sup>a</sup>	-15 dBm, characteristic
	Adjacent channel desensitization <sup>b</sup>	-20 dBm typical
	Adjacent channel rejection <sup>c</sup>	25 dB typical
	Internally generated spurious, input referred	-120 dBm for 1.25 MHz -115 dBm for 5 MHz
Input/Output	RF input	50 $\Omega$ Type-N



## Agilent E7476A Hardware Specifications

Model		E6455A Receiver, Options 360, 361
Connectors	Computer	RS-232 (DB9) Male
	GPS	RS-232 (DB9) Male
	Power	DC power jack 100 mils, positive center
Miscellaneous	Operating temperature range	0°C to 55°C
	Maximum relative humidity	80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C
	Storage temperature range	-40°C to +70°C
	Dimensions	6 in x 3-5/8 in x 8 in 15.24 cm x 9.21 cm x 20.32 cm
	Weight	4.6 lbs (2.1 kg)
	Power (option 360)	9 to 34 V DC, 9W
	Power (option 361, internal GPS)	9 to 34 V DC, 10W
	Transformer AC Power (supplied with receiver)	100 - 240 Volts AC 50 - 60 Hz
	Support for Pulse triggering measurements (refer to the Getting Started Guide and online help for more information).	
	Internal GPS (Option 361)	GPS Receiver
Connector type		SMA
Differential compatible without dead reckoning		

- a. It is recommended the input signal level not exceed -40 dBm.
- b. Adjacent channel desensitization applies to wideband mode (5 MHz IF filter) and is defined as: 1 dB compression of tuned signal with interfering signal 5 MHz from tuned signal.
- c. Adjacent channel rejection applies to the narrowband mode (1.25 MHz IF filter) and is defined as: Suppression of interfering signal  $\pm$  1.25 MHz from tuned signal.

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## Agilent E7476A System Options

For details on the measurement capabilities and setting up your system, refer to the *Getting Started Guide* shipped with your system. Contact your local Agilent sales and service office for information about ordering these options.

Option	Description	More Details On Page
110	W-CDMA (UMTS) 3G Receiver software license	<a href="#">page 36</a>
160	Real-time mapping software license	<a href="#">page 36</a>
180	Indoor Measurement software license	<a href="#">page 36</a>
360	W-CDMA (UMTS) Receiver Band Receiver (1920-1980 MHz and 2110-2170 MHz)	<a href="#">page 37</a>
361	W-CDMA (UMTS) Receiver Band Receiver (1920-1980 MHz and 2110-2170 MHz) with internal GPS	<a href="#">page 37</a>

## Agilent E7476A System Options

### Software License Options

Option	Part Number	Description
110		<ul style="list-style-type: none"><li>• W-CDMA Receiver software license</li><li>• Software CD</li><li>• Software License security key</li></ul>
	E7474-90035	<ul style="list-style-type: none"><li>• Getting Started Guide</li></ul>
	E7476-90004	<ul style="list-style-type: none"><li>• E7476A W-CDMA (UMTS) System Information Guide</li></ul>
160		<ul style="list-style-type: none"><li>• Real-Time Mapping software license</li><li>• Software CD</li><li>• Software License security key</li></ul>
180 <sup>a</sup>		<ul style="list-style-type: none"><li>• Indoor Measurement software license</li><li>• Software CD</li><li>• Software License security key</li></ul>
	E7474-90010	<ul style="list-style-type: none"><li>• Indoor Getting Started Guide</li></ul>
	E7476-90004	<ul style="list-style-type: none"><li>• E7476A W-CDMA (UMTS) System Information Guide</li></ul>

- a. Enables indoor measurement correlation to an imported floor plan/map in the absence of GPS. Indoor option must operate with other, 100-series, measurement software options in order to collect and record measurement data. Supports \*.tab, \*.gif, \*.tif formats for floor plan import.

## Receiver Options

Option	Part Number	Description
360		W-CDMA Receiver Band Receiver (1920-1980 MHz and 2110-2170 MHz) with:
	0950-2679	AC/DC Power Supply for Receiver
	E6455-80003	Magnetic Mount 1.9 - 1.2 GHz Band Antenna
	1200-1897	Antenna Adapter Connector (N Type to TNC)
	5182-4794	Receiver RS-232 9-pin to 9-pin Cable
	E6450-60007	Firmware Write Enable Key
	E6450-60010	Cigarette Lighter Power Adapter
	E7450-60015	Pulse trigger interconnect cable
86154-60033	Vehicle Mounting Kit	
361		W-CDMA Receiver Band Receiver (1920-1980 MHz and 2110-2170 MHz) with internal GPS and:
	0950-2679	AC/DC Power Supply for Receiver
	E6455-80003	Magnetic Mount 1.9 - 2.1 GHz Band Antenna
	1150-2085	Magnetic Mount GPS Antenna for internal GPS
	1200-1897	Antenna Adapter Connector (N Type to TNC)
	5182-4794	Receiver RS-232 9-pin to 9-pin Cable
	E6450-60007	Firmware Write Enable Key
	E6450-60010	Cigarette Lighter Power Adapter
	E7450-60001	15-pin Interconnection Cable 380mm (15in) (short)
	E7450-60015	Pulse trigger interconnect cable
86154-60033	Vehicle Mounting Kit	

## Agilent 86154A, 86153A, and N3419A System Accessories

The following options are offered by Agilent Technologies. By following the general setup and specifications, you can build your own system according to your needs, based on the standard system. The system can be integrated with a GPS receiver and mapping software. The digital receiver is not intended for stand-alone usage and does not function unless properly connected to one of the Agilent Wireless Solutions Systems.

### NOTE

To order any of the following options and accessories, specify model number 86154A and the option number, unless otherwise stated

### General System Accessories

Agilent Order Number	Option	Description	More Details On Page
N3419A		Agilent N3419A vehicle-mounted display system	<a href="#">page 46</a>
86153A		Retrofit internal GPS to Digital Receiver	<a href="#">page 46</a>
86154A	010	Laptop PC Omnibook 4150 series model	<a href="#">page 42</a>
86154A	020	Extra dual port ruggedized PCMCIA serial I/O card	<a href="#">page 42</a>
86154A	030	Fujitsu Pen Tablet PC	<a href="#">page 43</a>
86154A	032	Standard Pen Tablet PC Accessories	<a href="#">page 43</a>
86154A	034	Pen Tablet PC Battery Kit	<a href="#">page 43</a>

## Agilent 86154A, 86153A, and N3419A System Accessories

Agilent Order Number	Option	Description	More Details On Page
86154A	036	Universal Serial Bus (USB) 4 port adapter	<a href="#">page 44</a>
86154A	099	Multi-Receiver Connection Kit	<a href="#">page 42</a>
86154A	210	Trimble Placer 455-DR GPS Receiver	<a href="#">page 41</a>
86154A	211	Adapter Cable for use with a Trimble Placer GPS/DR Receiver	<a href="#">page 41</a>
86154A	212	Adapter Box for use with Trimble Placer GPS 455 Receiver	<a href="#">page 41</a>
86154A	230	Differential GPS Receiver Kit	<a href="#">page 41</a>
86154A	425	Multiband Antenna	<a href="#">page 44</a>
86154A	500	Receiver Power Kit	<a href="#">page 45</a>
86154A	510	Vehicle Mounting Kit	<a href="#">page 45</a>
86154A	507	Indoor Backpack	<a href="#">page 45</a>
86154A	531	Briefcase Carrier	<a href="#">page 40</a>
86154A	<b>ABA to ARS</b>	Country specific power localization	<a href="#">page 48</a>

## Agilent 86154A, 86153A, and N3419A System Accessories

### External GPS Receiver Options

Option	Part Number	Description
210		Trimble Placer 455-DR GPS Receiver <sup>a</sup> with:
	E6450-80002	Magnetic Mount GPS Antenna for Trimble Placer
	8120-8650	Interconnect Cable (3) RS-232 DB9-M to DB9-F
	5182-1290	GPS Cigarette Lighter Power Adapter
	E7450-60005	Adapter Box Trimble Placer Receiver
		Documentation and software to calibrate the gyroscope and odometer is available on the Web at <a href="http://www.trimble.com">http://www.trimble.com</a>
211		GPS/DR Receiver Adapter Cable
	E7450-60003	Adapter Cable
212	E7471-60007	Adapter Box for GPS/DR 455 Receiver with:
	E7450-60005	Adapter Box
	8120-8650	Interconnect Cables (3) RS-232 DB9-M to DB9-F
230	1150-5057	Differential GPS Receiver, RDS 3000 manufactured by DCI (Differential Corrections, Inc.). Includes utilities disk and Installation and Operator's Manual and:
	0960-0979	FM Antenna
	8120-8650	Serial Cable DB9-M to DB9-F
	5182-4794	Interconnect Cable RS-232 DB9-F to DB9-F

a. The Trimble Placer GPS 455 provides Dead Reckoning for use when the GPS signal cannot be received.

## Agilent 86154A, 86153A, and N3419A System Accessories

### Laptop PC Option

Option	Part Number	Description
010	E7450-60014	Laptop PC with a minimum specification of:  Pentium II Processor  Windows 95/98 (loaded)  64 Mbytes RAM  6 Gbytes Hard Disc  24 x CD-ROM  Enhanced lithium ion battery pack
	F1445A	Auto power adapter  14.1 inch XGA TFT display

### Miscellaneous Accessories

Option	Part Number	Description
020		Dual Port Ruggedized PCMCIA Serial I/O Card
	E7471-80004	Socket dual port ruggedized serial I/O card connects to two phones to the computer through the PCMCIA slot. Connecting four phones requires two PCMCIA slots on the computer and two dual port ruggedized serial I/O cards.
099		Receiver Interconnect Cable Kit
	E7450-60001	15-pin Interconnection Cable 380mm (15in) (short)
	E7450-60002	15-pin Interconnection Cable 635mm (24in) (long)



## Agilent 86154A, 86153A, and N3419A System Accessories

### Fujitsu Pen Tablet PC Options

Option	Part Number	Description
030	86154-60007	Pen Computer Kit including Pen Tablet PC Stylistic 2300 with a 1 year warranty and the following minimum specification and parts. Note: More information on the Stylistic 2300 pen computer can be found on the Fujitsu web site, <a href="http://www.fpsi.fujitsu.com/product/st2300.htm">http://www.fpsi.fujitsu.com/product/st2300.htm</a>  Pentium II Processor  4 Gbytes Hard Drive  64 Mbytes RAM  Windows 98 (loaded)
	86154-60012	External 3.5" Floppy Disc Drive
	86154-90009	Pen Tablet Stylus
	86154-60008	AC Adapter
	E7474-90010	Pen Tablet Getting Started Guide
	86154-60055	Travel Case
	86154-60009	In Service Case
	86154-60056	Harness for Service Case
	86154-60054	Hands Free Platform
	86154-60015	PCMCIA LAN Card
032	86154-60016	Car Auto Power System (12-24 VDC input)
034		Pen Tablet PC Battery Kit, consisting of:
	86154-60010	Lithium Ion Battery Pack (spare)
	86154-60011	External Battery Charger
	86154-60008	AC Adapter

## Agilent 86154A, 86153A, and N3419A System Accessories

Option	Part Number	Description
036	86154-60004	Universal Serial Bus (USB) 4 Port Adapter kit
	86154-60021	4 Port USB Hub
	8121-0136	Extension Cable

## Indoor Antenna Options

Option	Part Number	Description
425	86154-60047	Multiband Antenna Kit
	86154-60059	PCS/Cellular/JCDMA Antenna (green)
	86154-60058	GSM/DCS/Korean CDMA Antenna (orange)
	86154-60061	3GPP Antenna (yellow)
	E6450-00013	Ground Plane
	E6450-60057	Cable: Antenna to Receiver
	1250-1753	F SMA Connector

Agilent 86154A, 86153A, and N3419A System Accessories

**Portable Accessory Options**

Option	Part Number	Description
500	86154-60005	Receiver Power Kit
	E6450-60051	Receiver Battery and Cable
	86154-60019	Receiver Battery Charger
507	86154-60006	Indoor Backpack and Accessories
	86154-60020	Indoor System Backpack
	86154-60057	Phone Pouch
	E7474-90010	Pen Computer Getting Started Guide
	E7474-90024	Back Pack Packing Information Sheet
510	86154-60033	Vehicle Mounting Kit
		Mounting Screws
507	86154-60006	Indoor Backpack and Accessories
	86154-60020	Indoor System Backpack
	86154-60057	Phone Pouch

## 86153A Retrofit Option

It is possible to have an internal GPS receiver retrofitted to your Agilent digital receiver. These are ordered using the **86153A** Internal GPS retrofit products. You will need to return your receiver to the [address](#) shown below to have the retrofit carried out.

The internal GPS retrofit includes:

Magnetic Mount GPS Antenna for internal GPS (Part Number: 1150-2085)

The process for obtaining an internal GPS retrofit is as follows:

- Order the **86153A** upgrade.
- Include the **serial and model number** of your existing digital receiver on the order to ensure that the retrofit is performed on the correct receiver.
- Ship your digital receiver to:

Agilent Technologies  
1212 Valley House Drive  
Rohnert Park, CA 94928  
Attn: Factory Repair

For more information on packing and sending the receiver, refer to “Returning the Instrument for Service” in Chapter 5 of the *Getting Started Guide*.

## Agilent N3419A vehicle-mounted display system

All N3419A vehicle-mounted display system components are independent of wireless access technology. They work with any Agilent wireless solutions.

### Display

- 12.1-inch diagonal, flat-panel color LCD display with 800 x 600 resolution
- View multiple virtual front panels (VFPs) at the same time

## Agilent 86154A, 86153A, and N3419A System Accessories

- Power cords included for use with both 120 V ac from a power inverter, or 12 V dc from a vehicle
- Laptop connections - RS232
- Large, bright display for use in direct sunlight, with adjustable brightness for nighttime viewing
- Pedestal mounted
- Application-specific keypad
- Transmission hump mounting (typical in sport utility vehicles)
- Flat floor mounting (typical in minivans)

### **Functions during the drive including:**

- "Freeze" and re-start measurements
- Start and stop recording
- Maximize, normalize and minimize measurement (VFPs)
- Navigate between VFPs
- Start and stop calls
- Show or hide measurement and display controls
- Show or hide toolbars
- Add an auto-numbered note to the measurement data
- Open and navigate the window menu in the drive-test software
- Create a report
- Perform a tools re-configure
- Clear alarms and other dialog boxes
- Move between open windows applications
- Turn alarms on and off
- Enable/disable links

## Power Localization Options

In order that the correct power supplies and mains cables are supplied with your system, it is necessary to have the correct power localization. The localization options listed below only change the power cord and charger types supplied. They do not affect the software or manual language, which is U.S. English.

Option	Description	
ARM	Argentina - English	
ARS	Asia Pacific (UK Cord) / English	
ABG	Australia - English	
A1X	Chile - English	
AKM	China - English	
ACE	Denmark - English	
ABB	Europe - English	
AKJ	Israel - English	
ACQ	South Africa / India - English	
ACD	Switzerland - English	
AKL	Thailand	
ABA	U.S. - English	
ABU	United Kingdom - English	

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## Part Number Summary

The following list summarizes the part numbers that can be ordered from Agilent Technologies.

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### NOTE

When ordering parts from Agilent Technologies, it is recommended that you **order using the system option numbers**

CDMA Systems - Agilent E7473A

TDMA Systems - Agilent E7474A

GSM Systems - Agilent E7475A

W-CDMA Systems - Agilent E7476A

cdma2000 Systems - Agilent E7477A

Over Air Systems - Agilent E7490A

Accessories - see Agilent 86154A and 86153A options.

However, if you have a need for a specific part, the following numbers can be used.

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For more information on ordering parts or options, contact your local Agilent Technologies sales and service office.

Description	Part Number
Receiver	
AC/DC Power Supply for receiver	0950-2679
Magnetic Mount Cellular Band Antenna	1150-2061
Magnetic Mount Mini GPS Antenna for internal GPS – SMA	1150-2085
Magnetic Mount Mini GPS Antenna for internal GPS (Obsolete) – SMB	E6450-80002
Magnetic Mount PCS Band Antenna	E7475-60007

## Part Number Summary

Description	Part Number	
Receiver (continued)	Antenna Adapter Connector (N Type to TNC)	1200-1897
	Firmware Write Enable Key	E6450-60007
	Cigarette Lighter Power Adapter	E6450-60010
	2 AMP, 32 V, FB fuse for Cigarette Power Adapter	2110-0002
	15-pin Interconnection Cable 380mm (15in) (short)	5182-4794
	15-pin Interconnection Cable 635mm (24in) (long)	E7450-60002
	Pulse trigger interface cable	E7450-60015
	Magnetic Mount 1.7-1.9 GHz Band Antenna	E7450-80004
	Magnetic Mount 1.9 - 2.1 GHz Band Antenna	E6455-80003
	Magnetic Mount 900 MHz Band Antenna	E7450-80005
	Magnetic Mount GSM 900 RF Antenna	E7471-60009
	Vehicle Mounting Kit	86154-60033
	Universal Adapter (TNC) for RF Antenna	1200-1897
	Magnetic Mount DCS 1800 RF Antenna	E7475-60006
	Magnetic Mount GSM/PCS 1900 RF Antenna	E7475-60007
	Universal Adapter for RF Antenna	E7475-80005
External GPS	Bulkhead Mount GPS antenna for Trimble Placer (Obsolete)	1150-5061
	Trimble Placer 455 GPS Receiver	1150-5058
	GPS Cigarette Lighter Power Adapter	5182-1290
	Interconnect Cable RS-232 DB9-M to DB9-F	8120-8650
	Magnetic Mount Mini GPS Antenna for internal GPS	E6450-80002
	Adapter Cable for use with a Trimble Placer GPS/DR Receiver	E7450-60003
	Adapter Box for use with Trimble Placer GPS 455 Receiver	E7450-60005



## Part Number Summary

Description	Part Number	
Adapter Box and RS-232 Interconnect Cables (quantity 3)	E7471-60007	
Differential GPS	FM Antenna	0960-0979
	Differential GPS Receiver, RDS 3000 manufactured by DCI (Differential Corrections, Inc.). Includes utilities disk and Installation and Operator's Manual.	1150-5057
	Interconnect Cable RS-232 DB9-F to DB9-F	5182-4794
Phone Parts	Interconnect Cable for QCP 2700, QCP 820, QCP-1920, Sony CM-M1300, Sony CM-B1201SPR, and Sony CM-S1101STR phones	E6450-60029
	Interconnect Cable for QCP-800, QCP-1900, Sony CM-D500, Sony CM-D600 phones	E6450-60030
	Interconnect Cable for the Samsung SCH-1000 phone	8120-8754
	Powered Interface Cable for QCP-800, QCP-1900, Sony CM-D500, Sony CM-D600 phones	E6450-60034
	Powered Interface Cable for QCP 2700, QCP 820, QCP-1920, Sony CM-M1300, Sony CM-B1201SPR, and Sony CM-S1101STR phones	E6450-60033
	Interface Cable for Toshiba CD-10T J-CDMA Phone	E7452-60003
	Powered Interface Cable for Toshiba CD-10T J-CDMA Phone	E7474-60008
	GSM Phone Data Cable	E7471-62005
	GSM Car phone and data kit	E7475-60028
	Interface Cable for Motorola StarTAC TDMA Phone	E7474-60004
	Powered Interface Cable for Motorola StarTAC TDMA Phone	E7474-60006
	Power Interface Cable for Sagem Test Mobile	E7475-62010
	Interface Cable for QCP-860, 1960, 2760 Phones	E7474-60023
	Powered Interface Cable for QCP-860, 1960, 2760 Phones	E7474-60031
Accessories	Extra Dual Port Ruggedized PCMCIA Serial I/O Card	1150-2067

## Part Number Summary

Description	Part Number
Dual Port PCMCIA Serial I/O Card	E7471-80004
Single Port PCMCIA Serial I/O Card	0960-0992
Auto Power Adapter	86154-85001
Blank Software License Security Key	E7474-10007
Documentation	Getting Started Guide
	Indoor Getting Started Guide
	E7473A CDMA System Information Guide
	E7474A TDMA System Information Guide
	E7475A GSM System Information Guide
	E7476A W-CDMA (UMTS) System Information Guide
	E7477A cdma2000 System Information Guide
	E7490A Over Air Test System Information Guide