

Agilent E7478A GPRS Drive-Test System

Data Sheet



The Agilent E7478A GPRS drive-test system is a scalable, integrated, air interface measurement system. This system is used to support integration and maintenance of GPRS networks obtaining comprehensive call performance and quantifying the end-user's experience for both voice and data. The system includes extensive GSM measurement capability.

Depending on the selected hardware Options, the E7478A system can make measurements on E-GSM900, DCS1800, GSM1900, or dual-band GSM/DCS networks. A PC interfaces to a maximum of four test mobile phones (or two phones for simultaneous data and trace measurements). System software controls the phones to make and record user-selected GPRS and GSM measurements and protocol data.

The Agilent GSM digital receiver can be used in conjunction with the E7478A allowing correlation of RF measurements and phone measurements. A GPS receiver, which can be integrated with the receiver, may be used to obtain positioning information that is collated with the measurement results. The system can also be configured for use with a pen-tablet computer for indoor measurements without GPS. Logged data can be exported to mapping software for analysis.



About this document

This document gives detailed information on the features accessible on the E7478A GPRS drive-test system and associated software and hardware Options. It also includes information on the comprehensive GSM measurement capability, which is accessible with the E7478A Option 100 (GPRS phone measurement software license). Wireless data measurements are fundamental in the verification of the technology's end-to-end performance within a GPRS network. Additional details are provided in the Agilent Wireless Data Measurement Data Sheet, literature number 5988-1507EN.

GPRS functionality

System software

The E7478A system software is a user-friendly Microsoft^{*}, Windows[®],-based application designed to reside on a laptop PC. It is scalable and provides flexible measurement capabilities. Through a selection of licensing Options it is possible to configure the software to provide GPRS phone-based measurements, wireless data measurements or both. The E7475A GSM receiver-based measurement Options are also compatible with the E7478A system. Refer to GSM Configuration Guide, literature number 5968-5563E, for further details. With the multiple phone measurements license it is possible for the system to control up to four test mobile phones simultaneously (two for simultaneous data and trace). It is possible to expand your system at any time by adding software licenses or hardware to the base product. Multiple measurements can be made simultaneously. All the measurements can be displayed in real-time and logged to a database. Indoor measurement capability, without the need for GPS navigation, can be added by selecting the indoor measurements software license Option.

E7478A GPRS drive-test system

D Option 100	GPRS phone measurement software license
□ Option 150	Multiple GPRS test mobile software license
□ Option 160	Real-time mapping software license
D Option 180	Indoor measurement capability software license
□ Option 200	Data measurement software license
□ Option 220	Data measurement server software license
□ Option 540	GPRS GSM/DCS test mobile (Sagem OT 96MGPRS)

Phone measurement software

The system software has phone measurement ability for a single test mobile phone that is enabled with software license Option 100. If multiple phone control is required for benchmarking with two or more networks, Option 150, multiple phone control software license, must also be ordered.

With the GPRS phone measurement software licenses and the corresponding test mobile phone hardware, the following display windows can be activated, along with the GSM windows described in the 'GSM functionality' section of this document:

□ Phone control

 \Box GPRS measurements

□ Messaging (protocol log)

Note: The GPRS measurement software also supports the Motorola timeport, triband GPRS test phone. This phone hardware is not supplied by Agilent.

Phone control

The system software provides automated control of the handsets from the PC. Please note, the GPRS phone Option 540 will not support automated phone control features at initial release. The phone control virtual front panel (VFP) provides the following control functions:

Call controls

Call initiate mode

- Sequence
- Single (long) call
- Termination

Call initiation control

- Start/continue
- Pause
- Stop

□ Automatic call sequencing

- Access time (duration of call)
- Redial wait (duration between calls)
- Total calls (number of calls to be executed)
- □ Automatic redial
 - On a dropped call
 - On a blocked call (failed origination)
 - Redial interval (wait duration after drop or block)
 - Maximum redial attempts
- \Box Phone number pick list
 - Call Option
 - Full rate speech
 - Enhanced full rate speech (network dependent)
- □ Select channel
 - Force handover to an ARFCN
 - Prevent handover from an ARFCN
 - Force broadcast channel (BCH)
- Mobile behavior
 - Restrict timeslot to be used by mobile (0-7)
 - Ignore cell barring

In addition to the control function, the phone control VFP displays the following:

Tabular display (text)

- □ Access time counter
- (elapsed call time)
- □ Redial time counter
- □ Total attempts
- Total drops
- □ Total blocks

- Dropped call rate
- Blocked call rate
- □ Serving cell ARFCN
- □ Attempted handovers
- Successful handovers
- Failed handovers

GPRS measurements

The E7478A system extracts measurement data from the mobile handset. Extraction of the specific measurement types is controlled by a set of check boxes, as shown below:

Measurement type

- GMM information
- □ RLC/Mac information
- **Quality of Service**
- \Box QoS strip chart
- □ SM/SNDCP info

The following table gives a brief description of the phone based measurements using the Sagem GPRS phone (Option 540). For a full breakdown on calculation methods, please refer to the Sagem documentation. This documentation can be provided by your Agilent representative.



Specialized GPRS phone measurements.

Measurement Category	Measurement Parameter / States	Description (of E7478A Option 540 parameters)
GMM Service State	Stand By	The phone is attached to network.
	Ready	The phone has established a PDP context.
	Idle	The phone is not attached to network and no PDP context established, but it is camped on.
	No Service	The phone has not attached to the network.
SM State Indicators	PDP Inactive	The network has accepted a detach of the PDP context or has never had a PDP context established. This is usually the state found when the phone is first switched on.
	PDP Active Pending	The network has received a request to establish a PDP context. This is a request sent by the mobile.
	PDP Inactive Pending	The network or mobile has requested termination of the PDP context.
	PDP Active	The network has provided a PDP context and is ready to transfer data.
SNDCP Compression Red = compression is off	Header Compression	Header compression is the compression of the unused protocol control information, for example TCP/IP headers.
Green = compression is on	Data Compression at transmission and recept	Data compression is the compression of the unused user data ion.
GMM Information	P-TMSI	Displays the packet TMSI for the current cell being used by the mobile. This value is shown in 4 octet sets.
	TLLI	This displays the temporary logical link layer identifier. This value is displayed in 4 octet sets. The TLLI is only used in the uplink RLC data blocks. This value is only transmitted in the first 3 RLC data blocks.
	LAC	Displays the location area code being used by the serving cell.
	RAC	Displays the routing area code.
	MNC	Displays the mobile network code.
	MCC	Displays the mobile country code
RLC/MAC Informatio	n C Value (dBm)	Displays the received average carrier level. Refer to GSM 05.05 for more information.

Measurement <u>Category</u>	Measurement Parameter / States	Description (of E7478A Option 540 parameters)
	Output Power	Displays the current burst power being used by the mobile.
	Sign Variance	Displays the signal variance parameter SIGN_VAR calculated by the mobile station (refer to GSM 05.08). This value indicates the variance of the signal. High values may lead to poor data connections.
	MS Class	Displays the multislot class being used by the mobile during a call. Each class type refers to a set of timeslots that are available for uplink and downlink. It is not necessary for the network to use all the timeslots available. MS Class is shown as a string. For example, if the phone reports "4" as MS Class value, the display can be "4(3+1)". This means a maximum of 3 timeslots for the downlink and 1 timeslot for the uplink.
	Allocation Type	Displays the type of timeslot allocation being used. This value can be:
		Dynamic – where the timeslot can change depending on traffic and network load.
		Fixed – similar to the circuit switched method.
		No Allocation – this is where a timeslot has still to be allocated.
	TS Allocation	Displays the timeslots being used for the uplink and downlink. For example, if the downlink allocation was 1, 4, 7, then the mobile would be using 3 timeslots for downlink data reception. This information can also be found in the message VFP.
	Code Scheme	Displays the coding scheme being used for the uplink and downlink. The coding schemes are CS1, CS2, CS3, CS4. Where CS1 offers the highest data protection and CS4 offers the lowest data protection. As networks are in the initial turn-on stages, these values may be fixed.
	Temporary Block Flow	Displays the temporary block flow (TBF) status for the Uplink and Downlink. When the temporary block flow is OPEN, the block frame is being transmitted. When the TBF is OPEN the TFI number is valid. When the temporary block flow is CLOSED, the block frame is not being transmitted.
	Temporary Flow Identifier	Displays the temporary flow identifier (TFI) indicator for the Uplink and downlink. The temporary flow identifier is used to identify each radio block. The TFI is included in every RLC header belonging to a data block.
Quality Of Service	RLC BLER (%)	Displays the percentage block error rate for downlink RLC. The downlink RLC BLER is made when TBF is open and calculated over a 2s or 150 blocks window (whichever is reached first). BLER is computed as the percentage of blocks with bad CRC over the reporting period.
	ReTX RLC Block Rate (%)	U/L - Displays the re-transmitted radio link control block rate being used on the uplink. Measurements are made when TBF is open and are calculated over a 2s or 30 blocks window.
		D/L - Displays the re-transmitted radio link control block rate being used on the downlink. Calculated over a 2s or 140 blocks window (whichever is reached first).
	RLC/MAC Data Throughput (Kb/s)	Current - Displays the current data throughput when TBF is open. This value is calculated, over a 2s window, from the RLC ACK/N-ACK on the blocks of data sent and received.
		Max - Displays the maximum data throughput reached during the current call.

Comparisons of measurement parameters supported on the Sagem phone (E7478A Option 540) and the Motorola tri-band phone (as available on the graphic user interface) are tabulated below:

GPRS Measurement Parameter	Sagem	Motorola
GMM Info :		
P-TMSI	1	x
TLLI	1	x
LAC	1	1
RAC	1	1
MNC	1	1
MCC	1	1
RLC/MAC Info :		
MS class	1	х
Sign Var	1	1
C Value	1	1
Output power	1	x
Alloc type	1	х
Timeslot allocation	1	1
Code scheme	1	1
TBF	1	x
TFI	1	1
Quality of Service :		
RLC/MAC data throughput	1	1
Retransmit RLC block rate	1	x
RLC BLER	1	X
GPRS Layer 3 messages	1	1
RLC/MAC messages	1	1
GMM service state	1	1
SM state	1	1
LLC Info	x	x
SM/SNDCP Info	1	x

Display control

- 🗅 Freq. Units
- □ Autoscale
- Vertical offset
- □ Vertical scale
- Display mode
- □ Markers

Graphic displays

The following measurements can be selected for graphical representation:

D/L RLC/MAC Data Throughput

□ RLC BLER

C Value

RAC handovers shall be represented on the graphical display.

GPRS messaging

The E7478A extracts, decodes and displays the over-theair messaging to and from the test mobile phone (GPRS RLC/MAC and GPRS layer 3 and GSM layer 3). In the messaging display, the user can click on any message to expand it to the next level of decode detail, including the message hex dumps and frame number. A snapshot function captures the last 50 messages to a separate display, while the main display continues to update with the new messages, giving the user powerful analysis and diagnostic capabilities.

Message type selection controls

Layer 2 messages
Layer 3 messages
GPRS L3
RLC/MAC messages
Display control
Log to display
Layer 2
Layer 3

GSM functionality

All GSM control and measurement capability available from the E7475A GSM drive-test system has been replicated in the E7478A solution.

GSM Phone-based software

With the GPRS phone measurement software license and the corresponding GPRS test mobile phone hardware, the following control/display windows can be activated:

Dependence Phone measurements

Phone measurements (GSM)

The E7478A system extracts measurement data from the mobile handset. Extraction of the specific measurement types is controlled by a set of check boxes. The data types are listed below.

Display fields (text)

Cell name
State (no service/idle /dedicated)
BSIC (base station identity code)
Mobile transmit power
RxLev Full, Rx Lev Sub
RxQual Full, Rx Qual Sub
BCH ARFCN

□ Timing advance

- Time slot
- \Box MCC, MNC, LAC
- Cell identity
- □ RLTC (Radio link timeout counter)

Graph displays

 \square Serving cell and neighbor cells amplitudes versus frequency

- \square Serving cell and neighbor cells amplitude versus time
- □ Multitrace Rx level, Rx quality, Tx power, Timing advance against time with handover indication

Tabular displays

□ Frequency hopping channels

- \Box MAIO (Mobile allocation index offset)
- □ Hopping sequence number
- Number of hops
- □ Neighbor cell list
- □ C1, C2 cell selection and reselection parameters

Features common to the E74xx family of products

There are a number of features that are common to all Agilent drive-test systems. These features include the ability to record and playback data sets, export the data to post-processing software packages and define flexible alerts and alarms, based on user requirements.

Cell naming

The phone-based measurements and receiver-based broadcast channel analyzer provide cell-naming features. The cell naming features are dependent on the user providing a text file database with position and cell configuration information. Where the cell ID is known, for example in the phone serving cell measurement, this is used to correlate with the cell name in the database. Where no cell ID is known, for example in neighbor cell measurements or receiver based measurements, a 'best guess' algorithm is implemented. This algorithm makes use of the geographic location, ARFCN and BSIC to attempt to determine which cell from the database is the best match.

The format of the cell database is text file with the following fields:

- □ Cell name
- 🗅 Longitude
- □ Serving ARFCN
- □ TCH ARFCN
- 🗆 Latitude
- \Box Cell ID
- □ Azimuth

Report generator

The E7478A system provides fast and easy report generation. All of the current displays (VFPs) are captured to an HTML file. Each report includes a header section. After selecting "generate report", a dialog box prompts the user to enter the header information listed below. Smart defaults and persistent information are used, so minimal text entry is required.

Header elements:

🗅 Title

Company

🗆 Date

- \Box Location defaults to current GPS fix
- □ Comments user entered notes
- 🛛 User name
- 🗆 Time

There is no limit to the number of reports that can be generated. Reports can be generated during playback as well as during live data collection.

Data recording and playback

Logging and playback of data is controlled by VCR-like buttons. While logging data the user can enter notes into the data file. There are two methods of user note entry. One prompts the user to enter a text string, for example, "entering a tunnel." The other automatically enters a numbered note into the database requiring minimum interaction with the keyboard. A summary of record and playback features is listed below:

Record features

- 🗅 User note
- $\hfill\square$ Automatically numbered note
- Display on/off
- Dause/resume

Playback features

- Play forward
- Play reverse
- □ Step forward
- $\hfill\square$ Step reverse
- □ Variable speed
- □ Advance to alert/alarm
- $\hfill\square$ Advance to user note/auto-numbered note

Data export and post-processing

The Agilent OPAS32 engineering information management and analysis software solution directly accesses the E74xx database to give powerful post-processing capabilities allowing accurate diagnosis of network problems. OPAS32 can be ordered from Agilent under part number E6481A.

In addition, data can be exported from the E7478A database for display and post-processing. All measurement data can be exported. The export function provides flexible filtering capability that defines the specific data to be exported. Several different operations can be executed in order to provide the desired data in the desired format. An export "Wizard" guides the user in defining export templates that control the data fields, which are exported.

Processing functions

□ All values

- □ Count (counts number of values above or below a specified threshold)
- □ Count with summary (same as count with a text file summarizing the results)

🗆 Maximum

🗅 Minimum

- \Box Value(x)
- 🗆 Field

Conditionals

Greater than (>) a threshold

 \Box Less than (<) a threshold

□ All values

Qualified against another measurement

Sorting

□ Ascending

 \Box Descending

None

The output formats supported by the E7478A system are listed below. The system is designed to work with MapInfo in an integrated manner. MapInfo is not included with the E7478A system and can be procured from a retailer if required.

Data output formats Export file formats

- □ ArcView-compatible file a text file that is formatted to be acceptable to ArcView for an ASCII import operation
- □ MapInfo via COM the data is exported directly to MapInfo via an OLE automation link
- □ MapInfo-compatible file a file that MapInfo can read
- \square PlaNET-compatible file a PlaNet 'result' file for use with CW data
- \square Text file a generic text file with or without headers for the columns

Position formats

- □ Signed decimal degrees
- $\hfill\square$ Decimal degrees with direction
- \Box Deg: min: sec with direction
- □ Signed deg: min: sec
- \Box UTM

GPS datums

The following GPS Datums are available for use when exporting the data:

AGD 66
AGD 84
European
Hu-Tzu-Shan
NAD 27 (North American)

- □ NAD 83 (North American)
- OS36(GB)
- SAD 69 (Brazil)
- SAD 69 (Mean)
- □ Tokyo(J6) □ Tokyo-Korea
- □ WGS 72 (World Geodetic System)
- □ WGS 84 (World Geodetic System)

Geographic binning

Geographic binning can be applied to the data as part of the export function. It is a data-reduction process in which the data is averaged over a geographic area or distance.

Link Editor

This feature allows phone and receiver parameters to be linked to allow common measurement criteria to be tracked on the display.

Alerts and alarms

The E7478A has sophisticated alarm capabilities. An alert is defined as a single condition on a single measurement. An alarm is a Boolean expression made up of multiple conditions on multiple measurements. When an alert or alarm condition occurs, any or all of the actions listed below can be executed. If the alert or alarm condition occurs while data is being logged, each data record includes the alert/alarm information. An "Alarm Wizard" function makes it easy to set up the alarms.

Actions

Play a .wav audio file

Display a text message

□ Pause or stop measurements

Alert operators

🗆 Value

🗅 Maximum

🗅 Minimum

Alert conditions

□ Greater than (>)
□ Greater than or equal to (≥)
□ Less than (<)
□ Less than or equal to (≤)
□ Equal to (=)
□ Not equal to (≠)

Alarm operators

Value
Maximum
Minimum
Sub-set
OR
AND
XOR (exclusive OR)

Alarm conditions

- \Box Greater than (>)
- \Box Greater than or equal to (≥)
- \Box Less than (<)
- \Box Less than or equal to (≤)
- \Box Equal to (=)
- □ Not equal to (\neq)
- \Box Is a sub-set
- □ Is not a sub-set
- □ Sets intersect
- □ Sets do not intersect

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

Alerts: 1. (Rx Level < -90) 2. (MAX (Top N BCH) < -80) Alarms: 1. (Rx Level < -90) and (Rx Quality >5) 2. (Timing Advance > 50) and (MAX) (Neighbor Cell Reports) < -95 3. (GPS Fix Type <> GPS 3D) and (GPS Fix Type <> GPS 2D)

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

System status parameters

Available disk space
GPS fix
Location
Velocity
Percent CPU usage
PC battery level
PC AC power
Time of day

E7478E Options

Data measurement software license, Option 200

The data measurement capability utilizes a client / server architecture, where the client is the test mobile and laptop combination and the server is a remote computer connected to an IP interface within the GPRS network. The E7478A system is designed to allow a single server to support several clients. Option 200 requires the purchase of a data measurement server software license (Option 220). The data control and measurement user interface resides on the client laptop

Data measurement server software license, Option 220

The server is used to capture a number of data flow throughput measurements and to transmit them along with predefined data pages (for example, simulating Internet/ Intranet browsing, e-mail service, file transfer and more) back to the mobile client for analysis and characterization. Option 220 requires the purchase of at least one data measurement software license (Option 200) and will support several Option 200s. The Option 220 software resides on the server and once installed, can operate unmanned.

For detailed information on the data measurement capability of Options 200 and 220, please refer to the Wireless Data Measurement Data Sheet, literature number 5988-1507EN.

Multiple phone control, Option 150

Option 150 enables the system to simultaneously support up to four test mobile phones. This may be useful when you wish to benchmark one network against another and therefore wish to set up calls and data transactions on both networks at once.

Real-time mapping software license, Option 160

The E7478A Option 160 software license provides realtime data mapping. A single measurement parameter is plotted on the map, in color-coded thematic format, as the data is collected. Base-station locations are plotted on the map with site names and sector orientations. Alarms are plotted on the map. Double clicking on the alarm symbol displays the corresponding alarm text message. The underlying map is in MapInfo .tab format. The software can convert a raster image (.gif, .tif, or .PNG) to .tab format, so the user can use any map that is in .tab, .gif, .tif, or .PNG format.

Measurement parameters that can be plotted on map

Dependence Phone measurements

- \Box RxQual full
- □ RxQual sub
- \Box RxLev full
- □ RxLev sub
- □ RLTC (Radio link timeout counter)
- □ Timing advance
- □ Mobile transmit power
- □ RLC block rate (uplink)
- □ RLC block rate (downlink)
- □ RLC/MAC throughput (uplink)
- □ RLC/MAC throughput (downlink)
- □ An indicator line is drawn from the current location to the serving sector.
- \square Measurement parameters that can represent serving sector
- □ Phone measurements
- □ Serving BCH

Indoor measurement software license, Option 180

Option 180 enables the system to operate using a touch tablet PC, without GPS, to make phone- and receiverbased GSM wireless measurements inside of buildings. While walking through a building, waypoints are recorded on a floor plan of the building. Measurements are interpolated between waypoints. Indoor measurements require a floor plan or sketch of the building to be measured. This floor plan can be in .gif, .tif, or .png format.

An essential part of the indoor measurement system is a pen tablet computer, which allows the user to correlate measurements with positions on a floor plan. Additional accessories are available which provide a simple, ergonomic way of making indoor measurements (see the accessories section of this document).

Indoor measurement features

- □ Autoscale
- 🗅 Autopan
- Auto legend
- □ Ability to link phone or receiver measurements to plot
- □ Ability to save plot as a .tab file (MapInfo)
- □ Waypoints with interpolation
- □ Moveable waypoints

GSM digital receiver capability

The receiver measurement functionality of the E7475A GSM drive-test system is compatible with the E7478A system. Refer to the E7475A's Technical Specifications (Literature 5968-5564) for more details.

Outdoor navigation support

GPS

The E7478A drive-test system has the ability to work with several types of GPS interface. GPS is needed to provide location data to allow effective post processing of the collected data. The system is compatible with the protocols listed below. The physical interface is RS-232 with a DB9 connector.

The E7478A software includes a VFP for the GPS receiver. This window displays a bar graph with the individual satellite signal strengths, a text display of the GPS statistics and a map of location history. This map also displays the base station locations, names and serving ARFCN.

Compatible Protocols

□ TAIP □ TSIP □ NMEA

Agilent can supply a range of digital receivers with an integrated GPS receiver or an external GPS receiver. A suitable external GPS can be supplied as a GSM drive-test accessory product (Agilent 86154A Option 210).

Bosch Travel Pilot

The E7478A supports the navigation format from the Bosch (Travel Pilot) model RGS08 Professional. This uses a combination of GPS and dead-reckoning from a CD ROM based maps. Agilent does not provide the Travel Pilot hardware or maps.

Magneti Marelli

The E7478A supports the navigation format from the Magneti Marelli model NAV200 navigation system. This uses a combination of GPS and dead reckoning from CD ROM based maps. Agilent does not provide the Magneti Marelli hardware or maps.

Test mobile phone hardware

The E7478A system software can control up to four test mobile phones. If more than one test mobile phone needs to be controlled simultaneously, it is necessary to have the Option 150 Multiple GPRS Phone Software License.

The test mobile phone Options available for the Agilent E7478A are as follows:

Option 540 GPRS GSM/DCS Test Mobile (Sagem OT-96MGPRS)

The test mobiles are all supplied with with an RS-232 cable to connect them to the PC, a mains charger and two batteries.

Computer hardware requirements

The E7478A system requires a PC. The minimum PC requirements are listed on page 12. If you wish to purchase a PC with your system it is available as a drive-test accessory product (Agilent 86154A Option 010). For more details please refer to the accessory products section of this data sheet.

The PC requirements are different depending on whether you wish to collect data from single or multiple phones and on the operating system.

Minimum PC specifications:

Processor / memory requirements:

Single phone

□ Windows 98®

- Minimum: 266MHz Pentium, II or III, 64MB RAM
- Recommended: 500MHz PIII, 128MB RAM

□ Windows[®] NT 4.0 + service pack 6 (or later), Windows 2000

- Minimum: 266MHz PII or PIII, 64MB RAM
- Recommended: 500MHz PIII, 128MB RAM

Multiple phone

□ Windows 98

- Minimum: 333MHz PII or PIII, 64MB RAM
- Recommended: 500MHz PIII, 128MB RAM

UNINGOUS NT 4.0 + service pack 6 (or later), Windows 2000

- Minimum: 333MHz PII or PIII, 64MB RAM
- Recommended: 500MHz PIII, 128MB RAM

Common requirements

RS-232 DB9 serial port

- Parallel port
- \square 90 MB disk space for software installation
- \square 200 MB disk space recommended for data
- □ CD-Rom drive recommended
- □ 800 x 600 display resolution minimum (1024 x 768 recommended)
- □ For multiple phone operation two PCMCIA slots

Localization

It is necessary to order a localization Option with any of the system Options ordered so that the correct power supplies and connecting cables are supplied.

Localization Options do not add any cost to the order.

The localization Options will only affect the power cords and mains chargers that are supplied. They will not change the system software from U.S. English.

Option ABUUnited Kingdom - English localizationOption ABBEurope - English localizationOption ARSAsia Pacific - (UK Cord)/English localizationOption ABAU.S. - English localizationOption ABGAustralia - English localizationOption ACDSwitzerland - English localizationOption ACEDenmark - English localizationOption ACQS. Africa - English localizationOption AKMChina - English localizationOption AKJIsrael - English localizationOption A1XChile - English localizationOption ARMArgentina - English localizationOption AKLThailand - English localization

Training

For details of Agilent's training and consultancy services, please contact your local sales representative.

Warranty

One-year warranty on hardware components and one year of application support is included with your purchase of an Agilent E7478A GPRS drive-test system.

Agilent 86154A drive-test accessory products

In addition to the basic system components to address your drive-test needs Agilent can also supply a range of accessory Options. These accessories can be used with the entire range of Agilent drive-test solutions.

The following list of product Options is ordered under the 86154A drive-test accessories product, NOT the E7478A.

External GPS receiver

86154A Option 210

- External GPS receiver with dead-reckoning
- \square Trimble Placer GPS 455 with dead-reckoning
- □ Heading sensor
- □ Odometer sensor
- □ Interconnect adapter (to connect to a digital receiver)
- $\hfill\square$ Interconnect cables
- □ Magnetic mount antenna with cable
- □ Differential compatible

86154A Option 211, Option 212

Options 211 and 212 are interconnect adapters for connection of certain Trimble GPS receivers. The table below lists several GPS receiver models and the associated interconnect requirements. For other models of external GPS receivers, consult an Agilent representative for adapter availability.

GPS receiver model	Interconnect requirement
Trimble Placer GPS/DR	Option 211
Trimble Placer GPS 455	Option 212
Trimble SveeSix	Straight-through RS-232 cable
Trimble Placer GPS 400	Straight-through RS-232 cable

If a GPS receiver is purchased from Agilent as an Option to the system, all necessary interconnect parts are provided.

86154A Option 230

- □ Differential GPS receiver
- \square Differential corrections, incorporated RDS-3000
- □ Magnetic mount antenna
- □ Interconnect cables

Portability Accessories

86154A Option 531

- Briefcase Carrier
- □ Lightweight briefcase carrier for one test mobile, one Agilent digital receiver, laptop PC and connecting cables.

Laptop PC

86154A Option 010

Please consult your Agilent sales representative for up-to-date details on Laptop PC specifications.

Indoor measurement accessories

86154A Option 030

- Fujitsu pen tablet computer
- \square Pen tablet computer
- $\hfill\square$ Custom harsh environment case
- □ AC adapter
- G4MB memory upgrade

86154A Option 032

- Pen tablet accessories
- □ Floppy disk drive
- Desk stand
- □ Auto power adapter
- Tether
- LAN card

86154A Option 034

Pen tablet battery kit Pen tablet battery Battery charger

86154A Option 036

Universal serial bus hub

86154A Option 507

Measurement system backpack

□ Custom backpack designed to carry two receivers, batteries and all accessories

86154A Option 500

Receiver battery kit

- \Box Receiver battery (provides approximately 4 hours of use)
- Battery charger

86154A Option 425

Dual-band indoor antenna

Summary of E7478A GPRS and data measurement capability for typical configurations The following table summarizes the Option to feature mapping supported by the E7478A product range:							(Ind					
Ca System configuration	upabi	lity	San hours in the	Concerned and Co	to the second second	And Continue of Co	A Los det det	D. D. C.	AT A	Contraction of the second seco	en though the transformed to the test of t	a section contraction of the section
GPRS phone measurement (#100) AND GPRS test mobile (#540)	1	1	1	1	1	1						
GPRS phone measurement (#100) AND GPRS test mobile (#540), Data measurement (#200) AND Data measurement server (#220)	1	1	1	1	1	1	1	1	1	1	1	
Data measurement (#200) AND Data measurement server (#220) AND commercial non-test mobile phone							1	1	1	1	1	

E7478A Option summary

This is a complete list of all the product Options for the E7478A GPRS drive-test system.

E7478A GPRS drive-test system

Software license Options

Option 100	GPRS phone measurement software license
Option 150	Multiple GPRS test mobile software license.
Option 160	Real-time mapping software license
Option 180	Indoor measurement software license
Option 200	Data measurement software license
Option 220	Data measurement server software license

Test mobile phone Options

Option 540 GPRS GSM/DCS test mobile phone

Localization Options

Option ABU United Kingdom - English localization

Option ABB Europe - English localization

Option ARS Asia Pacific - (UK Cord)/English localization

Option ABA U.S. - English localization

Option ABG Australia - English localization

Option ACD Switzerland - English localization

Option ACE Denmark - English localization

Option ACQ S. Africa - English localization

Option AKM China - English localization

Option AKJ Israel - English localization

Option A1X Chile - English localization

Option ARM Argentina - English localization

Option AKL Thailand - English localization

Drive-test accessory Option summary

This is a list of the drive-test accessory Options relevant to the GSM drive-test system.

86154A Drive-test accessory Options

External GPS receiver

Option 210	External GPS receiver with dead-reckoning
Option 211	Interconnect cable for Trimble Placer
Option 212	Interconnect cable for Trimble Placer 455
Option 230	Differential GPS receiver

Portability Accessories

Option 531 Briefcase carrier

Laptop PC

Option 010 Laptop PC

Indoor measurement accessories

Option 030	Fujitsu pen tablet computer
Option 032	Pen tablet accessories
Option 034	Pen tablet battery kit
Option 036	Universal serial bus hub
Option 507	Measurement system backpack
Option 500	Receiver battery kit
Option 425	Dual band indoor antenna

Localization Options

Option ABU United Kingdom - English localization

Option ABB Europe - English localization

Option ARS Asia Pacific - (UK Cord)/English localization

Option ABA U.S. - English localization

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Option AKM China - English localization

Option AKJ Israel - English localization

Option A1X Chile - English localization

Option ARM Argentina - English localization

Option AKL Thailand - English localization

Additional literature:

□ E7478A GPRS Drive-Test System Product Overview 5980-2375E

- □ E7478A GPRS Drive-Test System Configuration Guide 5988-1505EN
- □ Wireless Data Measurement Product Overview 5980-1470E
- □ E7475A GSM Technical Specifications 5968-5564E
- □ Network Optimization Brochure 5980-0216E
- □ Indoor Wireless Measurement System Product Overview 5968-8691E

Please refer to: www.agilent.com/find/serviceproviders for additional information.

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