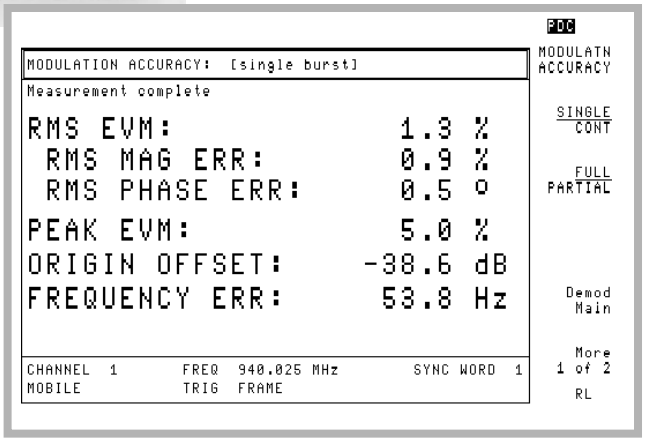
Agilent 85720C
Portable PDC Transmitter Tester

Product Overview

Agilent 85720C PDC Measurements Personality and Options 151 and 160 for the Agilent 8590 E-Series Spectrum Analyzers

Modulation accuracy measurements at a surprisingly affordable price now meet RCR STD-27C with faster measurement speed



Agilent Technologies
Innovating the HP Way

Custom Transmitter Testing—One Package, One Low Price

The explosion in cellular communication demands that you turn to today's new digital technology. How will you keep pace with the expanding systems and growing customer needs?

If your job is to design, manufacture, install, or maintain Personal Digital Cellular (PDC) time-division multiple-access (TDMA) equipment, Agilent Technologies presents the additional measurement capability of the 8590 E-series spectrum analyzer. This dedicated tool for PDC transmitters includes all of the spectrum analysis capability you've grown to rely on from Agilent in this dynamic marketplace.

Modulation Accuracy Measurements

Measure the quality of your digital transmitter with modulation accuracy metrics such as error vector magnitude (EVM) and carrier frequency error. The Agilent 8590 E-series analyzer along with the 85720C PDC measurements personality now adds modulation accuracy measurements to power, timing, and frequency measurements—all for the lowest price around!

Quick, Easy, One-Button Measurements

Perform transmitter tests simply and efficiently with the push of a button from easy-to-follow screen menus. The PDC transmitter tester does the work for you. It automatically sets the controls and performs the calculations required to test to RCR STD-27C.[1]

High-Speed Production Testing . . .

Reduce costs with increased test throughput and improved accuracy. Since all of the PDC measurements are programmable, each is executed with a single command. We've written the code for you.

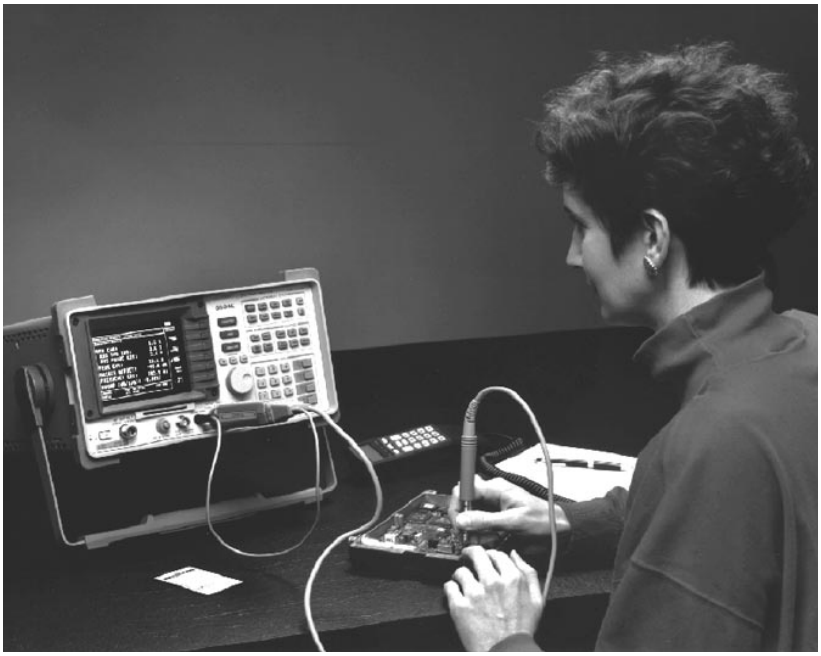
Reducing test times in an automated manufacturing environment is an important reason to use Agilent test personalities. Toward that end, the 85720C achieves as much as a 30% reduction in test times as compared to the 85720B.

. . . With Reliable Accuracy

Measure transmitters with near-power-meter accuracy. Option 051 provides absolute amplitude accuracy to within ±0.5 dB!

Product Development and Production Troubleshooting

Evaluate your design and thoroughly troubleshoot failures. Measurements can be run continuously, allowing real-time equipment adjustments and troubleshooting (e.g., EVM is updated once every second). Waveform and graphical results add key visual information to numerical results.



1. Research and Development Center for Radio Systems standard

Complete Transmitter Measurements at the Press of a Button

Power, Frequency, and Timing Measurements . . .

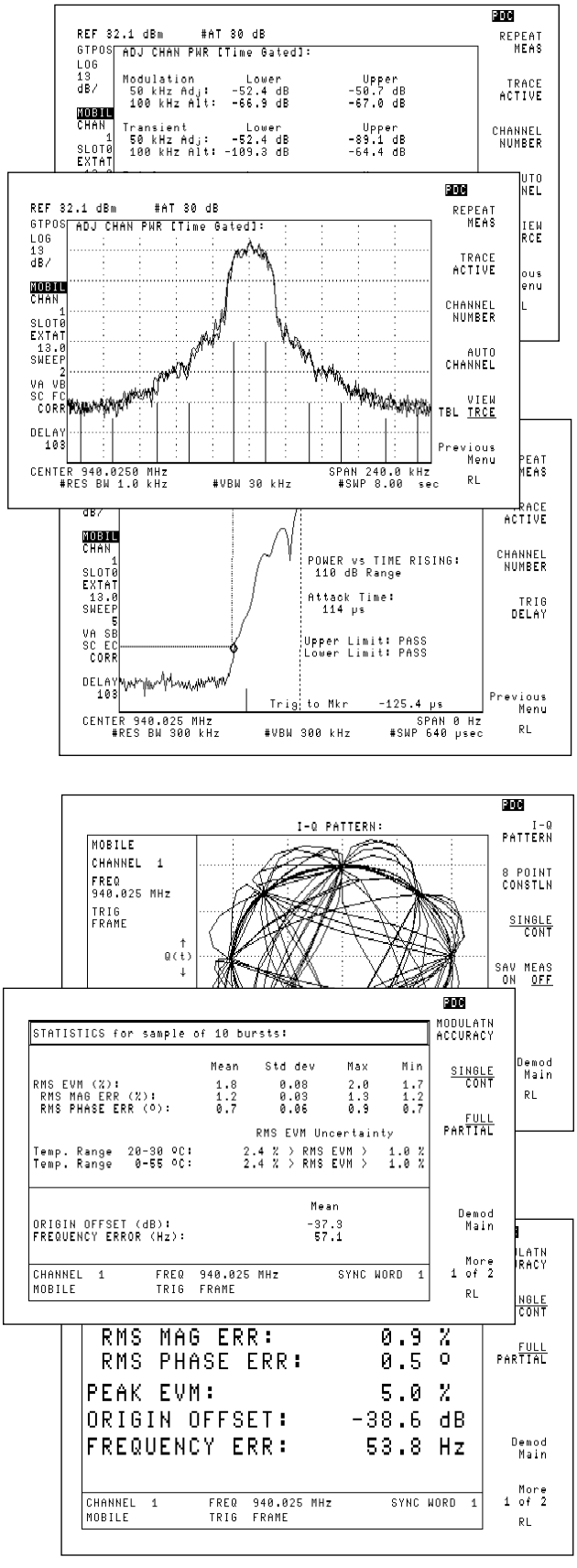
- Tuning by channel number
- Automatic channel search
- Antenna power
- Carrier off leakage power[2]
- Channel power
- Occupied bandwidth
- Adjacent channel leakage power
- Burst ramp-up and ramp-down power vs. time
- Transmitter intermodulation
- Spurious emissions[2]
- Tx band spurious and harmonic emissions
- Power step
- Combiner tuning
- Tx and Rx frequency-band monitoring

Modulation Accuracy Measurements[2] . . .

- RMS error vector magnitude (EVM)
- RMS magnitude error
- RMS phase error
- Peak EVM
- I-Q origin offset
- Carrier frequency error

. . . for both high and low PDC frequency bands.

The performance you need to test to RCR STD-27C!



2. Both RCR-STD-27B and -27C definitions are supported.

Install and Troubleshoot Cell Sites Faster

Installers and Service Providers
From commissioning to troubleshooting your system, the Agilent 8590 E-series spectrum analyzer with PDC personality is the perfect complement to a service monitor. Check for harmonics, intermodulation distortion, and spurious easily and reliably. Combiner tuning is effortless with convenient front panel controls. For complete transmitter testing, in-channel measurements are also provided.

Use the 8590 E-series spectrum analyzer for all of your cell site needs—from installing and commissioning transceivers to aligning and certifying microwave links. It's all there because these analyzers are available up to 26.5 GHz.

Test and Troubleshoot Mobiles and Portables Quickly and Inexpensively

Equipment and Component Manufacturers
Design and manufacture mobiles and portables quickly and accurately. Complete transmitter measurements give you additional assurance in delivering a quality product to your customer. We designed the PDC personality and 8590 E-series to be flexible, fast, and accurate. These tools satisfy the needs of manual testing as well as those of high-speed production.

Service Providers
With the PDC personality and the Agilent 8590 E-series, you can now evaluate mobile and portable phones with the same comprehensive testing the manufacturers use.

Easy to Use in Your Application

Get Started Quickly

Set-up is easy. Just enter the RF channel number you want to measure. Or, take advantage of the automatic channel feature and let the analyzer find the signal. You can even define your own unique channel. All you need to provide is a signal to measure.

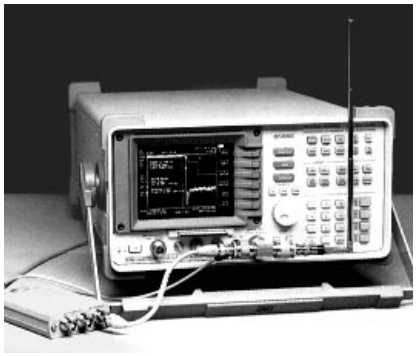
Synchronized Measurements

To make PDC mobile measurements, the spectrum analyzer requires a TTL trigger once per PDC frame. With the 8590 E-series digital demodulation hardware, a frame trigger is generated directly from your test signal, so you don't need to provide the trigger.

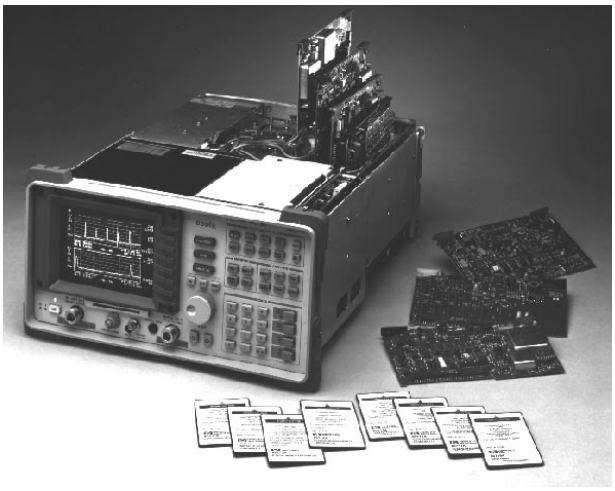
Or, use the Agilent 85902A burst carrier trigger accessory. This accessory converts the burst RF signal into a TTL frame trigger for use by the spectrum analyzer.

A Multipurpose Tool

The 85720C PDC measurements personality belongs to a large family of software and option cards for the Agilent 8590 E-series. For more cell-site RF testing, the Agilent 85713A digital radio personality and the Agilent 11770A link measurements personality add the capability to characterize microwave links. The optional tracking generator and Agilent 85714A scalar measurements personality are ideal for tuning filters and duplexers from 300 kHz to 2.9 GHz.



Mobile measurements are possible with the Agilent 85902A burst carrier trigger accessory.



The Agilent 8590 E-series portable spectrum analyzer family offers a multitude of hardware option cards and customized personality software.

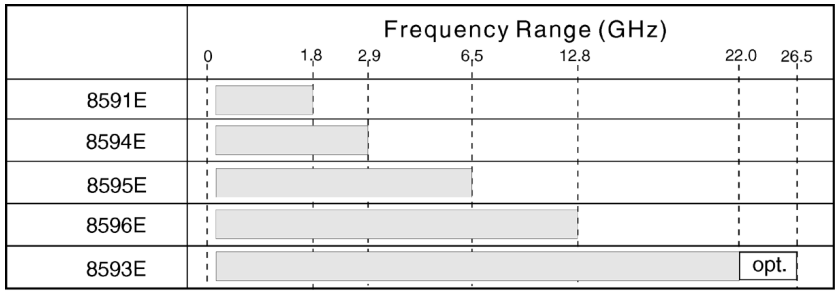
And the 8590 E-series is a flexible platform. So if PDC is your concern today, but NADC-TDMA, PHS, GSM, DCS1800, DCS1900, CT2-CAI, DECT, or even CDMA is in your future, you can upgrade the Agilent 8590 E-series to meet your needs. Just call us!

Fit an Analyzer to Your Needs

Offering high quality spectrum analysis with customized measurements, the 8590 E-series provides the right combination of power and portability. Select an analyzer with the frequency range you need.

ISO 9000

The 8590 E-series spectrum analyzer is manufactured in an ISO 9001 registered facility in concurrence with Agilent's commitment to quality.



Lower frequency limit for all analyzers is 9kHz.

Specifications

Specifications describe the instrument's warranted performance. Characteristics provide information about nonwarranted instrument performance in the form of nominal values. See the Agilent 8590 E-series literature for complete spectrum analyzer specifications.

For mobile station transmitters, a positive or negative TTL transition is required to synchronize the measurement system with the transmitter under test. The synchronization signal must occur once per PDC frame. Trigger signal is required for burst power vs. time and time-gated adjacent channel leakage power and spurious measurements. If an external trigger signal is unavailable, the trigger signal can be generated by using Options 151 and 160 or the Agilent 85902A.

General

Maximum safe input level	Total power must not exceed +30 dBm or 1 watt
Internal frequency reference	±1 x 10^{-7}/year (aging only)
Option 004	
Channel number tuning	Channel 0 to 32000
Defined channel x frequency	Any frequency within the range of the spectrum analyzer

Antenna Power (carrier power)

Antenna power range[1]	+53 dBm to –15 dBm	
(at transmitter)	(200 W to 0.03 mW)	
Absolute antenna power accuracy		
with Option 051	0° C to 55 °C	20° C to 30 °C
+25 dBm to –35 dBm[2]	±1.3 dB	±1.0 dB
+15 dBm to –15 dBm[2]	±1.0 dB	±0.5 dB
without Option 051	0° C to 55 °C	
+25 dBm to –35 dBm[2]	±4.3 dB (±2.0 dB typical)	

Carrier Off Leakage Power

Carrier power range	
Mobile[1]	+38 dBm to –15 dBm
Base (transmitter off)	<–35 dBm
Carrier off leakage power range[3]	
–35 dBm to (–85 + ext atten) dBm	
Carrier off leakage power accuracy	
for carrier levels >10 dB above the average noise level	
Absolute	
with Option 051	±2.7 dB, ±1.4 dB (typical)
without Option 051	±3.6 dB, ±1.9 dB (typical)
Relative	
with Option 051	±2.5 dB, ±1.1 dB (typical)
without Option 051	±2.9 dB, ±1.2 dB (typical)

Occupied Bandwidth

Frequency accuracy of	
Occupied Bandwidth	±300 Hz (characteristic)
Delta Frequency	±(700 Hz + Frequency reference error x Carrier frequency) (characteristic)

Adjacent Channel Leakage Power

Numerical entries	
Displayed in table	
Base and mobile	Power ratio for adjacent and alternate channels
Mobile	
Choose from 3 methods: Time-gated, Two-bandwidth, MKK:	
Time-gated, Two-bandwidth	Results for modulation, transients, and total (modulation + transients)
MKK	Results for total
ACP minimum result	
Adjacent channels	–60 dB (characteristic)
Alternate channels	–65 dB (characteristic)
Power ratio accuracy	
Adjacent and alternate channels	±1.6 dB (characteristic)

Power Step

Relative carrier power amplitude accuracy	±0.4 dB/dB with maximum of ±0.8 dB

Burst Power vs Time (mobile station)

Carrier power range[1]	+38 dBm to –15 dBm
Display range	0 dB to –110 dB or 0 dB to –70 dB
Vertical scale per division	1 dB to 15 dB in 1 dB steps
Relative amplitude accuracy	
for 0 to –70 dB from ref. level	±1.0 dB, ±0.7 dB (typical)
for 0 to –110 dB from ref. level	±2.2 dB, ±1.2 dB (typical)
Time resolution	
Frame	100 µs
Burst	20 µs
Rising edge	1.6 µs
Falling edge	1.6 µs
Ramp-up and ramp-down time accuracy	±4.5 µs (characteristic)
Burst width time accuracy	±45 µs (characteristic)
Absolute time error,	
with respect to external trigger	
Frame display	±110 µs (characteristic)
Burst display	±25 µs (characteristic)
Rising and falling edge displays	±6 µs (characteristic)

Transmitter Intermodulation (base station)
Using an external signal generator

Carrier power range[1]	+53 dBm to –15 dBm
Minimum spurious emission power sensitivity[3]	(–72 + ext atten) dBm

With RBW = 30 kHz and carrier to CW signal spacing >100 kHz

Transmitter intermodulation product spurious emission power accuracy
for product power levels >10 dB above the average noise level

Absolute	
with Option 051	±2.7 dB, ±1.4 dB (typical)
without Option 051	±3.6 dB, ±1.9 dB (typical)
Relative	
with Option 051	±3.0 dB, ±1.2 dB (typical)
without Option 051	±4.9 dB, ±2.4 dB (typical)

Spurious Emissions

Carrier power range[1]	+53 dBm to –15 dBm
Minimum spurious emission power[3,4]	(–69 + ext atten) dBm

for spur ≥1MHz from carrier and 1 MHz ≤spur frequency ≤2.9 GHz

Spurious emission power accuracy
for spurious levels >10 dB above the average noise level

Absolute	
with Option 051	±2.2 dB, ±1.4 dB (typical)
without Option 051	±3.6 dB, ±1.9 dB (typical)
Relative	
with Option 051	±2.2 dB, ±1.1 dB (typical)
without Option 051	±4.1 dB, ±2.3 dB (typical)

Modulation Accuracy Specifications
For Agilent 8593E, 8594E, 8595E, and 8596E only

General

Minimum input power	–15 dBm

Frequency Error

Frequency error accuracy	±[18 Hz + (frequency reference accuracy x carrier frequency)]

I-Q Origin Offset

I-Q origin offset accuracy	±0.5 dB for origin offset values greater than –40 dB

Error Vector Magnitude Accuracy

	20 °C to 30 °C		0 °C to 55 °C	
	Averaged[6]	**Single**	**Averaged**[6]	**Single**
RMS EVM Measurement Uncertainty[5]	+0.75% –1.9%	+0.75% –2.9%	+0.75% –2.3%	+0.75% –3.5%

RMS EVM

Standard deviation (20 °C to 30 °C)	±0.16% averaged[6] ±0.5% single
Minimum measurable value (20 °C to 30 °C)	
RMS EVM[5]	1.4%
RMS magnitude	0.5%
RMS phase[5]	0.8 °

1. CAUTION: Use sufficient external attenuation to limit power at spectrum analyzer input to absolute maximum of +30 dBm (1 watt).
2. At the spectrum analyzer input.
3. Lower limit is equivalent to the displayed average noise level of the spectrum analyzer.
4. Lower limit does not not include the effect of 2nd order distortion caused by the spectrum analyzer.
5. Can be improved using a calibrated PDC Pi/4 DQPSK source with known EVM. Please consult the 85720C User's Guide for more information.
6. Averaged measurement specifications require 10 or more averages.

Ordering Information

Recommended Configurations:
Agilent 8593E, 8594E, 8595E, or 8596E
Portable Spectrum Analyzer[1]

For PDC Mobile and Portable Stations:

Option BD3	Personal digital cellular system

This option includes:

Option 004	Precision frequency reference[2]
Option 051	Improved amplitude accuracy for PDC bands
Option 105	Time-gated spectrum analysis
Option 151	Fast ADC and digital demodulator[3]
Option 160	PDC/PHS/NADC/CDMA firmware for Option 151[3]
85720C	PDC measurements personality[3]

If modulation accuracy measurements are not needed:[4]

Option 10	Fast time domain sweeps
85902A	Burst carrier trigger

For PDC Base Stations:

Option 004	Precision frequency reference[2]
Option 051	Improved amplitude accuracy for PDC bands
Option 151	DSP, fast ADC and digital demodulator[3]
Option 160	PDC/PHS/NADC/CDMA firmware for Option 151[3]
85720C	PDC measurements personality
85720BC	PDC measurements personality upgrade kit

Related Spectrum Analyzer Options:

Option 010	Built-in tracking generator
Option 040	Front panel protective cover
Option 041	GPIB plus parallel printer interface
Option 042	Protective soft carrying case
Option 043	RS-232 plus parallel printer interface

Note: Retrofit kits are available for ALL of the listed 8590 E-series options

Related Products:

11770A	Link measurement personality
85712D	EMC measurements personality
85713A	Digital radio measurements personality
85714A	Scalar measurements personality
85715B	GSM900 transmitter measurements personality
85717A	CT2-CAI measurements personality
85718B	NADC-TDMA measurements personality
85719A	Noise figure measurements personality
85722B	DCS1800 transmitter measurements personality
85722B#H19	DCS1900 measurements personality
85723A	DECT measurements personality
85725B	CDMA measurements personality
85726B	PHS measurements personality
8920DT	Digital RF communications system for PHS and PDC
778D	Dual directional coupler
8498A	Option 030 fixed 30 dB attenuator
11667A	Power splitter, dc-18 GHz
87405A	Preamp, 0.01-3 GHz, 22 dB gain, 6.5 dB NF
85901A	Portable ac power source
C1405B	Option ABA keyboar
C1405-60015	Keyboard connector adapter

Agilent Technologies' Test and Measurement Support, Services, and Assistance

Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

Our Promise

"Our Promise" means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

Your Advantage

"Your Advantage" means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra- cost upgrades, out-of-warranty repairs, and on-site education and training, as well as design, system integration, project management, and other professional services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.

Get assistance with all your test and measurement needs at:
www.agilent.com/find/assist

Product specifications and descriptions in this document subject to change without notice.

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1. The 85720C is supported on the 8590 E-series with firmware date coded 930506 or later. The 8591E is only recommended where modulation accuracy measurements are NOT required.
2. Required unless 10 MHz external precision frequency reference is available.
3. If modulation accuracy measurements are NOT needed, Options 151 and 160 are not required.
4. If Options 151 and 160 are not ordered, Option 101 and 85902A are required for proper operation of the 85720C on PDC mobile station burst power vs. time, time-gated adjacent channel leakage power, and spurious measurements.

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