PiMPro

PRECISION PASSIVE INTERMOD ANALYZER

Precision Test & Measurement Solutions by CCI

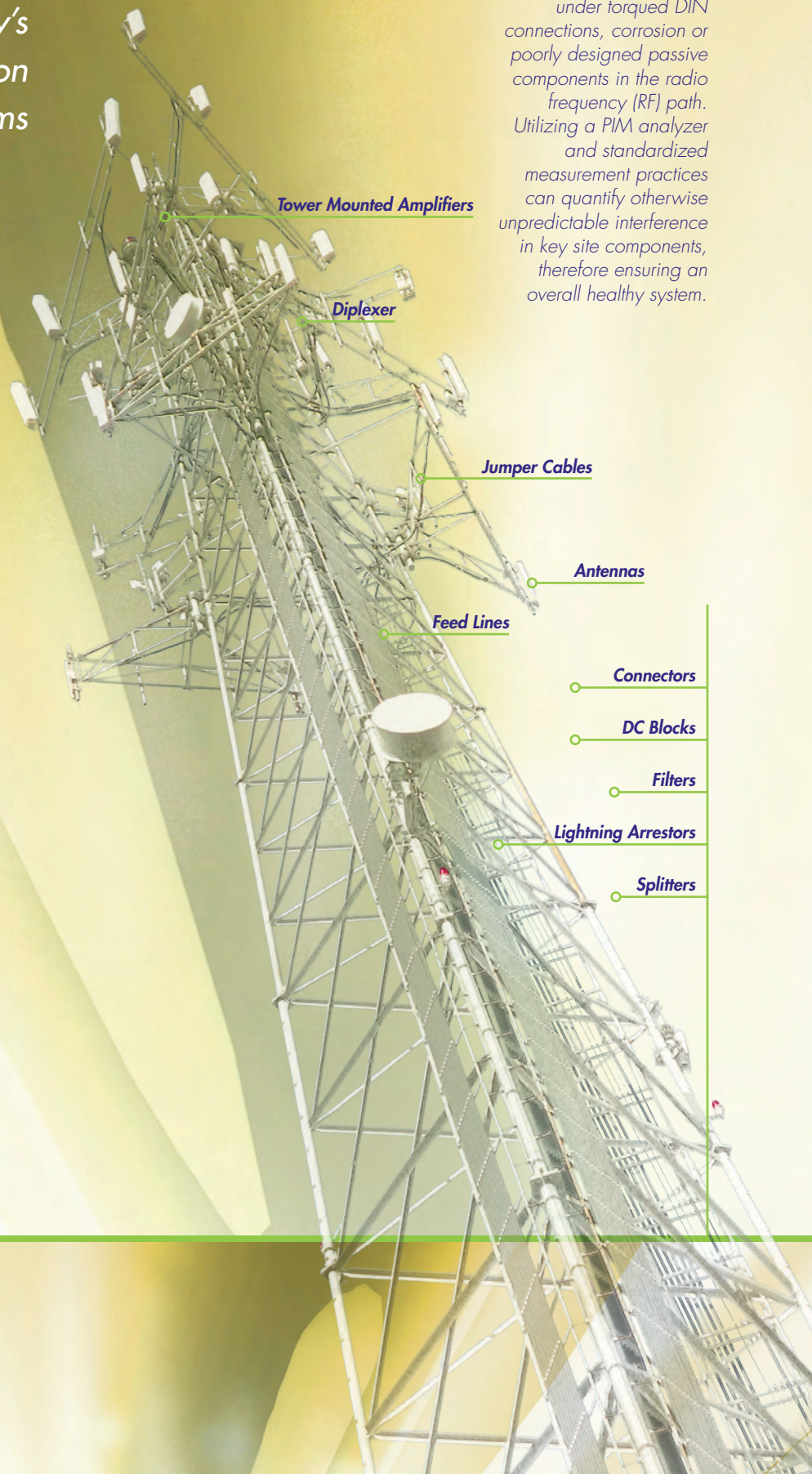
Passive Intermodulation

. . .challenging the technology of today's wireless communication systems

Passive Intermodulation (PIM) is an undesired, non-linear, signal energy generated as a bi-product of two or more carriers sharing the same down-link path in wireless networks. Due to network hardware configurations, this multi-carrier interaction can cause significant interference in the up-link receive band, which can lead to reduced receiver sensitivity. To the mobile phone user, this often translates to a loss in audio fidelity in conversations, decreased data speeds, and in extreme circumstances, dropped calls, an inability to make or receive calls or utilize data services. Since there is a mathematical correlation between the known carrier frequencies and the resultant interference signal in the receive band, accurate measurements of PIM signals can be achieved consistently. For practical PIM testing applications, PIM signals which interfere directly with a network's receive band are those of greatest concern. Typically these PIM signals are:

3rd order PIM = 2 × F1 – F2
5th order PIM = 3 × F1 – 2 × F2

PIM may manifest itself in a typical cell site environment for any number of reasons including ferromagnetic materials and dissimilar metals, poor contacts, under torqued DIN connections, corrosion or poorly designed passive components in the radio frequency (RF) path. Utilizing a PIM analyzer and standardized measurement practices can quantify otherwise unpredictable interference in key site components, therefore ensuring an overall healthy system.



PiMPro

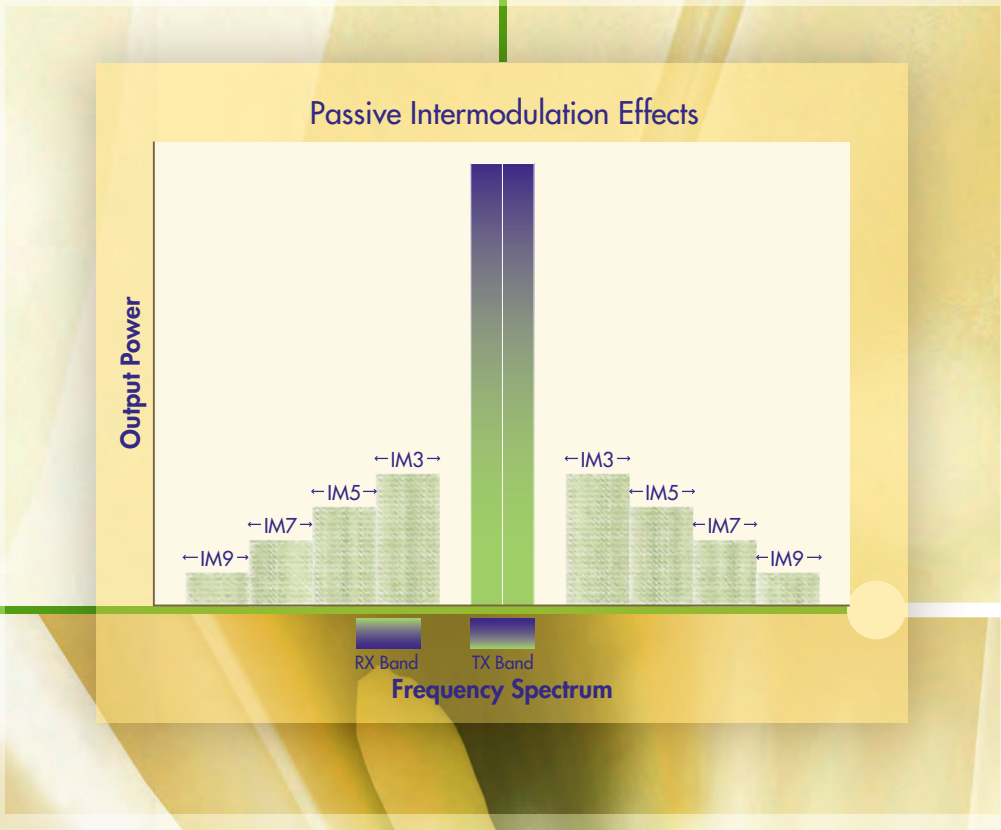
Features & Benefits

Passive Intermodulation (PIM), the new benchmark in antenna system health, has become one of the greatest challenges of frequency planners in today's mobile communication systems. System planners, equipment and component vendors alike are faced with the ever changing dynamics of higher transmit signals, basestation sensitivity and the nonlinear response of two or more frequency signals causing serious interference and network signal degradation. With the uncertainty of the root cause of PIM in any given system, the need to deploy specific testing solutions in a professional, reliable instrument has become paramount in maintaining the overall antenna health for system providers.

PiMPro has been designed to meet these challenges. Its compact, portable yet rugged features provide maximum power in a reliable, field proven design without compromising the accuracy and precision of intermodulation (IM) measurements.

As a leading provider of wireless basestation enhancement products, CCI set out to design and develop a reliable solution to system performance and enhancement challenges. **PiMPro** employs state-of-the-art technology and is built to meet the demands and needs of today's wireless suppliers.

By design, the **PiMPro** Precision Passive Intermod Analyzer provides precise measurement of the 3rd, 5th, 7th and 9th order of intermodulation of any system or component under high-power conditions. In addition to passive intermodulation measurements, the unit will provide VSWR and Return Loss values. **PiMPro** can be used to verify the integrity of individual passive components including connectors, cable assemblies, antennas, filters, making it an integral performance tool in the field and in the lab.



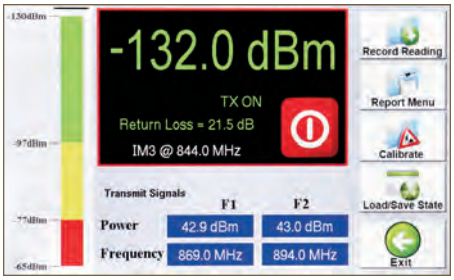
PiMPro

Portability & Performance

- Unique touch screen display
- Easy to use graphic navigation tools
- Lightweight portability in a 36 pound carry-on size
- Self-calibrating to industry standards
- Frequency resolution in 0.2 MHz step increments
- Accurate high-powered 40 watt portable unit with -125 dBm PIM sensitivity (-168 dBc at 20 watt)
- Instantaneous Measurement Modes for PIM and Return Loss, Frequency Sweep and PIM vs Time
- Variable output power in 0.1 dB step increments from 20 to 46 dBm
- High impact, water-resistant carrying case, color coded to frequency band, ideal for field environments
- Measures the 3rd, 5th, 7th and 9th reflective passive intermodulation
- Internal memory storage >150 MB and external data storage
- Software and firmware updates downloadable via USB connection
- PiMPro Eco optional lab-based software measurement tool
- Universal and Basic 7–16 DIN component Accessory Kits available with low PIM connectors at PIM levels <-122 dBm

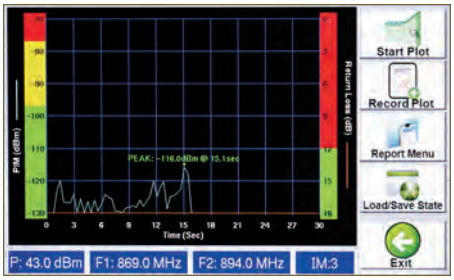
System Configuration

*System Configuration is the first data entry point for **PiMPro** users, where all system and report generation parameters are set. Includes settings for Date and Time, Audio Alarm, RF Power on Time interval, central Data Label management, **PiMPro** registration information and IP address are all keyed in from this screen. Software updates and screen calibrations are also accessed from this screen.*



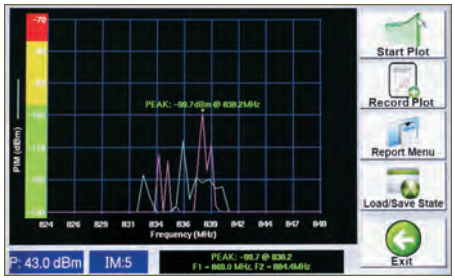
PIM vs Return Loss

***PiMPro's** main measurement screen provides instantaneous PIM measurement in both dBc or dBm. The large display flashes to annunciate the presence of RF power at the output connector. Pass/Marginal/Fail Limits, Output Power, Frequency and IM settings originate from this screen. **PiMPro's** unique Return Loss diagnostic feature at high transmit (TX) power, quickly points out open cables.*



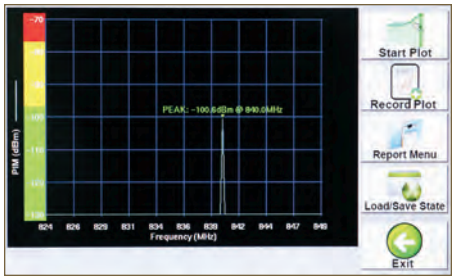
PIM vs Time Measurement

*The PIM vs Time dynamic measurement mode features a graphical representation of PIM as a function of time. Time scale can be set from 10 seconds to 4 minutes. The **PiMPro** Return Loss feature is also available on this screen.*



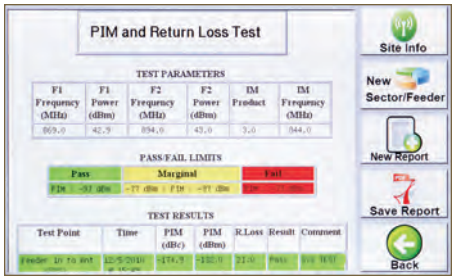
Frequency Sweep

PiMPro *displays a swept receive (RX) PIM range by sweeping the TX carriers from end to end within the set frequency band. PIM frequency response is displayed, exposing the worst case PIM level and the contributing frequencies. Users can immediately transfer the graph to the PIM vs Time feature and run a new test to isolate the causes of the specific PIM.*



RX Interference

With both internal amplifiers set to off, ***PiMPro*** *performs a spectral analysis sweep, for interfering signals. RX Interference mode provides the added ability to discern PIM from external interfering signals in the receive band. External and internal PIM signals are unlikely to be in phase or simultaneous within* ***PiMPro's*** *narrow receiver range, therefore, making RX Interference a powerful field diagnostic tool.*



Report Generator

Report data for all measurement modes can be stored in either, HTML or PDF file format. Users can concatenate a limitless series of measurements with different sector, feeder, color codes, as one single PDF file. Reports can be saved in ***PiMPro's*** *internal memory or to external USB memory from the unit's front panel.*

40 Watt x 2 PIM Testing

Today's long-term evolution (LTE) radios are configured for 40 watt or more output power per carrier. Since site configurations can have as many as four carriers per sector, PIM testing at anything less than 40 watt x 2 does not accurately simulate live network traffic and is likely to understate actual site PIM levels. **PiMPro's** 40 watt x 2 power level allows for more realistic PIM level testing in the field.

LTE 700 Frequency Band

PiMPro 700 has the unique ability to cover both, upper and lower bands in a single instrument. This dual band **PiMPro** exclusive feature provides both convenience and considerable cost savings for those having to perform testing in both bands.

Recommended applications include:

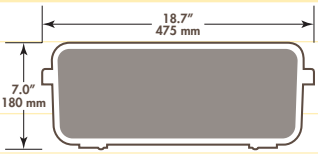
- Site Installation
- Mobile Operators
- Research & Development
- Manufacturing Automated Test Equipment (ATE) Testing

PiMPro

Technical Data

PiMPro Portable Model	PiMPro 700 [Dual Band]		PiMPro 850	PiMPro 900	PiMPro1821 [Dual Band]		PiMPro 1921 [Dual Band]	
Frequency Bands	LTE 700L	LTE 700U	Cellular 850	GSM 900	GSM 1800	UMTS 2100	PCS 1900	AWS 2100
Receive Range MHz	698-716	776-798	824-849	880-915	1710-1785	1920-1980	1850-1910	1710-1755
Transmit Range MHz	728-746	746-768	869-894	925-960	1805-1880	—	1930-1990	2110-2155

Weight	< 36 lbs (16.3 kg)
Dimensions	18.7″ × 14.8″ × 7.0″ (W × H × D) 475.0 mm × 375.9 mm × 177.8 mm (W × H × D)
Operating Temperature	0–40°C, 32–113°F, 85% Relative Humidity (RH)
Storage Temperature	-10–60°C, 14–140°F, 85% Relative Humidity (RH)
Measures	3rd, 5th, 7th and 9th reflected passive intermodulation of transmission lines, connectors, filters and combiners, jumpers, splitters, tower mounted devices, other passive system components
Alarms	Audio & Visual Display
Residual Intermod Level	-125 dBm (-168 dBc at 20 Watts and -171 dBc at 40 Watts)
Receiver Noise Floor	-136 dBm
Display Type	7″ TFT Color Touch Screen
Data Storage	USB Port and Internal Memory, supports HTML and PDF file format
Measurement Modes	PIM and Return Loss, Frequency Sweep, PIM vs Time and RX Interference
Power Requirement	90–256 V, 50–60 Hz
Power Supply	500 Watt
Test Port Power	20 dBm (100 mWatt) to 46 dBm (40 Watt)
Output Accuracy	± 0.3 dB
PIM Measurement Accuracy	± 2.0 dB
Frequency Accuracy	5 PPM
Directivity	> 25 dB
Software Controls	Via touch screen display; measurement mode, set-up, test time
Waterproof Enclosure	IP67 rated for ingress, dust and immersion. Meets airline carry-on regulations.
Certified	ASTM D4169 Rain / Vibration / Drop Test MIL-STD-810F Immersion
Communication Ports	USB and Ethernet



PiMPro 1921 *PiMPro 900* *PiMPro 850* *PiMPro 700*

PiMPro Rack Model	PiMPro 700 RM [Dual Band]		PiMPro 850 RM	PiMPro 900 RM	PiMPro1821 RM [Dual Band]		PiMPro 1921 RM [Dual Band]	
Frequency Bands	LTE 700L	LTE 700U	Cellular 850	GSM 900	GSM 1800	UMTS 2100	PCS 1900	AWS 2100
Receive Range MHz	698-716	776-798	824-849	880-915	1710-1785	1920-1980	1850-1910	1710-1755
Transmit Range MHz	728-746	746-768	869-894	925-960	1805-1880	—	1930-1990	2110-2155

Weight	< 36 lbs (16.3 kg)
Dimensions	19.0" × 12.25" × 7.25" (W×H×D) 482.6 mm × 311.2 mm × 184.2 mm (W×H×D)
Operating Temperature	0–40°C, 32–113°F, 85% Relative Humidity (RH)
Storage Temperature	-10–60°C, 14–140°F, 85% Relative Humidity (RH)
Measures	3rd, 5th, 7th and 9th reflected passive intermodulation of transmission lines, connectors, filters and combiners, jumpers, splitters, tower mounted devices, other passive system components
Alarms	Audio & Visual Display
Residual Intermod Level	-125 dBm (-168 dBc at 20 Watts and -171 dBc at 40 Watts)
Receiver Noise Floor	-136 dBm
Display Type	7" TFT Color Touch Screen
Data Storage	USB Port and Internal Memory, supports HTML and PDF file format
Measurement Modes	PIM and Return Loss, Frequency Sweep, PIM vs Time and RX Interference
Power Requirement	90–256 V, 50–60 Hz
Power Supply	500 Watt
Test Port Power	20 dBm (100 mW) to 46 dBm (40 W)
Output Accuracy	± 0.3 dB
PIM Measurement Accuracy	± 2.0 dB
Frequency Accuracy	5 PPM
Directivity	> 25 dB
Software Controls	Via touch screen display; measurement mode, set-up, test time
Communication Ports	USB and Ethernet

PiMPro 1921
portability in a rugged, field-proven design

***PiMPro Rack Mount** is ideal for research and development, manufacturing and lab testing environments, as well as a stationary calibration resource.*

PiMPro

Warranty & Services

Warranty

PiMPro Passive Intermodulation Analyzer is warranted for one year against manufacturers defects, parts and labor. Software updates and technical product support are available online at www.cciproducts.com, or by calling CCI Customer Service. Product training, annual calibration and on-site maintenance service agreements are available.

Passive Intermod Testing Solutions

In band Passive Intermodulation products on any sector of a base station can drastically reduce performance of a cell site and impact performance throughout a network. Utilizing a PIM analyzer and standardized diagnostic practices to monitor the systems passive components helps to ensure a systems overall quality.

PIM Testing Certification & Training

CCI provides PIM testing technical certification and training services, as well as, on-site standardized measurement practices evaluation and customized testing procedure plans. PIM Testing Certification includes hands-on PiMPro Analyzer System Configuration, Reporting and Software Update equipment training, simple testing procedures and diagnostic techniques.

PiMPro ECO

PiMPro Eco is an optional software application for automating Passive Intermodulation lab-based measurements performed on the PiMPro family of analyzers. The application allows users to create and recall test profiles, simultaneously perform frequency and power sweep, create customized reports for distribution and control ancillary instruments, such as network analyzers, signal analyzers and power meters for related RF measurements. PiMPro Eco software includes the applications source code written in LabVIEW, with a perpetual-use, royalty-free license. PiMPro Eco source code can easily be modified for various lab, field, production and proprietary environments. CCI's turn-key PIM solutions, leverage best-in-class instrumentation partners, RF-centric software expertise and a global support network.

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Order Information

PiMPro 1921 Portable

PiMPro Portable Analyzers

	PiMPro Model	Frequency Bands	
Dual Band	PiMPro 700	LTE 700L	LTE 700U
	PiMPro 850	Cellular 850	
	PiMPro 900	GSM 900	
	PiMPro 1821	GSM 1800	UMTS 2100
Dual Band	PiMPro 1921	PCS 1900	AWS 2100

PiMPro Transport Case PP-AK-CASE-RTC

PiMPro Rack Mount Analyzers

PiMPro Rack Mount

PiMPro Model	Frequency Bands	
PiMPro 700 RM	LTE 700L	LTE 700U
PiMPro 850 RM	Cellular 850	
PiMPro 900 RM	GSM 900	
PiMPro 1821 RM	GSM 1800	UMTS 2100
PiMPro 1921RM	PCS 1900	AWS 2100

PiMPro Accessories*

Accessory	Part Number
PiMPro Eco Optional Software	PP-ECO
PiMPro Transport Case	PP-AK-CASE-RTC
Universal Accessory Kit	PP-AK-KIT
Basic Accessory Kit	PP-B-KIT

Universal Accessory Kit PP-AK-KIT

Operational accessories available individually or in convenient Kit configurations.

Accessory Kit Contents: Basic AK	Accessory Kit Contents: Universal AK	Accessory Component	Part Number
o	o	Low PIM 7–16 DIN Male to Male Adapter	PP-AK-DMDM
o	o	Low PIM 7–16 DIN Female to Female Adapter	PP-AK-DFDF
	o	Low PIM 7–16 DIN Male to N Female Adapter	PP-AK-DMNF
	o	Low PIM 7–16 DIN Male to N Male Adapter	PP-AK-DMNM
o	o	Low PIM Termination Load <-168 dBc with both Male and Female 7–16 DIN	PP-AK-LOAD
o	o	Low PIM Male DIN to Female DIN jumper cable 3/8" 3 m (10 ft) length	PP-AK-CAB-DMDF
o	o	Low PIM Male DIN to Male DIN jumper cable 3/8" 3 m (10 ft) length	PP-AK-CAB-DMDM
	o	PIM Standard Verification Source Tool	PK-AK-PSTAN
o	o	Torque Wrench for 7–16 DIN Connector	PP-AK-TORW
o	o	Adjustable Wrench	PP-AK-ADJW
	o	Small 32 mm Wrench for 7–16 DIN	PP-AK-FIXW
o	o	Alcohol Cleaning Kit	PP-AK-ALCH

PIM Standard PP-AK-PSTAN

PIM Load PP-AK-LOAD

**All accessory Kit Components and cables have low PIM connectors, with PIM level <-122 dBm*

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Communication Components Inc. (CCI) is one of the fastest growing providers of basestation enhancement products and services. Our innovative solutions are designed and installed to allow service providers to get the most out of their basestation investments. With 25 years experience as a wireless technology service provider, and our worldwide network of manufacturing and service centers, **CCI** is poised to deliver the expertise, technology, and reliability to meet all your basestation enhancement needs.

Contact an area representative today.

PiMPro is also available from these fine independent industry partners.

For additional product ordering information contact your area Communication Components Inc. Account Representative or independent distributor.

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EXTENDING WIRELESS PERFORMANCE
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