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Test & Measurement

- sales
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Complimentary Reference Material

This PDF has been made available as a complimentary service for you to assist in evaluating this model for your testing requirements.

TMG offers a wide range of test equipment solutions, from renting short to long term, buying refurbished and purchasing new. Financing options, such as Financial Rental, and Leasing are also available on application.

TMG will assist if you are unsure whether this model will suit your requirements.

Call TMG if you need to organise repair and/or calibrate your unit.

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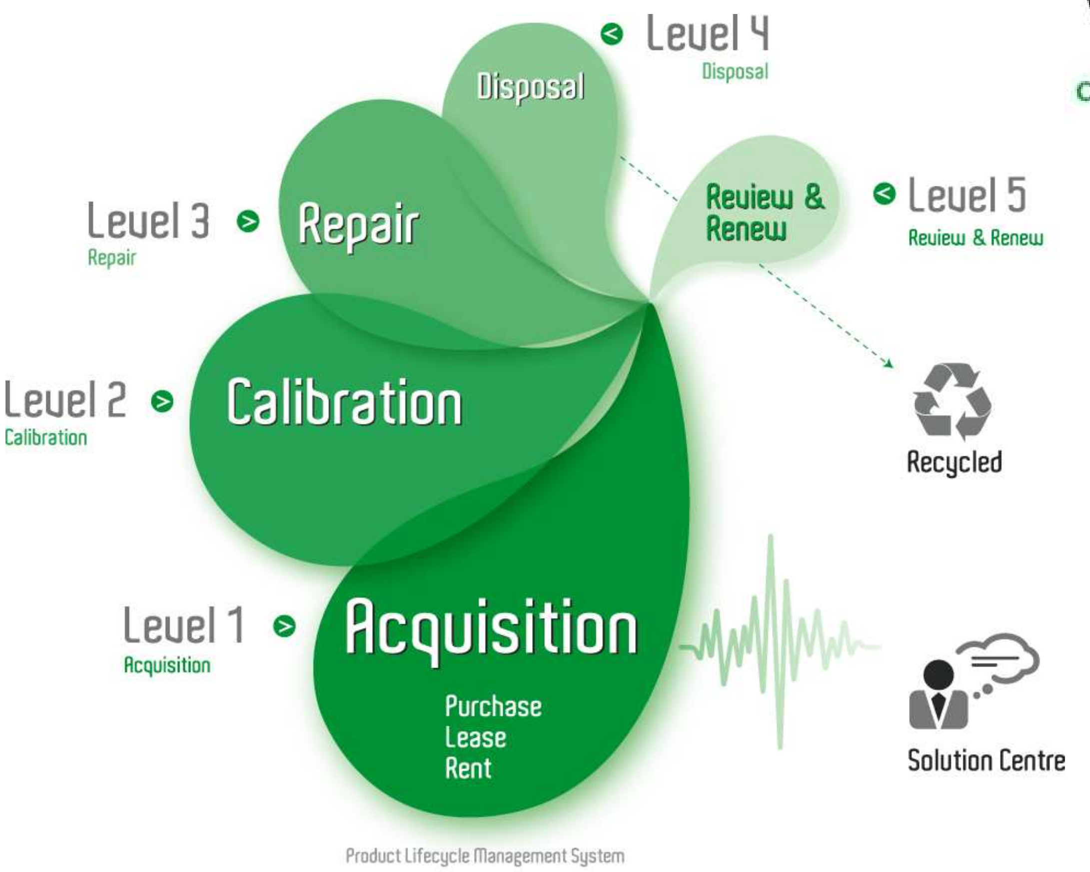


Interconnect Quality Analyzer

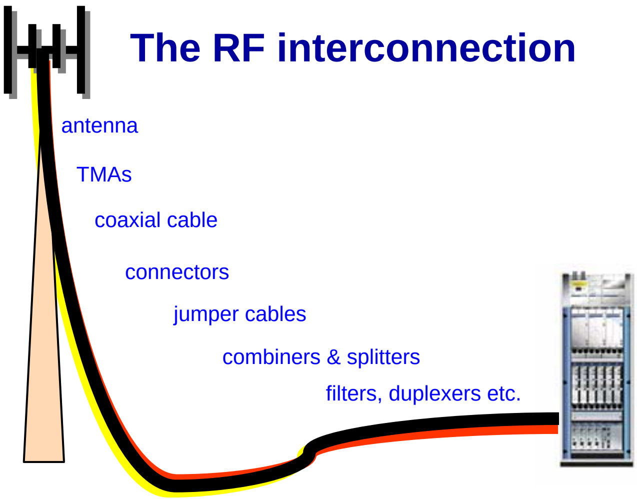
Technical Data

SUMMITEK™ INSTRUMENTS

Introduction to interconnect Quality Analysis (iQA)

For a wireless cellular network to achieve its full operating potential, each sector of each basestation within the network must perform up to its design standard. When this does not occur, the economic impact to the service provider can be substantial:

- lost revenue at that site
- customer dissatisfaction and churn
- increased infrastructure cost



To achieve the full operating potential of each node in the network, each RF component and each interconnection between components must be of the highest quality, and that quality must be regularly verified and maintained.

Viewed from the RF perspective, to maximize performance, it is essential that:

- the carrier signals be efficiently propagated from the transmitter output through the system components and into the air with minimum loss and distortion
- upon reception of the RF signal from the handset at the basestation antenna, the signal must be efficiently propagated back to the basestation receiver
- interference/noise at the basestation receiver within the frequency band of the handset uplink signals must be lower in magnitude than the receiver noise floor

Typically s-parameters measurements are used to evaluate the quality of the transmission paths in both the forward and reverse direction (bullet points one and two above). This is accomplished by performing return loss measurements and evaluating the resultant distance to fault (DTF) curves. This is certainly an important and necessary measurement, but it does not provide any information about self-generated interference that can desensitize the receiver nor does it, necessarily, confirm the true physical condition of the infrastructure. Loose, poorly fitted, or contaminated joints are not necessarily detected using this method.

The most common source of an increased noise floor within the network is poor construction quality of the components in the high power path of the basestation and/or the RF interconnections between these components.

The construction quality of the components is typically verified as a part of the manufacturing process using Passive Intermodulation (PIM) as the performance metric. PIM is an effective acceptance criterion, because it is extremely sensitive to manufacturing defects that might not be discovered through any other test or visual inspection. An unacceptably high PIM level indicates a potential for failure of the component at some point in the future. It is considerably less expensive to identify and reject or repair these components during manufacturing than after they are installed on a tower.

By contrast, the measure of construction quality at the basestation site is the previously described s-parameter tests, and this is not adequate to identify construction problems that can increase the system interference/noise levels and/or lead to future component failures. In fact, the DTF measurement often leads to the installer "tweaking" the interconnections through tightening or loosening of an RF joint to optimize the DTF performance. This action can directly lead to an intermittent RF junction, increased system noise floor, or early failure of the RF interconnection.

Just as on the manufacturing floor, a better and more reliable method to determine the quality of construction of cables built on site, or the interconnection of these cables, or the performance of individual components, is to perform a PIM measurement. This can determine if joints are stabilized and secure, clean, and moisture free. This test can also determine if a component was delivered to the site with a less than acceptable manufacturing standard, or has deteriorated over time.

The IMT and iQA family of analyzers provide an effective tool for performing these measurements. The IMT family performs a simple to use Go/No-Go test that can be used to identify whether the construction quality is a potential problem source. For more extensive diagnostic testing, the iQA family of instruments allows for varying the test parameters, such as frequency, for a more precise analysis of the complete infrastructure.

The Infrastructure Quality Analyzers are a product of Triasx Pty Ltd (Australia) and were developed to support the overlay of technologies by Telstra in Australia. Originally identified as a necessary tool to solve interconnect problems on in-building installations, it has expanded to be a required test prior to initial commissioning of all basestations, indoor and outdoor, and each time an RF interconnection is disconnected and then reconnected at an operational site.

These test instruments combined with the knowledge and experience of both Summitek and Triasx in the manufacture and analysis of low PIM devices assures our customers the highest possible standard in measurement instruments and support in these applications.

IMT Series

The IMT series provides a simple, compact and portable instrument for evaluating RF infrastructure quality. The test set emulates a base station radio by providing two 20 Watt output signals at fixed frequencies and measures the Reverse/Reflected IM signal level to determine whether the infrastructure under test is of high construction quality that will not degrade network performance. Designed to be used to test through all "full band " devices it may not always be possible to test from top to bottom through any part band limited devices such as filters and tower mounted amplifiers (TMA's). Hard copy reports on the status of testing performed are available.

Models	Transmit Frequencies	Receive Frequency
IMT-800A	869/891.5 MHz	846.5 MHz
IMT-900A	935/960 MHz	910 MHz
IMT-1000A	884.7/960 MHz	809.4 MHz

Test Capability

Reverse measurement of the third order IM product (IM3) when stimulated by two carriers at 43 dBm

Transmitter Power

43 dBm nominal

Receiver Specifications

Average Noise Floor:	-120 dBm, maximum (0 dB S/N)
Dynamic Range:	65 dB, typical
Maximum Survival Input Power:	16 dBm combined power

Residual Intermodulation

-105 dBm at 2 x 43 dBm carrier power (-148 dBc)

User Interface

LED display indicates IM power level measured

Audio alarm to indicate relative IM power measured

iQA Series

The iQA series is designed for those applications where greater operator control is desired or required to better analyze and understand cellular base station RF infrastructure quality and performance. These systems provide an interactive operator interface via a touch screen LCD display. As with the IMT series analyzers, the iQA analyzers perform an industry standard two tone PIM measurement at 20 Watts per carrier. The operator can select the frequency and power level of the test tones and measure reflected, IM3, IM5, and IM7 results. The iQA test sets are completely portable and have the ability to provide hard copy reports.

Models	**Transmit Frequencies** **Carrier 1; Carrier 2 Band**	**Receive Band**
iQA-1800A	1805 – 1880 MHz; 1805 -1880 MHz	1710 -1785 MHz
iQA-1921A	1930 – 2155 MHz; 1930 - 2155 MHz	1710 - 1910 MHz
iQA-1900A	1930 – 1990 MHz; 1930 - 1990 MHz	1850 - 1910 MHz

Test Capability

Reverse IM measurement

IM3, IM5, IM7 or IM9 – Operator Selectable

Operator selectable frequency pairs

Create and save test states

Detailed test reports

Transmitter Power

Selectable from 33 to 43 dBm

Receiver Specifications

Average Noise Floor: -125 dBm, maximum (0 dB S/N)

Dynamic Range: 65 dB, typical

Maximum Survival Input Power: 16 dBm combined power

Residual Intermodulation

-112 dBm at 2 x 43 dBm carrier power (-158 dBc)

User Interface

Graphical user interface on touch screen color LCD

Computer Interface

USB2

LAN

General Specifications

Environmental

Moisture:	Light mist (IP20)
Operating Temperature:	32° to 104°F (0° to 40°C)
Altitude:	Up to 6560 Feet (2000 meters)

Power Requirements

1400 Volt-Amps, maximum, at 110-120 or 220-240 VAC (±10%), 50-60 Hz.

Installation Category (Overvoltage Category) II

Weight and Dimensions

	Weight (lbs/kg)	**Width (inches/mm)**	**Height (inches/mm)**	**Depth (inches/mm)**
IMT Series	**44/20**	**17.75/450.8**	**5.5/139.7**	**17.6/447**
iQA Series	**46/21.58**	**19.5/495**	**16/410**	**6.3/160**

All weights are approximate as the actual weight will vary depending upon frequency band.

Related Products

Accessory Kit, includes:

Quantity	Item Description
1	Low IM Termination.
1	PIM Standard. Note: The PIM standard is used to verify that the test equipment is operating within its proper range. It is not intended as a precise PIM reference in terms of the response level, because PIM standards by their nature vary with operating temperature and frequency.
1	3 meter jumper cable: 7-16(M) to 7-16(M)
1	3 meter jumper cable: 7-16(M) to 7-16(F)
1	3 meter jumper cable: 7-16(M) to N(M)
1	7-16(F) to 7-16(F) Adapter
1	N(F) to N(F) Adapter
1	Cleaning Kit - Isopropyl Alcohol Cotton Swabs Rubber Gloves Lint free towels
2	Adjustable Wrenches

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The portable PIM test solutions are designed and manufactured by Triasx Pty Ltd. (www.triasx.com). Product sales, technical support and service are provided by Summitek Instruments, Inc. in North America, South America and Europe.

WARNING: Use of the portable PIM test units in a radiating mode, for example when connected to an antenna not enclosed in an anechoic environment, may be a violation of licensing regulations. Users should have permission in advance, from any licensed operators that might be affected by these tests. Furthermore, radiating high RF power can pose a personnel risk.

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Data Subject to Change without Notice

Revised 1/8/2008